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Learning English is essential for modern scientists — but German and French were once more significant.

LINGUISTICS

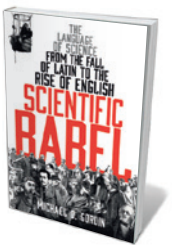
The ascent of English

Andrew Robinson salutes a chronicle of how one language came to dominate science.

A scientific paper published in 1905 gloried in the title *Zur Elektrodynamik bewegter Körper*. Today, Albert Einstein's 'On the electrodynamics of moving bodies', which introduced the special theory of relativity, would be published in English. English has become the language of almost every leading journal across the natural sciences, whatever its country of origin. Large conferences held in non-anglophone countries, such as those of the European Geosciences Union, often use English. Of the major producers of scientific research, only China and, to a lesser extent, Japan host international conferences in their own languages.

In 1905, however, some 30% of global scientific literature was in German, with a similar proportion in English, marginally less in French and much less in Russian and Japanese. So reveals US historian Michael Gordin in *Scientific Babel*, a massive, erudite and engaging study of the role of languages in science based on 15 years of research — and drawing on Gordin's knowledge of French, German, Russian, Esperanto and Latin. The numerous translations are generally his own.

The dominance of English — unpredicted a century ago — is rooted in Germany's defeat in the First World War. For some years afterwards, there was an international boycott of German scientists and attempts were made to curb the use of German by the League of Nations and 22 US states. The advent of the Third Reich in 1933 boosted English as the scientific lingua franca, as did the United States' postwar ascendancy in scientific output and geopolitical power — along with a perception of English as neutral.



Scientific Babel: The Language of Science from the Fall of Latin to the Rise of English
MICHAEL GORDIN
Profile/Univ. Chicago Press: 2015.

Gordin asks, with a touch of irony, whether this English-language "fait accompli" is always good for science. Although he finds that most scientists are in principle inclined to embrace the idea of one language for communicating, the dominance of English can disadvantage non-English speakers. The most creative thinking tends to be done in the language in which a person feels most at home. As Fields Medal winner Laurent Lafforgue noted (in French) in 2005: "it is to the degree that the French mathematical school remains attached to French that it conserves its originality and its force".

Gordin asks: does history suggest a future alternative? He considers relevant historical episodes in detail. Latin, for example, became the language of European science during the Italian Renaissance, but its use began to decline in the seventeenth century. Thus, Galileo Galilei turned to Italian, and Isaac Newton shifted from Latin for his *Principia Mathematica* (1687) to English for his *Opticks* (1704). During the Enlightenment, European libraries collected roughly one-third of their books in Latin, one-third in French and the rest in the local vernacular. Barring taxonomic nomenclature, the use of Latin had died out among leading scientists by the time of Charles Darwin, who wrote in English.

The linguistic complexity in science in the late nineteenth century is demonstrated by the story of the periodic table and its contested origin, which Gordin explored in his 2004 book *A Well-Ordered Thing* (Basic Books). When the German-language journal *Zeitschrift für Chemie* mistranslated an 1869 Russian abstract by Dmitri Mendeleev, a vehement priority dispute blew up between Mendeleev and German chemist Lothar Meyer. In a crucial sentence, "The elements ordered according to the magnitude of their atomic weights show a periodic change in properties", a rushed translator used the

German word *stufenweise* ('phased') instead of *periodische* ('periodic'); as a result, Meyer claimed precedence for his own research. When Mendeleev objected, Meyer replied: "It seems to me an excessive demand that we German chemists read, besides those articles appearing in the German and Romance languages, also those in the Slavic languages". He did not mention English.

By the end of the nineteenth century, scientists everywhere were obsessed with a multilingual information overload — Gordin's scientific babel. The solution seemed to be an auxiliary universal language. Volapük ('Worldspeak') was invented in 1880; the better-known Esperanto arose in 1887, and its offshoot, Ido, arrived in 1907. Gordin sympathetically analyses these artificial languages — taken seriously by leading scientists of the time — through the lens of Ido advocate Wilhelm Ostwald, a Nobel-prizewinning German chemist. In-fighting dissolved the movement, and Ostwald abandoned Ido during the First World War, championing German as an international language.

During the cold war, and especially after the Soviet Union launched Sputnik in 1957, much scientific attention switched to literature in Russian, which by 1970 reached 20% of the global output. In 1961, 85 Soviet journals were being translated into English, with US government funding. Preposterous claims were made for machine translation from Russian into English. Both translation programmes were eventually abandoned in favour of increased Russian-language teaching for US scientists — until the 1991 collapse of the Soviet Union sealed the fate of scientific Russian beyond its own borders. A lively Russian-language journals scene still prevails in Russia.

