

trypanosomiasis, one would hardly expect detailed worldwide coverage, and Neill does mention certain key figures and developments in Asia and the Americas. But the silence on the extensive contacts between the Brazilian scientist Carlos Chagas, who discovered American trypanosomiasis in 1909, and his European counterparts working on African trypanosomiasis at precisely the same time is disappointing. Chagas first published his finding in the journal of the Hamburg tropical medicine institute and was in close communication with several leading German protozoologists.¹ Yet Neill overlooks Chagas and relegates Brazil's notable role in the international rise of tropical medicine to an aside. Including this dimension—and understanding the global character of scientists' interchanges beyond the 'international' European-imperial theatre—would add an important interpretive lens to this otherwise excellent work.

In sum, and my lament notwithstanding, this is a learned and impressive volume, which should become a new classic for the field.

Anne-Emanuelle Birn

University of Toronto, Canada

doi:10.1017/mdh.2014.56

James F. Stark, *The Making of Modern Anthrax, 1875–1920* (London: Pickering & Chatto, 2013), pp. 251, £60.00, hardback, ISBN: 978 1 84893 446 7.

Rosemary Wall, *Bacteria in Britain, 1880–1939* (London: Pickering & Chatto, 2013), pp. 254, £60.00, hardback, ISBN: 978 1 84893 427 6.

The history of medical bacteriology has seen an almost complete inversion of its grand narrative over the last decades. In 1955 Erwin Ackerknecht could still maintain that 'the whole of medicine was transformed, with the fields of public health and surgery undergoing a complete rejuvenation'.¹ To him the rise of medical bacteriology seemed pivotal to a transformation from hospital-based to laboratory-based medicine that characterised late nineteenth-century medicine. With the advent of medical bacteriology the laboratory revolution in medicine which had taken its departure in basic medical sciences was brought to matter at the bedside, in urban sanitation and in household hygiene. While we may with some justification think that this view was more indebted to (heroic) actors' accounts than is considered acceptable today, it still fundamentally shaped the historiography of field. Invaluable textbooks on the history of the discipline are written from that perspective and it is easy to trace its influence into later historiography.² Such an approach could also be refined into philosophy of science where it would result in a heroism of concepts rather than of historical individuals. It would then portray medical bacteriology as a cornerstone of a transformation of medicine through a grand research

¹ Simone Petraglia KROPF and Magali Romero SÁ, 'The Discovery of *Trypanosoma Cruzi* and Chagas Disease (1908–1909): Tropical Medicine in Brazil', *História, Ciências, Saúde – Manguinhos*, 16, supl. 1 (2009), 13–34. <http://www.scielo.br/pdf/hcsm/v16s1/02.pdf>.

¹ Erwin H. Ackerknecht, *A Short History of Medicine* (Baltimore, MD: Johns Hopkins University Press, 1955, 1982), 184.

² William Bulloch, *The History of Bacteriology* (London: Oxford University Press, 1938, 1960). Think of the chapter 'Pettenkofer's last stand' in Richard J. Evans, *Death in Hamburg: Society and Politics in the Cholera Years 1830–1910* (Oxford: Clarendon, 1987), which gives a good example of how a progressivist alliance of bacteriological hygiene and Prussian politics prevailed in the field of cholera research. Bacteriological research made all the difference.

programme based on necessary causation that evolved from mid 19th century and it is fact still going on.³

For all its merits it seems fair to say that such historiography was more abandoned than refuted. The last two decades have seen the growth of a corpus of knowledge that has told a very different story. With its methodologically innovative unravelling of one of the heroes of that history, Gerald Geison's biography of Pasteur in 1995 opened up a field that saw rich critical scholarship in the years to follow.⁴ The result can be summed up as an inversion of the grand narrative. Rather than a story of medical microbiology as the laboratory revolution going practical, we now have a historiography of innumerable local variations, in which declared allegiance to a germ theory of infectious disease would not indicate related let alone similar methods and practices. Rapid transition into clinical practice, which tended to be assumed earlier on, remained elusive upon closer inspection.⁵ What looked like a novel diagnostic tool in a laboratory often became 'incommunicable knowledge'⁶ upon its arrival in a hospital. Also the notion of the concept of disease that emanated from the bacteriological laboratory being discontinuous with older ideas of contagion was replaced by the opposite view. A typical feature of, for instance, Robert Koch's medical bacteriology can now be identified as its ability to provide older ideas of contagion with a timely, scientific blessing.⁷ That same classical bacteriology of the Koch school has also been shown to continuously redefine essential concepts into the twentieth century.⁸

