

Centuries in the House of Wisdom

Iraq's golden age of science brought us algebra, optics, windmills and much more, writes Brian Whitaker

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For most of the last 5,000 years, Iraq was a key centre of scientific knowledge. Mathematics, developed initially for keeping accounts, gradually spread into far more ambitious areas such as predictive astronomy, making use of data painstakingly collected and recorded at the temples of Uruk and Babylon over several centuries.

During the first century after the birth of Islam, Muslim armies defeated the Persians and moved into Iraq. Around 762, the Abbasid caliphs established their capital in the newly founded city of Baghdad from where they ruled the vast Muslim empire for the next five centuries.

This was the high point of Islamic civilisation, when scholars of various religions from around the world flocked to the Bayt al-Hikma (House of Wisdom), an unrivalled centre for the study of humanities and for sciences, including mathematics, astronomy, medicine, chemistry, zoology and geography, as well as some more dubious subjects such as alchemy and astrology.

Drawing on Persian, Indian and Greek texts - Aristotle, Plato, Hippocrates, Euclid, Pythagoras and others - the scholars accumulated the greatest collection of knowledge in the world, and built on it through their own discoveries.

These developments in Iraq were made possible by widespread literacy and also by the availability of paper as an everyday writing material. The first paper arrived in Iraq from China, probably along the silk route via Samarkand, in the eighth century - long before it reached Europe. Shortly afterwards, a paper mill was established in Baghdad, and by the end of the 10th century, paper had replaced parchment and papyrus in the Arab world.

Probably the most famous mathematician at the House of Wisdom was al-Khawarizmi, known as the father of algebra - a word derived from the title of his book, *Kitab al-Jabr*.

Several important figures are also associated with the southern city of Basra, another key centre of learning. Al-Jahiz, born in Basra in 776, seems to have come from an ordinary background and as a youth helped his father to sell fish. His most famous work was the seven-volume *Book of Animals* which included his observations on the social organisation of ants, communication between animals and the effects of diet and environment. Altogether, he wrote

about 200 books on a wide range of topics, including *The Art of Keeping One's Mouth Shut* and *Against Civil Servants*. He died at the age of 92, allegedly when a pile of books in his personal library fell on top of him.

Al-Masu'di, who died in 957, spent some time in Basra writing about his travels to India, China and East Africa. As with many scholars of his day, his interests were broad and his writing contained elements of history, geography, sociology and anthropology which, unusually for the time, he approached in an analytical way. He also explored problems in the earth sciences - such as the causes of earthquakes - and was also the first writer to mention windmills, invented by Muslims in Sijistan.

Ibn al-Haytham (also known as Alhazen) worked as a civil servant in 10th-century Basra before taking up science. Moving later to Egypt, he became head of a project to regulate the flow of the Nile but, on investigation, he decided it was impossible. This annoyed the Fatimid caliph in Cairo, and Ibn al-Haytham reputedly escaped punishment by pretending to be mad until the caliph died.

Among the mathematical problems he explored was the squaring of the circle. He also wrote a seven-volume treatise on optics and the nature of light. This explored reflection from plane and curved surfaces, refraction, and the structure of the eye - though he did not understand the importance of the lens.

Iraqi science went into decline, partly because of natural disasters such as floods, but also for reasons that are familiar today: religious rivalries and problems with internal security. In 1258 the Mongols sacked Baghdad and, according to some accounts, the Tigris and Euphrates ran red with the blood of scholars.