

SARS and Ebola, as “dress rehearsals”. Although many people espouse health care for all, our globalized economic system militates against it — because profits are rarely invested where they were extracted — and we still seem to think that borders will keep disease out, even though they never have. Since Snowden completed his book, the administration of US President Donald Trump has announced that an immigrant’s chances of getting permanent residence will now be linked to the burden they put on the public purse — including health-care costs. That makes it more likely that recent arrivals will avoid doctors, and infectious diseases will go undetected.

The starkest reminder that the battle is not won, however, is that only one infectious disease has been eradicated globally: smallpox. Others that those optimists of the 1960s thought would have vanished by now have been hard to dislodge — and could easily flare up again. The strife-ridden Democratic Republic of the Congo is harbouring more than Ebola. There is also a measles outbreak, and a circulating strain of polio that mutated from the live, weakened one in the oral vaccine. There have been successful local disease eradications, but they often came at a price. A sustained campaign of DDT application helped eliminate malaria from the Italian island of Sardinia by 1952, for example, but in 2001, the pesticide was banned globally under the Stockholm Convention, after it was found to be dangerous to wildlife and the environment.

For Snowden, the lesson from more than 50 years of such experiments — successes and failures — is that eradication is most likely to work when doctors, politicians, drugmakers, the media and citizens work together. *Salus populi suprema lex*, he reminds us: public health must be the highest law. He has preached that message to generations of Yale undergraduates, and repeats it in this book. The risk is only that he is preaching to the converted. ■

Laura Spinney is a science writer based in Paris. Her most recent book is *Pale Rider: The Spanish Flu of 1918 and How it Changed the World*. e-mail: lfspinney@gmail.com



HISTORY OF TECHNOLOGY

Shadowed light

David E. Nye examines volumes on the complex history of lighting technologies and a great inventor.

Beyond steam engines and power blooms, the Industrial Revolution spawned innovation in artificial lighting — for city streets, lighthouses, railway carriages and mills. Incremental improvements, from whale oil to gas, kerosene and electric carbon-arc technology, culminated in 1879 in a practical incandescent light bulb created by prolific US inventor Thomas Edison. These advances were no straightforward march of progress, as two books — Jeremy Zallen’s *American Lucifers*, and *Edison* by the late Edmund Morris — reveal.

American Lucifers begins a century before Edison’s birth, in 1750. Zallen, a historian, explores the human costs of artificial lighting from then until 1890, concentrating on

American Lucifers: The Dark History of Artificial Light, 1750-1865

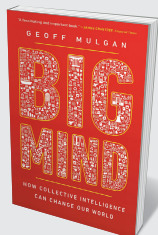
JEREMY ZALLEN
Univ. North Carolina Press (2019)

Edison

EDMUND MORRIS
Random House (2019)

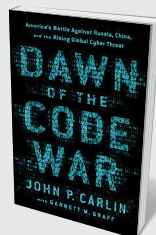
people producing and using fuel in the United States, and their links to South America, Britain and the Caribbean. Viewing energy in terms of class, he examines the fate of whalers, enslaved people distilling pine resin to make turpentine, children in match factories, petroleum refiners and miners of coal and copper.

The international networks he examines are convoluted. Jewish candle-makers in



Big Mind

Geoff Mulgan PRINCETON UNIV. PRESS (2019)
Innovation specialist Geoff Mulgan’s timely work draws on philosophy and computer science to explore collective intelligence: how combining human and technical abilities could help to tackle everyday problems, along with large-scale challenges in public health and climate change.



Dawn of The Code War

John P. Carlin & Garrett M. Graff PUBLICAFFAIRS (2019)
This cautionary insider story by security strategist John Carlin and journalist Garrett Graff examines targeting of US interests in cyberspace. From election hacking to terrorist recruitment, they provide legal insight into the risky situation facing the United States online.

Rhode Island, he argues, were culpable for the exploitation of workers who used their candles in Caribbean sugar plantations, New England cotton mills and Pennsylvania coal mines. Later, coal from those mines fed steam engines that powered electric lights. The candles themselves were made using either whale oil or tallow from livestock — cattle and hogs that “until the 1930s were mostly raised by farmers using kerosene lamps”. Zallen’s case studies also range over Argentinian slaughterhouses, phosphorus-match factories in Liverpool, UK, and a Montana copper mine.

The benefits of artificial light get short shrift. The “whole electric edifice”, Zallen argues, was predicated on “a century of steadily industrializing slave labor” along with the exploitation of women and children who, although not enslaved, worked at best for starvation wages. Yet such assertions oversimplify. In the nineteenth century, real wages in the United States increased. Factories demanded literacy and numeracy, which is one reason children were compelled to attend school. Nor is women’s history during this era one purely of exploitation and “rigid expectations”, as the spread of women’s colleges and the growing suffrage movement reveal.

In arguing that electrification was dangerous for miners, Zallen fails to acknowledge that, after around 1890, electric light proved safer in mines than candles. Electric-fan ventilation removed explosive gases, and alarms and telephones improved safety. But such technologies did not necessarily raise wages, and they did lead to redundancies.

