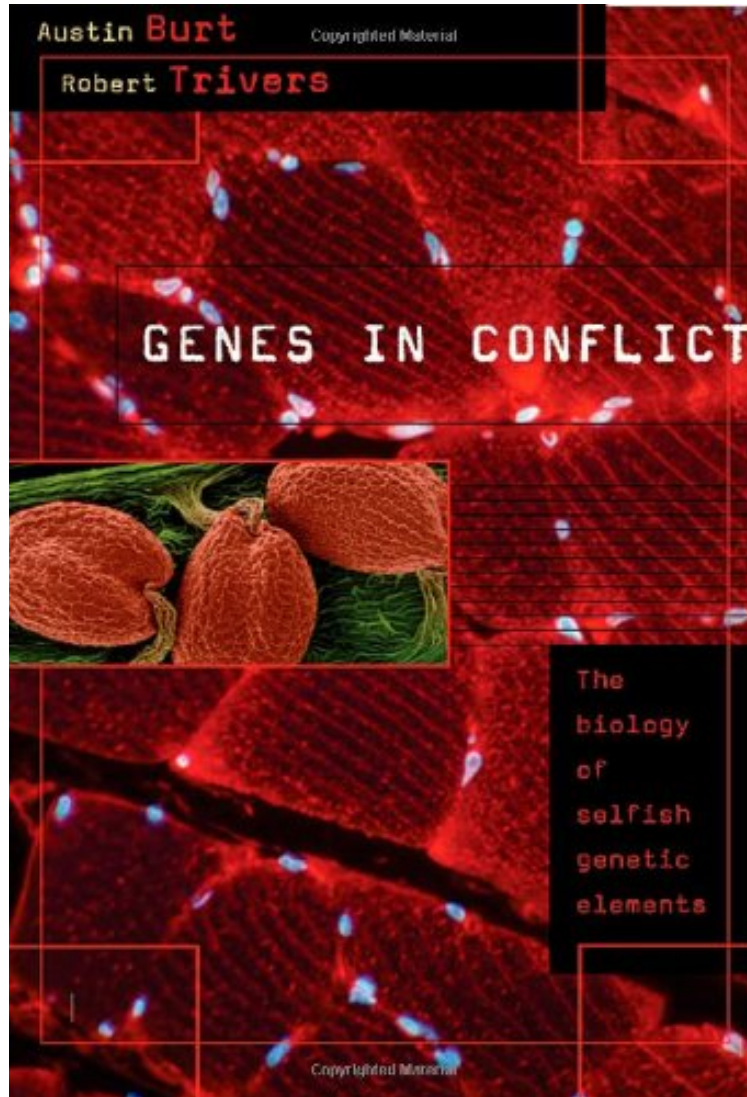


[Free and download] Genes in Conflict: The Biology of Selfish Genetic Elements

## Genes in Conflict: The Biology of Selfish Genetic Elements

*Austin Burt, Robert Trivers*

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**Austin Burt, Robert Trivers : Genes in Conflict: The Biology of Selfish Genetic Elements** before purchasing it in order to gage whether or not it would be worth my time, and all praised Genes in Conflict: The Biology of Selfish Genetic Elements:

37 of 40 people found the following review helpful. FascinatingBy Dr. Lee D. CarlsonThe concept of a "selfish gene" has made its way into the popular and semi-popular press, and because of this has provoked many discussions in ethical circles as well as in the area known as evolutionary psychology. Some of these discussions attempt to set the record straight on just what biologists mean when they talk about selfish genes. This book could be considered part of

these discussions, and offers the reader a fascinating account of the science behind what the authors call selfish genetic elements. The book however is not written for the popular audience, but instead assumes a strong background in genetics. However the authors have included a terminology section in the back of the book to assist non-experts in genetics (such as this reviewer). The authors are very careful to make distinctions between what is known about selfish genes and what constitutes speculation. For readers who still need more discussion over and above what the book gives, there is an extensive list of references included. In addition, the authors include a very detailed summary of the book in the last chapter. Every page of this book is filled with interesting insights, and many questions are answered as well as raised. Some of the questions that this reviewer found interesting include:

