

and nineteenth centuries and should be read seriously by historians of medicine and of early colonialism.

doi:10.1017/S000708742300095X

Lina Zeldovich, *The Other Dark Matter: The Science and Business of Turning Waste into Wealth and Health*

Chicago: University of Chicago Press, 2021. Pp. 259. ISBN 978-0-226-61557-8. \$26.00 (cloth).

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Human waste can tell us a great deal. At the most straightforward level, our attitudes towards it reveal what we think about sanitation and hygiene. However, human waste also carries far wider connotations: conceptualizations of disgust, cultural attitudes to reuse and the natural world and a reflection of urban–rural distinctions, amongst many other things. Taking this as the premise, Lina Zeldovich embarks on an enlightening tour that blends together the personal, historical, scientific and speculative. *The Other Dark Matter* is arranged across three sections covering in turn some pasts, presents and futures of waste in relation to health and commerce. At the outset, we learn of Zeldovich's passion for the value and virtues of human waste. This stems from her early family life on a farm in Russia, steeped in the process of converting septic-tank waste into the richest of fertilizer. She weaves a thread of powerful advocacy through the whole text, rooted in personal experience and her belief that a renewal of practices can transform our relationship – currently too distant, too sanitized – with excreta.

Zeldovich, a journalist and writer, is a superb guide. The book is brisk, wide-ranging and thoroughly engaging. She takes the reader in rapid succession through a series of vignettes and inflection points in early human activity, through the advent of farming and the close relationship ancient civilizations maintained with what today we might term the circular economy of waste. She intersperses occasional reflections from scientists working in the present, who provide insight into the chemical processes underlying managed decomposition. Although it is revealing to have these punctuate the narrative, this comes at cost. To hear those working in modern labs declare themselves to be 'impressed by the Chinese peasants' ability to maintain their soil fertility' (p. 35) is to privilege the present over the past. Equally, some of the generalizations Zeldovich deploys are unwarranted. For example, her assertion that 'urban Europeans didn't put their waste to good use' and instead focused on 'finding the most efficient ways to eliminate it from their homes' (p. 43) will likely irk historians who have long recognized the subtle nuances present across social status, geography and faith when considering attitudes towards effluence across all periods. Although Zeldovich makes full use of the freedom of expression that comes from playing fast and loose with chronology – a chapter on the insanitary state of the river Thames in the nineteenth century is followed by an immediate return to Antoine van Leeuwenhoek's 'animalcules' two centuries earlier – the historical section of her account therefore feels rather untethered from appropriate contextualization.

Once Zeldovich moves into the present, her account begins to flourish. At the outset, she recounts her experiences assisting researchers to measure nitrogen accumulation around Cape Cod, from septic-tank leakage in the area. This has had devastating effects on surrounding marshlands, impacting on these delicate ecosystems and affecting everything from water quality to the breeding cycles of aquatic organisms. Through further encounters with researchers and entrepreneurs who are seeking variously to extend our ability to harness the power of waste and to profit commercially from such ventures, Zeldovich truly embraces her role as ethnographer and explorer. She marvels at the creativity and imagination on display, but equally uses these episodes to reflect on how humans can become better connected to this aspect of our biological reality, for the betterment of the global ecology. Touring diverse locations and experiences, from visiting an enormous sewage treatment plant in Washington, DC to testing out a 'biotoilet', Zeldovich documents her experiences as both participant and potential beneficiary.

The final section, ostensibly focused on the future potential of other innovations in the use of waste, also reflects back on the past. The maverick British surgeon William Arbuthnot Lane (1856–1943) and freewheeling Russian zoologist Ilya (Elie) Metchnikoff (1845–1916) make cameo appearances in Chapter 15, which focuses on the human bowel. Their presence reinforces Zeldovich's central argument about effluence, affirmed in her closing paragraph: 'let's not just sit there and watch this versatile, renewable power go to waste' (p. 241).

For historians of science, technology and medicine, there is much in *The Other Dark Matter* to commend. The contemporary case study chapters in particular offer a window into current practices and attitudes towards the management and impact of human waste, and its potential, though they do at times feel more rooted in the North American context than the earlier, more geographically adventurous chapters might lead the reader to expect. Setting aside the lack of connection to recent historical scholarship, Zeldovich provides a fascinating window into current attitudes towards waste and reflects on the wide-ranging meanings and practices associated with excreta. In doing so, she has written a book which picks up wider trends in present research: the porosity of the human body and its leakiness, the incomplete nature of transitions across explanatory frameworks of disease, and the rehabilitation of historic practices that might have transformative potential in the future.

doi:10.1017/S0007087423000808

Neeraja Sankaran, *A Tale of Two Viruses: Parallels in the Research Trajectories of Tumor and Bacterial Viruses*

Pittsburgh: University of Pittsburgh Press, 2021. Pp. 312. ISBN: 978-0-8229-4630-4. \$55.00 (hardcover).

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What is a virus? This seemingly simple question, as historians and biologists alike know, is rife with controversy. Facets have been debated in scientific and philosophical journals nearly as often as at the pub or the dinner table. Are viruses alive? What relationships do they form with the living organisms they infect? These are murky, difficult and