"Straight Back to Barbarism": Antityphoid Inoculation and the Great War, 1914

Anne Hardy

Bulletin of the History of Medicine, Volume 74, Number 2, Summer 2000, pp. 265-290 (Article)

Published by Johns Hopkins University Press
DOI: *https://doi.org/10.1353/bhm.2000.0073*

"Straight Back to Barbarism": Antityphoid Inoculation and the Great War, 1914

ANNE HARDY

On 27 August 1914, just three weeks after the outbreak of the Great War, Sir William Osler, Regius Professor of Medicine at Oxford University, wrote a letter to the *Times,* in which he urged the necessity of compulsorily vaccinating British troops against typhoid. "In war," he pressed, "the microbe kills more than the bullet," and he reminded his readers that more men had died of dysentery and typhoid in the Boer War than had died in action.[1] Osler's plea was supported, in the first week of September, by letters from Sir Lauder Brunton, an acknowledged leader of the medical profession, and Sir Almroth Wright, head of the Inoculation Department at St Mary's Hospital, London, and a pioneer of antityphoid vaccine.[2] On 28 September Wright wrote again, arguing the case for compulsory vaccination at far greater length. "An army going on active service," he stated, "goes from the sanitary conditions of civilization straight back to those of barbarism. It goes out to confront dangers which have, in settled communities, been so completely extinguished as to have passed almost out of mind."[3]

The earliest version of this paper was written for the Jenner Bicentenary Symposium organized jointly by the Royal Society of Medicine and the Wellcome Institute, in 1996. I am grateful to William Bynum for asking me to give that paper; to the *Bulletin*'s anonymous referees for advice and correction; and to Mark Harrison for reading through the penultimate draft. Any errors or misinterpretations remain my own.

1. Sir William Osler, "Compulsory Anti-Typhoid Vaccination" (letter), *Times* (London), published 29 August 1914, p. 6, col. d.

2. Sir Lauder Brunton, "Inoculation against Typhoid" (letter), *Times,* 2 September 1914, p. 10, col. b; Sir Almroth Wright, "Doctors and Recruits" (letter), *Times,* 5 September 1914, p.10, col. e.

3. Sir Almroth Wright, "Inoculation of Troops" (letter), *Times,* 28 September 1914, p. 6, col. a.

On the face of it, these letters may be read as a reflection of medical altruism, of concern that governmental and military authorities should take advantage of the latest developments of modern medicine in protecting their armies and the wider war effort from the ravages of disease—but the reality was less prosaic, less disinterested, and considerably more complicated. Behind these letters lay a continuing tension between the British medical community's attempts to gain acceptance for the perceived benefits of immunization, and the political consensus and popular sensitivities established within the wider social context of British liberal adjustment to a modernizing industrial society.[4] The context of war, moreover, sharpened a parallel tension between medicine and modernizing managerial authorities in the British Army, who were increasingly obliged to take account of the rights as well as the duties of "the citizen soldier."[5] Almroth Wright's invocation of the concepts of civilization and barbarism was significant, for through them he issued a challenge to British society at large to pass judgment on an issue of fundamental concern to the Edwardian period: the respective rights and responsibilities of the individual and the wider community.[6] Wright's position on the situation of the soldier within this configuration was contentious: for Wright, the soldier, by entering the army, expressed his desire to be put under orders.[7] It was a view that was out of keeping with the predominant civilian and military political ethos, which supported the opposite view, as the debates surrounding the issue of compulsory antityphoid inoculation were to show, that the soldier's rights as a citizen to determine the disposition of his own body overrode external considerations of the benefits he might be thought to derive from medical prophylaxis.

In the early 1900s, British liberalism had moved significantly toward state intervention in the life of the citizen, and was to move further under the threat of war, with the implementation of the Official Secrets and the Defence of the Realm Acts, and finally with conscription in January

4. For the problems of British liberalism, see Michael Freeden, *The New Liberalism: An Ideology of Social Reform* (Oxford: Oxford University Press, 1978); Richard Bellamy, *Liberalism and Modern Society: An Historical Argument* (Cambridge: Polity Press, 1992); Jonathan Philip Parry, *The Rise and Fall of Liberal Government in Victorian Britain* (New Haven: Yale University Press, 1993).

5. Mark Harrison, "Medicine and the Management of Modern Warfare," *Hist. Sci.*, 1996, *34:* 379–410.

6. See Martin Pugh, *The Making of Modern British Politics 1867–1939,* 2d ed. (Oxford: Blackwell, 1993); David Powell, *The Edwardian Crisis: Britain, 1901–1914* (London: Macmillan, 1996); Samuel Lynn Hynes, *The Edwardian Turn of Mind* (Princeton: Princeton University Press, 1968).

7. Wright, "Inoculation of Troops" (n. 3).

1916.[8] In matters medical, however, the liberal ethos had moved in the opposite direction, toward significantly less direct intervention. This reversal of policy was epitomized by the 1907 Vaccination Act, which effectively dismantled the structure of compulsory infant vaccination against smallpox erected by Liberal governments in the 1860s.[9] In modernizing Britain, greater state intervention in social and economic welfare went hand in hand with an enhanced respect for individual liberty as regarded control of the individual body: medical intervention was to be by individual choice alone. Moreover, the outbreak of war had provoked widespread discussions of civilization, its nature and its imminent destruction.[10] Wright drew on both these political and cultural anxieties in framing his own objective: the question of compulsory antityphoid inoculation for the troops raised a critical reassessment of civilized values.

Typhoid is an acute infectious disease, whose causal organism, *Salmonella typhi,* is transmitted in the urine and bowel discharges of its victims. It had been a serious public health problem in mid-nineteenth-century England, but with the introduction of piped and filtered water supplies in most urban areas, its prominence as a cause of death had diminished (although more than eight thousand cases were still recorded in England and Wales in 1913).[11] In the first decade of the new century it was discovered that some 3 percent of typhoid victims continued to pass typhoid bacilli after their recovery, and these "healthy carriers" became the subject of renewed public health concern—more especially in the British Army in India.[12] Yet if the new bacteriology revealed new public health dangers, it also offered new preventive measures: an antityphoid vaccine had been developed almost simultaneously by Almroth Wright and by the German researchers Richard Pfeiffer and Wilhelm Kolle in 1896. It was the first of the new vaccines to have mass potential for human

8. Pugh, *Making of Modern British Politics* (n. 6), pp. 113–21, 167–68.

9. Royston Lambert, "A Victorian National Health Service: State Vaccination 1855–71," *Hist. J.,* 1962, *5:* 1–18; Roy M. Macleod, "Law, Medicine and Public Opinion: The Resistance to Compulsory Health Legislation, 1870–1907," *Public Law,* Summer 1967: 106–26, 188–211.

10. Samuel Hynes, *A War Imagined: The First World War and English Culture* (London: Pimlico, 1992), pp. 3–4.

11. Anne Hardy, *The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine, 1856–1900* (Oxford: Clarendon Press, 1993), chap. 5; HMSO (Her Majesty's Stationery Office), *Forty-third Annual Report of the Local Government Board 1913–1914,* Supplement containing the report of the Medical Officer for 1913, British Parliamentary Papers, 1914, vol. xxxix, command no. 7612, p. 47.

12. See Lieut.-Col. A. R. Aldridge, "The Prevention of Enteric Fever in India," *J. Roy. Army Med. Corps,* 1909, *13:* 221–32. In the United States, in considerable contrast to the United Kingdom, discovery of the carrier provoked sharp public health reactions: see

populations, for typhoid was still endemic in western Europe and the United States, as well as being a recognized hazard of colonial life in the tropics.[13]

Antityphoid vaccine offered no easy answer to the problem of endemic typhoid, however. Developed in the centenary year of William Jenner's discovery of vaccination against smallpox, the typhoid vaccine inherited Jenner's double legacy to immunology: the promise of disease eradication, on the one hand, and the vociferous opposition of principled antivaccinationists on the other. Vaccination against smallpox had for decades been the subject of contention between those who recognized its medical and social importance and those who did not; in the years 1898–1907, moreover, the latter achieved significant modifications to England's legislative provision for compulsory infant vaccination.[14]

The antivaccinationists' objections were not limited to Jenner's operation: their objections extended to all types of vaccination, and belonged to a worldview in which the liberty of the individual, and a conviction that civilization consisted in strict adherence to nature's laws of cleanliness, were an integral part. Thus, in the words of Alfred Russel Wallace, whose influential attack on vaccination was published in 1898, the Vaccination Acts were felt to

> stand alone in modern legislation as a gross interference with personal liberty and the sanctity of the home; while as an attempt to cheat outraged nature,

---

Judith Walzer Leavitt, *Typhoid Mary: Captive to the Public's Health* (Boston: Beacon Press, 1996). The concept of the urinary carrier had been gradually established in the 1890s, and was noted by the American investigators of epidemic typhoid during the Spanish-American War, but it was only with the evidence collected during the South-West German typhoid eradication campaign of 1904–7 that it was realized that the carrier condition was far from rare: see David S. Davies, "Typhoid Fever and Chronic Typhoid Carriers," *Pub. Health,* 1908, *22:* 40–49. For the American recognition of the problem of the carrier, see Walter Reed, Victor C. Vaughan, and Edward O. Shakespeare, *Abstract of Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps during the Spanish War of 1898* (Washington: Government Printing Office, 1900), pp. 201–4; for a review of the evidence on urinary carriers see idem, *Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps during the Spanish War of 1898* (Washington: Government Printing Office, 1904), Appendix 3: "A Paper on Typhoid Bacilluria Prepared under the Direction of the Board," by John Ralston Williams.

