BOOKS & ARTS

Faster, better, healthier

An exploration of how genetics has influenced many aspects of life.

The Strongest Boy In The World: How Genetic Information Is Reshaping Our Lives

by Philip R. Reilly
Cold Spring Harbor Laboratory Press: 2006.
278 pp. \$29

Michael A. Goldman

Physician, scientist, lawyer and chairman of healthcare company Interleukin Genetics, Philip Reilly has written five books on human genetics. Although his last book, *Is It In Your Genes?* (Cold Spring Harbor Laboratory Press, 2004), was targeted at health professionals, *The Strongest Boy in the World* is more in the vein of his earlier ones, being aimed at a broad, general audience.

The Strongest Boy in the World is a wonderful tour of genetics, genomics and stem-cell biology. General readers may find the science a stretch, but the effort will be amply rewarded with a better understanding of some of the most important issues currently facing our society. It isn't that Reilly gives new perspectives, but rather that he presents a rich, fascinating history and a broad view of the science that seasoned geneticists think about every day. Instruction about basic principles of genetics is minimal, with a 'knock-out' mouse being defined in terms of a transgenic mouse, for readers who know what the latter is. Reilly delves into broad fields of biology, society and history, clarifying the idea of 'race', but rather muddying the term 'family'.

The first part of the book explores what it means, in the light of our knowledge of genomics, to be human. The title essay, "The strongest boy in the world", refers to a child in Germany born into a family known for exceptional strength. The boy had a mutation in the myostatin or growth differentiation factor 8 (GDF-8) gene, which suppresses muscle growth. The child was an extreme variant, with quadriceps more than six standard deviations above the mean and an exceptionally low body-fat content. Drugs that inhibit the myostatin gene are currently being studied to alleviate the muscle-wasting symptoms of diseases such as cancer and AIDS, but it is only a question of time before such drugs are used for enhancement as well as treatment.

Reilly moves on to a broad-ranging discussion of athletic ability and the extent to which it might be influenced by heredity as well as the environment. He cites specific examples of

Running in the family: did genetics help Robert Cheruiyot and other Kenyans win the Boston marathon?

genetic variants that can or should have an effect on athletic performance. On this topic, Reilly is not judgemental: "I am not sure where I stand on the whole issue of efforts to 'enhance' performance. Elite athletes devote most of their lives to trying to do just that." Is it so different from steroid doping, or hiring an expensive trainer or orthopaedic surgeon? Or, for that matter, exercising? Should a child born with a natural mutation that greatly enhances athletic ability be allowed to compete? "There is no question that genes greatly influence athletic ability ... gender is determined by genes, and there is a significant gender gap in athletics."

There is also, Reilly points out, a gap in athletic ability between some ethnic groups. Kenyan athletes, who largely come from ethnic groups representing only 0.05% of the world's population, have won 14 of the past 16 Boston marathons, and it isn't just due to diet, tradition and altitude. Reilly describes, in limited detail, specific enzyme variants that seem to confer a benefit in endurance events, and others

that may be advantageous in sprinting. But he is cautious: "It would be foolish and wrong to suggest that one group of people is in some way genetically superior to other groups." He does suggest, however, that some people, in addition to other qualities, "may have been born with gene variants that by chance support their goals". Reilly sees a time when gene testing may be part of a physical examination for professional athletes, predicting who is most likely to succeed and who might be at risk of premature death. But he doesn't address questions such as how we draw the line between genetic traits or tendencies that can be used in screening for fitness for employment and those that cannot.

In four more engaging essays, Reilly goes on to explore human origins, race, longevity and intelligence, in each case looking carefully at the influence of genetics, and what our understanding of genetics means for our view of ourselves. Throughout the book, each chapter stands alone; this results in some repetition of

T.A. CLARY/AFP/GETTY

ideas, but it has the tremendous advantage that the reader can dive into any section of interest and feel at ease.

The second part of the book, on diseases, is a random walk through five different genetic conditions. This allows Reilly to explore different aspects of medicine, different disease aetiologies, different modes of therapy, and the complex ethics and sociology of conditions such as deafness, in which non-hearing parents may actually want to have non-hearing children. Missing from Reilly's treatment is a deeper look at genetic mechanisms. Trinucleotide repeats are introduced as more or less incidental to Huntington's disease, rather than as part of a set of more than a dozen disorders with an astoundingly similar underlying mutation mechanism that involves rapid changes in highly unstable stretches of DNA.

