



Frank A. von Hippel. *The Chemical Age: How Chemists Fought Famine and Disease, Killed Millions, and Changed Our Relationship with the Earth.* Chicago: University of Chicago Press, 2020. 368 pp. \$29.00, cloth, ISBN 978-0-226-69724-6.



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Published on H-Environment (August, 2021)

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Among the most oft-cited features of modernity is the convergence of political ideology and technoscientific capacity upon a vision of human thriving predicated upon the selective and complete eradication of agents of death. Achille Mbembe describes this as “the perception of the existence of the Other as an attempt on my life, as a mortal threat or absolute danger whose biophysical elimination would strengthen my potential to life and security.”[1] Frank A. von Hippel’s *The Chemical Age* takes up this phenomenon via the physicians, biologists, and chemists who fashioned a scientific basis and technological instruments for killing humans and other dangerous organisms for the greater good. The book’s greatest virtue is dramatizing how this orientation toward life, death, science, and technology came to be. Its greatest defect is taking the inevitability of this worldview for granted.

The Chemical Age is not an exercise in high theory but a page-turner. Von Hippel, a professor of ecotoxicology and science history podcaster, juxtaposes dramatic accounts of insect-transmit-

ted disease and warfare, of microbiology and tropical medicine, of the science and business of chemical biocides, and of wrangling over the justice, justification, and unintended consequences of all this killing. The writing is fast-moving and clearly explained throughout, achieving an impressive blend of depth and accessibility in its engagement with technical subject matter, focusing on the late nineteenth through mid-twentieth centuries but with excursions reaching back to antiquity.

The story is told in four parts, constituting two distinct stories: the first addresses microbes; the second, chemicals. An opening chapter on “Famine” addresses the potato blight that devastated nineteenth-century Ireland and a French botanist’s accidental discovery of a fungicidal prophylactic, originally employed as a repellent to prevent human passersby from pilfering grapes in Bordeaux vineyards. The second part, four chapters on “Plague,” presents capsule histories of malaria, yellow fever, typhus, and bubonic plague. The focus here is on the global cast of microbiologists and physicians who discovered the microbial

agents and insect vectors of these diseases. Von Hippel focuses on the Scots Patrick Manson and Ronald Ross, the American Walter Reed, and (of course) Louis Pasteur and Robert Koch. These are also among the main characters of the classic *Microbe Hunters* (1926), whose author, Paul de Kruif, himself a microbiologist, strenuously defended the human experimentation and deaths of experimental subjects involved in their discoveries. Von Hippel prefers not to render judgment. However, *The Chemical Age* follows de Kruif in its admiration for the self-experimenting, death-defying daring of these figures, and in implicitly endorsing the notion that, right or wrong, human experimentation was a necessary cost of their lifesaving discoveries.

Part 3, “War,” addresses chemical biocides in the first half of the twentieth century. The argument follows that of Edmund Russell’s *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (2001): the development and use of chemical warfare agents paved the way for the widespread use of similar chemicals as peacetime insecticides for crop protection and disease vector control, and vice versa. The German chemists Fritz Haber and Walter Nernst are the tragic heroes of these chapters, their complicity in explosives and war gas production during World War I (also pursued by the United States and other major combatants) partly redeemed by their rejection of and by the Nazi regime in the 1930s. The chemical conglomerate I. G. Farben and its leadership figure as villains: complicit in the Holocaust and beneficiaries of Nazi race policies and the forced labor of concentration camps inmates. So does I. G. Farben chemist Gerhard Schrader, inventor of the nerve gases tabun and sarin and subject of cloak-and-dagger operations by US spies to access his toxic knowledge. Part 4, “Ecology,” turns to *Silent Spring* (1962), Rachel Carson’s exposé of the effects of ecologically insensitive pesticide overuse on wildlife, workers, and potentially the public at large. The book concludes on a somewhat pessimistic note: *Silent*

Spring notwithstanding, chemical killing for the greater good has nonetheless carried on, as have the unintended (but predictable) consequences of using insecticides and herbicides for protecting crops, preventing disease, and waging war. An epilogue provides family-historical context for von Hippel’s story: his own grandfather and great-grandfather, Arthur von Hippel and James Franck, were anti-Nazi German physicists caught up in the disorders and tragedies of Nazism and World War II.

