Modified Nucleosides in Biochemistry, Biotechnology and Medicine

Nucleoside research, often referred to as a "speciality field", remains venerated and ageless. In large part this is due to the profound and wide-ranging roles that nucleosides, their derivatives, and analogues play in biochemistry, biology, and medicine, and as molecular probes. Nucleosides present a scaffold for rich and diverse modifications, and by virtue of their importance, the products of such modifications offer interesting application opportunities that gain greater significance in the post-genomic era.

The book *Modified Nucleosides in Biochemistry, Biotechnology and Medicine*, edited by Piet Herdewijn, should be viewed within the above contexts. This 658-page book consists of 25 chapters and has been divided into Parts I–IV.

Part I, on "Biochemistry and Biophysics", comprises 9 chapters. These include topics such as fluorine-labeled nucleic acids, 8-oxo-7,8-dihydro-2′-deoxyguanosine (an important oxidation product of 2′-deoxyguanosine), modified DNA bases and their recognition by polymerases, sugar-modified nucleoside triphosphates and their recognition by DNA polymerases, pyrimidine dimers that are highly important products of UV-induced DNA damage, locked nucleic acids that display high-affinity nucleic acid recognition properties, nucleic acids with modified bases, chemistry of nucleosides with sulfur-containing sugar surrogates, and the importance of *S*-adenosyl-l-methionine and its analogues in biochemistry.

Part II is concerned with "Biotechnology" and consists of two chapters. One describes modification at the 5-position of pyrimidines and the applications of such modified compounds, and the other is on the applications of universal bases.

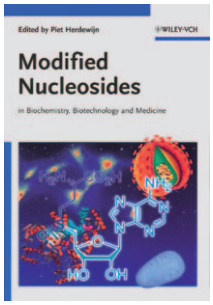
Part III is devoted to "Medicinal Chemistry" and consists of 11 chapters. The topics include cyclopropanated carba nucleoside analogues with locked conformations as enzymatic probes, data on cyclic bis(3′-5′)diguanilic acid and analogues, development of compounds for inhibiting the biosynthesis of siderophores (iron chelators), applications of some carbocyclic nucleoside analogues, antiviral properties of 4′-*C*-ethynyl-2′-deoxynucleosides, nucleoside analogues as modulators of adenosine receptors, design of purine nucleoside phosphorylase inhibitors as well as formycins and analogues, the chemistry and utility of E-Cyd as a potential anticancer agent, neplanocin and its analogues as biochemically interesting entities, and clitocine derivatives and their biological properties.

Part IV describes antivirals and antitumor agents and consists of three chapters. These are about the discovery of capecitabine (Xeloda) as a tumor-selective, in-vivo precursor of 5-FU, acyclic nucleoside phosphonates Tenofovir and Adefovir as efficacious agents against HIV and HBV, and finally the development of Clofarabine as a drug with multiple modes of action.

It is clear from the preceding paragraphs that the book presents a broad-based perspective of recent developments involving nucleoside chemistry, such as various types of biologically pertinent modifications, and the synthesis of analogues with applications that range from molecular probes to pharmacology. Obviously, the book cannot cover all contemporary developments, but nicely addresses the specific topics of high importance. Assembling such a book is certainly no trivial task, given the editor's thrust at encompassing such diverse areas. From this standpoint, division into the four sub-areas is reasonable, and it is notable that the 25 chapters required contributions from 56 authors and co-authors. This is not a book that can be used as a textbook or as a supplement for a course, but it should be a valuable, one-stop resource for anyone interested in gaining a broad understanding of the topics, for readers searching for new directions in the field, or for those looking for background material on the specific topics. The contributors to the chapters, as well as the editor, have all been actively engaged in the field, and as anticipated they bring state-of-the-art topics into the discussions. The individual chapters differ in style, as can be expected, since they are independently authored, and range from fairly long chapters to what appear to be brief ones. Some chapters have conclusions and projections for future directions, while others do not. Some chapters span, within themselves, a wide spectrum of information on aspects such as synthesis, results of biological testing, structural biology, etc.

The illustrations are generally clear. There are some chapter-specific errors and oversights, and in some cases uncommon acronyms are used, but these mistakes do not present problems with understanding the material. In the context of such a large volume of information there are many possibilities of overlap in subject matter, and one has to wonder whether overlap can be avoided at all. Surprisingly, this is minimal, and the two instances where readers may find common ground are in Chapters 3 and 11, and in Chapters 12 and 15.

The book certainly makes interesting reading of contemporary topics, and at the very least it should prove to be a useful resource for practitioners in the area and should find a place in libraries. The question, of course, is that of updating this information in forthcoming years to keep the book consistent with advances in the field.



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Coming back to the thought expressed at the beginning, this book is a reminder of the broadly encompassing nature of nucleosides and their analogues, and that the word "specialty" tends to misjudge this class of molecules, which often defies "conventional wisdom" in many ways.

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