Zallen is right to stress the human costs of resource extraction and to see technologies as ideological by implication and often oppressive in use. Energy historians need to integrate labour with invention and entrepreneurship, and *American Lucifers* contributes valuable perspectives. However, this well-written work comes close to reducing a complex transition between energy regimes into a simpler story of class struggle.

The packed narrative shows that the mid-nineteenth-century world into which Edison was born was not simply a prelude to electrification. But Zallen mistakenly dismisses the inventor as an “electric booster”, when he was actually well acquainted with the energy world of candles, coal and class conflict. Morris’s view of Edison is more nuanced. Known for his trilogy on US president

Theodore Roosevelt, Morris follows an unusual chronology, proceeding in reverse from Edison’s death in 1931. Thus, Edison’s final three decades, when important inventions tapered off, precede his spectacular triumphs.

Born in 1847 in rural Ohio, and moving to Michigan as a child, Edison had little schooling before he became a telegrapher at 15. He learnt how the telegraphy system worked, and became an inventor, ultimately based in New Jersey. At 30, he had improved telegraphy, the telephone and the microphone, and startled the world with the phonograph. By 1882, he and his collaborators had developed the electric bulb and the still-familiar electricity-distribution system of dynamos, wiring, fuses, sockets and wall switches.

Electric lighting outshone gas first in city

ELECTRIFICATION HAS PROVED A BOON BUT SPURRED RESOURCE EXTRACTION AND GLOBAL WARMING.

centres, stock exchanges, railway stations and prominent buildings; by 1910, it dominated street lighting. By 1940, it was on its way to today’s vast, energy-guzzling infrastructure. Morris, an engaging writer with an eye for details, explains the inventions clearly, including lesser-known technologies such as the 1877 translating embosser, which sped up telegraphic transmission. Perhaps Edison’s greatest invention was the first US industrial research lab, in West Orange, New Jersey. From 1886, this developed motion-picture equipment and a film studio; improved batteries, iron mining, cement production and phonograph recording; and found that a weed, goldenrod (*Solidago leavenworthii*), could be a domestic source of rubber.

Edison — twice married and a conflicted father to six children — was more devoted to the lab than to domestic life. Invention was a collective process, as the thousands of

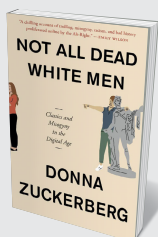
collaborative notebooks held at West Orange attest. His relationships with pioneering electrical engineer William Hammer, his chief experimental assistant Charles Batchelor, and others were essential to Edison’s success, but in later life he became more of a loner.

Like many inventors, he proved poor at business. Like many a self-made man, he had little sympathy for workers in the difficult 1890s. And like many founding entrepreneurs, he resisted delegation. At his death, his famous laboratory was left moribund and leaderless. Edison had long since lost control or even partial ownership of his electric-light interests, which financiers submerged in the General Electric company. He let major inventions, such as the phonograph and motion pictures, languish, but poured resources into quixotic projects — notably, a New Jersey iron mine, to the despair of family and associates. By telling Edison’s story in reverse, Morris downplays these accumulated failings, in a riches-to-rags narrative that explores how individual creativity emerges.

Morris’s treatment is detailed but flawed. Edison’s relationship with the US car magnate Henry Ford was more important than Morris credits: both grew up in the hinterlands of Detroit, Michigan, and they held similar convictions. Edison’s racism is only gingerly mentioned. Some fascinating letters to Edison, including several from the escape artist Harry Houdini, might have been included. But, faced with five million pages of documents, Morris had to omit much. The structure also inhibits retrospective summaries.

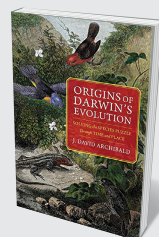
Electrification has proved a boon — but spurred resource extraction, light pollution and global warming. As we face another great transition, from fossil fuels to alternative energies, Zallen’s narrative is timely — echoing in the high human and environmental costs of dramas playing out in Nigerian oilfields and the smog of Indian cities. Meanwhile, Morris’s portrait of an energy revolution that was eagerly embraced, yet took more than half a century, leaves us hoping that rendering Edison’s system sustainable will not take as long. ■

David E. Nye is professor of US history at the University of Southern Denmark in Odense. His publications include *Electrifying America, When the Lights Went Out* and *American Illuminations*. e-mail: nye@sdu.dk



Not All Dead White Men

Donna Zuckerberg HARVARD UNIV. PRESS (2019)
With the proliferation of anti-feminist rhetoric online, the extreme right is using ancient philosophy to boost its credibility. As Stoic ethics moves from lecture halls to Reddit, classicist Donna Zuckerberg exposes this misappropriation, meant to enforce the concept of male superiority.



Origins of Darwin's Evolution

J. David Archibald COLUMBIA UNIV. PRESS (2019)
Biologist David Archibald examines an unsung hero of Charles Darwin’s evolutionary theory: historical biogeography, the natural history of species in time and place. Archibald invites us to enrich our understanding through Darwin’s ideas on species evolution in different regions.