

The Butchering Art: Joseph Lister's Quest to Transform the Grisly World of Victorian Medicine
LINDSEY FITZHARRIS
Scientific American/
Farrar, Straus and
Giroux: 2017.

enter this harrowing world? As Fitzharris shows, it was mostly down to his powerful sense of service to humanity, and passion for natural sciences. Medicine married the two. Lister was exposed to science early on, through his father Joseph Jackson Lister, a wine merchant and keen microscopist who was eventually elected a Fellow of the Royal Society. The younger Lister arrived at University College

London in 1844 with one of his father's microscopes, a much better instrument than his teachers had. Throughout his career, his scientific interests and meticulous microscopic examination of tissues — living, diseased and dead — distinguished his practice.

Initially, Lister focused on the management of surgical wounds, striving to understand normal healing and develop new ways of treating and monitoring post-operative patients. He routinely examined recovering wounds, taking samples and experimenting with dressings. Most surgeons, who regarded infection as unavoidable, scoffed. But Lister was not alone. Oliver Wendell Holmes in Boston, Massachusetts, and Ignaz Semmelweis in Vienna and Budapest also accumulated evidence in favour of it.

Fitzharris notes that a turning point came in 1864, when Lister discovered the work of Louis Pasteur on the microorganisms that cause fermentation and putrefaction. Lister believed that air-borne organisms could infect wounds, and realized that precautionary treatment might destroy them. After much experimentation, he heard that engineers used carbolic acid to reduce the smell from rotting waste. Tests led him to conclude that this was a perfect antiseptic for instruments, clothes and hands, and, diluted with olive oil, for the treatment of wounds. He designed an atomizer to maintain a fine mist of it throughout operations. Many professionals derided his methods, and some considered them quackery; others failed to follow

HEALTH

The war on germs

Tilli Tansey hails a history of Joseph Lister's drive to vanquish post-operative infection and putrefaction.

With antimicrobial resistance becoming a real threat in routine surgery, it is salutary to contemplate the early Victorian operating theatre. Pain and death were the norm, the surgical brutality matched by the torments of post-operative infection and putrefaction. In *The Butchering Art*, medical historian Lindsey Fitzharris ushers us into that realm.

Fitzharris's focus is the work of surgeon and medical researcher Joseph Lister (1827–1912) in developing and promoting antiseptic surgery. In the early nineteenth century, London, Edinburgh and other British cities had built large municipal hospitals to treat the poor. Operating theatres were arenas in which the spectacle of life and death was often viewed by a jostling crowd.

As Fitzharris vividly relates, the patient was strapped to an operating table bearing residues of earlier procedures. The surgeon wore street clothes, or an ancient, blood-encrusted

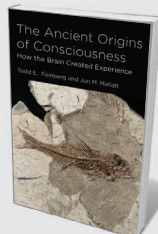
apron. Although instruments might be sharpened for swifter slicing, they (and surgeons' hands) were rarely washed. One famous, possibly apocryphal account of an operation by surgeon Robert Liston recorded a 300% mortality rate. The patient died; an assistant, fingers sliced off during high-speed surgery, died of gangrene; and an observer had a fatal heart attack.

Large urban hospitals had higher mortality rates than country practices. Four major infections were accepted as largely inevitable: septicaemia, erysipelas, gangrene and pyaemia. There was disagreement about the causes. One theory blamed the circulation of 'miasma', or 'bad air'; the other centred on contagion, the transmission of some poison. Rudimentary anaesthesia, first used in Britain in 1846, actually increased mortality rates for some years; surgeons performed ever-bolder operations, with no way to control infection.

Why would Lister, a serious and sensitive Quaker with an aptitude for the arts, want to

**NEW IN
PAPERBACK**

*Highlights of this
season's releases.*



The Ancient Origins of Consciousness: How the Brain Created Experience

Todd E. Feinberg and Jon M. Mallatt (MIT Press, 2017)

Psychiatrist Todd Feinberg and biologist Jon Mallatt draw on evolution, neurobiology and philosophy to trace the roots of consciousness back some 540 million years to the 'Cambrian explosion' in animal diversity. Comparing vertebrates and invertebrates, they chart the evolution of sense, memory and consciousness since the birth of complex brains, and explore questions such as whether fish feel pain, and which sense developed first: sight or smell?

