

Understanding Islam **Series Four: Bearers of the Final Message**

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Part Three: Greek knowledge passes through the Muslim lands

Greek influence in the countries of the Middle East pre-dates the time of Islam by a thousand years. The Greek general, Alexander, gave his name to Alexandria, the Egyptian seaport in the 4th century before the Common Era (BCE). This became a great centre of learning that rivalled Athens. It was here that the fabled Library of Alexandria was established under Ptolemy Philadelphus (285-247BCE). In 331BCE, Alexander conquered the Seleucid Empire and thus Persia. Greek influence now stretched from the Mediterranean to the Punjab in India. Under the Ptolemy rulers in Egypt, Greek became the language of administration and of the elite within society. The Syrians at this time were using a form of Syriac-Aramaic as their common language but after Syria became a Roman province in 65BCE, there was a further infusion of Greek influence in culture and learning in the region. By the second century of the Common Era (CE), much of Mesopotamia was under Greco-Roman rule, so we can see that there were centuries during which Greek learning spread its influence from Egypt, through Syria to Persia.

When we speak of Greek learning in this way, we are thinking of a wide range of subjects: the natural sciences, medicine, astronomy, mathematics, philosophy and logic. In addition, in the Christian centuries, theology had been developed in Greek and so we can see that influence in religious thought as well. With the coming of Greek learning to Egypt, this original deposit was developed with the incorporation of elements of ancient Egyptian thought. If we think of philosophy, then the school of Aristotle was dominant but with significant developments in Neo-Platonism, the school founded by Pythagoras (580-c500BCE). The Egyptian Neo-Platonist philosopher, Plotinus (c200-269CE), is regarded as its seminal thinker. Another philosopher of the period, Porphyry (233-after301CE), was a Syrian. The last head of the great Academy in Athens, Damascius, was a Syrian and when it was closed by Emperor Justinian in 529CE, he and six other professors of philosophy went to Persia in 532 hoping to find a haven there to carry on with their work. As it happened, they only stayed for a year before moving back to Greece.

Alexandria was also important in mathematics; the scholar of geometry, Euclid (c300BCE), worked there. Dozens of other leading mathematicians of the period studied or taught in Alexandria or were associated with it. In medicine, texts written by the Greek scholars Hippocrates (d.257BCE) and Galen (d.200CE) had been translated into Syriac and were widely used in the medical schools there along with the writings of several other Greek scholars.

Contacts between the Middle East and India date back to at least the 15th century BCE. The pre-Islamic trade routes between Damascus and Alexandria in the north and India in the south should be thought of as two-way routes for the spread of ideas. By the

dawn of Islam, Greek thought had made an impact in India through a sea route from Alexandria to Ujjain where it was further developed. There was another land route via Central Asia, so that Bactria in Afghanistan and Marw in Persia had Greek colonies, and thus Greek thought was transmitted to India where some leading Buddhist families are noted for their involvement.

An important point to take before leaving this pre-Islamic period is that when we speak of “Greek thought,” we are not using the term Greek as a description of ethnicity but as a linguistic community to which people of various ethnicities and religions contributed. This should be paralleled to the later term “Arabic thought,” which is also not an ethnic term but describes scholarship developed in the Arabic language by people of various ethnic groups and religions.

The rise of Islam

When the Umayyad’s took Damascus in 637 and subsequently established their capital there, they encountered a higher culture and civilisation than they knew in the Arabian desert settlements from which they came. They continued to employ Greek-speaking administrators for decades and specialists, such as physicians, for much longer. Syriac and Arabic are sister languages and thus Syriac provided a natural way into appreciating the sophistication of Greek thought, based on the books that had already been translated. Just as Greek writings had been translated into Syriac, so there was a natural move to bring these within the knowledge of Arabic-speakers and so another translation movement began that was to take-off in the second half of eighth century.

After the rise of the Abbasid Caliphate in 750, the Caliph al-Mansur relocated the capital to Iraq, where he laid the foundation for the new capital city of Baghdad in 762. This city was planned according to the Persian round city model, such as at Ctesiphon. It was a new creation under Islamic rule, unlike Jerusalem or Damascus, and the caliphal court, government offices and army barracks were housed in close proximity. The river brought access by ship and provided a pleasant and healthy habitat, which soon attracted the building of suburbs surrounding the gated round city. Within decades, it became a cosmopolitan multi-religious city, with Arabs, Persians, Turks, Berbers and Africans, who were Muslims, Christians and Jews.

