

Contents

Part I History of Great Discoveries

- 1 **The First Experiments on Ascidian and Sea Urchin Eggs Fertilization** 3
Margherita Raineri and Erki Tammiksaar

Part II Evolutionary Biology Concepts

- 2 **Ontic Openness as Key Factor in the Evolution of Biological Systems** 21
Søren Nors Nielsen and Claus Emmeche
- 3 **Effects of Epistasis and Pleiotropy on Fitness Landscapes** 37
Bjørn Østman

Part III Exobiology and the Origin of Life

- 4 **The Origin of Life, Evolution, and Functional Organization** 49
Wim Hordijk, Mike Steel and Stuart Kauffman
- 5 **Interactions of Clay Minerals with RNA Components** 61
Hideo Hashizume, Sjerry van der Gaast and Benny K. G. Theng
- 6 **Bottom-Up Protocell Design: Gaining Insights in the Emergence of Complex Functions** 81
Rafał Wieczorek, Michael C. Wamberg, Anders N. Albertsen, Philipp M. G. Löffler and Pierre-Alain Monnard
- 7 **From Life to Exolife: The Interdependence of Astrobiology and Evolutionary Biology** 95
Jack T. O'Malley-James and Stefanie Lutz

- 8 The Possible Roles of Water in the Prebiotic Chemical Evolution of DNA: An Approach by Single Molecule Studies** 109
Shuxun Cui

Part IV Evolutionary Mechanisms

- 9 Domain Architecture Evolution of Metazoan Proteins** 127
László Patthy
- 10 Of Trees and Bushes: Phylogenetic Networks as Tools to Detect, Visualize and Model Reticulate Evolution** 145
Antonio Hernandez-Lopez
- 11 Horizontal Acquisition of Prokaryotic Genes for Eukaryote Functioning and Niche Adaptation** 165
Maxime Bruto, Claire Prigent-Combaret, Patricia Luis, Grégory Hoff, Yvan Moënne-Loccoz and Daniel Muller
- 12 Molecular Evolution of Disrupted Transfer RNA Genes and Their Introns in Archaea** 181
Akio Kanai
- 13 Memory of Temperature in the Seasonal Control of Flowering Time: An Unexplored Link Between Meteorology and Molecular Biology** 195
Hiroshi Kudoh and Atsushi J. Nagano
- 14 Current Approaches in Spatial Genetics** 217
V. Montano, A. Eriksson, A. Manica and Y. Moodley
- 15 Consequences of Segregation and Genetic Exchange on Adaptability in Arbuscular Mycorrhizal Fungi (AMF)** 231
Caroline Angelard and Ian R. Sanders
- 16 Mitochondrial Genes, Sex Determination and Hermaphroditism in Freshwater Mussels (Bivalvia: Unionoida)** 245
Donald T. Stewart, Walter R. Hoeh, Gerhard Bauer and Sophie Breton

17 Variable Lymphocyte Receptors in Jawless Vertebrates: Illuminating the Origin and Early Evolution of Adaptive Immunity	257
Sabyasachi Das and Masayuki Hirano	
18 An Evo-Devo Perspective on Hybrid Infertility and Speciation	269
Priscilla Ambrosi, Sebastian Chahda, Emma Yang, Rui Sousa-Neves and Claudia M. Mizutani	
19 Genetic and Molecular Dissection of Animal Decision-Making: A New Frontier for Genetic Analysis	281
Youngmin Chu, Joseph Schinaman and Rui Sousa-Neves	
Index	297