

## Book Reviews

***Ecological Developmental Biology: Integrating Epigenetics, Medicine, and Evolution.*** By Scott F. Gilbert and David Epel. Sunderland, MA: Sinauer Associates Inc. 2008. 375 pp. US \$52.95 Paperback. ISBN: 978-0878932993.

*Ecological Developmental Biology* by Scott F. Gilbert and David Epel is a tremendous achievement of integration. The text discusses fields ranging from biogeography to chemical biology and diverse branches of the phylogenetic tree. It references both classic studies and the most recent primary data to illustrate the dependence of multi-cellular development on environmental context. The authors begin by establishing polyphenism, the ability of a single genotype to generate multiple phenotypes in response to environmental cues, as a common factor across plant and animal taxa. This concept is supported by well-known examples such as the temperature-dependence of sex determination in reptiles and by more exotic polyphenisms like stress-triggered cannibalism in spadefoot toad tadpoles. The authors include detailed molecular explanations for developmental phenomena and use recent epigenetic insights to explain how environment-induced phenotypes can be transmitted between generations. Also covered is the fascinating and surprisingly widespread phenomenon of developmental symbioses, wherein developmental cues are supplied by closely-associated foreign organisms.

The second section discusses developmental disruptions caused by aberrant environmental signals and highlights the dramatic effects of teratogenic compounds and endocrine disruptors. Attention is drawn to the provocative hypothesis that disorders such as cancer and obesity have their roots in gene expression patterns established early in

life. Although the focus shifts and the scope narrows, the theme of environmental sensitivity during development ties the book together.

The final three chapters are likely to be the most controversial. Gilbert and Epel make an argument for the inclusion of organism-environment interaction alongside evolutionary developmental biology in an expanded evolutionary synthesis. In their opinion, evolutionary theory has erred in treating phenotypes as purely a consequence of genes and the environment as a passive selector between alternative phenotypes rather than a source of variation. They conclude with a preliminary attempt at integrating development, epigenetics, and the interaction between organism and environment into modern evolutionary theory. Their ideas are thoughtful and daring, if somewhat speculative. However, there can be no doubt that in this new and rapidly advancing field, detailed mechanisms will emerge to fill the gaps.

One of the unusual features of *Ecological Developmental Biology* is the authors' tendency to step outside the role of passive reporters and offer their own interpretations. The authors do not avoid the political implications of their ideas, especially where it concerns conservation biology and the effects of environmental contaminants on human health. In the philosophical "Coda," which deserves a wider audience and perhaps its own book, they address how theories of development and evolution affect our understanding of human nature and the natural world and suggest that ecological developmental biology may modify the concept that evolution is a purely competitive affair.

In an era in which research is advancing too fast for textbooks to keep up and the Internet is often a more convenient source of

basic information, this book serves a unique role in providing the most recent information in a format that will encourage independent exploration of the primary literature and critical discussion of the authors' ideas. This makes *Ecological Developmental Biology* more suited to an advanced seminar than a lecture-based course. Further, since Gilbert and Epel frequently indicate what is unknown and where more research is needed, this text also may be a starting point for scientists entering the field.

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***Immunobiology: A Short Course. 6th edition.*** By Richard Coico and Geoffrey Sunshine. Hoboken, NJ: John Wiley & Sons Inc. 2009. 416 pp. US \$54.95 Paperback. ISBN: 978-0470081587.

With the emergence of swine flu, there is renewed interest in understanding how our immune system protects us. Immunobiology is a rapidly growing field of study, but the varied players and concepts can be overwhelming to someone with little or no familiarity with the subject. *Immunobiology: A Short Course* by Richard Coico and Geoffrey Sunshine provides an excellent and fairly up-to-date overview of the immune system, introducing major concepts without saturating the reader with information. While the textbook is clearly geared toward the needs of medical and pre-medical students, anyone with an interest in learning about or reviewing immunological concepts could benefit from reading it.

The first half of the book primarily focuses on the major components of the adaptive immune system: B cells and T cells. Simple schematics illustrate the development of these cells and their actions in an immune response. In addition, this new edition includes information on Toll-like receptors (TLRs), regulatory T cells (Tregs), and the role of activation-induced deaminase in somatic hypermutation and class-

switch recombination. The discovery of TLRs has given rise to the study of the innate immune system, while Tregs are now a much-studied component of self-regulation, one of the unique features of the adaptive immune response. While the increase of information on the innate immune system is a welcome improvement compared to earlier editions, the authors do miss an opportunity to use TLRs as a jumping off point for further comparison of the innate and adaptive immune systems.

The second half of the book is more clinically oriented with chapters on autoimmunity, hypersensitivity, cancer, transplantation, and vaccination. Since much of our understanding of the immune system derives from studying it during infection or extreme cases of over- or under-activity, these chapters provide an important link between the basic science presented earlier in the book and the clinical cases medical students encounter on a daily basis. Every chapter concludes with a summary of important points, references for further reading (both original articles as well as reviews), and review questions. This format is a useful tool for guiding the studies of students, and it also connects curious readers with extensive immunology literature. Although the layout of individual chapters is consistent and helpful, the grouping of topics in the book is sometimes confusing. For example, while it is nice that the authors do not shy away from describing experimental techniques that have been used to study the immune system, this information would be better placed at the end of the book rather than between two chapters on the maturation of the humoral response. These organizational quirks, however, do not significantly impair the reading experience.

Coico and Sunshine succeed in providing new information from the field while maintaining a focus on the best-studied and most clinically relevant aspects of the immune response. *Immunobiology: A Short Course* serves as an excellent introduction to immunobiology by not only providing sufficient and necessary information for