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Cholera and typhoid fever in Kent

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Cholera and typhoid fever are bacterial diseases that are acquired by the consumption, mainly of water, but sometimes of food, that has been contaminated by sewage containing the excrement of people suffering from the disease

The natural home of cholera is the Indian subcontinent where it had been known for many years. In the nineteenth century, however, for reasons that are not clear, it changed and caused a number of epidemics. It then travelled along the trade routes to most corners of the known world, causing several pandemics. In three of these during 1826-1838, 1846-1854 and 1863-1868, it entered Britain, causing widespread epidemics:

Pandemic years	Epidemic years in Britain
1826-1838	1826-1838
1846-1854	1848-49 and 1853-1854
1863-1868	1865-1866

Since the 1866, however, there have been only occasional cases in Britain, usually in travellers from abroad.

Typhoid fever has been with us for centuries, probably since Roman times and has caused many isolated cases, minor outbreaks and a few major epidemics. The history of the disease is clouded. For many centuries it was confused with other diseases. In Britain, before 1869, it was included among the 'continued fevers', such as typhus, characterised by a high temperature and a skin rash. In the mid-19th century, however, physicians and pathologists noted that in certain cases the fever was not continuous but showed a diurnal variation; and in fatal cases there were localised lesions in the submucosal lymphoid tissue of the small intestine (Peyer's patches, concerned with immunity). Physicians were then able to distinguish between typhus and typhoid (i.e. 'typhus-like') fevers. After 1869 the disease was recorded separately in the Registrar General's Reports, albeit as 'enteric fever' which encompassed typhoid itself and the three paratyphoid fevers, A, B and C, which were recognised only after bacteriological investigation became possible. Unfortunately

there may still be some confusion in nomenclature, as in the German language typhoid fever is known as typhus, typhus itself is called fleckfieber.

Cholera

An attack of cholera begins with violent diarrhoea and vomiting. At first the stools look normal but they soon become watery with flecks of mucus – ‘rice water stools’. There is rapid and severe dehydration and prostration. Electrolyte imbalance leads to peripheral circulatory failure and renal failure and often death. Milder forms of the disease are known.

Kent is largely a maritime county, bounded on the north by the Thames estuary and on the east and south by the Straits of Dover. There are several ports along this extensive seaboard. On the west the northern end of the county boundary is contiguous with London. The ports and the roads and railways which passed through the county provided gateways for the entry of cholera and other communicable diseases. In addition, there was a seasonal immigration of Londoners for the hop and fruit picking. Kent also had a number of barracks, military and naval, and, in the Thames estuary, several prison ships: the ‘hulks’ so well described by Dickens (1869). Cholera (‘choleraic disorders’) may well have been established in 1831 in the warships anchored in the River Medway (Creighton, 1895a), but there appears to be no record of its spread to the shore.

The county was affected by all four of the epidemics and the government responded to the threat of the sea-borne importation of cholera by reinforcing the quarantine restrictions. All shipping on its way to London was quarantined at Stangate Creek in the Medway estuary (see ‘Cholera at Sheerness’, below). Quarantine was also enforced at Dover, Faversham, Milton, Whitstable and Ramsgate (*Maidstone Gazette*, 1821a).

The General Board of Health in London had already issued instructions about the creation of local boards of health. A number of towns (Chatham, Gravesend, Maidstone, Sheerness, Faversham, Tonbridge and Dover) followed these and created local Boards (*Maidstone Gazette*, 1821b). That at Chatham asked the Admiralty for a hospital ship, and the Ordnance Board to flush the local drains. The

various boards arranged for the feeding and clothing of the poor, the fumigation and lime washing of premises, cleansing of streets and drains, the removal of nuisances, and also arranged for certain building to be used as hospitals. Unfortunately, neither the General nor the local Boards had powers to insist that such work be done, and there was opposition from so-called 'dirty parties', generally on the grounds that ratepayers would have to meet the cost (Yates *et al.* 1944). Nevertheless, some local authorities did implement the suggested reforms. *The Kentish Gazette* (1854) published a set of precautions against cholera:

1. Apply to a medical man immediately in case of looseness of the bowels, as it may bring on cholera.
 2. Do not take any salts or other strong medicines without proper advice.
 3. Beware of drink, for excess in beer, wine or spirits is likely to be followed by cholera.
 4. Avoid eating meat that is tainted or unwholesome, decayed or unripe fruit and stale fruit or vegetables.
 5. Avoid fasting too long. Be moderate in meals.
 6. Avoid great fatigue or getting heated and the chilled.
 7. Avoid getting wet or remaining in wet clothes.
 8. Keep yourself clean and your body and feet dry and as warm as your means and occupation will permit.
 9. Keep your room well cleaned and lime washed; open the windows as often as possible; remove all dirt and impurities immediately.
 10. Use chloride of lime or zinc to remove any offensive smells
 11. If there are any dust or dirt heaps, foul drains, bad smells or other nuisances in the house or neighbourhood make complaint without delay to the local authorities having legal power to remove them; or if there be no such authorities or you do not know who they are, complain to the Board of Guardians
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The first seven of these followed the advice given by the Royal College of Physicians and the General Board of Health. It is of interest, however, that Nos. 8 and 9 were concerned with the cleanliness of persons and premises and Nos. 10 and 11 with smells. At that time, when the real cause and mode of transmission of cholera was still unknown, it was commonly believed that smells (miasmas), from

decomposing human, animal and vegetable waste, was responsible: 'All smell is disease' (Chadwick, 1842).

