



CHICAGO JOURNALS



History
of
Science
Society

Henry Petroski. *To Forgive Design: Understanding Failure*.

To Forgive Design: Understanding Failure by Henry Petroski

Review by: Matthew Wisnioski

Isis, Vol. 104, No. 4 (December 2013), pp. 829–830

Published by: [The University of Chicago Press](#) on behalf of [The History of Science Society](#)

Stable URL: <http://www.jstor.org/stable/10.1086/676347>

Accessed: 17/03/2014 23:29

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at

<http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



The University of Chicago Press and *The History of Science Society* are collaborating with JSTOR to digitize, preserve and extend access to *Isis*.

<http://www.jstor.org>

the Bible, but the rocks don't lie. They tell it like it is" (p. 257).

KENNARD B. BORK

John Parascandola. *King of Poisons: A History of Arsenic.* ix + 197 pp., illus., index. Washington, D.C.: Potomac Books, 2012. \$27.50 (cloth).

The history of poisonous substances, of which many consider the metalloid element arsenic to be chief, has been the subject of considerable attention by professional historians and popular writers in the last decade. There are good reasons for such interest: in addition to its more titillating features, the history of poisons embraces aspects of the history of crime and punishment, medicine and pharmacy, food laws, environmental pollution, and workplace safety. Some recently published books in this line are of uneven quality, written by popular writers for a popular audience. Here we have a work written for a broad audience, but by an eminent historian of pharmacy, John Parascandola. The book does not disappoint.

Parascandola's first chapter reviews the history of arsenic as an agent for true crimes, and his second chapter covers fictional crimes. He then moves to a discussion of the history of arsenic production and industrial applications and the increasing understanding of the toxic effects on workers. A fourth chapter covers the developing story of environmental pollution, and the book concludes with a final chapter on the history of arsenic as a medicine. I was reminded (and taught) about the astonishingly broad range of applications of arsenic in human history. For instance, with regard to arsenical remedies Paul Ehrlich's 1909 development of salvarsan comes to mind—a landmark in early chemotherapeutics, effective against the scourge of syphilis. But arsenic and its compounds had been used for centuries in many other pharmaceutical applications. Moreover, arsenic trioxide (the "white arsenic" of the crime literature) is currently being used as an FDA-approved therapeutic agent for certain forms of cancer—and this despite the fact that arsenic is a well-documented carcinogen. As Paracelsus wrote four centuries ago, the dose makes the poison—or the medicine.

Parascandola makes good use of the existing literature, such as James Whorton's fine work *The Arsenic Century: How Victorian Britain Was Poisoned at Home, Work, and Play* (Oxford, 2010). Parascandola's scope, as well as his intended readership, is considerably broader

than Whorton's, and as a consequence the depth of detail that Parascandola treats in each of his subjects is limited. One could sometimes wish for tighter editing; for instance, we read about arsenical wallpaper pigments, and about arsenic-eating Styrian peasants, at several points in the course of the book, and the last chapter ends disconcertingly suddenly. But for a history of arsenic that is at once concise and authoritative, Parascandola's *King of Poisons* is just the thing.

ALAN ROCKE

Henry Petroski. *To Forgive Design: Understanding Failure.* xxi + 410 pp., illus., index. Cambridge, Mass.: Belknap Press of Harvard University Press, 2012. \$27.95, £19.95, €25.20.

Henry Petroski has made a career of explaining why things go wrong. In *To Forgive Design* he revisits the analysis of *To Engineer Is Human: The Role of Failure in Successful Design* (St. Martin's, 1985), with reference to over seventy examples of human-built failures from the *Titanic* to dropped iPhone calls. Deploying characteristic clarity of prose and technical explanation, he uses the case-study method to reveal the "nature of failure" (p. 4) so as to prevent history from repeating itself.

To Forgive Design is written primarily for engineers and those who would accuse Petroski's profession of malfeasance. As such, his sustained focus is on construction projects; he only occasionally dips into the history of science—for instance, citing Galileo's analysis of cracked obelisks in *Dialogue Concerning Two New Sciences* (pp. 35–38). But historians of science also stand to benefit from interrogations of design failure. Error, fraud, and the gulf between explanation and material reality are inextricable elements of the scientific enterprise. The construction of expertise, in particular, is a key nexus for exploring the interplay of design and theory; where there are disasters, there are experts.

