Arnos Vale

THE RISE OF MODERN MEDICINE

A BRISTOL PERSPECTIVE

Teachers Pack

ARNOS VALE

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CONTENTS

NOT YET COMPLETED

INTRODUCTION TO ARNOS VALE

Arnos Vale cemetery is a great depository of Bristol's social history, with strong links to the histories of public health, sanitation, disease and medical treatment in the city. This pack uses Arnos Vale as a primary resource. Its landscape, graves and epitaphs, private burial records, archives and historic development are used as learning material. This pack explores the concepts of disease & mortality; public health & sanitation; and medical pioneers from past.

This pack is designed for teachers to use in class and/or during a visit to Arnos Vale Cemetery.

The pack is broadly based around the themes of surgery, disease and public health. The resources concentrate on the advancement of health and medicine during the 18th, 19th and 20th century and are Bristol-centric, providing students the opportunity to explore their own local heritage.

The pack contains:

- Lesson plans
- First hand sources
- Supporting information for teachers
- Timelines relating to surgery, disease and public health
- Science-related activities and resources to support the knowledge and understanding of learners.
- A map of Arnos Vale detailing graves relating to medical history.

Arnos Vale Cemetery also offers History of Medicine workshops for students on site. These workshops have been designed in conjunction with local teachers, adding depth and skills development for students in an amazing historical landscape.

For more information about the learning programme at Arnos Vale Cemetery contact

learning@arnosvale.org.uk

0117 9719117

This schools education pack is proudly sponsored by the Wellcome Trust.

THANKS

To all the medical professionals for all their support and input into the project:

- Professor George Davey-Smith
- Dr Adam Finn
- David Andrew Gurney
- John-Peter Hartfield
- Dr Robert Spencer
- Professor Gareth Williams
- Dr Charlotte Wood

The students from Bristol University Medical Humanities course:

- Richard Brown
- Isla Colclasure
- Dorothy Davies
- Andrew Demetri
- Lizzie Hancock
- Katie Hyde
- Catherine Longthorpe
- Mariama Marfo
- Thomas Nutting,
- Katrin Platzer
- Anupa Shah
- Lucia Stevenson

The heritage and teaching professionals for their support and input

- Charles Booth of University West of England
- George Donaldson of Bristol University
- Helen Jeffery of Dr Jenner's House
- Richard Kennett of Redland Green School
- Hayley Kruger of the Hunterian Museum
- Mary Lawrence of St Mary Redcliffe and Temple School
- Dave Napier
- Andrew Steward of Bristol Catherdral School
- Anni Skilton

To the Wellcome Trust for supporting this project.

ARNOS VALE

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MEDICINE AND HEALTH IN BRISTOL IN 19TH CENTURY AN OVERVIEW

TEN KEY DEVELOPMENTS

Developments in the 19th-century included:

1 **Explosion of industry** and industrial diseases such as dermatitis, lung disease and 'phossy jaw'. Local industrialists included Wills tobacco and Robinson paper bag making.

2 **Urbanisation** Increase in public health problems that included 'filth diseases' such as cholera and typhus. Areas that were previously countryside become part of the city e.g. Brislington and Bedminster.

3 **Growth of empires** Widening experiences, knowledge, resources but also contact with new diseases such as yellow fever and cholera. Major Cholera outbreaks occurred in Bristol in 1832, 1848 and 1866.

4 **Growth of immense wealth,** based on trade and industry. Money now being spent on medical research and public health.

5 **Advances in technology** Medical machines such as the electrocardiograph.

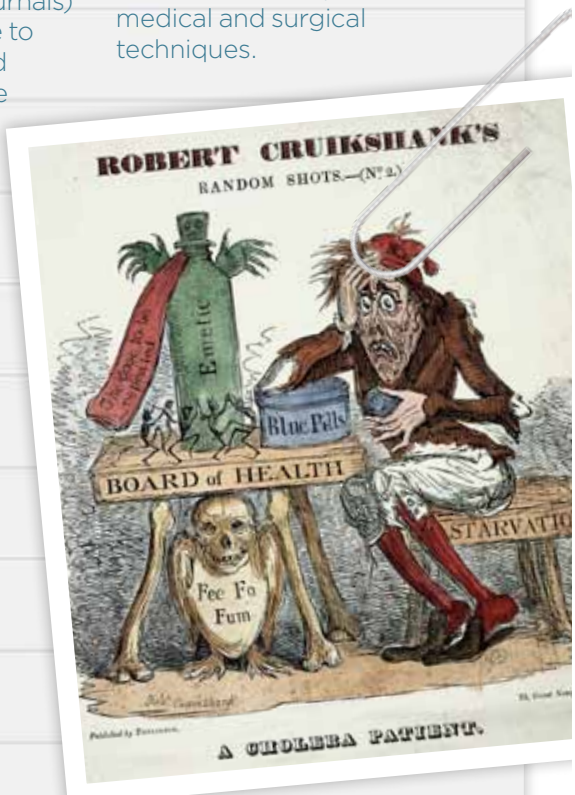
6 **Improved communications** (telephone, telegraph, faster ships, and medical journals) allowed medical knowledge to spread. Doctors now gained information from all over the world. William Herapath learned of anaesthetics from journals.

7 **Growth of science and research** leading to medical breakthroughs. William Budd realised the source of cholera through his research.

8 **Democracy and socialism** began to change the fact of health care provision as people believed they had the right to good health.

9 **New ideas in Science. Evolution** (Darwin), **germ theory** (Pasteur) and **genetics** (Mendel) affected the Church's control over medicine and medical ethics.

10 **Wars** were waged on a greater scale. Created mass injuries that were hitherto unknown and required new medical and surgical techniques.



'A cholera patient', caricature of a cholera patient experimenting with remedies (Robert Cruikshank's random shots No. 2)

Coloured etching 1832

BIBLIOGRAPHY OF FURTHER READING

Bad Science
B Goldacre

Biology of Plagues: Evidence from Historical Perspectives
Scott and Duncan

Disease: The Extraordinary Stories behind Histories Deadliest Killers
M Dobson

Dr William Budd: Bristol's Most Famous Physician
M Dunnill

A Grim Almanac of Bristol
N Sly

Gout, the patricians malady
R Porter

History of Medicine: A Scandalously Short Introduction
J Duffin

The History of Medicine: A Very Short Introduction
W Bynum

Hospital Infection: From Miasmas to MRSA
Ayliffe and English

An Introduction to the Social History of Medicine: Europe Since 1500
Dr K Waddington

The immortal life of Henrietta Lacks
R Skloot

Microbes and men
R Reid

Over my dead body
J Opie

The Plague and I
B MacDonald

Power unseen: How microbes rule the world
B Dixon

Public health in Mid-Victorian Bristol
Large and Round

Rats, Lice & History
H Zizsser

Tuberculosis: The Greatest Story Never Told
F Ryan

The White Death: a history of tuberculosis
T Dormandy

Websites and other information sources

Bristol Museum and Art Gallery

Bristol Records Office

Dr Jenner's House
www.jennermuseum.com/

e-Bugs
www.e-bug.eu/

Florence Nightingale Museum
www.florence-nightingale.co.uk

Foundling Museum
www.foundlingmuseum.org.uk

Hunterian Museum
www.rcseng.ac.uk/museums/hunterian

Old operating Theatre
www.thegarret.org.uk/

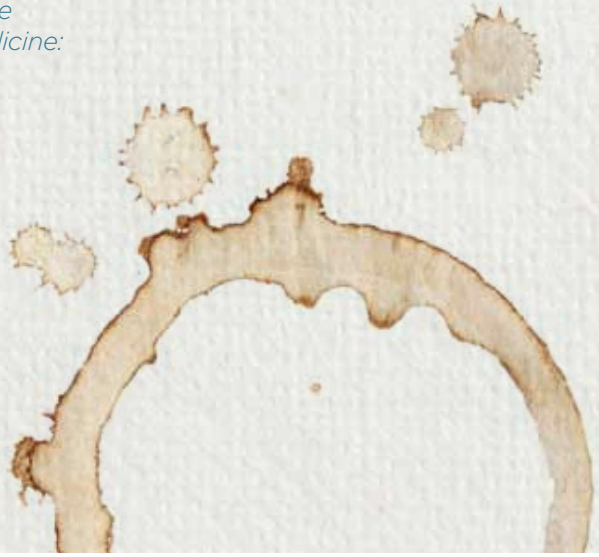
Oxford Dictionary of National Biography

Red Gold: the epic story of blood
www.pbs.org/wnet/redgold/

Science Museum
www.sciencemuseum.org.uk

Thackery Medical Museum
thackraymedicalmuseum.co.uk/

Wellcome Collection
www.wellcomecollection.org



GLOSSARY OF SCIENTIFIC AND MEDICAL TERMS

WORD	DEFINITION	SEE ALSO
Anaesthetic/ Anaesthetist	Numbs sensation (local anaesthetic) or causes reversible unconsciousness (general anaesthetic). Not the same as analgesic (painkiller). General anaesthetic can be administered in the form of a gas or injected into a vein. Modern anaesthetics are carried out by a specially trained doctor (anaesthetist). The introduction of anaesthetics in surgery during the 19th century helped radically reduce suffering. It also allowed surgeons to slow operations down and undertake more complicated operations.	History of Anaesthetic' support notes. The Royal College of Anaesthetists website
Analgesic	Medical name for painkillers. These are taken to relieve pain, not the same as an anaesthetic. They can be swallowed, rubbed on or sometimes injected. They can cause serious medical problems if more than the recommended dose is taken.	
Antibodies	Antibodies are manufactured by the body's immune system in the blood and are found in the white cells of the blood. The job of antibodies is to identify and neutralise invading germs including viruses and bacteria. Also known as immunoglobulin.	
Antibiotic	Antibiotics slow down the growth or kill bacteria within the body. They cannot kill viruses. During the 20th century, the discovery of the effects of antibiotics, in particular sulphonamides and then penicillin dramatically improved the recovery chances of patients with diseases caused by a range of bacteria.	
Antisepsis/ antiseptics	Antisepsis is the method of antiseptics to kill or inhibit the growth of bacteria on living tissue. They are applied to the skin to reduce the possibility of bacteria entering into the body and causing infection. Not to be confused with disinfectants or antibiotics.	Research Joseph Lister and Ignaz Semmelweis.
Antivaccination	Some people object to vaccination. The reasons may be religious or ethical. They may also be questioning the effectiveness or safety of vaccinations.	
Asexual	Asexual reproduction is a mode of reproduction by which offspring arise from a single parent. Bacteria usually reproduce by asexual method called binary fission. The parent organism literally divides in two and is therefore 'replaced' by two daughter organisms.	

Introduction: Glossary

WORD	DEFINITION	SEE ALSO
Asepsis/aseptic	Asepsis is a step beyond antisepsis. The goal of asepsis is to remove all biological contaminants from a 'field' of surgery. This will include: • Disinfecting all surfaces • Sterilising all surgical instruments, or only using instruments once • Surgeons, surgical team and patients gowns are freshly laundered • Washing the patient (who is a potential source of infection from their own skin, hair and nails) and cleaning the patient's operation area with a germicide.	
Bacteria	There are three distinct types of bacteria shapes. Spherical shaped (coccus), rod-shaped (bacillus) and spiral-shaped (spirillum). Bacteria can usually be killed by antibiotics. However some bacteria have developed a resistance to some antibiotics due to human's over use of antibiotics and not finishing antibiotic courses.	Bacteria or virus supporting notes
Blood	Blood is a mixture of cells and a watery fluid, called plasma, that the cells are suspended in. It also contains other things including nutrients (such as sugar), hormones, clotting agents and waste products to be flushed out of the body. There are three kinds of cells in the blood: red blood cells, white blood cells and platelets. Red blood cells carry oxygen from the lungs throughout the body and white blood cells help fight infection. Platelets help in clotting (forming a platelet plug or scab usually after an injury). Everyone has a blood group and some blood groups cannot be mixed without a serious reaction. The blood groups are O, A, B, and AB.	
Cholera	A very serious disease caused by drinking water infected with *Vibrio cholera* bacteria. The main symptoms are profuse, watery diarrhoea and vomiting. Transmission occurs primarily by drinking water or eating food that has been contaminated by the faeces (waste product) of an infected person.	
Contagious	A contagious disease is an infectious disease which is transmitted by physical contact with the person suffering the disease, through sneezing or saliva or via objects touched by them.	
Decomposition	Living tissue breaks down after death by decomposition. Two processes cause this to occur. Putrefaction (the breakdown of tissues by bacteria) and the breaking down of tissues by the chemicals and enzymes found in the tissue. Miasma theory held that diseases came from decomposing or rotting organic material.	

Introduction: Glossary

WORD	DEFINITION	SEE ALSO
Disinfectant	A substance that is applied to non-living objects to destroy microorganisms that are living on the objects. Disinfection does not necessarily kill all microorganisms and it is less effective than sterilisation. Disinfectants work by destroying the cell wall of microbes or interfering with the metabolism. They can be harmful to human and animal health. Disinfectants are used regularly in hospitals to kill infectious microorganisms. There are some bacteria that are resistant to disinfectants. The use of disinfectants in surgery was slow to be adopted until germ theory was more widely accepted. The introduction of disinfectants during the 19th century improved the post-surgery recovery chances of patients by preventing major infections being transferred from medical instruments and surfaces.	Supporting timeline 'The discovery of antiseptics'. Research Joseph Lister and Ignaz Semmelweis.
Epidemiology	The science of studying patterns, causes, and effects of health and disease conditions.	
Eradicate	One of the goals of biomedical science is to eradicate or totally remove infectious diseases from the human population. So far only one human disease has been totally eradicated: smallpox. There are currently attempts to eradicate the potentially fatal polio, measles and rubella through a global programme of vaccination. One animal disease has also been eradicated: rinderpest. Other diseases that may be eradicated in the near future are polio and Guinea worm disease.	
Experiment	An experiment is a methodical procedure. It is carried out with the goal of verifying, falsifying, or establishing the validity of a hypothesis. An experiment must be a repeatable procedure and it involves logical analysis of the results.	
Germ theory	Germ theory states that disease is caused by the invasion of micro organisms in the body. Germ theory came about with the discovery in the late 19th century that infectious diseases are caused by microorganisms that invade the host. The theory supplanted earlier explanations for disease such as miasma theory. Early exponents of theory were Joseph Lister, Louis Pasteur and Robert Koch. Miasma theory was the dominant theory up until the mid 19th century and it took a long time for germ theory to be proved correct. The work of the scientists to prove germ theory opened the door to research into the identification of disease-causing germs and potential life-saving treatments.	Miasma theory, John Snow, William Budd
Hypothesis	A scientific hypothesis is a proposed explanation for a phenomenon. For a hypothesis to be tested there must be a method designed that will test it.	

Introduction: Glossary

WORD	DEFINITION	SEE ALSO
Host	In biomedicine, a host is an organism (human, animal or a cell) that harbours a parasite, virus or bacterium. Being a host is usually beneficial for the micro organism but not for the host.	
Immunisation	See vaccination.	
Incubation period	An incubation period is the amount of time that elapses between exposure to a micro organism that causes a disease and when symptoms and signs are first apparent. In a typical infectious disease, incubation period signifies the period taken by the multiplying organism to reach a threshold necessary to produce symptoms in the host.	
Isolation (Quarantine)	If a person has been exposed to a contagious disease they may be isolated to ascertain if they have contracted the disease. This is to prevent them from spreading a contagious disease. Isolation is put into place if they become ill (the person is isolated from unaffected people).	
Miasma theory/ miasmatic theory	The miasma theory held that diseases were caused by a miasma, a noxious form of bad air. The miasma theory was accepted from ancient times in Europe, India and China. The miasma theory, although incorrect, did lead to improvements in sewage disposal in the UK which did improve public health but also helped to support miasma theory. The theory was eventually displaced in the 19th century by the discovery of germs and the germ theory of disease. It took a long time for miasma theory to be overturned by germ theory.	Research Germ theory, Louis Pasteur, Robert Koch, John Snow.
Microbe/micro-organism	Small organisms too small to see without magnification; bacteria, virus or fungi.	Also research Louis Pasteur
Poliomyelitis/ Polio	Poliomyelitis is an acute, viral, infectious disease. It is transmitted from person to person, primarily via the faecal-oral route. 90% of polio infections cause no symptoms but if the virus enters the central nervous system it can cause paralysis, wasted muscles and death. It is being vigorously being targeted by the World Health Organisation for eradication.	Research Hilary Koprowski, Jonas Salk, Albert Sabin.
Preventative medicine and care	Measures which are taken to prevent diseases, poor health or injuries including advice on health education on subjects like healthy eating, breastfeeding, hand washing, sexual health, smoking, drug use and alcohol abuse. Screening programmes will be set up to seek diseases such as breast, testicular and ovarian cancer, genetic disorders and inherited disease. Vaccination is also a preventative medicine. In developed and developing countries, there will be a system of professionals who ensure water supplies are clean and safe to drink, (microbiologists), food is fit for human consumption and that people are safe in their homes and work place from pollution, injuries and stress.	Public Health England – a government body.

Introduction: Glossary

WORD	DEFINITION	SEE ALSO
Research	Scientific research is the application of the scientific method and is used when developing and testing a hypothesis. This research provides scientific information and theories for the explanation of the world. This research often has practical applications and in the field of biomedicine, it can have life-saving consequences.	
Smallpox	Smallpox is caused by a virus (Variola). The symptoms were a blanket of raised painful and itchy blisters over a sufferer's body, particularly the hands and soles of feet and the face. A raised temperature, muscle pain and fever were early symptoms. It often caused scarring, blindness and could also be fatal. It was transmitted by face-face contact and also via bodily fluids. Smallpox is the only infectious disease suffered by humans that has been eradicated so far.	Edward Jenner's House website
Sterilisation	Sterilisation is an extreme physical and/or chemical process that kills all types of life. This is used in modern hospitals to sterilise medical instruments. It is also used to remove all micro organisms from instruments in laboratories and other healthcare settings. Ernst von Bergmann introduced the autoclave, a device used for the practice of the sterilization of surgical instruments.	Research Ernst von Bergmann
Symptoms	A symptom describes the effects of a disease on a person. These are the abnormal feelings experienced when a person is suffering the effects of micro organisms which has infected their body.	
Theory	A scientific theory is an explanation of some aspect of the natural world, based on a body of knowledge that has been repeatedly confirmed through observation and experimentation. A theory has been tested and evidence has been gathered that proves it to be correct. Scientists create scientific theories from hypotheses. A theory in scientific terms is not something that might be right or a speculation. Examples of scientific theories include: germ theory, the theory of evolution, gravitational theory, climate change theory and the big bang theory.	Research Sir Isaac Newton, Georges Lemaître, Charles Darwin.
Transmission	Transmission is the passing of viruses or bacteria (microorganisms) directly from one person to another by: • coughing or sneezing on another person • direct physical contact – touching an infected person, including sexual contact • indirect physical contact – usually by touching soil contamination or a contaminated surface • Airborne transmission – if the microorganism can remain in the air for long periods • From contaminated food or water sources via faecal-oral transmission	

Introduction: Glossary

WORD	DEFINITION	SEE ALSO
Transfusion	A blood transfusion can be given when a patient has lost a significant amount of blood due to an accident or during surgery. They may also get transfusions if they are suffering an illness which means they cannot make enough blood or their blood is diseased. Blood transfusions were not possible until Karl Landsteiner first identified the major human blood groups -- namely O, A, B, and AB -- in a series of experiments in 1901 that earned him the Nobel Prize. (At the time, Landsteiner identified only groups A, B, and O; further analysis, two years later, revealed AB.) Some religious groups have objections to blood transfusions.	Jehovah's Witness
Treatment/ therapy	A treatment is a therapy that is given to a patient to ease symptoms and help the patient to ease or get rid of a health problem. A treatment does not always lead to a cure and some diseases are non-treatable or only partially treatable.	
Vaccination	Vaccination is the method of preventing a specific infectious disease by administering a non-infectious or reduced-infectious version of the infectious disease. Vaccination can be undertaken through injection (measles) or ingestion (polio).	World Health Organisation website (WHO)
Virus	A virus is a small micro-organism that can replicate only inside the living cells of an organism. Viruses cannot be killed by antibiotics. Viruses are not properly classed as living things but there is much debate about this in the scientific community.	Virus or bacteria supporting notes

1 ADVANCES IN 20TH CENTURY MEDICINE

Timeline: Advances in 20th century medicine

1900-1910

1901 Landsteiner discovers blood groups. This allowed advancement in blood transfusion and discovering blood disorders.

1905 First successful cornea transplant by Edvard Zim.

1909 First Typhoid vaccination. The bacterium that caused Typhus had been identified during the Victorian period but an effective vaccine wasn't developed until 1909.

