Topic 9: Improvements in public health

9.1 Public health problems in industrial Britain

Research & Record

Why was public health so poor in industrial Britain?

1 Use the case studies on pages 64 and 65 to record public health problems. You should come up with a long list. Aim to identify at least ten problems.

2 Identify three similarities between the cholera epidemics of the nineteenth century and the Great Plague of London in 1665.

Case Study 1: The Great Stink of 1858

By the 1850s, over 2.5 million people lived in London. It was the largest and wealthiest city in the world, but it was also very unhealthy.

Many Londoners got their drinking water from the River Thames, even though the river was also where they dumped their rubbish – including dead animals and chemicals from factories based by the river. There was no sewage system so human waste ended up in the river as well.

The summer of 1858 was very hot. A thick layer of sewage lay on the water. As temperatures topped 30°C, the smell of the river became unbearable. It became known as the 'Great Stink'. In the Houses of Parliament, MPs found it impossible to use the rooms overlooking the river.

At that time, many people still believed that bad air (miasma) caused disease, so they treated the curtains with chloride of lime. It had little impact and the awful smell remained.

▼ **SOURCE 1** This cartoon was published in *Punch* magazine in June 1858, during the Great Stink. The River Thames is shown as a filthy old man with diseased and deformed offspring

FATHER THAMES INTRODUCING HIS OFFSPRING TO THE FAIR CITY OF LONDON.

(A Design for a Fresco in the New Houses of Parliament.)

9.3 The factors behind public health improvement: Part 2

Research & Record

What factors played the most important role in public health improvements?

Use the timeline below to complete column 3 of the table you started on page 66.

Think carefully about the words you use to evaluate the importance of each factor. Which factors were essential to public health improvement? Which factor was important?

Essential	No change could have happened without it
Important	Without it change might have been less widespread or significant
Minimal	Had only a little impact
No importance	No influence at all

1842 Chadwick's report
(see page 66) highlights the link between illness and poor living conditions.

1848 First Public Health Act
(see page 66) allows, but does not force, councils to make improvements.

1854 John Snow links cholera to infected water
(see page 67). His work showed the importance of using data to study epidemics. It also added to the pressure for clean water and effective sewerage systems.

1858 'The Great Stink'
(see page 64) added to the evidence that London needed a sewer system.

Summarise

The **SEWAGE** memory aid summarises Public Health changes in the nineteenth century.

S = **S**ewers open

E = **E**pidemics, e.g. cholera

W = **W**ater unclean

A = **A**cts by government, e.g. 1848 and 1875

G = **G**erm Theory and Great Stink trigger action

E = **E**ngineers improve sanitation, e.g. Bazalgette

1860s Joseph Bazalgette organises the building of London's sewer system

In the 1850s, many people still believed that bad air (miasma) carried disease, so Londoners were scared by the Great Stink. This chance event forced MPs to take action to clean up the River Thames. They approved money to pay for a new sewage system for London.

It was a major engineering achievement which is still in use today. All London's sewage was pumped out of the city through:

- 83 miles of large sewers, built underground from brick
- 1100 miles of smaller connecting sewers from each street
- pumping stations at regular points to pump the sewage along the pipes.

This project was led by **Joseph Bazalgette**. During the Industrial Revolution, there had been great improvements in technology and engineering. Bazalgette used what he had learned in railway building to design and manage this project.

Most of the work was complete by 1865 and it led to significant improvements in the public health of London. But there was no public health act to enforce improvements throughout the country.

1875 A new and more effective Public Health Act

The 1875 Public Health Act finally **forced** local councils to improve public health. After this turning point, it was compulsory for local councils in each city or town to:

- improve sewers and drainage
- provide fresh water supplies
- appoint medical officers and sanitary inspectors to inspect public health facilities.

1875 Octavia Hill shows how to provide healthy homes for working people

Octavia Hill started teaching poor children when she was only fourteen. She was appalled by their homes. She bought three London slum houses in 1865 and cleaned them up to show others how to provide healthy homes for working people and stop overcrowding. Over time, she bought and improved over 2000 houses. This led to similar schemes elsewhere and she went on to campaign for laws which would force local councils to improve housing.

The Artisans' Dwellings Act

Octavia Hill's influence helped persuade the government to pass the 1875 Artisans' Dwelling Act, giving councils the power to knock down slum housing if it was believed to be unhealthy.

1860s Pasteur's Germ Theory

Pasteur proved that there was a link between dirt and disease. The theory that illness was caused by 'bad air' finally faded away. This was a turning point. Faced with scientific proof, people were more willing to pay taxes to cover the costs of cleaning up their towns and cities, and more councils accepted responsibility to improve public health.

1867 Working men get the vote

The number of voters doubled. Now, if politicians wanted to win elections, they had to promise to do things to help working men, not just the wealthy and middle classes. The 1870s and 1880s saw many new laws passed designed to improve the lives of ordinary people.

1875–1900 More laws to improve public health

Laws were passed to:

- stop the pollution of rivers (from which people got water)
- shorten working hours in factories for women and children
- make it illegal to put unhealthy additives in food
- make education compulsory.

9.4 Nineteenth century period review

Review

What factors led to improvements in medicine and public health during the nineteenth century?

Fill in a table like the one below to review the period. Use the cards at the bottom of the page to guide you.

Theme	Improvements during the nineteenth century	Key individuals	Other factors
Knowledge about the causes of illness	Reached a turning point. • From 1860s, the Germ Theory replaced bad air as an explanation for disease. • Microbes that cause individual diseases were identified.		
Treatments	More continuity than change. • Everyday treatments remained the same. Patent medicines often worthless. (NB: Chemical cures (magic bullets) and antibiotics did not appear until the twentieth century.)		
Methods of preventing disease	Significant improvements after 1860s. • Smallpox vaccination made compulsory. • Other vaccinations developed (e.g. anthrax, rabies).		
Surgery	Revolutionised after c1840. • Dealing with pain: anaesthetics (e.g. ether, chloroform). • Dealing with infection: use of carbolic acid; start of aseptic surgery.		
Public health	Improvements from c1840s. Major turning point in 1875. • 1860s London sewer system. • 1875 Public Health Act. Government forces councils to take responsibility.		

Factor: individuals
- Louis Pasteur
- Robert Koch
- James Simpson
- Joseph Lister
- John Snow
- Joseph Bazalgette

Factor: government
- Political change (vote given to working-class men)
- Public Health Act of 1848
- Public Health Act of 1875

Factor: chance
- Cholera epidemics
- The Great Stink

Factor: science & technology
- Better microscopes
- Improvements in chemistry
- Improvements in engineering

Factor: communication
- Jenner's work (read and used by …)
- Pasteur's work (read and used by …)

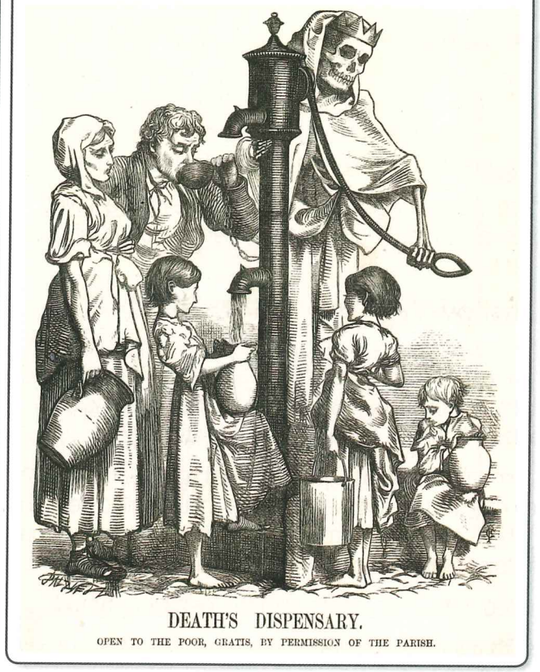
Apply Exam Practice

Revisiting questions 1–3

Question 1: How useful?

How useful is Source 1 to a historian studying public health in the nineteenth century? (8 marks)

▼ **SOURCE 1** This cartoon is called 'Death's Dispensary'. It was published in 1866



Question 2: Significance

Explain the significance of the Germ Theory in the development of medicine in Britain. (8 marks)

Question 3: Comparisons

Compare surgery at the time of Paré with surgery in the early 1800s. How was it similar? (8 marks)

Exam Tips

Question 1

Look again at the advice on how to approach this type of question on page 33.

Remember to focus on **why** the source is useful and to use your knowledge of the period.

- The date the cartoon was published is very important.
- It shows that by the 1860s people had accepted John Snow's theory that dirty water caused death.

It also shows that despite Snow's work, major public health improvements had still not been made. Remember that there were still cholera epidemics in the 1860s.

Question 2

Look again at the advice on how to approach this type of question on page 35.

Think about how Pasteur's work influenced a range of different areas of medicine.

Remember to explain the:

- Immediate impact – How did Pasteur's work change ideas about the cause of disease?
- Medium-term impact – How did the Germ Theory lead to microbe hunting, vaccinations and improvements in surgery?
- Longer-term significance – Why was Pasteur's research essential for the development of chemical cures and antibiotics?

Question 3

Look again at the advice on how to approach this type of question on page 43.

For a strong answer, do not write one paragraph describing surgery at the time of Paré and one paragraph about surgery at the end of the 1800s. Instead, make direct comparisons. For example:

- One paragraph could focus on the problem of pain.
- The second paragraph could focus on the problem of infection.

