

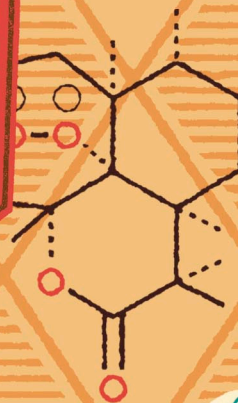
MEDICINE



A MAGNIFICENTLY ILLUSTRATED
HISTORY



From
mummies to
MRI scans,
plagues to
prosthetics



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LEARNING FROM THE PAST

Exploring the lives of people in the past requires detective work. Humans have always suffered illness and injury, but to understand past treatments and beliefs, we need to examine the historical evidence that survives. Everything from skeletons to manuscripts, portraits to songs, can help us to piece together the clues.

UP CLOSE AND PERSONAL

Skeletons and mummies provide a very personal way to investigate medical history. Today, scientists use modern medical techniques to study them and find out as much as they can about the diseases, injuries and diets of the past.

Specialist scientists called osteoarchaeologists research skeletons from many different centuries and have found signs of cancer, plague, fractures, vitamin deficiencies and tooth decay. Healed bone injuries even provide evidence that early humans successfully kept severe wounds clean.

In 1972, archaeologists found fossilised Viking faeces (known as a coprolite) in York, UK. Examination under a microscope shows that it contains pollen grains and bran, but also hundreds of parasite eggs, suggesting the person's stomach and intestines would have been full of worms.

In mummified bodies, the soft tissue, amazingly, survives. In 1993, scientists discovered the frozen mummified body of a 25-year-old woman in the Altai Mountains in Siberia. An MRI scan (see page 23) showed that she had suffered from breast cancer and a bone infection, and had had significant injuries, perhaps from falling off a horse.

WRITTEN RECORDS AND ARTEFACTS

Some of the oldest medical records are around 4,000 years old, created by the Assyrian people who lived in parts of present-day Iraq, Turkey and Iran. They recorded their prescriptions and medical recipes on clay tablets using cuneiform symbols. Other peoples including First Nations and Native Americans passed down medical knowledge through stories and songs.

Before the printing press was invented in the 1400s, books were written and illustrated by hand, and as a result were rare and expensive. As more people learned to read, printed medical books spread information more quickly, but often used complicated expert language which many people could not understand. Today, these sources reveal the beliefs of the people who wrote them, whether that's a handwritten medical recipe from the 16th century, or a textbook about disease from the 19th century.

Archaeologists and curators can also use other surviving objects to find out more. For example, ancient Roman surgical instruments look very similar to tools we use today, suggesting that their purpose may not have changed very much. Historians can read Latin labels on ceramic jars to find out what 17th-century apothecaries sold to their customers.

397
Serpentine
fit animum
apertum roburum
que fit hanc a relax

EVOLVING PERCEPTIONS

Examining historical evidence uncovers people's past medical beliefs, and while surviving sources provide many different perspectives, there are still lots of gaps in our knowledge. Our interpretation also changes over time. For example, an 18th-century painting of a tooth worm shows that people at the time believed that this was responsible for rotting teeth. Today we know that a worm is not the cause. Researchers are constantly finding new evidence, so who knows what we might discover next?

ANCIENT BELIEFS

Humans have always looked for ways to cure illnesses and treat injuries, but ideas and beliefs have changed over time. Today, if we feel ill or have an injury we often turn to medical treatments, but there are lots of other traditions which have historically made people feel better.

FAITH AND HOPE

In many past cultures, how you were feeling was believed to depend on the gods, the stars or luck. Linking body parts and diseases with the position of the stars, moon and planets is a practice used all over the world. In fact, the word influenza, which we often shorten to 'flu', comes from the Italian word for 'influence' of the planets. In medieval Europe, doctors linked each part of the body to an astrological sign (such as Pisces for the feet) and treatment was only carried out when the stars were in the correct position.

THE POWER OF TRUST

Kings and queens were once believed to have a God-given power to cure the disease scrofula. From the 11th–17th centuries, people queued to be touched by a monarch, or wore a coin around their neck which had been touched by royalty. Patients taking a placebo can often feel better, and scientists are still trying to understand the importance of trusting someone or something to provide a cure.

In traditional Australian medicine, good health relies on a person being connected with nature and the land, as well as positive links with spirits and ancestors.

Some ancient Greek people made sacrifices or underwent surgery at temples devoted to Asclepius, the god of healing.

In the Dahomey culture in West Africa, the great creator god had to be happy before medical remedies would work.

Ancient Egyptians called on the lioness-headed goddess Sekhmet to cure disease.

For Native Americans, treatment might start with climbing a sacred mountain.

A BALANCING ACT

The ancient Greeks believed that the key to a healthy body was to achieve balance. This balance was established between four bodily humours: blood, phlegm, black bile and yellow bile. Each humour was linked to four conditions: wet, cold, hot and dry, and also to personalities, diseases, organs and seasons of the year. For example, someone with an excess of blood in their body was considered to be cheerful and optimistic, and their characteristics were linked to springtime and to children. Their qualities represented warmth and moisture, which were associated with the liver, and therefore its diseases.