Lister's instructions and could not replicate his results. The eminent surgeon James Paget's 1869 declaration in *The Lancet* that Lister's system was "no good" was damning.

However, Lister's reputation in Britain was ultimately sealed by one high-profile patient: Queen Victoria. By 1871, he was the most renowned surgeon in Scotland, and successfully treated his royal patient for a large underarm abscess at Balmoral Castle. In 1876, Lister demonstrated his technique at the International Medical Congress in Philadelphia, Pennsylvania, convincing many US sceptics. Massachusetts General Hospital, which had banned his methods for years, became the first US hospital to endorse their use.

Lister received numerous honours and awards: a peerage, the Order of Merit and presidency of the Royal Society. Moreover, Britain began to obsess over cleanliness. The flourishing commercial companies of the late nineteenth century rushed to make products to satisfy the trend, including carbolic smoke balls (for nasal inhalation, to flush out infections), fumigators, soaps and the enduring oral antiseptic Listerine. Lister's place in the history of surgery was assured. Widespread adoption of his techniques exemplified the acceptance of germ theory; in time, there was a shift from antiseptics (germ-killing) to asepsis (germ-free). Ironically, as Fitzharris reveals, Lister resisted this: he believed that asepsis would be impossible in the home, where the wealthy and middle classes were treated. He failed to realize that he had sown the seeds for the rise of the hospital as a place for the specialist care of all, not just the poor.

The Butchering Art is well researched and written with verve. Fitzharris takes some licence with speculative conversations, thoughts and emotions, and a few anachronisms irk. For example, University College (called the modern 'UCL' throughout) did not have a 'campus'; neither did nineteenth-century physicians see non-hospital patients in their 'offices'. Nevertheless, this is a fine read full of vivid detail, prompting thoughtful reflection on the past, and the challenging future, of surgical practice. ■

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SUSTAINABILITY

China's path to ecotopia

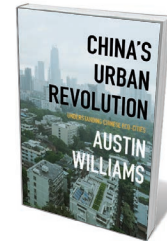
Xuemei Bai critiques a critique of the country's eco-city initiative.

It's easy to get a sense of China's rapid urbanization: overwhelming numbers and breathtaking images abound. In 40 years, the country's urban population has quadrupled to about 800 million, and its cities have tripled in number, to 657. To seek urban development with better economic, environmental and social outcomes, China has introduced many branding and accrediting schemes.

One is the eco-city. By 2016, at least 220 cities, towns, prefectures and districts had received the national accreditation for their socio-economically beneficial and ecologically 'clean' features such as renewable energy and water recycling. There is so much information on China's urban mosaic that it's hard to make sense of it.

In *China's Urban Revolution*, architect and writer Austin Williams attempts to do so, probing the country's eco-city experiment against the background of its socio-economic realities. The speed of change in China makes it extremely challenging to grasp what is happening and why: the social and political context can lose relevance rapidly, and so become risky to reference in as little as a decade. Williams should be commended for trying. He promises a nuanced view that is neither sinocentric nor biased towards the West — enticing for those who seek insights beyond blind criticism or blind optimism.

Unfortunately, the book falls short of this promise. Williams asserts that it is a "political assessment" of China's eco-urban initiatives, and that his exploration may "give rise to a number of contradictory viewpoints".



China's Urban Revolution: Understanding Chinese Eco-Cities
AUSTIN WILLIAMS
Bloomsbury Academic: 2017.

His perspectives are indeed often contradictory, sometimes drastically.

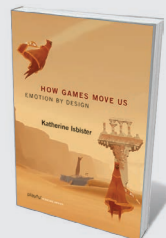
Williams declares that the concept of the eco-city is ill-defined. That is fair. He then says that this vagueness allows China to misrepresent itself as the eco-city capital of the world. Some of his criticisms are just, and are reflected in

China. Several high-profile planned eco-cities, such as Dongtan near Shanghai, are still unbuilt; projects can end up as box-ticking; development may take priority over sustainability. However, Williams often interprets local malpractices or failures as pertaining to China as a whole, and links them to perceived underlying politics. What I miss is a serious critique on why projects fail, and what can be learnt. The book bolts anecdotes and fragmented (but valuable) facts into sweeping political or ideological conclusions, often without in-depth analysis.

