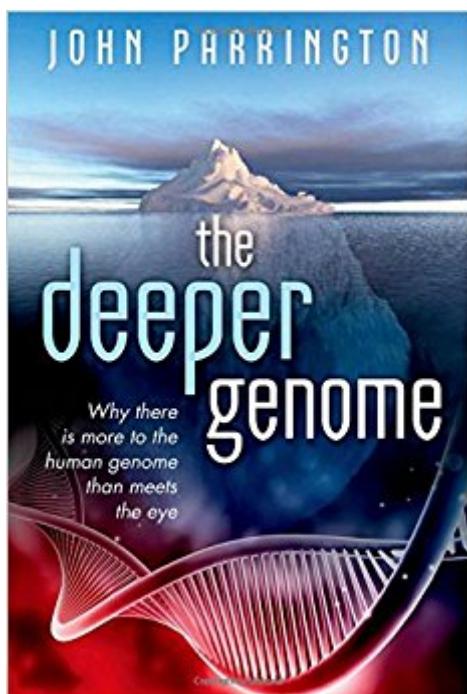


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The Deeper Genome: Why There Is More To The Human Genome Than Meets The Eye



Synopsis

Over a decade ago, as the Human Genome Project completed its mapping of the entire human genome, hopes ran high that we would rapidly be able to use our knowledge of human genes to tackle many inherited diseases, and understand what makes us unique among animals. But things didn't turn out that way. For a start, we turned out to have far fewer genes than originally thought - just over 20,000, the same sort of number as a fruit fly or worm. What's more, the proportion of DNA consisting of genes coding for proteins was a mere 2%. So, was the rest of the genome accumulated 'junk'? Things have changed since those early heady days of the Human Genome Project. But the emerging picture is if anything far more exciting. In this book, John Parrington explains the key features that are coming to light - some, such as the results of the international ENCODE programme, still much debated and controversial in their scope. He gives an outline of the deeper genome, involving layers of regulatory elements controlling and coordinating the switching on and off of genes; the impact of its 3D geometry; the discovery of a variety of new RNAs playing critical roles; the epigenetic changes influenced by the environment and life experiences that can make identical twins different and be passed on to the next generation; and the clues coming out of comparisons with the genomes of Neanderthals as well as that of chimps about the development of our species. We are learning more about ourselves, and about the genetic aspects of many diseases. But in its complexity, flexibility, and ability to respond to environmental cues, the human genome is proving to be far more subtle than we ever imagined.

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Customer Reviews

"The Deeper Genome is unique in that it provides an entertaining tale of personalities with lots of useful technical knowledge. We highly recommend the book as a supplement for classroom teaching as it covers fundamental concepts in an easily readable format. Students will likely find it even more interesting than many of the more standard textbooks. ... The Deeper Genome is a great read that definitely imparts knowledge in an entertaining fashion and connects the almost 99 percent of the genome that is not protein coding to all sorts of interesting questions. We highly recommend it." --Dov Greenbaum and Mark Gerstein, Cell "This informative, highly readable book addresses scientists' current understanding of noncoding DNA. ... All in all, this is a valuable book for anyone wishing to explore the newest discoveries, and the implications of these discoveries, in a rapidly expanding field. Highly recommended." --CHOICE

John Parrington, Associate Professor and University Lecturer in Cellular & Molecular Pharmacology, University of Oxford John Parrington is an Associate Professor in Molecular and Cellular Pharmacology at the University of Oxford, and a Tutorial Fellow in Medicine at Worcester College, Oxford. He has published over 80 peer-reviewed articles in science journals including *Nature*, *Current Biology*, *Journal of Cell Biology*, *Journal of Clinical Investigation*, *The EMBO Journal*, *Development*, *Developmental Biology*, and *Human Reproduction*. He has extensive experience writing popular science, having published articles in *The Guardian*, *New Scientist*, *Chemistry World*, and *The Biologist*. As a British Science Association Media Fellow he has worked as a science journalist at *The Times* for 7 weeks where he published 22 articles. He has also written science reports for the Wellcome Trust, British Council, and Royal Society.

