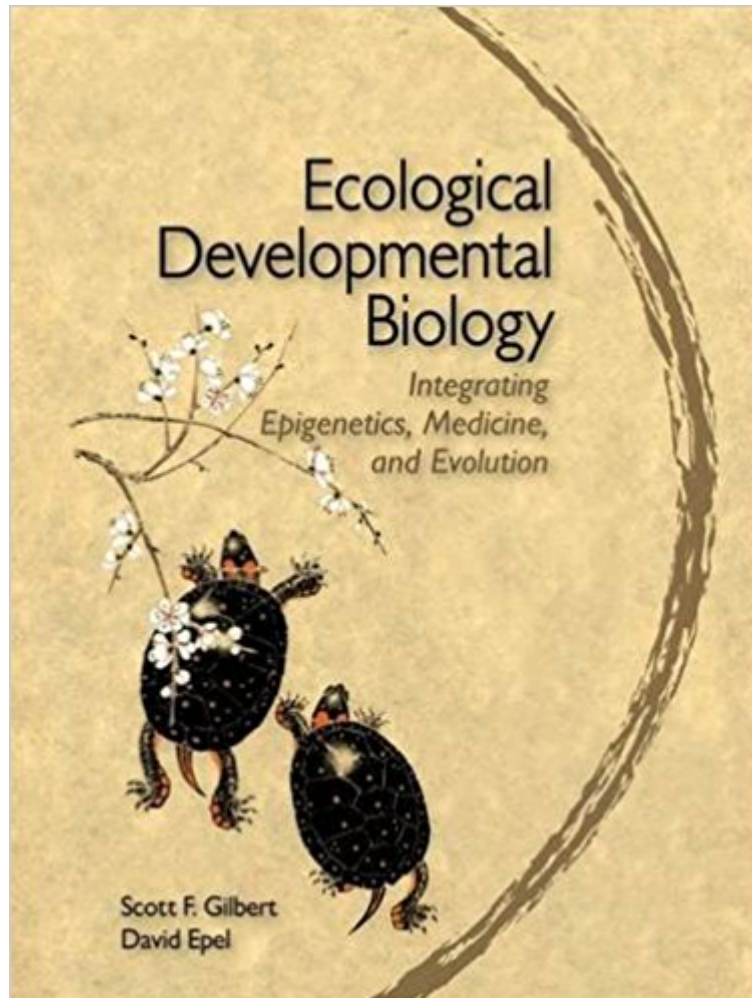


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# Ecological Developmental Biology



## Synopsis

When the molecular processes of epigenetics meet the ecological processes of phenotypic plasticity, the result is a revolutionary new field: ecological developmental biology, or eco-devo. This new science studies development in the real world of predators, pathogens, competitors, symbionts, toxic compounds, temperature changes, and nutritional differences. These environmental agents can result in changes to an individual's phenotype, often implemented when signals from the environment elicit epigenetic changes in gene expression. Ecological developmental biology is a truly integrative biology, detailing the interactions between developing organisms and their environmental contexts. Ecological developmental biology also provides a systems approach to the study of pathology, integrating the studies of diabetes, cancers, obesity, and the aging syndrome into the framework of an ecologically sensitive developmental biology. It looks at examples where the environment provides expected cues for normal development and where the organism develops improperly without such cues. Data from research on teratology, endocrine disruptors, and microbial symbioses, when integrated into a developmental context, may have enormous implications for human health as well as the overall health of Earth's ecosystems. The study of epigenetics changes in gene expression that are not the result of changes in a gene's DNA sequence has recently provided startling insights not only into mechanisms of development, but also into the mechanisms and processes of evolution. The notion that epialleles (changes in chromosome structure that alter gene expression) can be induced by environmental agents and transmitted across generations has altered our notions of evolution, as have new experiments documenting the genetic fixation of environmentally induced changes in development. The widespread use of symbiosis in development provides new targets for natural selection. Ecological developmental biology integrates these new ideas into an extended evolutionary synthesis that retains and enriches the notion of evolution by natural selection.

## Book Information

Paperback: 459 pages

Publisher: Sinauer Associates; 1 edition (December 1, 2008)

Language: English

ISBN-10: 0878932992

ISBN-13: 978-0878932993

Product Dimensions: 1 x 6.8 x 9 inches

Shipping Weight: 1.8 pounds

Average Customer Review: 4.5 out of 5 stars 11 customer reviews

Best Sellers Rank: #527,131 in Books (See Top 100 in Books) #137 in Books > Science & Math > Biological Sciences > Biology > Developmental Biology #451 in Books > Textbooks > Science & Mathematics > Biology & Life Sciences > Ecology #1664 in Books > Science & Math > Biological Sciences > Ecology