Williams looks at Chinese eco-cities and their contexts through the lens of Western environmental thinking. He

compares progressive Western scholarship on sustainability (such as biologist Rachel Carson's work in the 1960s) with mainstream practice in China at the time, and frames it as the West vs China. In truth, disparities between theory and practice ▶

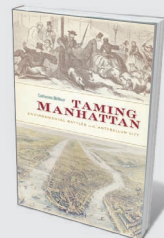
ECO-CITIES ARE ABOUT RECOGNIZING PROCESS AND EFFORT.



How Games Move Us: Emotion by Design

Katherine Isbister (MIT Press, 2017)

Games researcher Katherine Isbister offers fascinating insights into the ways in which designers trigger players' emotions. The ability to customize characters' appearance and personality in *The Sims*, for example, encourages players to form virtual attachments to the avatar.



Taming Manhattan

Catherine McNear (Harvard Univ. Press, 2017)

Before the American Civil War, Manhattan was awash in manure and sewage, and teeming with wild dogs. Catherine McNear's absorbing history traces how New York City was tamed through urban planning, yet plagued afterwards by social tensions and environmental pressures.

▶ are seen in many countries. It seems, too, that whatever China is doing, there is a Western thought leader whom Williams indicates must be an influence. This is fatiguing. It is not difficult to find as many arguments in China claiming that most of today's progressive environmental ideas are rooted in ancient Chinese philosophy.

At one point, Williams misinterprets the technical and cultural practices in Chinese calligraphy and poetry to make the shaky assertion that China has no concept of copyright. Further, he claims that China has been “nicking ideas from the West to fuel its own awakening” for the past four decades, although he adds that this is “no bad thing”. By contrast, he depicts Western nations as authentic, confident and with “a generally accepted narrative about their own societies over time”.

If Williams's criticisms are based on innocent misinterpretation, there are two likely reasons alongside the dizzying pace of change. First, the fine print around China's eco-cities can be lost in translation. The country's accrediting team clearly states that it includes cities, towns, districts and development zones, often all translated as eco-cities. Second, demonstration projects are common, to allow others to learn from front runners. Thus, eco-cities are more about recognizing process and effort than the end stage.

Williams concludes with a discussion of China's efforts in renewable-energy development, innovation and other relevant areas, and lists the country's top eco-cities — which are mentioned rarely, if at all, in earlier chapters. He even warns against Western bias when interpreting Chinese issues. I was left wondering whether the book's shifts in tone and perspective were the result of Williams's views evolving.

China's Urban Revolution is ultimately — as a collection of “contradictory viewpoints” — unsatisfying. But many of the facts presented are fascinating. ■

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ORNITHOLOGY

All eyes on the 10,000 species

Stuart Pimm considers the obsessive, sometimes dark side to the joyous pursuit of watching birds.

When the ship *Victoria*, the last remnant of Ferdinand Magellan's round-the-world voyage, returned to Seville in 1522, just 18 men survived from an expedition crew of more than 200. Magellan was not among them. *Victoria* held a fortune in spices — and the feathers of birds of paradise. The specimens' feet and wings had been removed, so people thought that the birds moved by divine means. Their shimmering plumage inspired wonder that galvanized both ornithologists and hunters.

Magellan's voyage, recounted in Bernd Brunner's *Birdmania*, is one manifestation among multitudes of humanity's great obsession with birds. By the end of 2016, one-third of a million people had contributed more than one-third of a billion observations to eBird (<http://ebird.org>), the world's largest citizen-science project. We know the natural history and distribution of birds much better than those of any other group. And colourful people walk the paths to this knowledge, as is amply shown in both *Birdmania* and Noah Strycker's *Birding Without Borders*. On a hike in Colombia, I contemplated these books — and concluded that I must write about passions for birds that have dark, even fatal, undercurrents.

