BOOKS: HISTORY OF SCIENCE

A Martian's Chronicles

Gregg Herken

Although Edward Teller has spent a career on the frontiers of physics, he is perhaps better known for a life on the battlements of unpopular causes—as a promoter and inventor of the hydrogen bomb, an opponent of the nuclear test ban treaty, and, most recently, a champion of "Star Wars." More than just an autobiography, *Memoirs* is a chronicle of the developments, both scientific and political, of the century just ended. Teller was born in 1908 and his life spans the period from the Bolsheviks' rise to power in Russia to the collapse of the Soviet Union; indeed, much of his remarkable persona has been interpreted as a reaction to the historical phenomenon of communism. Not surprisingly, *Memoirs* is far from an encomium.

Memoirs
A Twentieth-Century Journey in Science and Politics
by Edward Teller with Judy Shoolery
Perseus, Cambridge, MA, 2001. 640 pp. $35, C$52.95. ISBN 0-7382-0532-X.

Unlike Teller's previous books, this one contains a wealth of personal detail. He sees himself as overprotected by his mother and writes that he "reached adolescence still a serious child with no sense of humor." The taunts of his classmates he found "intolerable." Such insights help explain how a physicist of widely acknowledged brilliance came to have such a surprisingly fragile ego.

The book's brief and informative asides, which elucidate various physical phenomenon (from so-called phantom pain to the makeup of a neutron star), not only demonstrate Teller's famously self-deprecating wit but also confirm his reputation as an inspired and gifted teacher. The undergraduate physics class that Teller taught at Berkeley for many years was consistently over-enrolled, even at a time when radicals on campus were branding him a "war criminal." *Memoirs* reveals the Teller who, as some of his harshest critics admit, could be charming in face-to-face meetings.

As with any memoir, what is left out is at least as revealing as what was put in, and Teller has long been notorious for a selective memory. Some commentators have even observed that, contrary to nature, Teller's memory has been improving with age—to the point where he now vividly remembers events that never happened. True to the genre, *Memoirs* is also used by Teller as an opportunity to settle scores.

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One of the more celebrated (and bizarre) episodes recounted in the book is the author's feud with Stan Ulam. Teller admits to having had an "allergy" to Ulam, a mathematician who was his sometimes collaborator at Los Alamos. Teller's early account of the development of the hydrogen bomb, "The Work of Many People" [*Science* **121**, 267 (1955)], credited Ulam with the "imaginative suggestion" that led Teller to the breakthrough that resulted in an actual bomb. But in his publications and statements since then, Teller has gradually withdrawn credit from Ulam, who died in 1984. Earlier this year, in an interview published by the *New York Times* (24 April 2001), Teller argued that it was actually another Los Alamos scientist, Richard Garwin, who contributed to the invention. In *Memoirs*, Ulam has finally disappeared almost entirely from the H-bomb story. Teller now claims that he had solved the problem on his own, that Ulam only came up with a similar but unworkable scheme several weeks later, and that the mathematician, failing to understand the physics, opposed development of the new super-bomb.

Teller's memory also gets him into trouble in his account of his long and tortuous relationship with J. Robert Oppenheimer. As *Memoirs* confirms, Teller's feud with "Oppie" had its origins in the founding of Los Alamos laboratory during the Second World War and only ended with Oppenheimer's death, in 1967. The dramatic denouement, however, was Teller's testimony as a witness for the prosecution in Oppenheimer's 1954 loyalty hearing, which denied Oppenheimer a security clearance and cast him into a life of academic exile at Princeton. In Teller's eyes, the Oppenheimer case caused a split in the scientific community from which the nation has only just recovered. Thirty years after the hearing, Teller blamed it for the difficulties he encountered in rallying scientists behind the Strategic Defense Initiative. Oppenheimer is a ghost that haunts both Teller and his memoirs.

This clash of titans began with what seems to have been a simple misunderstanding. In fall 1942, when Oppenheimer was trying to put together the lab that would build the atomic bomb, he confided to Teller that the day might come when they, as scientists, would have to "resist the military." Although the comment was surely innocuous—Oppie was then having trouble recruiting academic colleagues, who feared, understandably, that General Groves and the Army would dominate Los Alamos—Teller, incredibly, interpreted the remark to mean that Oppenheimer was planning some future act of "civil disobedience," or worse. Teller claims that his unwillingness to participate in Oppie's implied conspiracy was the start of the distance between them.

Their conflict escalated, fueled in part by two wildly divergent personalities but also by their antipodal political views. Oppenheimer was a committed left-winger whose relatives and friends were members of the Communist Party; Teller, a stalwart anti-communist.

In the book, Teller sticks to the story that he has told since 1954: that he had intended to testify on Oppenheimer's behalf until, just minutes before taking the stand, he was shown Oppenheimer's own earlier testimony, in which Oppie admitted to lying to Army security officials about being contacted to spy for the Russians in 1943. (In a footnote, Teller graciously acknowledges my having given him a document relevant to the Oppenheimer case during an interview several years ago. It is a letter from the early 1960s, in Teller's own handwriting, in which he relates how he discussed his testimony with the prosecution's lawyer the night before his appearance at the hearings. Nonetheless, Teller now contends that his memory is more trustworthy than this

Supreme super-bomb. In 1994, while attending a conference at Russia's Chelyabinsk laboratory on possible means of avoiding meteorite impacts, Teller posed with this model of a 100-megaton hydrogen bomb (the largest ever exploded).

