



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

## A short introduction into the English-language historiography of epidemiology

**Citation for published version:**

Engelmann, L 2023, 'A short introduction into the English-language historiography of epidemiology', *Isis: A Journal of the History of Science Society*, vol. 114, no. S1, pp. S6-S25. <https://doi.org/10.1086/726978>

**Digital Object Identifier (DOI):**

[10.1086/726978](https://doi.org/10.1086/726978)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Peer reviewed version

**Published In:**

Isis: A Journal of the History of Science Society

**General rights**

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



## **A short introduction into the English-language historiography of epidemiology**

**Lukas Engelmann, [lukas.engelmann@ed.ac.uk](mailto:lukas.engelmann@ed.ac.uk), University of Edinburgh,  
<https://epidemy.org>**

This short introduction into the bibliography of epidemiology should achieve two modest goals. First, it will distinguish between two bodies of historical scholarship, separating the history of the field as told by epidemiological practitioners from the work developed in the history of science, medicine and public health. This, however, is not a neat distinction nor should this be mistaken with a judgement on the quality of scholarship. Rather, this distinction emphasizes a fairly consistent difference of perspective, audience and purpose in the field's historiography. Second, this essay is concerned with a modern history of epidemiology spanning the nineteenth and twentieth century. While this limitation should not diminish the value of the history of epidemiological thought and practices in earlier periods, it helps to accentuate a focus on the emergence of epidemiology as a scientific project.

To this end, the bibliography operates with a descriptive approach to epidemiology as an area of knowledge production that is dedicated to the understanding, analysis, classification, and prediction of epidemic diseases. It seeks to include all relevant literature that concerns epidemiology as a field, as a discipline, as well as a set of political and scientific visions, but it will also include considerations of epidemiological methods, practices and epistemologies. This bibliography will not include scholarship on the history of specific epidemics, unless the work offers principal contributions to the history of epidemiology. Further, this bibliography cannot include the vast literature on social medicine, public and global health, but seeks again to include those works that emphasise clearly the historical positioning of epidemiological practices and methods in these fields.

### **History of Epidemiology by and for Epidemiologists**

From the early twentieth century, histories by epidemiological practitioners have sought to define origin stories, institutional relationships, or changes in disease theory or practical methods (vital statistics, case-tracing, case-control studies, etc.) that have apparently motivated the formation of epidemiology as a scientific field. Since then, the historical background of epidemiology has been a fixture in almost all introductions to or handbooks of epidemiology in the second half of the twentieth century. The cursory glance at the field's historical contours has also helped to define scope, purpose and ethos of the budding field at least since the establishment of epidemiology as an academic discipline in the 1920s.<sup>1</sup>

---

<sup>1</sup> Wade Hampton Frost, 'Some Conceptions of Epidemics in General', *American Journal of Epidemiology* 103, no. 2 (1928 1976): 141–51, <https://doi.org/10.1093/oxfordjournals.aje.a112212>; M. Greenwood and W. W. C. Topley, 'Experimental Epidemiology: Some General Considerations', *Proceedings of the Royal Society of Medicine* 19, no. Sect Epidemiol State Med (1926): 31–44; F. G Crookshank, *Epidemiological Essays* (New York: Macmillan Co., 1931).

Reconstructing the “roots of today’s epidemiology” has since become a significant section in many epidemiological textbooks (MacMahon and Pugh 1971). The common narrative of the field’s historical emergence is usually built of references to Hippocrates’ antique consideration of diseases and places, the seventeenth century English physician Thomas Sydenham’s (1624-1689) concern with the epidemic constitution and various versions of the emergence of quantification and analytical epidemiology. These depart either from the Swiss mathematician Daniel Bernoulli (1700-1778), who brought statistical methods into the question of vaccine effectiveness. Or they might begin with the British pioneer of medical statistics, William Farr (1807-1883), but most accounts will reliably focus on the often-romanticised tale of John Snow (1813-1858) and the water pump in London’s cholera-stricken Soho in 1852.<sup>2</sup> Sections on the twentieth century, if they are included at all, then offer a glance at the mathematical innovations of epidemiologists and colonial medical officer Ronald Ross (1857-1932) and his fellows at the London Epidemiological Society, before moving on to a rather narrow and technical discussion of risk factors, correlation and perhaps questions of the epidemiological transition.<sup>3</sup> Overall, the introduction to epidemiological history for epidemiologists seeks, like all good disciplinary introductions, to create a canon and to align the historical development of concepts, methods and theories with the needs and requirements of epidemiological research and teaching in the present<sup>4</sup>. Nancy Krieger’s work requires an addendum to this section, as her expansive work is certainly written from within the disciplinary frame but much less concerned with the stabilisation of the field’s identity<sup>5</sup>.