The outbreaks of 1832 - 1835

Cholera first entered Kent in the spring of 1832. The first two cases were a female vagrant from London, who died in Rochester (*Maidstone Gazette*, 1832a) and a seaman at Chatham who worked on boat that plied between that town and London (Yates *et al.* 1944). There were 80 deaths on the prison ship *Cumberland* (including the surgeon). The disease spread rapidly. There were twelve deaths in Sheerness (Armstrong, 1994), another dozen in Faversham (*Maidstone Gazette*, 1832b) and 47 in Minster in Sheppey.

In September 1832 there was a debate in *The Maidstone Gazette* (1832c) about the advisability of employing of hop-pickers from London. It was thought that as there was cholera in the Metropolis, such people might bring it into Kent. There had already been twelve cases among those people in the East Farleigh district and then there nineteen more at Barming (*Maidstone Gazette*, 1834). After that, there seems to have been a lull. In 1834, however, cholera appeared again, this time on the North Kent coast. There was an outbreak at Whitstable, followed by another at Herne Bay in which 28 people died. As this town was a seaside resort, attracting summer visitors from London, attempts were made by the local authority to prevent publicity. One year later it surfaced again among the hop-pickers at East Farleigh, causing thirteen deaths (*Maidstone Gazette*, 1835).

The outbreaks of 1849 – 1850

There were two major outbreaks during these years. The first of these, in 1849, occurred at East Farleigh among hop-pickers at the same farm as that where there were cases of cholera in 1832. This second incident, which cost the lives of 43 people, is considered below. A further thirty hop-pickers died at the neighbouring villages of Yalding and Loose ((*Maidstone Gazette*, 1849). The second outbreak was in Canterbury and the surrounding parishes where there were forty-five deaths (Bateman, 1988).

There were nine deaths in Upper Rainham. Sporadic cases occurred in several of the North Kent towns – Gravesend, Rochester, Chatham, Milton Regis, Herne Bay, Margate and Ramsgate, as well as at Sheerness, Maidstone and Tonbridge.

The outbreaks of 1853 - 1855

The three most serious outbreaks of cholera during these years occurred at Canterbury and district (sixty deaths), Sandgate (forty-eight deaths) and Tonbridge (one hundred and 70 deaths). The latter two are considered below.

Other towns and areas affected include Greenwich, Sheerness, Milton, Sevenoaks, Maidstone, Tunbridge Wells and Ramsgate, from whence the disease spread to High Halden, Staplehurst, Sturry and Eastry (Barker-Read, 1982). The last outbreak in this period occurred at Shorncliffe Barracks (near Folkestone) in 1855, where the deaths totalled forty-one. There was a major outbreak at Sandgate (see below).

The outbreaks in 1865 - 1866

In this period, during the last epidemic of cholera in Britain, there were only sporadic cases in Kent. The disease was carried by ship from London to Gravesend and thence by barges to Faversham, Sittingbourne, Maidstone, Sheerness and Aylesford and finally Chatham. Various mid-Kent villages, Yalding, Hunton, Teston, Marden, Staplehurst, Otham, Bearsted and Barming, were also affected to a minor degree.

According to Creighton (1895b) the total death toll in Kent for the four events was 2,684. This is distributed as follows:

Years	1832-35	1849-50	1853-55	1865-6
Deaths	135	1208	1056	285

In Creighton's 'league tables' of the data for 43 counties and administrative areas of England and Wales Kent may be placed 22nd in the first period, 11th in the second, 2nd in the third, and 11th in the fourth.

Figure 1 shows the sites of the outbreaks in the county (excluding sporadic cases). The distribution of the green dots on this map suggests that cholera travelled along lines of sea, river and land transportation.

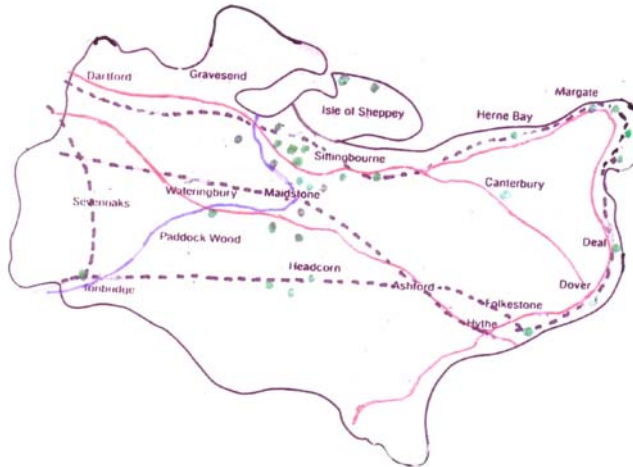


Figure 1. Dot map (●) showing sites of outbreaks of cholera in Kent
Roads ——— Navigable river ——— Railway - - - - -

The cholera outbreaks in four areas in the county merit more detailed examination. These are: Sheerness and the Isle of Sheppey, East Farleigh, Tonbridge, and Sandgate.

Cholera in Sheerness and Sheppey

The Isle of Sheppey, on the northwest coast of Kent, is separated from the mainland by a navigable waterway, the Swale, which connects the Medway estuary on the west to the Thames estuary on the east (Figure 2).