The lesson von Hippel draws from all these stories boils down to a Promethean take on science, technology, politics, and human-environment relations. Scientific discovery, according to von Hippel, is the fruit of manic genius: “The same compulsive drive likely plagued, motivated, and enabled the greatness of all of the scientists in this book” (p. 287). Once new chemicals are developed, if they can be used to kill pests or wage war, they will be.

These are reasonable conclusions to the narrative von Hippel has laid out; they are also unsatisfying. In part, this has to do with how this history is put together. *The Chemical Age* tends to absorb the arguments of its sources—particularly those that lend themselves to narrative drama—rather than subject them to critical scrutiny. Engagement with recent historical scholarship is relatively sparse, leading to long-refuted narratives getting repeated as fact—for example, the story that Friedrich Wöhler’s synthesis of urea in 1828 destroyed vitalism and gave rise to organic chemistry. Dubious generalizations subordinate history to dramatic tension. (Haber and Nernst were important figures, but casting their professional rivalry as the primary “intellectual drive behind Germany’s supremacy in chemistry” circa World War I [p. 138] is a drastic exaggeration.) Historian Peter Ramberg writes in his analysis of the much-debunked Wöhler myth that when a story “provides a hero who accomplished a specific datable task that assumed great significance,” its dramatic appeal

seems to lend it historiographic immortality.[2] *The Chemical Age* leans considerably upon such stories.

Another effect of the book's orientation toward its sources, subtler but to my mind more troubling, is its capitulation to the inevitable dominion of eradicationist common sense. *The Chemical Age* concludes:

What does the history of pesticides imply about the future of pesticides? New chemicals will emerge that are effective for a time, until pests evolve resistance. New techniques and technologies will dent pest populations, and thereby limit the scourge of deadly diseases and famine. The enticement of these new technologies will be irresistible and driven by necessity. Some, like tetraethyl lead and Freon, will result in serious unintended consequences. Others will vastly improve living conditions, and perhaps ease tensions and competition for resources and thereby reduce the risk of war. Some will be adapted for war, which seems to be an inevitable consequence of human existence. (p. 297)

This is the ethos its sources embody, and that (it would seem, though this is a research question) many of them purposefully cultivated. The actors have captured the historian. Yet the book offers an alternative to this blend of technological determinism and political fatalism. Back in chapter 1, drawing on the British historian Cecil Blanche Woodham-Smith (whose 1962 *The Great Hunger* environmental historians might find worth revisiting), von Hippel explains how in colonial Ireland, settler-favoring British land tenure policies, increasing cultivation of less favorable soils, and a growing population reliant on subsistence farming of potatoes all went hand in hand. The growing speed and volume of transatlantic trade (especially trade in agricultural commodities and inputs) provided the means for blight to travel from the Americas to Ireland and, subsequently, for many famine-stricken farmers to leave Ireland for America. One set of conditions favored the emer-

gence of potato blight, its devastating consequences, and its ramifications. These conditions were at once political, ecological, and technological. The course of events was overdetermined but not inevitable. There is much to appreciate about *The Chemical Age*. I want to read the version whose remaining chapters had followed this explanatory path.

Notes

[1]. Achille Mbembe, "Necropolitics," *Public Culture* 15, no. 1 (January 1, 2003): 11–40, 18.

[2]. Peter J. Ramberg, "Myth 7: That Friedrich Wöhler's Synthesis of Urea in 1828 Destroyed Vitalism and Gave Rise to Organic Chemistry," in *Newton's Apple and Other Myths about Science*, ed. Ronald L. Numbers and Kostas Kampourakis (Cambridge, MA: Harvard University Press, 2015), 59–66, 66.

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Citation: Evan Hepler-Smith. Review of von Hippel, Frank A. *The Chemical Age: How Chemists Fought Famine and Disease, Killed Millions, and Changed Our Relationship with the Earth*. H-Environment, H-Net Reviews. August, 2021.

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