## Histories of Epidemiology by Historians

The scholarly history of epidemiology is a little less straight forward to summarize and expectedly much more diversified. Rather than to attempt a systematic distinction of schools of thought and historiographic styles, this introduction follows – in true epidemiological fashion – a geographical structure. Over recent years, scholarship has come to embrace imperial and colonial frames in this history and the contours of a global history of epidemiology have become a little more visible.

---

<sup>2</sup> Tom Koch and Kenneth Denike, ‘Crediting His Critics’ Concerns: Remaking John Snow’s Map of Broad Street Cholera, 1854’, *Social Science & Medicine* 69 (2009): 1246–51; Tom Koch and Ken Denike, ‘Essential, Illustrative, or ... Just Propaganda? Rethinking John Snow’s Broad Street Map’, *Cartographica: The International Journal for Geographic Information and Geovisualization* 45, no. 1 (March 2010): 19–31, <https://doi.org/10.3138/carto.45.1.19>.

<sup>3</sup> Abraham M. Lilienfeld, Johns Hopkins University Institute of the History of Medicine, and Johns Hopkins University School of Hygiene and Public Health, *Times, Places, and Persons: Aspects of the History of Epidemiology* (Johns Hopkins University Press, 1980); Mervyn Susser and Zena Stein, *Eras in Epidemiology: The Evolution of Ideas* (New York ; Oxford: Oxford University Press, 2009); Adam Kucharski, *The Rules of Contagion: Why Things Spread - and Why They Stop* (Profile Books, 2020).

<sup>4</sup> Alfredo Morabia, *A History of Epidemiologic Methods and Concepts* (Birkhäuser, 2013).

<sup>5</sup> Nancy Krieger, *Epidemiology and the People’s Health: Theory and Context* (Oxford: Oxford University Press, 2011).

Recently, scholars have taken on the important but long-neglected task of excavating the field's colonial and imperial legacy. Where Alison Bashford had sketched out the contours of *Imperial Hygiene* and Warwick Anderson framed *Colonial Pathologies*, Suman Seth, Rohan Deb Roy, Jim Downs and Anjuli Fatima Reza Kolb (and many more) are now spearheading efforts to unpack the full scope of the colonial legacy of epidemiological reasoning.<sup>6</sup> This work continues and expands some of the analytical frames established in scholarship on epidemiology in transnational institutions, as exemplified by Sanjoy Bhattacharya, Mark Harrison and Michael Worboys work on vaccination campaigns,<sup>7</sup> by Paul Weindling's work on the League of Nations and in the comprehensive history of the World Health Organisation by Marco Cueto, Theodore Brown and Elizabeth Fee.<sup>8</sup>

Beyond these globalising perspectives, the historical distribution of epidemiological thought, practices and scientific endeavours has been told with overwhelming focus on Anglo-American developments; a historiographical bias that has left us with the rather skewed picture of modern epidemiology as merely a British or American endeavour. Interest in the social history of Victorian medicine has shaped much of the British history of epidemiology. The work of John Eyler marks an important reference, unpacking the influence of William Farr and its associates in Victorian Britain and tracing the impact of the Victorian public health advocate Arthur Newsholme on British state medicine into the twentieth century.<sup>9</sup> Christopher Hamlin has introduced the significance of social justice in the vision of the social reformer and public health advocate Edwin Chadwick for state medicine in the same period.<sup>10</sup> For the late-Victorian period of British epidemiology, the works of Anne Hardy and Michael Worboys have sharpened our understanding of the relations between the laboratory sciences and epidemiology, and more recently, Graham Mooney has shifted the focus to the domestic space in the epidemiological mindset.<sup>11</sup> Jacob Steere-Williams has offered a

