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## Appreciating Arabic science that predates Newton

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*In this era of intolerance and cultural tension, the West needs to appreciate the fertile scholarship that flowered with Islam.*

Watching the daily news stories of never-ending troubles, hardship, misery, and violence across the Arab world and central Asia, it is not surprising that many in the West view the culture of these countries as backward, and their religion as at best conservative and often as violent and extremist. It has never been more timely or more resonant to explore the extent to which Western cultural and scientific thought is indebted to the work, a thousand years ago, of Arab and Muslim thinkers.

If there is anything I truly believe in, it is that progress through reason and rationality is a good thing — knowledge and enlightenment are always better than ignorance. I proudly share my world view with one of the greatest rulers the Islamic world has ever seen: the ninth-century Abbasid caliph of Baghdad, Abu Ja'far Abdullah al-Ma'mun. Many in the West will know something of Ma'mun's more illustrious father, Harun al-Rashid, the caliph who is a central character in so many of the stories of the Arabian Nights. It was Ma'mun, who came to power in 813 AD, who truly launched the golden age of Arabic science. His thirst for knowledge was such an obsession that he was to create in Baghdad the greatest centre of learning the world has ever seen, known throughout history simply as Bayt al-Hikma: the House of Wisdom.

### Important period

We read in most accounts of the history of science that the contribution of the ancient Greeks would not be matched until the European Renaissance and the arrival of the likes of Copernicus and Galileo in the 16th century. The 1,000-year period sandwiched between the two is dismissed as the dark ages. But the scientists and philosophers whom Ma'mun brought together, and whom he entrusted with his dreams of scholarship and wisdom, sparked a period of scientific achievement that was just as important as the Greeks or Renaissance, and we cannot simply project the European dark ages on to the rest of the world.

Of course, some Islamic scholars are well known in the West. The Persian philosopher Avicenna — born in 980 AD — is famous as the greatest physician of the Middle Ages. His Canon of Medicine was to remain the standard medical text in the Islamic world and across Europe until the 17th century, a period of more than 600 years. But Avicenna was also undoubtedly the greatest philosopher of Islam and one of the most important of all time. Avicenna's work stands as the pinnacle of medieval philosophy. But Avicenna was not the greatest scientist in Islam. For he did not have the encyclopaedic mind or make the breadth of impact across so many fields as a less famous Persian who seems to have lived in his shadow: Abu Rayhan al-Biruni. Not only did Biruni make significant breakthroughs as a brilliant philosopher, mathematician, and astronomer, but he also left his mark as a theologian, encyclopaedist, linguist, historian, geographer, pharmacist, and physician. He is also considered to be the father of geology and anthropology. Yet

Biruni is hardly known in the Western world.

Many of the achievements of Arabic science often come as a surprise. For instance, while no one can doubt the genius of Copernicus and his heliocentric model of the solar system in heralding the age of modern astronomy, it is not commonly known that he relied on work carried out by Arab astronomers many centuries earlier. Many of his diagrams and calculations were taken from manuscripts of the 14th-century Syrian astronomer Ibn al-Shatir. Why is he never mentioned in our textbooks? Likewise, we are taught that English physician William Harvey was the first to correctly describe blood circulation in 1616. He was not. The first to give the correct description was the 13th-century Andalucian physician Ibn al-Nafees.

And we are reliably informed at school that Newton is the undisputed father of modern optics. School science books abound with his famous experiments with lenses and prisms, his study of the nature of light and its reflection, and the refraction and decomposition of light into the colours of the rainbow. But Newton stood on the shoulders of a giant who lived 700 years earlier. For, without doubt, one of the greatest of the Abbasid scientists was the Iraqi Ibn al-Haytham (born in 965 AD), who is regarded as the world's first physicist and as the father of the modern scientific method — long before Renaissance scholars such as Bacon and Descartes.

But what surprises many even more is that a ninth-century Iraqi zoologist by the name of al-Jahith developed a rudimentary theory of natural selection a thousand years before Darwin. In his *Book of Animals*, Jahith speculates on how environmental factors can affect the characteristics of species, forcing them to adapt and then pass on those new traits to future generations.

Clearly, the scientific revolution of the Abbasids would not have taken place if not for Islam — in contrast to the spread of Christianity over the preceding centuries, which had nothing like the same effect in stimulating and encouraging original scientific thinking. The brand of Islam between the beginning of the ninth and the end of the 11th century was one that promoted a spirit of free thinking, tolerance and rationalism.

### Rulers' indifference

The golden age of Arabic science slowed down after the 11th century. Many have speculated on the reason for this. Some blame the Mongols' destruction of Baghdad in 1258, others the change in attitude in Islamic theology towards science, and the lasting damage inflicted by religious conservatism upon the spirit of intellectual inquiry. But the real reason was simply the gradual fragmentation of the Abbasid empire and the indifference shown by weaker rulers towards science.

Why should this matter today? I would argue that, at time of increased cultural and religious tensions, misunderstandings and intolerance, the West needs to see the Islamic world through new eyes.

And, possibly more important, the Islamic world needs to see itself through new eyes and take pride in its rich and impressive heritage. — *©Guardian Newspapers Limited, 2008*

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