

Book Review

***RNA-Protein Interactions*, edited by K. Nagai and I. Mattaj**

Oxford University Press, New York, 1994. 272 pp, \$53.00 (paper)

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The timely, new monograph entitled *RNA-Protein Interactions* provides an excellent overview of some of the key discoveries and the current state of research in this rapidly growing field. I recommend this book to researchers in the field, as well as to non-experts. Over the last few years, substantial progress has been made in our understanding of RNA-protein interactions. This progress has, in large part, been due to major advances in techniques of RNA preparation and purification, which have facilitated structural determination by NMR and, to a lesser extent, by x-ray crystallography. Indeed, because of the rapid progress being made, there is a risk that a book on protein-RNA interactions will be outdated before it reaches the libraries and book stores. This potential problem does not detract significantly from the value of this book, however, because the editors have avoided producing a simple compilation of the latest results in the field. Instead, there is a significant pedagogical component to the book. The editors state in the preface that they hope the book will "serve as an introduction to this important subject for young scientists." To accomplish this goal, chapters begin with substantial background information on each subject, and the authors devote a significant amount of time to describing the techniques used to study RNA-protein interactions. As a result, the book provides a nice blend of background information and relevant techniques, along with detailed discussions of some of the latest results and future directions in the field.

The 11 individual chapters are well-written and easy to read. Moreover, the editors have done an excellent job of assembling the individual contributions written by experts in the field, such that there is good continuity and flow between chapters. They have accomplished this, in part, by cross-referencing chapters throughout the book. The first chapter by Varani and Pardi is a discussion of RNA structure. This chapter introduces the reader to common RNA structural motifs, and contains a very lucid explanation of NMR solution structural determination. The next chapter by Westhof and Michel continues with the same theme, providing a more thorough discussion of RNA structural motifs and folding. This chapter gives the reader a sense of the complexity of structural prediction for large RNAs. The authors describe a variety of biochemical and computational methods that must be used in combination to try to achieve the most accurate picture of a particular RNA secondary or tertiary structure. The limitations to molecular modeling approaches are also discussed. The third chapter by Arnez and Moras describes aminoacyl-tRNA synthetase-tRNA recognition. Although this is by no means a comprehensive review of the entire body of information that now exists for this

important family of RNA binding proteins, it summarizes many of the highlights in the field, beginning with the determination of the three-dimensional structure of tRNA^{Phe} in 1974. An introduction to the two classes of synthetases is followed by a more detailed discussion of tRNA recognition by representative members of each class. A chapter on RNA-protein interactions in ribosomes by Draper includes a useful section on "Methods for studying RNA-protein complexes" followed by a discussion of some of the best studied examples of protein-rRNA complexes. Other chapters in this book discuss RNA-protein interactions in RNase P and splicing snRNPs, hnRNP proteins, the interaction of 5S RNA with transcription factor TFIIA, and the HIV regulatory proteins tat and rev. The two back-to-back chapters devoted to the latter subject highlight the utility of a "reductionist" approach to studying RNA-protein interactions. It is appropriate that the book concludes with a chapter on studying RNA-protein recognition by the relatively new and powerful technique of in vitro selection. This chapter by Bartel and Szostak gives a brief overview of the basic features and applications of the method. The majority of the chapter, however, focuses on the practical aspects of this technique. For example, two especially informative sections for potential users of in vitro selection are "Choosing the length and degree of randomization" and "Creating randomized pools".

So, what's missing? It is surprising that a book on RNA-protein interactions fails to contain a section on one of the best biochemically characterized RNA-protein interactions: the R17 coat protein-translational operator complex. Synthetic RNA oligonucleotides have been used to identify specific functional groups that interact with the coat protein. "Atomic mutagenesis" experiments have greatly improved our understanding of this and other protein-RNA interactions, and have been possible because of major advances in automated chemical RNA synthesis. Whereas the utility of this approach is illustrated nicely in the chapter on RNA binding by tat and rev, a more extensive discussion of these key developments in the field would have made the volume more complete.

In summary, a wide range of interesting topics is covered in *RNA-Protein Interactions*, and even experts are sure to learn something new. The book is an excellent resource for researchers in the field, with each chapter providing an extensive list of references. I would also strongly recommend it to newcomers to the RNA-protein world. The reader gets an accurate picture of state-of-the-art research in this field, as well as a sense of excitement and anticipation for what the future holds.