1911-1920

1914 First non-direct blood transfusion. Blood transfusions had previously been directly person-to-person. It was discovered blood could be transported using refrigeration and sodium citrate as an anticoagulant.

1918 Spanish flu epidemic kills 50 million.

1921-1930

1922 Frederick Banting discovers insulin. This discovery meant type 1 diabetes changed from a death sentence to a manageable chronic disease.

1929 Alexander Flemming discovers Penicillin. This was discovery meant the first antibiotic could be produced

1931-1940

1932 First yellow fever vaccine developed. There is little effective treatment for yellow fever so vaccination is vital in the prevention of this dangerous disease.

1941-1950

1943 First kidney dialysis machine invented. Kidney dialysis replaces the kidneys in removing excess water and waste products from the blood.

1948 NHS founded

1950 John Hopps invents the first cardiac pacemaker. A pacemaker helps regulate the heart beat and can help prevent death by stimulating the heart when it is not beathing correctly.

1951-1960

1953 First successful open heart bypass surgery.

1953 DNA structure discovered by James D Watson and Francis Crick.

1954 First successful kidney transplant by J. Hartwell Harrison and Joseph Murray on identical twins.

1958 Polio and Diphtheria vaccines launched.

1961-1970

1963 First vaccine for measles licensed.

1964 Recognition of tobacco use as a health hazard.

1967 First successful liver transplant by Thomas Starzl .

1967 First successful heart transplant by Christian Barnard.

In the late 1960s Frank B Colton developed the first oral contraceptives.

1970 Raymond Damadian discovered the basis for using magnetic resonance imaging as a tool for medical diagnosis. By 1977, he had produced the first whole body MRI scanner.

1971-1980

1971 Measles, Mumps and Rubella (MMR) vaccine introduced.

1971 First computed tomography (CT) scan performed. CT scans allow a more complete scan of the inside of the body than ordinary x-ray.

1978 First 'test-tube' baby born, Louise Brown. Born to Lesley Brown, who had been unable to conceive due to blocked fallopian tubes.

1978 First cochlear implant surgery. Cochlear implants are directed connected to the brain and can allow Deaf and hard-of-hearing people to hear.

1980 World health agency declares eradication of small pox. Smallpox still remains the only disease that has been completely eradicated from the human population.

1981-1990

1981 First vaccine for Hepatitis B.

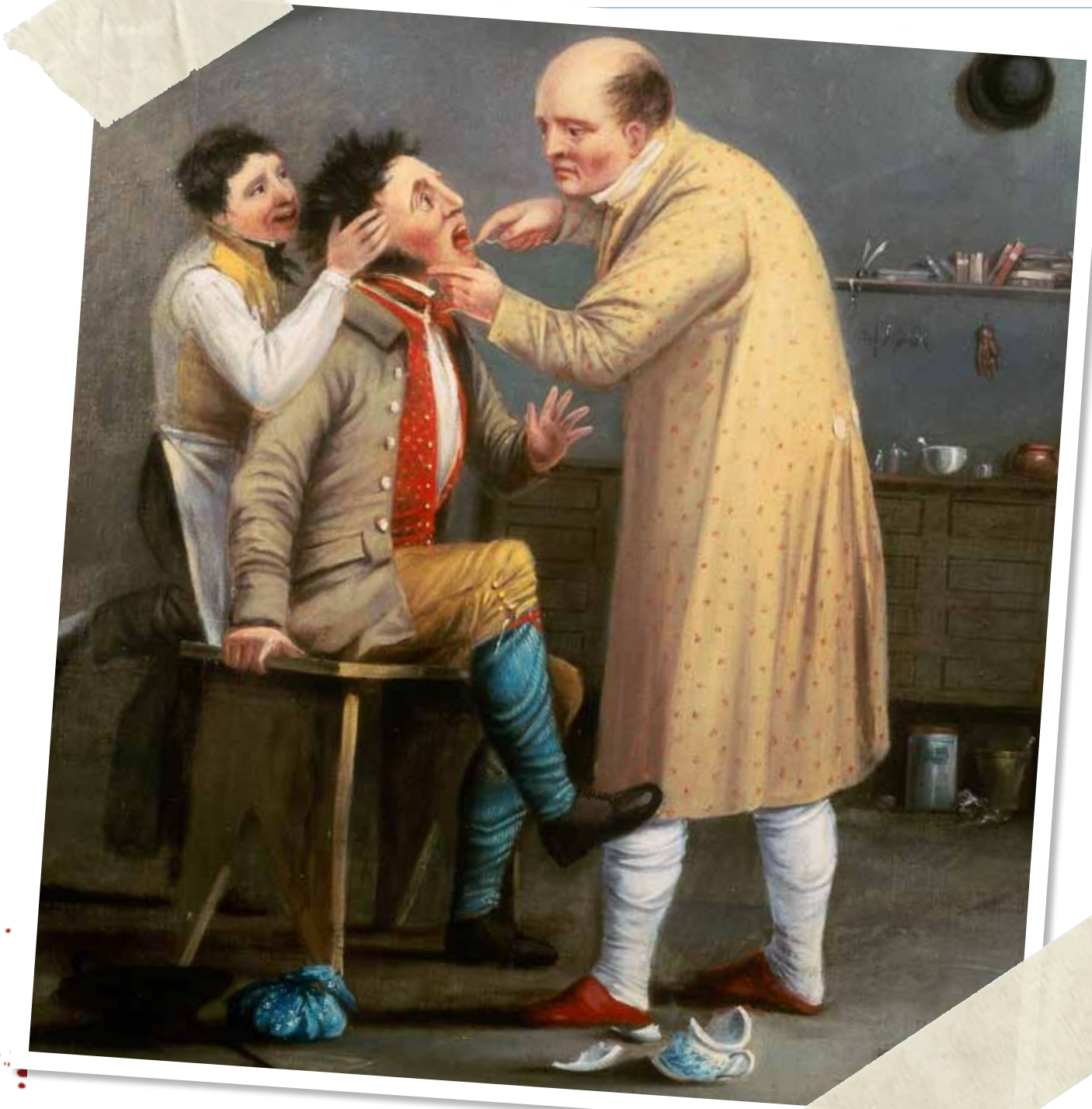
1982 Invention of the first artificial heart by Willem J Kolff. The articificial heart can be used for people awaiting a heart transplant.

1900-1910

1992 First vaccine for Hepatitis A.

1998 First vaccines for Lyme's disease and rotavirus.

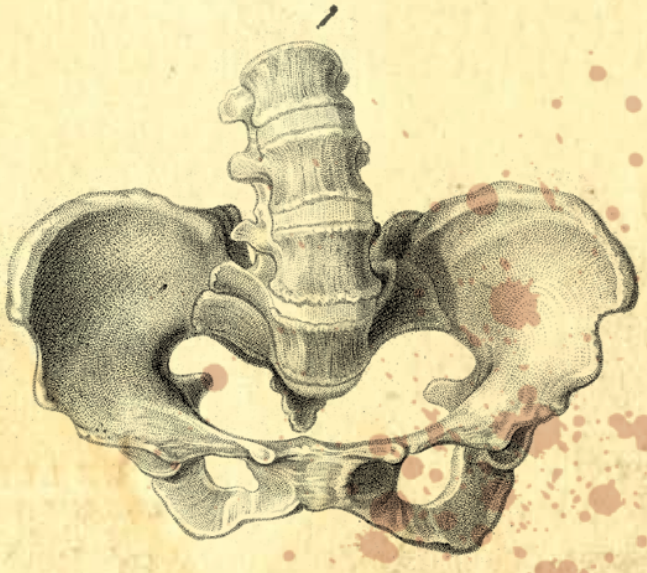
2 ADVANCES IN 19TH CENTURY MEDICINE

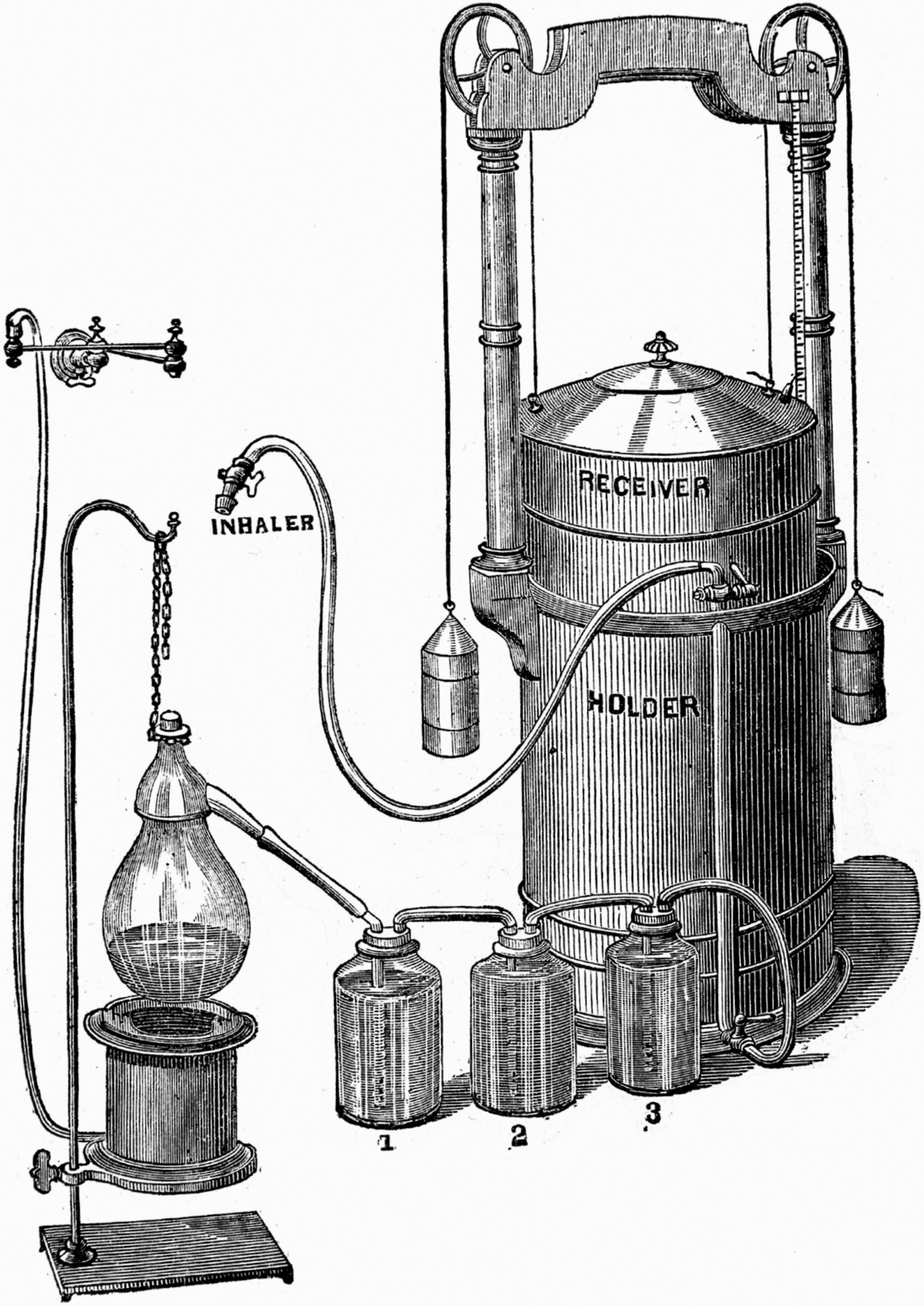


Timeline: Advances in 19th century medicine

1800	Humphry Davy and Thomas Beddoes experiment with 'laughing gas'. The experiments were undertaken at the Pneumatic Institute in Dowry Square, Hotwells, Bristol. Davey observed that nitrous oxide reduced the feeling of pain and so thought that it could be used during surgery,
1816	René Laennec invents the stethoscope. A major breakthrough in understanding what was going on inside the human body without surgery.
1818	Human-to-human blood transfusions take place. James Blundell begins experimenting with human-to-human blood transfusions. He has some success but was hampered by his lack of knowledge about blood groups.
1823	Thomas Wakley founds The Lancet (a medical journal). The establishment of a journal allowed Doctors to learn about the work of other doctors, it spread new medical theories and practices.
1832	Sir Charles Hastings founds the British Medical Association. This helped formalise the profession of doctors, give them a forum to learn from their colleagues and the BMA also produced a journal which is still going today (British Medical Journal).
1842	Ether used as an anaesthetic during an operation. American Crawford Long becomes the first physician to use ether on a patient during an operation. It took a year for him to publish but once he did, other doctors and dentists began to use ether on patients. In fact in 1844 American dentist Horace Wells had a 'painless' tooth extraction performed on him using ether.
1847	Obstetrician Sir James Young Simpson uses chloroform during a difficult birth.
1847	Ignaz Semmelweis observes that hand washing is vital in improving hospital hygiene and patient health. Sadly Semmelweis's discovery was not widely understood and his work was largely disregarded in hospitals until Germ Theory was established.
1847	Karl Ludwig invents the kymograph. This device measured blood pressure and was used to show how the heart was pumping the blood around the body. Patient blood pressure testing is now routinely tested.

1854	Florence Nightingale begins the reformation of nursing. By highlighting the importance of cleanliness and patient environment, Florence was able to radically reduce deaths in military hospitals. She published notes and statistics to prove her hypothesis.
1849	Elizabeth Blackwell becomes Britain's first female doctor. Blackwell had to fight hard to be allowed to practice medicine in both America (where she trained) and Britain as was regarded as a men-only pursuit.
1855	Cholera proved to be caused by bacterium in dirty water. John Snow observes that cholera outbreaks could be attributed to the water people drank. John Snow's theory took a long time to be accepted as the prevailing opinion at the time was that disease was spread by 'bad air' (miasma theory). At the same time in Bristol, William Budd had also observed that dirty water could cause cholera.
1877	Louis Pasteur develops Germ Theory. Louis Pasteur publishes his theory that diseases were caused by specific organisms (Germ Theory). He had developed his theory through observation and experimentation.
1858	Henry Gray publishes Gray's Anatomy. He was an renowned surgeon who worked with anatomist Henry Vandyke Carter produced very detailed and anatomically accurate drawings of human anatomy which could be used by doctors and medical students to help them with surgery and diagnosis.
1865	Joseph Lister introduces antiseptic surgery. Lister was a surgeon realised that if carbolic acid was sprayed into the air during surgery and used in patient dressings, then the patient was less likely to get a post operation infection. Although he was correct, it took the medical profession a long time to accept this finding.
1882	Robert Koch isolated the cause of tuberculosis. The bacterium *mycobacterium tuberculosis* is proved to cause TB. He was awarded the Nobel Prize for Medicine or Physiology in 1905 for his work.
1889	William Halsted invents rubber gloves. This step greatly reduced contamination between surgeon and the patient that they were operating on. Halsted actually introducing rubber gloves was not because of contamination but to protect the sensitive skin on his wife's hands (Caroline Hampton) who was a surgical nurse.
1895	Wilhelm Conrad Röntgen discovers X-rays. Although this discovery was an accident it was quickly implemented and in 1896 the Glasgow Royal Infirmary set up a radiology department.




RECEIVER
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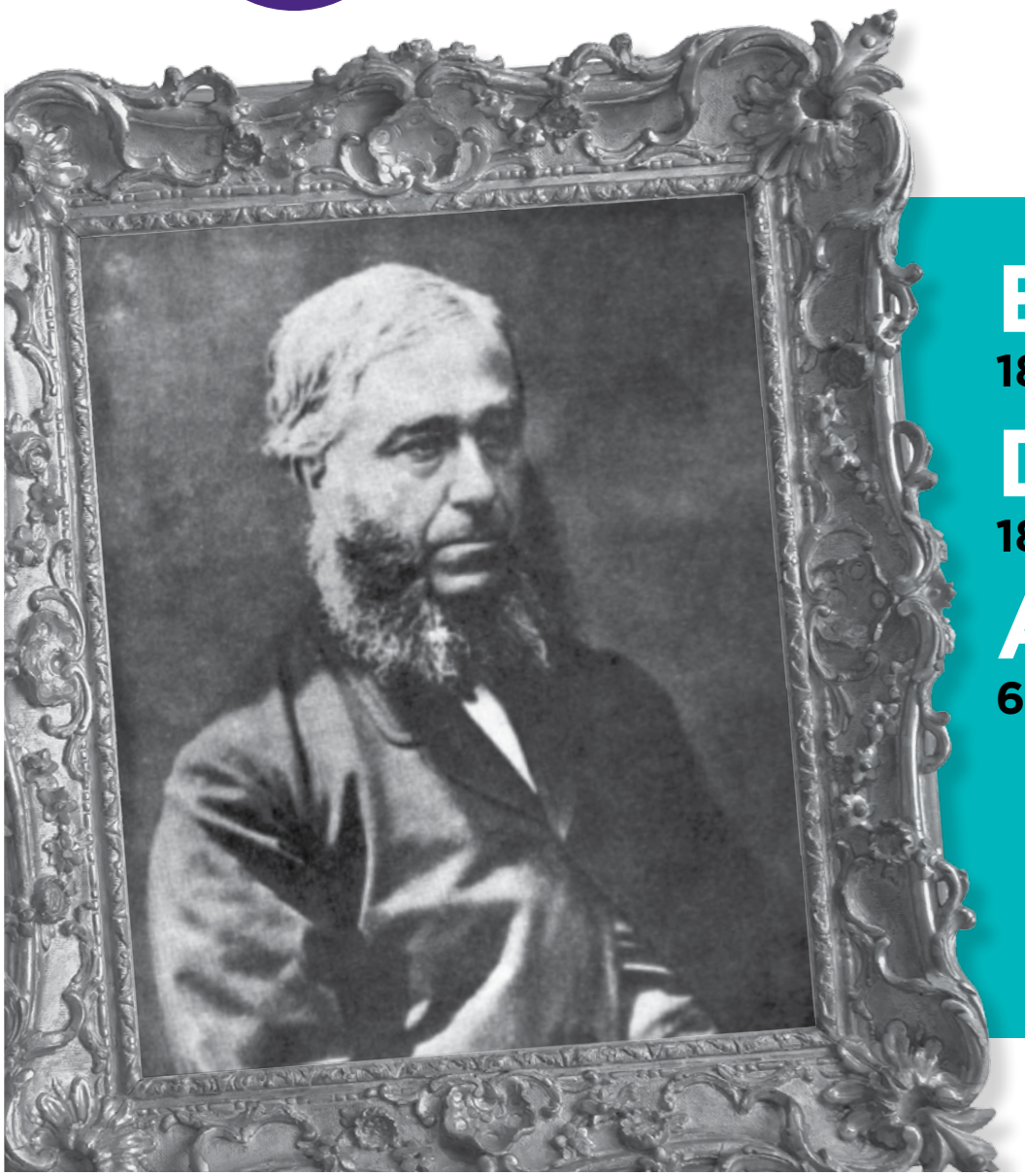
BIOGRAPHIES

PROFILE: WILLIAM BUDD

BRISTOL PHYSICIAN AND EPIDEMIOLOGIST



BORN
1811

DIED
1880

AGED
69

William Budd was born on the 14th of September 1811 in North Tawton; a small town in Devon. His father was Samuel Budd, who was a surgeon and his mother was Catherine Wreford. Budd was from a very medical family, as not only was his father a doctor, but five of his brothers became doctors as well. Budd was one of ten children. Budd married Caroline Mary Hilton in 1847 and together they had nine children.

