



Medicine for Managers

Dr Paul Lambden BSc MB BS BDS FDSRCS MRCS LRCP DRCOG MHSM

The Great Stench

The summer of 1858 was long and hot. The River Thames was grossly polluted because it was used as the convenient repository, not only for household and industrial waste but also for human sewage. The extreme heat reduced the river to a huge source of bubbling, stinking filth. Not only was the smell grossly unpleasant but of greater concern was the serious threat to health from what amounted to an open bacterial culture medium.

From the time of the Tudor kings, sewage was largely managed by an 'out of sight, out of mind' policy. There were **night soil** collectors who went round the City of London cleaning out people's privies. This practice continued with the night soil collectors transporting their loads from the city to rural areas where they were used to fertilise farmland, not only in London but in areas such as northern mining villages, up to and beyond the first world war.

By the nineteenth century, London was a bustling metropolis but sewage disposal was primitive and effluent was often carried in open channels or in wooden pipes. Water supplies to homes had improved and the population was enthusiastically taking up the use of flushing toilets. All the resulting sewage ended up in the Thames.

John Martin (1789-1854), a prolific artist, developed a keen interest in the resolution of

London's sewage problems. A friend of Michael Faraday and Charles Darwin, he worked on the problem and wrote and published proposals in the late 1820s.

He created a visionary plan in 1834 for a sewerage system along the Embankment. The plans included railway lines and thoroughfares. Unfortunately it was too visionary and was, as it turned out, twenty-five years ahead of its time.



The picture shows the scientist Michael Faraday giving his business card to Old Father Thames. Plans were drawn up in the 1820s to manage the sewage problem

Inevitably, the gross pollution resulted in an outbreak of cholera in 1832. It killed over 6,500 people in London and 20,000

nationally.

Typhoid and dysentery cases were also increasing. A second major outbreak in 1848 killed 15,000 or more people in London and

over 53,000 across England and Wales. a third outbreak in 1853/54 killed an estimated 11,000 in London

In 1848, during the second outbreak, ***The Times*** received a letter written from the London slums:

"We live in muck and filth. We ain't got no privez, no dustbins, no water s'plies and no drain or suer in the whole place. If the Colera comes, Lord help us".

Similar problems existed around the British Isles, where sewage was disposed of in similar ways. A report in 1842 about the Sanitary state of Glasgow noted that 50% of children would not reach their fifth birthday and it was:

"... possibly the filthiest and unhealthiest of all British towns".

The incidence of cholera resulted in considerable discussion of the cause. The most popular theory was the ***miasma theory*** which espoused the principle that the disease was spread on the air by a mysterious evil-smelling miasma, somehow associated with filth and rotting corpses.

The physician, John Snow, did not accept the miasma theory and advocated the ***germ theory*** that stated that the cause of cholera was an, as yet unidentified, germ, transmitted from person to person by drinking infected water contaminated with faecal material.

His theory received much criticism and opprobrium. His germ theory would not be supported by more concrete evidence until the work of Pasteur in 1861 and Koch in 1883.

However he held to his theory of contaminated water for some time, a view which he first postulated in 1849. In the epidemic which

occurred in the following five years, he carefully mapped the location of each case of cholera in particular areas and found the cholera was much less common in areas where water was from cleaner sources and was more carefully filtered.

In August 1854, an outbreak occurred in Broad Street in East London. Over three days 130 people died and in total 615 people died.

The source of water used by those patients afflicted with the disease was traced to a public water pump in Broad Street (now Broadwick Street).

The pattern of the disease was sufficiently persuasive to convince the St James parish authorities to disable the pump. The number of deaths immediately dropped dramatically.

There was one anomaly. None of the Broad Street brewery workers contracted cholera. They were given a daily allowance of beer and did not drink the Broad Street water.

During the fermenting process the unfermented beer (wort) is boiled so that hops can be added. Boiling killed the cholera bacteria.

Snow went on to show that the local water company (Southwark and Vauxhall Waterworks) was taking water from the sewage-polluted Thames and delivering it to homes. His part in this discovery was crucial to the development of public health and is regarded as the founding event in the study of epidemiology.

During the first half of the nineteenth century the Government was not mobilised to do anything significant. Indeed the Parliamentary response to the early days of the stink from the adjacent River was simply to douse the curtains in the Houses of Parliament with **chloride of lime** (a deodorising and sanitising bleach) to control the smell. Later, and more desperately, the politicians authorised pouring chloride of lime and carbolic acid directly into the Thames.

