

From egg to organism

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The embryo is a remarkable self-assembly machine. From a single cell, the fertilized egg, arises all of the differentiated cell types of the body. Embryos unfold in an elegantly choreographed manner that we strive to understand by observing the process, dissecting it into smaller bits, and mucking up the works by expressing too much or too little of some protein. Yet the mystery remains and, as knowledge and technology advance, we understand more about the depth of its complexity than about the process itself.

Given the beauty and intricacy of the developing embryo, it is a lofty challenge to put the current state of information in a form that is both understandable and captures the imagination of students of biology at the undergraduate and graduate level. Scott Gilbert has met this dual challenge in the latest edition of *Developmental Biology*. He has caught the excitement of the field in a remarkably lucid way. The book starts by building from first principles and defining concepts, and then moves toward the details of morphogenetic processes themselves and what is known about their molecular bases. This book is worth investing in because it has been nicely expanded and updated over the previous versions, and also has much improved graphics.

Although developmental biology has historically deep roots, some of the seminal work of the past is often ignored. Gilbert is keenly aware of this and does a wonderful job of putting the study of developmental biology in historical context. He describes the importance of development for understanding evolution, and discusses how it influenced Darwin's discovery of the origin of the species. He frequently refers to the work of individuals who pioneered different aspects of experimental embryology and made pivotal discoveries that still influence thinking today. He also

discusses the interesting interface between embryology and genetics, two fields that once were thought of as different disciplines, but that clearly have become integral to one another and are nearly indistinguishable today.

The book does a very nice job of looking at the developing embryo at many levels, from the submicroscopic to the macroscopic. Given the importance of regulatory and coding regions of the genome, and the proteins that they encode, Gilbert provides an excellent introduction into the fundamentals of differential gene expression. He explains basic concepts in cell biology and genetics, particularly those that are integral for developmental biology, such as cell interactions and cell signaling. Furthermore, there is a broad introduction to many different organisms so that the book does not seem too 'vertebrate-centric'. Of course, there is more detail and attention given to the better characterized 'model' organisms, but not at the expense of keeping a broad perspective. Sprinkled throughout the text are excellent illustrations that help the reader visualize the processes under study.

The book is organized into four large sections, each of which is subdivided into chapters. The first section presents the background information that is essential to understanding the concepts of biology, both historically and scientifically. The second section discusses early events in development, starting with fertilization and proceeding to axis formation. The third section deals with particular types of tissues, ranging from the formation of the nervous system to the limb. Finally, the book ends with a discussion of the medical implications of developmental biology and how development can instruct our understanding of evolution and vice versa. This section also includes a nice chapter, contributed by

Susan Singer, that provides an overview of plant development. For those whose primary interest is plant developmental biology, this section may seem to provide too little coverage of this topic and to come too late in the book. It is safe to say that the book is mostly one on animal developmental biology.

In conclusion, I highly recommend Gilbert's *Developmental Biology* to students at both the university and post-graduate level. For that matter, it's a very good read for more advanced investigators as well, and is a good resource for checking up on the latest research in an area that is outside of your own. It is up-to-date and is written in an engaging style that captures the excitement of developmental biology today.

