Personalities from the Past

THROUGHOUT THIS BOOK, you've read how Muslim men and women have contributed to all our daily lives. Here now is a Who's Who of some of the big names from a thousand years ago.

'Abbas ibn Firnas

Full name: 'Abbas Abu Al-Qassim ibn Farnas ibn Wirdas al-Takurini

Born: 9th-century; Andalusian descendent from a Berber family residing in Takuronna (now Ronda)

Died: 887

Most influential work: Producing a flying machine, crystal and a planetarium.

Go to: 'Fine Dining' in Home; 'Glass industry' in Market; and 'Flight' and 'Observatories' in Universe.

It's difficult to pin one profession on Cordoban 'Abbas ibn Firnas because he had numerous talents, including poetry, astrology, music and astronomy. He was also fluent in Greek, and made translations of philosophical and musical manuscripts.

After perfecting the technique of cutting rock crystal (quartz) and producing glass, he made a kind of glass planetarium, complete with artificial thunder and lightening.

His most famous achievement is the construction of a flying machine, the first of its kind capable of carrying a human into the air.

Unfortunately he left no trace of his original works, and his biography was reconstructed only from a few verses and information from eye witnesses left to us in numerous documents.

Al-Jazari

Full name: Badi'al-Zaman Abu al-'Izz Isma'il b al-Razzaz al-Jazari

Born: Birth date not known, but we do know he served the Urtuq kings of Diyarbakir (now in South East Turkey) from 1174-1200

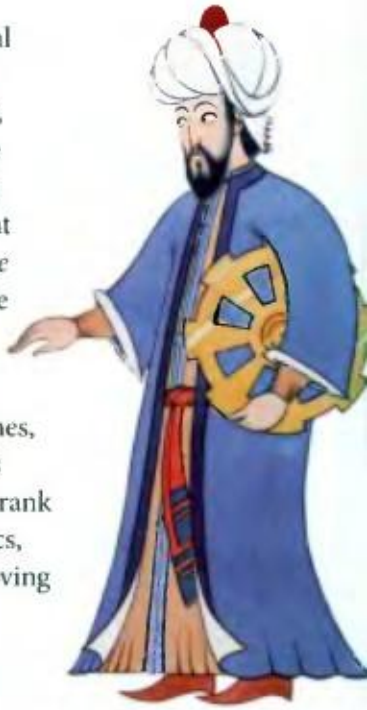
Died: Date not known

Most influential work: *Al-Jami Bain Al-Ilm Wal-Amal Al-Nafi fi sina'at Al-Hiyal*, or *The Book of Knowledge of Ingenious Mechanical Devices.*

Go to: 'Cleanliness,' 'Clocks' in Home; and 'Raising Water' in Market.

Today we might call al-Jazari a mechanical engineer, and he was an outstanding one at that. There is little known about his life, but what we do know is that he was in the service of Nasir al-Din, the Artuqid, King of Diyarbakir who asked him to document his inventions in a manual, the '*Knowledge of Ingenious Mechanical Devices,*' which he completed in 1206.

Before this, he had built many machines, including clocks and water raising machines, and a large number of mechanical devices that revolutionized engineering, like the crank shaft. He is possibly the first to use robotics, as many of his machines incorporated moving figures.



Al-Kindi

Full name: Abu Yusuf Yaqub ibn Ishaq al-Sabbah al-Kindi

Born: About 801 in Kufa, Iraq

Died: 873

Most influential work: Wrote over 361 works on a variety of subjects including '*The Book of the Chemistry of Perfume and Distillations*'

Go to: 'Sound System,' 'Cleanliness,' 'Vision and Camera' in Home; 'Chemistry,' 'House of Wisdom,' 'Translating Knowledge' in School; 'Pharmacy' in hospital; 'Commercial Chemistry' in Market; 'Earth Science' and 'Natural Phenomena' in World.

Al-Kindi was an encyclopaedic man, working as a physician, philosopher, mathematician, geometer, chemist, logician, musician and astronomer. A son of the governor of Kufa, he studied there and Baghdad's House of Wisdom, where he gained a high reputation at the Caliphs' court for translation, science, and philosophy. Caliph al-Mutassim also chose him as tutor to his son Ahmad.

His contributions include an introduction to arithmetic, eight manuscripts on the theory of numbers, and two on measuring proportions and time. He was the first to develop spherical geometry, and used this in his astronomical works. He wrote on spherics, the construction of an azimuth on a sphere, and how to level a sphere. As a musician he used musical notation and played a part in the development of the *'ud* (lute).

