



The Cooperative Gene: How Mendel's Demon Explains the Evolution of Complex Beings

Mark Ridley

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Why isn't all life pond-scum? Why are there multimillion-celled, long-lived monsters like us, built from tens of thousands of cooperating genes? Mark Ridley presents a new explanation of how complex large life forms like ourselves came to exist, showing that the answer to the greatest mystery of evolution for modern science is not the "selfish" gene; it is the "cooperative" gene. In this thought-provoking book, Ridley breaks down how two major biological hurdles had to be overcome in order to allow living complexity to evolve: the proliferation of genes and gene-selfishness. Because complex life has more genes than simple life, the increase in gene numbers poses a particular problem for complex beings. The more genes, the more chance for copying error; it is far easier to make a mistake copying the Bible than it is copying an advertising slogan. To add to the difficulty, Darwin's concept of natural selection encourages genes that look out for themselves, selfish genes that could easily evolve to sabotage the development of complex life forms. By retracing the history of life on our planet -- from the initial wobbly, replicating molecules, through microbes, worms, and flies, and on to humans -- Ridley reveals how life evolved as a series of steps to manage error and to coerce genes to cooperate within each body. Like a benign and unseen hand -- what Ridley calls "Mendel's Demon" -- the combination of these strategies enacts Austrian monk Gregor Mendel's fundamental laws of inheritance. This demon offers startling new perspectives on issues from curing AIDS, the origins of sex and gender, and cloning, to the genetics of angels. Indeed, if we are ever to understand the biology of other planets, we will need more than Darwin; we will need to understand how Mendel's Demon made the cooperative gene into the fundamental element of life.

What does the cooperative gene tell us about our future? With genetic technology burgeoning around the world, we must ask whether life will evolve to be even more complex than we already are. Human beings, Ridley concludes, may be near the limit of the possible, at least for earthly genetic mechanisms. But in the future, new genetic and reproductive biosystems could allow our descendants to increase their gene numbers and therefore their complexity. This process, he speculates, could lead to the evolution of life forms far stranger and more interesting than anything humanly discovered or imagined so far.

Written with uncommon energy, force, and clarity, "The Cooperative Gene" is essential reading for anyone wishing to see behind the headlines of our genetic age. It is an eye-opening invitation to the biotech adventure humanity has already embarked upon.

The Cooperative Gene: How Mendel's Demon Explains the Evolution of Complex Beings Details

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Lucas says

Covers some similar material as Adam's Curse- the degenerating Y chromosome of Adam's Curse is the 'mutational meltdown' of this book, though Ridley never talks about the Y chromosome.

All organisms have to deal with replication errors, and Ridley suggests that the history of life can be framed as a series of innovations that drive up the number of genes an organism might have- more genes means more damaging mutations which can drive the entire species to extinction, unless there's a mechanism that can deal with those mutations- sexual reproduction being one of the most prominent ones.

Ridley repeats himself so frequently it's often difficult to figure out when to start paying attention to the text when something new is being explained. I liked Sean Carroll's frequent illustrations using real examples, anecdotes calling out genes specifically, and there are far too few here. Even if an author wanted to make the same point twenty times over, if they have twenty concrete and detailed examples I would happily read through them, I have a much harder time with artificial and fanciful analogies. There are a series of bizarre biblically inspired illustrations and speculation on the error correcting mechanisms of an angel or god, which I think are supposed to be mildly humorous.

The end of the book talks about the extremely high mutation rates present in humans, but doesn't dig very far into resolving whether those rates could be caused by our technological civilization (or some other cause that hasn't been around for more than a few thousand years) rather than being inherent to the species.

Walt says

This was a very interesting book, but seems somewhat incomplete. As a description of the effect of genetics on the ability of populations to evolve "complexity," somewhat circularly defined as number of genes, it does fairly well. The problem of mutation is a very important one for organisms to deal with, especially as they become larger. And the likely benefits of sexual reproduction and anisogamy (unhelpfully called "gender") especially with regards to the effects of mitochondria and meiosis on reproduction, provide useful context in understanding past influences on present reproductive patterns. But this is only about half the book. The remaining half attempts to use this understanding to project future patterns of complex life. And this is where I think defining complexity in terms of genetics is unhelpful. Really complex patterns of behavior found in social organisms must be understood at higher levels in order to make any sense, and such context is not present here. While this has some really important ideas, it isn't organized very well and doesn't really explore the consequences of these ideas.

Gordon Gatis says

A challenging but very interesting book. Well worth reading. The book is rich in detail and explanation and the author demonstrates his wit and knowledge throughout. Why have different life forms appeared on Earth, and what is the point of sex? These and many more interesting and thought provoking questions are asked

and answered. A stimulating read. Recommended.

Meira Louis says

While I loved this book, my only copy was absconded a number of years ago. Its well written, interesting, and brings forward new ideas even if you know your evolutionary biology.

Chongkai says

Could give it a five start if not the slow part of Chapter 2 and 3.