"After having difused itself widely over Europe, the petilence has once more obtained a footing in England, and has visited Bristol, amongst other cities, for the fourth time." W. Budd. British Medical Journal, April 13th 1867

Medical life

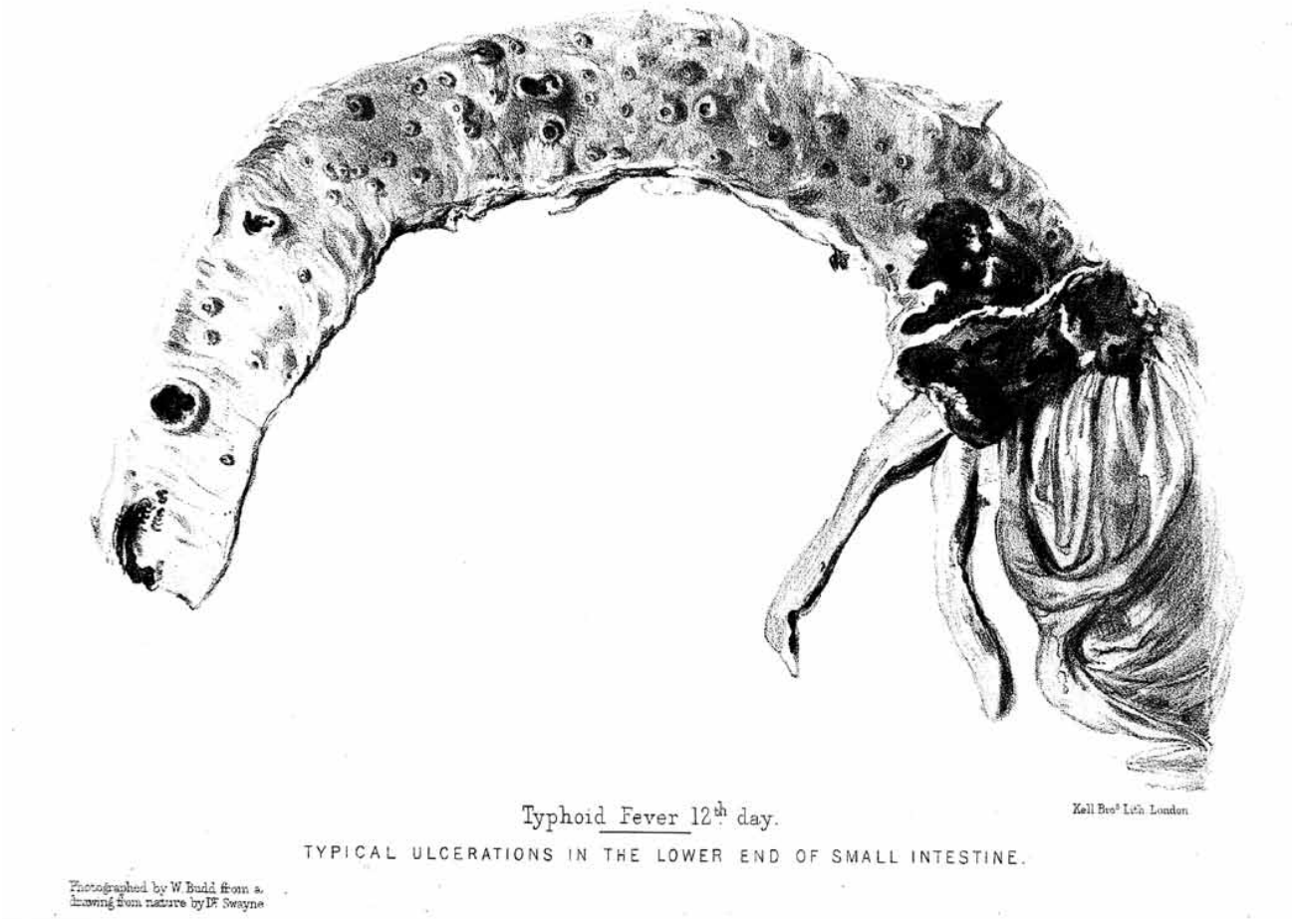
Budd was educated at École de Médecine in Paris where he finished in 1837. His studies were disrupted there due to a bout of typhoid fever. After finishing his education in Paris, he went on to attend Edinburgh University in order to finish his medical degree. He graduated in 1838.

Budd was interested in the spread of disease especially in relation to Cholera. In 1847, when he was practicing in Bristol, he realized typhoid fever was becoming a minor epidemic in a particular area of Bristol. Of those who had contracted this fever, he realized they all shared the same water supply, and those who had not contracted the fever appeared to have another source of water supply. This allowed Budd to conclude that the disease was being spread by water. He used this theory to apply in the case of Cholera. In 1849, he encouraged the development of the Bristol Water Company to avoid such spread of disease.

Not only did he conduct research about Cholera, but he also described the 'contagious nature' of the following diseases:

- Diphtheria (1861)
- Anthrax (1862)
- Tuberculosis (1867)
- Scarlet Fever (1869)

He died at the age of 69, after previously suffering from a stroke 6 years before. He was described as a vivacious man and very enthusiastic about his work.



PROFILE: EDWARD JENNER

THE PIONEER OF THE SMALLPOX VACCINE

BORN
1749

DIED
1823

AGED
74

“I hope that some day the practice of producing cowpox in human beings will spread over the world – when that day comes, there will be no more smallpox” Edward Jenner

Edward Jenner was born on 17th May 1749 in Berkeley, Gloucestershire1. He was the eighth out of nine children and his father was the vicar of Berkeley. Jenner married Catherine Kingscote in 1788. He met her during the course of an experiment involving balloons.

Medical life

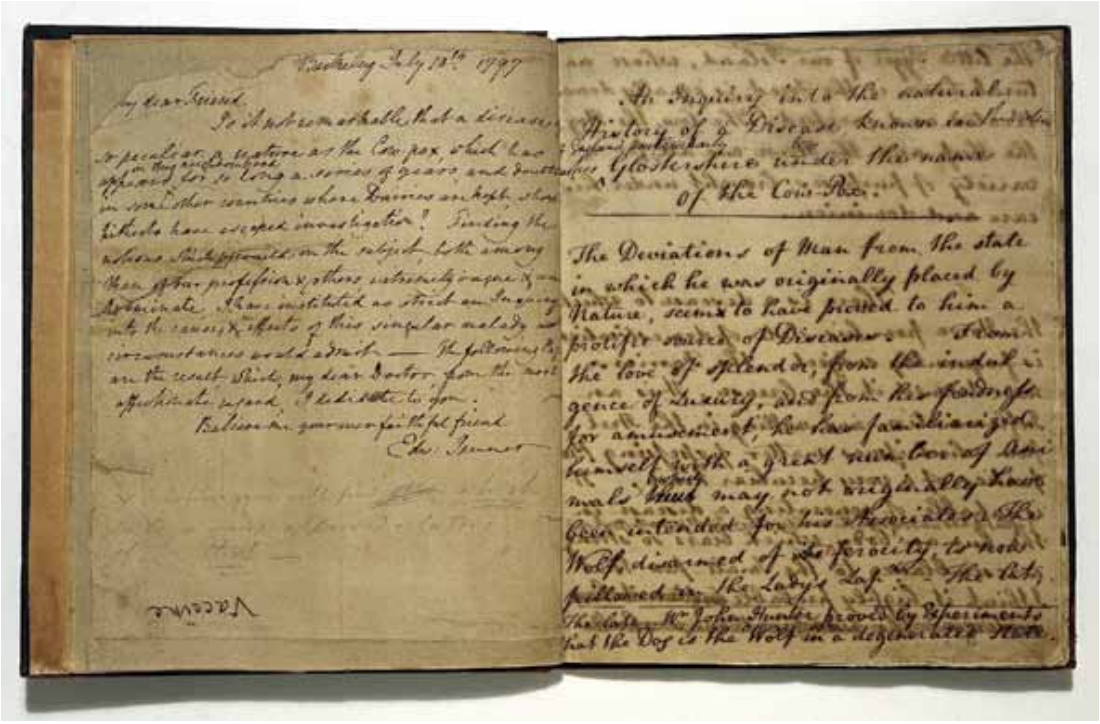
When Jenner was 14, he became an apprentice to a surgeon called Daniel Ludlow. Following his training, in 1770 he went to St. George’s Hospital in London to finish his medical training with another surgeon by the name of John Hunter. Two years later, he returned to Berkeley to practice as a Doctor.

In 1796, he carried out his famous experiment relating to cowpox and smallpox, using an 8 year old boy, James Phipps, who was the son of his gardener. Jenner had observed that in the countryside, milkmaids who had the mild disease of Cowpox, never seemed to contract Smallpox. These observations led him to investigate and experiment using cowpox as a means to prevent catching smallpox. At the time, Smallpox was a feared disease and could be deadly. Among children, it accounted for one in three of all deaths.

The first vaccination

Jenner rubbed some material from a cowpox sufferer into a scratch on Phipps’ arm. Phipps became mildly ill with Cowpox for a week after but soon recovered to feel well again. He then aimed to see if the tale was true about Cowpox protecting against Smallpox and so Phipps was then exposed to Smallpox. James Phipps did not contract Smallpox. His immunity was tested at later times also and he still had not contracted Smallpox. This confirmed that having the mild disease of Cowpox seemed to prevent the severe disease of Smallpox.

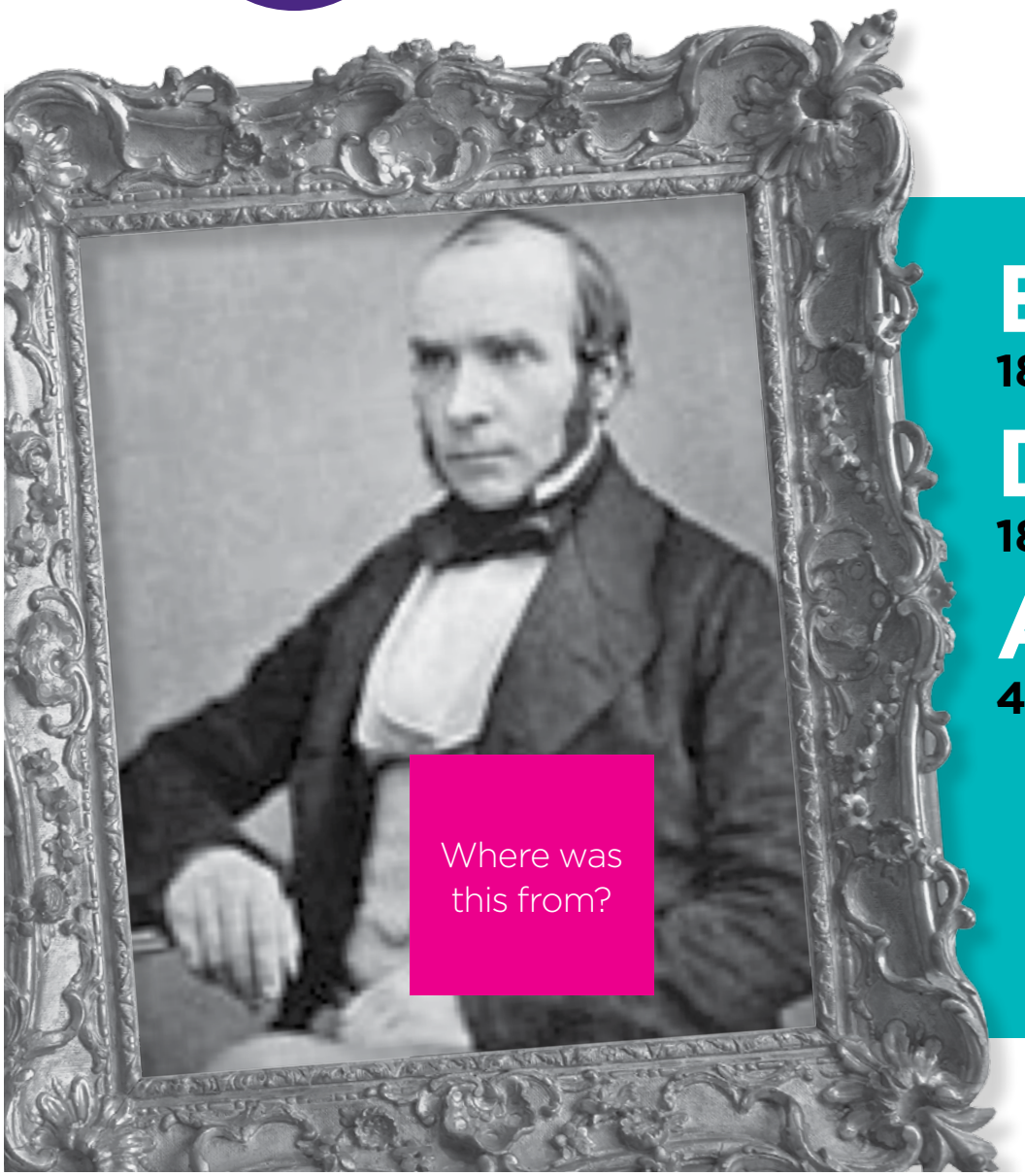
Jenner followed up this experiment with others to further solidify the notion of Cowpox protecting against Smallpox. He even tested it on his 11-month old son. In 1798, he published his research into a book. He also came up with the term ‘vaccine’ which comes from the Latin word “vacca”, meaning cow.



Wellcome Library, London. Manuscript open on titlepage. Photograph, March 29th 1797

PROFILE: JOHN SNOW

NOTED FOR HIS PIONEERING WORKS INTO ANAESTHESIA AND APPLICATION OF MEDICAL EPIDEMIOLOGY TO CHOLERA PREVENTION



BORN
1813

DIED
1858

AGED
45

John Snow, the eldest of nine children, was born in York in 1813. At the age of 14 he became an apprentice to a surgeon-apothecary William Hardcastle, and it was while studying with Hardcastle (in 1831) that Snow first witnessed a cholera outbreak. In 1836 he joined the Great Windmill Street medical school and after 6 months training at Westminster Hospital Snow became (in 1838) a member of the Royal College of Surgeons, and (achieving his doctorate of medicine in 1844) a member of the Royal College of Physicians in 1850.

In 1847 Snow watched a tooth extraction whilst the patient was anaesthetised with Ether. He then committed to the study and application of using inhalational anaesthesia during surgery. Snow specialised in anaesthesia becoming a prominent and successful anaesthetist and publishing eighteen papers in the London Medical Gazette between 1848 and 1851. He also invented several pieces of equipment to aid the use of anaesthesia. When, in 1847 James Young Simpson discovered the use of chloroform as an anaesthetic, Snow was keen to test the safety and uses of chloroform even experimenting upon himself. His vast amount of knowledge and skill as an anaesthetist gave Snow a reputation for safety and he even administered chloroform to Queen Victoria during the birth of Prince Leopold (1853) and Princess Beatrice (1857).

In addition to being a highly successful anaesthetist, Snow is remembered for his work with cholera epidemiology in London. In 1854 a cholera outbreak took hold of Broad Street in London killing five hundred people in ten days. Snow noticed a difference between the number cholera victims associated with different water companies in London and theorised that people could be getting cholera from infected water. Working with William Farr, they calculated that people who got their water from the Southwark and Vauxhall water company where up to nine times more likely to get cholera than people who got their water from the Lambeth water company. Snow also managed to isolate the source of the cholera outbreak to a particular pump in Broad Street. By removing the handle of the Broad Street pump, the number of cases of cholera dramatically decreased and proved Snow's theory of infected water. In 1856 Snow presented his work on locating the source of cholera in Paris (and met Emperor Napoleon III).

Unfortunately his work was not initially well received or accepted. Doctors at the time couldn't and wouldn't believe that infection could be carried in water but believed instead that disease was carried by miasma ('bad air'). It wasn't until the 1860s when Koch and Pasteur discovered Germ Theory that many other doctors and scientists accepted that cholera was transmitted by infected water.

Snow died unmarried in his home, from a stroke, age 45. A monument showing a handless pump on Broadwick street (formerly Broad Street) commemorates Snow's discovery.

Wellcome Library, London. Vapour or ether inhalation apparatus. Woodcut

PROFILE: WILLIAM HERAPATH

RENOWNED CHEMIST AND TOXICOLOGIST

Where was this from?

BORN
1796

DIED
1868

AGED
71

BURIED
Arnos Vale Cemetery

William Herapath was born in Bristol in 1796. From an early age he exhibited an interest in science and engineering and was affectionately known by his family as 'the little philosopher'. Age fourteen he took up chemistry and was intent on building his own equipment. After his father died in an accident, Herapath took over the family malting business and married Sophie Bird around the same time.

In 1832 Herapath was a founder of Bristol Medical School where he lectured in chemistry and toxicology until 1867. He was also a founding member of the Chemical Society in London. However, although he was considered by many a professional analyst in chemistry and toxicology it wasn't until 1834 that Herapath gave up the malting business to pursue his career in chemistry.

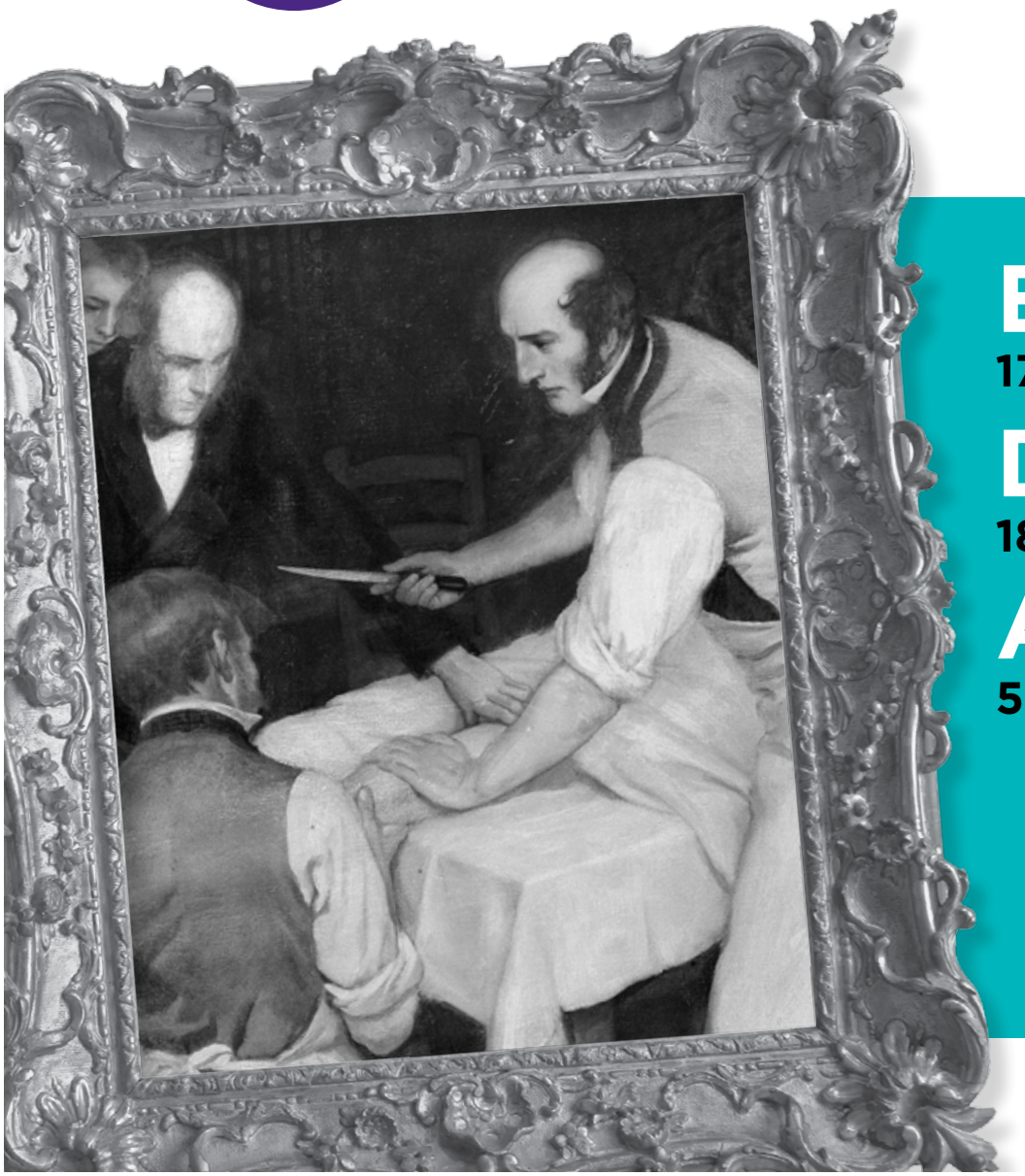
He was particularly noted for his involvement as a toxicologist in many famous murder trials. In 1835 Mary Ann Burdock was accused of the murder of her lodger. The court authorised the corpse to be exhumed and examined by Herapath. He reported finding large quantities of arsenic in the stomach of the deceased. Following this evidence Burdock was convicted and publically hanged in Bristol allegedly in front of 50, 000 spectators. Herapath was also a key toxicology witness in the case of the 'Rugeley Poisoner'. In 1856 William Palmer was accused of poisoning betting rival John Parsons Cook. Herapath gave evidence for the defence whilst Alfred Swaine Taylor, the most famous toxicologist in England at the time, argued for the prosecution. Herapath was unsuccessful in his defence and Palmer was found guilty and hanged in May 1857. During his career Herapath frequently faced Taylor in court. However, whilst famous for his participation in such famous trials, Herapath only rarely published his works on arsenical poisons. As well as his key talents and fame in toxicology, Herapath had an interest in politics. In 1831 he was appointed under-sheriff during the Bristol October riots and in 1832 he was president of the British Political Union.