1. What are the natures of genomic exclusion systems wherein chromosomes are discarded from one parent and transmit only those from the other parent?
2. Why did paternal genome loss (PGL) evolve? Was it because of bacterial endosymbionts manipulating the chromosomes of their hosts, and if so, what evidence is there for this? How common is PGL?
3. What is hybridogenesis and in what species does it occur? Why did it evolve?
4. Androgenesis is the loss of the maternal genome. How common is it and how risky is it for the species in which it occurs?
5. The chromosomal system of the fungus gnat is described in the book as the most complex of any organism. What is the nature of this complexity? And why do these gnats need such a complicated system?
6. Are there any species whose genome can benefit from outbreeding with closely related species?
7. How does a length of DNA distort its own transmission?
8. How fast do selfish genetic elements spread?
9. Can techniques from genetic engineering, such as transgenic strategies, suppress the spread of selfish genetic elements?
10. Can the spread of selfish genetic elements be suppressed by recombination?
11. What is the nature of segregation disorder? How did it evolve?
12. The t haplotype in mice spans one third of chromosome 17, making it very large. How is such a large section of DNA inherited? Why does it show drive in only one sex and what are the consequences of this?
13. What effects do selfish genetic elements have on the phenotype of the organism in which they occur?
14. What similarities are there between selfish genetic elements in terms of their genetic structure?
15. Can selfish genetic elements be created using techniques from genetic engineering?
16. What is the nature of maternal-effect dominant embryonic arrest (Medea)?
17. Why are maternal-effect killers more common than gamete killers?
18. Gametophyte factors are genes that act in the styles of plants in order to kill pollen in which they are absent. Why are they so prevalent?
19. Do killer X chromosomes ever cause species extinction?
20. In what species do killer Y-chromosomes occur?
21. Why is Y drive expected to cause more population extinction than X drive?
22. Why are killer sex chromosomes more prevalent in insects (dipterans) than mammals?
23. Why did meiotic sex chromosome inactivation evolve?
24. What is the nature of genomic imprinting? Why did it evolve?
25. Can genetic memory extend back for more than one generation?
26. Why do adult male chimeric mice possessing a large amount of parthenogenetic cells in their brains very aggressive towards other males?
27. Can imprinted genes affect brain function, and if so, what are the consequences of this for the organism?
28. Why do selfish mitochondrial genomes have a replication advantage over normal mitochondrial genomes in selection within organisms?
29. What evidence is there that uniparental inheritance evolved to prevent the spread of selfish mitochondria?
30. Why did doubly uniparental inheritance (DUI) evolve in freshwater mussels?
31. Does DUI lead to more recombination, and therefore to more effective evolution?
32. What is cytoplasmic male sterility (CMS) and how is it used in hybrid seed production in plants?
33. Homing endonuclease genes (HEG) can transfer between species. What advantages does this have for the persistence of these genes?
34. How are artificial HEGs used in genetic engineering?
35. Can selfish genetic elements be used to cure human diseases?
36. Transposable elements are described as being the most prevalent of the selfish genetic elements. What different types of transposable elements are there?
37. What are helitrons?
38. Why do DNA transposons persist for so long?
39. What evidence is there for the horizontal transmission of DNA transposons?
40. Are there any beneficial consequences of transposable element inserts?
41. About one-half of the mammalian genome is composed of transposable elements. What advantages does the genome have in possessing such a large number of transposable elements?
42. Large genomes have been shown to reduce the number of cells per unit brain size and the number of interconnections between them. What is the connection, if any, between selfish genetic elements and the intelligence of the organism?
43. Through more research of the type described in many parts of this book, will it be shown that every organism has some type of selfish genetic element? If some species lack selfish genetic elements, why do they have this property and what caused these elements to be suppressed in the course of evolution?
44. Do selfish genetic elements have any connection with determining sexual preferences in humans?
45. Can selfish genetic elements be induced by environmental or external pressures?