13. Neither the antirabies vaccine developed by Louis Pasteur, nor the cholera vaccine developed by W. M. W. Haffkine, approached any widespread level of application. For typhoid in the United States see George C. Whipple, *Typhoid Fever: Its Causation, Transmission and Prevention* (New York: Wiley, 1908); for its prevalence in the tropics, see "The Enteric Fever Problem," *J. Roy. Army Med. Corps,* 1903, *1:* 54–60.

14. Vaccination Act, 7 Edw. 7 (1907), c. 31. For the antivaccination agitation see Ann Beck, "Issues in the Anti-vaccination Movement in England," *Med. Hist.,* 1960, *4:* 310–21; MacLeod, "Law, Medicine" (n. 9), pp. 106–28, 188–211; Dorothy Porter and Roy S. Porter,

> and to avoid a zymotic disease without getting rid of the foul conditions that produce and propagate it, the practice of vaccination is utterly opposed to the teachings of sanitary science.[15]

Typhoid's well-known mode of transmission by the fecal-oral route, and especially through polluted water supplies, meant that it was generally recognized as a disease of civilization—or, as William T. Sedgwick, professor of biology at the Massachusetts Institute of Technology, put it, it was a disease of "*defective* civilization . . . due to defective sanitation; and defective sanitation means defective civilization."[16] Connections between typhoid and civilization—and, by association, barbarism—were widely made in Britain and the United States in the early years of this century, and in the former were reinforced by the experience of some sixty thousand cases and more than eight thousand deaths from typhoid during the Boer War.

At the outbreak of the Great War, medical concerns over the inevitable presence of carriers among troops, and the dangers of typhoid to fighting strength, brought the call for compulsory inoculation. Yet when, in 1914, the eminent medical gentlemen wrote to the *Times* to press for compulsory vaccination against typhoid for the troops, the antivaccinationists took up their cudgels with renewed vigor in defense of the liberty of the individual and of their own view of civilization. At the heart of this contest lay a political issue: the right of the individual citizen, of the individual citizen-soldier, to consent rather than to submit to medical intervention. Civilian reaction to the compulsory inoculation proposal not only suggests that civilian standards of liberty had been extended in the public mind to the soldiery, but also indicates the extent to which individual freedom had become enshrined in the model of the modernizing democractic state. For those who argued against compulsion, soldiers were first *men,* who had a right to the control of their bodies, and soldiers second. For the medical men who favored compulsory inoculation, however, the stakes included not only the welfare of Britain's army,

---

"The Politics of Prevention: Anti-vaccinationism and Public Health in Nineteenth-century England," *Med. Hist.,* 1988, *32:* 231–52.

15. Alfred R. Wallace, *The Wonderful Century: Its Successes and Failures* (London: Swan Sonnenschein, 1898), p. 314. Wallace's attack converted and inspired, for example, Henry George Chancellor (1863–1945), Liberal MP for Haggerston 1910–18, who brandished the antivaccinationist flag against typhoid vaccine in the House of Commons throughout 1914–18: see *Vacc. Inq. Health Rev.,* 1914, *37:* 279.

16. William T. Sedgwick, "Introductory Essay," in Whipple, *Typhoid Fever* (n. 13), xxiii–xxxvi, quotation on p. xxiv. See also *Med. Officer,* 1914, *12:* 171. For the resonances of this opinion with earlier sanitarian ideas, see Lloyd G. Stevenson, "Science Down the Drain: On

but the authority of modernizing medicine and, in the longer term, society's attitude toward new methods of disease prevention.

Antityphoid Vaccine before 1914

The antityphoid vaccine had had a fairly checkered history in the years before World War I. Developed independently by Wright and by Pfeiffer and Kolle, it was soon taken up by Europe's fledgling immunologic community, and within a decade there were several different versions of it in production. Both the French and the Germans developed their own versions, but in Britain Wright's version carried the day, and his vaccine was the first to receive extensive testing. Wright is often regarded as "the father of British bacteriology," but in the longer term, it could be argued, he did little but harm to the cause of bacteriology outside the scientific community in Britain. He was certainly a controversial figure, prominent in the world of Edwardian medicine, known for his work on pneumonia in South Africa, for his work on vaccine therapy, for his advocacy of scientific medicine; but he was also an erratic and disputatious public figure, known and disliked for (among other things) his attitude to women and his opposition to women's suffrage, his opposition to washing, and the arrogance that George Bernard Shaw caricatured in the character of Sir Colenso Rigeon in *The Doctor's Dilemma* (1906).[17]

When Wright developed the antityphoid vaccine, he was professor of pathology at the Royal Army College at Netley, although he did not belong to the army. His biographers have portrayed him as a man employed by the army but not of it, who was hampered by army protocols, and whom the army resented.[18] In 1902, he abandoned the Army Medical College, and took up the professorship of pathology at St Mary's Hospital, Paddington. His student Leonard Colebrooke, himself a distinguished bacteriologist, wrote admiringly of Wright that he was convinced that inoculation would save thousands of lives, and so he determined to fight for its adoption: "And a fight it certainly became," noted Colebrooke, "not always glorious. The story . . . illustrates well Wright's dogged resolve to 'get things in the world so very different'. And he knew well that

---

the Hostility of Certain Sanitarians to Animal Experimentation, Bacteriology and Immunology," *Bull. Hist. Med.,* 1955, *29:* 1–26, esp. pp. 5–7.

17. "Sir Almroth Wright," *Brit. Med. J.,* 1947, *1:* 646–47; ibid., pp. 699–700 (an appreciation by Leonard Colebrooke).

18. Leonard Colebrooke, *Almroth Wright: Provocative Doctor and Thinker* (London: Heinemann, 1954), chap. 4; Zachary Cope, *Almroth Wright: Founder of Modern Vaccine-Therapy* (London: Nelson, 1966), chaps. 3, 4.

revolutions were not usually achieved without high tensions."[19] This is the partisan view of the disciple. In fact, Wright's handling of his antityphoid vaccine promotion campaign damaged the prospects for its adoption not only by the military authorities, but also by the wider medical community and the general public. At a time when agitation against compulsory smallpox vaccination was reaching a climax, when public awareness of the political issues surrounding immunology was high, and when standards of scientific verification were achieving a new rigor, Wright's autocratic methods of testing his vaccine appeared both insensitive and impolitic. Already in 1900, for example, the antivaccinationist lobby declared of the antityphoid vaccine that "The new medicine is at least as 'pushful' as the new diplomacy, and as little affected by modesty or caution."[20] Nor did Wright's open admission of manifold sources of error in the early statistical analyses earn him much credit: as one medical journal noted, "fallacies of this kind must be fatal to any trustworthy deduction."[21] In the context of an emerging science of mathematical statistics, Wright's methods appeared increasingly old-fashioned.[22]

In some respects, Wright was fortunate with the antityphoid vaccine. In the first place, *Salmonella typhi* is specific to man, and does not cause disease in animals. This meant that the use of animals in the testing and production of the vaccine was minimal—a fact that was to be important in its profile vis-à-vis some of the antivivisectionists, who so often supported the antivaccinationists in their campaigns. Secondly, Wright considered the dangers of the disease associated with a live vaccine sufficient to develop a technique using heat-killed bacilli—a feature that was also important to the vaccine's public image. He was less fortunate in his arrangements for the testing of the vaccine on human subjects. In the early stages of production, Wright tried out his vaccine on himself and volunteer surgeon-probationers at Netley. By February 1897, he was confident enough of his technique to publish a first brief account of it in the *British Medical Journal,* suggesting that it was especially useful to young soldiers going abroad to typhoid-infected districts, to nurses attending typhoid patients, and to people living in any district where

19. Colebrooke, *Almroth Wright* (n. 18), p. 36. Colebrooke adopted a slightly more restrained version of this approach elsewhere: see Leonard Colebrooke, "Almroth Wright," *Obit. Not. Fell. Roy. Soc.,* 1948–49, *6:* 297–99, on p. 298.