In Brunner's tour of bird devotees through history, we meet a cast including

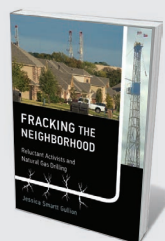
thirteenth-century Holy Roman Emperor Friedrich II von Hohenstaufen, who authored a treatise on falconry, and twentieth-century US ornithologist Robert Porter Allen, who did much to protect the whooping crane (*Grus americana*). Brunner reveals how hummingbirds were admired by European travellers long before becoming a highlight of Victorian specimen cabinets. Although most species of these acrobatic wonders live in the remote Andes and Amazon, the drive to find new ones was intense. Only 34 were known by 1788, but

by 1900, taxonomists had described 312 of the current 336. Avid collector John Gould recorded most of them in his lavishly illustrated *Monograph of the Trochilidae, or Family of Hummingbirds* (1849–61). The ranges of some hummingbirds are still being uncovered.

The end of this golden age of discovery was marked by a controversial figure:

Richard Meinertzhagen, chair of the British Ornithologists' Club. A career army officer, he participated in military exploits such as Edmund Allenby's 1917 victory in the Middle East. He was also an explorer, touring Afghanistan in 1937 with a young Salim Ali, destined to become India's most distinguished ornithologist. There, Meinertzhagen described a new species of snowfinch (*Montifringilla*

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Fracking the Neighborhood: Reluctant Activists and Natural Gas Drilling

Jessica Smartt Gullion (MIT Press, 2017)

North Texas takes centre stage in sociologist Jessica Smartt Gullion's study of urban US fracking. She explores the state's drilling culture and industrial health risks, and interviews locals forced to cope with fracking on their doorstep.



The Dancing Bees

Tania Munz (Univ. Chicago Press, 2017)

In this compelling account of the work of Karl von Frisch, Tania Munz shows how, despite pressures from the Nazis, he advanced studies of animal communication. Notably, he discovered how bees 'waggle dance' to indicate food sources (see Mark L. Winston's review: *Nature* **533**, 32–33; 2016).



theresae), the existence of which I can confirm: mentored by Salim Ali, I ringed some on an expedition in 1970. But Meinertzhagen was a monumental fraud. He stole specimens, mislabelled them and added false locations. As Brunner relates, Meinertzhagen's wife, ornithologist Ann Jackson, died in suspicious circumstances.

In *Birding without Borders*, Strycker records his quest to see as many species as possible in a year: what's known as a "big year". That comes with bragging rights, but demands money and time. Some of the more than 10,000 known bird species have large geographical ranges, so there are many places to see them. Yet 5,000 have ranges smaller than the median of 280,000 square kilometres. Fortunately, these are geographically concentrated (see www.biodiversitymapping.org). So a big year is mostly a matter of traversing the tropics: Central America, the northern Andes, coastal Brazil, West Africa, the East African mountains, Madagascar, northeast India, the islands of southeast Asia, New Guinea and Queensland, Australia. Strycker also visits other places, often lamenting that he doesn't see enough species to keep up his total.

His epic mission is made possible by a

Birdmania: A Remarkable Passion for Birds

BERND BRUNNER (TRANSLATED BY JANE BILLINGHURST)
Greystone: 2017.

Birding Without Borders: An Obsession, a Quest, and the Biggest Year in the World

NOAH STRYCKER
Houghton Mifflin Harcourt: 2017.

global network of guides. They drive him to forests and play tapes of the bird's song. Hopefully the bird responds or, better, pops out to see what's going on. Hummingbirds are lured to sugar-water feeders. My favourite, the small, upright antpittas, feed mainly on forest floors; they are hard to see, but some have been trained to emerge and feed on worms.

Strycker finds 6,042 species, beating the previous record — and does so travelling with a very restricted wardrobe. (When I asked one of his Colombian guides what he thought of Strycker, he answered, "Smelly.") In my view, however, visiting well-trodden paths with the same guides, and playing the same recordings to lure the same birds, may harm individual birds. And it does not contribute anything new to our knowledge of

their distributions. I cherish half a century of birding solitude with binoculars, a notebook and, in places such as Afghanistan, not even a bird book.