First written about by Hippocrates (see page 62), and then developed by the Greek physician Galen (129–c.210 CE) during the Roman Empire, the ideas spread to Europe, North Africa and the Middle East. The four humours idea was popular until the 1800s, and explains why practices such as bloodletting were used to reduce blood in the body, or why someone suffering with a temperature was believed to need a cold, dry remedy to counter a hot, wet fever. Ayurveda, Unani Tibb and Traditional Chinese Medicine also value the importance of balance. In Chinese medicine, the balance is between *qi* (air or energy) and *xue* (blood).

MENTAL HEALTH

Medical history often focuses on the body, but people have suffered with mental illness throughout history too. It wasn't until the 20th century, however, that scientists were better able to understand how the mind works and develop effective treatments. Prior to that, the treatment of the mind was often overlooked and sufferers were regularly treated cruelly or hidden from view. Our knowledge of mental health continues to evolve.

UNDERSTANDING THE MIND

Some doctors in the past explained mental illness using the theory of the four humours (see page 11), with **mania** linked to heat, and **melancholy** linked to excess black bile. From the 1600s, writers such as French philosopher René Descartes (1596–1650) proposed that the mind was separate from the body, which suggested it needed its own specialist doctors. Scientists were also beginning to research the brain's anatomy and how it linked to the body. In the 19th century, doctors formed two new medical specialities: **neurology** – the study of the nervous system; and **psychiatry** – the study of mental illness, behaviours and emotions.

SIGMUND FREUD

Sigmund Freud (1856–1939) is probably the most famous doctor to investigate mental health. He believed that our unconscious ideas influence all of our behaviour and actions, with a patient's problems often buried deep down, like layers in archaeology. He divided the mind into three parts: the id, the superego and the ego. The id is the part of the personality that controls desires. The superego makes judgements about whether an action is correct or ideal. The ego tries to find a balance between the other two parts, which Freud described as like trying to ride a strong-willed horse. His approach was called the 'talking cure' by Bertha Pappenheim, probably the first patient to talk about her thoughts and ideas as a form of treatment.

ASYLUMS AND TREATMENTS

In Europe, mentally ill people were sometimes moved into special hospitals, known as asylums. Perhaps the best-known is Bethlem Royal Hospital founded in London in 1247. Staff often used very brutal treatments to restrain patients, and the word 'bedlam', meaning a state of uproar and confusion, comes from the asylum's nickname. Some doctors in the 19th century introduced more sympathetic treatments, including activities such as gardening.

In the 20th century, scientists introduced more extreme treatments to try to alter the state of a sufferer's brain, including electrical shock therapy. The psychological impact on soldiers of the First World War gave a new focus and urgency to treating mental illness. From the 1950s, new medicines such as anti-depressants were introduced.

Gradually, mental health hospitals were closed, and in Britain by the mid-1990s virtually all patients were cared for in their own homes with medication.

HOW MEDICINES WORK

For generations, humans have noticed that plants such as willow or poppies and substances such as metals and salts affect the body.

In more recent history, scientists' growing knowledge about what causes diseases, coupled with how medicines affect our bodies, has dramatically increased the success of medicines. Today, they can improve symptoms such as pain or indigestion, or stop bacteria or viruses from causing infections.

The Enterobacteriaceae family of rod-shaped bacteria cause many common infections.



BACTERIUM OR VIRUS?

Bacteria are microscopic, single-celled organisms that can cause tonsillitis, pneumonia or tuberculosis. Viruses cause colds, chickenpox and flu, but, unlike bacteria, they need a host to survive. Both of these invading infectious agents are known as **pathogens**. To cure diseases, medicines must either destroy or damage the pathogens, or prevent them from growing or reproducing. Bacterial diseases can be cured by **antibiotics**, but stopping diseases caused by viruses is more difficult without damaging the cells of their human host. Scientists are still working to find effective medicines against many of them.

The SARS-CoV-2 or COVID-19 virus.



FINDING MAGIC BULLETS

Once researchers identify the germ that causes a disease, scientists can search for an active ingredient that harms the pathogen, but doesn't harm healthy human cells. In 1909, Paul Ehrlich (1854–1915) found the first 'magic bullet' medicine, meaning a drug designed to treat a specific germ. Ehrlich and his assistant Sahachiro Hata (1873–1938) had experimented with 605 substances to treat **syphilis** before they found success with Salvarsan or 'Compound 606'.



GERM THEORY ESTABLISHED ...

Before the 1860s, most people believed that diseases came from the body itself or from bad smells known as miasmas. French scientist Louis Pasteur (1822–95) was among the first to dispel these theories. He discovered that germs or micro-organisms could invade a substance or a body and affect it. Pasteur moved from researching how tiny living particles in wine and milk made them turn sour, to investigating how different germs cause different diseases. He went on to invent the first vaccine against **rabies**, by manipulating the strength of the virus to stop animals and people catching it.

... AND PROVED

German scientist Robert Koch (1843–1910) was inspired by Pasteur, but the two were also rivals. Over an incredibly productive 20-year period, Koch and his students managed to identify and isolate the specific bacteria that caused an impressive range of diseases: **anthrax**, **botulism**, **cholera**, **diphtheria**, **dysentery**, **syphilis**, **tetanus**, **tuberculosis** and **typhoid fever**. Pasteur's and Koch's achievements stimulated many more scientists to join the rapidly growing specialism of microbiology, continuing to find ways of preventing the spread of disease.