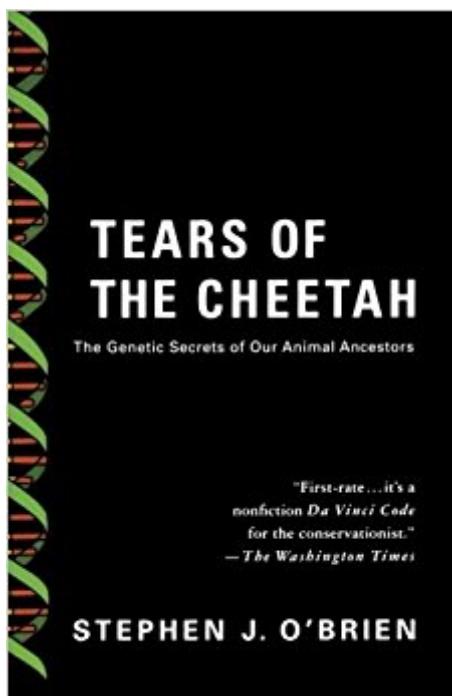


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Tears Of The Cheetah: The Genetic Secrets Of Our Animal Ancestors



Synopsis

The history of life on Earth is dominated by extinction events so numerous that over 99.9% of the species ever to have existed are gone forever. If animals could talk, we would ask them to recall their own ancestries, in particular the secrets as to how they avoided almost inevitable annihilation in the face of daily assaults by predators, climactic cataclysms, deadly infections and innate diseases. In *Tears of the Cheetah*, medical geneticist and conservationist Stephen J. O'Brien narrates fast-moving science adventure stories that explore the mysteries of survival among the earth's most endangered and beloved wildlife. Here we uncover the secret histories of exotic species such as Indonesian orangutans, humpback whales, and the imperiled cheetah—the world's fastest animal which nonetheless cannot escape its own genetic weaknesses. Among these genetic detective stories we also discover how the Serengeti lions have lived with FIV (the feline version of HIV), where giant pandas really come from, how bold genetic action pulled the Florida panther from the edge of extinction, how the survivors of the medieval Black Death passed on a genetic gift to their descendants, and how mapping the genome of the domestic cat solved a murder case in Canada. With each riveting account of animal resilience and adaptation, a remarkable parallel in human medicine is drawn, adding yet another rationale for species conservation—mining their genomes for cures to our own fatal diseases. *Tears of the Cheetah* offers a fascinating glimpse of the insight gained when geneticists venture into the wild.

Book Information

Paperback: 304 pages

Publisher: St. Martin's Griffin; Reprint edition (April 1, 2005)

Language: English

ISBN-10: 0312339003

ISBN-13: 978-0312339005

Product Dimensions: 5.5 x 0.7 x 8.5 inches

Shipping Weight: 1 pounds (View shipping rates and policies)

Average Customer Review: 4.2 out of 5 stars Â See all reviews Â (16 customer reviews)

Best Sellers Rank: #214,383 in Books (See Top 100 in Books) #46 in Books > Science & Math > Nature & Ecology > Endangered Species #488 in Books > Science & Math > Biological Sciences > Zoology #1063 in Books > Science & Math > Evolution

Customer Reviews

It has been but a few decades since the structure of the DNA molecule was discovered, a structure

of astonishing simplicity. The complexity comes with the infinite arrangements of the four simple letters of the molecule, and the array of proteins that the arrangements code for. We are just at the beginning of understanding and using the coding, and Stephen O'Brien, head of the Laboratory of Genomic Diversity at the National Cancer Institutes, is one of the decoders. In *Tears of the Cheetah: And Other Tales from the Genomic Frontier*, he has told fourteen stories of deciphering DNA for the purpose of determining animal history. There are remarkable discoveries outlined here, in which O'Brien directly took part or supervised those who did (he is gracious in his acknowledgement of these colleagues), and some of the molecular science is complex and will challenge readers who are not familiar with the field. The stories themselves, however, are compelling, and will be a good introduction to just what sort of mysteries are being unlocked by our knowledge of DNA and genomes (the sum total of an animal's genes), and how the solution of the mysteries holds potential not just for intellectual satisfaction but for the benefit of humanity. The story that gives the book its title is about genetic studies of wild cheetahs, and it reflects a theme of a population bottleneck which is frequent in these pages. Because 12,000 years ago, the number of cheetahs were drastically cut (probably by an epidemic), only a handful remained to breed. When O'Brien came to investigate why cheetahs were breeding so badly in zoos and preserves, there was a shock: there was almost no variation in cheetah DNA. They were as inbred as lab mice. Some mice in China a thousand years ago, however, had been squeak by a viral plague because they had part of the virus incorporated into their own DNA; this may mean that all sorts of DNA strands of viral preventatives are awaiting our discovery, and use. There is a chapter here on Florida's endangered panthers, which like cheetahs are dangerously inbred, and the politics of conservation of species and subspecies. O'Brien explains how feline immunodeficiency virus (something like our HIV) infects many cat species but kills few of them because beneficial genetic changes are evolving. There is a fine chapter on the century of controversy about how to classify panda bears. There were good arguments from the physical characteristics of pandas that put them in the bear family, but there were others that indicated they were related more to raccoons. The argument was at a dead end; some of the means of classifying animals are based on simple human judgement and are therefore to a degree subjective. With examination of the DNA, however, O'Brien's team could show that the panda's ancestors split away from the family of bears about twenty million years ago. Pandas are bears, and the controversy is, thanks to molecular genetics, over. Looking at DNA has been the way to show that meat from endangered whales was being sold illegally in Japanese markets, forever changing the sham arguments that the Japanese used that their whaling was only for scientific research. O'Brien's team was involved in solving a murder by DNA fingerprinting, but

