

Contents

RNAissance	1
Juergen Brosius	
Nucleic Acids as Therapeutics	19
Saraswat Pushpendra, Pareek Arvind, and Bhandari Anil	
Thio Effects as a Tool for Mechanistic Studies of the Cleavage of RNA Phosphodiester Bonds: The Chemical Basis	47
Mikko Ora, Tuomas Lönnberg, and Harri Lönnberg	
Off-Target Effects and Safety Aspects of Phosphorothioate Oligonucleotides	67
Martina Stessl, Christian R. Noe, and Johannes Winkler	
Oligonucleotide Conjugates: Rationale, Synthesis, and Applications	85
Yashveer Singh, Pierre Murat, Nicolas Spinelli, and Eric Defrancq	
CRISPR: A Bacterial Immunity System Based on Small RNAs	121
Rolf Wagner and Ümit Pul	
Antisense Technology: From Unique Laboratory Tool to Novel Anticancer Treatments	145
Christine Di Cresce, Colin Way, Mateusz Rytelski, Saman Maleki Vareki, Supritha Nilam, Mark D. Vincent, James Koropatnick, and Peter J. Ferguson	
Antisense-Mediated Reduction of Eukaryotic Noncoding RNAs	191
Xue-hai Liang, Timothy A. Vickers, and Stanley T. Crooke	
Antisense Oligonucleotides in the Treatment of Malignant Gliomas	215
Gerardo Caruso, Mariella Caffo, Giuseppe Raudino, Federica Raudino, Mario Venza, and Francesco Tomasello	

Natural Antisense Transcripts Mediate Regulation of Gene Expression	247
Marco Magistri and Mohammad Ali Faghihi	
Activation and Deactivation of Antisense and RNA Interference Function with Light	275
Jeane M. Govan and Alexander Deiters	
Ribozymes as Molecular Biology Reagents	293
Sanchita Bhadra, Arti Pothukuchy, and Andrew Ellington	
RNA Technologies for Mitochondrial Genetics	313
André Dietrich, Katarzyna Rolle, Marta Gabryelska, Eliza Wyszko, Romain Val, Maciej Szymanski, Clarisse Valentin, Anne Cosset, and Jan Barciszewski	
RNA-Based Therapies for Inherited Metabolic Diseases	357
Belén Pérez, Magdalena Ugarte, and Lourdes R. Desviat	
RNA-Cleaving DNA Enzymes and Their Potential Therapeutic Applications as Antibacterial and Antiviral Agents	371
P.I. Pradeepkumar and Claudia Höbartner	
Hammerhead Ribozymes Against Virus and Viroid RNAs	411
Alberto Carbonell, Ricardo Flores, and Selma Gago	
Suppression of Hepatitis C Viral Genome Replication with RNA-Cleaving Deoxyribozyme	429
Dal-Hee Min and Dong-Eun Kim	
Design of Synthetic shRNAs for Targeting Hepatitis C: A New Approach to Antiviral Therapeutics	453
Brian H. Johnston and Qing Ge	
The Diverse Active Sites in Splicing, Debranching, and MicroRNA Processing Around RNA Phosphodiester Bonds	475
Sourav Kumar Dey, Eduardo Paredes, Molly Evans, and Subha R. Das	
MicroRNAs and Their Antagonists as Novel Therapeutics	503
Jeppe Vinther, Jakob Lewin Rukov, and Noam Shomron	
microRNAs in Human Diseases and Viral Infections	525
Alessandra Mescalchin and Tobias Restle	
Dysregulation of MicroRNA Expression and Human Diseases?	553
To-Ha Thai	
Noncoding RNAs: Identification of Cancer-Associated MicroRNAs	573
Muller Fabbri and George A. Calin	

Targeting Non-coding RNAs for Cancer Therapy	589
Satya K. Kota and Savithri Balasubramanian	
MicroRNA Pathways in <i>Drosophila</i>	611
Geetanjali Chawla and Nicholas S. Sokol	
Viroids: The Smallest Known Infectious Agents Cause Accumulation of Viroid-Specific Small RNAs	629
Jaroslav Matoušek, Detlev Riesner, and Gerhard Steger	
Index	645