



Great Muslim Scientists and their contributions to the fields of Science

**ALI IBN RABBAN AL-TABARI
(838-870 A.D.)**

Abu al-Hasan Ali Ibn Sahl Rabban al-Tabari was born in 838 A.D. Professionally; Sahl was an extremely successful physician. He had command over Calligraphy, Astronomy, Philosophy, Mathematics, Literature and Syriac and Greek languages.

The main cause behind his exaltation lies in his world-renowned treatise Firdous al-Hikmah. Spread over seven parts, Firdous al-Hikmah is the first ever medical encyclopedia which incorporates all the branches of medical science in its folds.

Part One: Kulliyat-e-Tibb. This part throws light on contemporary ideology of medical science in that era.

Part Two: Elucidation of the organs of the human body, rules for keeping good health and comprehensive account of certain muscular diseases.

Part Three: Description of diet to be taken in conditions of health and disease.

Part Four: All diseases from head to toe.

Part Five: Description of flavor, taste and color.

Part Six: Drugs and poison.

Part Seven: Deals with diverse topics. Discusses climate and astronomy. Also contains a brief mention of Indian medicine.

He has two more compilations to his credit namely Deen-o-Doulat and Hifz-al-Sehat.

**NASEER AL-DIN AL-TUSI
(1201-1274 A.D.)**

Abu Jafar Muhammad Ibn Muhammad Ibn al-Hasan Naseer al-Din al-Tusi was born in Tus (Khurasan) in 1201 A.D. Naseer al-Din was one of the greatest scientists, philosophers, mathematicians, astronomers, theologians and physicians of the time and was a prolific writer. He made significant contributions to a large number of subjects.

He wrote several treatises on different sciences and subjects including Geometry, Algebra, Arithmetic, Trigonometry, Medicine, Metaphysics, Logic, Ethics and Theology. In addition, he wrote poetry in Persian.

In Mathematics, his major contribution would seem to be in trigonometry, which was compiled by him as a new subject in its own right for the first time. Also he developed the subject of spherical trigonometry, including six fundamental formulas for the solution of spherical right-angled triangles.

As the chief scientist of the observatory established under his supervision at Maragha, he made significant contributions to Astronomy. The observatory was equipped with the best possible instruments. He himself invented an instrument "turquet" that contained two planes. His book Akhlaq e Nasiri became the most important work on ethics, and Tajrid al-Aqaid was well known contribution on Islamic Scholastic Philosophy.

Great inventions by Muslims

1. Coffee

The story goes that an Arab named Khalid was tending his goats in the Kaffa region of southern Ethiopia, when he noticed his animals became livelier after eating a certain berry. He boiled the berries to make the first coffee. Certainly the first record of the drink is of beans exported from Ethiopia to Yemen where Sufis drank it to stay awake all night to pray on special occasions. By the late 15th century it had arrived in Mecca and Turkey from where it made its way to Venice in 1645. It was brought to England in 1650 by a Turk named Pasqua Rosee who opened the first coffee house in Lombard Street in the City of London. The Arabic qahwa became the Turkish kahve then the Italian caffè and then English coffee.

2. Pin Hole Camera

The ancient Greeks thought our eyes emitted rays, like a laser, which enabled us to see. The first person to realise that light enters the eye, rather than leaving it, was the 10th-century Muslim mathematician, astronomer and physicist Ibn al-Haitham. He invented the first pin-hole camera after noticing the way light came through a hole in window shutters. The smaller the hole, the better the picture, he worked out, and set up the first Camera Obscura (from the Arab word qamara for a dark or private room). He is also credited with being the first man to shift physics from a philosophical activity to an experimental one.

3. Parachute

A thousand years before the Wright brothers a Muslim poet, astronomer, musician and engineer named Abbas ibn Firnas made several attempts to construct a flying machine. In 852 he jumped from the minaret of the Grand Mosque in Cordoba using a loose cloak stiffened with wooden struts. He hoped to glide like a bird. He didn't. But the cloak slowed his fall, creating what is thought to be the first parachute, and leaving him with only minor injuries. In 875, aged 70, having perfected a machine of silk and eagles' feathers he tried again, jumping from a mountain. He flew to a significant height and stayed aloft for ten minutes but crashed on landing – concluding, correctly, that it was because he had not given his device a tail so it would stall on landing. Baghdad international airport and a crater on the Moon are named after him.

4. Refinement

Distillation, the means of separating liquids through differences in their boiling points, was invented around the year 800 by Islam's foremost scientist, Jabir ibn Hayyan, who transformed alchemy into chemistry, inventing many of the basic processes and apparatus still in use today – liquefaction, crystallization, distillation, purification, oxidization, evaporation and filtration. As well as discovering sulphuric and nitric acid, he invented the alembic still, giving the world intense rosewater and other perfumes and alcoholic spirits (although drinking them is haram, or forbidden, in Islam). Ibn Hayyan emphasised systematic experimentation and was the founder of modern chemistry.

