

# DISCOVER

Science, Technology, and The Future

## SPECIAL ANNIVERSARY ISSUE

Exploring The Outer Limits Of Knowledge

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What His Love Letters Reveal About The Nature Of Genius

## ULTIMATE MARS

NASA Speeds The Search For Life With The Greatest Alien Atlas Ever Made

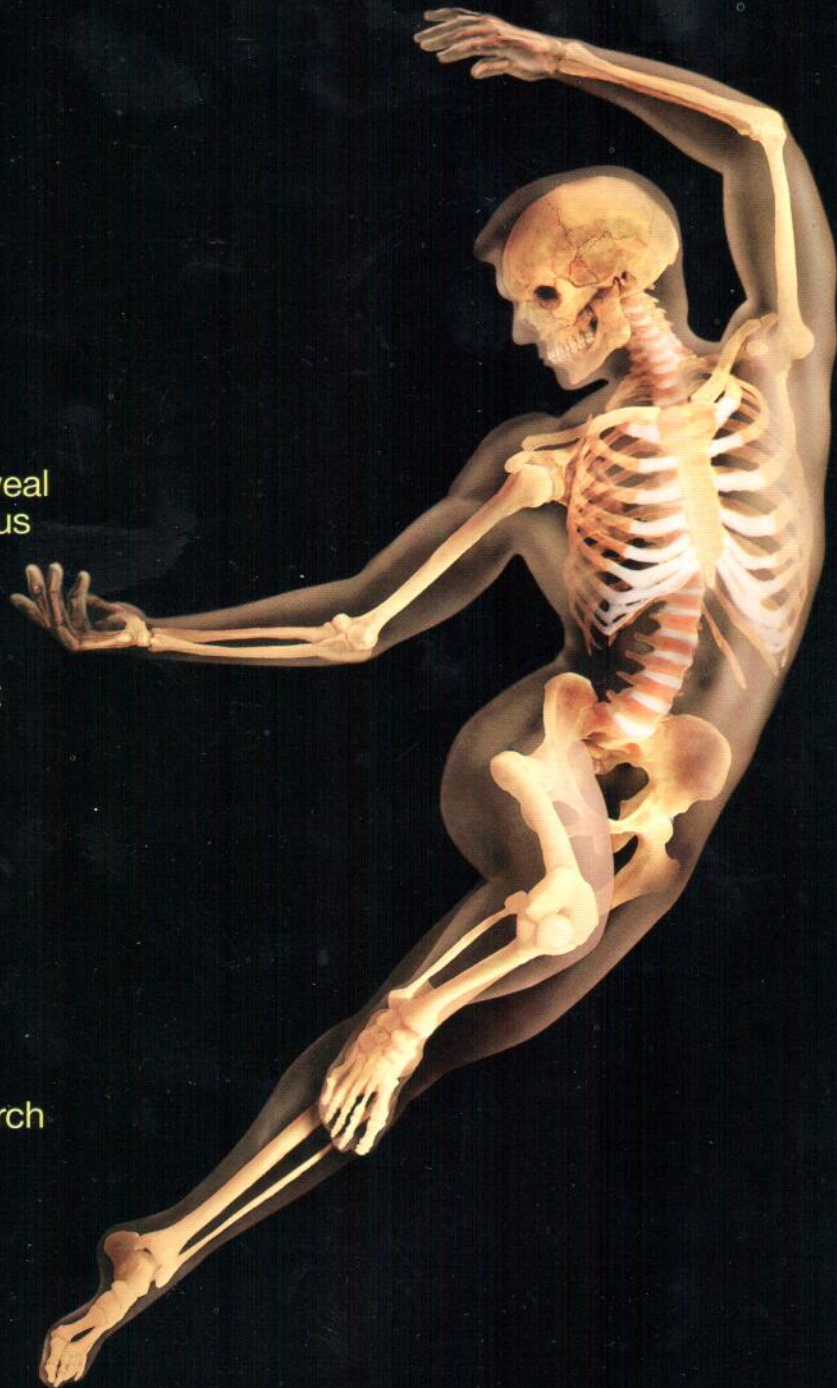
## NEWT GINGRICH

The Political Firebrand Plots A New Deal For American Science

## THE END OF SCIENCE?

Dispatches From The Search For The Final Frontier

**PLUS** Monkey Matchmakers, HDTV Versus Tony Soprano, Why Time Flows, and 20 Things You Didn't Know About The Nobel Prizes