20. Editorial, *Vaccination Inquirer and Health Review,* 1900, *21:* 133.

21. "Anti-typhoid Inoculations," *Med. Press Circ.,* 1900, *2:* 64.

22. For the rising importance of statistics in scientific verification, see J. Rosser Matthews, *Quantification and the Quest for Medical Certainty* (Princeton: Princeton University Press, 1995); Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995).

typhoid was epidemic.[23] The *BMJ* itself endorsed this view, with an editorial urging that "if a man knew he were likely to be exposed to the infection of typhoid he would act wisely if he submitted to be vaccinated by this method."[24] Wright was now looking for opportunities for an extended trial, and within months this came, when a serious typhoid epidemic broke out at Maidstone in Kent.

Wright's biographers have given brief accounts of this episode, indicating that there was an outbreak among staff at the Kent County Asylum; that Wright was called in and inoculated 84 volunteers among the 200 staff; and that none of the inoculated caught typhoid, whereas 4 of the uninoculated did.[25] What the biographers did not reveal is also suggestive: The typhoid outbreak was not confined to the Asylum but, being water-borne, was contained within an area of Maidstone town served by a particular water supply. The inoculations at the Asylum took place in the week ending 16 September, when the total number of cases had reached 37; by 13 October, 1,655 cases had been notified in the town (population ca. 35,000). The army surgeons deputed to the vaccination program, firstly Surgeon-Major David Semple, and secondly (after Semple fell ill with what was said to be Malta fever) Surgeon-Captain William Leishman—not Wright himself—had been dispatched with a supply of vaccine sufficient to vaccinate the whole town if necessary, presumably in the hope that many local people would accept the operation.[26] There is no evidence to suggest that any of the townsfolk took advantage of the vaccine, and the silence of the medical observers, the absence of any account in Wright's statistical compilations, and the steadily rising toll of cases after 16 September indicate that very few of them did.

Denied an extensive civilian trial, Wright turned his attention to the military. Visiting India with the First Plague Commission in 1898, he took advantage of his status at Netley to address barnstorming "stump speeches" to the troops at various stations to drum up volunteers for his operation. It was an activity that he undertook without asking permission of the military authorities, and it increased the tension between them.[27] When

23. Almroth E. Wright and David Semple, "Remarks on Vaccination against Typhoid Fever," *Brit. Med. J.,* 1897, *1:* 256–59.

24. "Vaccination against Typhoid Fever," *Brit. Med. J.,* 1897, *1:* 352–53, quotation on p. 353.

25. Colebrooke, *Almroth Wright* (n. 18), p. 36; Cope, *Almroth Wright* (n. 18), pp. 24–25. The figures given here are Colebrooke's; the exact figures given vary in the different accounts. See also Special Commissioner, "Epidemic of Typhoid at Maidstone," *Brit. Med. J.,* 1897, *2:* 1117.

26. "Vaccination against Typhoid Fever," *Brit. Med. J.,* 1897, *2:* 1015; Special Commissioner, "Epidemic at Maidstone" (n. 25).

27. Colebrooke, *Almroth Wright* (n. 18), pp. 36–37, quotation on p. 37; Cope, *Almroth*

war broke out in South Africa, Wright saw it as a special opportunity for a trial, for the Army Medical Department was well aware of the potential typhoid hazard waiting in South Africa.[28] He obtained War Office permission to inoculate such men as should voluntarily present themselves before embarkation, and prepared a large amount of vaccine. There can be no doubt that Wright was looking for convincing statistical proof of the efficacy of inoculation from this South African trial—but unfortunately, he did not ensure that proper records were kept and maintained; and although an able bacteriologist, he had not appreciated the full sensitivity of his vaccine to temperature changes while in storage. If the Boer Wars proved a disastrous debacle for Britain on the military and patriotic fronts, they were on a smaller canvas also initially disastrous for Wright's antityphoid vaccine.

While the failure to keep proper records undermined the scientific validity of the South African trial,[29] various other factors combined to damage extensively the popular reputation of the vaccine both during and after the war. Although the deficiencies of the records confused the issue somewhat, it seemed incontestable to many that numbers of men who had been inoculated against typhoid (even with the full two-dose course) had in fact caught the disease and died of it. Several forces were at work here. In the first place, Wright's vaccine was at this date specific to *Salmonella typhi*. Typhoid was not, however, the only salmonella present in South Africa: there was also paratyphoid, which in severe cases mimics typhoid proper, and against which Wright's vaccine may not have offered protection.[30] Although the existence of the paratyphoids had been recognized in 1896, it was not until 1902 that they were officially classified as paratyphoids A and B, and only in 1901–2 that Aldo Castellani began to experiment with mixed typhoid/paratyphoid vaccines.[31] By 1908, it had been demonstrated that 25 percent of continued fever cases among

Wright (n. 18), p. 25; Medical News: "Inoculation against Enteric Fever," *Brit. Med. J.,* 1899, *1:* 572; Medical News: "Inoculation against Enteric at Lucknow," ibid., p. 640. I am indebted to Mark Harrison for pointing out the extent of Wright's independent action in the recruitment of volunteers.

28. Stephen A. Pagaard, "Disease and the British Army in South Africa, 1899–1900," *Milit. Affairs,* 1986, *50:* 71–76, on p. 71.

29. "Anti-typhoid Inoculations," *Med. Press Circ.,* 1900, *1:* 64.

30. Major J. G. McNaught, "Paratyphoid Fevers in South Africa," *J. Roy. Army Med. Corps,* 1911, *16:* 505–14. Evidence from World War I suggested, however, that the revised vaccine was also to some extent effective against the paratyphoids: see David Harvey, "Bacillus Typhosus," in Medical Research Council, *A System of Bacteriology in Relation to Medicine* (London: HMSO, 1929–1931), 4: 56.

31. Major J. C. B. Statham, "The Complex Nature of Typhoid Etiology," *J. Roy. Army Med.*

troops stationed at Pretoria were of paratyphoid B.[32] In the light of subsequent evidence, the protective value of Wright's 1899 vaccine against the infections current in South Africa was inadequate. It is also likely that many batches of the vaccine did not protect against typhoid itself, either because the temperature at which the bacilli were killed was too high—a factor later shown to be crucial—or because it had been stored at the wrong temperature. Finally, because Wright had not yet refined the minimum strength at which the vaccine was effective, volunteers suffered severe reactions from overstrong dosages, and many were discouraged from undertaking the important follow-up jab ten days later.[33]

The question of the reaction was important in discouraging the uptake of the vaccine, both in South Africa and subsequently. It was clear from Wright's early researches that the larger the dose of vaccine given, the more severe the reaction—which included pain spreading from the injection site in the flank into the armpits and groin, faintness and collapse within 2–5 hours, loss of appetite, fever, and disturbed sleep lasting for 12–24 hours.[34] Quite apart from the communications of returning troops to their communities at the end of the war, the unpleasant effects of the vaccine were given wide publicity. On 28 June 1900, the *Morning Post* described the pale and shaken appearance of the newly inoculated troops aboard the *Dunstlar Castle,* causing public consternation and inaugurating a movement to ban the vaccine.[35] These flames were shortly fanned by the young Winston Churchill in his account of the South African campaign published that year. Describing the tedium of the fortnight's passage from Southampton in October 1899, Churchill detailed the diversion provided by antityphoid vaccination in loaded language:

> Inoculation against enteric fever proceeds daily. The doctors lecture in the saloon. One injection of serum protects; a second secures the subject against attack. Wonderful statistics are quoted in support of the experiment. Nearly everyone is convinced. The operations take place forthwith, and the next day sees haggard forms crawling about the deck in extreme discomfort and high

---

Corps, 1908, *11:* 351–67, on p. 357; Aldo Castellani, "Typhoid-Paratyphoid Vaccination with Mixed Vaccines," *J. Trop. Med. Hyg.,* 1914, *17:* 36–39.

32. McNaught, "Paratyphoid Fevers" (n. 30), pp. 507–11.

33. See Col. Henry Cayley, "A Note on the Value of Inoculation against Enteric Fever," *Brit. Med. J.,* 1901, *1:* 84.

34. Wright and Semple, "Remarks on Vaccination" (n. 23), p. 257.

35. Arnold Netter, "Les inoculations préventives contre la fièvre typhoïde," *Bull. Inst. Past.,* 1906, *4:* 979. A search through a poor-quality microfilm of this issue of the *Morning Post* at the British Newspaper Library, Colindale, London, failed to find the precise reference.

