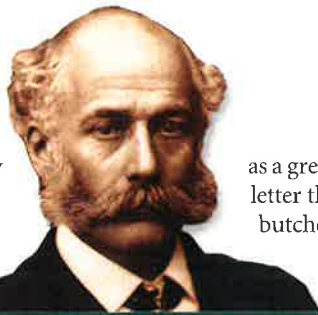


Sir Joseph Bazalgette and the **Great Stink** of 1858

One hundred and fifty years after London was blighted by a foul stench, **Stephen Halliday** explains how one man's pioneering sewage system transformed the capital's sanitation

A cartoon, published in *Punch* in 1855, shows Michael Faraday giving his card to a filthy Father Thames





Who was Joseph Bazalgette?

JOSEPH BAZALGETTE secured his place in history as one of Britain's greatest civil engineers by designing London's main drainage system. Born in Enfield in 1819, he made his first foray into the murky world of sewage when designing drainage projects in Northern Ireland. In 1856, he was appointed chief engineer for the Metropolitan Board of Works, with the remit of overhauling London's crumbling sewers. It was a challenge he was to meet with great success, implementing a system that was to see cholera wiped out in London in a matter of years and which largely remains in use today. Bazalgette was knighted in 1874. He died in Wimbledon in 1891, aged 71.

ON 9 JULY 1855, *The Times* published a letter by the most famous scientist of his day: "Sir, I traversed this day, by steam boat, the space between London and Hungerford Bridges. The appearance and the smell of the water forced themselves at once upon my attention. The whole of the river was an opaque, pale brown fluid. The smell was very bad and common to the whole of the water... If we neglect this subject we cannot expect to do so with impunity, nor ought we to be surprised if, ere many years are over, a hot season gives us sad proof of the folly of our carelessness. I am, Sir, your obedient servant, Michael Faraday, Royal Institution, July 7th 1855"

The stench arose from the fact that the sewage of London's two and a half million citizens was being discharged into the Thames where it was borne to and fro upon the tides. It carried with it waterborne diseases like cholera, which killed almost 40,000 Londoners in four epidemics; typhoid, which claimed the life of Prince Albert and nearly killed his son, the future Edward VII; and a continuous flow of dysentery. At high tides the Thames's stinking, disease-ridden waters backed up into the tributary streams like the Fleet and the Tyburn which flowed beneath the capital's streets and from these it leaked into springs, wells and other sources of drinking water.

Faraday's dour prophecy came true three years later when *The Times* again marked the climax of what the citizens of London were now calling The Great Stink. On 18 June 1858 the paper reported:

"What a pity that the thermometer fell ten degrees yesterday. Parliament was all but compelled to legislate upon the Great London Nuisance by the force of sheer stench. The intense heat had driven our legislators from those portions of their buildings which overlook the river. A few Members, bent upon investigating the matter to its very depth, ventured into the library but they were instantaneously driven to retreat, each man with a handkerchief to his nose. We are heartily glad of it"

The writer was glad because he believed that the discomfiture of the legislators would prompt them to give Joseph Bazalgette, London's chief engineer, the authority and the money he needed to execute his plan to end the pollution of the Thames by sewage.

A lot of hot air

Yet in 1844, only 14 years earlier, the journal *The Builder* received from a professor of chemistry a reassuring, if pompous letter which declared that, "The free currents of air which are necessarily in constant circulation from their proximity to the majestic Thames have been considered (and not improperly)

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as a great cause of the salubrity of the metropolis". Later in his letter the writer added, "From inhaling the odour of beef the butcher's wife obtains her obesity".

The professor's letter is significant for two reasons. First, it expresses in extreme form the contemporary 'miasmatic' theory of disease propagation which held that epidemics (and obesity) were caused exclusively by inhaling substances rather than by swallowing them. Many years would pass before it was accepted that cholera and typhoid were spread by polluted water rather than foul air. Indeed the mistaken belief that they were being slowly poisoned as well as inconvenienced by the Great Stink prompted MPs in the summer of 1858 to take action more swiftly and decisively than they otherwise would.

Middle-class manure

The second notable point about the letter is the claim that, in 1844, the Thames was relatively clean. There was still some truth in this belief, though not for much longer. The medieval system of sewage disposal that Bazalgette inherited (see box on page 37) worked reasonably well until about 1800. Nightsoilmen continued to empty cesspools and sell the contents to farmers but in the 1840s the

nightsoil trade collapsed in the face of the growing popularity of the water closet.

