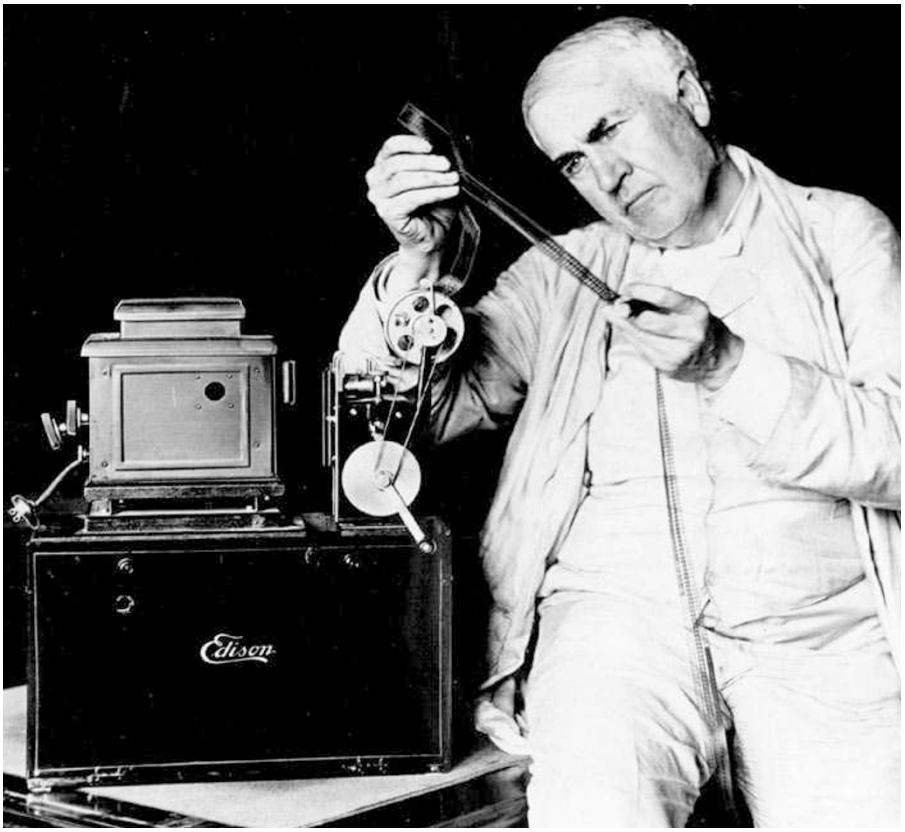
AKG-IMAGES



Thomas Edison invented and patented many early film technologies, allowing him to control the industry.

INNOVATION

Fighting monopolies

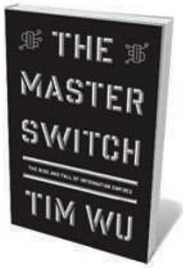
A history of communications technologies holds lessons for the Internet today, finds **Li Gong**.

Innovation and business interests do not always mesh. Thomas Edison, the inventor of the light bulb and the phonograph, almost suffocated the US film industry in the early 1900s by controlling all the crucial patents for film technology. His Motion Picture Patents Company (also called the Edison Trust) dictated film length, style, content, who could show films and at what price.

In 1934, New Jersey's Bell Laboratories, the birthplace of the semiconductor, suppressed development of its magnetic tape and the answering machine for six decades to protect the telephone business of its corporate parent, AT&T, who feared that the recording of conversations would deter people from using telephones. The arrival of fibre optics, mobile phones, faxes and speakerphones were similarly delayed.

In his groundbreaking book, *The Master Switch*, Columbia University law professor Tim Wu weaves together these and other examples to examine how disruptive technologies enter and develop within society. The new industries that emerge, he argues, progress in a cycle: companies grow to become empires, which close the field until the next wave of technology arrives to dismantle the existing order.

Wu covers the histories of radio, music, film, television and the Internet. All are littered with examples of vested interests that have thwarted competition and reduced innovation through commercial, political, legal and regulatory pressures. Drawing on their substantial war chests, large companies can lobby hard. For example, one telecommunications giant persuaded the state of Texas in 1995 to pass a law requiring that any would-be companies must build phone lines that reach at least 60% of homes and businesses, a measure that shut out new competitors. Another tactic is to charge exorbitant rental fees for facilities owned by large companies.



The Master Switch: The Rise and Fall of Information Empires
TIM WU
Knopf: 2010. 384 pp. $27.95

Monopolistic powers also restrict freedom of expression and civil liberty. For example, after deciding arbitrarily that films more than a few minutes in length were uninteresting, the Edison Trust refused to license longer feature films. Studios such as Paramount Pictures, Fox and Universal sprang up in rebellion. Hollywood grew partly as a result of its proximity to Mexico, where independent filmmakers could escape from injunctions and subpoenas coming from controlling interests on the US East Coast.

On taking over ownership of the film industry, these few studios soon applied their own censorship. Bowing to pressure from Catholic activists to uphold moral values on screen, the film-industry bosses in 1934 agreed to abide by a production code, known as the Hays Code. Named after campaigner William Hays, president of the Motion Picture Producers and Distributors of America, the set of rules specified what was considered obscene. For decades it restricted what the public could view.

PHONE WARS

Democracy is also influenced by the narrow ownership of telecommunications. For example, in the US presidential election of 1876, news monopoly Associated Press supplied content for communications monopoly Western Union, which leaked rivals' confidential telegrams to its favoured candidates. In the past decade, the US government has been accused of secret wiretapping, made possible by the concentration of telecommunications in a few hands. Thus there is constant combat over the ownership of communication technologies — between open and closed, decentralized and centralized models.

