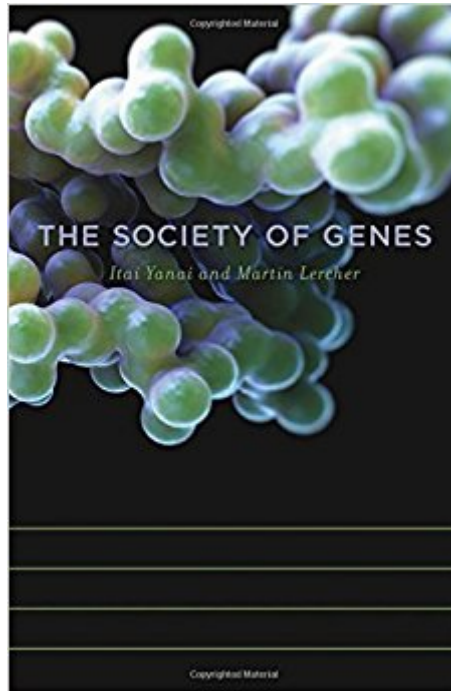




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# The Society Of Genes



## Synopsis

Nearly four decades ago Richard Dawkins published *The Selfish Gene*, famously reducing humans to “survival machines” whose sole purpose was to preserve “the selfish molecules known as genes.” How these selfish genes work together to construct the organism, however, remained a mystery. Standing atop a wealth of new research, *The Society of Genes* now provides a vision of how genes cooperate and compete in the struggle for life. Pioneers in the nascent field of systems biology, Itai Yanai and Martin Lercher present a compelling new framework to understand how the human genome evolved and why understanding the interactions among our genes shifts the basic paradigm of modern biology. Contrary to what Dawkins’s popular metaphor seems to imply, the genome is not made of individual genes that focus solely on their own survival. Instead, our genomes comprise a society of genes which, like human societies, is composed of members that form alliances and rivalries. In language accessible to lay readers, *The Society of Genes* uncovers genetic strategies of cooperation and competition at biological scales ranging from individual cells to entire species. It captures the way the genome works in cancer cells and Neanderthals, in sexual reproduction and the origin of life, always underscoring one critical point: that only by putting the interactions among genes at center stage can we appreciate the logic of life.

## Book Information

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## Customer Reviews

Yanai and Lercher invite the reader to step back and observe how genes assemble together to make a global genetic system, or genome. [It] largely succeeds in translating the findings of

an esoteric science into something that is easily understood. The Society of Genes represents a timely and welcome handbook for navigating this postgenomic era. (Joseph Swift Science 2016-03-25) Using findings from the molecular revolution that only really got going in the 1980s, the authors build up a picture of networks of genes forming guilds in order to preserve their DNA dynasties. [This] lively text contain[s] a panorama of examples illustrating how genes do better by combining forces in networks. (Charalambos P. Kyriacou Times Higher Education 2016-03-24) Yanai and Lercher use the idea of a society of genes as a vantage point from which to reintroduce the entire field of evolutionary genetics. Even experienced readers are likely to encounter perspectives that are unexpected enough to make the book worth their effort. Readers meeting biology for the first time will be well served by this richer, more nuanced, way of viewing genetics, while those with a deeper background will find plenty of interest, notably in the vivid clarity of the explanations. (Bob Holmes New Scientist 2016-01-16) If you're looking for a somewhat less hot in genetics in 2016, this book wouldn't be a bad place to start. It covers a huge number of topics from the basics of genetics to genome editing, antimicrobial resistance and the functions of junk DNA. We need books like this. (Simon Hazelwood-Smith BioNews 2016-04-18) The writing is engaging and clear, providing ample introductory material to ensure that the interested lay reader will be swept along by both the science and the evolutionary story. For the general reader, Yanai and Lercher's discussions of cancer, immunology, sexual reproduction, and population genetics are well worth exploring. (Publishers Weekly 2015-10-19) Written by two of the smartest young thinkers in their fields, The Society of Genes is an absorbing, thought-provoking exploration of the intersection of genetics, evolutionary biology, and society. (Eric Lander, Professor of Biology at MIT and founding director of the Broad Institute of MIT and Harvard) The Society of Genes is punchy, provocative, and timely and a must-read for us all. (Michael Levitt, Professor of Structural Biology at Stanford University and Recipient of the 2013 Nobel Prize in Chemistry) Well worth the interested reader's attention. (M. Taylor Choice 2017-01-01)