Al-Zahrawi

Full name: Abul Qasim Khalaf ibn al-Abbas al-Zahrawi, known in the west as Abulcasis

Born: 936 in Medinat al-Zahra near Cordoba, Spain

Died: 1013

Most influential work: *Al Tasrif liman 'Ajiza 'an Al Ta'lif*, shortened to *al-Tasrif*, and translated as '*The Method of Medicine*', which became a central part of the medical curriculum in European countries for many centuries.

Go to: 'Cleanliness' in Home; 'Translating knowledge' in School; 'European Medicine,' 'Instruments of Perfection,' 'Pharmacy' and 'Surgery' in Hospital.

Al-Zahrawi was a revolutionary physician and surgeon of Umayyad Spain. His thirty-volume book, *al-Tasrif*, gave detailed accounts of dental, pharmaceutical, and surgical practices, and it was one of the most influential medical encyclopaedias of the time.

His real surgical breakthroughs included his discovery of the use of catgut for internal stitching, and administering drugs by storing them in catgut parcels that were ready for swallowing, known today as the capsule.

He also designed and illustrated more than two hundred surgical instruments like syringes, droppers, scalpels and forceps, and his detailed diagrams of these figured prominently in medieval medical texts and journals in Europe and the Muslim world for centuries to come. Many modern surgical instruments have changed little from his original designs.

Fatima al-Fihri

Full name: Fatima Al-Fihri

Born: 9th century

Died: 841

Most influential work: Building the college mosque complex of al-Qarawiyin in Fez, Morocco in 841 CE

Go to: 'Universities' in School.

Fatima al-Fihri was a young, well educated princess who received a large amount from her father, a successful businessman. She vowed to spend her entire inheritance on building a mosque and learning centre for her Qairawaniyyin community, which was completed in 859. This developed into Morocco's number one university.

Studies included astronomy, the Quran and theology, law, rhetoric, prose and verse writing, logic, arithmetic, geography, medicine, grammar, Muslim history, and elements of chemistry and mathematics. This variety of topics and the high quality of its teaching drew scholars and students from all over.

Fatima's sister, Maryam, had simultaneously constructed al-Andalus Mosque in the vicinity of Qairawaniyyin. These two neighbourhoods became the nuclei to the city of Fez.

Ibn al-Haitham

Full name: Abu 'Ali al-Hasan Ibn al-Haitham, known in the West as Alhazen.

Born: 965 in Basra, Iraq

Died: 1039 in Cairo, Egypt

Most influential work: *Kitab al-Manazir* or *Book of Optics*, which formed the foundations for the science of optics. The Latin translation had an enormous impact on Roger Bacon, Witelo, Leonardo da Vinci, Descartes and Johan Kepler, centuries later.

Go to: 'Vision and Camera' in Home; 'Translating Knowledge' in School; 'Natural Phenomena' in World; and 'The Moon' in Universe.

Ibn al-Haitham revolutionised optics, taking the subject from one being discussed philosophically to a science based on experiments. He rejected the Greek idea that an invisible light emitting from the eye caused sight, and instead rightly stated that vision was caused by light reflecting off an object and entering the eye.

By using a dark room with a pinhole on one side and a white sheet on the other, he provided the evidence for his theory. Light came through the hole and projected an inverted image of the objects outside the room on the sheet opposite. He called this the '*qamara*', and it was the world's first camera obscura.

Ibn Battuta

Full name: Abu Abdullah Muhammad ibn Battuta

Born: 1304 in Tangier, Morocco

Died: 1368 or 1370

Most influential work: The *Rihla* or his travel book, narrated by him and written by Ibn Juzayy, a Royal Scribe, under the patronage of Abu 'Inan, the Sultan of Fez and Morocco

Go to: 'Raw Jewels', 'The Checkout', 'Trade' in Market; 'Public Baths' in Town; 'Travellers and Explorers' in World.

Ibn Battuta left his hometown of Tangier in Morocco as a twenty-one-year old, about 680 years ago. He set off as a lone pilgrim and didn't return for twenty-nine years. In this time, he covered over 75,000 miles, through forty-four modern day countries travelling on horse, cart, camel, boat and foot. This journey took him through North, West, and East Africa, Egypt, Syria, Persia, the Arabian Gulf, Anatolia, the Steppe, Turkistan, Afghanistan, India, Maldives, Ceylon (Sri Lanka), Bengal, Sumatra, China, Sardinia and Spain. By the end he had visited Mecca four times, and had met, and could name, over 1,500 people, including sixty heads of state.

He was then asked by the Sultan of Fez and Morocco to record all this in his *Rihla*, and this is our window into the 14th-century world because he has left some of the best eyewitness accounts of culture, customs, people, animal and plants of the medieval world stretching from Cordoba to Canton.

