Preface

This book is inspired by the extensive and exciting progress made over the past 10 years by the multitudes of scientists who have devoted their careers to the study of symmetry breaking in various biological systems. We hope that this collection of reviews will serve the purposes of both summarizing what we have learned so far, and of highlighting the central questions that remain for future investigation. After a broad Introduction that seeks both to establish a historical context and to preview the specific topics covered, the book begins with four "orthogonal" chapters that provide cross-system overviews of the common molecular machineries used for symmetry breaking in biology. These include overviews of cytoskeletal systems, signaling modules, and membrane systems, as well as a theory chapter on the chemical and physical principles that are beginning to emerge across different model systems. These initial four chapters are followed by thirteen additional contributions that focus on specific symmetry breaking problems in different model organisms or cell types. These chapters are ordered by increasing system scale and complexity, beginning with the smallest and simplest cells, bacteria, followed by the two most widely studied yeast cells, and finally by the exceedingly more complex systems of multicellular organisms. While none of the chapters provides a comprehensive review, all strive to highlight the most fascinating phenomena in their respective systems, our current understanding of their molecular bases, and the emerging principles and outstanding questions. Please note that all cited 2009 CSH Perspectives references are to other chapters within this book.

We have been exceptionally fortunate to be able to recruit leading researchers in cell and developmental biology to author these chapters. We are grateful to all of them for their scholarly efforts toward crafting and revising the manuscripts, especially given the stresses that follow from the currently difficult funding climate (which thankfully appears likely to improve). We also are extremely grateful to Maryliz Dickerson, whose exceptional organizational skills, enthusiasm, and attention to details ensured a smooth and pleasant process in the development of this book; to Mary Toth for her assistance; to Richard Sever at Cold Spring Harbor Laboratory Press for initiating this project and providing helpful advice throughout; and to Kaaren Kockenmeister and Denise Weiss for their excellent production work and cover art design. Finally, we thank our spouses for their constant love and support and our children for the happiness they bring us.

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