11.2 Pasteur and the germ theory

Spontaneous generation

By 1800 most scientists and doctors knew that micro-organisms called germs or microbes existed, but many of them thought germs were the *result* of disease, not the *cause* of it. This idea was called spontaneous generation. Some believed that disease was caused by gases, called miasmas, others believed different theories, but none of them thought germs were the cause.

Pasteur and the germ theory

Louis Pasteur was the scientist who made the first links between germs and disease. He did not set out to do this. His research was driven by the needs of businesses that asked him to solve a particular problem. In 1857 he began to investigate a problem in the brewing industry. Sugar beet, used to make alcohol, often went sour during fermentation and could not be used. Pasteur examined samples of the sour liquid under a microscope. He thought the souring was caused by germs in the air. He proved this by experimenting with water in a swan-neck flask. When the water was heated the warm air was pushed out of the flask around the bend in the neck. The curved neck then trapped the air and the germs it carried. When the neck was broken the air (and germs) rushed in and decay set in. When this discovery was announced many scientists and doctors refused to believe it. Even when Pasteur successfully carried out the experiment in public, some of them still clung to the spontaneous generation theory. Other doctors and scientists saw he had made a definite link between germs and decay.

In 1865 Pasteur began to study *pébrine*, a silkworm disease. His studies were disrupted by the deaths of his father and two of his daughters but, by 1867, he was able to demonstrate that germs were the cause of *pébrine*. The link between germs and disease had been made.

Source H

I place some liquid in a flask with a long neck. I boil it and let it cool. In a few days little animals will grow in it. But by boiling it I had killed the germs. If I repeat the experiment but draw the neck into a curve, but still open, the liquid will remain pure for three or four years. What difference is there between them? They both contain the same liquid and they both contain air. It is that in one the dust in the air and its germs can fall in, in the other they cannot. I have kept germs out of it and, therefore, have kept Life from it – for Life is a germ and a germ is Life.

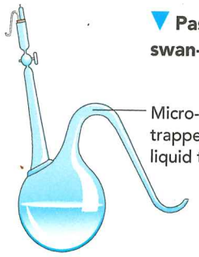
▲ **Pasteur's description of the experiment he carried out in public at the University of Paris on 7 April 1864.**

LOUIS PASTEUR
(1822–95)

Louis Pasteur was a French chemist. In 1849 he was made Professor of Chemistry at Strasbourg, and in 1854 he moved to Lille. He was the first person to prove the connection between germs and decay and then the connection between germs and disease.

Pasteur made many of his investigations for businesses who had problems that were losing them money. His researches were not always continuous. His work on silkworm disease, begun in 1865, was interrupted by deaths in his family. In 1868 a brain haemorrhage left him paralysed on one side. He stopped working, but by 1877 he was back, investigating anthrax.

His investigations of animal diseases had good results. He discovered vaccines for chicken cholera (1880), anthrax (1881) and rabies (1885). The deaths of two of his daughters from typhoid fever may have started his investigations into human disease. He tried to produce a cholera vaccine as early as 1865, but failed. In 1888 the French government set up the *Institut Pasteur*, for Pasteur and others to further medical research.



▼ **Pasteur's swan-neck flask.**

Source I

▲ **This contemporary engraving shows Pasteur working in his laboratory. This was produced when Pasteur had become famous as a chemist.**

11.3 Robert Koch

By 1870, Pasteur had shown the connection between germs and decay and disease. The next step, linking a particular germ or microbe to a particular disease, was made by a German doctor, Robert Koch, who had the detailed medical knowledge that Pasteur, a chemist, lacked. In 1872 Koch began to study anthrax, a fatal disease which affected cattle and sheep. It could spread to humans. By 1875 he had identified the microbe by studying the blood of affected and unaffected animals.

Koch moved on to study the germ that caused blood poisoning and septicemia in wounds. This microbe was impossible to see at first, even with a microscope. New technology came to his aid. He used new industrial dyes to stain the microbe. Now it could be seen. He devised a way to grow the germs and then used his daughter's pet mice to experiment with the germ. Soon Koch had a fluid that contained only one kind of germ. Mice injected with the fluid developed septicemia. Koch knew he had to ***prove*** he had the right germ. Again, new technology helped. He connected a new kind of lens to his microscope and photographed the whole process.

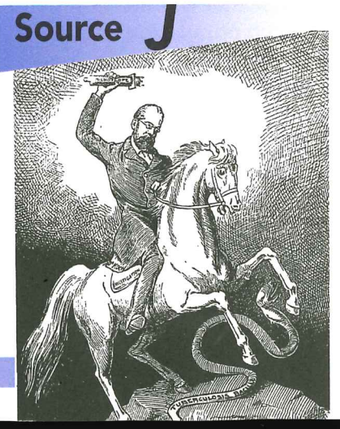
Koch developed superb experimental methods. As well as the use of dyes and photography, he developed a **solid culture** to breed colonies of germs on. This was more reliable than Pasteur's liquid culture. Koch went on to isolate other germs. In 1882 he discovered the germ that caused tuberculosis (TB) and in 1883 he identified the germ that caused cholera.

ROBERT KOCH
(1843–1910)

Robert Koch was born near Hanover. He graduated in medicine from Gottingen University and went to work in Hamburg in 1866. He joined the Prussian army in the war against France in 1870. The French were beaten within six months. After that he became the medical officer in Wollstein, a town near the border with Poland. His wife bought him a microscope for his 29th birthday. It was to affect his life greatly. He went on to be a pioneer of the new science of bacteriology, proving that one specific germ could cause a particular disease in animals and humans. He identified the microbes which caused TB (1882) and cholera (1883). His work caused the German government to set up the Institute for Infectious Diseases in Berlin in 1891. Koch won the Nobel prize in 1905 for his work.

▼ **Robert Koch is shown as St George defeating tuberculosis.**

Source J



Microbe hunters

The work of Pasteur and Koch meant that the real cause of disease was known at last. Pasteur's advice to 'seek the microbe' was followed and the new science of bacteriology was established. 'Microbe hunters' became the stars of scientific research. The chart below lists some of the other microbes (or germs) which were found.

Year	Microbe discovered	Name of scientist
1879	Leprosy	Hansen
1880	Typhoid	Eberth
1882	Diphtheria	Klebs
1884	Tetanus	Nicholaier
1884	Pneumonia	Frankael
1894	Plague	Kitasato and Yersin

The discovery of specific microbes led on to the production of vaccines and, later, the pioneering of chemotherapy. The mass murderers of earlier times were being controlled.

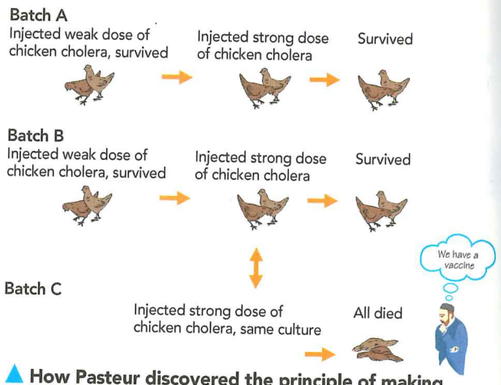
11.4 Vaccines

Chicken cholera

Pasteur read of Koch's achievements. He was determined to make more discoveries, to win prestige for France which had lost land to Germany at the end of the Franco-Prussian war of 1870–1. Pasteur built up a research team and, in 1877, began work on the anthrax germ. In 1880 he was asked to stop work on anthrax and investigate chicken cholera, a disease that was sweeping through the chicken population and losing French poultry farmers a lot of money. Pasteur and his team needed a liquid culture that the germ (already isolated by the professor of a veterinary school in Toulouse) would grow in. The usual liquids, water, urine, yeast, did not work. A sterile broth of chicken gristle and potash did. Now the disease had to be passed on to other chickens. One of Pasteur's team, Charles Chamberland, was responsible for injecting the chickens.

PASTEUR'S TEAM

Charles Chamberland (left) was one of the scientists who were attracted to work in Pasteur's team. Often they gave up more comfortable careers elsewhere to take part. Others included Emile Roux, who discovered the diphtheria toxin, Alexander Yersin, the Swiss scientist, who discovered the bubonic plague **bacillus**, and Albert Calmette, who became director of the Pasteur Institute, and, together with Camille Gurin, found the vaccine for tuberculosis.



▲ **How Pasteur discovered the principle of making vaccines from the germs of the disease chicken cholera.**

Pasteur gave Chamberland the liquid culture, but Chamberland, who was going on holiday, forgot to inject the chickens. The liquid stood uncovered on the bench for many days. Chamberland injected the chickens when he returned, but they did not die. He told Pasteur what had happened. Pasteur told him to inject the chickens with a fresh, strong culture. The chickens still did not die. Pasteur left a culture exposed to air for several days. New chickens were injected with this culture and did not die. Pasteur then injected these chickens and a new batch with a fresh culture. The new chickens died. Those who had been injected with the exposed culture did not. The germs had been weakened by exposure to air. They were not strong enough to kill, but they were strong enough to give immunity to a strong dose. This is the principle of **attenuation**. Pasteur called this culture 'vaccine' as a tribute to Jenner.

Anthrax – the experiment at Pouilly-le-Fort

After the discovery of the chicken cholera vaccine Pasteur was determined to try and find a vaccine for anthrax. His team, led by Dr Emile Roux, managed to produce a weakened strain of anthrax by keeping the germs at a temperature of 42–3°C over a period of eight days.