The Muslim self-understanding of being the bearers of the final message of Islam and thus a community blessed by God meant that there was a real sense in which they thought that all the knowledge of the world should be brought to the service of Islam. The task of translating that knowledge had already begun, for example, by Abu Muhammad ibn al-Muqaffa (d.757), a Persian convert, who worked for 'Isa ibn Ali, the uncle of the first two Abbasid Caliphs. He was translating works, many of which had been sourced in India, from Persian into Arabic. The garrison cities of Kufa and Basra had already become centres of Qur'anic studies, with the natural emphasis on the Arabic language, and thus Islamic theology. Scholars from these disciplines and cities were called to Baghdad by Caliph al-Mansur and thus it was transformed into a centre of Islamic learning. Baghdad was a natural meeting place where Greek and

Sanskrit learning encountered the message of Islam and so the new city became the intellectual power-house of the period.

This was given an enormous boost by the Caliph Harun al-Rashid (786-808), who sent out agents to purchase Greek works from various countries. This gave an impetus to many private individuals to begin to found their own libraries through collecting manuscripts and commissioning translations. Part of this movement is associated with the Bayt al-Hikma, or the House of Wisdom, which was founded by the Caliph al-Ma'mun (r.813-833). A regular seminar or *majlis* was established so that scholars could engage in discussion.

The process of translation

Works of scholarship were brought to Baghdad from a variety of disciplines: philosophy, especially the work of Aristotle and the Neo-Platonists, medicine, mathematics and astronomy were particularly favoured. Some were in Syriac, Persian and Sanskrit but eventually more arrived in the original Greek. The initial translation, especially of medical works, was undertaken by Nestorian Christian scholars, who rendered the Syriac into Arabic. Probably the first works translated direct from Greek into Arabic (probably before 803) were Ptolemy's *Almagest* and Euclid's *Elements*. Harun al-Rashid's personal librarian, Abu Sahl al-Fadl an-Nawbakht (d.c815) is noted for his translations from Persian into Arabic.

The critical early figure in this work of translation was Hunayn ibn Ishaq (d.c873), who was born in Hira in Upper Mesopotamia, the son of a Christian pharmacist. He learnt Arabic in Baghdad before going to "the land of the Greeks" to master that language. About 826, he returned to Baghdad and began the work of translating medical works from Greek to Arabic. He was presented to the Caliph al-Ma'mun, who appointed him as the director of the Bayt al-Hikma. Here he trained other translators and laid the foundations for later work. He is reported to have translated the works of Galen, Hippocrates, Ptolemy, Euclid and Aristotle plus other writers. He is thought to have translated twenty works of Galen into Syriac and fourteen works into Arabic. Some of the best early translations are reckoned to date from the reign of Caliph Mutawakkil (841-861) with authors such as: Diocorides, Archimedes, Hypsicles, Theodosius, Heron, John Philporus, Porphyry and Ammonius.

From translation to copying

To translate works into Arabic was the first step but the crucial development that followed was to make multiple copies so that the Arabic works could be disseminated around the Muslim world. This was hugely facilitated by the introduction of the mass production of paper, which replaced parchment and vellum as the writing material. This also marked the transition from scrolls to bound books. The production of paper originated in China and reached Central Asia, for example, Samarqand, in the eighth century and thus on to Baghdad by the ninth century. It was now possible to produce large quantities of writing material, copy the translations onto them and bind them so that they would be protected in transit and use. This also fuelled the great Hadith

collectors of the ninth century. In Baghdad, the development of inks and new sources of cellulose fibres allowed the process to be industrialised. The skill of the copyist was in precision and penmanship rather than the linguistic ability of the translators. The oldest existing book in Arabic written on paper is dated to 866. Paper production spread throughout the Muslim world, with paper mills reported in the Maghreb as early as 751, with Damascus and Cairo being noted centres of manufacture. From here it reached Europe in the tenth century.

From translation to original authorship

In order to create an intellectual flourishing, three things are needed: something to prime the process, scholars funded to do the work and a vision to drive it forward. Greek learning was to supply the impulse to prime the process of original work, the Abbasid Caliphs and other wealthy families in Baghdad provided the funds and facilities for the scholars to do their work and being the bearers of the final message of Islam provided the vision.

One of the scholars who marked this transition was Thabit ibn Qurra (d.901). He came from a non-Muslim Neo-Platonist family and was expert in Greek, Syriac and Arabic. He worked in Baghdad originally as a translator and reviser of earlier translations of the works of Apollonius, Archimedes, Euclid, Ptolemy and Theodosius. Later he went on to write a reported 150 works in Arabic covering the disciplines of logic, mathematics, astronomy and medicine.