The bacteriological revolution has evaporated into a phenomenon that had 'no transcendent reality, but rather had many meanings'.⁹ It is still possible to see it as a whole but it has become difficult to grasp in detail. Few authors would deny that fundamental change happened in the late nineteenth century. Yet it took a long time; it was far from complete at any point in time; and results differed with locality, thus its denomination as a revolution seems inappropriate.¹⁰ The most interesting feature of this revision is less the (predictable) demise of a heroic historiography to which drew the notion of a revolution in its wake than that a phenomenon that used to be seen as one of dissemination – of germ theory – is now framed as one of appropriation, where the result is essentially shaped by recipients, be they clinicians, public health officers, engineers or lay people.¹¹

³ K. Codell Carter, *The Rise of Causal Concepts of Disease: Case Histories* (Aldershot: Ashgate, 2003).

⁴ Gerald Geison, *The Private Science of Louis Pasteur* (Princeton, NJ: Princeton University Press, 1995) cf. Gerald Geison, 'Scientific Change, Emerging Specialities, and Research Schools', *History of Science*, 19, (1981), 20–40.

⁵ Both points have been forcefully argued by Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1885–1900* (Cambridge: Cambridge University Press, 2000). John Andrew Mendelsohn, 'Cultures of Bacteriology: Formation and Transformation of a Science in France and Germany, 1870–1914', Diss. phil., Princeton University, 1996 has in his influential thesis described the coming into being of very different microbiologies in Paris and Berlin.

⁶ Christopher Lawrence, 'Incommunicable Knowledge: Science, Technology and the Clinical Art in Britain 1850–1914', *Journal of Contemporary History*, 20 (1985), 503–20.

⁷ Christoph Gradmann, *Laboratory Disease: Robert Koch's Medical Bacteriology* (Baltimore, MD: Johns Hopkins University Press, 2009).

⁸ Silvia Berger, *Bakterien in Krieg und Frieden: Eine Geschichte der medizinischen Bakteriologie in Deutschland 1890–1933* (Göttingen: Wallstein, 2009).

⁹ Nancy J. Tomes and John Harley Warner, 'Introduction to the Special Issue on Rethinking the Reception of the Germ Theory of Disease: Comparative Perspectives', *Journal of the History of Medicine and Allied Sciences*, 52 (1997), 7–16: 12.

¹⁰ Michael Worboys, 'Was there a Bacteriological Revolution in Late Nineteenth-Century Medicine?', *Studies in History and Philosophy of Biological and Biomedical Sciences*, 38 (2007), 20–42.

¹¹ Patricia Peck Gossel, 'A need for standard methods: the case of American bacteriology', in A. Clarke and