---

<sup>6</sup> Alison Bashford, *Imperial Hygiene. A Critical History of Colonialism, Nationalism and Public Health* (Basingstoke, Hampshire [u.a.]: Palgrave Macmillan, 2004); Warwick Anderson, *Colonial Pathologies: American Tropical Medicine, Race, and Hygiene in the Philippines* (Durham: Duke University Press, 2006); Suman Seth, *Difference and Disease: Medicine, Race, and the Eighteenth-Century British Empire*, Global Health Histories (Cambridge: Cambridge University Press, 2018), <https://doi.org/10.1017/9781108289726>; Rohan Deb Roy, *Malarial Subjects: Empire, Medicine and Nonhumans in British India, 1820–1909*, Science in History (Cambridge: Cambridge University Press, 2017), <https://doi.org/10.1017/9781316771617>; Jim Downs, *Maladies of Empire: How Colonialism, Slavery, and War Transformed Medicine* (Harvard University Press, 2021); Anjuli Fatima Raza Kolb, *Epidemic Empire: Colonialism, Contagion, and Terror, 1817–2020* (University of Chicago Press, 2021).

<sup>7</sup> Sanjoy Bhattacharya, Mark Harrison, and Michael Worboys, *Fractured States: Smallpox, Public Health and Vaccination Policy in British India 1800–1947* (New Delhi: Orient Longman, 2005).

<sup>8</sup> Marcos Cueto, Theodore M. Brown, and Elizabeth Fee, *The World Health Organization: A History*, 1st ed. (Cambridge University Press, 2019), <https://doi.org/10.1017/9781108692878>.

<sup>9</sup> John M. Eyler, *Victorian Social Medicine: The Ideas and Methods of William Farr* (Cambridge: Cambridge University Press, 1979), <https://repository.library.georgetown.edu/handle/10822/782369>; John M. Eyler, *Sir Arthur Newsholme and State Medicine, 1885–1935* (Cambridge U.K.: Cambridge University Press, 2002).

<sup>10</sup> Christopher Hamlin, *Public Health and Social Justice in the Age of Chadwick: Britain, 1800–1854* (Cambridge University Press, 2009).

<sup>11</sup> Anne Hardy, *The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine, 1856–1900* (Wotton-under-Edge: Clarendon Press, 1993); Anne Hardy, *Salmonella Infections, Networks of Knowledge, and Public Health in Britain, 1880–1975* (Oxford, New York: Oxford University Press, 2014); Michael Worboys,

powerful new lens on the emergence of the practices of epidemiological outbreak investigations and Agnes Arnold-Forster recalls how non-communicable diseases, such as cancer have shaped epidemiological thinking long before the twentieth century.<sup>12</sup>

Tangential to the social history of epidemiology, works on the history of statistics should be considered a key reference for the development of epidemiological thought between medical and governmental requirements. These accounts, while not necessarily focused exclusively on the UK, often emphasise the outstanding role of British vital statistics. Here, Ian Hacking's work on *Chance*, J Rosser Matthews' contribution to quantification in medicine as well as Ted Porter's work on Karl Pearson and the biostatisticians are crucial as is Alain Desrosieres' monumental work on statistical reasoning across the UK, US and France.<sup>13</sup> Looking forward into the twentieth century, Eileen Magnello and Anne Hardy have laid out the *Road to Medical Statistics* and Olga Amsterdamska and J Andrew Mendelsohn have pioneered efforts to grapple with the formalisation of epidemiology in times of increasing complexity and uncertainty in the world of infectious diseases.<sup>14</sup>

The US American history of epidemiology is – like history of medicine at large – shaped most significantly by Charles Rosenberg's work, perhaps mostly by Rosenberg's focus on a social and cultural history at the heart of the epidemiological project. With a new focus on the social structures underpinning epidemiological inequality and with an analytical focus on the implications of frames of disease, scholarship homed in on the impact and effects of epidemiological reasoning.<sup>15</sup> John Duffy unpacked the growth of nineteenth century American epidemiology in a series of publications on health boards and the public health service, while William Coleman and Margaret Humphreys accounted for the history of epidemiology shaping up in the American South.<sup>16</sup> David Jones has written on the

---

*Spreading Germs: Disease Theories and Medical Practice in Britain, 1865-1900* (Cambridge, U.K.: Cambridge University Press, 2000); Graham Mooney, *Intrusive Interventions: Public Health, Domestic Space, and Infectious Disease Surveillance in England, 1840-1914* (Woodbridge: Boydell & Brewer, 2015).