William Herapath died on 13th Februrary 1868 age 71 in his home from complications of diabetes. He is buried in Arnos Vale Cemetery.

He and his wife Sophia had six children. Two of his sons were noted chemists. The youngest Thornton Herapath (born 1830) published 60 papers before he died in a drowning accident in 1858. Thornton is buried in the same site as his father. William Bird Herapath (born 1820) was trained at Bristol Medical School and London Hospital as a physician and became noted as a chemist after his discovery of *Herapathite* which is now used to make black polarised sheets.

PROFILE: ROBERT LISTON

FIRST OPERATION IN EUROPE UNDER ANAESTHESIA PIONEER IN THE USE OF ANAESTHETICS IN SURGERY

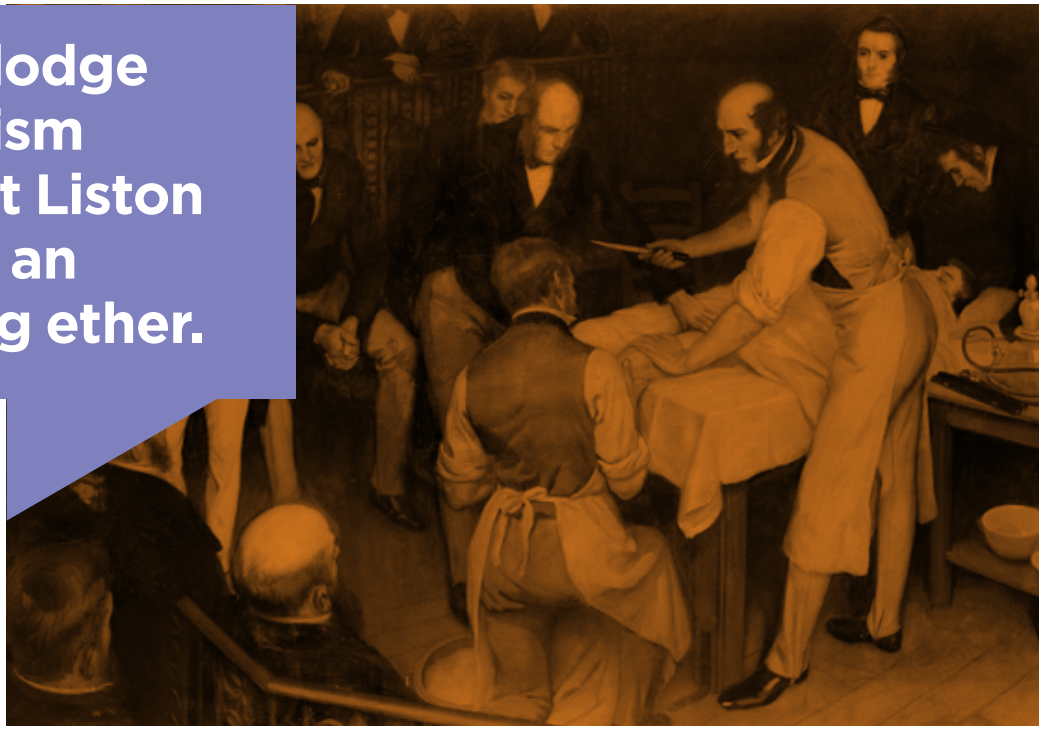


BORN
1794

DIED
1847

AGED
53

"This yankee dodge beats mesmerism hollow" Robert Liston on performing an operation using ether.



Robert Liston was a Scottish surgeon born in 1794 in Ecclesmachan (West Lothian). Famous for his speed and skill in surgery, he was also a pioneer in the use of anaesthetics for surgery. Upon completing his training in London, Liston was made Lecturer of Anatomy at the University of Edinburgh in 1818. However, his quite abrasive, egotistical and argumentative manner caused him to fall out with his fellow surgeons at the Edinburgh Royal Infirmary. His 'exile' from the Scottish surgical scene, lead to his eventual departure to London where he became the first Chair of Clinical Surgery at University College London in 1835.

When Liston began his career in surgery, it was necessary for surgeons to be as fast as possible as there were no anaesthetics and so the patient was fully awake during their operations. By being as quick as possible, the surgeon minimised the excruciating pain experienced by the patient and reduced the risk of them falling into shock. Robert Liston was remarked as one of the best surgeons of the time due to his ability to complete surgeries in a matter of seconds. It was said that he was able to amputate a leg in two and a half minutes. Known to be quite an arrogant gentleman he would often shout to students in the audience 'Time me, gentlemen, time me!' before diving into his surgical endeavours. To free his hands to hold more instruments, and thus saving more time, he would often be seen holding a bloodied knife in his mouth.

His speed, nevertheless, was not always advantageous. His most notorious case involved a sub two-and-a half-minutes leg amputation. Although the leg was successfully amputated by Liston the patient died a few days later due to an infection which was often the case in the days previous to antiseptic interventions. During the operation, Liston's enthusiasm also led to him removing his assistant's fingers (who also died of an infection in the subsequent days) and the slicing of the tail coats of one of the spectators, who was so scared that the knife had sliced his organs that he died of fright.

Although Liston's skill as a surgeon is widely recognised and known, what he is largely remembered for in history is his exploits with anaesthetics. On 21st December 1846, Liston undertook the first operation in Great Britain using anaesthesia at University College Hospital. The anaesthetic used was ether which had been used to similar effect in operations in the USA, and it meant that patients could be operated on in a pain-free way. Although Liston completed the operation in his usual rapid method, this start of the use of anaesthetics begun a new era of surgery in which surgeons could afford less haste, thus making surgery a slightly less daunting prospect for patients. The People's Journal at the time voiced their excitement at the potential of this new pain-free surgery saying that this was the *'discovery of the power to still the sense of pain, and veil the eye and memory from all the horrors of an operation. ... WE HAVE CONQUERED PAIN!'*

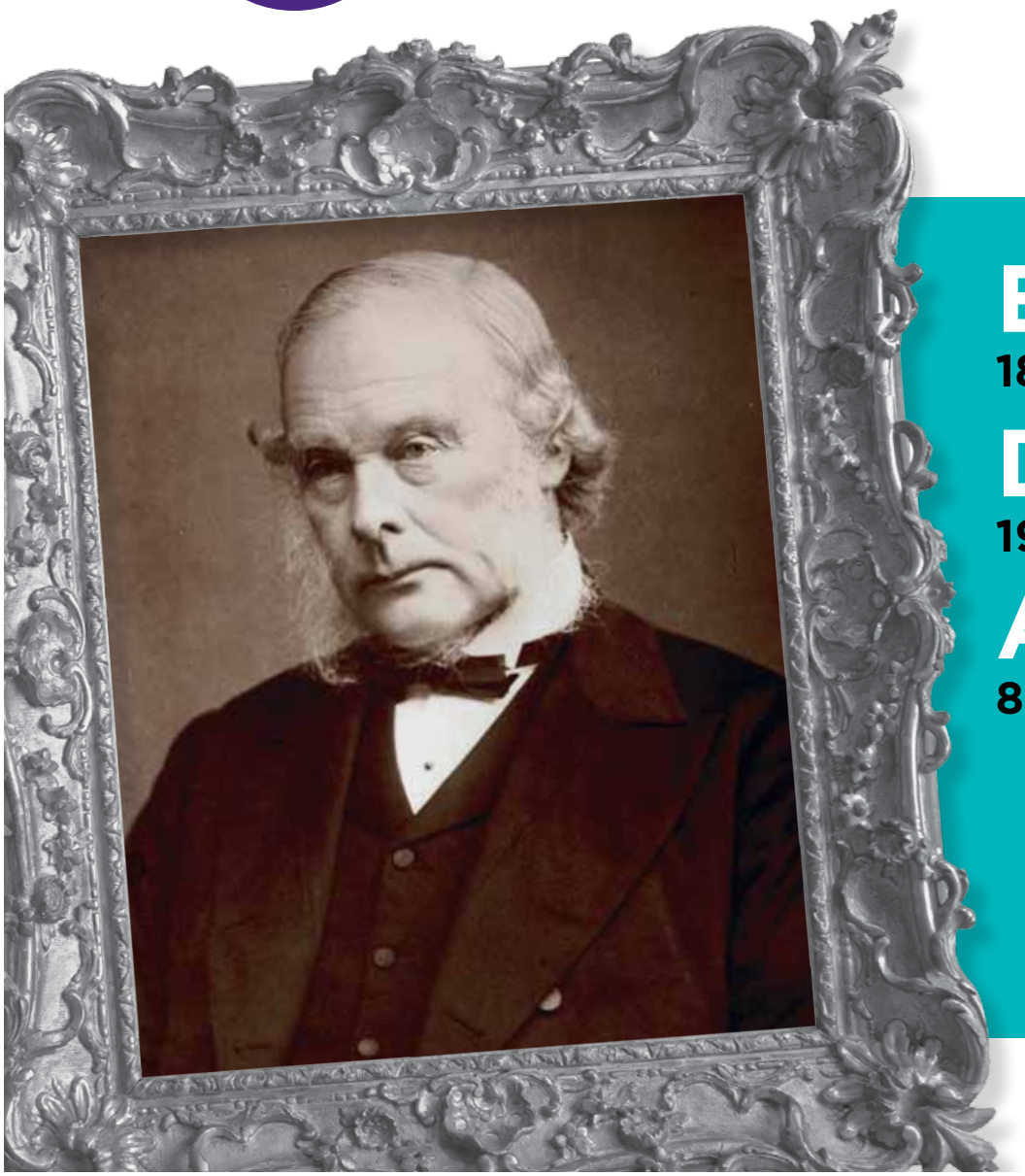
Other noteworthy aspects of Liston's career include the invention of the Liston splint, which supports fractured femurs and is still used today, and locking forceps to close arteries and prevent blood loss.

Image: 'Robert Liston operating. The artist was Ernest Board of Bristol (1877-1934), and this was one of the paintings he was commissioned to paint by Henry S. Wellcome circa 1912'

Source: Wellcome Collection

PROFILE: JOSEPH LISTER

CONTRIBUTOR TO MODERN AND ANTISEPTIC SURGERY



BORN
1827

DIED
1912

AGED
85

"...labor and toilsome investigation and experimant of which few can have any adequate idea" Sir Hector Cameron, assistant to Joseph Lister

Joseph Lister is known for his contribution to modern and antiseptic surgery. He is called the 'Father of Modern Surgery' for his contribution to sterile surgery. This greatly improved the safety of patients who underwent complex surgeries.

Family life

Joseph Lister was born in Essex. He was brought up in the Quaker faith and throughout his life was a religious man who strongly believed in God. He married Agnes Syme (the daughter of one of his colleagues). His wife supported him throughout his professional career and often worked alongside him. They had no children.

Education and medical career

Lister attended a number of prestigious schools throughout his education.

- 1844 he attended the University of London where he was awarded a Bachelor of Arts Degree. He then turned his attention to surgery.
- Graduated with honours in Bachelor of Medicine from London.
- 1852, he became a member of the Royal College of Surgeons in Ireland.
- 1853 became an assistant to one of the greatest surgical teacher of the age, James Syme.
- 1854 began his surgical career as a surgeon in Edinburgh.
- 1861 he became a full-time professor in the field of surgery at the Royal Infirmary in Glasgow.
- 1893 retired but still supported the advancement of science by joining various science associations.

Joseph Lister was a keen researcher. He published his own research and read the research of others. He had read **Louis Pasteur's** research that showed germs were air-borne. Through this and his own observations he concluded that infections did not come from surgical wounds but must come from air-borne germs. Unlike Pasteur he could not disinfect wounds by boiling. He discovered that carbolic acid was used as a disinfectant in sewers to kill parasites. He realised carbolic was not poisonous to humans and he began to use carbolic acid to clean his hands, surgical instruments, and bandages (antiseptics).

Initially his work on antiseptics was met with scepticism. Many surgeons did not want accept that infections might come from their own hands or their operations. The carbolic acid also made the surgeons hands sore. Despite the scepticism, by 1860 he had the reduced surgical mortality rate by 15% in his own hospital.

In 1869, Lister introduced a new germ killing technique. He filled a pump spray with carbolic acid which was used in the operation theatres to clean the air and surfaces. Soon other hospital and surgeons adopted this germ killing pump as deaths after surgery definitely dropped.

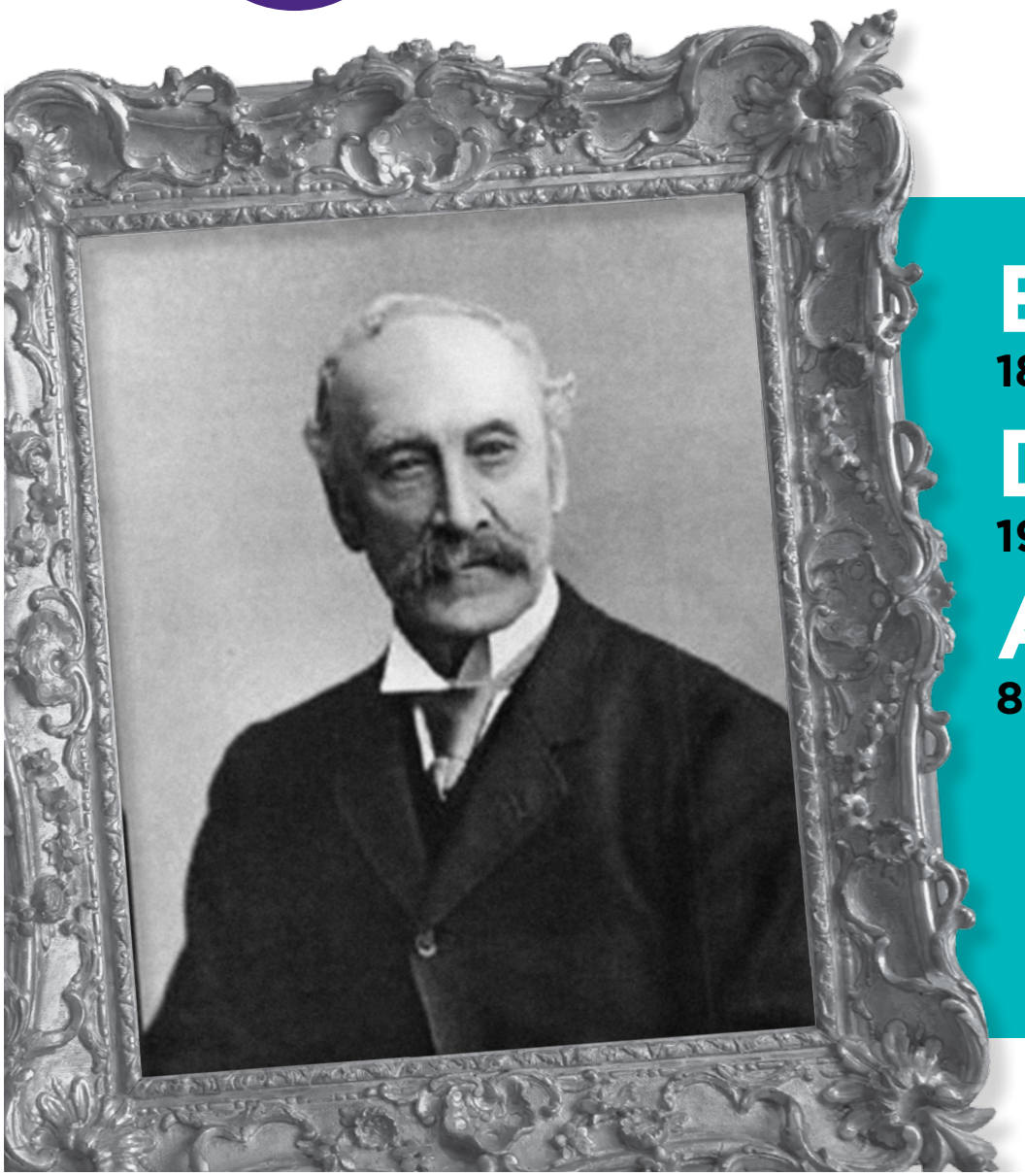
As the germ theory of disease became more widely accepted, the medical profession realised that infection could be better avoided by preventing bacteria from getting into wounds in the first place. This led to the rise of sterile surgery.

After being appointed as Queen Victoria's personal surgeon for many years, he was knighted as Sir Joseph Lister in 1883.

The 'Listerine' mouthwash was named after him, in his honour, in 1879.

