Book Reviews

Triple-Helical Nucleic Acids. By Valery N. Soyfer (George Mason University) and Vladimir N. Potaman (Texas A&M University). Springer: New York. 1995. xiv + 360 pp. $79.00. ISBN 0-387-94495-8.

Everything you always wanted to know about triplexes (but were afraid to ask). During the last decade, triplex DNA has attracted much attention from a structural viewpoint, as potential regulators of gene function, and as promising therapeutics. It was found that intramolecular triple helices (H DNA) may be formed by functionally important DNA sequences, a discovery which spawned much speculation on the role of triplexes in basic genetic processes. At the same time, it was shown that triplex-forming oligonucleotides (TFOs) can target double-stranded DNA in a highly sequence-specific manner, leading to the development of the so-called anti-gene strategy, where TFOs block target gene expression *in vivo*. The potentially high stakes in this field led to its explosive development, an exponential growth of publications, and much excitement in the biomedical community. Thus, the appearance of a book by Valery Soyfer and Vladimir Potaman entitled *Triple-Helical Nucleic Acids* seems quite timely.

The book is a scholarly study with a comprehensive and up-to-date review on triplexes including citation of nearly every paper published in the field. The clear advantage of such an encyclopedic approach is that this book is an excellent reference material. The disadvantage of it, however, is that the book is rather redundant. It is sometimes difficult to distinguish constructive ideas from all the other ideas discussed, and consequently the book is somewhat difficult to read.

From my point of view, Chapter 1, describing the discovery of triplex nucleic acids, is the strongest. It is where Valery Soyfer's passion for scientific historiography becomes evident. The book makes you feel the pulse of triplex studies, beginning with their discovery in 1957 through a relative limbo of 30 years to the brave new world of H DNA and TFOs. Notably, even though I have worked in the field for the last 12 years, I learned a lot from the authors' account of triplex youth.

Chapter 2, called Methods of Triplex Study, seems less successful to me. It would be fair to say that all basic methods of DNA analysis apply to triplexes and many of them were actually used. The authors chose to briefly describe the principles of different techniques followed by their application to triplexes. This becomes rather tedious and, worse, backfires when these same experimental techniques are discussed later.

Chapter 3 describes the general features of triplex structures while Chapter 5 summarizes the forces participating in triplex stabilization. This is the most complete and thorough review of triplex data at the phenomenological to atomic level that I have ever read. However, by dividing the materials into the two nonadjacent pats, the authors could not escape unnecessary redundancy. In my view, these two could be a single chapter.

Chapter 4 talks about triplex recognition with emphasis on attempts to overcome the pH dependence of pyrimidine/purine/pyrimidine triplexes and target sequence requirements for all triplexes. It is clearly written and certainly would be extremely useful for outsiders interested in the use of TFOs.

Chapter 6 is devoted to the biological role of triple-helical DNA. This is a very underdeveloped area of science with no clear vision, and the authors tried to compensate by discussing practically all the data on triplexes *in vivo* and their potential functions in replication, transcription, recombination, splicing, etc. It is obvious, however, that the current data are very fragmentary but not very convincing. Besides, it is hard to image that triplexes are indeed involved in all genetic processes. Nevertheless, it is certainly provocative reading which would likely encourage biologists to look closer at their DNA sequences. Finally, Chapter 7 is a careful description of the potentially powerful applications of triplexes in biotechnology, molecular pharmaceutics, the genome project, etc.

Triple-Helical Nucleic Acids contains everything one may want to know about triplexes including their history, methods of study, structural description, biology, applications, etc. Then, in keeping with the first comment of this review, why be afraid to ask about triplexes? If double-helical DNA deserves myriad textbooks, best-seller novels, movies, and drawings, why deny this right to its three-stranded counterpart? The clearest explanation for this disparity is hidden in Chapters 6 and 7 of the reviewed book: the lack of solid proof for the biological function of triplexes. Indeed, no single example of H structure functionality in natural DNA has ever been convincingly demonstrated, while the anti-gene approach has so far been efficient only in simplified model systems. I am personally a believer in the biological role of triplexes, but I feel that the long-term value of this book depends on whether or not the pervasive biological function of triplexes can be demonstrated in the future.

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X-ray Absorption Fine Structure for Catalysts and Surfaces. Series on Synchrotron Radiation Techniques and Applications. Volume 2. Edited by Yasuhiro Iwasawa (The University of Tokyo). World Scientific: River Edge, NJ. 1996. xvi + 410 pp. $86.00. ISBN 981 02-2323-4.

I found this book very interesting to read and easy to follow, although the writing could be improved to eliminate numerous grammatical errors. Application of extended and near-edge X-ray absorption structure to catalyst systems is timely and a complicated task. The nine chapters, with 22 total contributed reviews, include an introduction, theory and parameters of EXAFS, analysis of EXAFS, theory and analysis of XANES, measurement of XAFS, laboratory XAFS, application of EXAFS to catalyst characterization, application of XANES to catalyst characterization, and new techniques for catalysts and surfaces. Is this 1996 copyrighted work timely? Of the 1158 nonunique references cited in the book, 385 (33%) are dated 1991 or sooner and 87 (7.5%) are dated 1994−1995. This distribution may reflect a punctuated advancement of the X-ray absorption field. Regardless, I encountered discussions where comparisons were made between work published prior to 1990 and this book's self-contained studies.

The introductory chapters (1−6) are well organized and provide an appreciation for the different approaches to understanding both the theory and analyses of extended and near-edge X-ray absorption structure, including both practical and theoretical limitations. The remaining chapters (7−9) contain discussions of metal cluster, metal oxide, metal sulfide, and organometallic catalysts in attached and supported environments. Recent advances in surface techniques are presented with specific attention to polarization studies and the advent of state-of-the-art high-brilliance photon sources.

Two improvements would be for the editor to establish a unifying abbreviation scheme (we find EXAFS, XAFS, NEXAFS, SEXAFS, PTRF-XAFS, XRD, XANES, and DAFS) so that individual chapters need not repeat nor fail to provide definitions and to include complete journal article and book titles in the references. This book may be useful to those scientists looking for focused information regarding catalysts, but I wonder whether X-ray absorption activity in the catalyst field has been well documented in this particular collection.

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