Finally, in mid-1858, Parliament sprang into action, approving a bill signed into an Act of Parliament in eighteen days to resolve the situation. *The Times* noted that:

"... the proximity of the source of the stench concentrated attention on its causes in a way that many years of argument and campaigning had failed to do. . ."

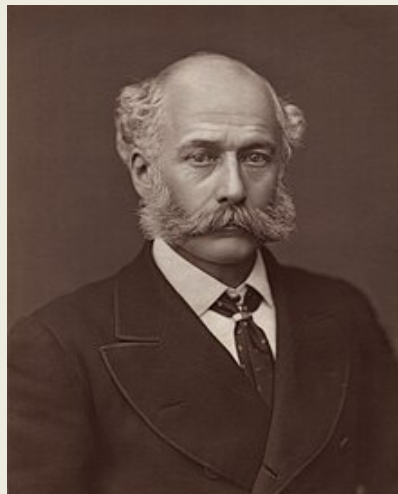
The Government ordered a monumental infrastructure programme to turn the antiquated sewers and drainage channels into a modern, robust, effective and resilient system

Without radical action, the epidemics of Cholera, as well as increasing deaths from Typhoid and Dysentery, would have continued.

However, the country was rescued and remains eternally fortunate to have had the services of

Joseph Bazalgette

(1819-1891) who, at the time of the Great Stench, was the Chief Engineer of London's metropolitan board of



works. He had begun his career as a railway engineer, gaining valuable experience in land drainage and reclamation. The board of works in London was established in 1856 with Bazalgette as its first chief engineer.

Ground was broken in 1859 and the ambitious programme of works was practically completed by 1868. Over 1,100 miles of street sewers were constructed feeding into 82 miles of main interconnecting sewers. At the time the project was considered to be the biggest and most ambitious engineering programme in the world.



The foul water from old sewers and underground rivers was intercepted and diverted along new low-level sewers.

Along the Embankment in London, about 80 yards of the width of the river was reclaimed from the Thames and a total of over 52 acres was utilised in Bazalgette's scheme as the new huge sewers were constructed. The land was also used to accommodate the new underground Metropolitan Line trains which ran above the sewers.

The sewers that were created under Bazalgette's supervision remain the foundational elements of London's sewage system and sanitation today.

The overflows that Bazalgette designed to drain into the Thames to prevent flooding in extreme weather are now used around 50 times a year. Pollution in the Thames is

therefore rising again and a new scheme has been commissioned once again to resolve the situation.

Whilst undertaking this vast project, Bazalgette continued throughout to train young civil engineers and to provide advice to a host of other British towns and cities with similar problems and also to engineers from countries and cities abroad as far apart as Budapest and Mauritius.

London was not the only city that succumbed to the noxious effects of effluent creating a terrible smell and acting as a vector for the typhoid, cholera and dysentery.

Cities all round the world had similar problems as their populations burgeoned.

Paris, for example, was overcome with such a putrid odour in the 1880s because of pollution of the River Seine that the citizens protested repeatedly in the streets over concerns about the risks of recurrent epidemics there.

The public outpouring of dissatisfaction resulted in the creation of a sanitary commission headed by **Louis Pasteur** to address the problem.

Bazalgette is widely held to have been the man who saved more lives than anyone in Britain during the Victorian era.

Certainly, with the expanding population of Britain and the considerable risk of exposure to Cholera, Dysentery and Typhoid, the country would have experienced epidemic after epidemic without his visionary engineering skills. The Thames provided the stimulus necessary to carry out the clean-up. As **Charles Dickens** wrote in his novel, *Little Dorritt*, in 1857:

“through the heart of the town a deadly sewer ebbbed and flowed, in place of a fine, fresh river”

The Chancellor, **Benjamin Disraeli** wrote in 1858 that:

“the noble river Thames had become a Stygian pool reeking with ineffable and unbearable horror”

In recent years, perhaps aggravated by the consequences of climate change, as well as the ever increasing population, sewage systems in London and throughout the country have again become inundated.

In such circumstances, outbreaks of infection are again becoming an increasing risk and action in London is being taken with the **Tideway scheme** to upgrade the sewer system to again ensure that the effluent does not find its way into the Thames. Once complete a new twenty-five kilometre tunnel will intercept, store and transfer



sewage away from the Thames. The principal tunnel will be 7.2 metres in diameter. Starting in Acton at 31 metres deep, it will gradually fall to 66 metres deep when it reaches the Abbey Mills pumping station in East London.

It will almost eliminate sewage overflows, and capture and treat the sewage before it is pumped out into the river.

It is a vital project, and one of many schemes for the UK, urgently needed to ensure that no further Great Stenches will be the consequence.

paullambden@compuserve.com