

Contents

Preface and Commentary	vii
List of Contributors	ix
Part I Biological Basis of Systems Biology	1
1 Systems Biology	3
<i>Melanie Boerries, Roland Eils, and Hauke Busch</i>	
2 Developmental Cell Biology	33
<i>Frank John Dye</i>	
3 Principles and Applications of Embryogenomics	51
<i>Vincent VanBuren</i>	
4 Interactome	85
<i>Teresa M. Przytycka and Dong-Yeon Cho</i>	
5 Protein Abundance Variation	117
<i>Greco Hernández and Gritta Tettweiler</i>	
Part II Systems Biology of Evolution	143
6 Genetic Variation and Molecular Darwinism	145
<i>Werner Arber</i>	
7 Systematics and Evolution	169
<i>Jeffrey H. Schwartz</i>	
8 Evolution of the Protein Repertoire	207
<i>Aaron David Goldman, Jeremy A. Horst, Ling-Hong Hung, and Ram Samudrala</i>	
Part III Modeling of Biological Systems	237
9 Chaos in Biochemistry and Physiology	239
<i>Miguel Antonio Aon, Sonia Cortassa, and David Lloyd</i>	

10 Computational Biology	277
<i>Thomas Lengauer, Mario Albrecht, and Francisco S. Domingues</i>	
11 Dynamics of Biomolecular Networks	349
<i>Emanuele Cozzo, Joaquín Sanz, and Yamir Moreno</i>	
12 E-Cell: Computer Simulation of the Cell	379
<i>Pawan K. Dhar, Kouichi Takahashi, Yoichi Nakayama, and Masaru Tomita</i>	
13 Fractals in Biology and Medicine	397
<i>Gabriele Angelo Losa</i>	
14 Models of Cell Migration	423
<i>Michael Meyer-Hermann and Tilo Beyer</i>	
15 Protein Modeling	469
<i>Marian R. Zlomislíc, Valentina Corradi, and D. Peter Tieleman</i>	
16 System Models for Inference on Mechanisms of Neuronal Dynamics	505
<i>Klaas E. Stephan and Karl J. Friston</i>	
17 Systems Biology of the Liver	539
<i>Ian David Lockhart Bogle, Rajiv Jalan, Elizabeth Shephard, Robert Seymour, Antony Finkelstein, Thomas Sumner, and Anne Warner</i>	
Part IV Systems Biology in Medicine and Disease	563
18 Inferring Networks for Diseases	565
<i>Mikael Benson and Michael A. Langston</i>	
19 Personalized Medicine (Predictive and Preventive)	593
<i>Alette M. Wessels, Robert R. Bies, and John Urquhart</i>	
Part V Systems Biology of Organisms	625
20 Microbiomes	627
<i>Ramana Madupu, Yu-Hui Rogers, Doug Rusch, Jason Miller, Konstantinos Krampis, and Karen E. Nelson</i>	
21 Synthetic Biology: Implications and Uses	653
<i>Sanjay Vashee, Mikkel A. Algire, Michael G. Montague, and Michele S. Garfinkel</i>	
22 Plant Systems Biology	685
<i>Sonia Osorio and Alisdair R. Fernie</i>	
Index	699