0 of 0 people found the following review helpful. A good review that non experts can understand. By Jackson John I would highly recommend this book for any general reader or student seeking a reference or an extensive overview of selfish genetic elements in just one book. The book is also remarkable for pursuing "selfish gene" insights down to their molecular level. Since it is six years old, let's hope the authors eventually compile a new edition, it could become a reference for selfish genetic elements. 0 of 0 people found the following review helpful. Great Book By Frances Walker If you are looking for a well written review of the genetics of selfish elements and other genetic mechanisms, this is the book for you!

In evolution, most genes survive and spread within populations because they increase the ability of their hosts (or their

close relatives) to survive and reproduce. But some genes spread in spite of being harmful to the host organism by distorting their own transmission to the next generation, or by changing how the host behaves toward relatives. As a consequence, different genes in a single organism can have diametrically opposed interests and adaptations. Covering all species from yeast to humans, *Genes in Conflict* is the first book to tell the story of selfish genetic elements, those continually appearing stretches of DNA that act narrowly to advance their own replication at the expense of the larger organism. As Austin Burt and Robert Trivers show, these selfish genes are a universal feature of life with pervasive effects, including numerous counter-adaptations. Their spread has created a whole world of socio-genetic interactions within individuals, usually completely hidden from sight. *Genes in Conflict* introduces the subject of selfish genetic elements in all its aspects, from molecular and genetic to behavioral and evolutionary. Burt and Trivers give us access for the first time to a crucial area of research now developing at an explosive rate that is cohering as a unitary whole, with its own logic and interconnected questions, a subject certain to be of enduring importance to our understanding of genetics and evolution.

Robert Trivers is an under-appreciated genius, and one of history's greatest thinkers in the analysis of behavior and emotion. (Steven Pinker, Johnstone Professor of Psychology, Harvard University, and author of *The Blank Slate* and *How the Mind Works*) Most of us have met at least one person who stands out as the epitome of logical thinking, someone you can trust to see the flaws in any erroneous conclusion and resolve the needle of signal in a haystack of seemingly discordant data. Austin Burt is that person for me, and his new book on genetic conflict reflects this intellectual prowess. (Bill Rice) *Genes in Conflict* is a well-written and beautifully organized synthesis that forges a link between evolutionary and molecular biology. It should be read by evolutionary biologists wishing to learn more about the menagerie of selfish genetic elements and by molecular biologists wishing to gain some evolutionary insights into their particular systems. (David Haig) Just over ten years ago, Trivers joined forces with geneticist Austin Burt for a detailed study of selfish genetic elements, and *Genes in Conflict* is the result of their fruitful collaboration. The book is the first of its kind and admirably fills an empty niche. (James F. Crow *Nature* 2006-03-30) *Genes in Conflict*, by evolutionary geneticist Austin Burt and biologist Robert Trivers, is the first book to review the vast empirical literature on selfish genetic elements. It reveals how widespread these elements are in nature, what evolutionary effects they have had on fundamental aspects of the genetic system itself (such as its size, organization, and degree of recombination), and how they influence reproduction, development, and behavior. While enthusiastically addressing the ever-accelerating advance of genetic conflict studies, the authors also take care to identify many open questions. Their fascinating and comprehensive book provides a gold mine for anyone entering the field. (Peter Hammerstein and Edward H. Hagen *Science* 2006-04-28) *Genes in Conflict* is an important contribution to biology and to the humanities: for biology, because it collects and represents a comprehensive source of information on the developing understanding of selfish Code; for the humanities, because it forces a reconceptualization of what all of 'life' is, and then perhaps, what it might become. (Nicholas Ruiz III *Metapsychology*) *Genes in Conflict* is the first book to review all aspects of this topic in depth. At just over 600 pages, it is a weighty and impressive work, and will undoubtedly serve as the major source of reference for years to come. Few, if any, biologists have expert knowledge on all of these fields, and many of the facts that they describe were unknown to me. I have certainly learnt a lot about systems of which I was ignorant or only dimly aware. For the topics where I do know something, the level of accuracy is very high. *Genes in Conflict* is an outstanding contribution to the literature on evolution, and can be read profitably by all kinds of biologists. (Brian Charlesworth *Current Biology*) Burt and Trivers offer a comprehensive, extensively referenced description of selfish genetic elements in eukaryotes. The book begins with a summary of these elements, followed in subsequent chapters by in-depth descriptions of specific classes of selfish DNA. In addition to providing a detailed description of various forms of selfish DNA, the book discusses a number of interesting topics relating to these genetic elements. Faculty would find many of these topics a useful springboard for discussions in genetics and other classes. (P. Guilfoile *Choice*) Thought provoking. In their 602-page opus, Burt and Trivers provide a plethora of exciting case studies. Although there is no lack of data to discuss, the authors emphasize repeatedly how little we really know about this area of evolution and biodiversity. I found the tone of this book to be very engaging. It is full of details that have been woven together into a very readable, well-organized package. Of importance for the nonspecialist reader, Burt and Trivers succeed in conveying complex concepts in population genetics without using mathematical equations. What a gift to graduate students and all researchers who are just entering this field of evolutionary biology! I found at least a dozen good projects for Ph.D. theses suggested within the pages of this book, and I am sure that there are many more. (Fred Gould *American Scientist* 2006-11-01) Some genes take advantage of the environment created by the cooperation of most of the others to advance their own rate of transmission. With their book *Genes in Conflict*, Burt and Trivers bring to the forefront this intragenomic treachery, revealing that genetic incompatibilities are diverse in form, widespread in nature. Perhaps most provoking is that these conflicts have significantly influenced the evolution of genomes, populations, and species. To this end they have synthesized a huge body of literature with the goal of understanding all aspects of genetic conflict in eukaryotic genomes without ignoring any fact of biology where studies have been done. Much of this literature had lacked previous review. In each chapter