> fever. The day after, however, all have recovered and rise gloriously immune. Others, like myself, remembering that we still stand only on the threshold of pathology, remain unconvinced, resolved to trust to "health and the laws of health."[36]

Passages like this, of course, were gifts to the antivaccinationists, and Churchill's judgment of 1900 was still being quoted in 1914.[37] But in 1900, even the regular press had its doubts. Already in January 1900, the *BMJ* noted the combative attitude of the daily press toward Wright's vaccine.[38] The *Daily News,* for example, noted that "the exposure of the Army to this kind of experiment has been without adequate justification," while the *Medical Press and Circular* remarked that the figures "did not inspire confidence."[39] Surgeon-General Jameson was noted as saying that the statistical proofs of efficacy were "the reverse of encouraging."[40] The former surgeon-general of the U.S. Army, George Sternberg, compared the typhoid death rates of the inoculated and uninoculated from South Africa and British India, and concluded that "the difference is insufficiently great to give confidence in inoculations by Wright's method as a preventive measure"; significantly, he added: "In this disease . . . our main reliance should be upon the sanitary measures . . . especially upon disinfection of excreta and sterilisation of drinking water."[41] By 1904, when Karl Pearson's statistical analysis of Wright's results concluded that the statistical justification for the technique was poor, and that its routine use should be suspended until trials had yielded unassailable data, even the *BMJ* had come around to the view that Pearson had a point.[42]

Although the army continued extensively to immunize volunteers among troops destined for India and Egypt between 1900 and 1904, pressures were building for a reconsideration of the policy. In 1904, the Advisory Board for Army Medical Services, reporting on the preparation and application of "all sera," recommended suspending the practice.[43]

36. Winston Churchill, *London to Ladysmith via Pretoria* (London: Longmans, Green, 1900), pp. 10–11. This passage is also cited in Pagaard, "Disease and the British Army" (n. 28), p. 74.

37. "Anti-typhoid Inoculation in Wartime," *Zoophilist,* 1914, *34:* 84; Notes of the Month: "Mr Winston Churchill Had No Use for Serums," *Vacc. Inq. Health Rev.,* 1914, *36:* 252.

38. "Antityphoid Inoculation and Its Results," *Brit. Med. J.,* 1900, *1:* 151–52.

39. *Daily News,* 21 June 1900, cited in "Anti-typhoid Inoculation" (n. 37); "Anti- typhoid Inoculations," *Med. Press Circ.,* 18 July 1900, p. 64.

40. "The Results of Anti-typhoid Inoculations in the Army" (editorial), *Med. Press Circ.,* 20 June 1900, p. 639.

41. George M. Sternberg, *Infection and Immunity: With Special Reference to the Prevention of Infectious Diseases* (London: John Murray, 1903), p. 139.

42. See "Antityphoid Inoculation," *Brit. Med. J.,* 1904, *2:* 1259–61; Karl Pearson, "Report on Certain Enteric Fever Inoculation Statistics," ibid., pp. 1243–46.

43. "Advisory Board for Army Medical Services," *J. Roy. Army Med. Corps,* 1905, *4:* 242–44.

The decision was based partly on an analysis of the available statistics by Lieutenant-Colonel David Bruce of the RAMC, who as assistant professor of pathology at Netley had been passed over in favor of Wright for the full professorship. The Board was, however, by its own admission, "largely influenced" by Wright's detection of a negative phase in the inoculation process that, if troops were inoculated shortly before reaching a typhoid-endemic area, would render some of them temporarily more susceptible to the disease.[44] More particularly, their reasoning was swayed not by the medical facts, or by their administrative implications, but by the likely public reaction. Although the operation was stated to be voluntary, the Board observed that

> the sentiment of military discipline may readily cause it to be in practice compulsory. There is, indeed, no doubt that the public opinion would severely condemn any system of compulsory inoculation which, though it might obtain some measure of protection for the majority, was admitted to entail upon a certain number of individuals increased liability to disease, suffering and death.[45]

While neither Wright nor his supporters could accept the Advisory Board's justification for the suspension of the military inoculation program, and Wright was deeply aggrieved,[46] there is little doubt that both in the public estimation and in the wider medical profession, antityphoid inoculation was widely discredited at this time. The Advisory Board's decision to suspend routine inoculations and to commission a thorough review of the scientific procedures under William Leishman, together with a series of scrupulously documented military trials, was fully justified by the civilian concern surrounding immunologic issues. Leonard Colebrooke was later to admit the wisdom of the Board's decision,[47] but Wright, although he afforded Leishman all the assistance he needed, thereafter essentially disassociated himself from discussion of the antityphoid vaccines until the circumstances of World War I provoked him to reenter the debate.

The army had, in fact, learned bitter lessons in South Africa, and not just in respect of inoculation. Despite the knowledge that typhoid would

44. Ibid., p. 243; ibid., Appendix: David Bruce, "Analysis of the Results of Professor Wright's Method of Anti-typhoid Inoculation," pp. 244–55. For Wright's discussion of the negative phase see Almroth E. Wright, "On the Changes Effected by Anti-Typhoid Inoculation in the Bactericidal Power of the Blood; with Remarks on the Probable Significance of these Changes," *Lancet,* 1901, *2:* 715–23, esp. pp. 716–20.

45. "Advisory Board" (n. 43), pp. 243–44.

46. See Cope, *Almroth Wright* (n. 18), pp. 25–26.

47. Colebrooke, *Almroth Wright* (n. 18), pp. 34–35.

always occur in armies, and that South Africa was a special danger zone, poor sanitary organization and the consistent failure by all ranks to take proper hygienic precautions against infection resulted in 54,684 cases of enteric fever with 8,022 deaths, among a mean strength of 208,266 men, in the years 1899–1902: a case mortality of nearly 15 percent.[48] The observation by medical men in the field of a widespread ignorance or neglect of basic sanitary precautions was too consistent to be ignored, and the Army Medical Department embarked on a campaign to remedy these shortcomings. By 1904, cadets at Woolwich and Sandhurst, and officers at the Staff College, were being subjected to regular courses of instruction in hygiene; in April 1906 a School of Army Sanitation was opened at Aldershot, holding classes of sanitary instruction for all ranks outside the Army Medical Corps.[49] Edge was probably lent to these educational exercises by the very general expectation—in the Army Medical Department, at least—that a great war would not be long in coming.[50]

By 1914, according to the official history of the war, nearly every man in the British Expeditionary Force (BEF) had some training in sanitation, and the value of hygiene and sanitation in the field was fully recognized (although this did not by any means ensure that the first year of the war was without significant sanitary problems).[51] Moreover, anxiety over the carrier problem had led to the establishment in India, in 1908, of the Naini Tal Enteric Depot, where convalescents were screened for carrier status: an innovation that created precedent for the utility of the mobile bacteriologic units of World War I. By 1915, it could be claimed that India had a "carrier-free Army"—an important testimony to the sanitary dedication of the Royal Army Medical Corps.[52]

Between 1904 and 1914, however, antityphoid inoculation became increasingly respectable, both scientifically and militarily; it even began

48. Harvey, "Bacillus Typhosus" (n. 30), p. 58. For an account of that experience see Pagaard, "Disease and the British Army" (n. 28); the best general account of the war remains Thomas Pakenham, *The Boer War* (London: George Weidenfeld & Nicholsen, 1979).

49. A. M. Davies, "On the Instruction of Staff and Regimental Officers in Military Hygiene," *J. Roy. Army Med. Corps,* 1904, *2:* 705–16; Army Medical Department, *Annual Report,* 1907, *49:* 47.

50. Sir William B. Leishman, "Enteric Fevers in the British Expeditionary Force," *J. Roy. Army Med. Corps,* 1921, *37:* 2.

51. Major-General William G. MacPherson, Col. Sir W. H. Horrocks, and Major-General W. W. O. Beveridge, *Medical Services: Hygiene of the War,* 2 vols. (London: HMSO, 1923), 1: 1.

52. Major David Harvey, "The Causation and Prevention of Enteric Fever in Military Service, with Special Reference to the Importance of the Carrier. Being an Account of the Work Done at Naini Tal Enteric Depot, 1908–11," *J. Roy. Army Med. Corps,* 1915, *25:* 94–120, on p. 94. See also Major Stevenson Lyle Cummins, "The Causation and Prevention of Enteric Fever in Military Service," ibid., 1913, *20:* 635–65.

to infiltrate civilian practice. The work of William Leishman was of central importance in this development.[53] Leishman and his colleagues began work in October 1904, and for the next four years published a stream of reports detailing their precise bacteriologic investigations of all the problematic aspects of Wright's typhoid vaccine.[54] By the time Leishman published the final, conclusive statistical summary in 1909, they had reestablished the technique's scientific credentials. Most important, perhaps, Leishman established that there was no negative phase;[55] that the temperature at which the typhoid bacilli were killed was crucial to the effectiveness of the vaccine;[56] and that with carefully regulated dosages, severe local reactions could be avoided.[57] If Wright has had much of the credit—in the English-speaking world—for introducing the antityphoid vaccine, Leishman should get equal credit for establishing the scientific credibility of Wright's method, and for creating a climate of opinion in which the wider medical community could contemplate using the procedure.