Mathematics and astronomy went hand-in-hand in Greek thought, and astronomy led also to its sister discipline of astrology. It was not uncommon for scholars to command several disciplines, such as al-Khwarizmi (780-c850), who was born in Uzbekistan and moved to Baghdad, where he worked in the Bayt al-Hikma. He was originally a Zoroastrian who converted to Islam. In his *Kitab al-Jabr*, he developed the Greek science of algebra and applied it to the Islamic laws of inheritance as well as trade and agriculture (This was later translated into Latin by Gerard of Cremona and Robert of Chester). The Greeks, Babylonians and Indians had made initial steps in algebra but he developed rules (algorithms), which allowed problems to be solved by general principles. He is credited with taking Sanskrit numerals and developing them into the Arabic numerals that have become widespread today. They were based around the number of enclosed angles, so 1 contained one angle, 2 (Z) contained two, 3 (Σ) contained three and so on. He also imported the Indian decimal system, transformed it to run horizontally and developed the zero as a place-holder. In astronomy, he is credited with building the first observatory in Baghdad and developing a star chart. He also drew a new map of the world in 833, worked out various distances and the coordinates of places. He is credited with being the first geographer of Islam.

Translation beyond Baghdad

Scholarship flourished beyond the Abbasid heartlands. The great centre of learning in Fez, Morocco, the al-Qarawiyyin, was built by the daughter of the ruler, Fatimah al-

Fihri, in 859, who had vowed to use all her inheritance to further learning. It became a renowned mosque-college specialising in astronomy, law, mathematics and medicine in addition to the Islamic religious sciences.

The Fatimids conquered the Muslim Egyptian capital of Fustat in 969 and built the new city of Cairo nearby from 972. They established the mosque-university of al-Azhar in Cairo in 978. The Fatimids were Ismailis, the branch of the Shi'a that follow a different line of Imams from the seventh Imam of the general Shi'a line, and Greek philosophy played a central part in the development of their form of Islam. The Fatimid Caliph-Imam, al-Hakim (985-1021), established the House of Knowledge in 1005, the library of which is reported to have comprised forty rooms filled with books, of which 18,000 are held to have been works in translation. He set up men's and women's study circles in the al-Azhar. The Fatimids flourished in Cairo until 1171, when Saladin re-took their territory for Sunni Islam, thus transforming the orientation of the al-Azhar University, which remains until today as the single most respected centre of Sunni Islamic learning.

The Umayyad Caliphate of Spain established its capital at Cordoba from 756 and began the building of the Great Mosque, which contained a library that grew to be the most significant of the first millennium in Europe. The Great Mosque was an architectural masterpiece with its horse-shoe arches built with a second tier of intersecting arches. Cordoba was a city of advanced civilisation by the ninth century, having paved streets, street-lighting fuelled by oil burners, piped water and sewerage canals. In 951, the Byzantine Emperor made a gift to the Caliph Abd al-Rahman III (d.961) of a monk called Nicholas, who was a noted translator of Greek works into Arabic. In the tenth century, scholars from the Muslim world were attracted to Cordoba and Christian and Jewish students and scholars came to work there from other parts of Europe. The caliphal library, the Library of Knowledge, was reported to have four hundred thousand volumes at its height. Of particular note are the women scholars in science, law and theology who worked there. The Caliph Al-Hakam II (r.961-976) is recorded as having a secretary called Lubnah, who was also his librarian, and a mathematician and poet in her own right. At the same court, there was a book-collector called Fatimah, who made regular trips to Cairo and Damascus. Further, women were prominent as copyists, with 170 women recorded in one district of the city alone, who specialised in copying in the kulfic script. Some of these higher copyists also added marginal notes to augment the texts on which they were working.

All-encompassing knowledge

This was an age in which the frontiers of knowledge were extended in many disciplines. Al-Biruni (973-c1050) from Khurasan, was committed to the science of time. He plotted solar and lunar eclipses, calculated the circumference of the earth and calculated the speeds of the movements of the heavenly bodies. He wrote a treatise on pharmacology and *materia medica*, in which he described more than a thousand medicines. He came into contact with Indian wisdom and was able to read and translate Sanskrit so that he could write on the life and times of India. His work, "The Extant Remains of Bygone Ages," contained a history of religions.