<sup>12</sup> Jacob Steere-Williams, *The Filth Disease - Typhoid Fever and the Practices of Epidemiology in Victorian England* (S.I.: Boydell and Brewer, 2020); Agnes Arnold-Forster, *The Cancer Problem: Malignancy in Nineteenth-Century Britain* (Oxford University Press, 2021).

<sup>13</sup> Ian Hacking, *The Taming of Chance* (Cambridge u.a.: Cambridge Univ. Press, 1990); J. Rosser Matthews, *Quantification and the Quest for Medical Certainty* (Princeton, N.J.: Princeton University Press, 1995); Theodore M. Porter, *Trust in Numbers. The Pursuit of Objectivity in Science and Public Life* (Princeton, N.J.: Princeton University Press, 1995); Alain Desrosieres, *The Politics of Large Numbers. A History of Statistical Reasoning* (Cambridge, Mass: Harvard University Press, 1998).

<sup>14</sup> Eileen Magnello and Anne Hardy, *The Road to Medical Statistics* (Amsterdam: Rodopi, 2002); Olga Amsterdamska, 'Achieving Disbelief: Thought Styles, Microbial Variation, and American and British Epidemiology, 1900–1940', *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences* 35, no. 3 (1 September 2004): 483–507, <https://doi.org/10.1016/j.shpsc.2004.06.001>; Olga Amsterdamska, 'Demarcating Epidemiology', *Science, Technology, & Human Values* 30, no. 1 (2005): 17–51; J. Andrew Mendelsohn, 'From Eradication to Equilibrium. How Epidemics Became Complex after World War I.', in *Greater Than the Parts: Holism in Biomedicine, 1920-1950*, ed. Christopher Lawrence and George Weisz (Oxford: Oxford University Press, 1998), 303–34.

<sup>15</sup> Charles E. Rosenberg, *The Cholera Years. The United States in 1832, 1849, and 1866* (Chicago u.a.: Univ. of Chicago Press [u.a.], 1962); Charles E. Rosenberg, *Explaining Epidemics and Other Studies in the History of Medicine* (Cambridge: Cambridge University Press, 1992).

<sup>16</sup> John Duffy, *The Sanitarians: A History of American Public Health* (Urbana: University of Illinois Press, 1990); William Coleman, *Yellow Fever in the North: The Methods of Early Epidemiology* (Madison: University of

rationalisation of epidemics in the encounter with native Americans.<sup>17</sup> With Howard Markel and Alan Kraut, the intersection of border regimes and epidemiological reasoning has received significant attention, while Elisabeth Fee has covered some of the emergence of epidemiology as an academic field at Johns Hopkins University and Elizabeth Etheridge traced the development of the Centers for Disease Control<sup>18</sup>.

Significant contributions to the history of US epidemiology are also found in the scholarship grappling with the AIDS epidemic, with Gerald Oppenheimer and Steven Epstein emphasizing the significant impurity of epidemiological knowledge and Richard McKay introducing the histories of cluster studies and contact tracing.<sup>19</sup> More recently, the question of race has reshaped historiographical approaches to epidemiology in the US, revisiting and expanding Susanne Reverby's scholarship on Tuskegee or Keith Wailoo's work on race and sickle-cell anaemia<sup>20</sup>.

Beyond the frame of infectious diseases, the historical development of the epidemiology of non-transmissible conditions has received considerable attention, as Jeremy Greene has shown for heart conditions or Allan Brandt for the history of smoking.<sup>21</sup> George Weisz' account of the invention and expansion of the category of chronic disease for France, the UK and US scrutinizes the impact on epidemiological thinking.<sup>22</sup> Much has been written on perhaps one of the most influential hypotheses in this regards, Abdel Omran's 1971 proposition of an "epidemiological transition", according to which modern society as well as modern epidemiology has come to grapple with chronic conditions as an effect of the successful defeat of infectious diseases.<sup>23</sup> Non-transmissible conditions, in particular the history of birth defects or the history of psychiatric epidemiology have since maintained their

---

Wisconsin Press, 1987); Margaret Humphreys, *Yellow Fever and the South* (Baltimore: Johns Hopkins University Press, 1999).