While Leishman and his colleagues labored in the laboratory, moreover, military and scientific authorities elsewhere were beginning to express their belief in the value—or at least the inoffensiveness—of antityphoid vaccines. In 1905, Germany began inoculating both troops and civilians in her West African territories with Pfeiffer and Kolle's vaccine, in the context of the Herrero uprising of that year.[58] Significantly and interestingly, it was reported from South-West Africa that both whites and blacks submitted to the vaccination procedure with greater readi-

53. For the career of Lieutenant-General Sir William Boog Leishman (1865–1926), see "Obituary," *Brit. Med. J.,* 1926, *1:* 1013–16. Leishman entered the Royal Army Medical Corps in 1887; was promoted Major in 1899; brevet Lieut.-Col. in 1905; Lieut.-Col., 1911; brevet Col., 1912; Major-General, 1918; Lieutenant-General, 1923. He was knighted in 1909, and made a Fellow of the Royal Society in 1910.

54. W. S. Harrison, "On a Modification of Wright's Method for Counting the Bacteria Contained in a Culture," *J. Roy. Army Med. Corps,* 1905, *4:* 313–18; W. B. Leishman, "The Blood Changes Following Typhoid Inoculation," ibid., 1905, *5:* 1–53; idem, "The Progress of Anti-Typhoid Inoculation in the Army," ibid., 1907, *8:* 463–71; W. S. Harrison, "Report on the Results of Experiments in Connection with Anti-typhoid Vaccine," ibid., pp. 472–91; W. B. Leishman, W. S. Harrison, H. W. Grattan, and R. G. Archibald, "Report on Further Experiments in Connection with Anti-typhoid Inoculation," ibid., 1908, *10:* 583–601; W. B. Leishman, W. S. Harrison, H. W. Grattan, A. L. A. Webb, and J. C. Kennedy, "Third Report on Experiments in Connection with Anti-typhoid Vaccine," ibid., 1908, *11:* 327–50; W. B. Leishman, "Statistical Table of the Recent Results of Anti-typhoid Inoculation," ibid., 1909, *12:* 163–67.

55. Leishman, "Blood Changes" (n. 54), pp. 17–30.

56. Leishman, "Progress of Anti-typhoid Inoculation" (n. 54), pp. 467–68.

57. Ibid., pp. 460–70.

58. "German Experience of Antityphoid Inoculation," *Brit. Med. J.,* 1905, *1:* 726. For a more detailed account of the German use and assessment of antityphoid vaccine, see Netter, "Les inoculations préventives" (n. 35), pp. 873–83, 921–27, 969–80, 1024–34.

ness than would have been the case in Germany: the people were accustomed to seeing their cattle inoculated for pleuropneumonia and rinderpest, and so had lost their prejudice against similar prophylactics for themselves.[59] In 1906, the French bacteriologist Arnold Netter published a full review and description of all the different techniques of antityphoid vaccination, and concluded that both the German and English methods might confidently be recommended in all cases where it appeared necessary to resort to antityphoid inoculation.[60] By 1910, even the *BMJ*'s special correspondent in Paris admitted that "antityphoid vaccination would seem to have entered upon the practical stage."[61] In 1911, antityphoid inoculation was made compulsory for all officers and men under the age of forty-five in the U.S. Army; the U.S. Navy followed suit in 1912.[62] In 1912 also, the vaccine was made available to French army troops, and in that year more than 62,000 men volunteered for the operation; early in 1914, the French Senate passed a bill making it compulsory in the French army.[63] At this time it was described as "incontestably effective," and it was beginning to take a prime place in the struggle against typhoid fever.[64]

Leishman's work also bore fruit in the British Army. As early as 1906, inoculation was gradually reintroduced into the British Army in India, following an outbreak of typhoid among the 17th Lancers stationed at Meerut, where the immunity of troops already protected by Leishman's improved vaccine carried "all the force of a laboratory experiment."[65] By 1909, when the Army Council was finally convinced of the utility and safety of Leishman's modified vaccine and agreed to its general employment, although always on a voluntary basis, nearly all troops stationed in India were already immunized. For all India, enteric admissions per thousand men fell from 8.9 in 1909 to 2.3 by 1913, while case mortality fell from 1.58 to 0.25 per thousand men.[66] While the declining incidence

59. "German Experience" (n. 58). For domestic German attitudes to smallpox vaccination, see Claudia Huercamp, "The History of Smallpox Vaccination in Germany," *J. Contemp. Hist.,* 1985, *20:* 617–35.

60. Netter, "Les inoculations préventives" (n. 35), p. 1034.

61. Special Correspondent, "Paris: Antityphoid Vaccine," *Brit. Med. J.,* 1910, *2:* 812–13, quotation on p. 813.

62. Untitled note, *Brit. Med. J.,* 1911, *2:* 699; untitled note, ibid., 1912, *1:* 229. For the further history of the U.S. program, see Frederick Parker Gay, *Typhoid Fever Considered as a Problem of Scientific Medicine* (New York: Macmillan, 1918).

63. "Antityphoid Vaccination in France," *Brit. Med. J.,* 1913, *1:* 1002; 1914, *1:* 57.

64. A. Rodet, "Lutte contre la fièvre typhoïde par les moyens spécifiques," *J. State Med.,* 1914, *22:* 79–85, on p. 79.

65. W. S. Harrison, "Memorandum Regarding Antityphoid Inoculation," *J. Roy. Army Med. Corps,* 1906, *7:* 63–65, on p. 63.

66. Harvey, "Bacillus Typhosus" (n. 30), p. 52.

of the disease might partly be attributed to sanitary measures, the reductions in case fatality could only be attributed to the vaccine. Although a number of army sanitary specialists emphasized the importance of a general sanitary approach, most military and medical authorities were convinced of the vaccine's usefulness, and were convinced again by the experience of the Great War.[67] Nonetheless, its use before 1914 depended very much on local circumstances: unlike their Indian colleagues, troops on home service in Britain were not immunized.[68]

Meanwhile, antityphoid inoculation began to infiltrate British civilian practice. Already in 1899, it had been adopted for nursing staff by the Monsall Hospital, Manchester, and by 1914 several other hospitals had followed suit.[69] In the tropical context, it was seen to be especially important. The Friends Foreign Mission was immunizing both male and female missionaries by 1908, and missionary society medical officers were urging inoculation on their membership from that year.[70] By 1912, inoculation had been made compulsory for members of the Indian Civil Service and other branches of the Indian public services, while many commercial firms, sending young men into the tropics as tea growers, rubber planters, and so forth ensured that they were inoculated before going abroad.[71] Middle-class individuals and institutions thus appear to have generally accepted the procedure by circa 1910; but prejudice against immunizations in general lingered among ordinary people. In October 1913, the Newcastle public health authorities thought to use inoculation to stem a carrier-epidemic of typhoid in their city. "Unfortunately," the assistant medical officer reported, "the word 'vaccination' was used to convey the idea that similar protection against enteric fever would be afforded as against smallpox; but as soon as this was mentioned one met with an unconditional refusal to have anything at all to do with it, and no amount of explanation would convince the people that it would not affect their working powers."[72] Determined to make the best of it, the health authorities adopted the strategy already in place for small-

67. Leishman, "Enteric Fevers" (n. 50), pp. 2, 8–22.

68. Harvey, "Bacillus Typhosus" (n. 30), p. 51.

69. R. W. Marsden, "Inoculation with Typhoid Vaccine as a Preventive of Typhoid Fever," *Brit. Med. J.,* 1900, *1:* 1017–18; D. Stewart, "Vaccine Treatment of Enteric Fever," *Med. Officer,* 1911, *6:* 232; "Anti-typhoid Inoculation," ibid., 1915, *14:* 164.

70. R. Hingston Fox, "The Present Position of Anti-typhoid Inoculation and the Desirability of Its Use for Missionaries and Others Proceeding to Tropical Climates," *J. Trop. Med. Hyg.,* 1908, *11:* 201–5; idem, "Recent Progress in Antityphoid Inoculation," ibid., 1910, *13:* 367–70.

71. "The Protection Afforded by Typhoid Vaccine" (editorial), *J. Trop. Med. Hyg.,* 1912, *15:* 151–52.