Burt and Trivers are careful to demarcate the numerous questions awaiting answer, ending the book with a summary of future directions, as well as a provocative list of host features that they propose have arisen as the result of genetic conflict. This book is an incredible resource for any scientist interested in evolutionary genetics. Burt and Trivers have tackled a huge breadth of topics without sacrificing depth. They are able to compare sometimes seemingly disparate phenomena suggesting numerous connections that are either worthy of further exploration or at least provide the fodder for further debate. This book serves as the perfect primer for those interested in exploring the dark side of the genome and understanding some of the perhaps-underappreciated forces that may have acted to shape it. (Ellen J. Pritham *American Journal of Human Biology*) In a meticulously assembled, thought-provoking and sometimes deliciously speculative textbook, Burt and Trivers' *Genes in Conflict* documents the selfish genetic elements that populate eukaryotic biology. Reading this book from a narrow viewpoint, one could see it as a recurrent tale of genetic conflict, but even from that perspective, the staggering variety of selfish strategies it discusses alone makes it worth reading. A broader view of this compilation is as a recurrent tale of genetic opportunity, revealing the innovative and insidious nature of genes as they vie with each other in complex sociogenetic negotiations for evolutionary survival. The overwhelming value of the book is the opportunity it highlights, as there are unanswered questions even in the best-studied instances of selfish genes. It both serves as a guidebook and a 'call to arms' for the next generation of inquisitive students, hopefully whetting their appetites and leaving them asking for more. (Harmit S. Malik *Nature Genetics* 2007-05-01) I highly recommend this volume for all practitioners of evolutionary genetics. It seems particularly suited for graduate seminars and reading groups. Some passages require heavy lifting, even for specialists, but the effort is well worth it. Burt and Trivers have written a masterpiece. (Norman A. Johnson *Quarterly of Biology*)

**About the Author** Austin Burt is Professor of Evolutionary Genetics, Imperial College London. Robert Trivers is Professor of Anthropology and Biological Sciences, Rutgers University. Professor Trivers has been named 2007 winner of the Crafoord Prize in Biosciences.