PROFILE: JOSEPH GRIFFITHS SWAYNE

PUBLISHED STUDENT TEXT BOOK 'OBSTETRIC APHORISMS' AND ADVOCATED 'ASEPSIS'



BORN
1819

DIED
1903

AGED
84

Biographies

Born 1819 in St. James' Barton Bristol and educated in Bristol. Joseph Griffiths Swayne came from a medical family as his father was a Lecturer in Midwifery at the Bristol Medical School and his mother was the daughter of Dr. Thomas Griffiths. He married Georgina Gunning, had one son and one daughter. Died 1903

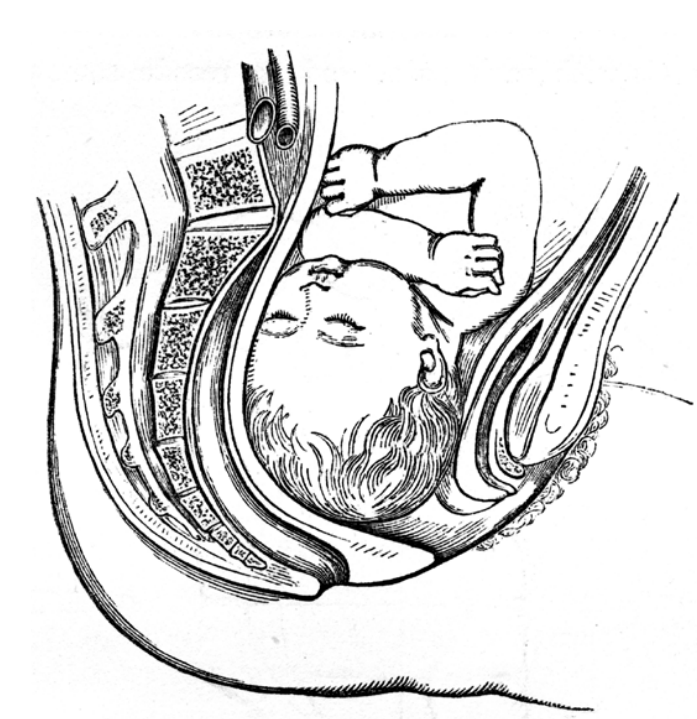
Education and medical career

- Educated at Bristol College in Park Row
- Trained under his father in the Bristol Medical School
- 1841 continued his trained at Guy's hospital, London where he became a Member of the Royal College of Surgeons.
- 1843 then graduated from Paris medical school with a degree in medicine.
- Returned to Bristol and practiced alongside his father and was a lecturer in anatomy at the Bristol Medical school.
- 1845 Graduated as a Medical Doctor (M.D.). Took over from his father as the Lecturer in Midwifery at Bristol Medical School.
- 1848 after suffering a mild bout of Cholera, he wrote about it for the medical journal The Lancet.
- 1853 appointed as the consulting Physician at the maternity department of Bristol General Hospital.
- 1856 published 'Obstetric Aphorisms for the Use of Students' which eventually ran to 11 editions.
- Regularly lectured to medical students at Bristol General Hospital and Medical School.
- 1883 published a study of maternal deaths in the Bristol Medical Chirurgical Journal.
- 893 became Professor of Midwifery at University College Bristol as Bristol Medical School became part of the University.
- 1895 became Professor Emeritus for the University

Griffiths Swayne was practicing medicine before Germ Theory was known. However he was always very careful about washing his hands. He believed that surgeons should not wear their beards or hair long. He had observed that septic poisoning was more common in the patients of those who did so. He also believed that the practice of dissecting corpses and then immediately dealing with maternity patients led to infections. He was very keen on education and regularly lectured students.

He was a keen artist and would often sketch during lectures. He was a pupil of Samuel Jackson, who's art can be seen in theBristol Museum Collection. In 1858 he travelled to New Zealand to improve his health after an infection caused him to go temporarily blind. Whilst there he undertook a number of paintings and drawings.

With many thanks to Gail Boyle of Bristol Museums and Art Gallery for sharing all her knowledge and research.



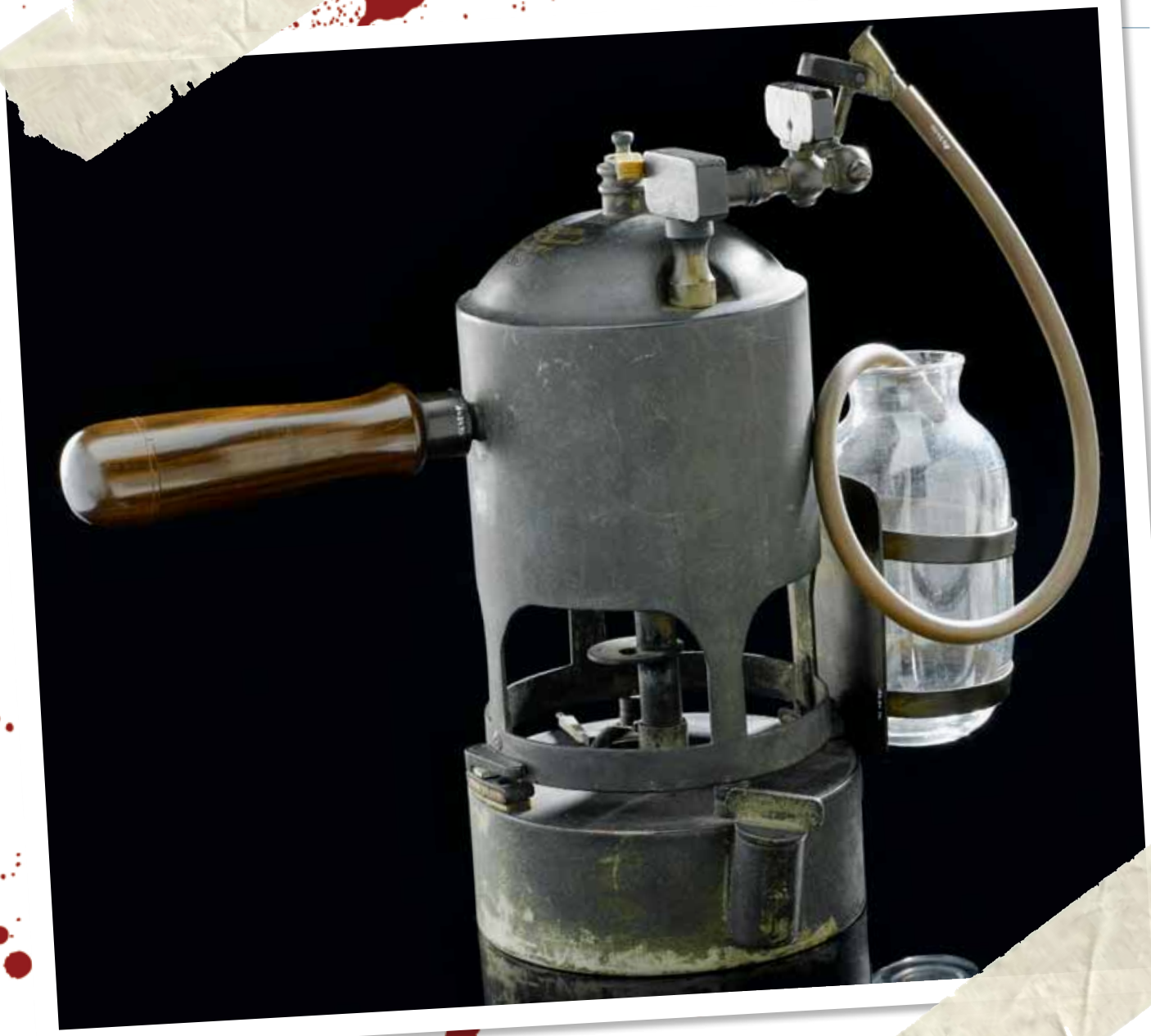
SURGERY

4 ADVANCES IN ANAESTHETICS

Timeline: Advances in Anaesthetics

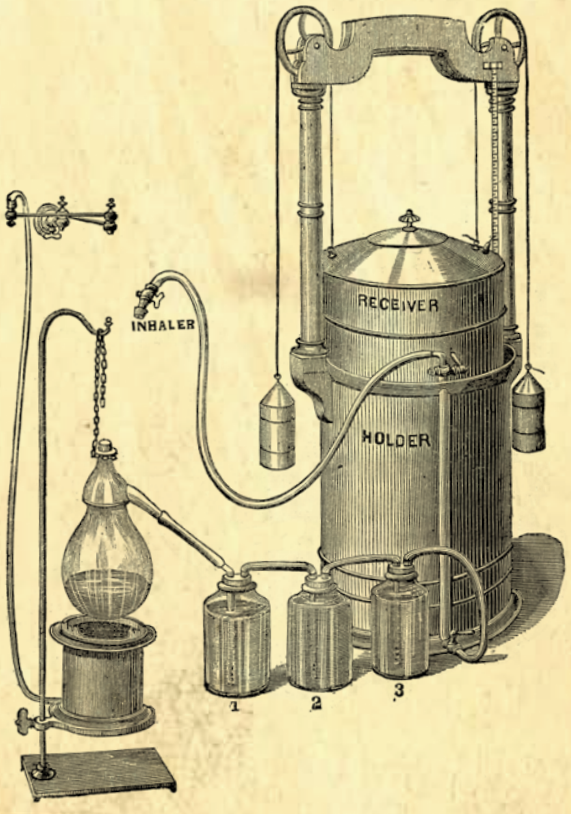
200AD	**The first anaesthetic drugs were derived from plants and herbs.** These include Opium (from the opium poppy), mandrake root and alcohol.
1798	**Joseph Priestley (1733–1804) discovers nitrous oxide.**
1800	**Humphry Davy experiments with nitrous oxide**. Whilst experimenting at the Pneumatic Institute in Dowry Square, Hotwells. He notes that after inhalation he became dizzy
1842	**Ether used as an anaesthetic during an operation.** American Crawford Long becomes the first physician to use ether on a patient during an operation. It took a year for him to publish but once he did, other doctors and dentists began to use ether on patients. In fact in 1844 American dentist Horace Wells had a 'painless' tooth extraction performed on him using ether.
16 OCTOBER 1846	**Ether anaesthesia demonstration**. William Morton and surgeon John Warren perform the first public demonstration of ether anaesthesia, during an operation to remove a lump under the jaw of Gilbert Abbott.
1853	**Queen Victoria inhales chloroform during childbirth.** John Snow administered chloroform to Queen Victoria during the birth of Prince Leopold. The fact that the Queen had used chloroform during childbirth made its use much more socially acceptable.
DECEMBER 1846	**Early used of ether anaesthetics in Britain.** Dentist James Robinson removed a tooth of a Miss Lonsdale under ether anaesthesia. Robert Liston amputated the leg of a chauffeur, Frederick Churchill.
1847	**John Simpson uses chloroform during the delivery of a baby.** Chloroform was found work more quickly and was less irritating to the throat and lungs than ether.
1877	**Cocaine used as an anaesthetic.** It was found to be an effective local anaesthetic and starts to be used during dentistry.
1943	**Curare first used as an anaesthetic.** This anaesthetic is a muscle relaxant and modern anaesthetics are based on this drug.
1956	**Anaesthetic halothane is used by a doctor in Manchester.** Halothane was safer and less volatile that other inhaled anaesthetics. Its use was eventually phased out because it could cause hepatitis.

5 THE DISCOVERY OF ANTISEPTICS



Timeline: The discovery of antiseptics

1847	Ignaz Semmelweis discovered if doctors washed their hands in chlorinated lime solution before gynaecological exams it drastically reduced the incident of puerperal fever. The mortality rate reduced from 35-10% to below 1%.
1865	Joseph Lister read Louis Pasteur's work on the link between germs and infections which suggested that microbes in the air or on dressings might carry infection.
1867	Lister applied Pasteur's idea in the use of antiseptic in 3 ways: 1. Surgeons washed hands in carbolic acid before surgery 2. Wounds were cleaned thoroughly and covered with lint soaked in carbolic acid 3. He developed a carbolic spray which was sprayed over the patient to kill any microbes in the air Published a book on his study of antiseptics using carbolic.
1878	Robert Koch found the bacterium which caused septicaemia. This gave great boost to Lister's ideas.
1887	All surgical instruments were steam-sterilized.
1892	Lister and Pasteur were together given an award at the Sorbonne University in Paris for their contribution to the fight against disease.
1894	Sterilized rubber gloves were used for the first time in surgery.
1896	The first heart operation was carried out when surgeons repaired a heart damaged by a stab wound



LESSON TITLE: PERFORMING MIRACLES – LEAPS AND BOUNDS IN SURGERY

PRIOR ASSESSMENT / PRIOR LEARNING:

An understanding that surgery in the past carried significant risks due to blood loss, infection and lack of pain control.

RESOURCES:

18th century operation picture, 19th century operation picture, biographies of surgeons

Aa STARTER

Using their own knowledge, draw 3 pictures or word clouds that represent the changes in surgery from prehistory, through middle ages, on to renaissance.

LEARNING OBJECTIVES:

To understand that experimentation and risk taking helped improve surgery.

To understand that the discovery of the causes of disease and infection had a dramatic effect on the changes to surgery during the 19th century.

KEY THEMES:

All students will understand the discovery of anaesthetic improved survival chances but surgery was still extremely dangerous due to infection and bleeding.

Most students will be understand that infection was the greatest risk to patients after an operation.

Some students will be able to explain that the progress of surgery was slow due to resistance to change, slow spread of knowledge and the introduction of methods at different times.

SUCCESS CRITERIA:

How will students demonstrate their learning?

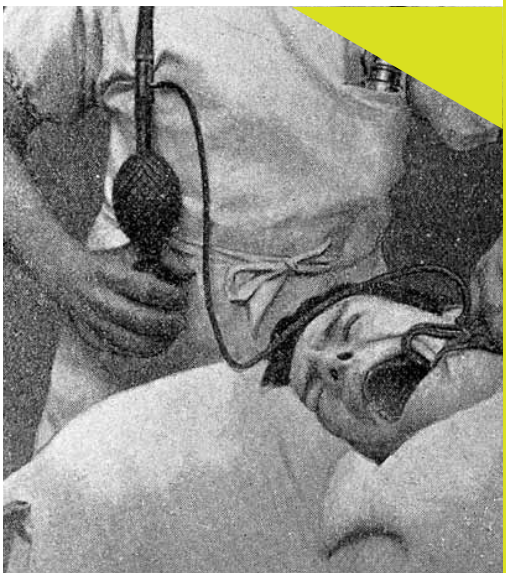
Students will demonstrate their learning by giving examples of people who worked to improve surgery and how they went about it. They will also be able to explain what other problems were a barrier to improving medicine.

PLENARY:

Having seen the improvements in surgery during the Victorian period, consider what still needed to be discovered or improved to make surgery even safer. Think about the themes of blood loss, infection, pain and research.

ASSESSMENT / EVALUATION:

Come up with 5 reasons why the 19th century was such an important era for the progress of surgery. Support the answer with examples of people and innovations that improved life expectancy during and after surgery.



ACTIVITY:

Compare the images of the 18th century operation to the 19th century operation. What is different? How would these differences have affected the recovery chances of the patient?

Review the recommended biographies in the pack (see the surgery symbol)

Explain what the surgeons and scientists were trying to do and what they believed they were preventing – blood loss, pain and/or infection.

From the biographies, suggest how successful their efforts would have been. Consider their influence on students, improvements to patient safety and influence on colleagues.

How could any of these changes actually have a negative effect on patient safety? Consider experimentation, resistance to change and the confidence/ability of the surgeon.

LESSON TITLE: WAR AND MEDICINE

RESOURCES:

After the War – newspaper article, The VAD brigade – poem

WW1

Memorial

STARTER

Write 'Necessity is the mother of invention' up on the board. In groups, students to think of things that were 'invented' because they were necessary. Starters could be the Sherman Tank, x-ray, GPS etc. These inventions don't need to be related to war or medicine initially.

PRIOR ASSESSMENT / PRIOR LEARNING:

Bristol is a port town and during WW1 and WW2 it was a major drop off point for war casualties.

ACTIVITY:

Review the two sources (poem and newsletter article), what do they tell us about what was put in place the in the local hospitals during the World Wars. Decide if they were positive or negative.

Consider the changing role of women during WW2. What happened to the women after the men came back from war?

Once the World Wars were over, what was the legacy for Bristol? Medical staff, new hospitals, better equipped hospitals. What negative effects would Bristol have suffered after WW1 or WW2?

LEARNING OBJECTIVES:

To understand that War has been a major driving factor in a range of health improvements.

To understand that War also affected people's lives in a range of ways; some positive, some negative.

KEY THEMES:

All students will understand that there were great many deaths during the World Wars but war also contributed to medical innovations

Most students will be able to conclude that wars made great changes and they will be able to explain some of the changes.

Some students will evaluate historical sources and draw conclusions about the lives of the injured in Bristol, the people of Bristol (in particular women).

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will demonstrate that they can argue more than one point and that there can be conflicting arguments.

ASSESSMENT / EVALUATION:

Undertake research to find 2 innovations that were direct outcomes of war which improved people's health. Suggestions could be x-ray, anti-malaria treatments, plastic surgery, blood transfusions and mass production of penicillin.

Create a report on the innovation including names of the inventors and why war influenced the creation or development of the innovation.

PLENARY:

Debate:
Hippocrates is quoted as saying that 'war is the only proper school for a surgeon'. War often moves on the development of new inventions. However, the innovation of weapons also creates new types of injuries. Is war the mother of invention or invention the mother of war?

Resource: After the War by "Spero"

AFTER THE WAR.
BY "SPERO."

Pessimists say, "Things will never be the same again after the war." No, but look at our gain: we shall emerge a steadier, strengthened nation. Those with any greatness of soul must feel proud even to have lived during this world's greatest drama, in which we have all been literally flung upon the stage and compelled to act without any rehearsal.

After the war there will be a cleaning up of the world's stage, and if each merely does his or her part we shall make our national life pretty nearly perfect. The Allies doing the same, it means the regeneration of the world. Universal service, civil and military, for we have learnt our lesson, and British manhood will not suffer the humiliation of unpreparedness again.

Co-operation in the highest sense, for tragedy has made all "akin," and the working classes now know that our aristocracy possess grit as well as culture, and as workers are indomitable. Take the other side. The upper classes have literally rubbed shoulders with the lower, and know that they also are "noble men," for heroism knows no class distinction. It 's just the Divinity in the man or woman at a supreme moment finding an outlet, and we stand awed before it. Kings with all their inherited traditions could do no more than each of our men have done and are doing in this war.

All are heroes, but as a forlorn hope deserves special praise, take our heroes of Gallipoli as an example. No one could find adequate words of praise for such men. As a great writer says in his wonderful account of the Gallipoli campaign, "No army in history has made a more heroic attack; no army in history has been set such a task. No other body of men in any modern war has been called upon to land over mined and wired waters under the cross fire of machine guns. Our men achieved a feat without parallel in war."

Such men as these will never be content with a self-seeking life, elbowing the weaker aside. Neither will our women, who have worked with a smile, putting their own sorrow aside, be content to go back to nothing but the trivialities of life. Take our Bishop's Knoll workers as one example out of thousands. Go into the wards and see the Sisters with their kind, smiling faces and tender, dexterous hands; go into the kitchen, and see to what a fine art cooking can be brought—brain sauce with everything. Cooking for a hundred and more is no light work, and yet all goes without a hitch. This strenuous work being done all over the country by girls who probably, many of them, have done nothing previously in the way of manual labour beyond hitting a soft ball with a racquet or throwing a hard one at a wicket. Now they are skilled munition workers, gardeners, labourers, drivers, and police-women, in fact, there is little needed which they cannot do, and nothing which they will not attempt.

We shall never be "as you were," so let us unite in the will to do our best, and the result will show forth in future generations long after the tragic cause has been forgotten.

BETTER SCAN?

PATIENTS AND STAFF, BISHOP'S KNOLL [illegible]TAL.

The V.A.D. Brigade
by Angel Davis

I thought I knew each regiment, battalion and brigade
Until I got to Bristol, by Red Cross train conveyed,
And saw upon the platform a company in blue,
Of goodly wives and daughters, and little flappers too.

I whispered to a comrade, "Pray tell me who are these
With smiles upon their faces?" He answered, "V.A.D.s.
They're called the 'Pillow-Smoothers', they have another name,
The 'Very Artful Darlings', and well they play the game".

I'm but a shy young ANZAC, not used to women much,
I've always dreaded nurses, and hospitals, and such;
How was I going to stick it, until my wounds were well?
A crowd of them all fussing – far worse than shot or shell.

I lay upon a stretcher, a little girl tripped up,
My cigarette she lighted, and held my coffee cup,
And "Could she write a postcard to send to any friend?"
Or, "Would I like a pillow?" She bucked me up no end.

I had no friends in Blighty, and when the pain got worse,
I never could have stood it, without that little nurse;
A father, mother, sister, and sweetheart all in one.
If I had not adored her, I must have been a hun.

Buty what if I should lose her? I know, I'll put a ring
Upon her wedding finger, to claim my little thing;
And when the war is over, if I should lucky be,
That 'Very Artful Darling' perhaps may cross the sea.

From Coo-ee, The Journal of Bishop's Knoll Hospital, Bristol, Vol 1, No. 4 (February, 1917)

PUBLIC HEALTH

LESSON TITLE: LEAPS AND BOUNDS – GREAT BRISTOL SCIENTISTS

RESOURCES:

biographies and images of historic scientists, post-its

Aa STARTER

Create a class word cloud of words (using post-its) related to public health in Bristol. Students add various words to different A1 sheets placed around the room with Starter Words: disease, sanitation, medicine, surgery, industry.

