

Preface

This book was initiated as lecture notes to a course in biological physics at Copenhagen University in 1998–1999. In this connection, Chapters 1–5 were developed as a collaboration between Kim Sneppen and Giovanni Zocchi. Later chapters were developed by Kim Sneppen in connection to courses taught at the Norwegian University of Science and Technology at Trondheim (2001) and at Nordita and the Niels Bohr Institute in 2002 and 2003.

A book like this very much relies on feedback from students and collaborators. Particular thanks go to Jacob Bock Axelsen, Audun Bakk, Tom Kristian Bardøl, Jesper Borg, Petter Holme, Alexandru Nicolaeu, Martin Rosvall, Karin Stibius, Guido Tiana and Ala Trusina. In addition, much of the content of the book is the result of collaborations that have been published previously in scientific journals. Thus we would very much like to thank:

- Jesper Borg, Mogens Høgh Jensen and Guido Tiana for collaborations on polymer collapse modeling;
- Terry Hwa, E. Marinari and Lee-han Tang for collaborations on DNA melting;
- Audun Bakk, Jacob Bock, Poul Dommersness, Alex Hansen and Mogens Høgh Jensen for collaborations on protein folding models and models of discrete ratchets;
- Deborah Kuchnir Fygenson and Albert Libchaber for collaborations on nucleation of microtubules and inspiration;
- Erik Aurell, Kristoffer Bæk, Stanley Brown, Harwey Eisen and Sine Svenningsen for collaborations on λ -phage modeling and experiments;
- Ian Dodd, Barry Egan and Keith Shearwin for collaborations on modeling the 186 phage;
- Jacob Bock, Mogens Høgh Jensen, Sergei Maslov, Petter Minnhagen, Martin Rosvall, Guido Tiana and Ala Trusina for ongoing collaborations on the properties of molecular networks, and modeling features of complex networks;
- Sergei Maslov and Kasper Astrup Eriksen on collaborations on large-scale patterns of evolution within protein paralogs in yeast;
- Per Bak and Stefan Bornholdt for collaborations on macro-evolutionary models, quantifications of large-scale evolution, and modeling evolution of robust Boolean networks.

Kim Sneppen is particularly grateful for the hospitality of KITP at the University of California, Santa Barbara, where material for part of this book was collected during long visits at programs on Physics in Biological Systems in winter/spring 2001 and 2003.

I, Kim, thank my infinitely wise and beautiful wife Simone for patience and love throughout this work, and my children Ida, Thor, Eva and Albert for putting life into the right perspective.

This book was initiated as lecture notes to a course in biological physics at Copenhagen University in 1998–1999. In this connection, Chapters 1–5 were developed as a collaboration between Kim Sneppen and Giovanni Zocchi. Later chapters were developed by Kim Sneppen in connection to courses taught at the Norwegian University of Science and Technology at Trondheim (2001) and at Nordita and the Niels Bohr Institute in 2002 and 2003.

A book like this very much relies on feedback from students and collaborators. Particular thanks go to Jacob Bock Axelser, Audun Bak, Tom Kristian Bardsley, Jesper Bock, Peter Holme, Alexander Nielsen, Martin Rosvall, Karin Ståhl, Guido Tiana and Ala Tsimia. In addition, much of the content of the book is the result of collaborations that have been published previously in scientific journals. Thus we would very much like to thank:

- Jesper Bock, Mogens Høj Jensen and Guido Tiana for collaborations on polymer collapse modeling;
- Terry Hwa, E. Mariani and Lee-han Tang for collaborations on DNA melting;
- Audun Bak, Jacob Bock, Poul Damberg, Alex Hansen and Mogens Høj Jensen for collaborations on protein folding models and models of disease networks;
- Deborah Kuchart, Pysgyn and Albert-László Barabási for collaborations on nucleation of microtubules and inspiration;
- Erik Anzell, Kristoffer Bak, Stanley Brown, Harvey Eisen and Sine Svendsen for collaborations on λ -phage modeling and experiments;
- Ian Dobb, Barry Egan and Keith Sharkey for collaborations on modeling the 130 pages;
- Jacob Bock, Mogens Høj Jensen, Sergei Maslov, Peter Minnhagen, Martin Rosvall, Guido Tiana and Ala Tsimia for ongoing collaborations on the properties of molecular networks and modeling features of complex networks;
- Sergei Maslov and Kasper Astrup-Erikson for collaborations on large-scale patterns of evolution within protein families in yeast;
- Per Bak and Stefan Bornholdt for collaborations on master-equation models, quantifications of large-scale evolution, and modeling evolution of robust Boolean networks.