72. S. J. Clegg, "Notes on an Outbreak of Enteric Fever in Newcastle-upon-Tyne, August–October, 1913," *Pub. Health,* 1913–14, *27:* 235–40, quotation on p. 239.

pox vaccination: they offered financial compensation for any loss of work due to the operation.

This episode in Newcastle revealed several elements that were to be relevant a year later: it was a carrier outbreak; the health authorities' acceptance of inoculation reflected its increasing acceptance among the middle class; and the working peoples' resistance was based not on any philosophical revulsion from the principle of vaccination, or on any notions of natural health, but on a desire to safeguard their earning capacity. At the outbreak of war in August 1914, these and other elements fused into an escalating controversy.

Antityphoid Inoculation, 1914

In the early autumn of 1914, therefore, powerful figures in the British medical profession began agitating for the compulsory inoculation of British troops against typhoid. Vaccination against smallpox had long been compulsory for all troops, and they could see only good reasons why inoculation against typhoid should also become so.[73] The government, however, resisted, and medical pressure for compulsory inoculation continued throughout the autumn of 1914, arousing vigorous opposition from the antivaccinationist movement. As with the differential military inoculation policy in the prewar period, it is likely that this reluctance was contingent on circumstance: recruiting a huge volunteer army in haste—750,000 men in September alone—and with manpower demands rising rapidly and inexorably, neither military nor political authorities wished to set up time-consuming political confrontations over the citizen-soldier's rights as against his duties. As the *Times* argued, "it might do more harm than good to create a friction which can be avoided to reduce a problematical risk."[74] Instead, they opted for a subtler form of argument. In the third week of September, Lord Kitchener, who was a long-standing supporter of antityphoid immunization, declared that men who did not accept inoculation would not be sent abroad. The measure was not popular with libertarian protesters, but the extraordinary desire to get to the front that characterized this period of the war had its effect.[75]

73. See above, nn. 1–3; "The Protective Inoculation of Troops," *Brit. Med. J.,* 1914, *2:* 483–84 (letter from Sir Clifford Allbut and other prominent medical men in favor of the protective inoculation of troops).

74. Cited in *New Age,* 1914, *15:* 541.

75. Leonard Colebrooke, "Diary," 24 September 1914, Contemporary Medical Archives Centre, Wellcome Library for the History of Medicine, London, PP COL, box 1, A.3. For

Throughout the autumn of 1914, however, the controversy over compulsory inoculation was bitter. The medical men argued that antityphoid inoculation was proven effective and that on epidemiologic and bacteriologic grounds it was essential that all fighting men be protected against typhoid. In the first place, the conditions of war—the return to barbarism—meant the complete dismantling of the hygienic structures that had so reduced the incidence of typhoid in the civilized world: clean water supplies and the effective disposal of excreta were virtually impossible on the battlefield. Secondly, they pointed to the problem of the typhoid carrier. It was inevitable, they argued, that numbers of carriers would be included among the fighting men, and in the conditions of war it was only too likely that their presence would initiate typhoid outbreaks; besides the difficulty with basic hygiene services, it was too much to expect that every mouthful of food should be disinfected before the men ate.[76] Here was the unspoken crisis for preventive medicine and for medical research. Epidemiology and bacteriology had finally unraveled the mysteries of typhoid transmission, and bacteriologic research had provided a remedy in inoculation. If, in conditions of the utmost risk, and at the expense of Britain's fighting strength, the authorities refused to endorse recommendations based on the latest medical research, what authority remained to modern medicine? Where was the justification for its endeavors?

As it was, the government's refusal of compulsion left the Royal Army Medical Corps with the additional stress of persuading men to accept inoculation, as well as the task of administering the inoculation program.[77] Moreover, the absence of compulsion laid their efforts open to seige by the antivaccinationists, who seized the opportunity of deluging recruiting stations, training camps, and barracks with literature denouncing inoculation as hurtful and dangerous. In these endeavors they were considerably assisted by the *Medical Times,* an idiosyncratic popular publication for general practitioners, which viewed bacteriology with disapprobation, and regarded Robert Koch, for example, as "an extremely over-rated scientist."[78] Although it later claimed, when challenged by the

---

the protest reaction, see Charles Brookfarmer, "Diary of a Recruit," *New Age,* 1914, *15:* 510, 635; J. L. Murray, "Vaccination for Volunteers" (letter), ibid., pp. 533–34.

76. "Antityphoid Inoculation" (editorial), *Brit. Med. J.,* 1914, *2:* 1072–74.

77. The British government never retracted its refusal to permit compulsory inoculation against typhoid. Claims that compulsory inoculation was introduced in 1914 are simply wrong—as, for example, in C. W. Lebaron and D. W. Taylor, "Typhoid Fever," in *The Cambridge World History of Human Disease,* ed. Kenneth F. Kiple (Cambridge: Cambridge University Press, 1993), p. 1075.

78."Our Weekly Survey," *Med. Times,* 1914, *42:* 756.

respectable medical press, to have acted in unwitting support of the antivaccination campaigners, the *Medical Times* ran a series of editorials during the autumn that were eagerly incorporated into the antivaccinationists' propaganda.[79]

Unlike its contemporaries, the *Medical Times* was sustained by a very rosy vision of the conditions of war in France. Where Almroth Wright stressed that the Franco-German frontier was "thickly sown" with typhoid,[80] the *Medical Times* questioned whether the fear of typhoid in France was not overestimated? It observed confidently in early September that "there is not much to be feared from typhoid infection, apart from inoculation, if proper attention is given to hygiene, and the provision of an absolutely pure and abundant supply of water."[81] A few weeks later, it noted that there should be no difficulty with regard to hygiene in the parts of France where the troops were currently operating, since they were constantly on the move, and were in a land "flowing with milk and honey, not to mention rivers of grape juice, which is, if rationally used, Nature's own antityphoid serum."[82] Beyond its naive preventive faith, this remark betrays the profound ignorance of conditions in France that existed at home.[83] Moreover, the paper did not hesitate directly to disparage the military inoculation effort:

> It may be that a very much improved kind of serum has been manipulated, and put on the market since the Boer War, but, from the reports which reached us at that time, we came to the conclusion that the supposed benefit of anti-typhoid serum was a delusion.[84]

79. "Opposition to Anti-Typhoid Inoculation," *Med. Officer,* 1914, *12:* 212.

80. Wright, "Inoculation of Troops" (n. 3). This view with regard to rural France in general is supported by Arnold Netter in his article "Les inoculations préventives" (n. 35), p. 927. The basis of Wright's assertions probably lay in the accounts of the campaign mounted to eradicate typhoid and typhoid carriers in southwest Germany in 1906 and 1907, which focused on an area that included the cities of Trier, Saarbrucken, St. Johann, Metz, and Strasbourg: see D. Klinger, "Epidemiological Observations on the Antityphoid Campaign in the South-West of the German Empire," trans. Captain J. A. Balk, *J. Roy. Army Med. Corps,* 1910, *14:* 90–101.

81. "Survey Notes," *Med. Times,* 1914, *42:* 645.

82. "Our Weekly Survey," *Med. Times,* 1914, *42:* 681.

83. Medical preparations for the war were incomplete when the British Expeditionary Force arrived in France in August 1914, and problems of sanitation in camps, billets, and along lines of communication continued before the introduction of effective sanitary sections in November: see Major-General William G. MacPherson, *Medical Services: General History,* 4 vols. (London: HMSO, 1921–1924), 2: 184–85; MacPherson, Horrocks, and Beveridge, *Medical Services: Hygiene of the War* (n. 51), 1: 1–6.

84. "Our Weekly Survey" (n. 82). See also, for the extreme antivaccinationist position, "Typhoid Fever: The Truth about Inoculation," *Vacc. Inq. Health Rev.,* 1914, *36:* 240–43.

In the autumn of 1914, therefore, battle was joined between the medical proponents of antityphoid inoculation and the antivaccinationists over the hearts and minds of Britain's fighting men—who, representatives of the common man, of the general public will, were required either to demonstrate their faith in the new immunology, or to reject it outright. The official history of the war naturally does not document this episode. The BEF had arrived in France with only 25–30 percent strength immunized against typhoid, after a one-shot immunization campaign; Leishman was later to claim that it was "not long" before that number rose to 90–98 percent. However, he admitted that military conditions early in the war made any attempt at increasing the percentage of inoculated impossible: it was not until after trench warfare had become established on the Aisne, and the army was able to reconstruct and incorporate its reinforcements, that such a campaign became possible.[85] At this point, in early October, while antivaccinationist agitation was still running high at home, typhoid made its appearance among allied troops. Although British casualties (388) were small compared with the French (45,450), anxiety was sharp among medical staff.[86] A military memorandum written at about this time expressed "serious anxiety and apprehension" over the numbers of men arriving from England unprotected against typhoid, and requested that the government "seriously consider combatting with the fullest force of rebutting evidence at their disposal the propaganda of the promotors of the anti-vaccination campaign."[87]

By December, the military medical authorities were seriously worried by the falling numbers of men coming forward for inoculation. At a high-level discussion at the Royal Sanitary Institute, on 8 December, William Leishman, who had primary responsibility for encouraging inoculation among the troops, gave vent to his rage and despair. He told the assembled company that to send uninoculated men to the front was "little

85. Leishman, "Enteric Fevers" (n. 50), p. 3; Major-General William Grant MacPherson, Major-General Sir W. B. Leishman, and Col. S. L. Cummins, *Medical Services: Pathology* (London: HMSO, 1923), p. 250.