PRIOR ASSESSMENT / PRIOR LEARNING:

An understanding that sanitation, public health programmes and medicine advances have improved people's lives.

LEARNING OBJECTIVES:

To understand that specific scientists, campaigners and innovators had an effect on healthcare.

ASSESSMENT / EVALUATION:

Peer assess each other's presentations through positive criticism and informed questions.

Some students will be able to develop further questions that could be researched.

KEY THEMES:

All students will understand that through their actions certain key figures in history helped improve health locally and nationally.

Most students will be able to organise and communicate their historical knowledge.

Some students will evaluate historical sources and draw conclusions about how people's health was directly and indirectly improved through the actions of key scientists.

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will be able to answer constructive questioning from peers on their designated person.

PLENARY:

Is there anything they would like to add/change in the group word clouds. Justify their reasons.

ACTIVITY:

Students are grouped and given a key scientist to study:

They have 30 minutes to construct a group presentation on their designated person.

Demonstrate:

- How these medical professionals actions help the health of Bristol,
- Who in particular benefited from their reforms,
- If their actions have any effect on general medical research ,
- If their actions have any effect on national policy.

Ask the students to consider the key Starter Words from the beginning of the lesson

LESSON TITLE: DANGEROUS BRISTOL – PUBLIC HEALTH IN 19TH CENTURY BRISTOL

RESOURCES:

Budd's cholera map, Punch cartoon 'Monster Soup', Public Health Act 1948, Terrett memorial image and transcription and graves.

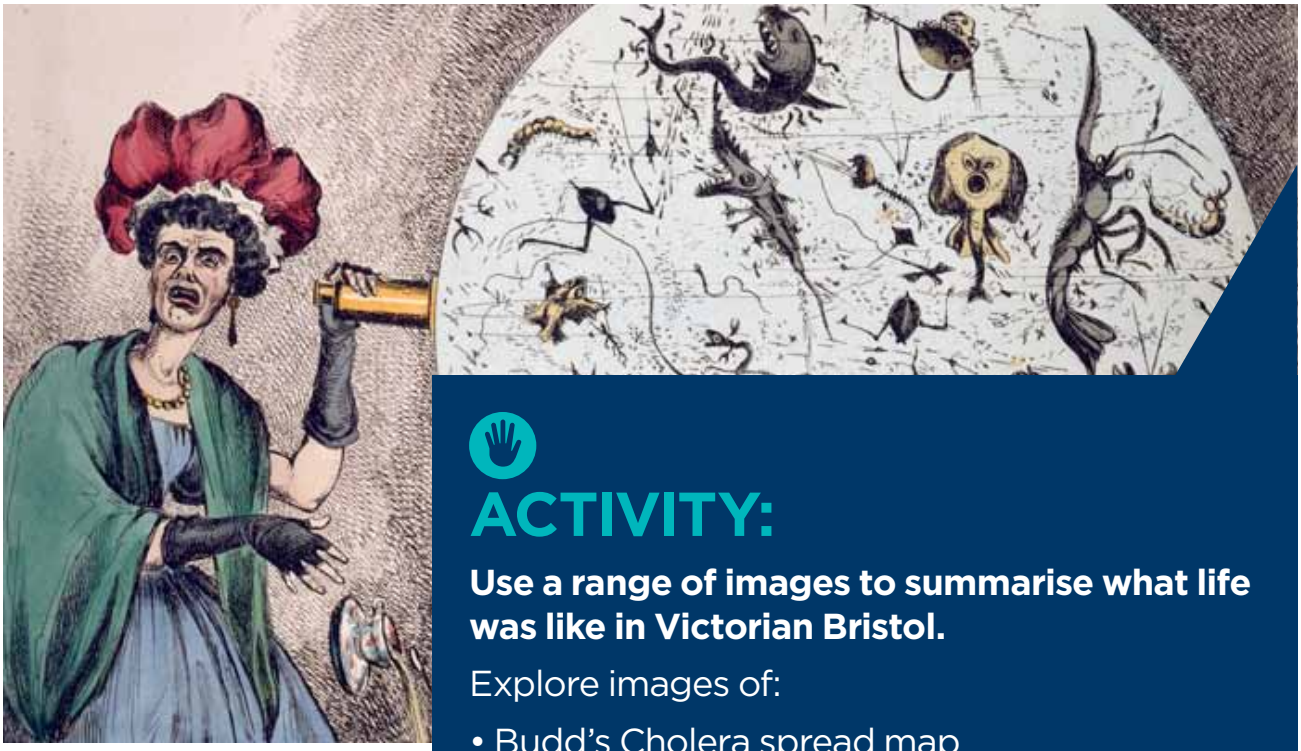
Aa STARTER

In groups, examine images of 19th century living conditions. Ask students to make guesses about what they are looking at. Ask them to annotate the images with the words that come to mind. Why these images might have been produced?

PRIOR ASSESSMENT / PRIOR LEARNING:

Understanding of how diseases spread.

Lesson plan 2



ACTIVITY:

Use a range of images to summarise what life was like in Victorian Bristol.

Explore images of:

- Budd's Cholera spread map
- The Terrett memorial photograph and transcription
- Punch cartoon 'Monster Soup' 1828

Task

Evaluate whether being poor had a significant effect on life expectancy in Victorian Britain? Use sources to explain your answer.

SEN support – read through the background notes and timelines.

LEARNING OBJECTIVES:

All students will understand that there were great many dangers to health in Bristol during the Georgian and Victorian eras by exploring first hand sources.

Most students will understand that poverty and class often had a effect on life expectancy.

Some students will evaluate the first hand evidence and ask questions about the past.

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will be able to say which methods of disease control existed in Victorian Britain and some will be able to explain how current medical knowledge influence their practice

A specific time period should be assigned for less-able students.

ASSESSMENT / EVALUATION:

Diary entries show evidence that students explored the resources and found evidence to show what life was like.

PLENARY:

Using prior knowledge, suggest possible causes of death for the Terrett children.

Justify the answers.

LESSON TITLE:
YOU'VE NEVER HAD IT SO GOOD – THE DEVELOPMENT OF THE NHS

RESEARCH LESSON (1 OR 2 LESSONS)

RESOURCES:

Quotes from early NHS workers, pamphlets pre and post NHS from reformers (internet), Doctors and government. Script of speech by Aneurin Bevan about the introduction of NHS (YouTube), Cartoon 1948 'Your Very Good Health' (YouTube).

Aa STARTER

View the online cartoon 'Your very good health'; explore the internet for resources on the evolution of the NHS.

PRIOR ASSESSMENT / PRIOR LEARNING:

An understanding that sanitation, public health programmes and medical advances all lead to improvements in general public health

ACTIVITY:

Using the sources provided, develop a list of reasons for/ against the NHS. Work together in groups to pick out the arguments for and against in all the sources.

More able students to write a letter to a newspaper describing why they think there should or should not be an NHS.

Try to convince, discuss, argue, debate in the letter.

Less able pupils to use scaffolding frame for the letter.

LEARNING OBJECTIVES:

To understand that not everyone in England had access to healthcare until 1948.

All students will understand that the NHS was introduced to the UK in 1948.

Most students will understand that a many different factors persuaded the British government that there was a need for a NHS.

Some students will be able communicate the reasons for and against a NHS and explain how.

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will explain what types of services were provided by the new NHS.

HOMEWORK/ KEY QUESTION:

Before the NHS, who was responsible for providing healthcare in the UK? Consider who benefited and who suffered

ASSESSMENT / EVALUATION:

Hot seating: After reviewing the for/against arguments; students develop a list of questions for a pro-NHS nurse, an anti-NHS doctor and a local MP. Students take it in turn (either in groups or as a class) to be the character and pose the questions.

PLENARY:

Discuss the kinds of diseases and conditions that now kill people in the UK. Consider genetic disorders, diseases that cannot be vaccinated against, diseases that have no cures.

QUOTES FROM NHS STAFF

'I had the experience where my mother was very ill and we had to call the doctor. I can remember the doctor standing in the doorway of the bedroom. I was only 9 then and I was ashamed of him because he just stood there and said, "I can't examine you until I see that you've got some money." One of my mothers neighbours who was there, it was always like that as neighbours were all around when there was something happening. She ran home and got her rent and showed it to the doctor and the doctor said, 'I can examine you now.' I was appalled that a doctor could behave like that because we looked up to doctors. On the one hand I suppose he had to live and needed the money but my mother could have died because she was bleeding so heavily. He didn't want see her unless he had money.'

Molly – who was a child before the introducation of the NHS.

'When I did my district nursing training, the doctors had to keep the private patients sick enough to be visited. I was covering a holiday for a district nurse and I had been trained to rehabilitate the patient. When she arrived back, the patient was sitting up (she had had a stroke) and I got told off. The nurse said, "How can the Doctor visit every day if the patient is not bed-ridden?" So even people with money didn't get the best treatment.'

Bettina – a trainee nurse before the introduction of the NHS.

'People could not get public assistance (for medical care) if they lived in their own cottage. They would have to sell their house, there were quite a few older people who had to sell their houses. When my father was out of work he would come home with no money, the public assistant people would come and point and say, 'you could sell this, or sell that.' It was very hard for people. I remember this even though I was only a child in the Late 1930's. I was 7 when the war started.'

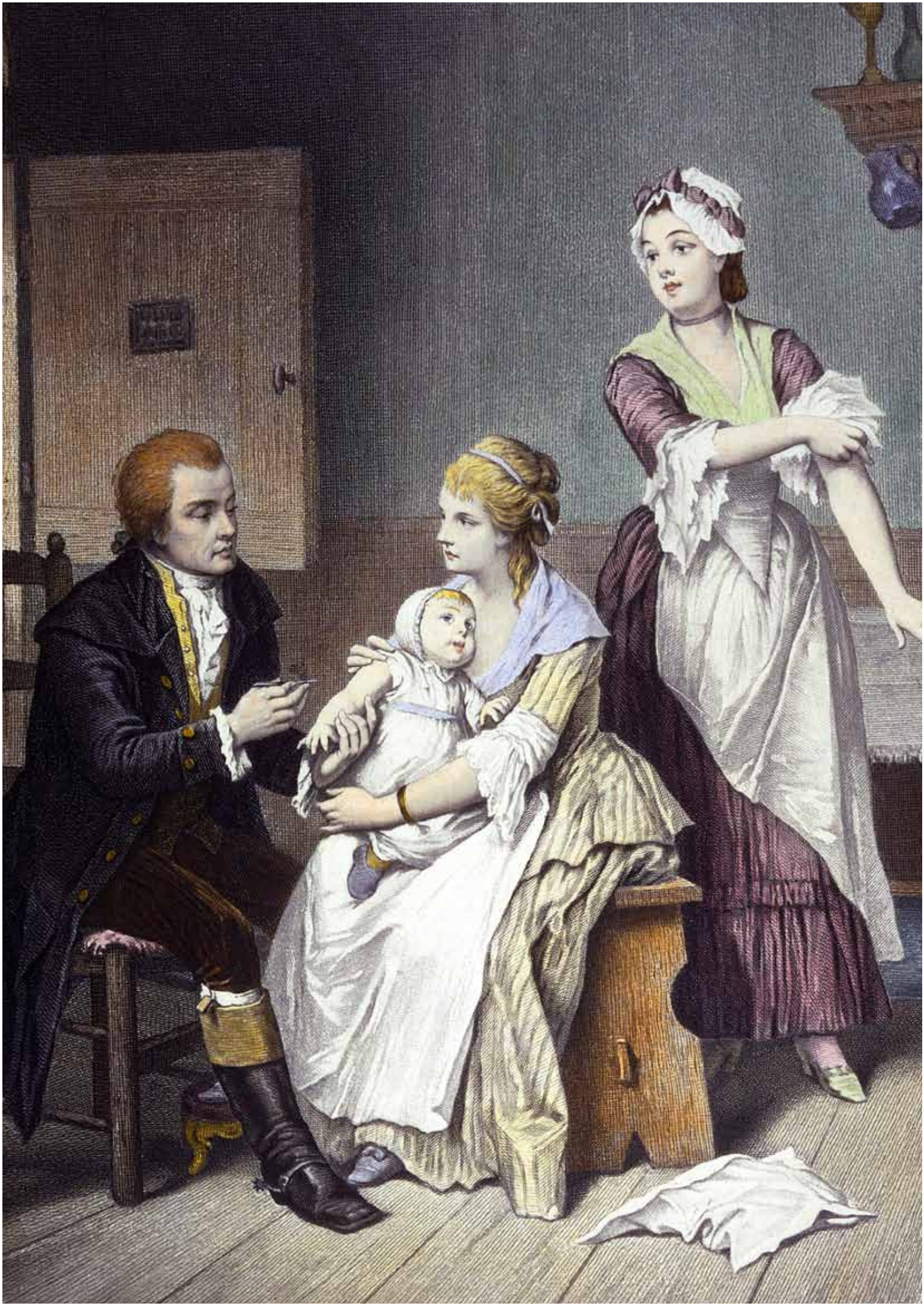
Molly on being poor and needing medical care.

'When the health service started when I was nursing, it was incredible how grateful people were. Now we take it for granted that we get free service. Then the number of people would say "oh I am so grateful to have this done." People didn't have the money to pay and they couldn't take the time off because they would get sacked. They couldn't have minor things fixed which made their lives easier, like hernias. There was so much backlog. The people who set up the health service believed that once they'd cleared the backlog it would be easier.'

Bettina and Molly describing their experiences as nurses when the NHS first started.

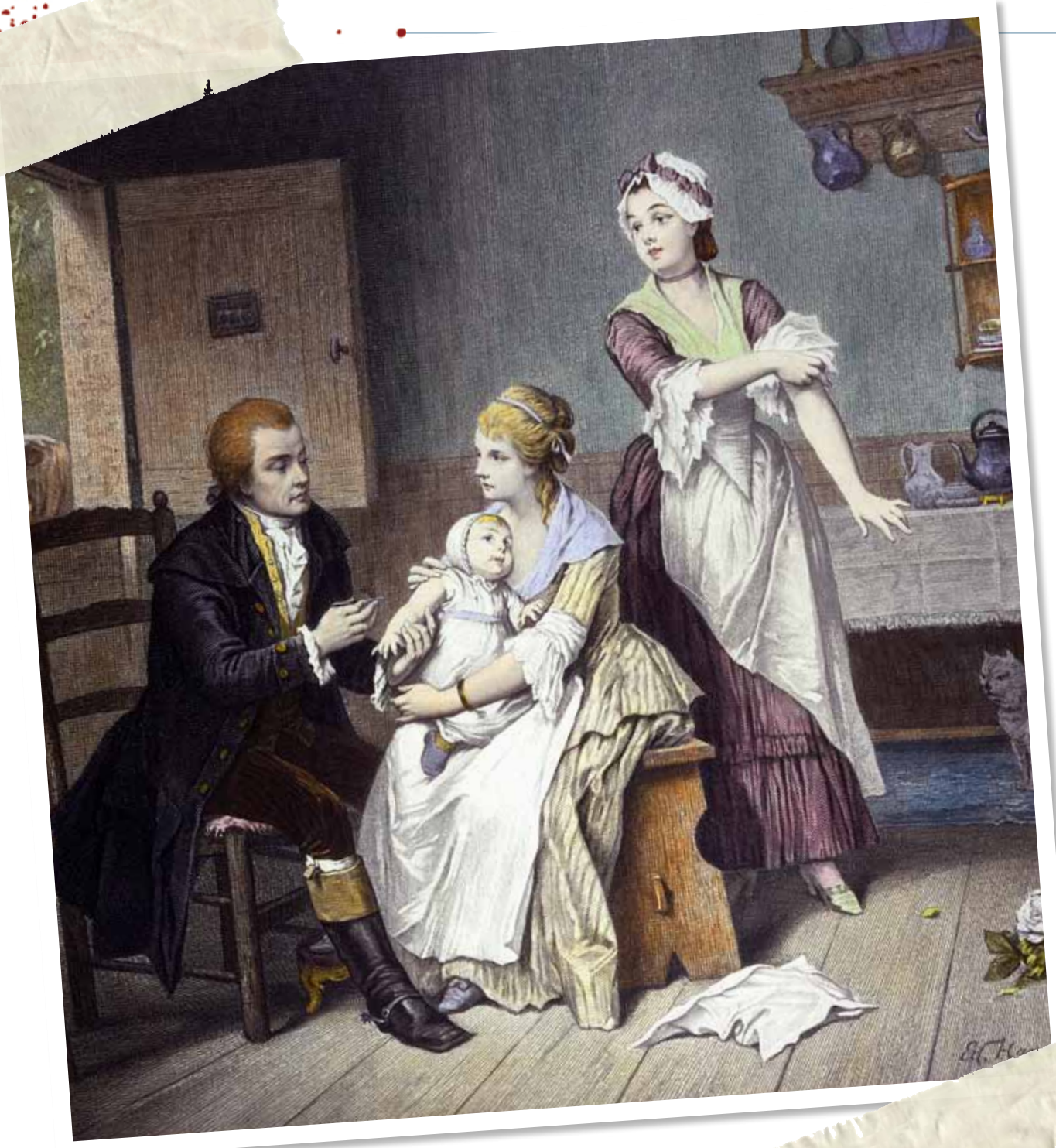
'When the NHS was being discussed, people called it communism. I don't think people should label it. I think its fairness, its the way I was brought up. My father would say its not fair if they haven't got a job, they want to work. They have to do without altogether. Bevan said he had to "stuff the Doctors mouths with gold."'

Recollection of the debate after the war about NHS.



DISEASE

1 ADVANCEMENT IN THE HISTORY OF VACCINATION



Timeline

8TH CENTURY TO 17TH CENTURY	**Variolation used to prevent smallpox.** There is evidence of inoculation being undertaken in both Turkey and China. The scabs of a smallpox sufferer were dried and the powder blown into the nostrils or scratched into the skin. This usually produced a less severe version of smallpox in the patient and gave them immunity to full-blown smallpox. However it could also cause smallpox and death in a number of cases.
18TH CENTURY	**Lady Mary Wortley Montagu introduces variolation to England.** She discovered variolation being used to prevent smallpox in Turkey and realized its benefits in preventing smallpox.
1796	**First vaccination carried out.** Edward Jenner observed that people who suffer cowpox cannot catch smallpox. He tested this theory by deliberately infecting James Phipps, the son of his gardener, with cowpox from the infected hand of a dairymaid, Sarah Nelmes.
28 APRIL 1881	**Demonstration of a vaccination against anthrax**. Louis Pasteur proved that a weakened bacteria can be used to vaccinate against a full strength version of the bacteria.
1882	**Robert Koch** isolated the cause of tuberculosis. The bacterium mycobacterium tuberculosis is proved to cause TB. He was awarded the Nobel Prize for Medicine or Physiology in 1905 for his work.
1890s	**Emil von Behring** discovered the basis of the diphtheria and tetanus vaccines.
1925	**First test of whooping cough (pertussis) vaccine on a wide scale.** Danish physician Thorvald Madsen used the vaccine to control outbreaks in the Faroe Islands after the Dr. Louis W. Sauer developed a vaccine for whooping cough in the 1920s.
1932	**First yellow fever vaccine developed.** There is little effective treatment for yellow fever so vaccination is vital in the prevention of this dangerous disease.
1958	**Polio and Diphtheria vaccines launched.**
1963	**First vaccine for measles licensed.**
1971	**Measles, Mumps and Rubella (MMR) vaccine introduced.** Unfortunately the now discredited work of Andrew Wakefield (then Dr) has slowed the uptake of this vaccination and there continues to be outbreaks of measles, mumps and rubella, which are preventable with vaccination.
1981	**First vaccine for Hepatitis B. Hepatitis B causes liver inflammation and damage.** It is usually sexually transmitted, transmitted from an infected mother during delivery of a baby or caught through reuse of contaminated needles usually during intravenous drug use.
1992	**First vaccine for Hepatitis A.** Not to be confused with hepatitis B. Caught from dirty water, through poor sanitation and can also be caught by eating shellfish from polluted water.
1998	**First vaccines for Lyme's disease and rotavirus.**

DISEASE OR NOT?