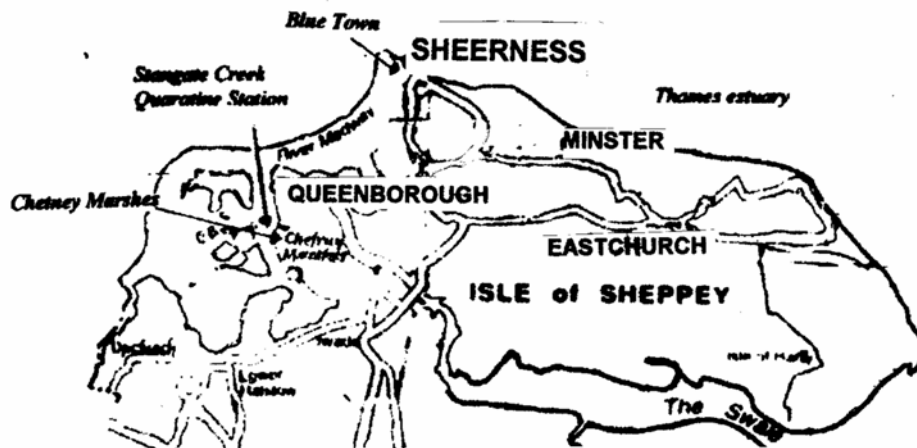


Figure 2. The Isle of Sheppey

Sheerness is the principal town, a port and, in the nineteenth century, was an important naval establishment. Apart from the arrival of cholera in 1831 and 1832, it had a long association with other importable infectious diseases (e.g. plague and yellow fever) because the naval authorities there had control of a quarantine station in Stangate Creek. At the beginning of the 19th century the government built a 'lazaretto' on Chetney Marsh (see Figure 2) for the isolation on shore of cases of such diseases that occurred on quarantined ships. This shore station was never used because it was built on unsound ground. In the 1920s it was abandoned (Froggatt, 1964). Nothing now remains.

With the threat of cholera, which had arrived in Sunderland, quarantine of ships bringing coal from that area was enforced. Stangate Creek soon became crowded with coasters and other shipping. Letters from passengers and crew of the quarantined ships were opened, fumigated (with vinegar) and then resealed before delivery to the Post Office in Queenborough (Froggatt, 1964). Quarantined goods were 'aired' on the decks of hulks.

In 1831 there was cholera on the hulk *Euryalus*, moored off Chatham and used as a prison ship mainly for boys aged 8 – 15. Naval records indicate that a lighter took convicts from this hulk to Sheerness for transportation to New South Wales and Tasmania. The ship's surgeon's log of the transport vessel *Waterloo* recorded that 214 convicts were taken aboard at Sheerness. Because of gales the ship had to anchor off Margate where its anchors were lost. It had to return to Sheerness for replacements, but as there was cholera aboard it had to be quarantined. The surgeon recorded 40 cases of cholera, with eight deaths (Kennedy, 2003).

By mid-1832 there had been 135 deaths in 11 areas of Sheppey. Sheerness itself and the neighbouring township of Minster were most affected (Minster suffered 38 deaths).

The Blue Town area, in the western part of Sheerness was invaded again during the 1853-1855 and 1866 outbreaks (Judge, 1849).

There were several cases in Eastchurch. It is of note that while two harvest labourers who succumbed there were buried in fenced-off graves in accordance with government instructions, another victim, Vice Admiral Sir Richard King, Commander in Chief, Nore, was interred in the chancel of the parish Church

(www.allsaintchurch.info), where his memorial (Figure 3) may still be seen.

Apparently, cholera victims varied in their threat to others!

Local response

The response of the local authorities was sketchy. In 1849 cholera returned to Sheppey (*South Eastern Gazette*, 1853). Although a local Board of Health had been in existence for four years, not one of the original nuisances had been removed (Ranger, 1849). The new outbreak did stimulate an inquiry, however, and a report was made to the General Board of Health (Ryan, 1853). This noted the scale of the outbreak and the high mortality, criticised the overcrowding, poor ventilation, the inadequacy of the water supply and lack of sewers, drains and privies. Many recommendations were made but to little effect. Even in 1860 Sheerness had no drains. There was a survey by the local Board of Health in 1857 (Kennedy, 2000). This again detailed the sanitary shortcomings of Sheerness and nearby Minster.



Figure 3. Memorial plaque to cholera victim Vice Admiral Sir Richard King, C. in C., Nore, who is interred in the chancel of All Saints Church at Eastchurch. Reproduced by permission of the Rector and Churchwardens of All Saints Church.

The only public water supply undertaking in 1834 was that of the Sheerness Economical Society, which distributed water by donkey and cart from a local well. This enterprise was purchased in 1864 by the local Board of Health, and the first mains were laid (Martin, 2003).

Cholera in Tonbridge

In the nineteenth century Tonbridge was a small market town on the River Medway. It suffered outbreaks of cholera in 1832, 1849, 1851-54 and 1866, but there appear to be no actual numbers of deaths on record for the first and last of these. In the second outbreak there were 39 deaths and in the third 48 (Barker-Read, 1983).

The town was divided geographically and socially, into three areas (Chalklin, 1983), marked A, B and C in Figure 4. In the northern area, A, well above the Great Bridge over the River Medway, there were the larger houses of the more well-to-do people. The middle area, B, between the Great Bridge and the railway, through which five separate side-streams of the Medway (not marked on map) passed, was on the flood plain of the river and housed the poorer classes, especially between the Little Bridge and the railway. The southern area, C, on rising ground and south of the railway, was developed for better-class housing in the mid-century. This geographical-social division was emphasised by the overall mortality rates: 24.3 per thousand in areas A and C and nearly 28 per thousand in the much less salubrious middle area B. Between January 1851 and September 1854 there were 22 deaths from cholera among the total of 59 for infectious disease, and in the six months up to 30th September 1854 there were 48 due to cholera, of a total of 66 for all fevers (Neve, 1933).

In the 1850s the few sewers and drains that existed were inadequate, being barrel-shaped with flat bottoms and therefore readily blocked. Five of them emptied directly into the River Medway or into its separate streams. Privies connected to them were untrapped and no water was available for flushing. Some privies emptied, via wooden chutes, directly into ditches or one of the streams (and hence into the Medway). Some new houses were built over sewers.