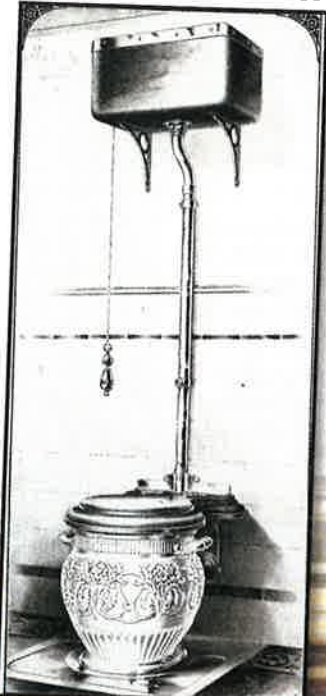
The water closet had been invented by an Elizabethan courtier called Sir John Harington but it owed its popularity to a Yorkshire carpenter called Joseph Bramah (1749–1814) who in 1778 redesigned the mechanism so that it would be more

It was widely believed that diseases were spread by foul air rather than polluted water

efficient and could be mass-produced. From that date Bramah's device became increasingly popular with homeowners, especially the middle-class families who were working in trade, finance, shipping and similar occupations in London's growing

economy. However when attached to medieval cesspools in their homes the new WCs had one serious drawback. As well as dispatching to the cesspool a fairly small quantity of potential manure, the WC added a much larger quantity of water, filling the cesspools ten or twenty times as quickly with a smelly liquid which nightsoilmen could not handle, which farmers did not want to buy and which leaked into surrounding watercourses, polluting wells and springs.

Faced with this problem, in 1815 the government lifted the prohibition on connecting cesspools and house sewers to the public drains and in 1845, the year after the letter in *The Builder*, passed further legislation



A toilet installation in the 1880s. The popularity of the new WC was one of the main causes of The Great Stink

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which obliged new or reconstructed buildings to make such connections. Thus in just three decades London passed from a situation in which sewage could only surreptitiously be dispatched to the Thames to one in which virtually all of London's sewage was disposed of in this way.

The situation was exacerbated by the enterprise of George Jennings, a manufacturer of WCs, who in 1851 persuaded the organisers of the Great Exhibition to allow him to install his designs in the Crystal Palace where they were used by 827,000 people at a cost of one penny each. He thus popularised the devices while adding to the language the expression "spend a penny". The Great Stink followed seven years later.

Dumping sewage downstream

In the meantime, all attempts to improve the condition of the capital's sanitation were inhibited by the fact that London had no effective government. Outside the square mile of the City, London was governed by parish councils whose aim was often to dump their sewage in the next parish downstream.

In 1848 the government had established a Metropolitan Commission of Sewers with the task of creating an effective sewage system. But by 1854, the commissioners had achieved nothing of value except to appoint Joseph Bazalgette as chief engineer. In 1856 the commission was replaced by the Metropolitan Board of Works, which wielded more power than its somewhat toothless predecessor. It too gave Bazalgette the role of chief engineer. However, the board's increased authority initially proved its Achilles' heel. MPs feared that such an influential body would rival 'the Imperial Parliament'

Cholera vanished from London, the last epidemic occurring in 1866 in Whitechapel

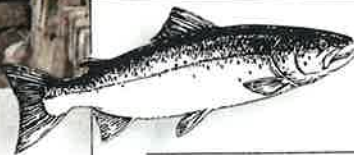
in authority and, for this reason, the legislation which created the board also provided that any plans it devised had to be approved by the government's chief commissioner of works.

That gentleman was Sir Benjamin Hall (1802-67), an eminent MP and ironmaster who was not troubled by self-doubt (he had recently had a bell in Parliament's new clock named after him). With the support of rival engineers, Hall proceeded to question the suitability of Bazalgette's proposed design for a landmark new sewage system (see box right). Was



Timeline: The battle to improve London's sewers

1815 House drains connected to public sewers for the first time



1820 Salmon disappear from the Thames

1831 Cholera reaches Britain; 40,000 Londoners die in four epidemics

1855 Michael Faraday writes to *The Times* complaining about the filthy Thames

1856 Metropolitan Board of Works takes office. Bazalgette chief engineer

1856-8 Bazalgette and Benjamin Hall argue about the suitability of the former's drainage system and who will pay for it