## Customer Reviews

The appearance of a textbook is often the culmination of a long process moving a subject from the fringes to the center of a discipline, or perhaps the coalescence of a discipline. Ecological Developmental Biology is such a milestone. --Samuel M. Scheiner, Evolution Brilliantly conceived and executed. I applaud Gilbert and Epel for so clearly showing the rapid methodological and theoretical changes in developmental biology and the corresponding impact on evolutionary theory. Their portrait of these contemporary sciences signifies an important movement of the conceptual parameters by which all biologists might reconsider their governing concepts, teach their science, and practice their craft. --Alfred I. Tauber, Perspectives in Biology and Medicine Gilbert and Epel's work contains a wealth of fascinating information about the biological world, described in a crystal-clear and engaging writing style and with informative, aesthetic figures. This, together with its clear and comprehensive structure, makes the book a didactic masterpiece. Read it and be inspired! Highly conceptual, thought-provoking and beautiful this is biology at its best. --Christine Hassler, Lab Times

Scott F. Gilbert, a Senior Research Associate at Swarthmore College and the Finland Distinguished Professor at the University of Helsinki Institute of Biotechnology, teaches developmental biology, developmental genetics, and the history of biology. After receiving his B.A. from Wesleyan University, he pursued his graduate and postdoctoral research at The Johns Hopkins University and the University of Wisconsin. Dr. Gilbert is the recipient of several awards, including the first Viktor Hamburger Award for excellence in developmental biology education, the 2004 Alexander Kowalevsky Prize for evolutionary developmental biology, honorary degrees from the Universities of Helsinki and Tartu, and the Medal of François I from the Collège de France. He is a Fellow of the American Association for the Advancement of Science, a corresponding member of the St. Petersburg Society of Naturalists, and has been chair of the Professional Development and Education Committee of the Society for Developmental Biology. His research pursues the developmental genetic mechanisms by which the turtle forms its shell. David Epel is the Jane and

Marshall Steel Jr. Professor Emeritus of Biological Sciences at Stanford University's Hopkins Marine Station in Pacific Grove CA. He did his undergraduate studies at Wayne State University and then graduate and postdoctoral studies at the University of California, Berkeley and the University of Pennsylvania. Dr. Epel has been a Guggenheim Fellow, is a Fellow of the American Association for the Advancement of Science, the California Academy of Sciences, and an Overseas Fellow of Churchill College and Life Fellow of Clare Hall at the University of Cambridge. His honors include the Cox Medal for Fostering Undergraduate Research at Stanford and the Ed Ricketts Memorial Award for Lifetime Achievement in the Marine Sciences. Epel's research focuses on the activation of the egg at fertilization, the unique physiology of the embryo, and developing web sites and curricula highlighting early development of the sea urchin embryo to capture the imagination and interest of high school students.

Interested in how environment affects gene expression? This book is a great blend of molecular biology, population genetics and ecology. The examples are easy to understand and support the chapter topics. This is a great book to use in a diverse survey class and is full of discussion topics. The physical book is a smaller text, so not too heavy to carry around. Worth a look if at all related to your field of study.

We read this book for my evo-devo book group. It's pretty meaty for a group of recreational readers, but we got quite a lot out of it. To give you an idea of where these readers were coming from, we're a mix of professionals, only some of whom are even in the life sciences. We've read books like Sean Carroll's before this one. If you've read Carroll's books and want to take the next step, I do recommend this one. I don't know if it's used as a textbook, but it's certainly beyond most popularizations. With this perspective, let me say: the whole group really enjoyed this one. We took three sessions to read it, but found the writing clear and the pictures very helpful. The chapter on endocrine disruptors was especially eye-opening.

LOVE THIS BOOK. Will be interesting for anyone with an interest in developmental biology and the interactions at the gene-environment interface. An easy read for anyone with even a basic biology background.

This book details how epigenetic processes are the key to biological development. This is a crucial new understanding in recent decades that undermines the purely gene-centric view of development

we have had pushed at us for so long, and replaces it with a more holistic view of developmental processes. The book is an excellent guide to the topic.

I have to read this for school and luckily it is not a real textbook so reading it much easier. The pictures are great and I think it does a fairly well job at explaining stuff.

A very good book; must have for anyone wanting to understand evolution. Very good exposition of eco-devo ideas; changed my thinking.

One of favorites during recent weeks

I would say that this is a pioneering book, but I would mis credit Mary Jane West-Eberhard. This book puts the importance of environmental conditions into our gene - centric view of biology. West-Eberhard has argued that phenotypic plasticity is a valid and major driving force behind development and evolution, a voice that is now being echoed by Gilbert and Epel in our hardwired Davidsonian world of molecular biology. This is a great read, especially for grad students who have forgotten the beauty that drew them to biology in the first place and get drugged down by the details of mol bio.

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