The latest battlefield is the Internet. Wu stresses that, because it is so crucial to our society, we must prevent the monopolistic cycle that might close this diverse, distributed, decentralized and democratic system. Such attempts to gain broad control have so far failed — witness

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Carl Zimmer muses on science and film:
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the ill-fated merger, now dissolved, between media giant Time Warner and Internet service provider AOL. But Wu is wary of the rise of 'closed' platform devices that restrict what programs can be used, such as Apple's Mac, iPad and iPhone, compared with open systems, such as the earlier Apple II. He quotes Tom Conlon writing online in *Popular Science*: "Once we replace the personal computer with a closed-platform device such as the iPad, we replace freedom, choice, and the free market with oppression, censorship, and monopoly."

Central in keeping the Internet open is the concept of 'network neutrality', which Wu has popularized: government and information carriers should place no restriction on where, when, what and how users access information. A requirement of net neutrality is that Internet service providers should not use price differentiation to fend off upstarts, to favour their collaborators, or to retain their monopolistic power in new or adjacent fields. But opinions are varied and examples to the contrary abound: the US cable firm Comcast allegedly levied additional fees for video traffic from companies that compete with its cable business, for example. The British government has also recently announced support for a two-speed Internet.

"Should we intervene to protect innovation and a free and open Internet at any expense?"

Wu believes that the antiquated competition laws that focus on pricing to protect consumers are inadequate in the information industry, because collusion restricts choices but does not always inflate prices. Rather than legislation, he proposes a 'separations principle', whereby vital components of the information industry are entrusted to different institutions, both public and private. These bodies would apply checks and balances to ensure that control is not given to only a few players. Such an idea is attractive, yet will undoubtedly be difficult to put into practice because of vested interests.

The Master Switch offers powerful lessons from the past for the future of the Internet. Should we let it evolve along its natural trajectory, and risk it becoming temporarily controlled by monopolies until the next breakthrough? Or should we intervene to protect innovation and a free and open Internet at any expense? Perhaps, though, we don't have as much control as we think. Wu cites ancient Chinese wisdom from Luo Guanzhong: "An empire long united, must divide; an empire long divided, must unite. Thus it has ever been, and thus it will always be." ■

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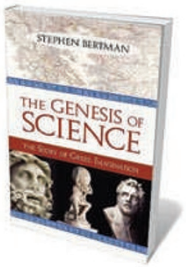
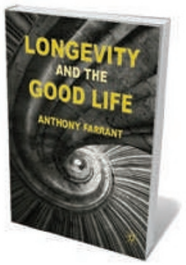
Books in brief



The Genesis of Science: The Story of Greek Imagination
Stephen Bertman PROMETHEUS BOOKS *304 pp. $27 (2010)*
The origins of science in ancient Greece are explored by classicist Stephen Bertman. He looks beyond the familiar names such as Euclid and Pythagoras to lesser-known figures, including the mapmaker Anaximander and alchemist Maria the Jewess, popularly known for inventing the eponymous bain-marie water bath and various pieces of chemical apparatus, including the still. Bertman argues that the Greeks owe their scientific success to their belief in an ordered Universe, the rules of which could be unpicked by the human mind.

Hunger: The Biology and Politics of Starvation
John R. Butterly and Jack Shepherd DARTMOUTH COLLEGE PRESS *360 pp. $29.95 (2010)*
One in seven of the world's population is short of food. Lack of political will is the main reason for not addressing hunger, explain medical scientist John Butterly and environmental scientist Jack Shepherd. As well as describing the biology of human nutrition and famine, they examine the political and historical factors that cause hunger and malnutrition to remain major health problems today despite advances in science and technology and the proliferation of humanitarian efforts.



Longevity and the Good Life
Anthony Farrant PALGRAVE MACMILLAN *256 pp. $85 (2010)*
Living longer may not be such a good thing, cautions bioethicist Anthony Farrant. Although breakthroughs in medical biotechnology have the potential to extend our lives and make them healthier, he disputes the idea that immortality is desirable and cautions that the ready availability of such enhancements will diminish the value we put on reaching old age. Increasing longevity will challenge the fair distribution of resources, especially health care. Ultimately, he says, these pressures will undermine the idea that all people are fundamentally equal, and thus threaten the good life.

Man and Woman: An Inside Story
Donald W. Pfaff OXFORD UNIVERSITY PRESS *232 pp. £15.99 (2010)*
Gender differences have deep and tangled roots, according to neuroscientist Donald Pfaff. Although genetic and biological factors such as neuroanatomy contribute to this dichotomy, he argues, they do not dominate. Cultural influences, including experiences of stress throughout various stages of our lives, may be just as large and affect males and females in varied ways. Differences between the sexes, both physical and mental, result from a combination of genetics and environment that operates on many levels to influence behavioural mechanisms.

Lessons Learned: Reflections of a University President
William G. Bowen PRINCETON UNIVERSITY PRESS *168 pp. $24.95 (2010)*
William Bowen reflects on the lessons he learned while he was president of Princeton University in New Jersey from 1972 to 1988, and president of the Andrew W. Mellon Foundation in New York from 1988 to 2006. He shares advice on fund-raising, hiring, managing faculty members and interacting with trustees. And he reveals his experience of shepherding the elite university through the civil-rights movement and the Vietnam War, a period during which he helped to expand the faculty, especially in the life sciences.