

Preface

Unlocking the role of RNA in biological cellular processes has proved to be more challenging than perhaps many investigators had first believed would be the case. However, it is also becoming apparent that, as the mysteries of RNA function are revealed, greater rewards will be gained than had been imagined. While life is indeed complicated, this book takes an approach to understanding life by examining it as a set of discrete, simple chemical reactions—the control of which generates the complexity. In continuing with this theme of reductionism, RNA is particularly amenable to *in vitro* analysis and, by isolating the RNA and asking questions in a very controlled manner, the details of specifics relating to the catalysis, affinities and mechanisms of RNA can be identified. As a result, major advances should be achieved in our fundamental understanding of biology, and perhaps even greater medical rewards can be gained.

RNA is fragile and complex in both its structure and function, and advanced tools are required for the reliable capture, purification and analysis of its various types. It is not the purpose of this book to provide a series of “cookbook” procedures for RNA’s extraction, separation, and analysis; rather, it is intended as a “tool book”, in which we describe the chemical principles that can be used as the foundations for the various methods and tools used to investigate RNA. For that reason, some examples are provided to illustrate the various concepts. By understanding these basic chemical concepts, and how to apply them in terms of the way in which RNA can be manipulated, the biologist should be able to better use the routine products and methods that are currently available, or perhaps develop new techniques for coping with any new-found problems associated with RNA.

In this book, we have brought together the concepts of both biology and chemistry to describe what these tools are, and how they work. Some of the tools described, such as spin columns and precipitation procedures, will already be familiar to the biologist, as will the various procedures described for the different types of RNA. Some other tools may be unfamiliar to the reader, however, and consequently the potential of high-performance liquid chromatography is described in detail, as are the basic instrumentation, the separation columns, and the means by which these separations are controlled.

The special instrumentation and columns required for RNA separations have led to this technology being referred to as "RNA Chromatography", with the breadth of the subject being illustrated clearly by the many applications described.

So, we hope that this book will be used by biologists not only as a means of expanding their arsenal of tools for RNA-based investigations, but also to help them use these tools to great effect. With such techniques available it should, in time, be possible to solve—in creative manner—the vast array of problems encountered in RNA-related research.

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