James Stark's *The Making of Modern Anthrax, 1875–1920* is deeply indebted to the recent historiography as it has been sketched out above. Traditionally the story of this condition would be seen as one that took a sudden and revolutionary turn in 1876 when the *Bacillus anthracis* was identified as the pathogen of that condition in the make-shift laboratory of a heroic general practitioner in rural Prussia, Robert Koch. Stark, to the contrary, locates the origins in the northern English centre of the wool industry, Bradford, where cases of what was called 'woolsorters' disease' in the had become frequent in the nineteenth century – part and parcel of the town's position at the centre of the global wool trade and the processing of wool, hides etc. Frequent infections of workers led to a reframing of the disease. A veterinary condition mostly of sheep that rarely attacked humans came to be known as an occupational hazard in various places around the globe where the wool industry and trade existed. Yet, interest and knowledge had its epicentre where the industry was centred, in Bradford. Where Susanne Jones has recently told the cautiously revisionist story of the coming into being of an international network of anthrax researchers in the closing decades of the nineteenth century,¹² Stark gives us a story where woolsorters and Bradford came to dominate anthrax all the way through. The peculiar conditions in Bradford as a centre of the wool industry with a highly skilled and politically conscious workforce resulted in a sustained interest in woolsorters. Local medical experts like John Henry Bell from the mid 1870s and Frederick William Eurich in the early 1900s shaped the very specific idea of anthrax as an occupational hazard or disease. Their framing was based on sanitarian notions of environmental hazards, of places and their control through hygienic measures, focusing on the workplace rather than on transmission through bacteria. They kept their distance from the French Pasteurian approach of framing it as a vaccine-preventable infection of cattle and also ignored the microbe-centred German bacteriology well into the 1880s and even its later appropriation (by Eurich) served more as a confirmation of the sanitarian framing. Stark then goes on to argue that the Bradford framing of woolsorters' disease as an occupational hazard became prototypical for other places like Glasgow, London and even Australia. Bradford, however, stood central in this history of anthrax as an occupational disease and medical bacteriology played only a peripheral role in this. Instead, employing Jim Secord's concept of knowledge in transit, Stark argues that the condition was re-framed with each re-location. Bradford's position in this empire of travelling knowledge was central, 'the work of Eurich and Bell gained truly global recognition' (p. 173). Yet, it did not result in the creation of universal knowledge, instead it was central in creating a local brand of thinking, which, solidly based in sanitarian tradition, was all about anthrax as a disease of humans.

Unsurprisingly for a book that covers local knowledge, Stark's material basis, apart from medical literature, is local newspapers, and that basis can only be called vast. This certainly helps to make the author's line of argument graphic and makes *The Making of Modern Anthrax* entertaining and enlightening reading. Yet, the approach is, heuristically, not without pitfalls. It essentially presupposes what it attempts to prove, namely the importance of local knowledge in shaping an object of knowledge. The abundance of evidence provided on local practices can be a bit deceptive. That Koch's *Bacillus anthracis* was ignored in 1876 Bradford turns out to a much less impressive piece of information, if we add that he did not find receptive audiences elsewhere. There is, in fact, no

J. Fujimura (eds), *The Right Tools for the Job: At Work in Twentieth Century Life Sciences* (Princeton, NJ: Princeton University Press, 1992), 287–311.

¹² Susan D. Jones, *Death in a Small Package: A Short History of Anthrax* (Baltimore, MD: Johns Hopkins University Press, 2010).

indication that his work made a splash before he publicly attacked Pasteur in 1881 over issues of priority in relation to the anthrax bacillus. At the same time, pathologists and microbiologists from Germany and France (Bollinger and Davaine, for example) had mostly agreed on anthrax being infectious by the 1870s and *Bacillus anthracis* was widely regarded as a likely candidate for a pathogen. Bell, Stark's crown witness, was quite aware of that work and there was probably more anthrax in Bell's woolsorters' than Stark assumes. Koch's contribution in all this, by the way, came to be the addition of the spore stage to the bacterium's life cycle, a concept he had adopted from specialist botany. Yet, it swiftly combined with sanitarian approaches – Koch himself insisted that his investigations confirmed traditional knowledge about the continued dangerousness of certain places where cattle had been buried and spores could evolve. Stark, asking the question whether bacteriology did matter in Bradford, goes a long way to suggest that practice from Bradford did matter, science from Wollstein did not. In doing so he combines historiographic approaches that are indeed difficult to reconcile: reserving a modern, practice-centred approach, modelled on Worboys's *Spreading Germs*, for Bradford, Koch's work is represented through Carter's writings that owe a lot to a Lakatosian methodology which is irreconcilable with the approach taken for Bradford. It would have been more convincing to stay with the Worboys approach and treat Koch's bacteriology as yet another breed of germ theory – albeit one that came to be influential by being endorsed by Prussia's imperial health office in the early 1880s. Stark's analysis would have profited from approaching Koch through some of the more recent work on the German physician.¹³ Still, he challenges the established wisdom about the history of anthrax in an enlightening fashion. He provides a very convincing historical explanation of just why anthrax, regarded as a veterinary condition in large parts of the globe, enjoyed such a unique career in human medicine in Great Britain. Experiences originating from Bradford were pivotal in creating the 'largely ambivalent attitude of Bradfordians and the British medical press in the nineteenth century towards the animal-focused vaccination programme of Louis Pasteur and the bacterio-centric work of Robert Koch'. (177)

