

PREFACE

After the discovery of catalytic RNA nearly 30 years ago, and after the initial excitement wore off, RNA was viewed predominantly as an ancient biological macromolecule with vestigial, albeit critical, functions in modern-day biology. Thus, while important and informative, studies of RNA behavior and function took a back seat to the interrogation of transcription factors, protein kinases, and other molecules directly involved in the regulation of gene expression.

But more recent discoveries have clearly illuminated the central importance of RNA to modern-day biology—the discovery of fewer genes but vastly more alternative spliced gene products than anticipated in the human genome, the discovery of RNA regulatory elements in the form of riboswitches, the finding of many noncoded RNAs, the finding of functional groupings of RNAs by RNA binding proteins, and, of course, the discovery of RNA interference (RNAi) and its likely role in regulation of about half of all human genes.

Thus, it is now clear that we need to understand these molecules in order to understand how biology works, and applications to understanding and curing diseases, while still largely remote, are ultimately likely to become common. Fortunately, in the years since the discovery of catalytic RNA, many incisive and powerful chemical, biochemical, and biophysical tools have been developed to study the folding and conformational behavior of RNA. Here, we have assembled many of these together, in this two volume series. Descriptions of two of the most common and powerful techniques are not covered, NMR and X-ray crystallography (although there is a chapter on preparation of RNA for crystallography), as these approaches can warrant volumes on their own and have been treated separately (see, e.g., Volume 394 on Biological NMR).

I believe that this compilation is particularly important, not just because of the importance of the subject matter, but because the tools and contributors span previously distinct fields from molecular biology, biochemistry, chemistry, and physics. Now students and researchers in each of these areas can get a sense of, as well as detailed protocols for, the entire gambit of approaches. I hope that the efforts of the many contributors will inspire new students and investigators to join the search for understanding of these most fascinating macromolecules. And finally I want to thank a phenomenal group of contributors for agreeing to contribute and then coming through, even sometimes on time, with chapters of uniform high quality.

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