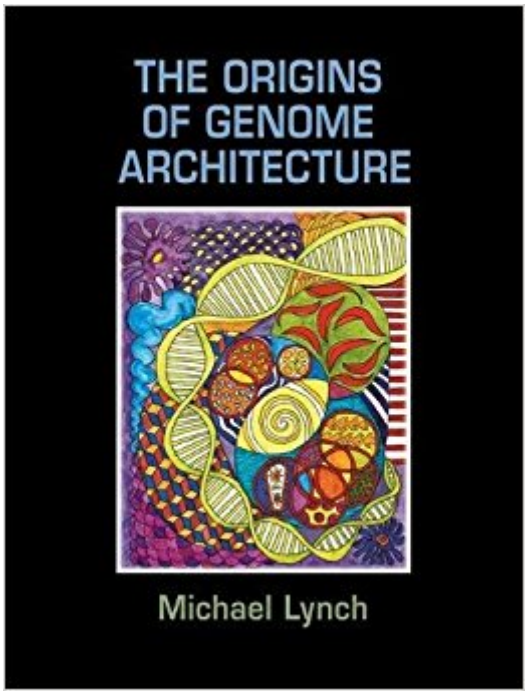
The Origins Of Genome Architecture



Synopsis

With official genomic blueprints now available for hundreds of species, and thousands more expected in the near future, the field of biology has been forever transformed. Such readily accessible data have encouraged the proliferation of adaptive arguments for the evolution of gene and genomic features, often with little or no attention being given to simpler and more powerful alternative explanations. By integrating the central observations from molecular biology and population genetics relevant to comparative genomics, Lynch shows why the details matter.Presented in a nontechnical fashion, at both the population-genetic and molecular-genetic levels, this book offers a unifying explanatory framework for how the peculiar architectural diversity of eukaryotic genomes and genes came to arise. Under Lynch’s hypothesis, the genome-wide repatterning of eukaryotic gene structure, which resulted primarily from nonadaptive processes, provided an entirely novel resource from which natural selection could secondarily build new forms of organismal complexity.

Book Information

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Customer Reviews

"This book is a must-read for every genome researcher. It is the most up-to-date and thorough summary of genome evolution published. Almost every page introduces interesting, unanswered problems, making it a gold mine for graduate students in search of a thesis topic." --Axel Meyer, Nature"If you want a good summary of what genomics has revealed about genome architecture over the last two decades, merged with a nontechnical exposition of the relevant principles of

population genetics, this is the book to get." --Daniel Hartl, Nature Genetics"The book's first twelve chapters are a must-read for anyone interested in the evolution of genomes. As a whole, Origins of Genome Architecture represents a serious, valiant, and highly scholarly attempt at making sense of the new data provided by the genomic revolution. To that aim, Lynch deploys the full array of conceptual tools that make up the modern synthesis paradigm in evolutionary biology." --Massimo Pigliucci, Science"This volume would be an excellent foundation for an upper-level undergraduate course or a graduate seminar. It has become increasingly clear that a blind reliance on the explanatory power of natural selection has led to a lot of "sloppy thinking" and this book is a start toward clearing up some of this problem." --Richard J. Mural, The Quarterly Review of Biology"This is a truly remarkable book, which will forever change your view of evolutionary biology. Anyone with even tangential interest in evolution needs to read the preface, epilogue, and especially the fourth chapter on population size. Lynch takes a detailed knowledge of molecular genetics and genomics, combined with a refined fluency in population genetics, to create sound sweeping descriptions and predictions about evolution. Read Lynch's book, have your students read it, and let's revise our views of evolution." --Root Gorelick, Plant Science Bulletin"Lynch presents a synthesis of molecular genetics and evolutionary biology with a goal of driving new interdisciplinary research and understanding. He succeeds admirably. This extremely interesting book presents genomic evolution in a comprehensive manner and with different perspectives. What makes this volume so useful is that each chapter presents not only what and how, but also why (and why it matters). This book will appeal to everyone interested in genetics, molecular biology, and evolution. It is highly recommended." --D. Carroll, Choice