Rosemary Wall in her *Bacteria in Britain, 1880–1939* takes on an altogether different challenge. She attempts no less than to rewrite the history of British bacteriology between 1880 and 1939 from the perspective of those who applied the knowledge gained. Where in older historiography medical bacteriology would often be portrayed as an ideology that penetrated medicine and public health and added to its benevolent absolutism,¹⁴ Wall sets out to explore how the history of that discipline was shaped by those who used it. By doing so she reminds us of Pratik Chakrabarti's recent book on bacteriology in India¹⁵, which has shown how physicians in colonial and early post-colonial days appropriated and thereby deeply changed bacteriology. She takes that approach back to the assumed origin of historical developments in Europe, insisting that the development of bacteriology was driven along rather than just influenced by those who were employing its tools.

She does so from three angles, to each of which two chapters of her book are devoted: the hospital, the workplace and the public. When it comes to clinical medicine Walls goes straight for the lion's den and re-assesses the teaching and clinical practice of some

¹³ Mendelsohn, *op. cit.* (note 5); Gradmann, *op. cit.* (note 7).

¹⁴ Strange as it may seem, even methodologically different authors as Richard Evans, *op. cit.* (note 2) and Bruno Latour, *The Pasteurization of France* (Cambridge, MA: Harvard University Press, 1988 (1984)) both present bacteriology as a ruling ideology in public health.

¹⁵ Pratik Chakrabarti, *Bacteriology in British India: Laboratory Medicine and the Tropics* (Rochester, NY: University of Rochester Press, 2012).

of the very elite doctors that figured in Christopher Lawrence's influential and much disputed paper 'Incommunicable Knowledge' from 1985.¹⁶ Looking at two hospitals in Cambridge and London (Addenbrooke's and St. Bartholomew's) allows for an interesting additional comparison. The results are surprising: gentleman clinicians, who indulged in anti-modernist rhetoric, turn out to be sceptics rather than critics, judging by their practice: quite eager to incorporate the new science into teaching and bedside practice, they tried to make sure that such incorporation happened on their terms. Such appropriation could be driven by working applications, such as in the case of the diphtheria antitoxin, and it could be more muted, as in the case of tuberculosis where bacteriology provided a mere confirmation to the clinical art of diagnosing phthisis. Laboratory diagnosis in general – just think of X-ray – could and would indeed be seen as a threat to the exclusiveness of elite physicians' skills. As Wall shows by her reading of clinical files, this did not keep the same doctors from increasingly incorporating it into the repertoire of their skills. Wall's results, expressly denouncing older research as being over-inspired by 1970s sociological critiques of the medical profession, are quite consistent with more recent work that showed that bacteriology entered clinical medicine not as a revolution but as a confirmation. And indeed: elite clinicians had achieved a gentlemanly status (and income ...) that bacteriologists were yet aspiring to. As Michael Worboys has shown in the example of Almroth Wright's serum therapies, the truth of opsonic sera would result from the skilled art of its gentlemanly practitioners – a striking resemblance to the world view of elite clinicians.¹⁷

Chapters three and four provide insight into the same subject as Stark's book, anthrax as an occupational disease. Comparing the discussion of that condition in Bradford and London from about 1880, Wall, who is aware of Stark's work, differs from the latter in her conclusions. Where Stark sees a continuation of sanitarian traditions that became equipped with a bacteriological window dressing, Wall insists that an early and comprehensive reception of medical bacteriology from 1881 – the year of the Koch-Pasteur dispute – played a role. *Woolsorters' disease* became *anthrax* and a local coalition of organised labour and medical science in Bradford found medical bacteriology to be just the right approach to provide its campaign with a scientific underpinning. The 'cause of woolsorters' disease was established by collaborations by local doctors and workers' (p. 87). Being able to point to a material and organic parasite proved valuable in negotiations with factory owners. When it comes to the centrality of Bradford, both authors are in agreement and Wall proves her case by looking at the London case, where in the absence of strong organised labour, attention to anthrax remained confined to hospitals that took on the treatment of sufferers.