86. Figures are taken from Joseph Franklin Siler, "Communicable and Other Diseases," in *The Medical Department of the United States Army in the World War,* ed. Merritte Webber Ireland, 12 vols. (Washington, D.C.: Government Printing Office, 1921–1929), vol. 9, chap. 1, table 7, p. 38.

87. Carbon copy of undated memorandum among the papers of Sir Charles Burchteal (1866–1932), Assistant Director General of Medical Services to the British Armies in France: Contemporary Medical Archives Centre, Wellcome Trust Library: RAMC 446/25. The wording of the memorandum—with references to civilians and enemy troops residing in the vicinity of the area held by the British Army, to the benefits of inoculation "during recent years in India," and to the danger of typhoid being particularly acute with the arrival of spring—suggests a date in the autumn of 1914.

short of murder": he spoke strongly on the subject, it was reported, "because he felt strongly about it and if they (his audience) knew the labour and anxiety the uninoculated men caused the RAMC, they would sympathise with them." In Leishman's view also, the explanation for the falling numbers of inoculations clearly lay in "the propaganda started by the anti-inoculation people, and . . . he found it difficult to speak with restraint. He could commit atrocities compared with which the German atrocities would be nothing if he could get these anti-inoculation people to himself."[88]

In January 1915, matters reached a climax. The Research Defence Society issued a popular leaflet arguing the benefits of inoculation, and Sir William Osler appealed in the *Times* to soldiers not to allow themselves to be misled by "the misguided cranks who are playing into the enemy's hands."[89] Here, at last, in the accusation of unpatriotic behavior, the medical profession had found an effective weapon against the antivaccinationists—and they fielded it with alacrity. "It is difficult to conceive of a more unpatriotic movement," observed the *British Medical Journal*.[90] The *Medical Officer* was more forceful: "We cannot find words strong enough to condemn the opponents of inoculation. They deserve only to be classed with persons who would advocate the arming of our troops with ineffective guns or ammunition."[91] The editor of the "Supplement for Public Vaccinators" was, predictably, even more outspoken: "There is no word of patriotism in the [*Vaccination*] *Inquirer,* no thought of national welfare. All that is found there is a perverse clinging to exploded eccentriticies"; the medical profession, on the other hand, "are for protecting the defenders of the Empire. They believe in vaccination and inoculation and having regard to the interests of the Empire alone, they say emphatically—IT IS WORTH IT!"[92]

Finally, a leaflet on the benefits of inoculation was issued to all soldiers, endorsed with a printed message from Lord Kitchener: "I commend to the careful attention of every soldier the following statement, to which, in the interests of the health of the army, I attach great importance"; the signatures of the presidents of the Royal Colleges of Surgeons

88. (Debate), "Protective Inoculation against Typhoid Fever," *Med. Officer,* 1914, *12:* 290. Leishman's outburst was toned down in the transcript of the meeting published by the Royal Sanitary Institute: *J. Roy. Sanit. Inst.,* 1915, *36:* 17.

89. *Times,* 15 January 1915, p. 9, col. d.

90. "The Antivivisectionists and Inoculation against Typhoid" (editorial), *Brit. Med. J.,* 1915, *1:* 171.

91. "The Prevention of Typhoid," *Med. Officer,* 1915, *13:* 79.

92. "Public Vaccination Service Notes," edited by Arthur Drury, p. 5, insert into *Med. Officer,* 20 February 1915, *13.*

and Physicians of England, Scotland, and Ireland, and of Sir Frederick Treves, Serjeant-Surgeon to the King, further graced the leaflet.[93] The Royal Army Medical Corps, meanwhile, intensified its educational efforts, while pressure exerted by officers, and by ordinary soldiers themselves on their uninoculated comrades, proved perhaps the most significant factor in raising inoculation levels.[94] Following these measures, the immediate heat went out of the antityphoid agitation. The antivivisectionist paper the *Zoophilist,* for example, hitherto a doughty supporter of that position, publicly withdrew from the fray claiming rather belatedly to be a nonpolitical organ.[95] Although its sister paper, the *Abolitionist,* continued the campaign, by January 1916 the antivaccinationists were complaining of a public conspiracy of suppression against their attempts at publicity.[96]

This "inoculation crisis" in the winter of 1914–15 may in some sense have been a hysterical reaction, a response to and focus for more general anxieties about the progress of the war—fueled by the November realization that the war would not be short, by the novel phenomenon of trench warfare, by the German shelling of British east-coast ports in mid-December, by the arrival in England of some 100,000 Belgian refugees with shocking stories of German atrocities, by the pressure on military medical authorities generated by the continuing vast numbers of men coming forward as volunteers (125,000 a month until June 1915). The medical discovery of patriotism may have occurred as the direct result of the recognition that the war would take longer, and be more bitter, than anyone had expected. Indeed, it seems that the inoculation situation may never have been as bad as Leishman thought in December—according to one authoritative account, 80 percent of British troops in France had been inoculated by the end of 1914.[97]

During 1915 further headway was made, with an estimated 90 percent of troops inoculated by the end of the year. At this time, British troops were immunized using typhoid-specific vaccine (T.V.); it was only from February 1916 that T.A.B., protective also against paratyphoid A and B,

93. "The Army and Anti-Typhoid Inoculation," *Med. Officer,* 1915, *13:* 82.

94. Leishman, "Enteric Fevers" (n. 50), p. 4; Harrison, "Medicine and the Management of Modern Warfare" (n. 5), p. 397.

95. *Zoophilist,* 1914–15, *14:* 84, 100–101, 106–7, 117, 126–27, 142.

96. Notes of the Month: "1916," *Vacc. Inq. Health Rev.,* 1916, *38:* 1–2. The *Abolitionist* was the organ of the British Union Against Vivisection. For its campaign against typhoid inoculation see Mark Paul, "Antivivisection and the Inoculation Scandal of the Great War, 1914–1918" (B.Sc. diss., University College London, 1993), in Wellcome Library for the History of Medicine, London.

97. Harvey, "Bacillus Typhosus" (n. 30), p. 52.

was routinely given.[98] While the incidence of enteric fever in the BEF held roughly steady in 1915 and 1916, it fell sharply in 1917, despite a doubling in size of the military strength in France. Moreover, case-fatality rates fell (unevenly) from 12 percent in 1914 to 6 percent in 1918.[99] Over the entire course of the war, the incidence and fatality of enteric among British troops was considerably lower than among both their French and German counterparts, whose immunization campaigns began later and were probably less complete: 7,000 British cases with a fatality rate of 3.8 percent, as against 125,000 and 12.2 among the French, and 112,400 and 10.2 among the Germans.[100]

The British immunization effort represented an immense and successful organizational effort on the part of the Royal Army Medical Corps, not only in the development of a viable vaccine and its administration to the troops, but in the maintenance of its production in the circumstances of war. Between August 1914 and 31 July 1919, 25,068,271 cc of typhoid vaccine (T.V. and T.A.B.) were issued, largely supplied by the RAMC's own laboratories.[101] The success of the inoculation program is perhaps best measured against the BEF's experience of bacillary dysentery, which totaled 12,211 cases between 1916 and 1918 alone. As Lieutenant-Colonel Harvey of the RAMC noted, monthly sick rates revealed that periods of "activity" when sanitary arrangements were disrupted were accompanied by sharp increases in bowel complaints: "it must be obvious that but for this special protection each of these periods of activity would have been followed by an outbreak of enteric fever."[102] In these terms, Wright's pioneering experiments, and the ten further years of research that followed into the production and administration of antityphoid vaccines by the RAMC, were amply justified.