In 1881 Monsieur Rossignol, a French journalist, challenged Pasteur to test out the vaccine in public. Pasteur accepted and the tests were set for 5 May on Rossignol's farm at Pouilly-le-Fort, near Paris. The event attracted huge interest throughout Europe and was attended by politicians, farmers and journalists. Pasteur was provided with sixty sheep, twenty-five of which would be vaccinated and then given deadly anthrax germs. Another twenty-five would just be given a fatal dose of anthrax. The remaining ten sheep were left alone so that they could be compared with any survivors. The experiment was carried out. By 2 June the unvaccinated sheep were dead and those that had been vaccinated were fit and well. It was a complete triumph. Reports of the event were sent by electric telegraph on the very same day. The world soon knew of Pasteur's success (see Source L). Robert Koch also tried to find a vaccine for anthrax, but failed. He resorted to attacking Pasteur in the medical press.

Pasteur's vaccine greatly reduced the death rate from anthrax in animals and saved the French farming industry large amounts of money.

These experiments on animals were important in human medicine too. Once people were confident that vaccination worked on animals they were more likely to accept human vaccination. Also, the techniques and equipment developed would be the same whether the patient was a chicken, a sheep or a person.

Source K

Will you have some microbe? There is some everywhere. Microbiolatry [the worship of microbes] is the fashion, it reigns undisputed; it is a doctrine which must not even be discussed, especially when its Pontiff [Pope], the learned Monsieur Pasteur, has pronounced the holy words, 'I have spoken.' The microbe alone is and shall be the characteristic of a disease; that is understood and settled; the microbe alone is true, and Pasteur is its prophet.

▲ **The article in the *Veterinary Press*, 31 January, 1881, in which Monsieur Rossignol ridiculed the germ theory and which led to the challenge at Pouilly-le-Fort.**

Source L

Paris 2 June. 9.30pm [by telegraph from our correspondents]

Today I went to Pouilly-le-Fort to see the result of an experiment by M. Pasteur . . . On 5 May, 25 sheep were marked with a hole in their ear and inoculated with [anthrax vaccine]. On 31 May all 50 sheep were inoculated with the strongest [anthrax] virus. M. Pasteur predicted that today [2 June] the sheep not inoculated with the vaccine would be dead and the others would show no symptoms of sickness. As M. Pasteur foretold at two o'clock 23 sheep were dead. Two more died an hour later. The sheep which had been vaccinated frolicked and gave signs of perfect health. Farmers now know that a perfect prevention exists against anthrax.

▲ **A report from *The Times*, Friday 3 June 1881, describing Pasteur's anthrax experiment at Pouilly-le-Fort.**

QUESTIONS

1 Did the hostility between Pasteur and Koch help or hinder progress? Explain your answer.

2 How did communications such as railways, the press and electric telegraph, help medical progress?

Rabies

In 1882 Pasteur's team got set to produce a vaccine for rabies, a terrible disease that is always fatal once symptoms develop. Emile Roux made most progress in early studies, devising a way of drying rabbits' spines in a glass flask to see how long the rabies virus remained dangerous. Pasteur saw this and copied Roux's idea. It caused a furious row, but Pasteur began to test the vaccine on animals. He administered a series of injections starting with spines that had been drying for fourteen days which would not pass the disease on. The next injection was made using a thirteen day old spine and so on until the last injection used a fresh spine which would definitely cause the disease. This gradual increase of virulent germs resulted in immunity. The team, and Pasteur himself, had doubts about this method but, in 1885, their hand was forced by a chance happening. A mother turned up at Pasteur's laboratory on 6 July. She had come from Alsace with her son who was covered in bites from a rabid dog. Joseph Meister was doomed unless Pasteur tried the untested vaccine. Dr Vulpian and Dr Grancher advised Pasteur to try. The boy was given a series of injections, which proved to be successful (Source N).

Diphtheria

The diphtheria bacillus was discovered by a German doctor, Edwin Klebs. Freidrich Loeffler bred them but could not work out how they killed. He guessed that they produced some kind of toxin or poison. The search was taken up by Roux who was able to prove that it was the toxin, not the germs, that was fatal. Emil von Behring, a former member of Koch's team, developed a serum from the blood of animals that survived the disease, which he called 'anti-toxin'. Once injected, this prevented the bacillus from producing toxin within the body. The disease was conquered not by one person but by several, all building upon the discoveries of the others.

Tuberculosis

Koch tested a vaccine for tuberculosis (TB), called 'tuberculin', which seemed to work on animals. The German government pushed him to announce the success at the 10th International Medical Congress in 1890. It caused great excitement and thousands of sufferers flocked to Berlin for treatment. Tuberculin, however, did not work and Koch was blamed. His career waned but his team continued to succeed.

Government help

The governments of France and Germany realized how the work of Pasteur and Koch brought national prestige. Both men were given research institutes to carry out their work.

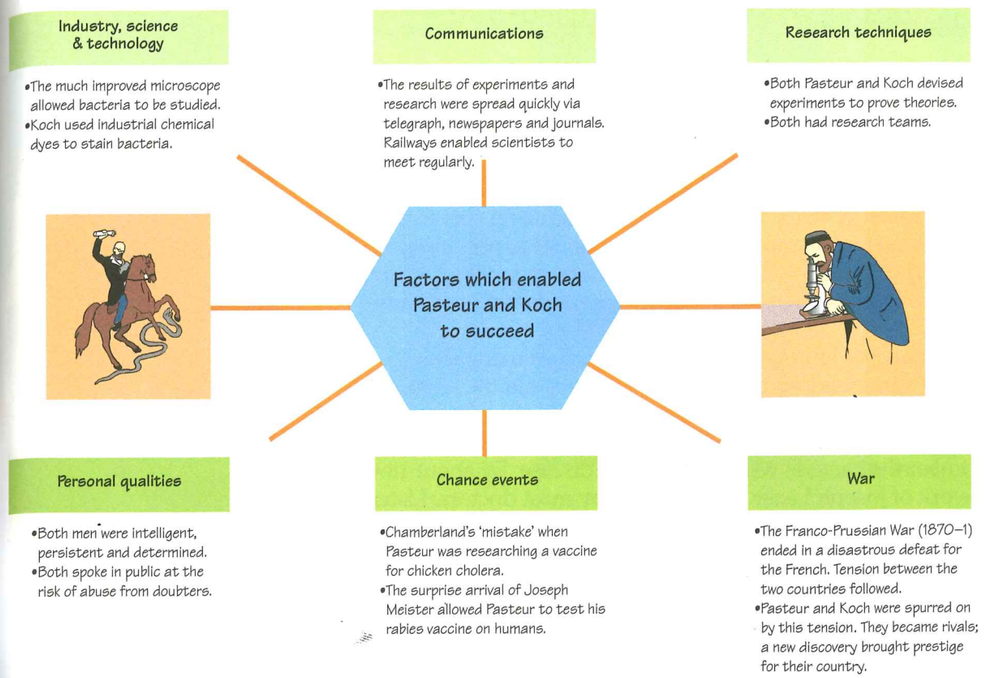
Source M

▲ **Removing saliva from a rabid dog. This engraving shows the risks taken by Pasteur's team.**

Source N

Joseph Meister, aged nine years, was bitten on 4 July, at eight o'clock in the morning. This child had been knocked over by the dog and showed numerous bites, on the hands, legs and thighs, some so deep as to make walking difficult. The dog was certainly rabid. Joseph Meister had been pulled out from him covered in foam and blood. The death of this child being certain, I decided to try the method which had been successful with dogs. Young Meister was inoculated under a fold of skin with half a syringeful of the spinal cord of a rabbit which had died of rabies and had been preserved for fifteen days in a flask of dry air. Joseph Meister has survived not only the rabies from the bites but also the rabies with which I inoculated him.

▲ **Pasteur's description of the rabies injection, from *A Lecture on the Prevention of Rabies*, 1885.**



QUESTIONS

1 Look back through this chapter and list the achievements of Pasteur and Koch with their dates.

2 a What was the germ theory of disease?

b Explain how the germ theory opened the way for further progress in medicine.

c Why did some people oppose the germ theory?

3 What personal qualities did Pasteur and Koch have which enabled them to succeed in their research?

4 Did chance play a part in the production of vaccines? Explain your answer.

5 Out of all the factors which enabled Pasteur and Koch to succeed, which do you think was the most important?

6 Study Source J on page 85 and Source M on page 88. Why do you think such pictures were made?

SUMMARY

- In 1850 there were still several different ideas about what caused disease.
- Pasteur was asked by Monsieur Bigo to explain why his alcohol fermentation had gone bad. His experiments showed that germs caused decay.
- Pasteur demonstrated that germs caused disease in animals.
- Robert Koch was able to prove that each type of germ caused a specific disease by his work on anthrax.
- A variety of factors enabled these pioneers to make their discoveries.
  - Both Pasteur and Koch built teams of scientists and doctors to help their developments.
  - Individual genius enabled them to recognize opportunities for progress.
  - Development did not happen in isolation. Communications enabled pioneers to improve upon each other's discoveries.