Chapters five and six engage the history of a disease that is most closely associated with the image of medical bacteriology as the scientific blessing of aggressive public health, ignorant of individuals' health and dignity, namely typhoid. The proverbial example of Mary Mallon, who as 'Typhoid Mary' became 'captive to the public's health'¹⁸ seems to suggest that medical bacteriology, in particular when it set out to hunt for disease carriers, provided yet another tool for the benevolent absolutism of modern state bureaucracies.¹⁹ To re-assess such historiography Wall assesses public responses to various typhoid

¹⁶ Lawrence, *op. cit.* (note 6).

¹⁷ Michael Worboys, 'The Wright Way': the production and standardization of therapeutic vaccines in Britain, 1902–13', in C. Gradmann and J. Simon (eds), *Evaluating and Standardizing Therapeutic Agents 1890–1950* (Basingstoke: Palgrave Macmillan, 2010), 153–73.

¹⁸ Judith Walzer Leavitt, *Typhoid Mary, Captive to the Public's Health* (Boston, MA: Beacon Press, 1996).

¹⁹ Argued most impressively of all by Andrew Mendelsohn in Mendelsohn, *op. cit.* (note 5).

epidemics as they happened in Britain from the early 1880s into the interwar period. The insight gained can only be called surprising. Firstly it suggests a quick and comprehensive dissemination of bacteriology prior to the availability of carrier-state epidemiology from the early 1900s: while an 1882 epidemic in Bangor was framed in classical sanitarian style, e.g. by pointing to sewage as the ultimate cause, another outbreak in Maidstone fifteen years later provides the picture of experts and the lay public having embraced the bacteriological world view in the meantime. Bacteriological testing was widespread and it met with interested and competent audiences. Wall then goes on to study outbreaks after the carrier-state epidemiology of typhoid had been taken into use and bacteriology had complemented hunting for microbes with screening for carriers – thereby starting the classic blame game that came to be seen as the ultimate cause of Marry Mallon's suffering. The biggest surprise, however is, that the course of events as they had unfolded in New York was rarely followed: 'it seems that apart from Mallon's famous case, carriers were never really held to blame for disease' (p. 137). While carrier-state epidemiology did add to the usefulness of bacteriology, it did not automatically result in the classic blame game. Rather, matters of class were more important than matters of hygiene – a classic point made by Judith Walzer Leavit and Andrew Mendelsohn. It is indeed possible to find other stories of people whose fates were comparable to Mallon's, such as the case of some unfortunate Norwegian peasants who in the interwar years were subjected to an aggressive typhoid sanitation that took its departure from aggressive screening and did not shy back from enforced splenectomy.²⁰ Wall's final example of an epidemic in a middle-class district of 1930s London strongly suggests this point of view and also gives a splendid example of citizen science *avant la lettre*. The inhabitants of the borough of Croydon showed themselves to be quite capable of appropriating an amount of epidemiological expertise that enabled them to practise an amateur epidemiology that more than lived up to its professional counterpart. They correctly identified the source of the outbreak and ultimately delivered the blame for the epidemic on the doorstep of negligent health authorities rather than ostracising the carrier who had in fact been identified.