asdfl study sociobiology in general, and the sociobiology of *Homo sapiens* in particular. The population genetics of the New Synthesis is now verging on a century old, and it is firmly grounded in a conception of genetic information transmission that is clearly out of date. I have been studying epigenetics and epistasis to understand the complex nature of multicellular organisms and social species. The most important thing I have learned so far is that the traditional idea of how information is passed from a biological entity to its daughter copies goes far beyond Mendelian segregation. This book describes contemporary genetic research in to complex information transfer mechanisms in the genome. It requires that the reader know something about molecular biology, but not that much. The description is very well done, and the bibliography is extensive and well directed. Most fascinating is the author's argument that the complexities of the genome require that we go beyond

the "reductionism" that has guided microbiological research and theory for more than a century. It is not clear what the alternative is, but some of the readings in the bibliography do give some indications.

This is worth the many re-reads required to understand it. I will read it again and probably again. It is complicated but not opaque.

A lot of technical stuff but if you are not a biochemist you can glide on and get the core of the information which is very interesting and revolutionary in its view of genetics.

Liked this very much.

According to John Parrington, his interest in writing this book developed from a concern about how our genomes make us human. What the author purports to do is find a middle ground between two views: one that states that the complexities of the human condition can be reduced to hypothetical "genes," and the other that views things as more complex, yet rejects the idea that we have learned any useful information from the genome project. He brings to the table many years experience studying genes and their function. In the process, he challenges some long held beliefs in biology, such as the treatment of genes in isolation and the very definition of a gene. What's interesting, and what got my attention in this book, is how newly recognized features of the genome have played a fundamental role in the emergence of *Homo sapiens* as a unique species. He begins by discussing the work of Darwin, Wallace, Mendel, Flemming, Mayr, Crick, Watson, and many others too numerous to mention here. These people laid the foundations for our knowledge base on genetics that we have today. It would be helpful if the reader had at least a rudimentary knowledge of genetics for a better grasp of the material present here, I feel. Beginning with chapter three, we delve into what I find very fascinating. I have always thought that the concept of natural selection and mutations was too simple. I felt evolution needed a more pliable, more complex genome machinery than we have assumed. Parrington shows us just how complex this genome really is according to recent studies. He discusses switches, importance of histones, enhancers, introns, and the fact that the "junk" designation for most of the genome may be, in fact, misleading. RNA seems to play a bigger role than we thought. We learn of RNA as a catalyst, as self-replicating, the RNA-induced silencing complex, RNA interference, non-coding RNAs, siRNA, miRNA, piRNA, and lcrRNA. Other tantalizing findings of the genome are "its 3D character, the mobility of genetic elements, and links

between genes and the environment mediated by epigenetic mechanisms." There are topologically associating domains and even 'transcription factories.' There is even some evidence now that Lamarck may not have been entirely off base in his belief that the environment can shape the genome, and that these changes can be passed down - think epigenetics. This all makes sense. Life is complicated, and it would need to be accompanied by a sophisticated, complex genome machine so life can evolve. Parrington devotes some space to discussing genes and disease, where we find out that "the genetic basis of human disease is itself turning out to be far more complicated than many people had predicted." In the final chapters, the author discusses what it is that makes us human and there is also a section on the genome and the brain. Throughout the book, he relates how the ENCODE (ENCyclopedia of DNA Elements) project mapped out diverse biochemical activities across the entire genome. He concludes that "the findings of such analyses are revealing an undreamt of complexity in the genome." His hope is that this book will stimulate a desire to learn more about the workings of the genome and how we are affected. But he also hopes "that it has reaffirmed the importance of what truly distinguishes our species."

excellent book, although not really written for the general public. I own both audio and kindle versions. As a PhD graduate student am using it to help get ideas for research proposals and as a brush up for my required prelims.

The state of the art changes weekly. This treatment is probably as up-to-date as it's reasonable to expect. And it's very well written and presented.

A very densely written, but also very informative account of genetics and genomics research. Patient readers will definitely learn a lot by reading it.

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