Early successes

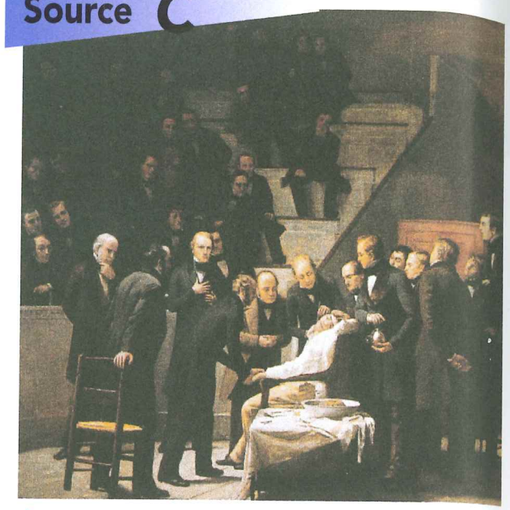
During the early-1840s a number of experiments were made to find an effective anaesthetic. In 1842 the American doctor, Crawford Long, found that ether was a useful anaesthetic, but did not publicly announce his discovery.

On 10 December 1845 an American dentist, Horace Wells, saw people inhaling nitrous oxide at a fair. He noticed that they could injure themselves, but felt no pain. The next day, Wells had a tooth painlessly taken out after inhaling the gas. He tried to demonstrate painless tooth extraction to some medical students at a Hospital in Boston, USA. What he did not know was that some people are not affected by nitrous oxide. Wells' volunteer yelled as the tooth was taken out. The students left shouting 'Humbug! Humbug!'

On 16 October 1846 William Thomas Green Morton (1819–68) persuaded John Warren, the head surgeon at the Boston Hospital, to carry out an operation in public using ether as an anaesthetic. The patient, Gilbert Abbott, was given ether through an inhaler by Morton. Warren proceeded to remove a tumour painlessly from his neck. Warren turned to his audience and announced: 'Gentlemen, this is no humbug!'

News of Warren's success spread quickly to Europe. By 18 October, a Dr Bigelow, who had seen the operation, had published an article on it. On 3 December a steamship carried a letter from Bigelow to a Dr Boot in London. By 19 December Dr Boot had extracted a tooth using ether – and had written an article about it. On 21 December the surgeon, Robert Liston, successfully amputated the leg of Frederick Churchill (a butler) using ether as an anaesthetic. Liston removed the leg in 26 seconds! With the leg already on the floor, Churchill raised his head and asked Liston when he was going to begin the operation.

Source C



▲ **Warren's operation on Gilbert Abbott, 16 October 1846, painted by Robert Hinckley in 1882.**

Source D

This Yankee dodge, gentlemen, beats mesmerism hollow!

▲ **A remark made by Robert Liston to the audience after his public operation on Frederick Churchill at the University College Hospital, London.**

QUESTIONS

1 What problems of surgery are shown in Source A?

2 Make out a chart, like the one below, to record the times when experiments were made with anaesthetics.

Date	Event	Person(s) involved

3 Source C is a painting completed after the event. Is it a reliable source of evidence for a historian? Explain your answer.

4 Study Source D. What do you think Liston meant?

James Simpson and chloroform

James Young Simpson (1811–70), Professor of Midwifery at Edinburgh University, wanted to find something which relieved pain during childbirth. He disliked ether because it was inflammable, had a pungent smell and, when inhaled, irritated the lungs making the patient cough. He began to test the effects of different chemicals. On 4 November 1847 Simpson and two other doctors discovered the effects of chloroform (see Source E). Simpson found chloroform easier to administer than ether. Less of it was needed and it appeared to take effect more quickly. By the end of November he had given chloroform to more than 50 patients and he declared himself pleased with the outcome.

Opposition to anaesthetics

These anaesthetics meant painless operations, but they were not welcomed by everyone.

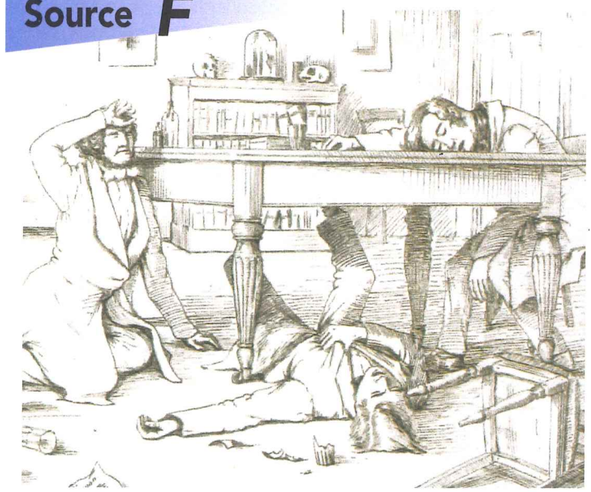
- Some people worried that surgeons were too inexperienced. They were unsure as to the correct amount to give or of any side effects they could have. There were even instances of explosions in operating theatres caused by the use of ether. Their fears appeared to be realized when, in 1848, Hannah Green, aged fifteen, died from an overdose of chloroform. Deaths also occurred from the overuse of ether.
- Members of the Calvinist Church in Scotland were outraged at the use of chloroform in childbirth. They pointed to the Book of Genesis where God says to Eve: 'In sorrow shalt thou bring forth children.' In other words, God intended women to bear pain when giving birth.
- Some people were worried that anaesthetics placed the patient under the total control of the surgeons. What if they did something against the patient's will?
- In the army some officers regarded the use of anaesthetics as 'soft'. In 1854 John Hall, Chief of Medical Staff in the Crimea, told his team of doctors: 'A good hand on the knife is stimulating. It is much better to hear a fellow shouting with all his might than to see him sink quietly into his grave.'

Source E

Late one evening Dr Simpson with his two friends and assistants, sat down to their somewhat hazardous work in Dr Simpson's dining room. Having sniffed several substances, but without much effect, it occurred to Dr Simpson to try a material which he had regarded as likely to be of no use whatever; that happened to be a small bottle of chloroform. It was searched for and recovered from beneath a heap of waste paper. [They inhaled the chloroform and passed out.] On awakening Dr Simpson's first thought was, 'This is far stronger and better than ether.'

▲ **From H. L. Gordon, *Sir James Young Simpson and Chloroform*, 1897.**

Source F



▲ **A 19th century drawing showing the effect of inhaling chloroform on Simpson and his assistants.**

The royal seal of approval!

Some of this opposition disappeared when, on 7 April 1853, Queen Victoria was given chloroform during the birth of her eighth child, Prince Leopold. The anaesthetist was Dr John Snow, later to do vital research into cholera. The Queen wrote in her journal that chloroform was 'soothing, quietening and delightful beyond measure.' Chloroform became socially more acceptable as a result of the Queen's experience. It became the most popular anaesthetic until about 1900, when it was realized that it could damage the liver. Surgeons then returned to using ether.

Anaesthetics from the late-19th century to the present day

Even though anaesthetics came to be accepted, there were still problems in using them. Massive amounts were often needed, not to prevent pain, but to relax the muscles. Patients became saturated and slept for hours, even days. Recovery was slow and there were frequent complications.

From the end of the 19th century, anaesthetists became specialists. New substances were discovered and put into use. In 1884 cocaine was first used as a local anaesthetic, numbing one part of the body while the patient remained conscious. In Germany, in 1905, novocaine was proved to be more effective than cocaine. In 1942 curare, a South American poison, was first used as a muscle relaxant during operations; it remains in use today. A skilled anaesthetist is now a crucial member of the surgical team, responsible for monitoring the patient's well-being during operations.

Source G

▲ **A chloroform inhaler from 1879. It consists of a cotton facemask on to which the chloroform was poured.**

QUESTIONS

1 Why did Simpson dislike ether?

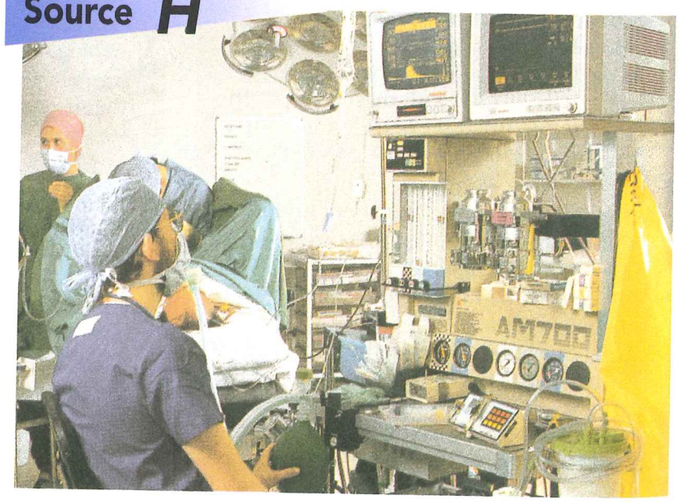
2 Does Source E show that chance played a part in the discovery of chloroform?

3 What other factors enabled Simpson to make his discovery?

4 a Why was there such fierce opposition to anaesthetics?

b How was this opposition overcome?

Source H



▶ **Modern anaesthetists at work. Anaesthetists now monitor heart beat, blood pressure, breathing patterns and brain waves using high-technology equipment.**

12.2 The problem of infection

The problem of infection

The period between the first use of ether as an anaesthetic in 1846 and about 1870 has been called the 'black period' of surgery. The removal of pain made surgeons over confident and they performed many operations that they would not have attempted before anaesthetics. Operations, however, were still carried out in unhygienic conditions. Surgeons wore their everyday clothes when operating and instruments were not sterilized between operations. Before Pasteur proved the germ theory the need for cleanliness was not understood. As a result, many patients died from the infections that developed after the operation.