Ijliya al-Astrulabi

Full name: Maeriam al-Ijliya al-Astrulabi

Born: 944 in Aleppo, Syria in the era of Saif ad-Dawdla

Died: 967

Most influential work: She was the daughter of Al-Ijili al-Astrulabi and continued her father's work of making astrolabes.

Go to: 'Astrolabe' in Universe.

Jabir ibn Hayyan

Full name: Abu Musa Jabir ibn Hayyan, known in the West as Geber

Born: 722 in Tus, Iran

Died: 815 in Kufa, Iraq

Most influential work: Devising and perfecting the processes of sublimation, liquefaction, crystallization, distillation, purification, amalgamation, oxidation, evaporation, and filtration; and producing sulphuric acid by distilling alum.

Go to: 'Chemistry' in School; 'Commercial Chemistry' in Market.

Jabir ibn Hayyan is generally known as the 'father' of chemistry. The son of a druggist and perfume maker, he worked under the patronage of the Barmaki vizier during the Abbassid Caliphate of Harun al-Rashid. This meant that he shared some of the effects of the downfall of the Barmakis and was placed under house arrest in Kufa, where he died.

His work wasn't all in the lab and had practical applications, as he described processes for the preparation of steel, hair-dyes, metal refinement, dyeing cloth and leather, making varnishes to waterproof cloth, and illuminating manuscript ink. Some of his most groundbreaking work was in acids and in discovering sulphuric and hydrochloric acid.

Sinan

Full name: Koca Mimar Sinan

Born: 1489

Died: 1588

Most influential work: Designing and building over 477 buildings, including the Selimiye Mosque in Edirne, which has the tallest, earthquake defying minarets in Turkey.

Go to: 'Architecture' in Town.

Sinan was the son of Greek Orthodox Christian parents who embraced Islam. His father was a stonemason and a carpenter, and from an early age Sinan followed in his footsteps, learning the skills of his trade. Aged twenty-one, he was recruited into the Janissary Corps and as a conscript, he mentioned that he wanted to learn carpentry. This saw him eventually building ships, wooden bridges and all sorts of temporary wooden constructions.

Through military service he participated in a number of Ottoman campaigns and gained experience building and repairing bridges, defences and castles. The Ottoman Sultans noticed his talents and he became their chief architect, constructing mosques, schools and other civic buildings all around the Muslim (Ottoman) world, from Turkey to Damascus, Mecca and Bosnia.

He is also honoured with a crater on Mercury being named after him.

Zheng He

Full name: Born as Ma He; then his name changed to Zheng He as he was awarded the supreme command of the Chinese Imperial Household Agency.

Born: 1371 in Kunming, China

Died: 1433 in India

Most influential work: Transformed China into the 15th century's regional, and perhaps world, superpower by making seven monumental sea voyages.

Go to: 'Sea Exploration' in World

Zheng He was the admiral of the Chinese fleet, and within twenty-eight years of travel, he'd visited thirty-seven countries in the name of trade and diplomacy. The expeditions covered more than 50,000 km, and his first fleet included 27,870 men on 317 ships. Today it is not known how his ships, that were over four hundred feet long, were built without metal in them. These massive vessels were five times as big as the vessels of other European explorers like Vasco da Gama and were described as 'swimming dragons', because they were dotted with dragon's eyes to help them 'see.'

Some of the lands the great fleet visited include Java, Sumatra, Ceylon, Siam, the East Indies, Bengal, the Maldives, the Persian Sultanate of Ormuz, Ryukyu and Brunei, Mogadishiu, Mombasa and other East African ports, Borneo, Mecca; they even possibly rounded the Cape.

These voyages fostered scientific discovery and the search for gems, minerals, plants, animals, drugs and medicine. They also improved navigational and cartographical knowledge of the world; developed international relations; and traded large quantities of cargo, including silk and cotton goods, porcelain, gold and silverware, copper utensils and iron implements. They also carried live animals including giraffes and ostriches, had watertight bulkheads to hold live fish and also make bath houses, and used otters to round up fish into large nets.

Europe's Leading Minds

THE FOLLOWING MEN have all engaged in groundbreaking work and are remembered for their outstanding contributions to modern day science and discovery. Their genius rose above the mediocrity of their day in the same way that outstanding Muslims had previously shown. It was the work that the Muslims left behind, described in this book, which provided the foundations for this next leap of knowledge and invention.

Roger Bacon (1214–1292).

