

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 Moënné-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