Ignaz Semmelweiss

Semmelweiss was a young Hungarian doctor working in Vienna in the 1840s. He was worried about the high death rate of women from puerperal fever, an infection which set in after childbirth. Some doctors believed this was spread by miasmas present in the air of hospital wards. In 1847 Semmelweiss suggested that the doctors themselves might be spreading the infection by examining patients immediately after dissecting the dead bodies of victims of the disease. He ordered the doctors to wash their hands in a solution of chloride of lime before examining patients. This was unpleasant and many doctors resented it. But the death rate from puerperal fever in these wards fell dramatically. Other doctors did not accept Semmelweiss' method. The high death rates continued in most places.

Joseph Lister and antiseptics

The breakthrough in preventing infection was made by Joseph Lister. He had read of Pasteur's research and he realized that the infections that were killing his patients were caused by germs. To kill any germs that were present he decided to use carbolic acid, a disinfectant that was used to combat the smell at sewage works. He knew that the smell of rotting sewage and the operating theatre were similar. First he used bandages soaked in the acid, then he developed his technique to include a spray that drenched the air, the surgeon's hands, the instruments and the patient. This was unpleasant for surgeons but the results were remarkable. Mortality plummeted and when Lister died in 1912, ten times as many operations were being performed as there had been in 1867. Surgeons were able, for the first time, to operate without fear of infection killing the patient. The combination of anaesthetics and antiseptics meant that surgery was now much safer.

JOSEPH LISTER
(1828–1912)

Joseph Lister came from a well off family in Essex. By the time he was 33, he was Professor of Surgery at Glasgow University. Although, at first, many doctors opposed his ideas, Lister was recognized for making one of the greatest advances ever in surgery.

The figures below come from his records of amputations.

Date	No. of patients	% died
1864–6 (no antiseptics)	35	46%
1867–70 (antiseptics)	40	15%

Source I

Lister's creativity was a simple process. Chance had not helped in his discovery. He had read of the germ theory of disease and had applied it. The only significant piece of luck involved was the sweeping effects of the consequences. Millions of lives were saved by the new principle of **antisepsis** [the use of antiseptics to kill germs] and what followed it. The frightful spectre which had haunted operating theatres had at last been shown to have an organic cause, and Lister had shown how to defeat it.

▲ **Robert Reid, *Microbes and Men*, 1974.**

Source J

▲ An antiseptic operation in Aberdeen in the 1880s. Lister's steam carbolic spray is being used.

Source K

Despite the [support] of statistical evidence, Lister's method met with interference and even violent opposition ... Fully twenty years of patient trial, improvement, demonstration and education were needed before British surgeons were won over to the idea, and not before many senior members of the profession had been replaced by a younger generation.

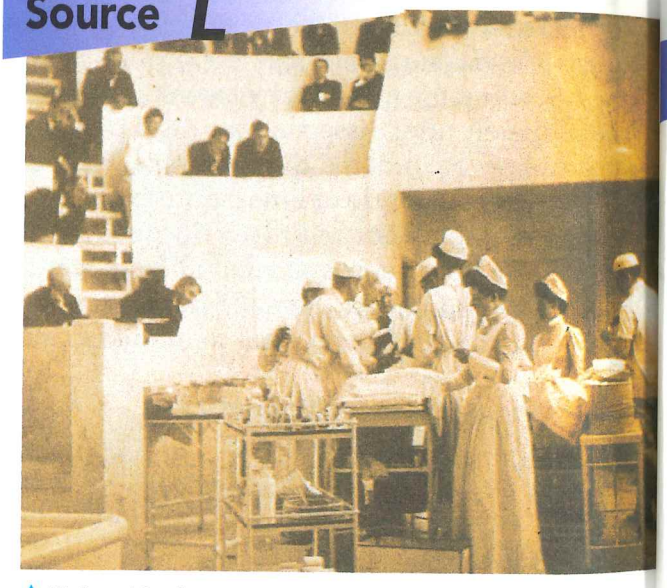
▲ Leo M. Zimmermann and Ilza Veith, *Great Ideas in the History of Surgery*, 1961.

From antiseptic to aseptic surgery

Antiseptic surgery had its drawbacks, not least being the discomfort felt by surgeons and nurses whose skin was burnt by the carbolic acid and lungs irritated by the spray. Rather than trying to fight germs, surgeons in Germany developed techniques for keeping them away. This is known as **asepsis** and aseptic surgery quickly became the normal procedure in the operating theatre. The idea of scrupulous cleanliness originated with Professor Neuber and was developed by Ernst Bergmann. Surgeons' hands, clothes and instruments were all sterilized. A chamber was used to pass superheated steam over the instruments, thus killing the germs without the need for disinfecting chemicals.

The 'father' of American surgery, William S. Halsted, introduced a further innovation. In 1889 his nurse, Caroline Hampton, complained that antiseptic chemicals were harming her hands. Halsted asked the Goodyear Rubber Company to make some gloves. He had a particular interest as he was to marry Nurse Hampton in 1890. Halsted realized that the gloves were protecting the patient as well as the nurse. He followed this by introducing caps, masks and gowns for surgery. Halsted also investigated cocaine as an anaesthetic but became a drug addict, taking both cocaine and morphine.

Source L



▲ Halsted in the operating theatre at the Johns Hopkins Medical School, Baltimore, USA. He operated and taught his students at the same time.

Today instruments are pre-packed in sterile containers. The air is sterilized before it enters the operating theatre. Some operations, especially on babies or for joint replacement, take place in sterile 'tents' to ensure that there is no risk of infection.

.4 Nursing after 1850

1850, nursing was looked upon as a lowly occupation. Nurses re generally portrayed as uneducated and slovenly and they d a reputation for heavy drinking. This image, however, was t totally fair. The conditions under which they worked were en appalling and there was no proper training available. At iserwerth in Germany, however, the local pastor, Theodor edner, set up a small hospital and training school in 1853. e insisted that his nurses be of 'good character'. Elizabeth Fry, mous for her attempts to reform prison conditions in London's ewgate gaol, visited Kaiserwerth in 1840. She was so impressed at on her return to England she founded Britain's first nursing hool, the Institute of Nursing Sisters. During the second half of e 19th century nursing underwent a revolution and developed to a respected profession. How did this change come about?

he Crimean War (1854–6): a tale of two women

orence Nightingale (1820–1910) came from a wealthy middle-ass family. In 1844 she told her parents that she wanted to enter rsing. Her parents naturally had a low opinion of nurses and it ok Florence seven years of determined effort to persuade them agree. She then visited Kaiserwerth, travelling on to Paris to udy nursing. In 1853 she became the Superintendent at the stitution for the Care of Sick Gentlewomen in Harley Street, ondon which she ran very efficiently. By now she was fully mmitted to a career involving the training of nurses.

March 1854 Britain, along with France and Turkey, went to war gainst Russia. The war was fought in the Crimea, a peninsula on e Black Sea, three thousand miles from Britain. A scandal broke hen the public read the reports of William Russell, the war rrespondent of *The Times* newspaper. He told of chaotic nditions in the Barrack Hospital in Scutari near Constantinople. Wounded British troops were being kept in overcrowded and lthy conditions. There were no nursing staff, no bandages and nen were dying in agony.

Nightingale's work at Scutari

The Secretary of War, Sidney Herbert, who was a friend of the Nightingale family, wrote to ask Florence if she would 'go and uperintend the whole thing'. She agreed to Herbert's request and, n the autumn of 1854, departed for Scutari in Turkey with a team f 38 nurses whom she had personally selected. When they rrived in Scutari, they were not warmly welcomed by the army doctors who felt that female nurses were 'unfavourable to military discipline and to the recovery of the patients'. Despite this undercurrent of hostility, Nightingale made sure that the wards were clean, the patients well fed, the sanitation and water supply improved and that supplies were plentiful. By early 1856 the death rate in the hospital had fallen from 42 per cent to 2 per cent.

Source S

▲ **This illustration shows how nurses were often portrayed in the 19th century – old and unattractive and possibly drunk.**

Source T

She was a woman of iron will and imposed her ideas of nursing and medical care on those in authority and on her nurses. She had friends in the high place of the Cabinet. Through an endless stream of letters ... she determined to improve nursing education and care ... It can only be said that she succeeded mightily, in that every nurse, every patient, every hospital design, the organization of medical and nursing services everywhere, owe something to her ... spirit.

▲ **Philip Rhodes, *An Outline History of Medicine*, 1985.**

Source U

She was a wonderful woman ... All the men ... would seek her advice and use her herbal medicines, in preference to reporting themselves to their own doctors ... Her never failing presence among the wounded after a battle and assisting them made her loved by the rank and file of the whole army.

▲ **Memories of Mary Seacole by a British soldier who fought in the Crimean War.**

The work of Mary Seacole

Mary Jane Seacole (1805–81) was born in Kingston, Jamaica. Her mother ran a boarding house for invalid soldiers where Mary helped to care for the patients. In 1854 she went to England and told the War Office she was willing to go to the Crimea as a nurse. She was rejected and felt that it was because her 'blood flowed beneath a somewhat duskier skin than theirs'. In other words she was a victim of Victorian racism.

Not to be outdone, she made her own way to the Crimea and at her own expense. She set up a medical store and hostel near Balaclava, where soldiers could obtain medicines. She also tended the wounded on the battlefield and became known to the troops as 'Mother Seacole'. She met Florence Nightingale on several occasions but was not invited to join her team of nurses.

