

Contents

Part I Molecular information and evolution

Statistical significance and extremal ensemble of gapped local hybrid alignment

Yi-Kuo Yu, Ralf Bundschuh, Terence Hwa 3

On the design of optimization criteria for multiple sequence alignment

Dannie Durand, Martin Farach-Colton 22

Red queen dynamics and the evolution of translational redundancy and degeneracy

David C. Krakauer, Vincent A.A. Jansen, Martin Nowak 37

A testable genotype-phenotype map: Modeling evolution of RNA molecules

Peter Schuster 55

Evolutionary perspectives on protein structure, stability, and functionality

Richard A. Goldstein 82

Part II Phylogeny

The statistical approach to molecular phylogeny: Evidence for a nonhyperthermophilic common ancestor

Nicolas Galtier 111

Principles of cophylogenetic maps

Michael A. Charleston 122

Accounting for phylogenetic uncertainty in comparative studies of evolution and adaptation

Mark Pagel, François Lutzoni 148

The 'shape' of phylogenies under simple random speciation models	
<i>Mike Steel, Andy McKenzie</i>	162

Part III The evolution of populations and species

Fitness landscapes	
<i>Peter F. Stadler</i>	183
Tempo and mode in quasispecies evolution	
<i>Joachim Krug</i>	205
Multilevel processes in evolution and development: Computational models and biological insights	
<i>Paulien Hogeweg</i>	217
Evolutionary strategies for solving optimization problems	
<i>Werner Ebeling, Axel Reimann, Lutz Molgedey</i>	240
Review of biological ageing on the computer	
<i>Dietrich Stauffer</i>	255
Spatio-temporal modes of speciation	
<i>Martin Rost, Michael Lässig</i>	268

Part IV Large-scale evolution

Food web structure and the evolution of ecological communities	
<i>Christopher Quince, Paul G. Higgs, Alan J. McKane</i>	281
Dynamics and topology of species networks	
<i>Ugo Bastolla, Michael Lässig, Susanna C. Manrubia, Angelo Valleriani</i> ...	299
Modelling macroevolutionary patterns: An ecological perspective	
<i>Ricard V. Solé</i>	312