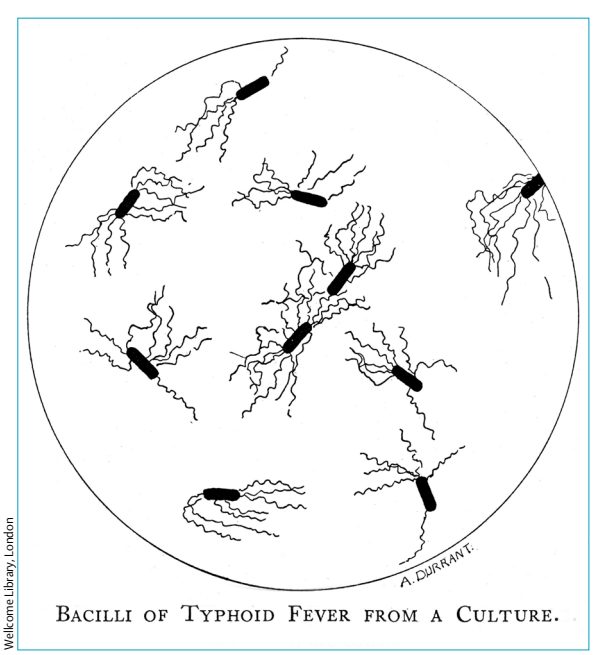
# Case histories
## Typhoid fever

For generations of physicians, typhoid was one of a broad class of fevers linked to putrid air, best treated with bed rest, strengthening foods, and traditional standbys such as laudanum and bloodletting. By the end of the 19th century this view had been swept away: epidemiologists and bacteriologists disentangled typhoid from typhus and other fevers, and reframed it in terms of the presence or absence of a microorganism. But 20th-century public health campaigns discovered the limitations of a strictly scientific approach, and the tensions between treating an individual patient and addressing infectious diseases at the level of cities or nations.

In 1829 the French pathologist Pierre Louis, deploying the anatomo-localist thinking of Paris medicine, identified distinctive lesions in the abdominal lymph nodes of patients who had succumbed to a severe form of gastric fever. Louis named it typhoid fever, from the Greek *typhus*, "smoky", reflecting the delirium into which patients fell. By the 1860s physicians in Europe and America accepted that typhoid fever and typhus were distinct, the former characterised in life by rose-coloured spots on the skin and diarrhoea. In *Das Verhalten der Eigenwärme in Krankheit* (1868), the German physician Carl Wunderlich used a piece of new technology—the clinical thermometer—to visualise the two diseases, and showed that the temperature charts of typhoid victims were quite different from those of patients suffering typhus.

Though historians have focused on cholera and 19th-century sanitation reform, the historian Jacob Steere-Williams argues that "by the 1870s, typhoid was considered by most public health authorities the pre-eminent filth disease". In 1847, physician and epidemiologist William Budd concluded that an outbreak of typhoid in Clifton, outside Bristol in the UK, had been spread by contaminated water: "the sewer", he argued, was "the direct continuation of the diseased intestine". In his *Typhoid Fever* (1873), Budd recommended strict disinfection of privies, drains, bed linen, and hands in all cases of the disease. Steere-Williams has shown that contaminated milk also became a source of epidemiological concern, especially when unscrupulous dairies had watered it down, and popular anxieties over the disease flourished after Prince Albert's death in 1861 was ascribed to typhoid.



Bacilli of Typhoid Fever from a Culture.

Wellcome Library, London

From a bacteriological perspective, the puzzle of typhoid was solved by the end of the 19th century. In 1880 the German pathologist Karl Eberth had identified a bacterium (now known as *Salmonella enterica*), isolated and cultured 4 years later by the bacteriologist Georg Gaffky, and in 1896 their British colleague Almroth Wright developed a vaccine. But in the 1898 Spanish–American War, when more than 20 000 US troops died from typhoid, and in Robert Koch's study of a 1901 epidemic in the Ruhr valley, established modes of transmission could not explain the proliferation of cases. Could some individuals spread the disease without showing any symptoms?

The most notorious instance of a "healthy carrier" came in 1906, when the civil engineer George Soper investigated an outbreak of typhoid in Long Island. Having excluded all other possibilities of transmission, Soper concluded that the household's cook, Mary Mallon, must have transmitted the disease without succumbing to it. He tracked Mallon down and detained her, with the aid of three police officers and Sara Josephine Baker, the New York City health officer. Mallon was confined until 1910, and arrested again in 1915 after an outbreak in a maternity hospital was traced to her kitchen. She was kept in custody until her death in 1938. In public health campaigns "Typhoid Mary" became a caricature—Baker called her "a destroying angel" who "never listened to reason"—but the idea of confining healthy carriers was swiftly abandoned on practical and political grounds.

The introduction of antibiotics in the mid-1940s provided a more effective response to this problem, but even nations with resilient systems of public health and sanitation have suffered occasional epidemics. In 21st-century global health campaigns, especially in southeast Asia where the disease burden remains high, we are returning to the central dilemma of late-Victorian public health: should microscopic parasites or their human hosts be put at the heart of public health?

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For more on **Case histories** see **Comment** *Lancet* 2016; **387:** 211, **Perspectives** *Lancet* 2016; **387:** 217, 737, 1265, 1711, 2082, 2495, and *Lancet* 2016; **388:** 228, 649, 1148, e10

**Further reading**

Hardy A. Scientific strategy and ad hoc response: the problem of typhoid in America and England, c. 1910–50. *J Hist Med Allied Sci* 2014; **69:** 3–37

Smith DF, Diack L, Pennington H, Russell EM. Food poisoning, policy and politics: corned beef and typhoid in Britain in the 1960s. Woodbridge: Boydell Press, 2005

Steere-Williams J. The perfect food and the filth disease: milk-borne typhoid and epidemiological practice in late Victorian Britain. *J Hist Med Allied Sci* 2010; **65:** 514–45