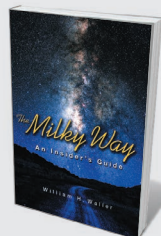
Colombia tops the global league with most bird species, and most species seen in one day. Its growing birding community penetrates remote areas and pieces together which species aren't being seen. That provides invaluable data for conservation. And along the dirt track to Buenaventura, in a cloud-forest shack perched precariously on an Andean hillside, works Doña Dora. She serves bananas and papayas to a dozen species of brightly coloured tanagers, and massive lunches of soup and empanadas to birders. Here, and in a thousand similar places worldwide, the bright side of bird watching is providing income to poor, rural communities and incentives to protect remaining ecosystems. ■

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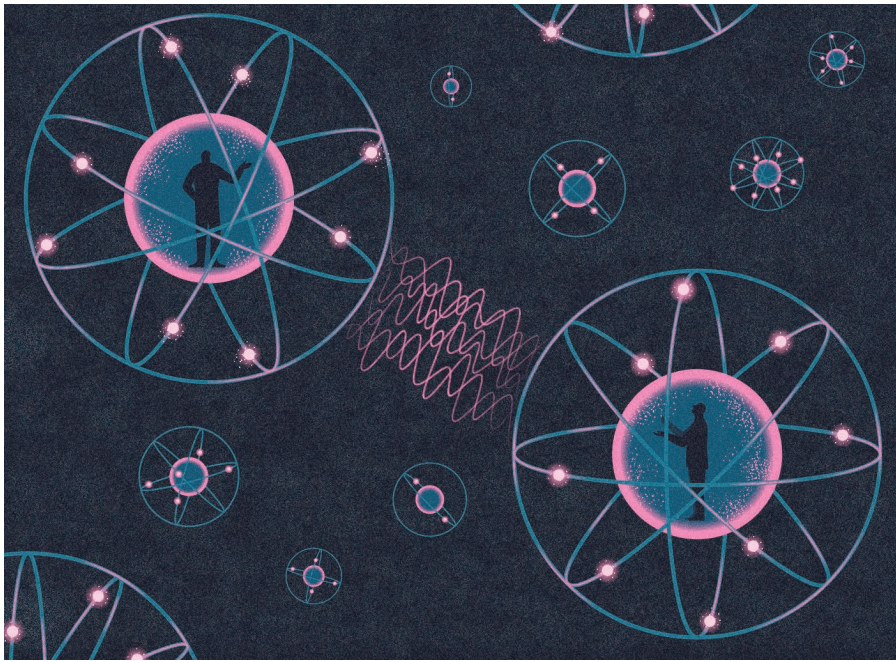
Gender Medicine

Marek Glezerman (*Duckworth Overlook, 2017*)
Gender disparities in medicine are rife: less than 30% of participants in cardiovascular-disease trials are female, for instance. Medic Marek Glezerman advocates gender-specific therapy that factors in issues such as the menstrual cycle altering the efficacy of some pain-relief medication.



The Milky Way: An Insider's Guide

William H. Waller (*Princeton Univ. Press, 2017*)
Spanning star formation and Italian polymath Galileo Galilei's handmade spyglasses, astronomer William Waller's sweeping chronicle examines the formation of the Milky Way and the history of mapping and researching the 13-billion-year-old Galaxy.



THEORETICAL PHYSICS

When the doer met the dreamer

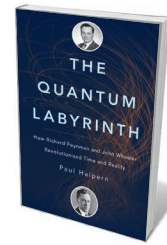
Graham Farmelo applauds a study on the productive friendship of two very different physicists.

Richard Feynman and John Wheeler, both consummate theoretical physicists, approached their subject in different ways. Feynman was a doer, Wheeler a dreamer. So Paul Halpern aptly describes them in *The Quantum Labyrinth*, his book about their lives, work and friendship, and the virtues of their complementary styles.

The two men met in 1939, probably in the physics department of Princeton University, New Jersey. Wheeler was then 28, an assistant professor — quiet, measured and with impeccable manners. Feynman was seven years younger, a new and extremely promising PhD student and something of a rough

diamond, raised in the borough of Queens, New York City. He became Wheeler's research assistant and they got on well, beginning what Halpern describes as “a long, productive — but often silly — friendship”.

