Contents

Part I Tribute

Grzegorz Rozenberg: A Magical Scientist and Brother 3
Arto Salomaa

Part II Sequence Discovery, Generation, and Analysis

Monotony and Surprise 15
Alberto Apostolico

Information Content of Sets of Biological Sequences Revisited 31
Alessandra Carbone and Stefan Engelen

Duplication in DNA Sequences 43
Masami Ito, Lila Kari, Zachary Kincaid, and Shinnosuke Seki

Sequence and Structural Analyses for Functional Non-coding RNAs . . . 63
Yasubumi Sakakibara and Kengo Sato

Part III Gene Assembly in Ciliates

Strategies for RNA-Guided DNA Recombination 83
Angela Angeleska, Nataša Jonoska, Masahico Saito,
and Laura F. Landweber

Reality-and-Desire in Ciliates 99
Robert Brijder and Hendrik Jan Hoogeboom

Template-Guided Recombination: From Theory to Laboratory 117
Mark Daley and Michael Domaratzki

Part IV Nanoconstructions and Self-assembly

DNA Cages with Icosahedral Symmetry in Bionanotechnology 141
Nataša Jonoska, Anne Taormina, and Reidun Twarock

Applying Symmetric Enumeration Method to One-Dimensional Assembly of Rotatable Tiles 159
Satoshi Kobayashi

A Self-assembly Model of Time-Dependent Glue Strength 185
Sudheer Sahu, Peng Yin, and John H. Reif

The Perils of Polynucleotides Revisited 205
Nadrian C. Seeman

Algorithmic Control: The Assembly and Operation of DNA Nanostructures and Molecular Machinery 215
Andrew J. Turberfield

Part V Membrane Computing

On Nonuniversal Symport/Antiport P Systems 229
Oscar H. Ibarra and Sara Woodworth

Spiking Neural P Systems. Recent Results, Research Topics 273
Gheorghe Păun and Mario J. Pérez-Jiménez

Membrane Computing Schema: A New Approach to Computation Using String Insertions 293
Mario J. Pérez-Jiménez and Takashi Yokomori

Part VI Formal Models and Analysis

Finite Splicing: Generative Capacity, New Models and Complexity Aspects 313
Paola Bonizzoni and Remco Loos

Formal Models of the *Calyx of Held* 331
Andrea Bracciali, Marcello Brunelli, Enrico Cataldo, and Pierpaolo Degano

Understanding Network Behavior by Structured Representations of Transition Invariants 367
Monika Heiner

Quantitative Verification Techniques for Biological Processes 391
Marta Kwiatkowska, Gethin Norman, and David Parker

A New Mathematical Model for the Heat Shock Response 411
Ion Petre, Andrzej Mizera, Claire L. Hyder, Andrey Mikhailov, John E. Eriksson, Lea Sistonen, and Ralph-Johan Back

Part VII Process Calculi and Automata

Artificial Biochemistry 429
Luca Cardelli

Process Calculi Abstractions for Biology 463
Maria Luisa Guerriero, Davide Prandi, Corrado Priami, and Paola Quaglia

Deriving Differential Equations from Process Algebra Models in Reagent-Centric Style 487
Jane Hillston and Adam Duguid

Programmable DNA-Based Finite Automata 505
Tamar Ratner and Ehud Keinan

Part VIII Biochemical Reactions

A Multi-volume Approach to Stochastic Modeling with Membrane Systems 519
Daniela Besozzi, Paolo Cazzaniga, Dario Pescini, and Giancarlo Mauri

Programmability of Chemical Reaction Networks 543
Matthew Cook, David Soloveichik, Erik Winfree, and Jehoshua Bruck

Log-gain Principles for Metabolic P Systems 585
Vincenzo Manca

Hybrid Method for Simulating Small-Number Molecular Systems 607
Kazufumi Mizunuma and Masami Hagiya

Part IX Broader Perspective

On Involutions Arising from Graphs 623
Jurriaan Hage and Tero Harju

Parallel Computing by Xeroxing on Transparencies 631
Tom Head

Some Undecidable Dynamical Properties for One-Dimensional Reversible Cellular Automata 639
Jarkko Kari and Ville Lukkarila

On Using Divide and Conquer in Modeling Natural Systems 661
Yaki Setty, Irun R. Cohen, Avi E. Mayo, and David Harel

No Molecule Is an Island: Molecular Evolution and the Study of Sequence Space 675
Erik A. Schultes, Peter T. Hraber, and Thomas H. LaBean

Niching Methods: Speciation Theory Applied for Multi-modal Function Optimization 705
Ofer M. Shir and Thomas Bäck

On the Concept of *Cis*-regulatory Information: From Sequence Motifs to Logic Functions 731
Ryan Tarpine and Sorin Istrail