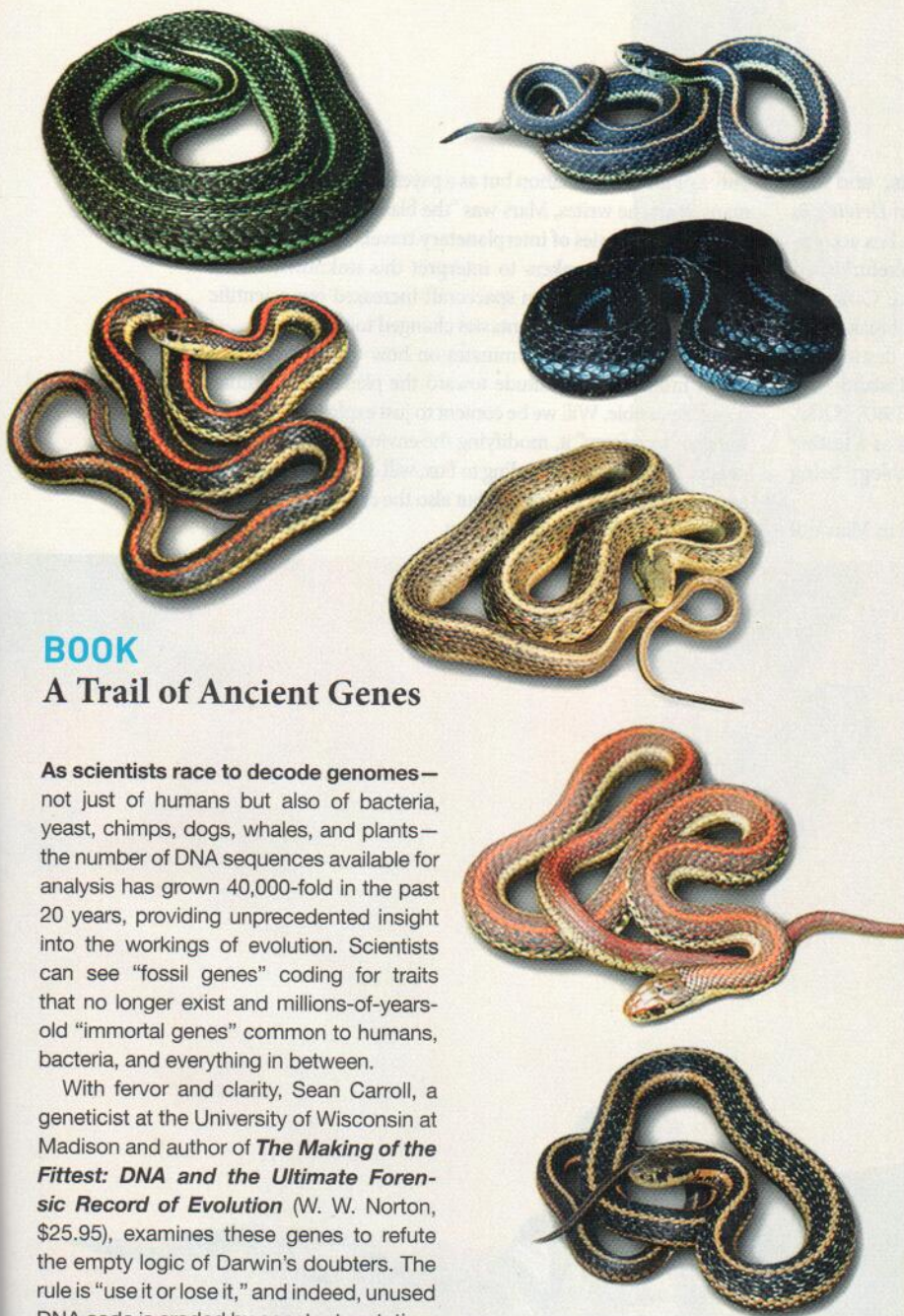


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## BOOK

### A Trail of Ancient Genes

As scientists race to decode genomes—not just of humans but also of bacteria, yeast, chimps, dogs, whales, and plants—the number of DNA sequences available for analysis has grown 40,000-fold in the past 20 years, providing unprecedented insight into the workings of evolution. Scientists can see “fossil genes” coding for traits that no longer exist and millions-of-years-old “immortal genes” common to humans, bacteria, and everything in between.

With fervor and clarity, Sean Carroll, a geneticist at the University of Wisconsin at Madison and author of *The Making of the Fittest: DNA and the Ultimate Forensic Record of Evolution* (W. W. Norton, \$25.95), examines these genes to refute the empty logic of Darwin’s doubters. The rule is “use it or lose it,” and indeed, unused DNA code is eroded by constant mutation. The Antarctic icefish, a near-transparent inhabitant of the South Atlantic Ocean, no longer needs to produce oxygen-binding red hemoglobin in the oxygen-rich waters. The two genes that code for hemoglobin have gone extinct—one has disappeared, and the other remains as a noncoding molecular fossil, a useless remnant.

The DNA record offers clues to why certain genes have emerged—often repeatedly in unrelated species—and how they affect the living today. Both Antarctic and Arctic fish carry antifreeze proteins in their blood, but the genes that code for them differ in sequence and arose millions of years apart. Carroll also shows how evolution

is ongoing in humans: A gene for sickle-cell anemia, which protects against malaria, most likely evolved in the past 3,200 to 7,700 years, after humans cleared forests and probably encountered malarial mosquitoes, which breed in open pools.