<sup>17</sup> David S. Jones, *Rationalizing Epidemics* (Harvard University Press, 2004).

<sup>18</sup> Howard Markel, *Quarantine!: East European Jewish Immigrants and the New York City Epidemics of 1892* (JHU Press, 1999); Alan M. Kraut, *Silent Travelers. Germs, Genes, and the 'Immigrant Menace'* (New York: BasicBooks, 1995); Elisabeth Fee, *Disease and Discovery: A History of the Johns Hopkins School of Hygiene and Public Health, 1916–1939* (JHU Press, 2016); Elizabeth W. Etheridge, *Sentinel for Health: A History of the Centers for Disease Control* (University of California Press, 1992).

<sup>19</sup> Gerald M. Oppenheimer, 'In the Eye of the Storm. The Epidemiological Construction of AIDS', in *AIDS. The Burdens of History*, ed. Elisabeth Fee and Daniel M. Fox (Berkeley: University of California Press, 1988), 267–300; Steven Epstein, *Impure Science. AIDS, Activism, and the Politics of Knowledge* (Berkeley: University of California Press, 1996); Richard A. McKay, *Patient Zero and the Making of the AIDS Epidemic* (Chicago: University of Chicago Press, 2017).

<sup>20</sup> Susan Reverby, *Examining Tuskegee. The Infamous Syphilis Study and Its Legacy*, John Hope Franklin Series in African American History and Culture (Chapel Hill: University of North Carolina Press, 2009); Keith Wailoo, *Dying in the City of the Blues: Sickle Cell Anemia and the Politics of Race and Health* (Chapel Hill: UNC Press, 2014).

<sup>21</sup> Jeremy A. Greene, *Prescribing by Numbers. Drugs and the Definition of Disease* (Baltimore: Johns Hopkins University Press, 2007); Allan M. Brandt, *The Cigarette Century. The Rise, Fall, and Deadly Persistence of the Product That Defined America* (New York: Basic Books, 2007).

<sup>22</sup> George Weisz, *Chronic Disease in the Twentieth Century: A History* (JHU Press, 2014).

<sup>23</sup> Abdel R. Omran, 'The Epidemiologic Transition: A Theory of the Epidemiology of Population Change', *The Milbank Memorial Fund Quarterly* 49, no. 4 (1971): 509–38, <https://doi.org/10.2307/3349375>; George Weisz and Jesse Olszynko-Gryn, 'The Theory of Epidemiologic Transition: The Origins of a Citation Classic', *Journal of the History of Medicine and Allied Sciences* 65, no. 3 (July 2010): 287–326, <https://doi.org/10.1093/jhmas/jrp058>.

position as an important epidemiological research field.<sup>24</sup> With the emergence of the AIDS pandemic, a renewed interest in tuberculosis and malaria in the 1990s and with the following outbreaks of SARS, Ebola, Zika, and of course the Covid-19 pandemic, the focus on transmissible conditions returned, without, however, abandoning an interest in epidemiology of non-transmissible conditions.

There is only sparse English language literature on the history of epidemiology beyond the UK and the US. However, a recent collection by Marissa Mika, Kafui Ajaye-Gbewonyo and Megan Vaughan brings attention to the history of sub-Saharan epidemiology of chronic disease<sup>25</sup>. The Latin American history has received some excellent attention, particularly owed to Marco Cueto and Steven Palmer, but crucially also through the work of Nancy Stepan and Diego Armus<sup>26</sup>. The Asian history too has proliferated over the last decades, with notable contributions from Ruth Rogaski, Christos Lynteris and Mary Brazelton<sup>27</sup>. Susan Jones' work on epidemiology in the Russian context should be an essential reference<sup>28</sup> For Europe, with most contribution supplied in languages other than English, Peter Baldwin's *Contagion* has been a standard reference on the interlacing of economic and epidemiological concerns, while Richard Evans' work on Hamburg's cholera has become a classic reference in its own right<sup>29</sup>.