The third part of the book is an investigation of dogs, cats, mice, corn and rice, what genetics has meant for them, and what these organisms have meant for the development of modern genetics. Reilly's treatment of corn is typical of his approach to other organisms. He writes about corn's place in the human economy, its domestication and breeding, and what we have learned about its genetics. He then analyses some of the work on genetically modified corn, addressing a topical issue that could have profoundly disturbing implications for ecology and food safety — or that could lead to fantastic gains in the war on hunger. Reilly does not ignore the arguments against the use of genetically modified foods. He even sympathizes with those who fear multinational agriculture companies taking over the world at the expense of small farmers. But there's no question how Reilly feels about this technology. "I side squarely with those who favor the rapid, safe development of genetically modified groups. I think it could be the most important positive event for the environment in history."

The final section deals more specifically with the implications of genetic and reproductive technologies for our society. Reilly addresses not only the obvious topics such as stem-cell biology, preimplantation genetic diagnosis, and forensics, but also what we can learn about history through genetics (tracing US president Thomas Jefferson's genes, for example), and how genetics has come to pervade our art and language.

For the geneticist, Reilly presents a balanced, positive view of ethical and social issues in genetics, and an entertaining background in history, geography and economics, and the way these fields interface with modern genetics and genomics. I've often tried to convince my colleagues across campus that genetics should be a part of every undergraduate's education. No book makes this case more clearly than *The Strongest Boy in the World*. ■

Michael A. Goldman is in the Department of Biology, San Francisco State University, San Francisco, California 94132-1722, USA.

A glimpse of the early Universe

Chasing Hubble's Shadows: The Search for Galaxies at the Edge of Time

by Jeff Kanipe

Hill & Wang: 2006. 224 pp. \$24

Patrick Petitjean

Can beauty save the world? Anyone who reads *Chasing Hubble's Shadows* by Jeff Kanipe may be able to find an answer in the book's images of a tiny part of the sky, taken by the Hubble Space Telescope. They reveal thousands of galaxies, the "Hubble's shadows" of the title, at different stages of their evolution. The images portray breathtaking beauty surrounded by silence.

The book is about the beauty of the heavens as revealed by Hubble, the questions such images raise, and the explanations astronomers have proposed, along with their doubts and hopes. How did astronomers become interested in galaxies? How can galaxies be classified? How are the most remote of them detected? How can their formation and evolution be explained? The book is much more than a description of the farthest images ever taken. It is also a vivid description of how astronomers work and how ideas develop. It is a virtual trip into the complex realm of dark matter and dark energy, but also a real trip through the Moon-like landscape of the Mauna Kea summit in Hawaii where the world's biggest telescopes are located. This is an exciting time, with astronomers facing challenges similar to those that confronted Galileo when he discovered the satellites of Jupiter. Astronomers are trying to understand the physical processes at play in the early Universe.

Kanipe has written a narrative rather than an analysis. He reports discussions with dozens

of astronomers and their explanations of a variety of subjects relevant to the early Universe and to the formation and evolution of galaxies. The writing is uneven and a few topics are discussed several times, but isn't the art of saying things several times without bothering the reader part of pedagogy? The resulting mixture of journalistic and scientific styles certainly keeps the reader excited.

The book will not help readers understand physics from first principles, or discover a theory that can make sense of the little information we have on our Universe. Rather, it provides an opportunity to meet people and ideas. This is an entertaining way to approach the relation between the big scientific questions and the emotions that overcome astronomers during their research. We hear of their nightmares, their doubts, their patience, their scepticism and the risks they take.

It is difficult to define the target audience for this book. There are sometimes too many inappropriate technical details for a general reader and, probably driven by his enthusiasm, the author also goes too fast or too far. For example, it may be unrealistic to assume that general readers know what a graviton is, or why it may be interesting to follow up on radio galaxies, and specialists will learn little too. Nonetheless, if general readers are happy to leave a few technical details unexplained, they will be able to enjoy this entertaining approach to the mysteries of our Universe. Anyone curious about the mechanisms of our world will be thrilled by the book.

Few would disagree with the remarks here concerning the lack of funding, although these are hardly unique to astronomy. Kanipe also questions the political choices being made,

The Hubble Space Telescope has identified infant stars in the Small Magellanic Cloud galaxy.

NASA/ESA/A. NOTA