Seacole's fortunes after the Crimean War

In 1856 Mary Seacole returned to England but not to a heroine's welcome. She went bankrupt and received a deal of sympathy from the English press, notably *The Times* and *Punch* magazine. A four day festival of music was organized for her benefit in 1857, but it raised only £233. In the same year, Mary published her lifestory (see Source Y) in an effort to raise money. Although she was quite well-off when she died, no one in the medical world had bothered to make use of her nursing skills since the end of the Crimean War.

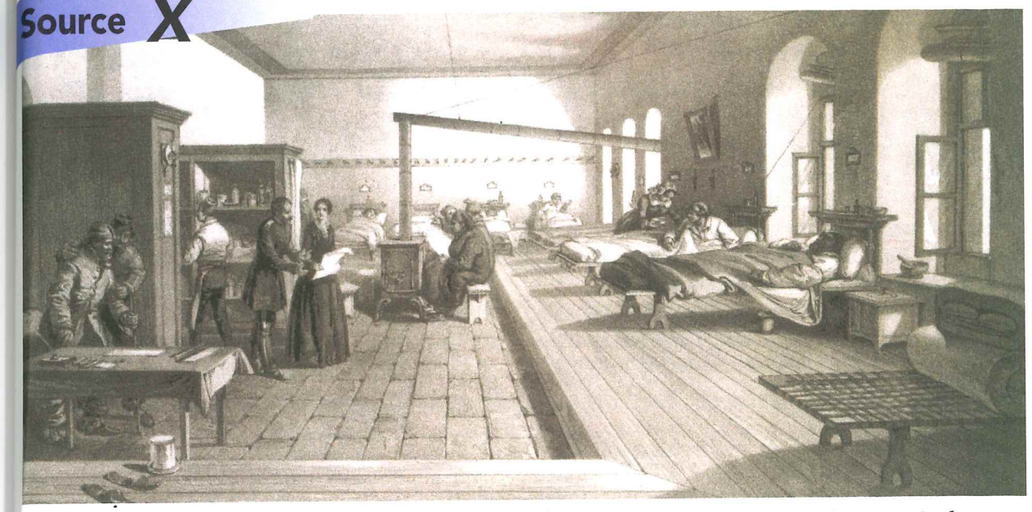
Source V

▲ **A legend grew up around Florence Nightingale. She became known as 'the lady with the lamp' and 'an angel of mercy'. She was said to tour the wards at night making sure the patients were comfortable. This picture was painted by Tomkins in 1855.**

Source W

▲ **A rare portrait of Mary Seacole. It appears on the title page of her autobiography, *The Wonderful Adventures of Mrs Seacole*, published in 1857.**

Source X



▲ **A ward in the military hospital at Scutari, after it had been cleaned and reorganized by Nightingale nurses.**

Nursing becomes a profession

Florence Nightingale returned to England and immediately won huge public acclaim. *The Times*, however, commented: 'While the benevolent deeds of Florence Nightingale are being handed down to posterity ... are the human actions of Mrs Seacole to be entirely forgotten?' (24 November 1856). Nightingale had high hopes that her success in the Crimea would enable her to establish nursing as a respected profession. In 1859 she published a book called *Notes on Nursing* which described her methods. It stressed the importance of professionalism and ward hygiene and became the standard text for trainee nurses.

A public fund was opened to enable Nightingale to develop the training of nurses. It raised £44,000 and the money was used to start up the Nightingale School of Nursing at St Thomas's Hospital in London. It was here that the standards were laid down for the training of nurses. Trainees had to be disciplined and willing to work hard. They served a one-year probationary period and then trained for a further two years in order to qualify. Other training schools followed her example and, by 1900, there were 64,000 trained nurses in Britain.

In 1919 the Registration of Nurses Act was passed which laid down the qualifications needed to enter nursing. Today men also choose nursing as a career and it remains a highly respected profession.

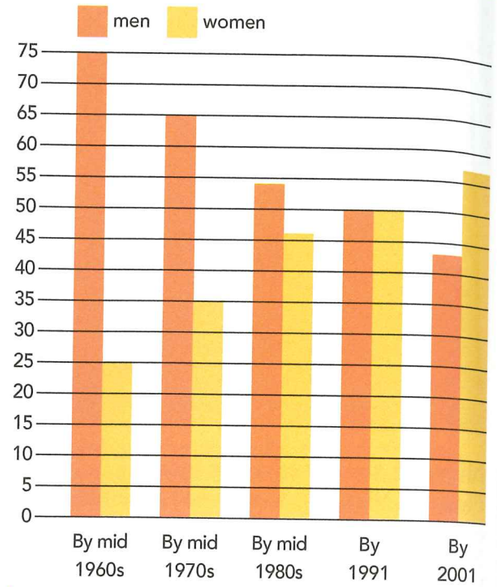
QUESTIONS

1. What were the personal qualities of Florence Nightingale and Mary Seacole?
2. What contribution did each woman make to the nursing of troops during the Crimean War?
3. Was the presence of both women welcomed by the British army? Explain your answer.
4. Which woman is more important in the development of nursing as a profession? Give reasons for your answer.
5. Was a strong personality the only factor in Nightingale's success? Explain your answer.

12.5 Women enter the medical profession

In the mid-19th century women were not allowed to enter the universities. It was impossible, therefore, for them to obtain a degree in medicine and become practising doctors. In 1849 Elizabeth Blackwell, an American woman born in Britain, was awarded a medical degree by a New York college. In Britain most doctors fiercely opposed the entry of women into the medical profession, partly because they believed that women were 'too emotional' to do such important work.

In the 1860s there were signs of a change in society's attitude towards women. By this time, some men were also arguing that women should be emancipated (freed), allowed to vote, and have the same rights to education and a choice of work as men. Elizabeth Garrett Anderson and Sophia Jex-Blake (see boxes) were the first women to gain medical qualifications in Britain and, in doing so, pointed the way to future developments. Women made a vital contribution to the medical services in both the First and Second World Wars and by the mid-20th century, women had made significant progress in being accepted into the medical profession. In 1975 the passing of the Sex Discrimination Act meant that jobs were open to everyone, irrespective of whether they were male or female.



▲ **The percentage proportion of women and men in medical schools in Britain.**

QUESTIONS

1 What factors enabled women to progress in the medical profession?

2 What evidence is there here that there is still progress to be made?

3 Do you agree that since the Sex Discrimination Act of 1975 it has been just as easy for women to succeed in medicine as it is for men? Explain your answer.

Source Y

Inflexible NHS 'holds back' women doctors

Women are being held back in the race to become senior hospital doctors because of the 'working all hours' culture that remains in the NHS.

▲ **An account in a newspaper, 27 June 2001, explaining how women find it difficult to get top jobs in hospitals because of the impact the excessive hours have on their family life. The report suggested that only 17 per cent of consultants in hospitals are women.**

ELIZABETH BLACKWELL:
The first woman doctor

Born: Bristol, 1821.

Career: Elizabeth's family emigrated to the USA. When attending a dying friend, Elizabeth was inspired to become a doctor.

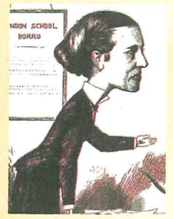
She taught herself enough science to be able to study medicine, but most medical schools refused to admit a woman. After 29 refusals, she was finally accepted by a college in New York State. She graduated top of her class in 1849.

In 1853 she set up a clinic for children in New York and it was whilst working there that she caught an eye infection and had to replace her damaged eye with a glass eye.

In 1859 she travelled to Europe and met Elizabeth Garrett Anderson, who also decided to qualify as a doctor.

Died: 1910.

ELIZABETH GARRETT ANDERSON
(1836–1917)



Born: Whitechapel, London 1836.

Education: Her father was a rich corn and coal merchant and so Elizabeth received a good education at boarding school. In 1859 she met Elizabeth Blackwell and became convinced that she wanted a career in medicine. At first her parents disapproved, but eventually her father supported her efforts to become Britain's first female doctor.

Between 1861 and 1865 she applied to every college and hospital to train as a doctor, but was refused entry.

Career: Elizabeth became a nurse at Middlesex Hospital, and began attending lectures for male trainee doctors. After they complained she was forbidden to attend.

In 1865 she discovered that the Society of Apothecaries did not specifically ban women from taking their examinations. So she studied privately and passed their examinations. She was now qualified to be a doctor and her father paid for her to be in practice. Later she went to the University of Paris where she passed a degree in medicine (though the British Medical Register did not recognise the degree).

In 1882 she opened the New Hospital for Women in London and in 1883 became Dean of the London School of Medicine for Women. After her retirement in 1902 she was elected mayor of Aldeburgh, the first woman mayor in England.

Died: 1917.

SOPHIA JEX-BLAKE
(1840–1912)

Born: Hastings, 1840

Education: Sophia was the daughter of a leading physician, but he had very traditional views about women's education and did not approve of her attending university. However, he did eventually relent and Sophie became a tutor in mathematics and toured Europe and the USA teaching mathematics.

Career: In 1869 she decided that she wanted to be a doctor and persuaded Edinburgh University to allow her and three other women to be taught in separate classes from men. But after complaints from the men, the university said that it could not award degrees to women. Sophie took the university to court, but lost her case.

She took the case to parliament and eventually a law was passed in 1875 making it legal to award degrees to women. However, Sophie herself took a medical degree in Berne, Switzerland and later qualified as a doctor in Ireland.