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I must admit I am from the field, however I often read general books like this one in order to understand how to convey complex scientific ideas to the general reader. I read most of the book

over the weekend. I think it is written very well. It has very clear examples. It is thought provoking. Some ideas are renewed, others are novel. I truly believe it reaches a niche of clever readers who are not biology savvy.

This is an extremely interesting primer (and then some) on the nascent field of the systems biology of living systems, at least for those who are willing to write down a large number of new terms for future reference (a glossary would have been helpful). The thesis is that it is a huge society of genes within every living organism that is selfishly devoted to propagating itself to future generations, not the individual gene of Peter Dawkins's "The Selfish Gene". The question of why remains unanswered. We learn a lot about the details of evolution, mutations, regulation of cell growth, and the cellular details of natural selection. The gene is a coherent pattern of molecules containing the information about how to make large molecules called proteins, which perform most of the functions carried out in the cell. We also learn, surprisingly, that the process is grossly inefficient. The human genome consists of 20,000 genes, and there are 1.5 billion copies of the human genome in the human body, not all containing the same genes. Only about one-third of all genes in the human genome are productively employed in the success of the human organism, while the other two-thirds are basically free loaders that trick the productive genes into carrying them along into the next generation, and the next. One is tempted to make some connection between this behavior of our genes and our own behavior as members of society. With the advent of rapid genome mapping, one can provide a genetic answer to the old question of how different are "we" and "them". It seems that any two people on the planet are 99.9% the same in terms of their genomes, which translates into 6 million different letters out of a total 6 billion letters in the human genome, but that only about 15% of this 0.1% difference distinguishes different populations from different parts of the world. There is much more genetic variation among different populations within Africa than between European or Asian populations, which left Africa 50,000 years ago, and the present African population in the region from which they are believed to have migrated. The main difference between chimpanzees and humans is that chimps have 24 chromosomes (the famous double helix of DNA strands) and humans have 23, so that 2 of the chromosomes in the common ancestor must have fused together at some time during human evolution. The genomes of chimps and humans differ by about 4%. I don't even want to get into the oyster and fruit fly.

This book is wonderful! I found it completely accessible, and enthralling. Itai Yanai and Martin Lercher's research is insightful and may very well lead the way in a field that is ever more prevalent. I would recommend this book as a must read, in particular for anyone eager to know about the mysterious world of genetics and it's most current direction. It's clear, concise, and thought-provoking, with just the right balance of science and humanity.

This is a well-informed book that would have had a higher impact if the authors had avoided the extreme and unreasonable anthropomorphism that characterizes the book, even in the title! At the same time, teleological expressions such as "need", "must", "have to" may give to lay readers the impression that "life will find a way" somehow. The authors are of course aware of what they are doing and they acknowledge it on pages 37-38, where they write that "Anthropomorphising provides a convenient shorthand for discussing many processes". They also note that readers should remember the full description behind the shorthand". I absolutely agree. But can all readers do that? People do not need to be advocates of intelligent design/creationism in order to think in terms of final ends and purposes. Extensive research in psychology shows that this comes naturally to all of us (e.g. see the work of Deborah Kelemen at Boston University). I am very concerned that rather than being a useful book that would explain evolution and genes, this book will only help to enhance readers' teleological biases and leave them more confused than before about cause and effect in evolution. For this reason, this is a book that - I am afraid - lost a big opportunity to educate non-experts. Beyond that, readers with a clear understanding that evolution is a purposeless and unintentional process, and that any teleological explanations make sense only if they explicitly invoke natural selection (but not in the way the authors of this book do), will found useful information in this book, and some very insightful illustrations. Writing in a non-technical manner is important, but readers' minds are not blank. Readers have preconceptions, stemming from cognitive biases, and so authors had better avoid any language use that might enhance these.

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