Until 1852 drinking water was obtained from wells at the Town Hall and Cage Green and from the River Medway at Little Bridge, all therefore liable to pollution. The Tonbridge Water Company opened its waterworks in 1852 (Martin, 2003). The opening ceremony was marred by an 'intolerable stench' from cesspools and drains

(Neve, 1933). Nevertheless, in 1852 only 176 of 1120 houses in the town had piped water.

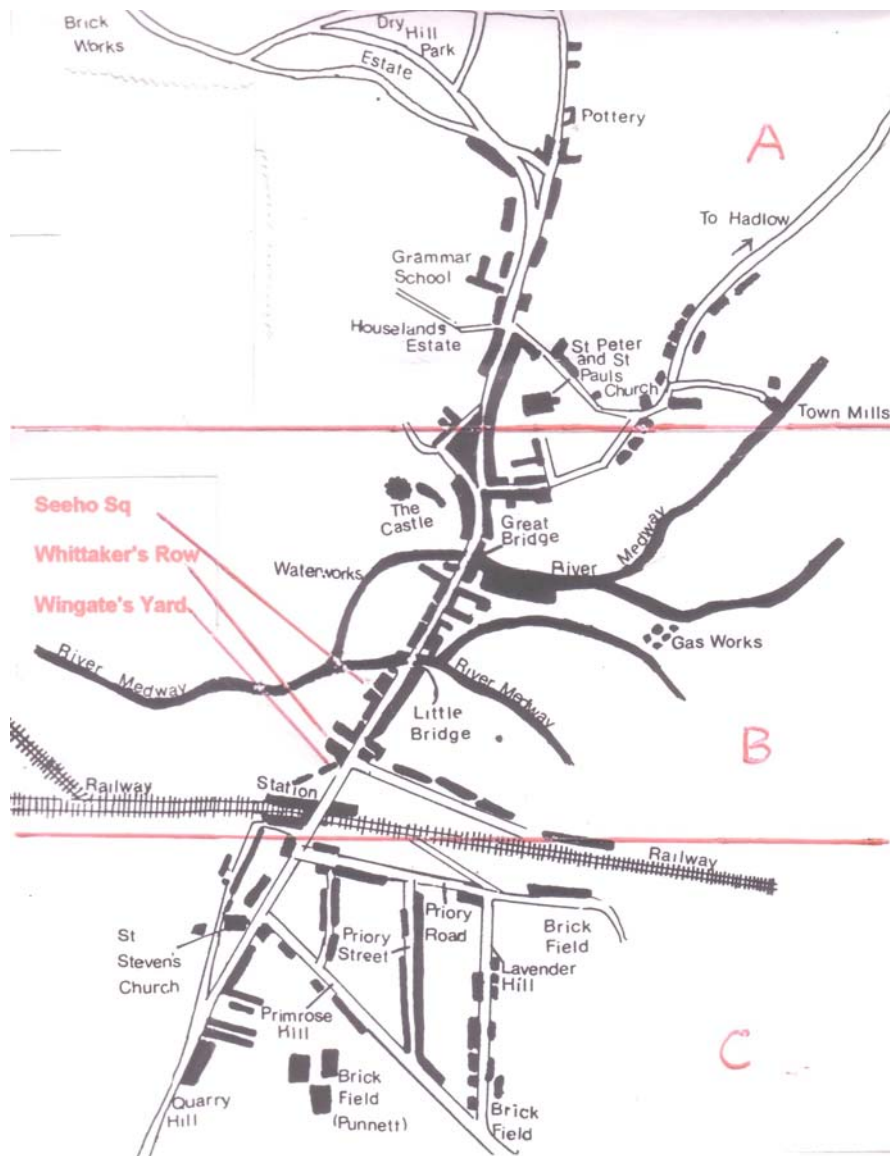


Figure 4. Tonbridge, mid-nineteenth century

Reproduced by courtesy of Dr C Chalklin, with additional material (in red: demarcation of zones of cholera incidence and approximate sites of areas investigated by Dickens, 1854).

In September 1854 cholera was rampant, especially in the wholly insalubrious areas behind the High Street in the central part of the town (area C).

A local newspaper (*Tonbridge Miscellaneous Advertiser*, 1894) commented.

Cholera is still raging in the town. Who can expect to meet anything but disease in those houses where pigsties are almost adjacent to the back doors, and filth and rubbish of vegetables and other matter are thrown in a heap, with house slops, to rot.

In December of that year, in spite of opposition from some ratepayers who thought that no progressive measures were necessary to stay the cholera, a sufficient number of citizens voted that a petition be sent to the General Board of Health, requesting an inspection and public enquiry. An Inspector, Mr A.L. Dickens was sent down from London. His Report (Dickens, 1854) was damning. Apart from the conditions mentioned above, those in See-hoe Square, Whittaker's Row and Wingate's Cottages (Figures 5 and 6) are of particular interest as they highlight the inadequacy of sanitation and the pollution of the river from privies.

Dickens also commented on the stagnation of some of the Medway streams, the dirty, unpaved roads and dung heaps, offensive privy cess pools, as well as cataloguing filthy premises.

Water extracted from the River Medway west of the town was not filtered. It was not clear and contained animalcules and vegetable matter.