She founded the London School of Medicine for Women in 1874.

Died: 1912.

13.2 Public health in Britain after 1700

From 1700 onwards Britain was caught up in the Industrial Revolution. People no longer worked making things at home or in small workshops. They worked in bigger groups, in factories. As more and more machines were invented to help the manufacturing industries, especially the cloth industry, large factories were set up. These factories needed many workers, so factory towns or villages grew rapidly. The workers, mostly badly paid, could not afford good housing. They were either crammed into old buildings, often more than one family to a room, or new houses were built for them as cheaply as possible. Little provision was made for fresh water or sewage disposal. The government had a policy of *laissez-faire*. This means that they were not prepared to interfere with how people lived their lives, or their working and living conditions.

Town houses were often built on a back-to-back system. Sometimes they were built round a courtyard. These, like the roads, were unpaved and became muddy and contaminated with sewage. Houses were **verminous**, badly ventilated and overcrowded. Waste was piled in the courtyard or thrown into streams. Wells and watercourses quickly became polluted.

Industry made problems worse. Factory chimneys belched smoke and fumes into the air and their waste products polluted the rivers.

THE GROWTH OF TOWNS 1801–1901 (in thousands)

City	1801	1851	1901
Birmingham	71	233	523
Bradford	13	104	280
Leeds	53	172	429
Liverpool	82	376	704
Manchester	70	303	645
Newcastle	33	88	247
Nottingham	29	57	240
Sheffield	46	135	407

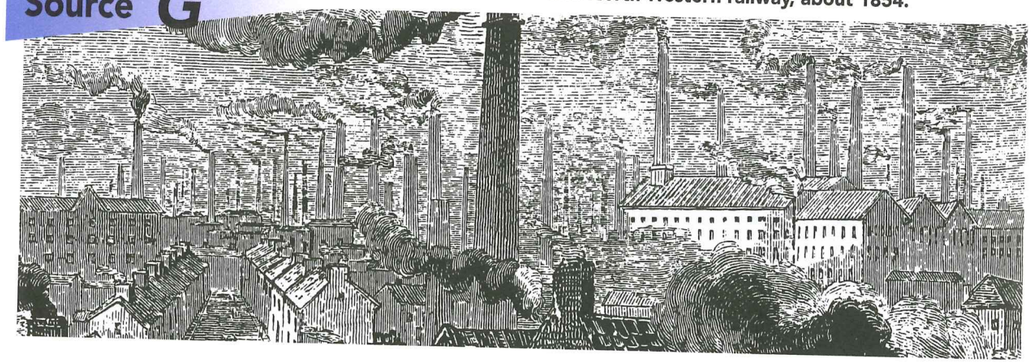
Source F

Alfred and Beckwith Row consist of a number of buildings, each of which is divided into two houses, one back and the other front. These houses are surrounded by a broad open drain in a filthy condition. The houses have common, open privies [toilets] which are in the most offensive condition. In one house I found six persons occupying a very small room, two in bed, ill with fever. In the room above this were two more persons in one bed, ill with fever. In this same room a woman was carrying out the process of silk weaving.

▲ **Living conditions in Bethnall Green, London, as described by Dr Thomas Southwood-Smith in 1838.**

▼ **A view of Manchester looking from the London and North-Western railway, about 1854.**

Source G



Disease

Bad living conditions meant that infectious diseases spread easily. The smallpox scourge of the 18th century was accompanied by tuberculosis, influenza and 'fever'. The fevers were typhoid, spread through dirty water, and typhus that was spread by the bites of body lice, which most people had because of poor personal hygiene.

These endemic diseases, which were always present in the population, were joined, in 1831–2, by a new epidemic, a disease which finally reached Britain and suddenly infected large numbers of people. This was cholera, which had been spreading across Europe from China and India since the beginning of the century.

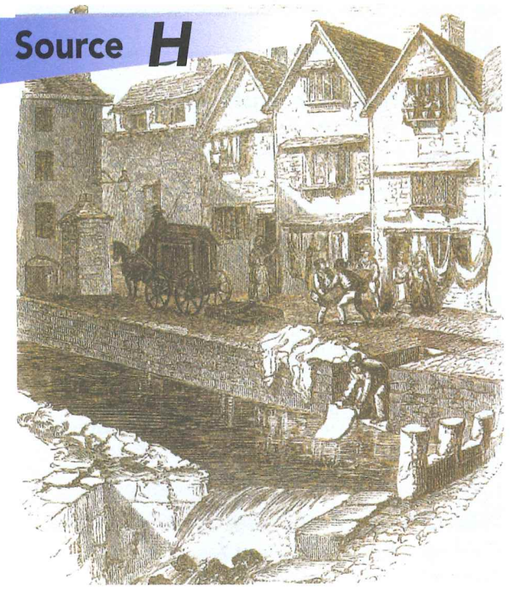
Cholera is caused by a germ that attacks the intestines and leads to diarrhoea, vomiting, cramps, fever and death. The disease is spread through water that is infected by sewage from the victims. Cholera was first known to have entered Britain when William Sproat, a sailor, died in the port of Sunderland.

Doctors at the time had no idea what caused cholera or how to cure it. In some places barrels of tar were burnt in the streets to try to ward off 'poisonous miasmas', invisible gases that were thought to be the cause of disease. The disease spread rapidly and so many people died that the government was forced to act. Instructions were given about the immediate burial of the dead and the depth of burial.

By the end of 1832, most places in Britain had been affected by cholera and over 21,000 people had died. Then the disease seemed to die out and the boards of health that had been set up to combat it were abolished. Cholera was to return, however, in 1848, 1854 and 1866.

▶ **A memorial to 420 cholera victims in Dumfries, Scotland, 1832.**

Source H



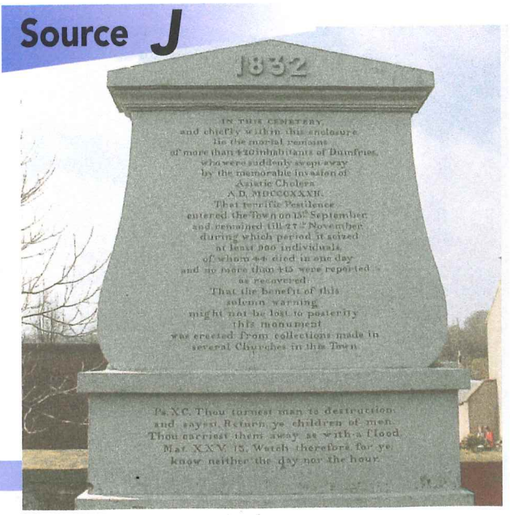
▲ **Washing a cholera victim's bedclothes in the Mill Stream in Exeter, 1832. The stream being used was also the main source of drinking water for the city.**

Source I

Dwellings are occupied by from five to fifteen families huddled together in dirty rooms. There are slaughter houses in Butcher Row with putrid heaps of offal. Pigs are kept in large numbers. Poultry are kept in cellars and outhouses. There are dung-heaps everywhere.

▲ **From *The History of the Cholera in Exeter in 1832*, written by Dr Thomas Shapter, in 1841.**

Source J



Edwin Chadwick and public health

The crisis brought about by the cholera epidemic of 1832 prompted the government to act. Edwin Chadwick published the *Report on the Sanitary Condition of the Labouring Population of Great Britain* in 1842. It contained evidence from doctors involved in the workings of the **Poor Law** all over the country. The information it contained about the squalor in which many working people lived and worked shocked and horrified the wealthy classes. When taken together with statistics about birth and death compiled by William Farr, from 1839, a picture was built up that showed that something needed to be done about public health in Britain.

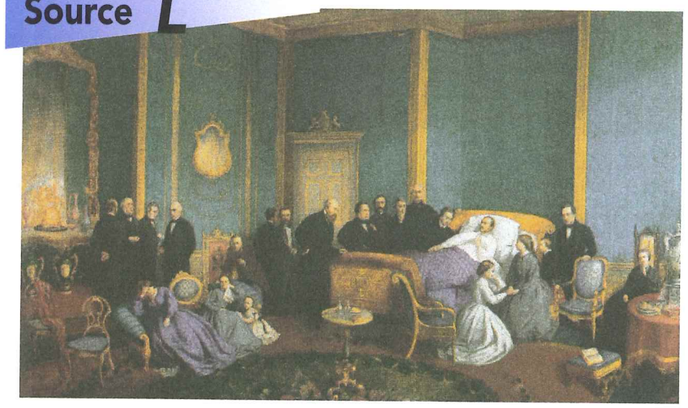
Chadwick was convinced that sickness was the cause of poverty. He was supported by the findings of Dr Southwood Smith who, in 1838, found 14,000 cases of fever among the poor of Whitechapel, London.

Source K

In one part of Market Street is a dunghill. Yet it is too large to be called a dunghill. I do not overestimate its size when I say that it contains 100 cubic yards [76 cubic metres] of impure filth which has been collected from all parts of the town. It is never removed. It is the main supply of a person who deals in dung. He sells it by the cart full. To please his customers he holds some back as the older the filth, the higher the price. The moisture oozes through the wall and over the pavement. This place is horrible, with swarms of flies which give a strong taste of the dunghill to any food left uncovered.