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- This Oxford scholar is known as the originator of the experimental method in Europe, and he received his training from the pupils of Spanish Moors. He spoke Arabic and never tired of telling people that knowledge of Arabic and Arabic science was the only way to true knowledge.
- Bacon quotes Ibn al-Haitham or refers to him at almost every step in the optics section of his *Opus Maius*. Part VI of this also rests almost entirely on the findings of Ibn al-Haitham, especially in areas relating to the intromission theory of vision. It was Ibn al-Haitham who introduced the scientific, experimental method, and it was this that Bacon picked up on also.
- Al-Kindi was another source of inspiration for Bacon, and his two treatises on geometrical and physiological optics were used by the European.
- Ibn Firnas's flying machine inspired Bacon's flying machine or ornithopter, which he described in his manuscript *De Mirabili Potestate Artis et Naturae* or *On the Marvellous Powers of Art and Nature* from 1260. It is known that Bacon studied in Cordoba, the homeland of Ibn Firnas.
- Bacon's writing on gunpowder was based on Muslim sources, and the so-called Latin book *Liber Ignium of Marcus Graecus*, which gives many recipes for making gunpowder, was originally in Arabic and translated in Spain.
- Roger Bacon became acquainted with Muslim chemistry from the Latin translations of Arabic works, and believed in the great importance of alchemy, and in transmutation.
- His chief guide in medicine was the *Canon* of Ibn Sina, which he cites as frequently as all those other writers combined.
- The book that had the greatest impact upon Bacon's method of thinking, and made him different from his western contemporaries, was *The Book of the Secret of the Secrets* by 9th-century Zakariya' al-Razi (known in the West as Rhazes). In Latin, this was *Secretum Secretorum*.

Leonardo da Vinci (1452–1519).

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- Leonardo da Vinci was an Italian painter, sculptor, architect, musician, engineer, mathematician and scientist, and a key figure in Renaissance Europe.
- Da Vinci drew 'The Vitruvian Man,' a man of perfect proportions in two superimposed positions with his arms apart, appearing in a circle and square, which illustrated the text of the Roman Canon of Vitruvius. Da Vinci's drawing was seen as innovative because he said the man's centre, when drawn in a square, was not his naval, as the Canon stated, but lower. However, five centuries

earlier Muslim scholars *Ikhwan al-Safa'* or the Brothers of Purity from the 10th century had come to the same conclusion, saying that the centre of the figure was only the navel for a child under seven and after this the centre moved to the groin area.

- Historians have acknowledged Ibn Sina's *Book of Cure, Healing or Remedy from Ignorance* as an inspiring source of thought for the founders of geometrical thought in Europe, including Leonardo da Vinci.
- Ibn al-Haitham invented the camera obscura long before Leonardo da Vinci, who produced the full and developed camera design.
- He found arabesque designs fascinating and worked out his own complicated patterns. The Muslim knot, in particular, intrigued him so he produced two plates of six knots, which were later reproduced in circular copper engravings by one of his followers in Milan around 1483 and 1499.

Nicolas Copernicus (1473–1543)

- Polish scientist Copernicus is said to be the founder of modern astronomy.
- Many of his theories were based on those of Nasir al-Din al-Tusi and Ibn al-Shatir. Ibn al-Shatir's planetary theory and models are mathematically identical to those prepared by Copernicus over a century later. Copernicus would have come into contact with these in Italy, where he studied.
- Another influence on Copernicus is believed to have been the famous Toledan Tables written by al-Zarqali, who was born in 1028.
- It is known that he relied heavily on the comprehensive astronomical treatise of al-Battani that included star catalogues and planetary tables of al-Battani.
- He relies profusely on al-Zarqali and al-Battani in his book *De Revolutionibus*.

Tycho Brahe (1546–1601)

- This leading Danish Renaissance astronomer was credited for many influential works, including the production of the quadrant and one of Europe's leading observatories.
- He is renowned for rediscovering the Moon's variation, which was first discovered by a Muslim astronomer Mohammed Abu al-Wafa al-Bouzjani about six hundred years earlier.
- The instruments used by this famous 16th-century observational astronomer were very similar to those used by Muslim astronomers. His famous mural quadrant was like those developed in eastern Islam, especially by astronomer Taqi al-Din.

Johannes Kepler (1571–1630)

- Kepler is renowned in the West for discovering the laws of planetary motion; his work on optics; as the founder of the first correct mathematical theory of the camera obscura; and the first correct explanation of the working of the human eye, with an upside-down picture formed on the retina.
- Ibn al-Haitham's influence can easily be detected in Kepler's work, as the former had revolutionized optics six hundred years earlier. His *Kitab al-Manazir* or *Book of Optics* was translated into Latin by Gerard of Cremona and called *Perspectiva* or *De aspectibus*.
- Both Kepler and Descartes relied upon Ibn al-Haitham's studies on the refraction of light, and Kepler took up where Ibn al-Haitham left off.
- He developed the camera obscura after its first discovery by Ibn al-Haitham, improving it with a negative lens behind the positive lens, which enlarged the projected image (the principle used in the modern telephoto lens).

Nicolaus Copernicus (1473–1543).

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