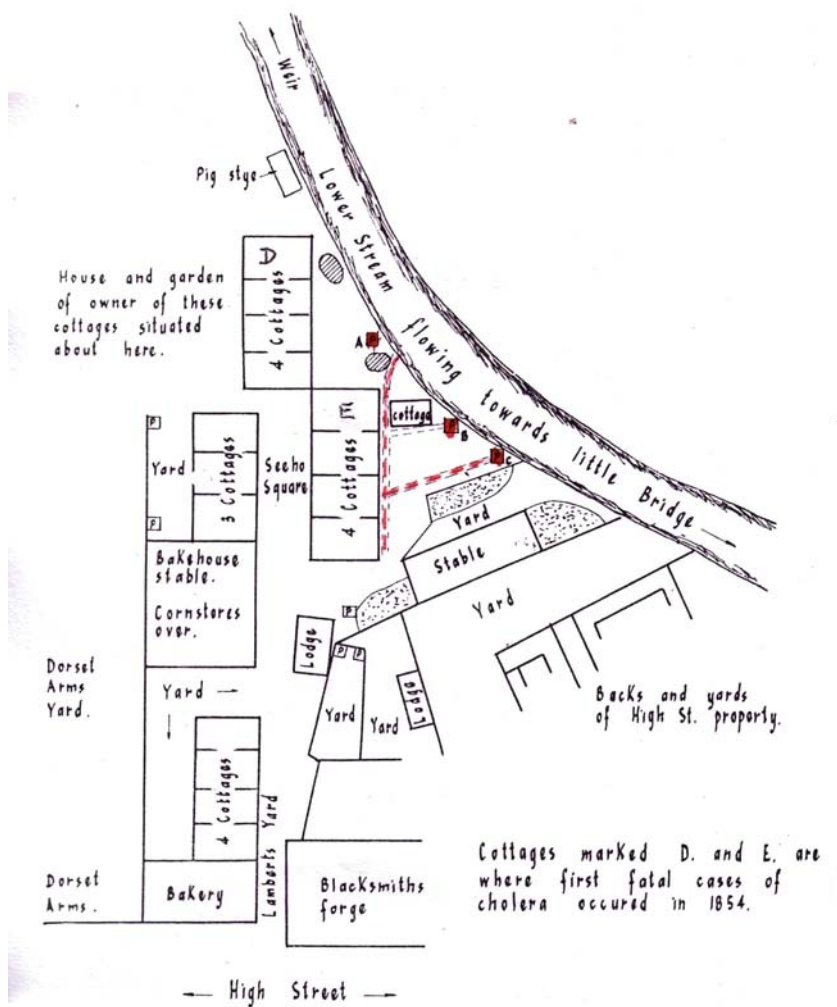


Figure 5. Seehoe Square, Tonbridge, showing privies (■) and surface drains (- - -) to River Medway
 [From Dickens, 1854)

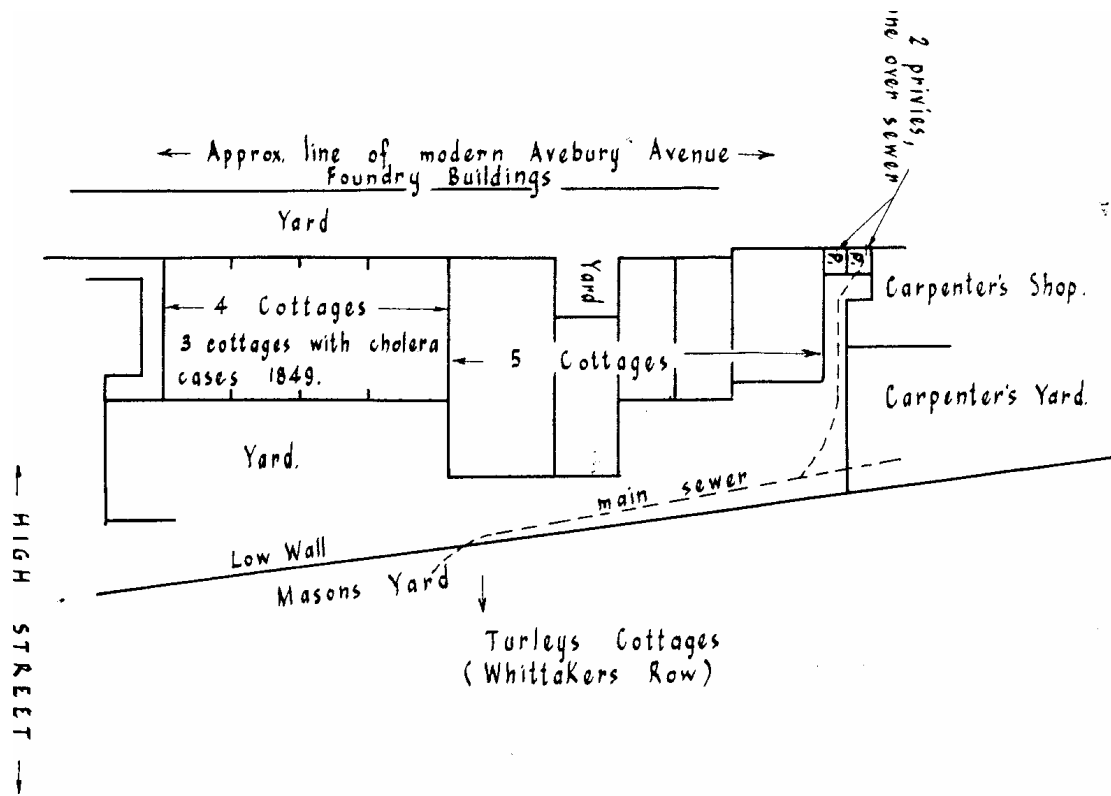


Figure 6a . Whittaker's Row, showing privies.
 [From Dickens (1854)]