not DNA of the murderer; O'Brien is an expert on feline DNA, and they had to make a link between the murderer and the only applicable physical evidence, cat fur on a jacket spattered by the victim's blood. The cat belonged to the murderer's family. Another chapter shows that amazingly, the human gene lines that squeaked through the bubonic plague in the Middle Ages may be the ones that are best fighting off AIDS. As both a memoir along the lines of "My Most Unforgettable Genomic Researches" and an introduction to what is going to be an increasingly important method of understanding our world's biology, *Tears of the Cheetah* is a real success. The really tantalizing prospect, however, the main message of the book, is that humans and animals may have a genetic store of disease-fighting capacity that is only beginning to be understood, and has tremendous potential for improving health worldwide.

The bits of the book I have read so far have been interesting and fun to read. I think the reader from Seattle with the poor spelling skills who believes that wildlife conservation is a "special interest" should quit griping in his anonymous envy of O'Brien, who has produced hundreds of scientific papers furthering our understanding of human diseases, in many cases by studying related diseases in wildlife. Many of the stories are highly interesting. Read the book.

I enjoyed the book very much. I would recommend it highly for anyone who has an interest in understanding basic genetics or for someone who is just interested in learning something new. Dr. O'Brien is a wonderful story teller and writes in a language that is easily understandable. He slowly introduces the concepts in an interesting progressive manner which enables the reader to understand the more advanced concepts toward the end of the book. I thought the book was truly fascinating.

I am a biology graduate student and was thrilled to get back to reading science for a general audience when I got this book. The book delivered great stories of how our understanding of biology (mainly genetics and evolution) has grown by real leaps and bounds lately. Each chapter is a different scientific adventure of the O'Brien lab; the book reads very much like an *Odyssey*. Sometimes the chapters are closely related (his work on the titular cheetahs clearly helped when he studied lions) and other times only the thinnest of threads brings (the amazingly well-written chapter on HIV seemed a bit out of context). This makes for a great style, as the stories are brief and get right to the interesting meat of the material. If you know academics, everything usually gets stretched out longer and the whole kitchen sink is discussed, but this chapter format avoids those

typical traps. These chapters are not just the science but also the social aspects of conducting science. There's the drama of personality clashes on international collaboration, the sweaty, dangerous work in the Everglades, South America and Africa, and the tragedy mixed with hope in the stories on HIV research. A textbook this is not, it moves and each story is just that: a story, not a summary. Know nothing about biology? Yes, you can still read this book. While O'Brien does tend to assume some facts are common knowledge, he puts things in context so that you can at least get an idea. At times you can hear O'Brien's editor requesting explanations and these are sprinkled in often enough to get by. These sections are infrequent and short, so even if you just skip them you'll still get an appreciation for how cool the science is. As a biology grad student, I would rate the most technical language as easily understood by a someone with a few biology college courses under their belt, but even a high school understanding should make the majority of the details accessible.

Tears of the Cheetah is an interesting book on many fronts. The author gives an inciteful historical overview of the extinction of species over time. He also presents a thorough picture of HIV from its inception and through its migration across multiple species. He provides food for thought on the potential extinction of humans as well. While the book begins somewhat slow for my taste it improves in mid and later chapters. This is a clear understandable presentation of complex and complicated subject matter like DNA mapping, etc. I highly recommend this book for those readers interested in species health, recent scientific advances and the survival of the human species. The book documents the increasing rapidity of medical advances at the microbiotic level of human DNA predicting the eventual eradication of numerous diseases.

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