5. Surgery

Many modern surgical instruments are of exactly the same design as those devised in the 10th century by a Muslim surgeon called al-Zahrawi. His scalpels, bone saws, forceps, fine scissors for eye surgery and many of the 200 instruments he devised are recognizable to a modern surgeon. It was he who discovered that catgut used for internal stitches dissolves away naturally (a discovery he made when his monkey ate his lute strings) and that it can be also used to make medicine capsules. In the 13th century, another Muslim medic named Ibn Nafis described the circulation of the blood, 300 years before William Harvey discovered it. Muslims doctors also invented anesthetics of opium and alcohol mixes and developed hollow needles to suck cataracts from eyes in a technique still used today.

6. Windmill

The windmill was invented in 634 for a Persian caliph and was used to grind corn and draw up water for irrigation. In the vast deserts of Arabia, when the seasonal streams ran dry, the only source of power was the wind which blew steadily from one direction for months. Mills had six or 12 sails covered in fabric or palm leaves. It was 500 years before the first windmill was seen in Europe.

7. Vaccination

The technique of inoculation was not invented by Jenner and Pasteur but was devised in the Muslim world and brought to Europe from Turkey by the wife of the English ambassador to Istanbul in 1724. Children in Turkey were vaccinated with cowpox to fight the deadly smallpox at least 50 years before the West discovered it.

8. Fountain Pen

The fountain pen was invented for the Sultan of Egypt in 953 after he demanded a pen which would not stain his hands or clothes. It held ink in a reservoir and, as with modern pens, fed ink to the nib by a combination of gravity and capillary action.

9. Numerical Numbering

The system of numbering in use all round the world is probably Indian in origin but the style of the numerals is Arabic and first appears in print in the work of the Muslim mathematicians al-Khwarizmi and al-Kindi around 825. Algebra was named after al-Khwarizmi's book, *Al-Jabr wa-al-Muqabilah*, much of whose contents are still in use. The work of Muslim math's scholars was imported into Europe 300 years later by the Italian mathematician Fibonacci. Algorithms and much of the theory of trigonometry came from the Muslim world. And Al-Kindi's discovery of frequency analysis rendered all the codes of the ancient world soluble and created the basis of modern cryptology.

10. Shampoo & Soap

Washing and bathing are religious requirements for Muslims, which is perhaps why they perfected the recipe for soap which we still use today. It was the Arabs who combined vegetable oils with sodium hydroxide and aromatics such as thyme oil. Shampoo was introduced to England by a Muslim who opened Mahomed's Indian Vapour Baths on Brighton seafront in 1759 and was appointed Shampooing Surgeon to Kings George IV and William IV.

Ali ibn Nafi, known by his nickname of Ziryab (Blackbird) came from Iraq to Cordoba in the 9th century and brought with him the concept of the three-course meal – soup, followed by fish or meat, then fruit and nuts. He also introduced crystal glasses (which had been invented after experiments with rock crystal by Abbas ibn Firnas).

11. Carpets

Carpets were regarded as part of Paradise by medieval Muslims, thanks to their advanced weaving techniques, new tinctures from Islamic chemistry and highly developed sense of pattern and arabesque which were the basis of Islam's non-representational art. In contrast, Europe's floors were distinctly earthly, not to say earthy, until Arabian and Persian carpets were introduced. In England, as Erasmus recorded, floors were "covered in rushes, occasionally renewed, but so imperfectly that the bottom layer is left undisturbed, sometimes for 20 years, harboring expectoration, vomiting, the leakage of dogs and men, ale droppings, scraps of fish, and other abominations not fit to be mentioned". Carpets, unsurprisingly, caught on quickly.

12. Pay Cheques

The modern cheque comes from the Arabic saqq, a written vow to pay for goods when they were delivered, to avoid money having to be transported across dangerous terrain. In the 9th century, a Muslim businessman could cash a cheque in China drawn on his bank in Baghdad.

13. Sphere shape of earth

By the 9th century, many Muslim scholars took it for granted that the Earth was a sphere. The proof, said astronomer Ibn Hazm, “is that the Sun is always vertical to a particular spot on Earth”. It was 500 years before that realization dawned on Galileo. The calculations of Muslim astronomers were so accurate that in the 9th century they reckoned the Earth’s circumference to be 40, 253.4km – less than 200km out. The scholar al-Idrisi took a globe depicting the world to the court of King Roger of Sicily in 1139.

14. Rocket

Though the Chinese invented saltpetre gunpowder, and used it in their fireworks, it was the Arabs who worked out that it could be purified using potassium nitrate for military use. Muslim incendiary devices terrified the Crusaders. By the 15th century they had invented both a rocket, which they called a “self-moving and combusting egg”, and a torpedo – a self-propelled pear-shaped bomb with a spear at the front which impaled itself in enemy ships and then blew up.

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