▲ **A description of conditions in Greenock, Scotland, by Dr Laurie. It was included in Chadwick's 1842 Report to Parliament.**

Source L



◀ **Not even the most privileged could escape disease. This painting, dating from about 1862, shows the last moments of Prince Albert, Queen Victoria's husband. He died of typhoid fever in 1861, caught from the drains of Windsor Castle.**

EDWIN CHADWICK
1800–90

Chadwick believed that all laws should be useful and efficient. He first worked as a lawyer but, in 1832, he became a civil servant when he helped to investigate the Poor Laws. In 1838 he was given permission to inquire into the living conditions of the poor in the East End of London. In 1840 he began a national investigation of living conditions and, in 1842, published his *Report on the Sanitary Condition of the Labouring Population*. This revealed the terrible conditions in the towns and shocked the nation. Chadwick argued that if the towns were cleaner, there would be less disease and people would not need to take time off work. As a result, fewer people would need poor relief and this would save the ratepayers money. His work inspired the sanitary reform movement.

Chadwick said that Parliament should pass legislation to improve sewage disposal and water supplies. Although he was hard working and intelligent, Chadwick could often be argumentative and tactless. He was 'pensioned off' by the government in 1854.

The sanitary reform movement

Public health reform was slow to happen. Chadwick's 1842 report, however, did spark off a fierce debate about cleaning up the towns. Supporters of reform became known as the 'Clean Party'. In 1844 the Health of Towns Association was set up to campaign for healthier living conditions. Local branches of the Association were set up across the country. Each produced evidence of filthy streets, lack of sewage facilities and inadequate supplies of fresh water. The Association called for an Act of Parliament.

In 1847 a Public Health Bill was finally introduced into Parliament. It was strongly opposed by a group of MPs who were nicknamed the 'Dirty Party'. They believed in *laissez-faire* and argued that it was not the government's responsibility to clean up the towns. Furthermore, cleaning up the towns would cost too much money and make the government too powerful. The poor were often looked down on and it was thought they should try and help themselves. The poor did not have votes, so why should the wealthy try to help? Although Chadwick's report clearly showed that there was a connection between dirty living conditions and disease, no one knew exactly what caused these diseases.

Then, in 1848, cholera struck again and MPs voted in favour of the Bill which became the first Public Health Act.

The First Public Health Act 1848

Central Board of Health in London to sit for five years.

Local Boards of Health could be set up in towns if 10% of the rate payers agreed. These boards had the power to improve water supply and sewage disposals. They took over from private companies and individuals.

The Act was not compulsory. It was not fully applied across the whole country.

▲ **The terms of the first Public Health Act, 1848.**

Source M

Epidemic disease amongst the labouring classes is caused by atmospheric impurities produced by decomposing animal and vegetable substances, by damp and filth, and overcrowded dwellings. The annual loss of life is greater than the loss from death or wounds in any wars in modern times.The most important and practical measures are drainage, refuse removal and the improvement of water supplies. This expense would be a financial gain by lessening the cost of sickness and death. To prevent disease it would be efficient to appoint a district medical officer.

▲ **Chadwick's main conclusions from the Report of 1842.**

Source N

The chief theme of the speakers in opposition to the plan related to saving the pockets of the ratepayers. Their idea was calculated more to save an outlay of money than to ensure efficiency. The sewers were to discharge into the river nearby thus continuing the pollution.

▲ **Opposition to a new sewerage scheme in Leeds described by James Smith in his *Report on the Condition of the Town of Leeds*, 1844.**

QUESTIONS

1 What public health problems resulted from the Industrial Revolution?
2 What effects did the cholera epidemic of 1831–2 have?
3 What motives did Edwin Chadwick have for trying to improve public health?
4 Why was there opposition to reform during the 1840s?
5 Why was the first Public Health Act eventually passed in 1848?

13.3 Public health after 1850

The impact of the 1848 Public Health Act

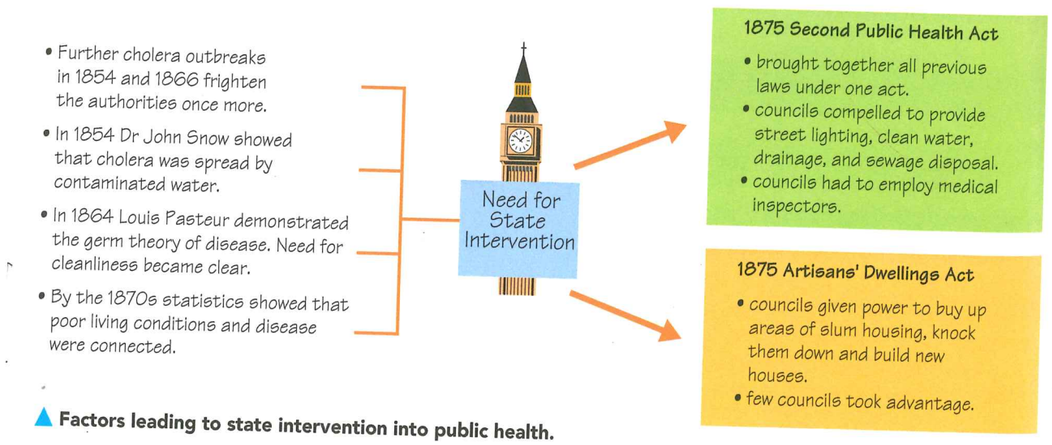
The 1848 Act brought only limited improvements. Under the Act, local health boards, were set up in only 182 towns. As a result, sewage disposal and water supplies were improved in some of these places.

In 1854 those who were opposed to the Central Board of Health in London, were able to bring it to an end. Many water companies, landlords and builders had hated its very existence. Others still firmly believed that it was wrong for the government to interfere in people's private lives. *The Times* said, 'We prefer to take our chance of cholera and the rest than be bullied into health'. There was also bad feeling between Edwin Chadwick and the medical profession. Chadwick thought that preventing the environment from becoming filthy was the key to a healthy nation. Thus, he emphasized the need for clean water supplies and good sanitation. He did not appreciate that curative measures such as good doctors and hospitals also had a part to play. Meanwhile in September 1854, Dr John Snow had deduced that water was responsible for the spread of cholera when he plotted the victims of the disease in Broad Street, London, and found they used water from the same local pump. He removed the handle of the pump and the disease disappeared. In 1858 public health came under the control of the Privy Council and Sir John Simon, a surgeon, was made the Medical Officer of Health. He believed that public health involved both preventative and curative measures.

Further government measures

By the mid 1860s, the government realized that it would have to become more consistently involved in providing public health. A number of factors brought about this change of attitude (see diagram).

In 1869 Simon persuaded the government to set up the Royal Sanitary Commission. It found that the provision of clean water was still very patchy and recommended that laws should be made which were 'uniform, universal and imperative'. The government responded by forming the Local Government Board (1871) to oversee the administration of public health. The 1872 Public Health Act divided the country into 'sanitary areas' each with a medical officer of health. In 1875 Benjamin Disraeli's Conservative government passed a second Public Health Act and the Artisans' Dwellings Act – which together formed the most wide-reaching legislation to date.



▲ **Factors leading to state intervention into public health.**

OCTAVIA HILL

Octavia Hill was born in 1838. Her parents and grandparents were involved in charity work, so Octavia and her sisters naturally joined in. In 1853 Octavia started to work with a group of women called the Ladies' Guild. She taught in a ragged school. This was the first instance of her working with the poor. By 1858 she and her sister had set up their own school. Working in poor areas showed her how appalling the housing conditions of the poor were. She began to plan how they could be improved. In 1865 she managed to raise enough money to buy the leases of three houses. She repaired them, collected the rent regularly and got to know the tenants. She made sure that tenants did not take in lodgers – which led to severe overcrowding and the spread of infection. She got rid of the bad tenants and improved the homes for the remaining tenants, who then looked after the houses.

Octavia's scheme was a success. Her tenants cared for their homes and paid the rent on time. This quickly paid off the costs of improvements. Everyone was better off. Soon many people, from ordinary people to the Church of England, were paying Octavia to manage their properties for them. She used the money she made on this to buy up more houses for the poor. People began to think that Octavia talked a lot of sense about how to help the poor. In 1869 she helped to set up the Charity Organization Society and also pushed for open spaces in all cities for the use of everyone, especially the poor. She felt that this would help to stop houses being crowded together and give the poor places where they could exercise in the open air. Both these things would be good for their health. She campaigned for better conditions for the poor until her death in 1912.

JOHN SNOW AND CHOLERA

John Snow was born in York in 1813 and was apprenticed to a surgeon in Newcastle-upon-Tyne at the age of fourteen. He saw his first cases of cholera when working at Killingworth Colliery in 1833. In 1838 Snow travelled to London and qualified as a member of the Royal College of Surgeons. He then set up a medical practice in Soho. One of his most famous acts was to administer chloroform to Queen Victoria to ease the pain of childbirth.

During the 1848 outbreak of cholera in London, Snow spent a great deal of time investigating the causes of the disease. He discovered that in one area of London the people who caught cholera drank water which came from the Thames. In the same area some people took their water from a pump using water from fresh springs. They did not catch cholera. He set out his ideas that the disease was transmitted through water not through the air, but not everyone accepted his view.

Source O

The state of the air which is most likely to encourage cholera is a hot, moist atmosphere. Under these conditions the unpleasant animal and vegetable refuse rots the most quickly and poisons from it are carried in greatest quantity into the blood from the lungs.

▲ **A report from the new government department, the Central Board of Health. It is explaining why cholera seemed to be worse in the summer than in the winter.**