Take a look at these words and try to decide if it is a real disease or made up.

TYPHUS

TYPHOID

VAMPIRISM

SPINACROSIS

GUINEA WORM

TUBERCULOSIS

PERTUSSIS

ANTHRAX

ROTAVIRUS

BRAINPOX

DRAGONPOX

ZOMBISM

RED DEATH

CHOLERA

HOLOVIRUS

SMALLPOX

ROTAVIRUS

CRAMPUS

PRENTIDITUS

POLIO

If you aren't sure, try researching the word.

Worksheet

WRITING FRAME
TURNING POINTS IN DISEASE CONTROL

_____ (Name) set out to eradicate/control/research _____

First they

Next they

A problem was

In order to prevent the disease spreading they needed

The disease was eventually <u>eradicated/controlled/still a problem</u> (explain how and where)

Key words to use

Observed | Tested | Discovered | Sewarage | Vaccination | Identify | Research | Experiment | Antibiotic | Bacteria | Virus | Fungus | Disinfect | Steralise

LESSON TITLE: YOU'VE NEVER BEEN SO HEALTHY

TURNING POINTS IN DISEASE CONTROL 1 OF 2

RESOURCES:

Images of Bristol graveyards, Bristol city slums and living conditions, Dr Budd's paper about cholera spread in Bristol, Image of Arnos Vale, 'The cemetery 1848' poem

STARTER

List all the diseases they know of and try to group them by different criteria; possible to vaccinate against, transmission route, virus or bacteria, present in Europe. Try to think of other ways to sort them.

PRIOR ASSESSMENT / PRIOR LEARNING:

An understanding of the unsanitary conditions in Bristol.

LEARNING OBJECTIVES:

To understand that both improvements in public health and scientific break through contributed to changes in disease control

KEY THEMES:

All students will understand that there were a wide range of reasons for the spread of disease.

Most students will be able to name a number of killer diseases, describe how they spread and explain why they spread.

Some students will be able to explain the factors that influenced the control or eradication of a disease. They will be able to offer a range of reasons for their answer from the first hand evidence.

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will be able to name a number of diseases prevalent in Victorian Britain. They will be able to explain why certain diseases spread readily and where they came from.

Students will be able to name a number of scientists that worked to control a disease and how.

HOMEWORK QUESTION:

Research a scientists that helped improve public health in the 19th century. Discover the factors that drove them to try to prompt a change.

ACTIVITY:

Explore the image of 19th century Bristol living conditions, 'Monster Soup' cartoon and 'The cemetery 1848' poem. Discuss what these sources tell us about public health in the 19th century.

Are these sources totally reliable? Is there evidence of bias?

Annotate photocopies of the images with reasons why disease would spread in Bristol.

From prior knowledge and primary sources, try to work out which diseases would thrive in unsanitary conditions.

ASSESSMENT / EVALUATION:

Imagine you are a Bristol doctor; write a letter explaining why an epidemic of a disease has broken out and what the council should do to stop outbreaks.

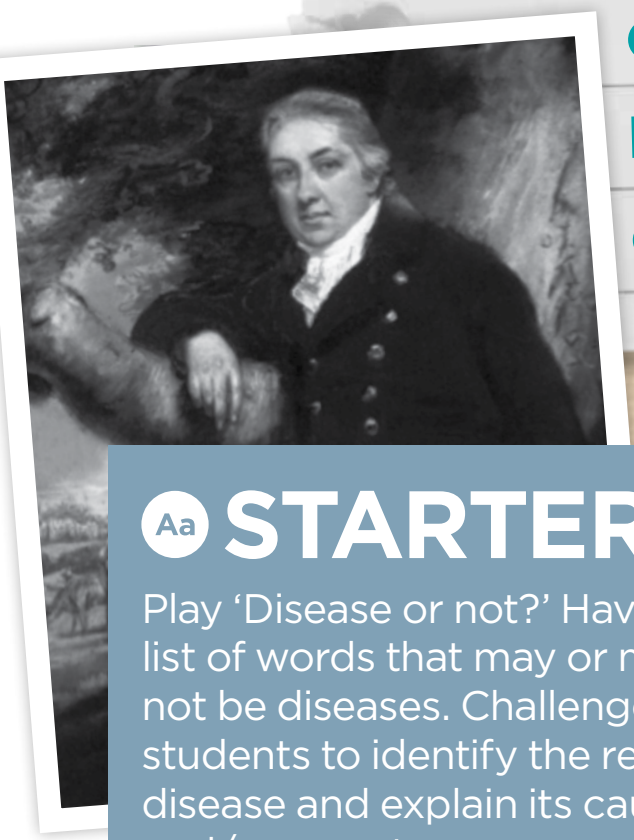
Suggested diseases include: cholera, whooping cough, scarlet fever, smallpox and influenza.

PLENARY:

Explore the image of Arnos Vale Cemetery and compare it with the images of the 19th century graveyard. From previous knowledge and the sources discuss which factors may have influenced the improvements in public health in Bristol including the addition of out of town cemeteries.

LESSON TITLE: YOU'VE NEVER BEEN SO HEALTHY

TURNING POINTS IN DISEASE CONTROL 2 OF 2



RESOURCES:

Outlines of scientist's lives, writing frame, disease or not worksheet

Aa STARTER

Play 'Disease or not?' Have a list of words that may or may not be diseases. Challenge students to identify the real disease and explain its cause and/or symptom.

PRIOR ASSESSMENT / PRIOR LEARNING:

Disease spreads faster in unsanitary conditions and poor health leads to lower immunity.

ACTIVITY:

Model filling in the writing frame using Edward Jenner as an example to the class.

Students are given a range of scientist biographies, then using the information students should explain the steps the scientist used to defeat the disease/improve healthcare.

Some students will be able to explain how this work effects today's modern healthcare – e.g. antiseptics, anaesthetics, epidemiology.

See bibliographies section for a range of scientists to use for research.

Key words can be found on the writing frame

LEARNING OBJECTIVES:

To understand that specific scientists, campaigners and innovators had an effect on healthcare.

All students will understand that there were a wide range of reasons for the spread of disease.

Most students will be able to name a number of important scientists and breakthroughs in disease control.

Some students will be able to explain the factors that influenced the control or eradication of a disease. They will be able to offer a range of reasons for their answer from the evidence.

ASSESSMENT / EVALUATION:

Completed writing frame

Discuss if these scientist led change, if so how?

HOMEWORK QUESTION:

John Snow and William Budd both discovered that disease could be water-bourne. Explain why John Snow is more famous for this discovery.

SUCCESS CRITERIA:

How will students demonstrate their learning?

Students will be able to name a number of scientists that worked to control a disease and how.

Students An understanding that individual research, sanitation and public health programmes work together to improve health.

PLENARY:

Using the knowledge gained during the lesson, create group/ class timeline of the control or eradication of diseases in Bristol. National and international factors may apply.

Able students will be able to extend the timeline through own knowledge and research

SCIENCE ACTIVITIES

IS THIS DISEASE A BACTERIA OR A VIRUS?

Categories of Disease
There are 4 categories of disease
1 = benign (non harmful)
4 = dangerous/fatal/hard to eradicate

nm = nanometres

For information and games about microorganisms, visit **www.e-bug.eu**

Attributes	Bacteria	Virus
Living	Living organism	Not defined as a proper living organism
Structure	One cell (unicellular) Has a cell wall and cell membrane	No cells Exists within a coat of protein
Nucleus	No	No
Can cause disease?	Yes (pathogenic)	Yes
Infection	Usually localised (happens in a specific place) but can be systemic. A bacterial infection that spreads throughout the body can be fatal.	Viruses are usually systemic (throughout the body).
Example of pathogenic microorganism	Streptococcus Tuberculosis Bacterial meningitis Escherichia coli (E-Coli)	Common cold Influenza Polio Hepatitis
Reproduction	Reproduction is usually asexual. Bacteria divides creating copies of themselves that spread. However bacteria can conjugate and mix DNA to create a slightly different version of the bacteria.[1] Can survive and reproduce without a living host and will grow on non-living surfaces and in soil.	Invades host cells. Virus then splices its own DNA into the cell DNA or RNA which makes copies of the virus. These spread through the body when the cell 'bursts' or is destroyed. Cannot replicate and spread without a living host
Where do they exist in the host?	Between the cells (intercellular)	Inside the cells (intracellular)
Size	Larger than a virus (at least 1000 nm)	Much smaller than a bacteria between 20-40 mm
Can be killed using antibiotics	Yes	No
Vaccination can prevent infection	Yes	Yes
Always pathogenic?	Bacteria can be beneficial to the body (not pathogenic). The gut is filled with bacteria that help to support the immune system and aids digestion	Viruses are never beneficial to the body (always pathogenic).

Fungi can also cause illness. Athlete's foot and thrush (candida) are caused by fungal infection.

[1]This is one of the ways antibiotic resistance occurs.

THE SCIENCE BEHIND THE HISTORY CROSS CURRICULAR ACTIVITY SUGGESTIONS

Activity suggestion	School Subject area	Pack theme/lesson
Create 2D or 3D works of art incorporating images of diseases. Explore the concepts of art and science (see section on Wellcome Trust website). Take a look at http://www.cdc.gov/ for images of diseases.	Art	Disease
Explore art works based on dissection and the human body. • Leonardo da Vinci's anatomical studies of the human body- still lives with skulls included • Professor Gunther von Hagens' 'Body Worlds' exhibition. • Visit Bristol Museums and art galleries to discover images of death and dying in the collections. • Mexican Day of the Dead	Art	Surgery
Seal a piece of fruit in a bag and explore the progress of its decomposition during science lessons. How do bodies decompose? Consider the types of micro-organisms that might be involved. What are the processes of decomposition?	Science	Disease Public health Surgery
Write and Epitath. Consider what qualifications, skills and abilities would be vital for this profession.	Art and PHSE	Public health
Suture a banana. Practice sewing a banana skin (empty) together. Use a pair of needle holders (easily purchased through e-bay) try sewing the two banana edges together using an ordinary needle.	History, D&T	Surgery
Create disease venn diagrams. As a class develop a list of serious diseases. Take 2/3/4 hoops, place them crossing over. Develop a list of diseases. Sort them into different catagories. These are examples. • Transmission: Waterborne, airborne, touch, via animals • Success against disease helped by: Improvements in public health, introduction of vaccination or both Alternatively they can be sorted into two columns • Outcome: patient rarely recovers, patient usually recovers • Vaccination: Vaccination available, no vaccination available	Maths Science	Disease
Play 'Plague Inc' on apple or android products. Explore the scenarios needed to create an epidemic or pandemic	ICT	Disease Public health

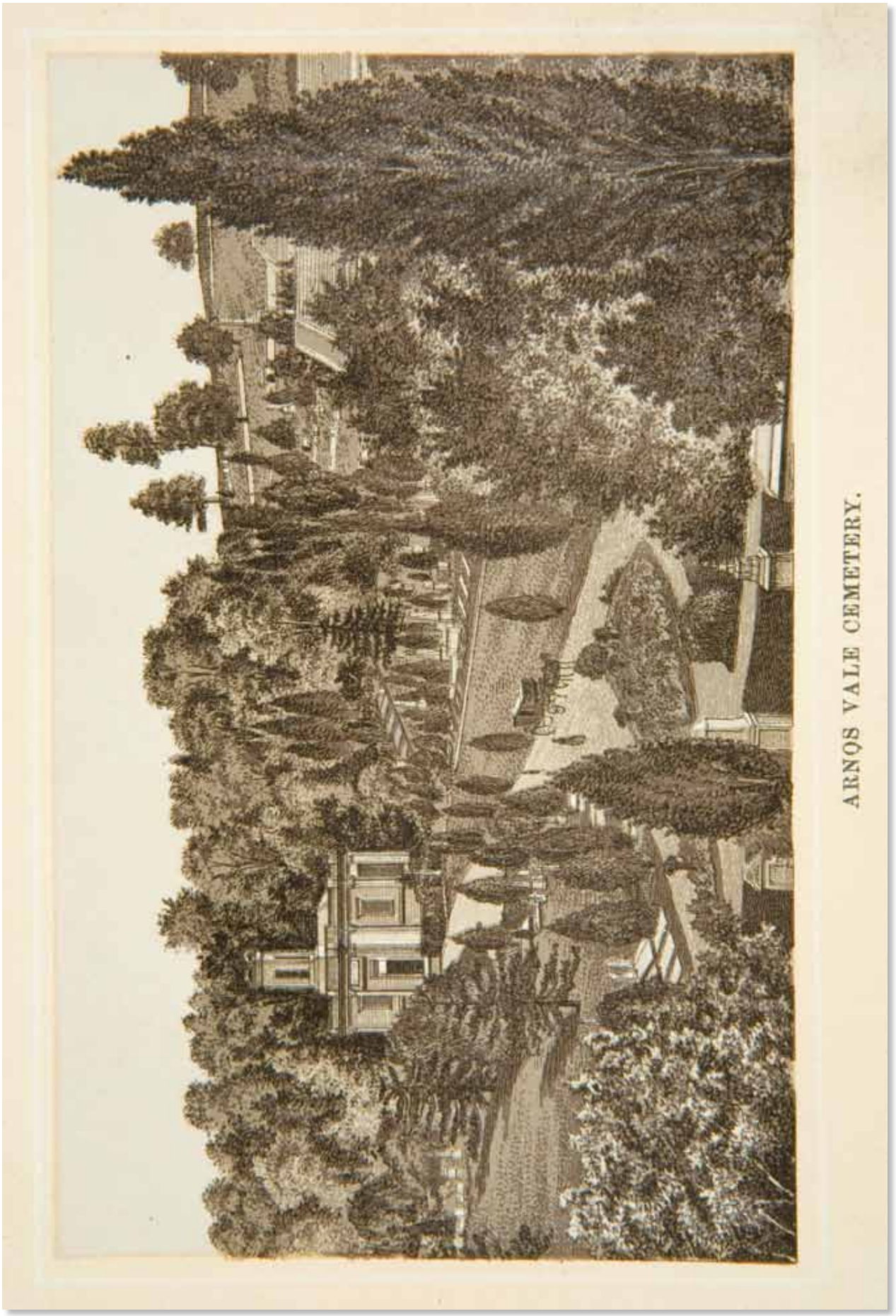
Worksheet: The Science behind the history

Research suggestions	School Subject area	Pack theme/lesson
Research the Spanish influenza epidemic. What is the current thinking on its virulence and global spread?	Science and history	Disease Public health
Smallpox: the speckled monster. What was smallpox? How did it spread? What were the symptoms? How was it eradicated?	History Science	Disease
Write a biography of a disease. Research its first appearance, symptoms, how it spreads, how it is treated, when it 'died' or not.	English History	Disease
Write a biography of a modern scientist.	English History	Public health Surgery
Collect scenes of death from modern and past writers: Frankenstein, Harry Potter etc	English	Public health
Is there any scientific basis behind the idea of zombies? Consider transmission (bite), can the body work if brain dead/in coma. What diseases could compare? The *Ophiocordyceps* fungus takes over an ants body.	Science	Disease
Is there any scientific basis behind the idea of vampires? Consider condition Porphoria, sleepwalking, photodermatitus, allergy to water (*water urticaria*)	Science	Disease
Many of the people who died during the Victorian period were also malnourished. To what extent do you feel that had an effect on their vulnerability to disease and inability to fight it off? Use modern knowledge about nutrition and health to support your arguments.	Science	Disease Public health

Discussion/debate questions	School Subject area	Pack theme/lesson
What would happen if smallpox broke out in Britain today? **Consider:** the lack of herd immunity, vaccinations needed, rapid spread.	Science	Disease
What 'qualities' does a disease need to make it very dangerous to the human race? **Consider:** infectiousness, transmission route, incubation period, vaccination and mortality rate.	Science	Disease
Debate vaccination or organ and blood donation. Consider religious objections, moral objections, personal feelings.	RE	Public health Surgery
Animal testing. Herapath's son developed Herapathite by experimenting using a dog. Many lifesaving treatments and medicines have first been tested and developed using animals. Research the types of medical discoveries that have come about after using animals in research. Discuss if and how much animals should be involved in modern scientific research. What are the pros and cons of using animals in research?	PHSE Science	Disease Public health
Should we wipe out a disease from the face of the planet? What are the pros and cons? Examples include smallpox and guinea worm.	Science Philosophy RE	Disease Public health

