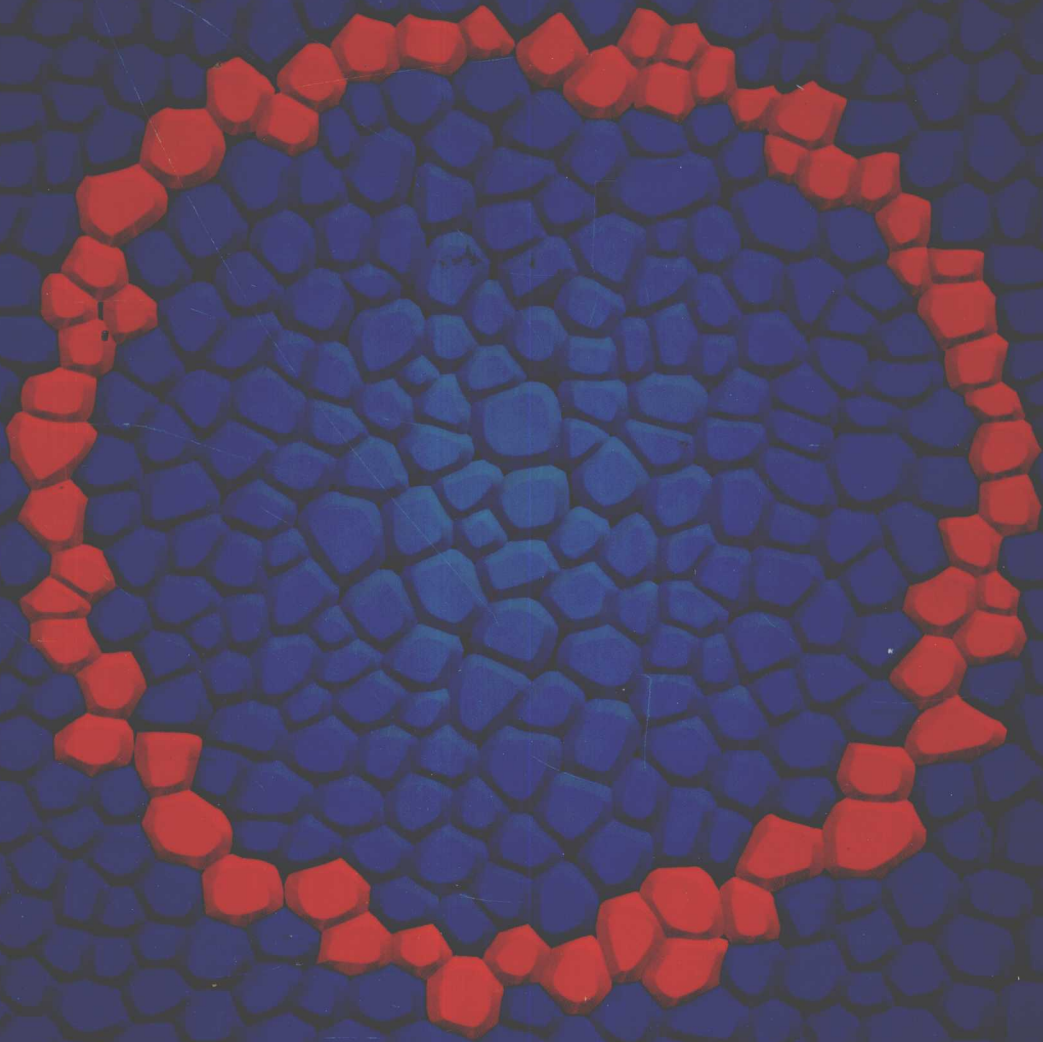


PRINCIPLES OF DEVELOPMENT



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The cover represents cells communicating positional information and cell identity by production of a diffusion gradient in a signaling molecule. At a threshold concentration, cells are triggered to differentiate, thus expressing a new phenotype. Design by Matthew McClements.

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Preface

Developmental biology is at the core of all biology. It deals with the process by which the genes in the fertilized egg control cell behavior in the embryo and so determine its pattern, its form, and much of its behavior. The progress in developmental biology in recent years with the applications of advances in cell and molecular biology, has been remarkable and an enormous amount of information is now available.

Principles of Development is designed for undergraduates as well as graduates, and the emphasis is on principles and key concepts. Central to our approach is that development can be best understood by understanding how genes control cell behavior. We have assumed that the students have some very basic familiarity with cell biology and genetics, but all key concepts, like the control of gene activity, are explained in the text.

Conscious of the pressures on students, we have tried to make the principles as clear as possible and to provide numerous summaries, both in words and in pictures. The illustrations in the book are a special feature and have been carefully designed and chosen to illuminate both experiments and mechanisms.

We have resisted the temptation to cover every aspect of development and have, instead, focused on those systems that best illuminate common principles. Indeed a theme that runs throughout the book is that universal principles govern the process of development. At all stages, what we included has been guided by what we believe undergraduates should know about development.

We have thus concentrated our attention on vertebrates and *Drosophila*, but not to the exclusion of the other systems, such as nematodes and sea urchins, where they best illustrate a concept. An important feature of our book is the inclusion of the development of plants, which is usually neglected in text books. There have been striking advances in plant developmental biology in recent times, and some unique and important features have emerged. As knowing the basic features of the embryology of the main organisms used to study development is essential for an understanding of molecular mechanisms, we have introduced embryology at an early stage.

Whereas our emphasis has been on the laying down of the body plans and organ systems, such as limbs and the nervous system, we have also included later aspects of development, including growth and regeneration. The book concludes with a consideration of evolution and development.

In providing references, our prime concern has been to guide the students to helpful papers rather than giving credit to the scientists who have made major contributions: to those whom we have neglected, we apologize.

The way the book was written was rather special. Although I was in continual consultation with my co-authors, I did all the writing—and I mean writing, which was skillfully typed by Maureen Moloney. Each chapter was also reviewed by a number of experts (see page xv), to whom we give thanks. The text was initially edited, and often re-written, by Eleanor Lawrence, whose expertise and influence pervades the book. Further critical editing was carried out by Hazel Richardson. And Huw Woodman magically turned the whole text into finished pages.

Central to the book are the illustrations, which were brilliantly created or adapted by Matthew McClements. The whole complex project was masterfully managed by Giles Montier. Particularly to Giles and Matthew, I offer my thanks for their patient dealing with my impatience and incompetence. The complete team was a pleasure, even fun, to work with.

Finally my thanks to Peter Newmark, the head of Current Biology Ltd., and to Vitek Tracz, the head of the Current Science Group; without them, the book would never have been started, let alone completed.

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