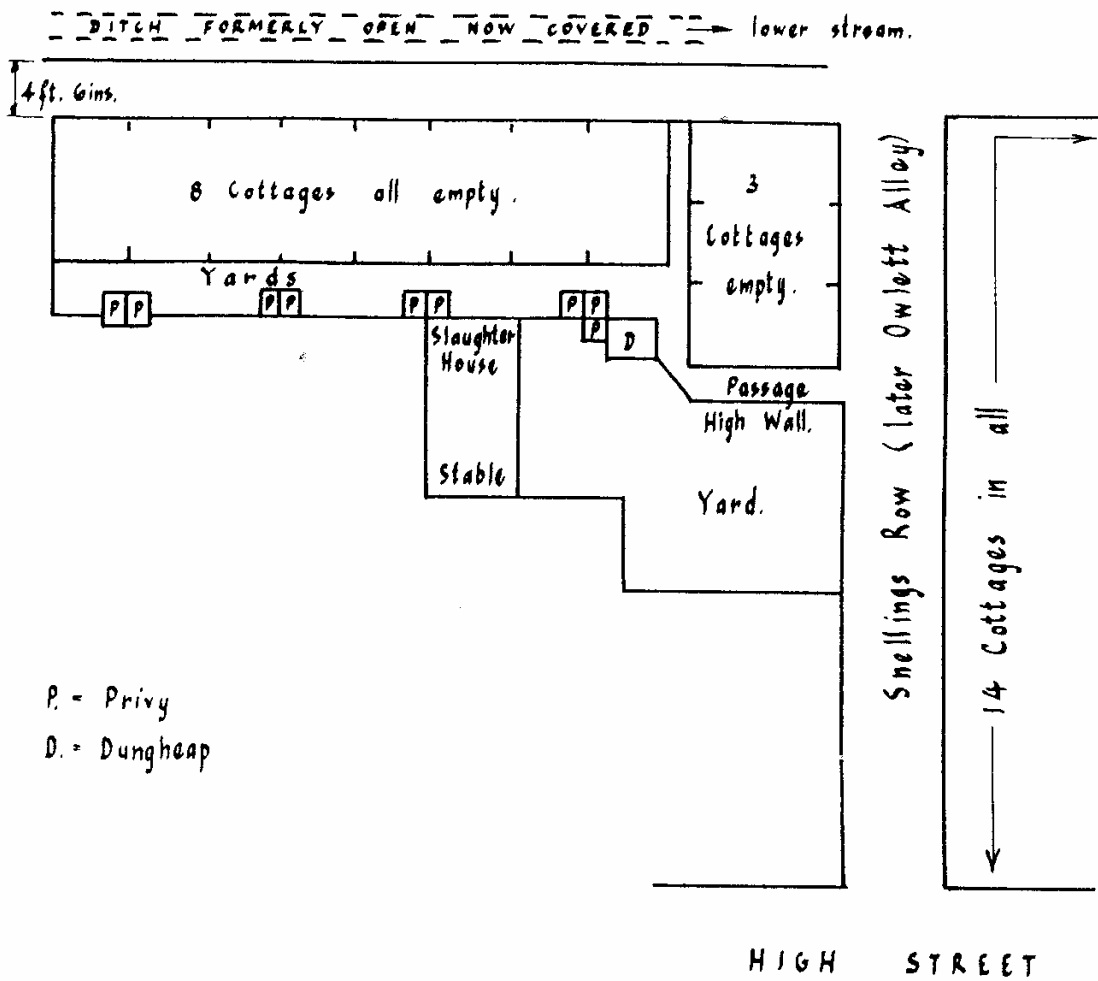


Figure 6b. Wingate's Cottages, showing privies.

[From Dickens (1854)]

Local response

The Dickens Report did stimulate some local interest, but little action. The problems were (1), central legislation was permissive, not statutory; (2), local vested interests were opposed to any changes that might well affect their pockets; and (3), boundary problems, as Tonbridge and Tunbridge Wells formed a single parish but residents in the latter were unconcerned. Moreover, changes in legislation left some uncertainty about which act and which central authority was responsible for dealing with petitions (Neve, 1933). As a result, nothing of note was achieved for fifteen years, until the setting up of the Local Government Board. Then the Tonbridge authorities agreed to a sewerage system. New drains and sewers were built, leading to a 'sewage farm'. Nevertheless, the effluent from this was discharged into River

Medway and no information is now available about the efficacy of the treatment of sewage.

There was another cholera outbreak in 1866. The Registrar-General's Report that year shows, again, the difference in the incidence of the disease between the upper and lower parts of the town; a rate of 16 per 1,000 north of the Great Bridge and 25 per 1,000 south of it (Barker-Read, 1983).

Cholera in East Farleigh

East Farleigh is a village on the River Medway, some 14 miles down river from Tonbridge. The various farms in the parish were visited each summer by a large number of hop-pickers (known locally as 'strangers'), most of whom came from the East End of London and Ireland (www.kentishpeople.com/article).

In September 1849 there was an outbreak of cholera among several hundred hop-pickers who came to work at Court Lodge Farm (Figure 7). Dr P Plomley, Medical Officer to the Maidstone Union, investigated the incident. His report was published in the local newspaper (*Maidstone and Kentish Journal*, 1849a). He stressed that the conditions under which these hop-pickers were accommodated, in huts, barns and sheds, were very bad, overcrowded and ill-ventilated. Drinking and washing water was drawn from wells contaminated by run-off from cow yards and by human waste. The people were half-starved and compelled to eat impure food, putrid fish and adulterated bread sold at cheap rates by unprincipled and itinerant vendors.



Figure 7. East Farleigh district showing hop garden (site of cholera outbreak) and sites associated with the Maidstone typhoid epidemic

The number of cases and deaths increased during the first few days of the outbreak and the local clergy (Catholic as well as Anglican and nonconformists, as many of the victims were from Ireland) opened the National School as a hospital and worked among the sick. Doctors and nurses (two of whom caught cholera) came down from London to help, as local medical assistance was limited and overwhelmed.