RESOURCES

Resource 1: Arnos Vale cemetery in the 19th century



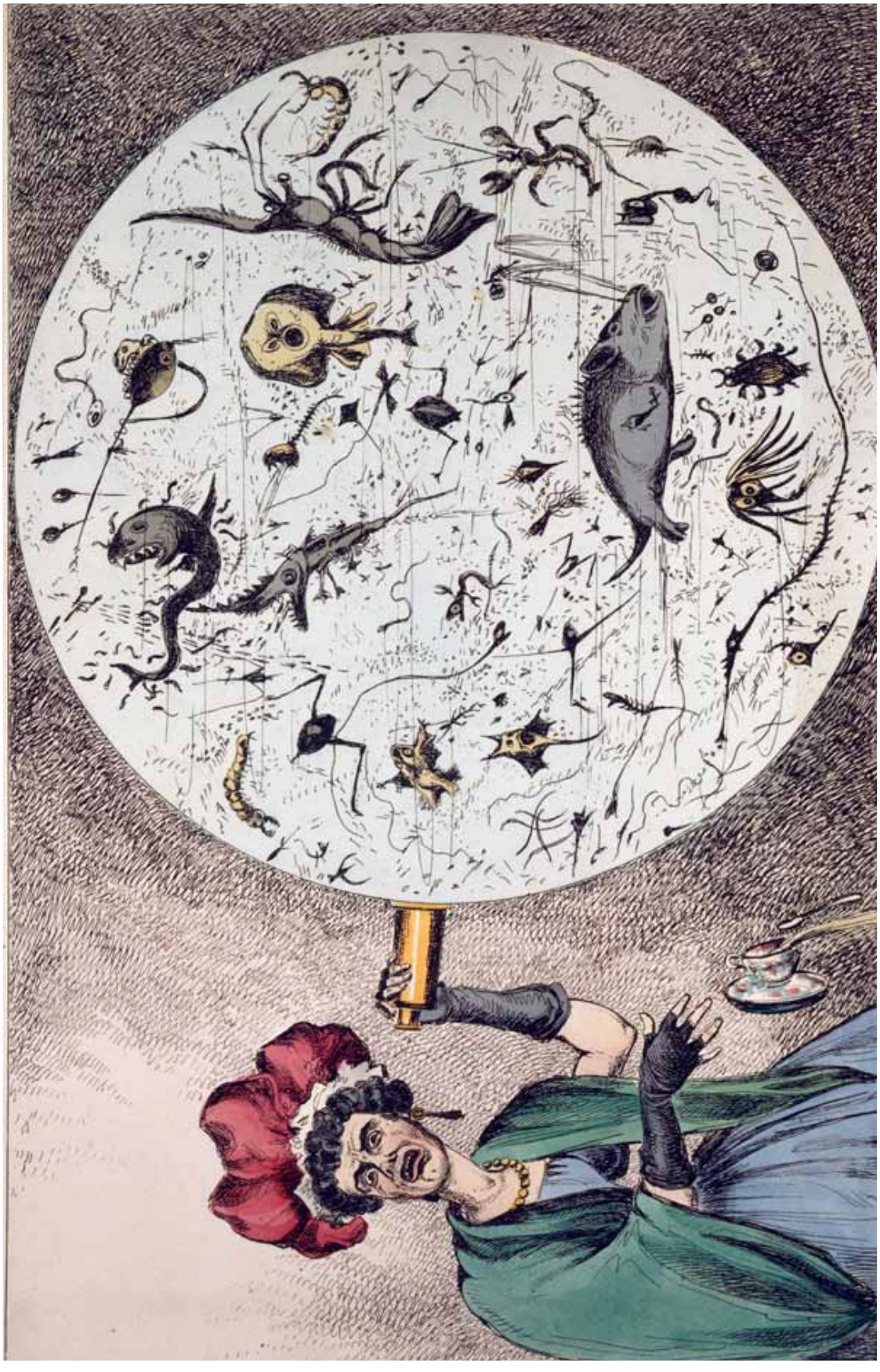
Bristol Museums and Art Gallery

Resource 2: Bristol Graveyard 19th century

Resource 3: Bristol City in 19th century

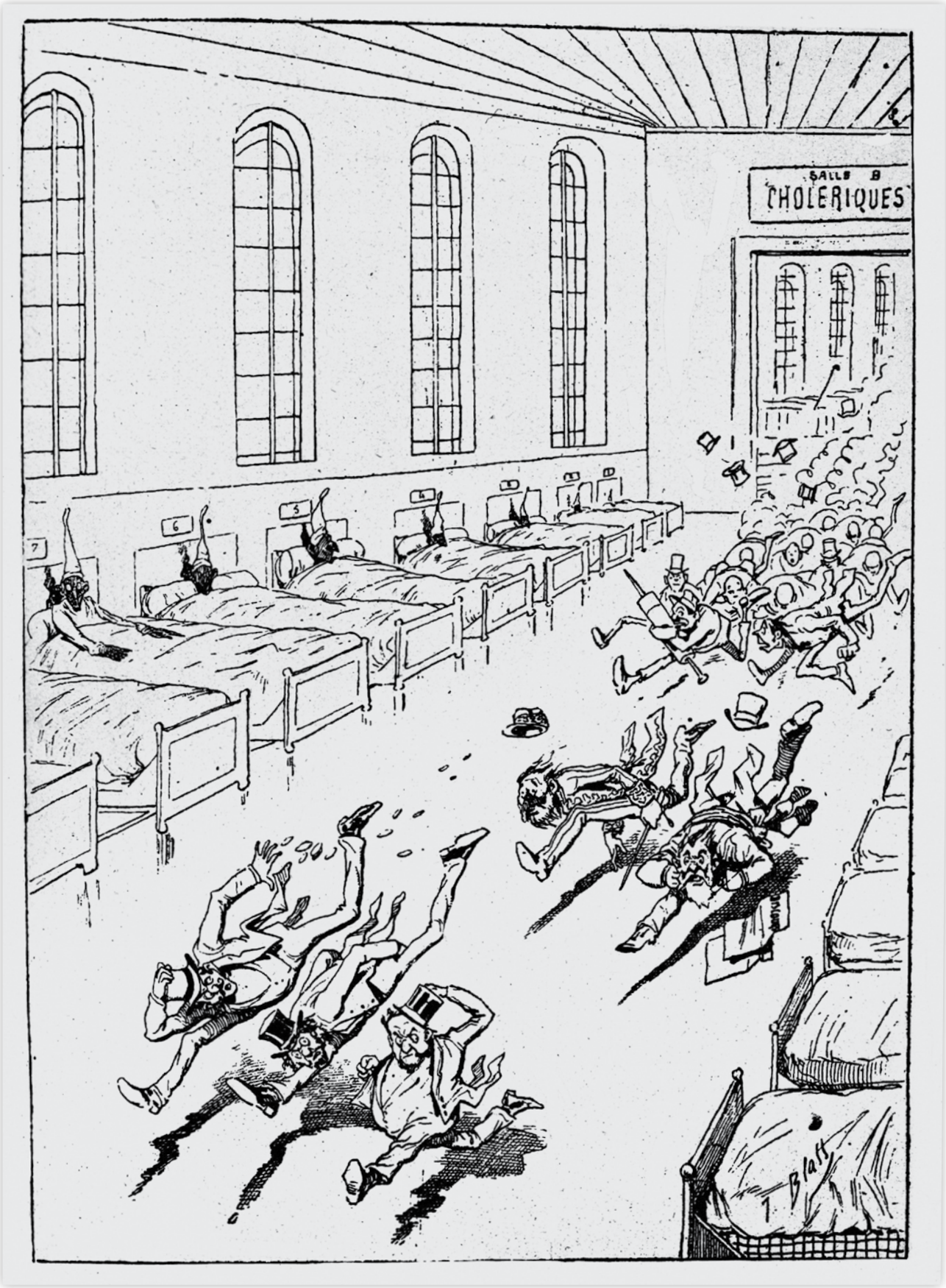
Bristol Museums and Art Gallery

Resource 4: Monster Soup



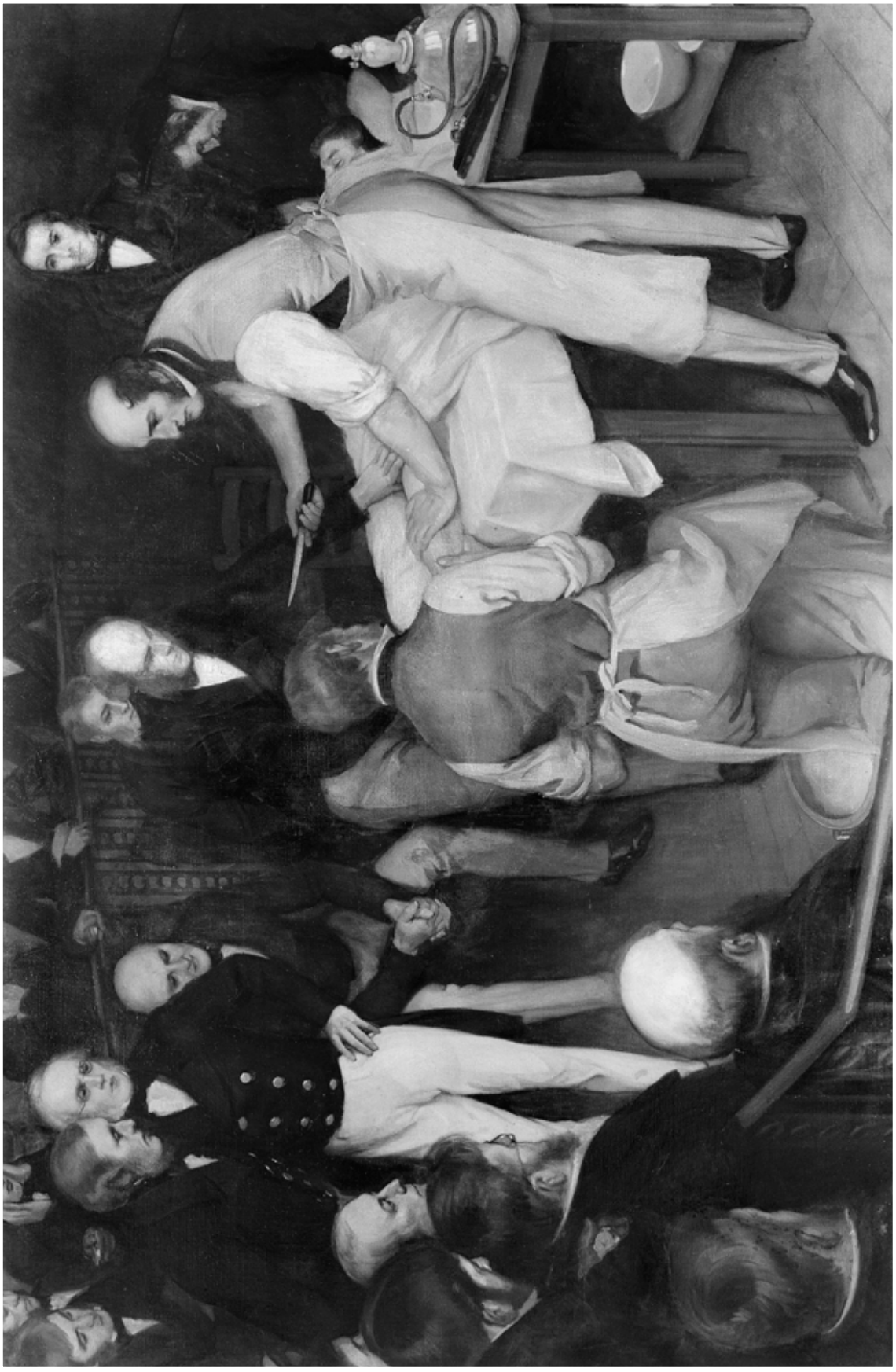
Wellcome Library, London. ‘Monster Soup, commonly called Thames Water’

Resource 5: A visit by the authorities to a cholera hospital



Wellcome Library, London
A visit by the authorities to a cholera hospital.
Wood engraving 1884

Resource 6: Robert Liston



Robert Liston operating. The artist was Ernest Board of Bristol (1877-1934), and this was one of the paintings he was commissioned to paint by Henry S. Wellcome circa 1912.

Resource 7: Male Operating Theatre of St Thomas Hospital

Wellcome Library, London. Five surgeons participating in the amputation of a man's leg while another oversees them. Coloured Aquatint 1793

Resource 8: Terrett memorial

The Cow-Pock – or the wonderful effects of the new inoculation. Punch cartoon. Wellcome Library, London

Resource 9: Terrett memorial inscription

Resource 9: Terrett memorial - Inscription

TO THE MEMORY OF DEAR WILLIE
SON OF WILLIAM AND SARAH TERRETT
CHURCH HOUSE, BEDMINSTER
ALSO MARY THEIR DAUGHTER
WHO DIED MARCH 10TH 1868, AGED 3 YEARS AND SIX MONTHS

NOW THEY'RE GONE FROM ALL THE SORROW
TURMOIL, PASSION, SIN AND STRIFE
WHICH RUSH IN WITH EACH TO MORROW
DRIFTING FORMS O'ER HUMAN LIFE

NOW THE SILVER CORD IS RIVEN
WE'VE TAKEN OUR LAST LINGERING KISS
AND THINK OF THEM AS NOW IN HEAVEN
BATHED IN LIGHT AND LOVE AND BLISS

ALSO OF HANNAH THEIR FIRST BORN
WHO DIED 12TH FEB 1872 AGED 11 YEARS AND ONE MONTH

ALSO ELIZABETH MILDRED (MILLIE) WHO DIED THE 27TH
AND LUCY ELLEN AGNES, THE 31ST OF JANUARY 1877
AGED 2 YEARS AND 7 MONTHS AND 11 MONTHS

ALSO OF HANNAH THE BELOVED MOTHER OF
HE ABOVE WILLIAM TERRETT
WHO DIED 26TH MARCH 1877, AGED 63 YEARS

ALSO OF EMILY ANN
WHO DIED 2ND MAY 1878
AGED 9 YEARS AND 9 MONTHS

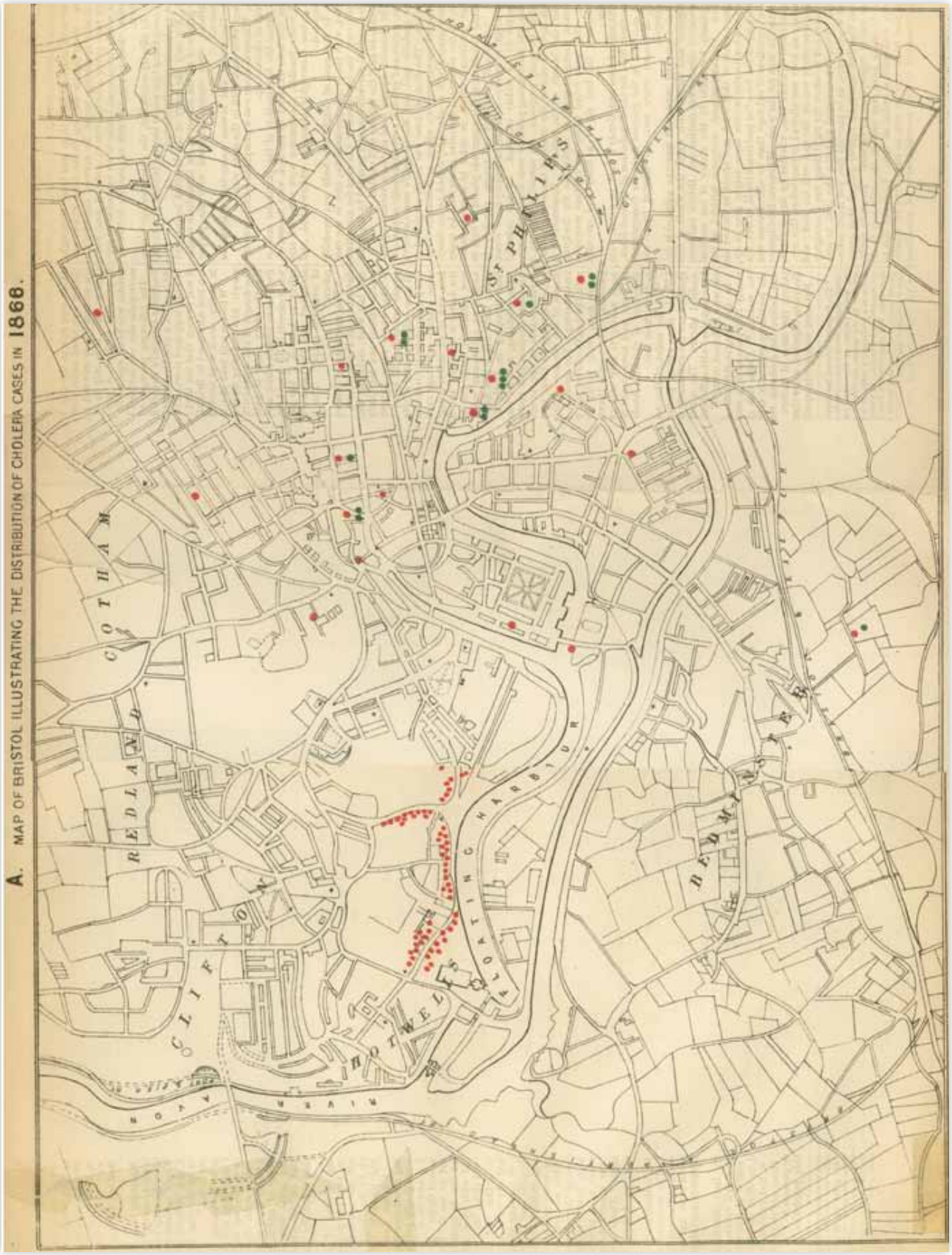
ALSO OF GEORGE CLOVEN BABBAGE
THEIR ONLY SURVIVING SON
WHO DEPARTED THIS LIFE JULY 13TH 1883 AGED 19 YEARS

SARAH MARY TERRETT
WHO WHILE ENGAGED IN HER BEST LOVED WORK OF RESCUING
THE PERISHING FROM DRUNKENESS AND SIN
PASSED FROM THE PLATFORM OF A WHITE RIBBON
GOSPEL TEMPERANCE ARMY MEETING
(OF WHICH SHE WAS FOUNDER)
INTO THE PRESCENCE OF HER SAVIOUR,
NOVEMBER 25TH 1889 AGED 53 YEARS
A FAITHFUL AND DEVOTED WIFE AND MOTHER,
AN EARNEST CHRISTIAN WORKER
A SUCCOURER OF MANY

ALSO OF HANNAH (SUNNIE) BELOVED DAUGHTER
OF ABOVE WHO WAS CALLED TO REST
JANUARY 24TH 1903 AGED 29 YEARS

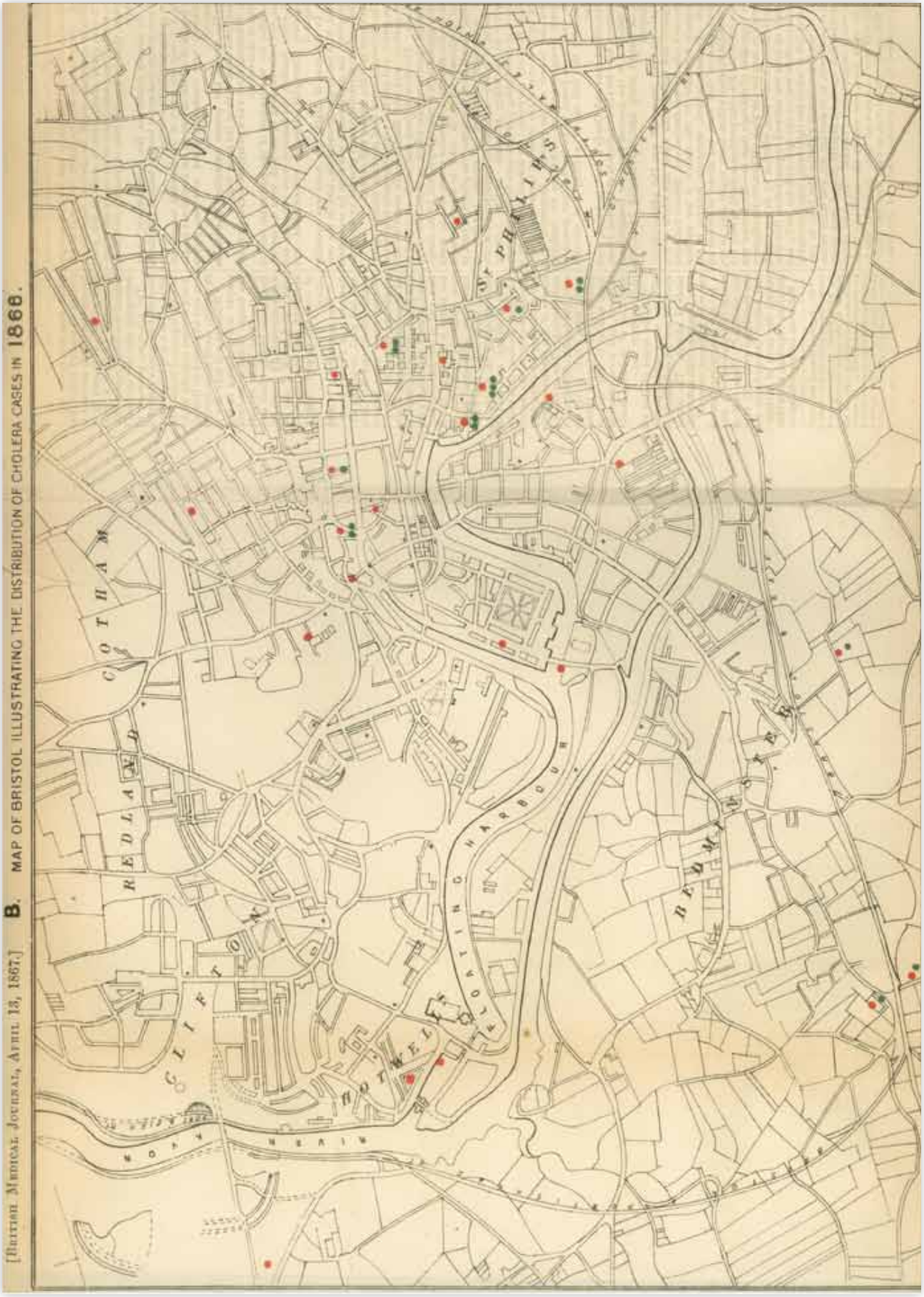
ALSO OF THE ABOVE WILLIAM TERRETT
(ALDERMAN OF THE CITY)
WHO FELL ASLEEP NOVEMBER 15TH 1916
THEY REST...AND THEIR WORKS DO FOLLOW THEM

Resource 13: Budds cholera spread map



Credit?

Resource 13: Budds cholera spread map



Credit?

1848 POEM

A contemporary described the overcrowded and scandalous conditions of graveyards in the poem The Cemetery in 1848, which highlights people's concern for a 'Decent' burial:

"In foul accumulation, tier on tier,
Each due instalment of the pauper bier,
Crushed in dense-pack'd corruption there they dwell
'Mongst earthy rags of shroud, and splinter'd shell.
A quagmire of old bones, where darkly bred,
The slimy life is busy with the dead.
Reeks from that bloated earth miasma's breath,
The full-fed taint of undigested death,
Thence, like the fumes from sleeping glutton's throat,
The noisome vapours of her surfeit float."

Quoted in Curl's *The Victorian Celebration of Death*.