Wall's book clearly delivers a very significant expansion of what we know about the history of bacteriology. The central hypothesis that the history of that discipline is largely driven by its applicants rather than its inventors, is forcefully and convincingly made. The book also shows that the authority of the discipline of medical bacteriology was challenged by the very phenomena that had created its authority in the first place: epidemic infectious diseases. The prestige of medical bacteriology since the 1880s had rested on a promise not just of the identification but of the prevention and control of such conditions. Recurrent infectious disease, such as typhoid, therefore threatened to undermine the authority of bacteriologists. If there had been a bacteriological revolution between 1880 and 1920 – arguable a bit of a slow revolution – it had remained incomplete, notably in relation to the almost complete absence of effective therapeutic interventions for infectious diseases. Diagnosis and prevention as they were skilfully and successfully practised by the citizen scientists of Croydon were no small matter. Yet, apart from a few working sero-therapies and the Salvarsan cure for syphilis, the therapeutic promise that the disease aetiologies of the 1880s had harboured remained almost empty until about 1935. As Wall reminds us in the closing lines of her chapter on anthrax it was the arrival of sulphur drugs and antibiotics from the mid 1930s that completed the bacteriological revolution and finally freed bacteriology from its involuntary embracing of sanitary traditions.

²⁰ Morten Hammerborg *et al.*, 'The campaign to eradicate typhoid fever in Western Norway', in A. Andresen (ed.), *Healthcare Systems and Medical Institutions* (Oslo: Novus, 2009), 170–85.

In a 1997 paper, Nancy Tomes and John Harley Warner wrote about the ultimate outcome of the revisionist historiography of bacteriology that was unfolding in those years. Their prediction was that historians were bound to return to the germ theory-narrative and its status as a watershed in modern medical history: 'even when the germ theory receives the revisionist scrutiny it merits, freshly reconfigured and historicised, it is likely to retain the status of an icon, both in popular understandings of the medical past and in the way historians construct their accounts of medical history'.²¹ Rosemary Wall has, to date, delivered one of the finest stories to put them right: encompassing the sheer magnitude of changes that medical bacteriology brought about, familiarising her readers with lots of new actors and doing all this without falling into neo-heroism.

Christoph Gradmann

University of Oslo, Norway

doi:10.1017/mdh.2014.57

John Paul DiMoia, *Reconstructing Bodies: Biomedicine, Health, and Nation-Building in South Korea since 1945* (Stanford, CA: Stanford University Press, 2013), pp. xvi, 280, \$45.00, hardback, ISBN: 978-0-8047-8411-5.

John DiMoia's *Reconstructing Bodies: Biomedicine, Health, and Nation-Building in South Korea since 1945*, is a much awaited work in English in the field of Korean history of science, technology and medicine. Korean history, in general, remains less well known than its Chinese and Japanese counterparts to English-language readers, and this is even more the case in the field of Korean history of science, technology and medicine. Given this, John DiMoia's work will be remembered as the first work in English on the history of health and medicine in Korea. The work deserves much praise for this fact and also for introducing materials previously unknown to researchers in the world. However, as deserving as this may be, questions arise as to whether this work fulfils the expectation as a comprehensive introduction into the history of Korean health and medicine. In other words, in DiMoia's work, there is a fascinating collection of selected records, mostly in English, pertaining to biomedical interventions that occurred in 'South Korea', but whether they form a cogent history with compelling conclusions drawn on the role of biomedicine in the building of the health and nation of South Korea, remains inconclusive.

To show how biomedical interventions carried out on bodies, or, to be exact, Korean bodies, were 'reconstructions' that enabled the development of the South Korean nation, DiMoia presents six case studies of various biomedical activities that took place in Korea organized under six headings. The first two chapters examine the legacies of traditional medicine (1392–1910), the introduction of biomedicine during Japanese colonisation (1910–45) and the public health activities of the American military government (1945–8). These two chapters function as an introductory survey of the health and medical conditions in Korea prior to the establishment of the Republic of Korea or South Korea in 1948. The four chapters that follow examine the biomedical activities that have taken place in South Korea since the end of the Korean War (1950–3) to the present. The four activities that DiMoia selected for the remaining four chapters are: the introduction of open-heart surgery at the Seoul National University Hospital by the University of Minnesota team, the trial experiments conducted by Seoul National University and Yonsei University on Family Planning from the mid-1960s to late 1970s, the anti-parasite campaign of the same

²¹ Tomes and Warner, *op. cit.* (note 9): 16.