98. The date 1915 that is often given for the introduction of T.A.B. vaccine is incorrect, resulting from a misprint in the text of the official history: Sir W. G. MacPherson, Sir W. P. Herringham, Col. T. R. Elliott, and Lieut.-Col. A. Balfour, *History of the Great War: Medical Services: Diseases of the War* (London: HMSO, 1922), 1: 56. This is clear from the table on the facing page, and is substantiated elsewhere: see Leishman, "Enteric Fevers" (n. 50), p. 16; MacPherson, Leishman, and Cummins, *Medical Services: Pathology* (n. 85), p. 256; Harvey, "Bacillus Typhosus" (n. 30), p. 53.

99. Harvey, "Bacillus Typhosus" (n. 30), p. 56; Siler, "Communicable and Other Diseases" (n. 86), table 7, pp. 38–39.

100. Siler, "Communicable and Other Diseases" (n. 86), table 7, p. 39. Siler also gives an account of immunization levels among the different fighting forces: see pp. 39–42.

101. MacPherson, Leishman, and Cummins, *Medical Services: Pathology* (n. 85), p. 30.

102. Harvey, "Bacillus Typhosus" (n. 30), p. 56.

Immunization and Individual Liberty

In this particular battle to extend the benefits of the new immunology, its medical advocates successfully routed the antivaccinationists. By the end of the war, the great majority of British troops had been voluntarily and fully inoculated against typhoid.[103] Yet in the longer run, this achievement remained consistent with the liberal compromise on medical prophylaxis. Antityphoid inoculation was never made compulsory for the British Army during the Great War, because medical and military demands never outweighed political expediency. The citizen-soldiers of the Great War made their own choice of inoculation, of service at home or abroad; they retained the right to dispose of their own bodies. Despite high-level medical pressure, the issue of the personal liberty of the subject had acquired too much weight by 1914 for it to be successfully challenged by authoritative interest groups.

Even the physicians gathered at the Royal Sanitary Institute on 8 December 1914 recognized and accepted this fact of English political life. Despite Leishman's frustration, despite near unanimity on the desirability of inoculation for all troops, the meeting determined not to recommend compulsory inoculation because, in the words of the secretary, Edmund Parkes, "this [is] a free country and love[s] its freedom, and would rather muddle through war in eighteenth months than finish it in six months with conscription and other measures."[104] It was a heartfelt if muddled echo of the issue that had been put more elegantly and succinctly by the *New Age* in October 1914. Significantly, the *New Age,* an influential literary and political journal, was edited by A. R. Orage, who with G. D. H. Cole was one of the founders and leaders of the British Guild of Socialism movement. Compulsory inoculation, that journal argued, would privilege medicine above the state in respect of a volunteer and professional army, and in a telling passage it articulated the political nuances of the compulsion issue:

103. The military authorities put the number of men inoculated at over 90 percent: MacPherson et al., *History . . . Diseases of the War* (n. 98), p. 56. See also the observations of volunteer military medical officers, such as E. W. Goodall of the Metropolitan Asylums Board's Eastern Fever Hospital, and G. S. Buchanan, medical inspector for the Local Government Board: E. W. Goodall, "Enteric Fever in Flanders, 1914 and 1915," *Proc. Roy. Soc. Med.,* Section of Epidemiology and State Medicine, 1919, vol. 12, pt. 1, sect. 2, pp. 15–34, especially p. 17; George S. Buchanan, "Epidemics of the Eastern Campaigns," ibid., 1918, vol. 11, pt. 1, sect. 2, pp. 1–30, especially p. 10.

104. (Debate), "Anti-typhoid Inoculation," *Med. Officer,* 1914, *12:* 290. Again, this passage was omitted from the official account, and replaced by something more anodyne.

> Blind obedience to the orders of superior officers, instead of intelligent co-operation with them, would be the psychological consequence of the extension of the principles of compulsion. The division of labour has its dangers; but the monopoly of intelligence by the superior classes, which is implied by the principle of compulsion, would be a national calamity if it could be made. The soldier has the native human right to decide, according to his intelligence, what shall be done with his body . . . no man has the right to bully him into submission to what is, at best, a contested system of prophylaxis.[105]

This was an interpretation with resonances well beyond socialism, in the revised liberalism of influential idealists like Lord Haldane, and in the extraordinary spirit of class collaboration that manifested itself in the early months of the war.[106] Thus far had the English liberal tradition traveled from the heyday of the Compulsory Vaccination Acts in the 1860s. By 1914, the delicate processes of political negotiation that accompanied the establishing of the modern democratic state had advanced to a point where the educated middle classes could assume no right of patronage over the working man.

Once the Great War had passed, the political defeats over compulsory smallpox and antityphoid immunization continued to reverberate through the policies and practices of the British public health service. Where other Western countries adopted immunization against diphtheria in the 1920s, British medical officers clung to a policy of isolation and disinfection; in the 1930s they were reluctant to take up the BCG vaccine against tuberculosis; in the mid-1950s, the introduction of Salk's poliomyelitis vaccine was delayed following the Cutter incident, while the preventive establishment convinced itself—and the public—that the vaccine was harmless.[107] England's Ministry of Health remained content to leave immunization programs to local authority initiative: as one of its spokesmen remarked, on the subject of giving more of a lead in the adoption of new methods based on new knowledge, "a Government department

105. "Compulsion," *New Age,* 1914, *15:* 541.

106. Andrew Vincent and Raymond Plant, *Philosophy, Politics and Citizenship: The Life and Thought of the British Idealists* (Oxford: Blackwell, 1984), pp. 1–4; Roland N. Stromberg, *Redemption by War: The Intellectuals and 1914* (Lawrence: Regent's Press of Kansas, 1982), pp. 42–43.

107. See Jane Lewis, "The Prevention of Diphtheria in Canada and Britain, 1914–1945," *J. Soc. Hist.,* 1986, *20:* 163–76; F. B. Smith, *The Retreat of Tuberculosis 1850–1950* (London: Croom Helm, 1988), pp. 194–203; Anne Hardy, "Poliomyelitis and the Neurologists: The View from England, 1896–1966," *Bull. Hist. Med.,* 1997, *71:* 249–272, especially p. 270 n. 83; Linda Bryder, "'We Shall Not Find Salvation in Inoculation': BCG Vaccination in Scandinavia, Britain, and the USA, 1921–60," *Soc. Sci. Med.,* 1999, *49* (9): 1157–67.

cannot usefully take special action in advance of public opinion."[108] And public opinion remained suspicious. Local authority officers had to contend with fathers who remembered the horrors of army antityphoid immunization well enough to reject immunizations for their own children;[109] while even the medical community trailed the shadow of antivaccinationist agitation, and perhaps of Wright's early experiments. As the *BMJ* noted in 1929, "Progress marches slowly in England, for medical investigators have a full—the eager researcher may be inclined to say 'overfull'—sense of responsibility, and try the new thing only with the greatest caution."[110] When Austin Bradford Hill first used the randomized clinical trial—the Medical Research Council trial of whooping cough vaccine in 1945–46—it was to obtain a statistically sound estimation of the value of the vaccine. Modern statistical methods of research validation were as important in the preventive field as in the curative; but all immunizations remain voluntary in Britain to this day.[111]

The 1914 debates over antityphoid inoculation showed British preventive medicine very clearly the limits of its political influence and powers. In this sense, the antivaccinationists demonstrated that their argument rested on the fundamental political core of the modernizing British democratic state: on the right of the individual to determine matters pertaining to his person and his individuality. In the final event, barbarism—for the British—did not mean any falling off in accepted hygienic standards, but, essentially, the deprivation of individual liberty. Conscription, when it came, was justified by the extreme need of the state; no such justification was extended to preventive medicine in the military context, despite the vast expense and labor that sickness among fighting men was known to create. In this respect, at least, wartime policy remained consistent with the painfully achieved political and medical compromises of peace.[112]

108. S. Monckton Copeman, "The Point of View of the Government Department," contribution to symposium "The Education of the Public in Regard to Modern Methods of Disease Prevention," *Pub. Health,* 1926–27, *40:* 239–241, quotation on p. 240.

109. C. W. Hutt, "The Point of View of the Medical Officer of Health," ibid., pp. 242–46, see especially p. 245.

110. "Toxoid and Toxoid-antitoxin in Diphtheria Immunisation," *Brit. Med. J.,* 1929, *2:* 22–23, quotation on p. 23.

111. Austin Bradford Hill, "Memoirs," London School of Hygiene and Tropical Medicine Archives, p. 15; "The Prevention of Whooping Cough by Vaccination," *Brit. Med. J.,* 1951, *1:* 1463–70. For the prewar problems with whooping cough vaccines, see A. D. Gardner, "Prophylaxis, Treatment and Bacteriology of Pertussis," *Proc. Roy. Soc. Med.,* 1935–36, *29* (2): 1273–82.

112. MacPherson et al., *History . . . Diseases of the War* (n. 98), 1: 1–3.