## Conclusions

None of these categories for the history of epidemiology can withstand much critical scrutiny. Many of the listed works continue to bleed into neighbouring fields and regions, as they are either concerned with specific disease biographies, questions of public health and policy or do not stick to the narrow boundaries of political geography. Rather than to introduce further limitations or to apply a more fine-grained classification, this circumstance should prompt further reflection on the difficult demarcation of epidemiology as a field, a

---

<sup>24</sup> Ilana Löwy, *Tangled Diagnoses: Prenatal Testing, Women, and Risk*, Illustrated edition (Chicago: University of Chicago Press, 2018); Anne M. Lovell and Gerald M. Oppenheimer, *Reimagining Psychiatric Epidemiology in a Global Frame: Toward a Social and Conceptual History* (University of Rochester Press, 2022).

<sup>25</sup> Marissa Anne Mika, Kafui Adjaye-Gbewonyo, and Megan Vaughan, eds., *Epidemiological Change and Chronic Disease in Sub-Saharan Africa* (UCL Press, 2021).

<sup>26</sup> Marcos Cueto, *The Value of Health: A History of the Pan American Health Organization*, Rochester Studies in Medical History 9 (Washington, D.C.: Pan American Health Organization, 2007); Marcos Cueto and Steven Palmer, *Medicine and Public Health in Latin America* (Cambridge, U.K.: Cambridge University Press, 2014); Diego Armus, *Disease in the History of Modern Latin America: From Malaria to AIDS* (Durham, N.C.: Duke University Press, 2003); Diego Armus, *The Ailing City: Health, Tuberculosis, and Culture in Buenos Aires, 1870–1950* (Durham, N.C.: Duke University Press, 2011); Nancy Leys Stepan, *Beginnings of Brazilian Science: Oswaldo Cruz, Medical Research and Policy, 1890-1920* (New York: Science History Publications, 1976).

<sup>27</sup> Ruth Rogaski, *Hygienic Modernity: Meanings of Health and Disease in Treaty-Port China* (Oakland, California: University of California Press, 2004); Christos Lynteris, *Ethnographic Plague: Configuring Disease on the Chinese-Russian Frontier* (Basingstoke: Palgrave Macmillan, 2016); Mary Augusta Brazelton, *Mass Vaccination: Citizens' Bodies and State Power in Modern China* (Cornell University Press, 2019).

<sup>28</sup> Susan D. Jones and Anna A. Amramina, 'Entangled Histories of Plague Ecology in Russia and the USSR', *History and Philosophy of the Life Sciences* 40, no. 3 (21 August 2018): 49, <https://doi.org/10.1007/s40656-018-0220-3>.

<sup>29</sup> Peter Baldwin, *Contagion and the State in Europe, 1830-1930* (Cambridge University Press, 1999); Richard J. Evans, *Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910* (Clarendon Press, 1987).

discipline or a style of reasoning <sup>30</sup>. Particularly, as the range of works listed above excludes significant influences from the history of economics <sup>31</sup> or the history of ecology <sup>32</sup>, which have informed so much of our contemporary approaches to epidemiology and its histories. The historical account of epidemiology continues to drift between histories of medicine, the history of science as well as the histories of the social science, and of the state. Rather than to tie it down to a particular set of first principles, this preliminary introduction into its bibliography should serve to explore and to expand the multiple frames of references in which epidemiology has become a meaningful practice as well as an authoritative science.

---

<sup>30</sup> Amsterdamska, 'Demarcating Epidemiology'.

<sup>31</sup> Mary S. Morgan, *The World in the Model: How Economists Work and Think* (Cambridge University Press, 2012); Michelle Murphy, *The Economization of Life* (Duke University Press, 2017).

<sup>32</sup> Sharon E. Kingsland, *The Evolution of American Ecology, 1890-2000* (JHU Press, 2005); Warwick Anderson, 'Nowhere to Run, Rabbit: The Cold-War Calculus of Disease Ecology', *History and Philosophy of the Life Sciences* 39, no. 2 (1 June 2017): 13, <https://doi.org/10.1007/s40656-017-0140-7>; Pierre-Olivier Méthot, 'Why Do Parasites Harm Their Host? On the Origin and Legacy of Theobald Smith's "Law of Declining Virulence" — 1900-1980', *History and Philosophy of the Life Sciences* 34, no. 4 (2012): 561–601.