Genomic Control Process: Development and Evolution

Isabelle Peter, Eric H. Davidson
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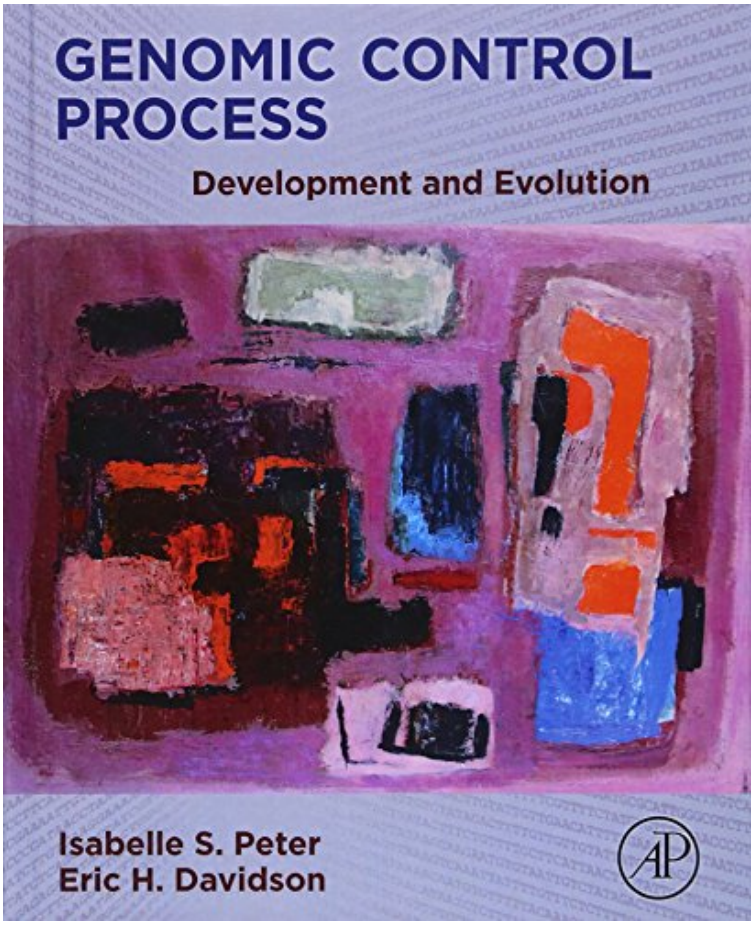

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Isabelle Peter, Eric H. Davidson : Genomic Control Process: Development and Evolution before purchasing it in order to gage whether or not it would be worth my time, and all praised Genomic Control Process: Development and Evolution:

7 of 7 people found the following review helpful. A fascinating book that is easy to read, provided you have dev-bio backgroundBy manoj samantaThis is a fascinating book that puts you years ahead of cutting-edge researchers, and fifty years ahead of what you can learn from college textbooks !! Some knowledge of developmental biology is a prerequisite, because you need to know about the puzzle the authors are trying to solve before seeing their solution. I am a researcher working on understanding the genomes and their evolutionary implications, and no book helped me more than this one.I wrote a review in the blog -http://www.homolog.us/blogs/blog/2015/05/01/a-must-read-book-if-you-like-to-understand-genomes/5 of 6 people found the following review helpful. A fascinating bookBy Wendell S. ReadI am a non-biologist, but I have often wondered how the information in the genome (the DNA) is used to 'build' a mature organism. In so far as it is currently known, this book provides the answer. My concern however was that since

I only have a smattering of self-taught biological information, would I be able to make good use of the book.? The answer is a qualified 'yes'. The concepts presented are clear and understandable. They are however often followed by examples to illustrate the points being made which require specialized biological knowledge which I do not have. An example:"The developmental context or cell type in which the histones around a particular gene will be modified thus depends on expression of both the recruiting transcription factor and the modification enzyme. From what we now know the genome encodes many fewer modification enzymes than it does transcription factors. Thus the same enzymes are recruited by different regulatory factors, depending on the cellular context. For example, the lysine methyltransferase G9a catalyzes H3K9 dimethylation, which is often associated with transcriptional repression. In liver cells, G9a is recruited by the transcription factor E4bp4 to the gene encoding fibroblast growth factor 21 (FGF21) and is required for the repression of this gene (Tong et al., 2013)."I have not yet finished the book, but I am enthusiastically pushing ahead. It is a truly fascinating description of our current understanding of the development of organisms, and the profound implication this information has on evolutionary processes.

