Preface

The years that have elapsed since the previous version of this book was published, in 2001, have been momentous ones for nucleic acid studies. In 2003 we celebrated both the 50th anniversary of the discovery of the structure of the DNA double helix, and the announcement of the determination of the sequence of the human genome. It might therefore be thought that the study of nucleic acid structure is itself now part of history, and that there is little more to be known. The reality is very different; we have seen a number of profound new discoveries relating to both RNA and DNA structure, just in the first seven years of this millennium. These significant advances in the subject have required, not just a new edition, but an expansion of many sections and a re write of others.

The aim of the book is to provide an introduction to the underlying fundamental features and principles governing nucleic acid structures, as well as many of the structures themselves. It is hoped that this provides a firm foundation for subsequent studies of the structural biology and chemistry of nucleic acids. Its intended audience is at graduate level, and it is hoped that it will be of use to active researchers, and even to the more inquisitive final-year undergraduate students. The book does not attempt to be a comprehensive survey of all nucleic acid-containing structures. Instead, it concentrates on more general themes, and focuses on those structures that illustrate a particular feature of interest or generality, especially in the context of their relevance to chemical, biological, or pharmacological issues. I apologize in advance to those whose favourite structure has been ignored in favour of my own more subjective judgments.

The book emphasizes those structures determined by X-ray crystallography, since this methodology continues to dominate the field in terms of size of molecule whose structure can be determined, as well as still providing the majority of high-resolution structures. The introduction to crystallography and other techniques is designed to provide the non-specialist with sufficient understanding to read the primary literature, and most importantly, to be able to begin to judge the scope and quality of both experimental and theoretical structural studies. I have also expanded the reference and reading lists to provide a reasonably comprehensive guide to both the past and recent literature, and have included information on a number of relevant websites.

Any book on molecular structure suffers from the disadvantage of not being able to adequately convey the three-dimensionality of structures. The previous edition was associated with a dedicated Internet site, which enabled the structures to be examined interactively, and in a variety of display modes. The excellence of the many graphics programs freely available on the web, together with the molecular display tools available from the Protein Data Bank and other web sites, makes a dedicated site no longer

necessary, or even desirable. I have included tables of PDB and NDB (Nucleic Acid Database) codes for a large number of representative structures, to aid the reader in speedily viewing a particular feature, or downloading a structure file for subsequent display and analysis on one's own desktop or laptop. I have also included a list of my own favourite molecular graphics programs that have nucleic acid-friendly features.

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Stephen Neidle
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