Amid all the larking around, Wheeler and Feynman did useful work. They came up with a new interpretation of the theory of moving electrically charged particles that yielded useful but not revolutionary results. Bursting with creativity, Feynman made his deepest contribution to physics while working alone. Picking up on a profound but under-developed idea by theoretician Paul Dirac, he found a way of reformulating quantum mechanics in terms of a ‘sum



The Quantum Labyrinth: How Richard Feynman and John Wheeler Revolutionized Time and Reality

PAUL HALPERN
Basic: 2017.

over paths’ between points in space-time. It was mathematical nonsense, as Feynman's friend Freeman Dyson observed. But it worked unfailingly, perfectly reproducing the results of conventional quantum techniques and providing a host of invaluable insights into the theory. This was all that mattered to Feynman, who was unconcerned that mathematicians found the successes of his method baffling. (They still do.)

Building on this success, Feynman came up with an ingenious way of doing calculations about the interactions of subatomic particles using what are now universally known as Feynman diagrams. They, too, were soon essential to the toolkit of particle physicists.

Although Feynman was not short of self-regard, he readily acknowledged his debt to Wheeler: “You might say that my success was a result of things I learned from him.” Wheeler was even more generous: “I am eternally grateful for the fortune that brought us together.” Wheeler's own accomplishments, which Halpern does a good job of highlighting, included a brilliant insight into the fission of uranium nuclei, conceived with the great Danish scientist Niels Bohr. This advance was fundamental to the development of nuclear weapons in the Manhattan Project, which drew in both Wheeler and Feynman. After the Second World War, Feynman dropped military-related work, unlike Wheeler, a nuclear hawk.

Although Wheeler was superficially stolid, he had an imagination arguably even more vivid than Feynman's. During the renaissance of gravity theory, beginning in the 1950s, Wheeler was perhaps its most energetic intellectual leader, willing to entertain even the most adventurous ideas. He enthusiastically supported research into black holes (a term he successfully promoted) and coined the word ‘wormhole’ to describe hypothetical tunnels in space-time.

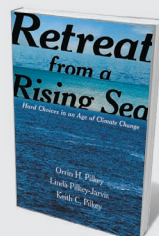
Later, Wheeler was no less imaginative in



Goodbye Berlin: The Biography of Gerald Wiener

Margaret M. Dunlop (*Birlinn, 2017*)

This fascinating biography of animal geneticist Gerald Wiener by writer Margaret Dunlop, his wife, describes Wiener's journey from his arrival in Britain on the *Kindertransport* during the Second World War to his pioneering research working with the team that cloned Dolly the sheep.



Retreat from a Rising Sea

Orrin H. Pilkey, Linda Pilkey-Jarvis and Keith C. Pilkey (*Columbia Univ. Press, 2017*)

Science and policy intertwine in this cogent study of global sea-level change and the challenges of addressing it — from Alaskan villages forced inland from the coast to the ongoing surge of climate-change denialism.

his thinking about information theory. He believed that information is not a secondary concept, but fundamental to the Universe. He coined the shorthand “it from bit” for the concept that every entity — every particle, every field and even space-time — derives its meaning from ideas in information theory. His view is now becoming part of the physics orthodoxy. In later life, Feynman told his colleague Kip Thorne that if you “unwrap the layers of craziness” from Wheeler’s ideas, “you will often find a powerful kernel of truth”.

Halpern admires Wheeler and Feynman so much that the narrative is occasionally cloying. As usual, Feynman is portrayed as a popular and generous-spirited figure. Yet I have often heard that he was sometimes unpleasantly aggressive to physicists who might claim to be his peers, several of whom have told me privately that they didn’t much like him. Freeman Dyson is an exception to this, although even he told me: “Conversations with Feynman were mostly all about him.”

At first, I doubted the depth of Feynman and Wheeler’s friendship, but Halpern eventually convinced me. In one delightful passage near the end of the book, he describes a conference organized by Wheeler and held in Austin, Texas, in 1981 at a venue much too “fancy-schmanzy” for Feynman, as Halpern puts it. Feynman checked out of the room and slept in nearby woods, even though he was in remission from cancer. After one night of al fresco slumber, Wheeler invited him to stay in his home. Shortly afterwards, Feynman told a local reporter: “One of the biggest regrets of my life is that I am not as nice as [Wheeler] is.” Feynman died 7 years later; Wheeler outlived him by 20 years.