Genomic Control Process explores the biological phenomena around genomic regulatory systems that control and shape animal development processes, and which determine the nature of evolutionary processes that affect body plan. Unifying and simplifying the descriptions of development and evolution by focusing on the causality in these processes, it provides a comprehensive method of considering genomic control across diverse biological processes. This book is essential for graduate researchers in genomics, systems biology and molecular biology seeking to understand deep biological processes which regulate the structure of animals during development. Covers a vast area of current biological research to produce a genome oriented regulatory bioscience of animal life Places gene regulation, embryonic and postembryonic development, and evolution of the body plan in a unified conceptual frameworkProvides the conceptual keys to interpret a broad developmental and evolutionary landscape with precise experimental illustrations drawn from contemporary literatureIncludes a range of material, from developmental phenomenology to quantitative and logic models, from phylogenetics to the molecular biology of gene regulation, from animal models of all kinds to evidence of every relevant typeDemonstrates the causal power of system-level understanding of genomic control processConceptually organizes a constellation of complex and diverse biological phenomenaInvestigates fundamental developmental control system logic in diverse circumstances and expresses these in conceptual modelsExplores mechanistic evolutionary processes, illuminating the evolutionary consequences of developmental control systems as they are encoded in the genome

"...highly recommended to a wide range of readers interested in genomics and genomic control mechanisms...This excellent book will be a leading reference for the genomic control process for years to come." --European Journal of Human Genetics "...a fascinating book that came out recently...would like to strongly recommend it to our readers...one of those rare gems that will continue to influence researchers many decades from today." --Homolog.us-BioinformaticsFrom the Back CoverThis volume provides a unifying conceptual framework for the genomic control system that encodes development of the body plan. The authors have dealt with a range of formerly disparate fields to create a synthesis refracted through the lens of gene regulatory networks (GRNs). In this book, without immersing the reader in descriptive details, selected recent results from a great variety of animal model systems are embedded in a conceptual resolution of the control logic underlying the developmental process, and of the changes in that logic by which evolution of the body plan occurs. Both the breadth of the biological processes treated, and the framework conceptual approach makes this an entirely unique work. It is intended for biologists and molecular biologists, with or without expertise in development or evolution per se, but it will also provide illumination for engineers, physicists, mathematicians, for students of any of these fields, and for anyone who feels the requirement to organize their understanding of development or evolution as the output of genomic control processes. The book begins with a consideration of the relative roles of the different levels of control affecting developmental gene expression in animal cells, an overview of the physical nature of the regulatory genome, and the fundamental experimental demonstration of its primacy. The second Chapter provides an in depth understanding of GRNs, of how they generate the regulatory conditions that control all else, of the significance of the cis-regulatory functions operating at the network nodes, of the dynamics of transcriptional activity, and of the Boolean spatial patterns that GRNs output in development. The following three Chapters apply network theory to three different kinds of developmental process: to embryonic development of all major kinds; to development of adult body parts and organs; and to cell fate specification. Chapter 6 examines the conceptual richness that has derived from various approaches to predictive, quantitative models of GRNs and GRN circuits. In the final section of this book much of the foregoing is applied to the conceptual problems of understanding bilaterian evolution, including the underlying explanation of hierarchical animal phylogeny, the flexibility or inflexibility of different aspects of GRNs to evolutionary change, and the discontinuity of evolutionary rates of change, and of how productive evolution of GRNs does and does not occur. The outcome is a set of keys that unlock the apparent mysteries of large aspects of bilaterian evolution.About the AuthorIsabelle S. Peter is Assistant Research Professor and Eric H. Davidson is Norman Chandler Professor of Cell Biology in the Division of Biology

and Biological Engineering at the California Institute of Technology, Pasadena, California. Over the last seven years they have co-authored a series of works on experimental, conceptual and computational analyses of developmental gene regulatory networks, including their evolutionary significance. The discussions and conceptual explorations occasioned by this collaboration produced the new synthetic views encompassed in this book, building on decades of earlier work summarized in the 2001 and 2006 Academic Press books by Eric H. Davidson.Isabelle S. Peter is Assistant Research Professor and Eric H. Davidson is Norman Chandler Professor of Cell Biology in the Division of Biology and Biological Engineering at the California Institute of Technology, Pasadena, California. Over the last seven years they have co-authored a series of works on experimental, conceptual and computational analyses of developmental gene regulatory networks, including their evolutionary significance. The discussions and conceptual explorations occasioned by this collaboration produced the new synthetic views encompassed in this book, building on decades of earlier work summarized in the 2001 and 2006 Academic Press books by Eric H. Davidson.