DNA STRUCTURES: UNUSUAL BUT NOT EXCEPTIONAL

***Unusual DNA Structures*. Edited by R. D. Wells and S. C. Harvey. Pp. 311. ISBN 0-387-96631-5. $39.00 (Springer-Verlag, New York, NY: 1988).**

DNA structure (not sequence alone) plays an important role in gene expression, protein-DNA interaction, chromosome replication, recombination, and numerous other genetic events. Within the field of molecular biology considerable demand has been generated for this information since its acquisition is rate-limiting for many aspects of the analysis of DNA functions. The study of DNA structure is providing molecular biologists with a rapidly expanding catalog of known structures of small duplex oligomers and a much better understanding of the structure and behavior of larger DNA molecules. The ability of DNA to adopt unusual structures may be one of the fundamental properties that make this nucleic acid so central to biological chemistry.

The reader unfamiliar with the variety of DNA structures who wants to learn what questions are being asked and what approaches are being applied would benefit most from *Unusual DNA Structures*. Unfortunately the book, a collection of symposium papers, would have benefited from a lot more organizational care and from a more logical presentation of ideas.

The study of DNA structure is such a rapidly advancing field that significant new discoveries have been reported since the time of the symposium. Notable is the report on the structure of an oligo (dA). oligo (dT) tract (Nelson et al., Nature *330*, 221–226, 1987), which revealed a rigid duplex resulting from enhanced base stacking and cross-strand bifurcated hydrogen bonds. The straight helical axis of this poly (dA). poly (dT) stretch argues strongly against the wedge model as an explanation for sequence-dependent DNA curvature that is discussed in the chapter by Trifonov and Ulanovsky. The most recent information does not disprove the existence of DNA wedges as the cause of DNA curvature, but this chapter does little to inform the less familiar reader about alternative models.

A strength of *Unusual DNA Structures* is that it highlights a number of methods used to determine DNA structures. This variety results from the difficulty of studying different types of DNA structure and also depends on the degree of resolution required to answer the most interesting questions.

A number of chemical, enzymatic and antibody-probing techniques for unique DNA structures are described. For example, the chapter by Cantor et al. describes the use of DNA restriction methylases to detect DNA structural transitions in highly supercoiled plasmids. Also, the use of single strand nucleases to detect a number of DNA structures, including Z-DNA, are reviewed by Pulleyblank et al.

The study of DNA structure by NMR is particularly well treated by Patel et al. This chapter first presents a concise review of how distance measurements between DNA protons are made using the 2-D NOE technology (NOESY). Explained is how the NOESY data are treated, with distance geometry and molecular dynamic algorithms, to refine structures. Most importantly, they clearly state the limitations of this technology. The remainder of this chapter is devoted to the description of a number of unique DNA structures that were solved by NMR, including a DNA duplex containing an extra adenine. The structure presented here shows that the duplex accommodates the adenine by stacking between base pairs. This is in direct contradiction to recent "solid state" results obtained with x-ray crystallography on a DNA duplex with a similarly unpaired base (Miller et al., Nature *334*, 85–86, 1988), which instead is looped out of an otherwise normal B-type helix.

Dickerson provides a short review of what x-ray crystallography has accomplished. Unfortunately, important limitations, especially highlighted by recent discrepancies between NMR and x-ray crystallographically determined structures, are not discussed.

A most definite plus for *Unusual DNA Structures* is the six chapters devoted to DNA model development based on quantitative rather than intuitive information. The goal of these studies is to predict structure, flexibility and stability of DNA starting solely with sequence information. The topics discussed in these chapters range from modeling single base-pair effects on local structure to the conformation of supercoiled plasmids. An example is a method for modeling DNA based on potential energy and statistical mechanical calculations described in the chapter by Olson et al. It is quite interesting that results from this study predict that it is GC rather than AT sequences which contribute to DNA bending. This chapter provides a good alternative discussion to that by Trifonov and Ulanovsky though it is a dense read. Overall, *Unusual DNA Structures*, while neither a text nor a specialist's monograph, is the kind of book a good student would appreciate finding in the library.

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GUIDE TO ELECTROPHORESIS

***Advances in Electrophoresis*. Volume I. Edited by A. Chrambach, M. J. Dunn, and B. J. Radola. Pp. 441. ISBN 0-895-73669-1. $110.00 (VCH Publishers, New York, NY: 1987).**

Electrophoresis in its various manifestations is a widely used tool for separations and analysis, and a primary technique in important areas of biological research. Unlike chromatography, electrophoresis has developed largely outside the realm of traditional analytical chemistry, due to its intimate tie with biology. Although the journal *Electrophoresis*, as well as numerous specialized reviews and symposia proceedings, serves to document the development of the field, the literature is broadly scattered. Specialized reviews are often written in a fashion relatively inaccessible to the non-specialist. This situation is magnified by the fact that the ratio of practitioners of "routine" electrophoretic methods to those involved in research related to the methods themselves is far larger than for chromatography. As a result, many practitioners do not possess the necessary knowledge base to deal with a new problem: developments which depend on cross-fertilization