The Quantum Labyrinth confirms the received opinion that Feynman was one of the greatest intuitive problem-solvers in twentieth-century physics, a world-class doer. But I suspect that many readers will take most pleasure from the account of Wheeler’s inspired dreaming. As Dyson told me: “Posterity has given Feynman his due, but Wheeler has been cruelly underrated.” ■

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TECHNOLOGY

Into cyberia

Li Gong weighs up three tomes on Silicon Valley’s vast influence, for good or ill.

The phrase “Making the world a better place” famously sums up the stated aim of Silicon Valley. Three books on California’s digital kingdom and its ‘four horsemen’ (Amazon, Apple, Facebook and Google) see that as at best self-delusional. Their authors characterize the ‘valley boys’, their companies and, by extension, the technology industry and all of computer science as destroying the United States by eliminating jobs and polluting people’s minds — even enabling Donald Trump’s presidency. Is Silicon Valley guilty as charged?

The Four, by marketing scholar Scott Galloway, is full of sharp insights and unconventional views. (Colourful asides include an account of his stint on the board of *The New York Times* as an activist shareholder, and a no-holds-barred career guide.) Instead of the usual rehash of product innovations or the personal peculiarities of valley players, Galloway analyses the big four’s business context and competitive landscape, and clinically pinpoints differentiators of success that may surprise many. Apple stores, not the iPhone, transformed the company into a luxury brand — even as it enjoys a spectacular sales margin by maintaining its low-cost production base. Galloway’s own proposals for success include a “T-algorithm” of eight factors (such as geographical location) for evaluating a company’s prospects of becoming a trillion-dollar enterprise.

Galloway’s main criticism of the tech

The Four: The Hidden DNA of Amazon, Apple, Facebook, and Google

SCOTT GALLOWAY
Portfolio: 2017.

World Without Mind: The Existential Threat of Big Tech

FRANKLIN FOER
Penguin: 2017.

The Know-It-Alls: The Rise of Silicon Valley as a Political Powerhouse and Social Wrecking Ball

NOAM COHEN
The New Press: 2017.

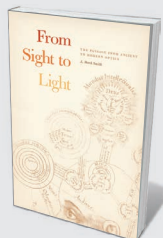
industry is its impact on non-tech jobs. He suspects that Amazon head Jeff Bezos supports a guaranteed income in the United States because he looks at the future and does not see many humans in jobs. Ama-

zon’s warehouses and data centres are exhibit A in a robotics heaven. Galloway brusquely calls on “Jeff” to show some real vision.

In *World Without Mind*, journalist Franklin Foer argues that the tech industry has had a negative impact on knowledge and democracy, by controlling information flow. He sees tech as an existential

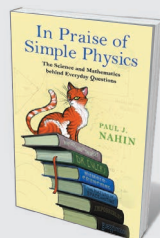
threat. He focuses on its role in the decline of journalism and creative writing, drawing on his stint as editor-in-chief of *New Republic*. In 2012, Facebook co-founder Chris Hughes bought the magazine to rebrand it as a digital-media company, prompting a staff exodus. Foer was given a monthly ▶

THE INDUSTRY
MANUFACTURES
**‘JUNK
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THAT
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From Sight to Light

A. Mark Smith (*Univ. Chicago Press, 2017*)
Historian Mark Smith unpicks optics from the classical period on. He pinpoints Johannes Kepler’s seventeenth-century research on retinal imaging as the shift towards modern optics, along with René Descartes’s study of refraction and the development of instrumentation.



In Praise of Simple Physics: The Science and Mathematics behind Everyday Questions

Paul J. Nahin (*Princeton Univ. Press, 2017*)
The energy of moving water, the physics of communication satellites and the maths behind catching a ball are all skilfully dissected by engineer and writer Paul Nahin in this enjoyable study of everyday physics.

► dashboard showing each writer's cost, production output and associated ad revenue. He hid it, fearing a demoralizing effect.

