

Preface

This book is addressed to students of biology and medicine whose interests encompass human development as well as the most important model organisms currently being investigated with methods from genetics, biochemistry, and molecular biology. *Developmental Biology* has been written for advanced undergraduates as well as graduate students and instructors who seek a succinct but thorough introduction to contemporary developmental biology.

A particular aim of this book is to bring together the rich heritage and pivotal ideas of the first "golden age" of developmental biology (1890–1940) with discoveries and hypotheses of recent research. Modern research in developmental biology is based mainly on biochemical and molecular methods, but increasingly incorporates computer modeling to cope with such intriguing and complex phenomena as biological pattern formation. The awarding of the 1995 Nobel prize in physiology or medicine for research on embryo development in *Drosophila* highlights a new "golden era" for developmental biology. This book takes full advantage of the molecular revolution that has swept through the biological sciences, but it also presents, in addition to data and observations, basic principles of development and points out the historical roots of our interpretations.

Many years of teaching experience have prompted me to follow an approach different from that used in other textbooks. After an introduction to terminology used in descriptive developmental biology, I introduce several "model" organisms of importance in research and teaching. I then introduce selected developmental processes and present them from a comparative perspective. Using this approach, students do not have to piece together the development of, for example, the frog (*Xenopus*) or the fruit fly (*Drosophila*), from fragmentary information scattered throughout many chapters (such as "Cleavage," "Gastrulation," and so forth). Nevertheless, the student will also find overviews of major themes, such as fertilization (Chapter 6), developmental genetics (Chapter 10), or sexual development (Chapter 20). It is my experience that any redundancy arising from this approach will serve to reinforce the concepts. An additional feature of the book is the presentation of seven boxed essays, each providing a brief overview of a single topic, such as the history of developmental biology (Box 1), signal transduction (Box 3), or current methods of research in developmental biology (Box 7).

Developmental biology is a discipline undergoing extremely rapid development: an explosion of papers appears daily in an ever-growing number of journals and monographs devoted to this field. It is my hope that reading this book will prepare a student to understand and appreciate information presented in more extensive (but perhaps less clearly structured) textbooks, and to follow the present state of knowledge by reading original research articles and current reviews.

This book is a revision and translation of a volume published in Germany in 1995. To illustrate the book, I drew most of the figures with my own hands; a minority were prepared on a computer using a drawing program. Approximately one-third of the figures were redrawn by Peter Adam, reproducing and modifying my drafts or the figures cited in the legends.

Following recent rules, the name of a gene is written in *italics*. To designate proteins derived from defined genes, this book uses capital letters. This enables the reader to easily distinguish, for example, the WINGLESS and EYELESS proteins from wingless and eyeless flies.

The following people have assisted in preparing this book for publication: the staff of Springer-Verlag, particularly the Editor, Robert C. Garber; Senior Production Editor, Natalie Johnson; and, in addition, the staff at Impressions Book and Journal Services, Inc. I also express my gratitude to all those who read (parts of) the original German edition and gave hints for improving the book. In particular, I would like to name Kurt Baumann, Günter Fachbach, Horst Grunz, Klaus Sander, and Einhard Schierenberg.

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