Residents in the neighbourhood contributed personal assistance, food and material (*Maidstone and Kentish Journal* 1949b). In spite of medical and lay assistance, however, there were about 300 cases of cholera with 45 deaths. Forty-three of the latter, which included eight children under ten years old), were buried in East Farleigh churchyard, where their memorial may still be seen (Figure 8).



Figure 8. Memorial (of wood) to 43 hop-pickers who died during the East Farleigh outbreak. The inscription, now barely readable, is

**IN MEMORY OF FORTY-THREE
STRANGERS**

**WHO DIED OF CHOLERA SEP^R 1849
RIP.**

[Photograph Dr T Donovan, reproduced by permission of the Rector and Churchwardens]

At the time there was no public water supply in the area. Residents probably obtained their water from springs along the Medway valley (Martin, 2003). It is of interest that there were no cases of cholera among these people, nor in Maidstone, a few miles downstream, where, at that time the water from the Medway was unusable. People had to obtain drinking water from old wells which yielded only about 20,000 gallons a day (Smith, 1979).

Local response

The immediate response, of doctors, clergy and residents, is indicated above. Although the outbreak was extensively reported in the local newspapers and has passed into local folklore no record of local authority action seems to be available.

A possible source of the outbreak

During the 1849 outbreak in Tonbridge raw sewage from houses where there were cases of cholera drained to was or deposited in the River Medway (as described above). The site of the outbreak (Court Lodge Farm, East Farleigh) is only fourteen miles downstream from Tonbridge and near to the river. At the normal flow of the river, two-three miles an hour, water containing the agent of cholera would reach the hop garden area within seven hours. It is possible, therefore, that the cholera victims could have ingested contaminated water directly from the river or from wells contaminated with river water

Cholera in Sandgate

In the nineteenth century Sandgate (now a suburb of Folkestone) was a small town (little more than a village) two miles east of Folkestone, lining the road to Hythe. It was visited by cholera in 1854, having escaped during earlier national epidemics.

Before 1848 there were no main sewers. Latrines and privies nearest to the sea discharged their sewage directly onto the beach. Most of the wells, which provided drinking water to many of the residents, were polluted. In that year, however, the local ratepayers applied, under the *Public Health Act 1848*, for a local Board of Health to be established. In 1849 Mr T W Rammell of the General Board of Health was sent down to inquire into the sewerage, drainage, supply of water and the sanitary condition of the inhabitants of the town. His Report (Rammell, 1849), resulted in some improvements. By 1852 a sewage works was in operation and many cesspools had been filled in.

In 1854, however, cholera attacked the area. There were 94 cases, with 48 deaths, and another inspection and inquiry were instituted (Rammell, 1854). Several important and interesting facts emerged during that inspection. In the first place, no

connection could be established between the first case, a resident who had not been away from the town for several months, and the disease in other parts of the country. It was noted that when some of the cesspools had been filled in (above) the 'soil' in them had not been removed, permitting seepage. Moreover, the joints of the new sewers and house drains leaked. The inspector concluded

Briefly it may be stated that the public and private drainage of Sandgate is, from defective construction, insufficient for the purposes required; that the escape of the liquid sewage and water necessary to its perfect action contaminates the soil; that the surface drainage and cleansing, although in some measure lately improved, are much neglected; that many of the cesspools formerly in use are still open, or only imperfectly closed; that the private sources of water supply are in many cases polluted; and that the public water supply is liable to be very short in quantity and not exceptional in quality.

The piped water supply came from two water companies, Sandgate and Folkestone, and from private wells. An analysis of the figures in the Report reveals the following:

Source	Fatal cases	Nonfatal cases
Sandgate Water Works	15	8
Folkestone Water Works	6	5
Sandgate and wells	7	12
Folkestone and wells	3	2
Wells only	14	14

The immediate conclusion was that the water from the Sandgate Works suffered a higher level of pollution than that from Folkestone. But clearly, the wells in Sandgate were also contaminated.

Local response

The local Board of Health acted on the Report, particular in respect of cesspools, which were emptied where possible, and properly capped. The Sandgate Water Company took steps to safeguard its well against external pollution. Regrettably, local records at the Folkestone Reference Library yielded little useful information

about actions by the local authority but Hastings (1982) has given a good account of the events.

A possible source of the outbreak

In the Report of the outbreak at Sandgate (Rammell, 1854) it is made clear that contaminated drinking water was suspected as the source of the disease. There is also mention of the building of a sea wall some years earlier, before the establishment of the water companies. This wall was intended to prevent seawater from seeping into the land and entering the wells, so making the water taste brackish. But the wall may not have been properly maintained. At that time all sewage from houses in Sandgate was discharged into the sea. Moreover, coastal shipping, passing inshore, could have discharged their bilges or ships' privies into the sea. Thus there were two possible sources of water containing the cholera agent that could have seeped into the wells on land.

Typhoid fever

The incubation period of typhoid fever, after ingestion of the agent, is 14-21 days. During the first week of the disease there is fever, general malaise, abdominal pain, diarrhoea and mental confusion. Later, there may be an abdominal rash ('rose spots') and complications including intestinal perforation and haemorrhage, osteomyelitis and meningitis. In untreated patients the mortality rate is about 10%. About 5% of those who recover become carriers and excrete the bacteria in their stools or (less often) in their urine.