Work in astronomy was forwarded by al-Battani (d.929), who was given the Latin name Albategnius in Europe. He worked in observatories in Baghdad and Damascus, where he further developed the astrolabe and built celestial spheres and quadrants. The chemist, Jabir ibn Hayyan (722-855), Geber in Latin Europe, worked on the process of distillation, the classification of materials and made big strides in developing acids. Throughout the period, there was an interest in alchemy, the search for turning base metals into gold. Abd l-Wafa (10th century) is credited with observing natural proportions and thus developing the Golden Ratio of width to height (1:1.62), which combines strength with that which is pleasing to the eye and is important in architecture, art and calligraphy. There were developments in mechanics, such as the windmill for grinding corn and pumping water, and pumps to lift water for irrigation.

Abu Bakr Muhammad ibn Zakariyya al-Razi (d.c932), Razes in Latin Europe, is regarded as the father of Arabic medicine. This was an area in which Jewish scholars made an important contribution, such as Ishaq ibn Amran al-Isra'eli, who was court physician to the Caliph Ziyadet Allah III (r.902-903) in Qayrawan. He was trained in Baghdad and is credited with introducing Greek medicine to North Africa and Spain. Ibn al-Haytham (965-1039), in Latin Europe Alhazan, was a mathematician and physicist of note. He is called the father of optics and was the first recorded to use the *camera obscura* to observe eclipses. Great strides took place in anatomy, surgical techniques and medicine, in which fields al-Mosuli (10th century) advanced eye surgery, Ibn Sina (d.1037) is noted for his work on fractures and bone-setting, and Ibn Nafis (1210-1288) worked out the pulmonary circulation of the blood.

Focus on philosophy

One of the areas of particular interest was philosophy. It was training to the mind and the key to the other sciences, it also helped Muslims to articulate their faith in the face of sophisticated Christian theology. Abu Yusuf Ya'qub ibn Ishaq al-Kindi (d.873) was born in Basra of the Arab clan of Kinda. He began his career as a translator and then developed into a philosopher in his own right and is regarded as the father of Arabic philosophy. He belonged to the Aristotelean school and his book "On First Philosophy" is regarded as his most important work, although he is credited with having written three hundred titles on philosophy and science. Abu Nasr Muhammad al-Farabi (d.950) came from Central Asia and worked in Aleppo and Baghdad. He worked on both Aristotelean and Neo-Platonic systems and tried to develop an integrated philosophy. Two of those that he influenced were Moses Maimonides (d.1204) and ibn Rushd (d.1198). Another group of philosophers who worked in Baghdad around the year 980 were the Brethren of Purity (*Ikhwan al-Safa*), who developed a series of fifty-two epistles covering mathematics, logic, natural science, metaphysics, mystical theology, astrology and magic. They drew mainly from the school of Aristotle but combined it with the thought of Hermes, Pythagoras, Socrates and Plato into something of an esoteric tradition.

The two Muslim philosophers with the greatest impact on their own tradition and on Europe were Ibn Sina (980-1037), in Latin Avicenna, and Ibn Rushd (1126-1198), in Latin Averroës. Ibn Sina was born in Bukhara and worked in Persia, especially in Isfahan. His medical work was seminal and his *Canon* was taught in European medical schools up to 1715. He wrote an acclaimed commentary on Aristotle's metaphysics and developed his own original contribution to the field. Ibn Rushd was born in Cordoba and became a jurist, physician and outstanding philosopher. He worked in Cordoba and Seville and died in Marrakesh. He was the first of the Arabic philosophers to write a commentary on Plato's *Republic* but it is for his work on Aristotle that he is famous. He wrote a series of *Middle Commentaries* on his work, which were essentially paraphrases; these were later translated into Hebrew by the Jewish philosophers. His *Long Commentaries* on Aristotle's five major works not only presented Aristotle but took his teaching further in many directions. These were translated into Latin and fuelled the awakening of European scholars to Aristotle's body of work. He had such a stature in Europe, where he was just referred to as "The Commentator" that even those who disagreed with some of his positions and wrote refutations of them regarded him as the outstanding master of Aristotle's work. His *Long Commentaries* were taken to Paris by the Scottish translator, Michael Scot (d.c.1236), from which European scholars drew their knowledge of Aristotle. Even when better translations of Aristotle from the Greek became available, his commentaries were read alongside them to draw out the meaning. He figured prominently in the book of Giles of Rome, *Errors of the Philosophers*, written in the thirteenth century.