1858 The Great Stink. Parliament grants Bazalgette the authority and money required to implement his system

1865 Southern drainage completed

1866 The final cholera epidemic in Whitechapel

1868 Northern drainage completed

1874 Bazalgette knighted

1891 Bazalgette dies

1892 Cholera strikes Hamburg; London unaffected

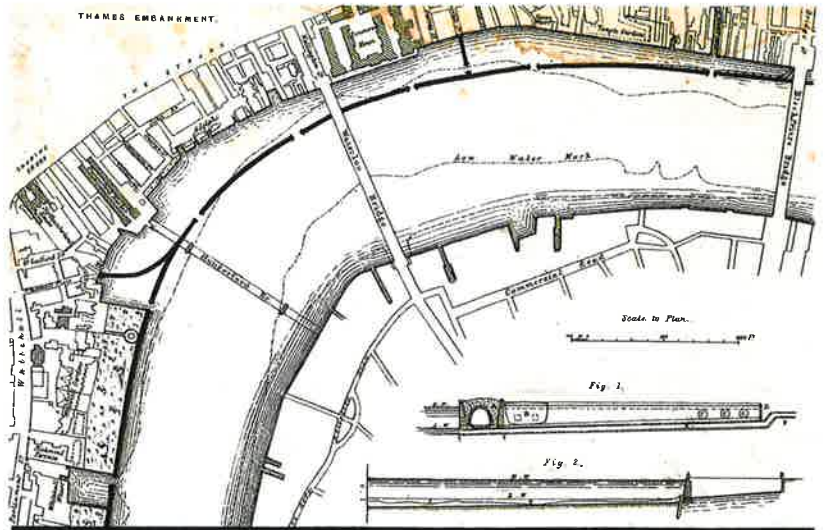
it sufficiently capacious? Did it take the sewage far enough downstream? Above all, who would pay for it? For two years the parties quarrelled and it took The Great Stink and the fear of 'miasmatic' cholera that it created to persuade Parliament to overturn Hall's veto and give Bazalgette the authority and money to proceed.

By late 1858 Bazalgette had begun work and by 1868 the system was substantially complete, using 318 million bricks and making inventive use of new techniques and materials. The work was widely praised. *The Observer* referred to "the most extensive and wonderful work of modern times" and the normally critical *Marylebone Mercury* wrote "to Mr Bazalgette no tribute of praise can be undeserved".

The *Mercury* had every reason to laud Bazalgette's work. Cholera vanished

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Joseph Bazalgette, standing top right, views the Northern Outfall sewer being built below the Abbey Mills pumping station, c1862



Bazalgette's plan of the Thames Embankment, from Blackfriars Bridge to Westminster Bridge

The capital's great clean-up act: How Bazalgette shaped Victorian London

BY 1861, AS Bazalgette's work gathered pace, London's population was 2,807,000, almost three times the level recorded in 1801. It was the largest city in the world and would more than double again in population by the time of Victoria's death in 1901.

The sewage system that Bazalgette inherited would have been recognised by the first mayor of London, Henry Fitzalwyn who, in 1189, laid down regulations concerning the construction and use of the 'necessary chamber' (cesspool), in which sewage was deposited before being collected and sold by 'nightsoilmen' as fertiliser to farmers in the fields. In Fitzalwyn's time, these fields lay close to the City itself in places like Spitalfields.

When, from 1815, householders were permitted (and later required) to connect their

cesspools and water closets to the public sewers, a flood of human waste entered London's underground rivers. From these it flowed into the Thames, turning the great waterway, in 30 years, from a clean river in which salmon could breed into an open sewer in which nothing could live.

A flood of human waste turned the Thames into a huge open sewer

Moreover many of the public sewers were in a state of collapse.

Bazalgette replaced 162 miles of these old sewers as well as building 1,100 miles of new sewers but his greatest achievement was the 82 miles of intercepting sewers which are in places larger than the underground train tunnels. Running parallel to the river, north and

south, they collected the waste from the street sewers and conducted it to treatment works at Crossness in Kent and Becton in Essex where, once treated, it could be released at high tide and make its way out to sea.

Bazalgette's system remained in use until 1998 when incinerators were

installed at his treatment works to burn the solid waste and turn it into electricity.

In addition Bazalgette built four pumping stations to raise the sewage at various points so that it could continue its flow by gravity. He also built the Victoria, Albert and Chelsea Embankments to accommodate his sewers, to narrow and speed the river's flow and to protect London from flooding. Virtually the entire system remains in use.

from London, the last epidemic occurring in 1866 in Whitechapel, shortly before it was connected to Bazalgette's system. A final, devastating outbreak in Hamburg in 1892 caused alarm in Britain but no epidemic occurred. Bazalgette also reclaimed 52 acres of land from the Thames, turning the sewage-ridden foreshore of the Strand into the Victoria Embankment. The obituarist of *The Times* summarised Bazalgette's achievement in the tribute which appeared on 16 March 1891, the day after his death:

"When the New Zealander comes to London, a thousand years hence, to sketch the ruins of St Paul's, the magnificent solidity and the faultless symmetry of the great granite blocks which form the wall of the Thames Embankment will still remain to testify that, in the reign of Victoria, 'jerry-building' was not quite universal. Of the great sewer that runs beneath, Londoners know, as a rule, nothing, though the Registrar-General could tell them that its existence has added twenty years to their chance of life."

No one disagreed. **II**

JOURNEYS

BOOKS

The Great Stink of London (Sutton, 1999); **The Great Filth: the War Against Disease in Victorian England** (Sutton, 2007) both by Stephen Halliday

The site of the Victoria Embankment, shown in 1863. Opening in 1870, it accommodated Bazalgette's new main sewer