Typhoid fever was an accepted fact of life during the 19th century, affecting all walks of life. Prince Albert died of the disease and the Prince of Wales (later Edward VII), his servant and Prince Leopold contracted it while staying at a country house. There were epidemics in Britain in 1801, 1816-19, 1837-38, 1846-47 (Creighton, 1894c) but these were largely confined to the midlands and the north of England. Creighton does not mention any outbreaks in Kent, where there appears to have been only sporadic cases in, for example, the Tunbridge Wells area. The Medical Officer of Health in Maidstone expected only five or six cases a year.

The last major epidemic of the 19th century was at Maidstone in 1897. This commenced in mid-August. By 9 September 117 cases had been reported; within three weeks there were 774 and by 9 October the number had risen to 1200, with 42 deaths. The epidemic was over by the end of December, apart from a few, probably secondary cases. The total number of cases was 1847, with 132 deaths (Report, 1898), but this may well be an underestimate (Stanwell-Smith, 2000). Some mild cases may have not been reported or notified.

The water supply

The lessons of the mid-century water-borne cholera epidemics had been learned and the Medical Officer of Health suspected the local supply. His investigations showed that water from the reservoir at Barming, a short distance west of Maidstone, was responsible. The town was supplied by the Maidstone Water Company, a private enterprise. The pumping station was at the bridge over the R. Medway (Figure 8). Water was obtained from several springs: at Tutsham and Ewell, west of the

pumping station at Farleigh Bridge, and at Cossington and Boarley, north of Maidstone, at the foot of the North Downs (Hales, 1983) Before 1896 samples of the supply had been tested at monthly intervals but the Town Council, in the interests of economy, had reduced this to quarterly (Hales, 1984).. Although these were chemical, not bacteriological tests the former would certainly have indicated pollution.

The last samples to be tested before the epidemic were in June. Later, a local newspaper commented that the epidemic was the penalty of such economy (*South Eastern Gazette*, 1897).

Epidemiological investigations showed that there had been 1583 cases among customers supplied with water from the Farleigh area (Tutsham and Ewell), but only 29 and 69 respectively from the springs at Cossington and Boarley (Report, 1988). There was also evidence of gross faecal contamination of the area around the Tutsham spring. There were hop gardens nearby and accommodation for the hop-pickers was highly unsatisfactory and the sanitary facilities were non-existent. The hop-pickers defaecated anywhere, just as they had in the cholera epidemic in the same area in 1849. There had been little or no improvement in sanitation since that time. The conclusion that these people were responsible for the contamination and, in consequence, the typhoid epidemic, was fuelled by local prejudice. There was a mismatch, here, however, as the hop-pickers arrived on 20 August, after the first cases of cholera on 17 August and the incubation period for the disease is at least a fortnight. Moreover, the Public Inquiry (Report, 1898) found no evidence of typhoid fever among the hop-pickers.

The sanitation in Maidstone Town was also most unsatisfactory. Nearly half of the houses with WCs had no means of mechanical flushing, and 4000 of the 6000 houses had WCs connected to imperfectly flushed drains (Report, 1898).

Typhoid vaccination

A successful trial of a typhoid vaccine was carried out among the staff at the Barming asylum by Prof A (later Sir Almroth) Wright. This led to its general use in the armed forces

Local response

At the peak of the epidemic, on 20 September, the supply from the Tutsham springs was cut off, followed, a few days later by closure of other local supplies. On

16 October the water in the Barming reservoir was treated with chloride of lime and acid, under the supervision of a distinguished pathologist (Dr Sims Woodhead). This may have been the first attempt at the chlorination of a public water supply.

The Town Council issued a handbill, recommending the boiling of all drinking water and milk. A laundry was opened to wash and disinfect (free of charge) all clothing, bedding, etc from houses where there had been cases of typhoid. Such houses were disinfected with sulphur and carbolic acid and cleansed. Emergency hospitals were opened, staffed mainly by volunteer doctors and nurses, some of whom came from London. Local people did their best to help and public subscriptions, to assist the poorer townsfolk were founded. Contributions came from many parts of England (Hales, 1984).

Out-of-town traders and would-be visitors stayed away and trade generally suffered in spite of advertisements in local newspapers that their merchandise was safe and in no way connected with the water supply. Schools were closed; church bells and factory whistles were silent. The law court sessions were transferred to Canterbury and public gatherings were cancelled. There was a marked fall in the numbers of rail passengers to the town. Town councillors and those connected with the Water Company were pilloried in the local press and the events were widely reported in the national press.

The Public Inquiry

There were some initial local difficulties in the setting up of a public inquiry, but it went ahead and reported in 1898. There "was no hesitation on the conclusion that the epidemic was caused by pollution of the water supplied by the Maidstone Company from their Farleigh sources." The Report (1898) was critical of both the Town Council and the Water Company.

Typhoid in Faversham

Although typhoid fever did not reach epidemic proportions in Faversham the Medical Officer of Health reported that there were 103 cases between 1893 and 1906 and the annual variation is of interest:

1893	19	1900	*
1984	'a small number'	1901	*
1895	8	1902	7
1896	2	1903	13
1897	15	1904	16
1898	*	1905	6
1899	*	1906	17

In spite of quite detailed investigation, the Medical Officer and his staff were unable to find any point sources for any of the incidents. The water supplies were tested and any found to be 'suspect' were closed. The sewerage in the town was not of a very high order, affected as it was by the proximity of the Faversham Creek, but was improved by the local authority over the period. It is possible that some, at least, of the 15 cases in 1897 were associated with or secondary to the epidemic in Maidstone in that year, as there was commerce between the two towns. The return to double figures (17) in 1906, however, cannot be explained. After that year, however, the annual numbers returned to single figures, consistent with the general endemicity of typhoid fever at the time.

The reports of the Medical Officer are held by the Faversham Society (www.faversham.org).

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