CREDIT: EDWARD TELLER/COURTESY PERSEUS PUBLISHING

documentary evidence.) In fact, the office diary kept by the Atomic Energy Commission's general manager, Ken Nichols, who stage-managed much of the prosecution's case against Oppenheimer, notes that on 24 April 1954, Teller told Nichols that "he would be glad to testify." As Teller also promised Nichols, his testimony four days later was, almost verbatim, what he had told the prosecution's lawyers about Oppenheimer several weeks earlier: that Oppenheimer's judgment could not be trusted. At the hearing, however, Teller went even further and, during cross-examination, volunteered that he considered it "wiser not to grant clearance" to Oppenheimer.

Despite Teller's modest disclaimers, he has always been much more a force of nature upon the American political landscape than the simple physicist-concerned-with-current-events portrayed here. Those not already familiar with the history of the times, and the man, may miss the fact that the author of this well-written and often fascinating book was, quite simply, the most politically influential scientist of the 20th century. Readers of the book should keep in mind that *Memoirs* is not the truth, rather—to paraphrase Teller's physicist friend, Leo Szilárd—it is Teller's version of the truth.

BOOKS: EPIDEMIOLOGY

Certain Diseases, Uncertain Explanations

David Morens

"The only way to make our planet safe and habitable...is to turn into adaptation the still frequent disadaptation between man and his environment." So wrote the physician Félix Martí-Ibáñez in the 1950s, a distant time when diseases were believed to be instances of personal bad luck, curable by the wondrous drugs, and procedures of medical archangels. Few listened to him.

Much has changed since then. Epidemiology has shown that the occurrence of disease is not just a matter based on the individual but is the result of complex interactions between the triumvirate of agent, host, and environment. In fact, as proto-epidemiologists have been saying since the 1820s, diseases are sometimes preventable by interventions at the population level.

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Unvanquished disease. The cholera pandemic that began in 1961 is the largest and longest-lasting of seven that have occurred since the early 1800s. (The drawing depicts residents of Cairo fleeing an 1883 outbreak.)

But even that concept proves too narrow. On the way to eradicating malaria, DDT poisoned the environment and elicited mosquito resistance. Better food distribution led to bigger food poisoning epidemics. And agricultural and environmental fiddling provoked unintended health consequences: administering antibiotics to farm animals enhanced meat production and lowered prices, while creating antibiotic-resistant bacteria. A broader context within which to understand human health and disease is clearly needed.

Enter disease ecology. Although it doesn't advertise the trendy term, Tony McMichael's new book, *Human Frontiers, Environments and Disease*, nevertheless is in this still-developing tradition. Other works on the shelf, including Jared Diamond's Pulitzer Prize–winning *Guns, Germs, and Steel* (Norton, New York, 1997) and William McNeill's classic *Plagues and Peoples* (Anchor, Garden City, NY, 1976), cover similar terrain. What does McMichael, an epidemiologist at the London School of Hygiene and Tropical Medicine, offer that is new? Most obviously, his book encompasses a broader scope—broader even than Diamond's, if that is possible. Enlisting the approaches of anthropology, demography, epidemiology, genetics, history, sociology, and other disciplines, McMichael addresses not only infectious diseases but also chronic, nutritional, and genetic ones. Such wide coverage raises the danger of incoherence, and *Human Frontiers* does sometimes seem a patchwork quilt, roughly stitched. Yet the narrative's drip-drip-drip of disparate facts eventually does run together. McMichael is specific and integrative when he needs to be. Ecology is not so much the subject of the book as its organizing principle, the interdisciplinary framework for pigeon-holing disciplinary specifics.

Human Frontiers, Environments and Disease
Past Patterns, Uncertain Futures
by Tony McMichael
Cambridge University Press, Cambridge, 2001. 413 pp. $59.95. ISBN 0-521-80311-X. Paper, $24.95. ISBN 0-521-00494-2.

McMichael sprinkles the text with anecdotes that urge the reader to examine familiar problems in new ways. For example, in discussing long-term effects of marked improvements in nutrition around 1850, he notes that almost exactly 100 years later Buckingham Palace suddenly found itself sending congratulatory telegrams to centenarians. Other historical asides also freshen things up. We learn about Beethoven's health, tuberculosis as a plot device in Italian opera, the "English Sweate," Napoleon's retreat from Russia, and the decline of Hawaii's native population. We also read that Pythagoras (who had a genetic glucose 6-phosphate dehydrogenase deficiency) was killed by an angry mob when he found a geometry problem he could not solve: whether to escape directly along the hypotenuse of a field of flowering fava beans, risking hemolytic crisis brought on by the pollen, or to run along the edges of the field, allowing his pursuers the shorter route of the hypotenuse. Such historical tales provoke thought without seeming gimmicky.

There is a little to quibble about. One misses some discussion of the psychological and psychosocial impacts of modernization. McMichael's humans are too much like dandelion puffs helplessly buffeted by the winds of genetics and environment; *Homo sapiens* is given too little credit for rational problem-solving. And, alas, despite 35 pages of notes, the most interesting information is usually unreferenced. On the plus side, McMichael resists mentioning either the Aswan High Dam (tough for any ecologist) or rabbit myxomatosis (nearly impossible for an Australian such as himself).

The book's forte, however, is found not in McMichael's talent to lightly charm but in his ability to honestly alarm. Without preaching or reaching for political correctness, he leads the reluctant reader to a state of worry. By the last chapter, we have come not just to learn but to understand why humans are standing at the edge of disaster. There are already six billion people on our planet, and the global population continues

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