Michael Lynch is Distinguished Professor of Biology at Indiana University. He received his B.S. in Biology from St. Bonaventure University, and his Ph.D. in Ecology from the University of Minnesota. Dr. Lynch has served as President of both the Society for the Study of Evolution and the American Genetic Association, and is a past council member of the Society for Molecular Biology and Evolution, and a fellow of the American Academy of Arts and Sciences. His research is focused on mechanisms of evolution at the gene, genomic, cellular, and phenotypic levels, with special attention being given to the roles of mutation, random genetic drift, and recombination.

Dr. Lynch is right about a great many things, and gives a lengthy review about many relevant topics regarding evolution and population genetics. The only charge against this book is the author's language: while discussing a rigorous subject, lengthy, deeply complex sentence structures make

the subject a challenge to understand. The book is worth reading, but it will not be easy.

This is not a course book in the field but not a beginners book either however quite much scientific references are accompanying ideas. I recommend for everyone interested in genetics.

A must have if you are an evolutionary biologist. Excellent book.

If you ever wondered why the genome behaves in a certain manner and how certain changes in the genome ever came to be, then this is the book for you. Brilliantly written by one of the authority's in genome architecture. Read Dr. Lynch paper in Science 2000.

An excellent book for people interested in molecular evolution, origin of eukaryotic organims, parasitic genetic elements, etc. The topics on populational genetics, despite the effort of the author, are still boring and not attractive.

This book covers fundamental concepts in evolution and described how various evolutionary forces act together to drive the evolution of organisms from the genomic, protein, systematic level etc.. Although epigenetics do play an important role in the shaping of life, it is undoubtedly factual that DNA, at the basic level, encodes majority of information for any organisms to survive and thrive. Therefore, the architecture of DNA (genome) and its evolution remains the ultimate question in the field of biology.This book is NOT for people who are just starting to learn biology or evolution. It is mathematics heavy and biology heavy and definitely requires at least graduate level understanding of said topics. However, that being said, I can imagine that college students who are interested in graduate school would also benefit from reading this book, as this book touches biology from a very comprehensive and systematic level.Simply put, this book has opened my eyes to the grand picture of biology and makes me passionate about it.

I read this book the year it came out and am still re-reading it regularly. In the meantime, I learned some population genetics, which makes it much easier for me to understand now. As other reviewers have said, it is a deep and careful study; not easy reading, but very, very rewarding if you are interested in evolution and the genome.

Lynch makes the case that the transition from prokaryote to eukaryote - and the evolution of

multicellularity and greater complexity afterward - are best explained by non-adaptive processes. Genetic drift, rather than natural selection, may have cause the necessary genome expansions that we see in the higher lineages, along with increasing amounts of ambiguous, non-coding DNA with no known purpose.Lynch's case is an extremely strong, refreshing and compelling one. His writing is clear and simple, considering the subject matter. However, this is not quite a beginner's book. Lynch's case is fairly one-sided; he does not give an enormous amount of consideration to alternative possibilities, whether such alternatives necessarily invoke natural selection or not. Reduced population size is certainly symptomatic of increased organismal complexity and size. It does not automatically follow that it is caused by this reduction. Further, we should be careful about invoking traditional population genetics theory in light of more recent genomics work, which challenges many of the traditional core assumptions. Note, this is a caveat, and not a criticism (hence, the 5-star rating); Lynch is simply making his case. Nonetheless, this approach could lead a new reader to assume that the case is closed - that Lynch's explanation is comprehensive and there is no more work to be done.In reality, this book, along with many of Lynch's recent publications in prestigious journals, open whole avenues of investigation which need urgent attention. Lynch and his contemporaries appear to be well-equipped to undertake this work.

Files Book 2) Combinatorics of Genome Rearrangements (Computational Molecular Biology) The Genome War: How Craig Venter Tried to Capture the Code of Life and Save the World