Greek learning returns to Europe

After 1031, which marked the fall of the Umayyad Caliphate of Spain, the next two hundred years saw the decline of Muslim rule in waves, until it was only to be found in the Kingdom of Granada from 1238 to 1492. As the Christians became more powerful, they realised that it would be possible to further the knowledge of Europe by translating the product of Arabic scholarship into Latin. This happened in various places, such as Barcelona under the translator, Plato of Tivoli, and near Saragossa, but the main centre was in Toledo, which came under the rule of the Kingdom of Castile from 1085. During the time of Muslim rule and to a degree afterwards, Jews, Christians and Muslims worked side-by-side in academic work. This was to change with the Inquisition from the thirteenth century onwards. One of the riches of Spain was that the most influential Jewish systematic theologian of the era, Moses Maimonides (d.1204), wrote in Arabic in the philosophical tradition of Aristotle and thus there was a common intellectual conceptual framework for Muslims and Jews (and later Christians) based on his system.

In early twelfth century Toledo, Archbishop Raimundo (r.1125-1151), perceived that he had a golden opportunity offered by the presence of Muslims, Jews and Christians in the city who between them could command Arabic and Latin. He was encouraged to begin the work of translation by the Abbot of Cluny, Peter the Venerable (d.1156), who came to Toledo on a visit in 1142. The system of working was for translators to be paired, so that the one who was specialised in Arabic would render the text into

basic Latin vocabulary and then the Latin specialist would turn this into grammatical Latin. A number of names are associated with this process including Robert of Ketton, whose name is attached to the first translation of the Qur'an into a European language, Dominic Grundisalvi and John of Seville. It may well be that translations were later attached to their names, so it is not clear who translated which books. Three major translators were Gerard of Cremona (d.1187), who is credited with the translation of over a hundred books, Michael Scot and Hermann the German. In this way seminal works in the philosophy of ibn Rushd, ibn Sina and al-Farabi became available in Latin. In addition to the philosophical works, many scientific and medical works were translated.

We can trace something of the progression of this philosophy in European centres of learning. The scholastic theologian, Peter Lombard (d.1160), did not display any knowledge of them when writing his *Sentences*. By contrast, John of Salisbury (d.1182), working in Paris, had some knowledge of them. Michael Scot, working in Toledo in 1217, translated the *Long Commentaries* of Aristotle into Latin and is reported to have taken them to the newly established University of Paris.

Another European source of translations was Sicily, which had been the subject of Arab raids in the eighth century and come under Muslim rule in stages from 831-902. It was taken by the Norman, Count Roger, between 1061 and 1091, and then by the German Emperor, Henry VI in 1194. When Emperor Frederick II (d.1250) came to power in 1215, he set up the work of translation. He is reputed to have been able to read Arabic and to have had considerable respect for Islam and Muslims. He set up the University of Naples in 1224 to make the product of Arabic translations into Latin more widely known in Europe. It was in this university that Thomas Aquinas (d.1274) received his education. Frederick also employed the services of Michael Scot as his translator in Bologna from 1220 to 1227.

The thirteenth century saw the rise of the Friars, who took up the newly acquired knowledge. Amongst the Franciscans was Alexander of Hales (d.1245) and amongst the Dominicans, the first two professors of theology in Paris, Albert the Great (1206-1280) and Thomas Aquinas. Albert used the commentaries of ibn Sina and ibn Rushd and Aquinas regarded ibn Rushd as the great Commentator in his writings, even though he disagreed with him on a number of issues. Both the Dominicans realised that the translations of Aristotle that they received in Latin (via Arabic) were in need of improvement and so they pushed for new translations from the Greek texts that had become available to Latin Europe after the Crusaders' sack of Constantinople in 1204. This Greek-Latin translation work was undertaken by men like William de Moerbeka (1215-1286). The Arabic-Latin work of translation had seen almost all of ibn Rushd rendered into Latin by this time but some translations were still being commissioned by Alfonso the Wise of Castile (1252-1284).

On the basis of these philosophical texts, Thomas Aquinas and his successors were able to bring about the systematisation of western Christian theology that powered a renaissance in Europe. They also had their impact in literature, for example, through their influence on Dante, who put ibn Sina and ibn Rushd in his "Purgatory" along

with the Greek philosophers. The maps and navigational instruments were used in the European voyages of discovery that opened up the Americas. The medical writings transformed that discipline in Europe and many of the scientific works were consumed and developed in the European High Middle Ages.