

HISTORY OF

SCIENCE

By Margot Hislop

Science before the revolution

Spanning a thousand years, the Middle Ages and Renaissance periods were full of advances in science. Packed with algorithms, algebra, flying machines, and even a teenage doctor, it was a time that heralded the birth of the scientific method, the dislocation of Earth from the centre of the universe and the 'discovery' of outer space with the very first telescope.

Middle Ages

Arab scientists at the heart and start

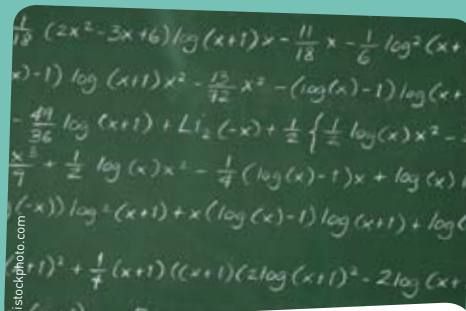
Around 800 CE, after the fall of the Roman Empire, the Middle East became the centre of scientific thinking. The city of Baghdad was home to The House of Wisdom, where scholars from far and wide came to study. They focused on science, technology, poetry and philosophy, and translations of the Ancient Greek thinkers.

Scientific method – making observations, devising theories and performing experiments – was fully developed by Arab scientists.

Here, mathematician Al-Khwarizmi made one of his great contributions. He introduced the Hindu numbering system – later called the Arab system – becoming the basis of our modern numbers. It used 10 digits (zero to nine), which was more compact than previous systems (such as Roman numerals), making all calculations simpler.

Ibn Sina, also known as Avicenna, was a Persian scholar, and a physician. Becoming a qualified doctor by age 16, he treated many princes and caliphs

(religious leaders) and wrote many papers on medicine. His greatest work, *The Canon of Medicine*, first noted that diseases were contagious and emotions can affect health.



Arab mathematician Al-Khwarizmi invented algebra. This new form of maths used symbols to replace unknown numbers in linear and quadratic equations.

Did you know?

Flowers always have 3,4,5, 6 or 8 petals, never 7 or 9? Persian scholar al-Biruni was first to observe this.

The Renaissance

Drawing flying machines

Leonardo da Vinci (1452-1519) is well known for his paintings, such as *Mona Lisa* and *The Last Supper*. However, the writing and drawing in his notebooks reveal a scientific mind with great understanding of anatomy, astronomy, geology, flight, mechanics and engineering. On thousands of pages he drew hundreds of machine designs – considered crazy contraptions at the time – that are the basis of many machines today, including helicopters, tanks and aeroplanes.

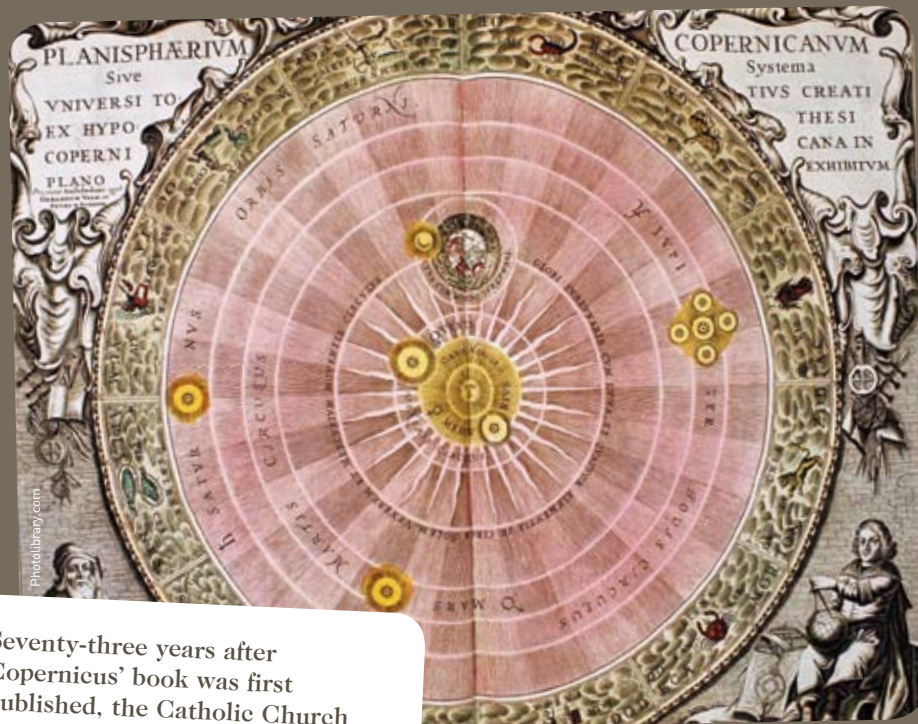
Da Vinci was fascinated with anatomy and bird flight. He believed that humans could replicate the ability to fly. He drew wing-flapping machines, called ornithopters, powered by a human pilot, but soon realised human power was not enough and focused on designing gliders. Recently, one of his gliders was built, based on his design, proving it could fly.



Swapping the Earth and sun

In the 16th Century, Nicolas Copernicus — a Polish priest and astronomer — started questioning the belief that the Earth lay in the centre of the universe. Studying Ptolemy's work, whose ideas had been current for more than 1000 years, Copernicus found problems with explanations about planets orbiting in perfectly circular motion and 'epicycles' accounting for unusual planet behaviour.

His famous work *On the Revolutions of the Heavenly Bodies* was not taken seriously at first, as many people did not believe it, while others became extremely upset by these new ideas.



Seventy-three years after Copernicus' book was first published, the Catholic Church banned it. However, it was too late – Copernicus' ideas were out.

The ins and outs of the human body

Knowledge of human anatomy remained the same for 1300 years. Based on the work of Galen, a Roman physician, knowledge was gathered by dissecting monkeys. Human dissections were not allowed, and it was not until a 16th century physician named Andreas Vesalius came along that things changed.

Breaking the taboo, Vesalius carried out dissections on corpses. He employed artists to draw anatomical illustrations, which became popular with students. Following this popularity he embarked on a masterwork – the first illustrated book of human anatomy: *De humani corporis fabrica*.

Discovering the sun, moon and stars

In the late 16th Century, while there was still resistance to scientific thinking, Galileo Galilei insisted on observation and experiment to prove his ideas. He also used his inventions to practice science.

Having seen a perspicillum (tube with two lenses), Galileo made a telescope with 10 times the magnification. Turning it towards the sky, Galileo discovered mountains and valleys on the moon; the four moons of Jupiter; phases of Venus, and spots on the sun. His observations reinforced Copernicus' view of a sun-centred universe, with which Galileo agreed.

Galileo did not make the first astronomical observation through a telescope. That honour goes (as far as we know) to Thomas Harriott, an Englishman who observed the moon in July 1609. But, Harriott didn't publish his results, and Galileo did.

Unfortunately, Galileo's views upset the Church so much that he was ordered to deny that the Earth moves around the sun. Although he did this, he kept writing about his ideas. Sadly, when the Church found out, he was imprisoned in his own house for the rest of his life.

Despite criticism, disbelief and threats, these scientists laid the foundations for the Scientific Revolution that followed, and are the reason we take so much for granted today. We can thank them for so many things ... except maybe algebra homework!