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Anglophone dominance is unlikely to change soon, says Gordin. If scientific importance were based on population, Spanish would be a major scientific language; if on geopolitical power, scientists would publish much more in Chinese. In the 1660s and later, philosopher and mathematician Gottfried Leibniz advocated a universal writing system for science independent of any spoken language, similar to mathematical notation. This must stay a dream: intellectual activity demands language. As the polyglot Gordin concludes, "we remain bound to the constraints of history, to the shackles of the words in human languages: untranslatable yet intelligible, frustrating yet infinitely beguiling". ■

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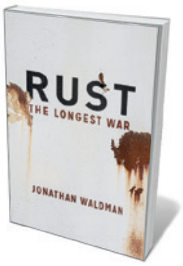
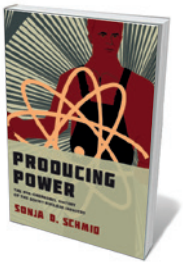
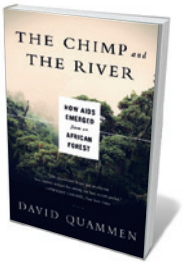
Books in brief



Rust: The Longest War
Jonathan Waldman SIMON AND SCHUSTER *(2015)*
Corrosion has killed people in nuclear power plants, taken out planes in mid-air and reddened the face of Mars. So notes environmental journalist Jonathan Waldman in this dexterous technological study of this insidious process, which is nibbling away at Western civilization. The science compels, but what leap from the page are Waldman's snapshots of rust geeks — such as the team that rebuilt the hole-ridden metal skin of New York's Statue of Liberty in the 1980s, and Bhaskar Neogi, 'integrity manager' of the Trans-Alaska Pipeline System, one of the heftiest metal objects in the Western Hemisphere.

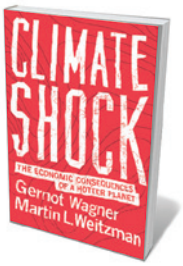


Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry
Sonja D. Schmid MIT PRESS *(2015)*
In the annals of nuclear meltdown, the April 1986 explosion at Chernobyl in Soviet Ukraine remains the most devastating, contaminating thousands of square kilometres of land. This trenchant study by science historian Sonja Schmid digs deep into the catastrophe's tangled prehistory to make nuanced sense of it. She unravels key scientific, social and political factors, from the plant's lack of 'redundant' safety features to rivalries in the Soviet nuclear industry and inefficiencies in the country's economy.



The Chimp and the River: How AIDS Emerged from an African Forest
David Quammen W. W. NORTON *(2015)*
This intense study of the origins of AIDS is excerpted and adapted by David Quammen from his book *Spillover* (W. W. Norton, 2012; see N. Wolfe *Nature* **490,** 33; 2012). With Sherlockian verve, Quammen traces the trail from the first human cases, through labs around the world, and finally to virologist Beatrice Hahn's discovery that simian immunodeficiency virus (SIV), from which HIV-1 is derived, can kill wild chimpanzees. Quammen's portrait of the real 'Patient Zero' as a Cameroonian hunter clumsily butchering a chimp is a masterful summing-up of the evidence.

Science in Wonderland: The Scientific Fairy Tales of Victorian Britain
Melanie Keene OXFORD UNIVERSITY PRESS *(2015)*
The prodigious pace of Victorian research — from the unearthing of dinosaur fossils to the laying of a transatlantic telegraph cable — posed a stiff pedagogical challenge. To deliver the new findings on nature to the public, writers seized on the era's obsession with the supernatural. Science historian Melanie Keene argues here that many "fairy tales of science" were educational gems: by harnessing tropes of the genre to communicate facts, they evoked a scientific wonder that truly came into its own in the age of quantum mechanics and relativity. (See M. Keene *Nature* **504,** 374–375; 2013.)



Climate Shock: The Economic Consequences of a Hotter Planet
Gernot Wagner and Martin L. Weitzman PRINCETON UNIVERSITY PRESS *(2015)*
Economists Gernot Wagner and Martin Weitzman deliver a high-voltage shock in their analysis of the costs of climate change. With uncurbed emissions predicted to rise steeply by 2100, a radical reframing of the catastrophe as a global risk-management issue is due, they argue. Their blueprint is a three-step response: scream (call for business and policy-makers to snap to it); cope (adapt rapidly to events); and profit (invest in green industry). **Barbara Kiser**