The icefish itself could disappear if, as predicted, the temperature of the Southern Ocean rises over the next century. As Carroll concludes, quoting Sir Peter Medawar, “the alternative to thinking in evolutionary terms is not to think at all.”

**Josie Glausiusz**

For an extended version of this review and an interview with Sean Carroll, please visit [www.discover.com](http://www.discover.com).

## The End of Medicine

HOW SILICON VALLEY  
(AND NAKED MICE)  
WILL REBOOT YOUR DOCTOR



**Andy Kessler**

National Bestselling Author of *WARNING MONEY* and *WALL STREET MEAT*

## SCIENCE BEST SELLERS

SOURCE: BARNES & NOBLE

- 1. AN INCONVENIENT TRUTH:** The Planetary Emergency of Global Warming and What We Can Do About It Al Gore (Rodale)
- 2. THE GOOD GOOD PIG:** The Extraordinary Life of Christopher Hogwood Sy Montgomery (Ballantine Books)
- 3. THE END OF MEDICINE:** How Silicon Valley (and Naked Mice) Will Reboot Your Doctor Andy Kessler (HarperCollins)
- 4. THE LAST SEASON** Eric Blehm (HarperCollins)
- 5. ANOTHER DAY IN THE FRONTAL LOBE:** A Brain Surgeon Exposes Life on the Inside Katrina Firlík (Random House)
- 6. HOW INVENTION BEGINS:** Echoes of Old Voices in the Rise of New Machines John H. Lienhard (Oxford University Press)
- 7. THE REVENGE OF GAIA:** Earth’s Climate Crisis and the Fate of Humanity James Lovelock (Basic Books)
- 8. THE WEATHER MAKERS:** How Man Is Changing the Climate and What It Means for Life on Earth Tim Flannery (Atlantic Monthly Press)
- 9. MANY WORLDS IN ONE:** The Search for Other Universes Alex Vilenkin (Hill and Wang)
- 10. FRANCIS CRICK:** Discoverer of the Genetic Code Matt Ridley (Eminent Lives)

Color variation in the garter snake is a conspicuous indicator of natural selection.