Foer thinks that Silicon Valley's view of creativity is out of the middle ages, a time when it was held that "God alone creates" (in the words of thirteenth-century philosopher Thomas Aquinas) and writers were manual labourers. He argues that the tech industry's assault on copyright laws, championed by the likes of legal scholar Lawrence Lessig, have resulted in large-scale collateral damage. Moreover, the industry manufactures 'junk information' that poisons our thinking just as much as processed foods erode our health, he asserts. Ultimately, he blames computer science. He sometimes finds a smoking gun — such as a Google engineer who explains that the company's book-scanning project is aimed at machine-readers, not people. More often, his evidence is unconvincing. Mathematician Alan Turing's work did not determine the path of the digital revolution, although Turing and others, from philosopher Gottfried Leibniz to writer Stewart Brand, made major technological impacts. No single person fomented the change. Much of Silicon Valley might still be orchards if the Second World War had not extended to the Pacific, drawing defence industries, money and labour forces to California.

Foer argues that the US faith in technology is no longer consistent with its belief in liberty. His call for resistance includes a raft of measures, from government regulation of digital monopolies' behaviour to the rigorous application of anti-trust laws.

Like Foer, journalist Noam Cohen investigates computer and tech pioneers to shed light on the evolution of Silicon Valley's ideology of radical individualism and relentless disruption. His *The Know-It-Alls* examines highly influential figures such as the often-neglected computer pioneers John McCarthy and Frederick Terman, who helped to transform Stanford, California, and its valley into a digital powerhouse — McCarthy as the father of artificial intelligence, Terman as a catalyst for local entrepreneurialism. These finely researched portraits are a joy. Terman's father, for instance, a Stanford University psychologist, devised the first US IQ test to identify the best and brightest for selective assistance. Local boy William Shockley failed



to make the cut — only to go on to invent the transistor and win a Nobel Prize.

Cohen's arguments get contentious in the passages on what he sees as Silicon Valley's belief system. He is right that those who purport to serve others without their consent necessarily exploit. Yet his claim of a "natural affinity" between the values of Silicon Valley and Trump is shocking. The pillars of the Trump campaign, such as its anti-immigration stance, are the polar opposite of valley values. What Cohen sees is that digital disruptions caused by Silicon Valley businesses and their founders' libertarian principles have undermined forces that might have held Trump back, from mainstream media to labour unions. Hacker arrogance and entrepreneurial greed, he avers, have led to a loss of civility and empathy. He calls instead for a "just society" with "a commitment to the local, the plural, the small scale and the active".

Is the future, or even the present, as bleak as these books deem it? I don't think so. Technological revolutions always squeeze parts of the old economy: players come and go. Intel, Microsoft and IBM could be called the original big three. The fabulous four of 'Web 1.0' were Cisco, Oracle, Sun Microsystems (submerged into Oracle) and EMC (eaten up by Dell). As Galloway puts it, "business mimics biology and, thus far, the mortality rate is 100 percent".

Moreover, looking beyond the United States reveals a very different picture. Consider China. The early dominance of Baidu's search engine and Sina's Weibo social-media platform has not made them the sole arbiter of news. They have been mostly upended by Tencent's WeChat — itself now challenged by five-year-old upstart Toutiao. Something besides technology must be at work; government control over media does not usually benefit new entrants. As a long-time Silicon Valley resident, I often wonder which companies truly represent its spirit. To me that is, simply, and apolitically, innovation and entrepreneurship. Perhaps those who have made it symbolize only the past, and we need not pay much attention to their spiel. We'll have to wait to see what's around the bend. ■

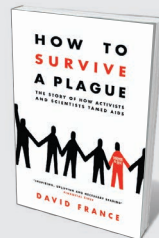
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Twenty-Six Portland Place

Gordon C. Cook (CRC, 2017)

Founded in 1907, London's Royal Society of Tropical Medicine and Hygiene drew in pioneering researchers through two world wars. Former society president Gordon Cook has mined its archives to compile this gripping chronicle of its first, momentous, 50 years.



How to Survive a Plague

David France (Picador, 2017)

This poignant account of the US AIDS crisis of the 1980s and 1990s follows the activists who expedited treatment on the ground. Prolific campaigner Spencer Cox, for example, designed clinical trials of potential medication and raised awareness of the psychological effects of AIDS.