

Contents

From Membranes to Membrane Machines	
R. Lipowsky	1
‘Sausage-String’ Patterns in Blood Vessels at High Blood Pressures	
P. Alstrøm, V.M. Eguíluz, F. Gustafsson, and N.-H. Holstein-Rathlou	24
Phase Transitions in Mesoscopic Spherical Membranes	
M.V. Voinova	38
Modeling Microtubule Oscillations	
E. Jobs, D.E. Wolf, and H. Flyvbjerg	46
Designing RNA Folding Cooperativity	
E. Tøstesen, S.-J. Chen, and K.A. Dill	56
Scaling Laws for Protein Folding	
W. Wenzel and K. Hamacher	62
Self-Organizing Networks of Molecular Machines in Allosterically Regulated Enzymic Reactions	
A.S. Mikhailov, P. Stange, D.H. Zanette, and B. Hess	72
Coupled Brownian Motors	
C. Van den Broeck, P. Reimann, R. Kawai, and P. Hänggi	93
On the Role of Molecular Machines in the Origin of the Genetic Code	
G. Martinez-Mekler, M. Aldana, and G. Cocho	112
Population Dynamics and Non-Hermitian Localization	
K.A. Dahmen, D.R. Nelson, and N.M. Shnerb	124
Collective Motion	
A. Czirók and T. Vicsek	152

A Population Dynamics Approach to Biological Aging R.M.C. de Almeida	165
Small-World Networks S. Strogatz	172
Extended Mean-Field Theory for Networks of Spiking Neurons D.J. Amit	173
Pattern Formation in the Developing Visual Cortex: Topological Defects, Their Generation, Motion, and Annihilation F. Wolf and T. Geisel	174
Complex Spiking Behavior from Noise-Driven Neuron Interaction R. Stoop	194
A New Nonlinear Model for Pitch Perception J.H.E. Cartwright, D.L. González, and O. Piro	205
Statistical Mechanics of Network Models of Macroevo- lution and Extinction R.V. Solé	217
Exact Analytical Results in a Simple Model of Self-Organized Biological Evolution Yu.M. Pis'mak	251
Transition to Chaos in Models of Genetic Networks C. Hill, B. Sawhill, S. Kauffman, and L. Glass	261
 Appendix I Contributions Presented as Posters 	
Fluid Membranes: Two-Dimensional Systems with “Live” Geometry L. Miao, P.L. Hansen, and J.H. Ipsen	277
A Model for Mixed Surfactant Vesicles D. Duque, P. Tarazona, and E. Chacón	278

A Novel Monte Carlo Procedure for Protein Design	
A. Irbäck, C. Peterson, F. Potthast, and E. Sandelin	279
Folding and Aggregation of Designed Proteins	
R.A. Broglia, G. Tiana, S. Pasquali, H.E. Roman, and E. Vigezzi	280
Swollen-Collapsed Transition in Random Hetero-polymers	
A. Trovato, J. van Mourik, and A. Maritan	281
Statistical Mechanics of Double-Stranded Semi-flexible Polymers	
T.B. Liverpool, R. Golestanian, and K. Kremer	282
Casimir Forces in Polymer Liquid Crystals	
J. Dobnikar and R. Podgornik	283
Interaction of Me^{2+} Ions with Poly I in Conformation of Four-Stranded Helix	
M.V. Degtyar, V.A. Sorokin, V.A. Valeev, G.O. Gladchenko, I.V. Sysa, and Y.P. Blagoi	284
Decomposition of DNA Complexity	
R. Roman-Roldan, P.A. Bernal-Galvan, and J.L. Oliver	285
Transport of Markers and the Dynamic Phase Transition in a Stochastic Cellular Automaton	
B. Tadić	286
Algorithmic Complexity of Thermal Ratchet Motion	
J.R. Sanchez, F. Family, and C.M. Arizmendi	287
Mesoscopic Transport of Structured Systems in Periodic Potentials: a Plausible Modelization for Motor Molecules	
S. Cilia, F. Faló, and L.M. Floría	288
Efficiency of Brownian Motors	
B.J. de Cisneros Bailly-Bailliere	289
Collective Self-propelled Motion in 3D	
A. Czirók, M. Vicsek, and T. Vicsek	290
Concentric Rings in Bacterial Colonies: Patterning and Differentiation	
I. Ràfols, J. Wakita, T. Matsuyama, and M. Matsushita	291

Spatio-temporal Patterns in Bacterial Colonies C.E. Auguet, I.R. Cantalapiedra, A.M. Lacasta, A. Peñaranda, and L. Ramírez-Piscina	292
Stochastic Pattern Formation with Competing Phases M.T. Batchelor, B.I. Henry, and S.D. Watt	293
Scaling and Complexity in Insect Populations M.A.P.Gomes, G.L.Vasconcelos, S.K.Adhikari, I.J.Tsang, and I.R.Tsang	294
Formation of the Interspecies Interaction in the Process of Ecosystem Evolution O.V. Kirillova	295
A Cellular Automaton Model for Species Formation in Simple Ecosystems F. Bagnoli and M. Bezzi	296
The CA3 Hippocampal Region as an Autoassociative Memory: Quantitative Measures of Performance M. Maravall	297
Storage Capacity and Information Processing in Multi-modular Cortical Recurrent Networks A. Renart, N. Parga, and E.T. Rolls	298
Fast Collective Oscillations in Neural Networks N. Brunel and V. Hakim	299
Mutual Synchronisation in Molecular Enzymic Networks P. Stange, A.S. Mikhailov, and B. Hess	300
Mutual Information of 3-State Attractor Neural Networks D. Dominguez, D. Bollé, and S. Amari	301
Kinetics of the Periodically Driven FitzHugh-Nagumo Model T. Alarcón, A. Pérez-Madrid, and J.M. Rubí	302
Deterministic Resonance on Noisy Fitzhugh-Nagumo Neuron Models S. Ripoll Massanés and C.J. Pérez Vicente	303

Autonomous Stochastic Resonance as a Function of the Correlation Time in Simple Biological Models
 J.L. Cabrera, J. Gorroñoigoitia, and F.J. de la Rubia 304

Genetic Algorithms, Evolutionary Computation and Biological Neural Networks
 A.V. Adamopoulos, S.D. Likothanassis, and E.F. Georgopoulos 305

A Statistical Mechanics Approach to Modelling the Dynamics of Genetic Algorithms
 A. Rogers 306

Soft Glassy Materials: Rheology and Aging
 S. Fielding, P. Sollich, M.E. Gates 307

Solvable Dynamics in a System of Interacting Random Tops
 F. Ritort 308

Thermodynamics of Glasses and Black Holes
 Th.M. Nieuwenhuizen 309

Statistical Mechanics of Polarons and Double Well Potentials
 M. Zoli 310

Appendix II List of Participants