Petroski relies on two adages to describe the nature of failure: artifacts are always in the process of deteriorating, and we must always be vigilant to mitigate human fallibility. This intersection of nature and humanity is the "technological condition." In his platonic interpretation of the designer, however, the self-image of the engineer runs afoul of historical contingency and the political economy of failure. "The design process" today, he writes, "is fundamentally the same as the design process thirty, three hundred, even three thousand years ago. The

creative and inherently human process of design . . . is in effect timeless” (p. 32). From this perspective, the engineers’ task is to overcome the loss of “technological memory” that comes with the passing of each “engineering generation.” Historical study by engineers, he contends, can provide a check against hubris while also revealing general principles such as the “cyclical nature” of success and failure.

To Forgive Design is at its best when it pulls back the curtain on tensions between failure analyses and analysts. A chapter centered on the University of Illinois’s Talbot Laboratory offers a memoir of Petroski’s own career over a period of epistemic flux in mechanics. As a student, he marveled at the behemoth machines of controlled destruction that reigned from the 1890s to the 1960s and the identity of the “engineer” affiliated with them. This earlier model of physical testing has been replaced by computer simulation, with the machine hangar encroached on by offices populated by engineering scientists. Changes in instrumentation and method brought a tectonic shift in the culture of expertise.

An analogous transformation has taken place in social studies of engineering and disaster. Petroski’s pioneering work as a public intellectual of the engineering profession has given rise to (and been encroached upon by) social scientific interrogations that have complicated interpretations of design and failure. In Ulrich Beck’s characterization of disaster epochs, for example, the varieties of risks in technological systems are evolutionary, with the concept of reflexive modernization a challenge to a universal technological condition and the designer’s role in it. Charles Perrow’s *Normal Accidents* (Basic, 1984) and the sociological work it inspired—by Barbara Allen, Scott Frickel, Diane Vaughan, and others—reveal networks of nature, artifice, and organization in which the origins of failure can be rooted out in political systems with equal precision to the identification of weak epoxy or hasty construction. At the same time, historical and ethnographic work in engineering studies spotlights the vital role of experts in design and locates them in broader context. Scott Knowles’s recent *Disaster Experts: Mastering Risk in Modern America* (Pennsylvania, 2011) showcases the intersection of engineering studies and disaster studies in a book that argues for the interdisciplinary and distributed nature of designing for failure mitigation.

The flourishing of social studies of engineering and disaster suggests that design does not need forgiveness so much as expanded vantages of understanding. Petroski is aware of this evolution, citing Perrow and Vaughan for details

about Apollo 13 and the Space Shuttle, and it would be fascinating to see him reflect on it in depth. Over a decade ago, he surveyed such analyses and concluded that “none . . . really teaches engineers much” (“The Success of Failure,” *Technology and Culture*, 2001, 42:321–328, on p. 328), but the status and sophistication of this literature have changed markedly. Engineers, Petroski argues, do not own totality of responsibility for design failures—nor, it is increasingly clear, for explanations of how to prevent them.

MATTHEW WISNOSKI

Hillel Schwartz. *Making Noise: From Babel to the Big Bang and Beyond*. 912 pp., illus., bibl., index. New York: Zone Books, 2011. \$38 (cloth).

I have been reviewing books for thirty years, and this is the hardest book I have yet had to tackle. Hillel Schwartz likes to describe himself as an “independent scholar”—the book he has produced seems independent of most current scholarly conventions. *Making Noise* weighs in at 912 pages, and the endnotes (available only as an annoying download from the MIT Press Zone website) add a further 349 pages. I will freely admit that I have not read it all. What can be said in a thousand-word review of a book nearly a thousand pages long? Worse, the book does not make the usual sorts of scholarly arguments; it requires a whole new set of reading practices. I felt I could begin anywhere, read the latter sections earlier, miss out whole sections with little consequence, or just read random passages. Nevertheless, I believe the book to be a work of genius, a labor of love—a triumph that readers will turn to as a sonic bible for years to come.

Noise disrupts—it moves between the material world of bodies and machines, the spiritual world, the world of fact and fiction, and everywhere is inculcated in the everyday lives, work, and dreams of people. But sound also joins, it heals, it makes whole; it tells us about ourselves, our medicine, science, and technology, our poetry and literature, in a new way. The sonic has too long played second fiddle to the visual—let it now lead the orchestra. No one before Schwartz has taken on the task of trying to chart all the passages and turbulent eddies sound carves into our human existence. We have to thank him for taking on this magnificent and impossible task—he is the sympathetic ear of all history.

Some passages are beautiful, poetic, lyrical; at other points the text gets stodgy, as if every tidbit about sound and noise is being served up