DNA Synthesis. Arthur Kornberg. Pp. 399. (Freeman: San Francisco, 1974.) $18.00.

THIS is an updated and expanded version of Arthur Kornberg's earlier book, *Enzymatic Synthesis of DNA*. That was published in 1962 and since then, the field of DNA biochemistry has progressed enormously, but has become, in many ways, more and more complex. So this new book is an attempt by a protagonist of DNA replication to provide an overall review of the biochemistry (as against physiology) of DNA synthesis.

The book has been split into natural chapters, each concentrating on a specific area of interest. The first, on the structure and function of DNA, is a good introduction to the basic physical properties of DNA, and the second is an excellent simplified presentation of nucleotide biosynthesis. It may, however, be said that the section on thymine and thymidine utilisation is perhaps a little brief, especially when one considers the extensive use to which these precursors have been put. A whole chapter is spent discussing *E. coli* DNA polymerase I. (The author's laboratory has, in an enzymological *tour de force* spanning some 15 years, elucidated the detailed enzymology of this enzyme. That work has formed the basis for the characterisation of all other DNA polymerases.) Succeeding chapters describe in turn the two other *E. coli* DNA polymerases, enzymes from other bacteria and bacteriophage-induced polymerases and then the relatively murky field of eukaryote and virus induced DNA polymerases. Later chapters also describe the basic biochemical properties of nucleases and *E. coli* RNA polymerase, although the former is dealt with in a rather cursory manner. That is rather surprising considering the reiterated and necessary emphasis on these enzymes throughout the book. The last chapter addresses itself to nucleotide sequence determination and gene synthesis and manipulation, and considers the social and moral aspects of 'genetic engineering'.

All of that, together with the section on polynucleotide ligase represent an excellent summary of the current (early 1974) knowledge of the biochemistry of nucleic acid enzymes. It is in the realm of DNA replication, however, where the book is more subject to criticism. These chapters present not only the known facts but also the author's personal interpretation of DNA replication and it is not always clear what is generally accepted by workers in the field and what is still under dispute. For example, it is by no means proven that RNA always initiates DNA synthesis. Continued research and the test of time will confirm or disprove Kornberg's thoughts. If they are disproved the book may, because of factual rather than speculative errors, age rather faster than it otherwise ought.

To present an overview of DNA synthesis in such detail in only 400 pages is in itself a remarkable achievement and the result is commendable. Despite a few shortcomings, some of which I have alluded to, the book is particularly welcome to workers in DNA replication in providing a concise and up-to-date compendium of nucleic acid enzymology. In addition, the book has an extremely useful comprehensive bibliography that not only follows the text but is also cross-referenced to both authors and subjects. The style of presentation and the good organisation makes for comprehensible (if occasionally encyclopaedic) reading and as such should also be of value to those with only a passive interest in DNA synthesis.

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Nucleic acids

Physical Chemistry of Nucleic Acids. By Victor A. Bloomfield, Donald Crothers and J. R. Tinoco. Pp. x+517. (Harper and Row; New York and London, 1974.) £12.50.

SPECIALISED monographs are aligned between two extremes: that of the scholarly work with a personal flavour, which serves to lever the jaded research worker from his rut so that he may view the surounding countryside from a new vantage, and that of the encyclopaedic work that provides little but map references to where he may want to go. This book, tends to the latter extreme and is founded on a necessary compromise.

To cover in a manner comprehensible to the novice the theory of all the experimental methods mentioned, to discuss all the ramifications of their interpretation, and to present even the salient results available in the vast literature on the physical chemistry of nucleic acids and their components, would require many, many volumes. On the other hand, to present only the experimental findings would be incomprehensible to all but the specialist—and who is a specialist in all aspects of this subject? As a compromise the reader is referred to standard texts for standard theories, and only those not easily found are discussed in detail.

The opening chapters deal with the properties of the constituent bases, nucleosides and nucleotides and with attempts to account for their spectroscopic and thermodynamic properties in quantum mechanical terms. The book progresses to a consideration of single stranded oligomers and polymers before coming to grips with various aspects of double helical complexes. A final chapter deals with transfer RNA. Despite this orderly progression, the preoccupations of the authors are sometimes in evidence and readers fascinated by the intricacies of the interpretation of the properties of RNA may be disappointed by the emphasis given to double stranded DNA. The absorption, rotation and scattering of radiation by nucleic acids are well covered though because of the compromise on which the book is founded some fierce quantum mechanical formulae occur with but terse discussion of their meaning, in a way that may well deter the novice. Similar strictures apply to parts of the discussions on hydrodynamic properties and other topics. So encyclopaedic is the range of topics covered that the few sins of omissions may be excused: there is scant mention of electrophoretic properties even though electrophoresis in polyacrylamide gels is now a favourite tool of the nucleic acid investigator; similarly there is no mention of photochemical matters.

The reader will require a background knowledge of physical chemistry, though the level of mathematical expertise required should be well within the range of all likely to want to read this book. Specialists, however, may cavil at the treatment of some topics: thus the section on polymer statistics makes no mention of the rotational isomerism theory; perhaps that is because it is at this point that the theory becomes intricate and not suitable for inclusion in a general text of this sort. Similarly, the treatment of helix coil transitions, though one of the few available at this level, is elementary, and the notion of 'partition function' barely mentioned, and at that in awe inspiring italics. These simplifications are in jarring contrast to some of the quantum mechanical formulations which occur elsewhere.

Despite these criticisms this is a very useful book indeed and is the only volume of this scope that has been published in English. The text is clear, and only occasionally does the numbering of equations and figures go astray. Although the references do not go beyond about 1970, I read the book with much profit and would expect both research students and experienced workers to do likewise. I may not remember all that I have read but at least I now know where to find it all. It is worth the price, high as it is, for that reason alone.

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