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Author: **Salah Zaimeche** PhD
Chief Editor: **Lamaan Ball**
Sub Editor: **Rumeana Jahangir**
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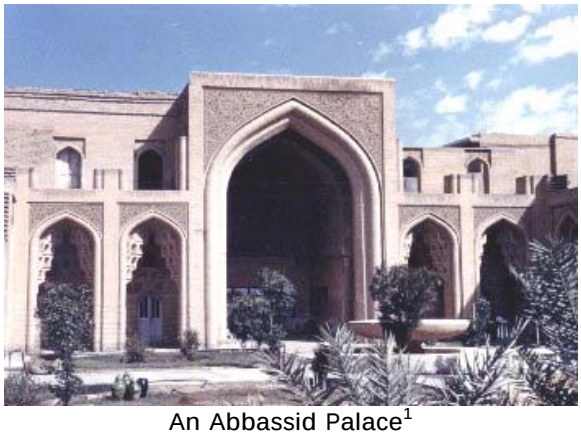

An Abbassid Palace[1]

In the words of Artz:

> *`Baghdad, in the tenth century had at least 800,000 inhabitants and was, after Constantinople, the largest city in the world. The Tigris River and a system of canals gave the city access to the sea, and its trade and manufacture brought an enormous accumulation of wealth. Its palaces, mosques, schools, and public buildings were the wonder of the world.* [2]

The city of Baghdad was founded under the second Abbasid caliph al-Mansur who ruled in 754-775 CE. After a lengthy research along the course of the Tigris as far north as Mosul, he decided to construct a palace complex at the junction of the Tigris and the Sarat canal. It appears that al-Mansur decided on this particular location because of strategic and geographic advantages.[3] The Sarat was deep enough to accommodate commercial traffic and so the Caliph was able to utilise the two major river systems which the Sarat connected: The Tigris and the Euphrates.[4]

The first major structure to be erected was the famous round city called Madinat as-Salam (City of Peace). Thousands, if not tens of thousands, of skilled and unskilled workers, artisans from outlying districts and military staff required housing, services and an industrial complex for the production of construction materials. Baghdad therefore acquired a quality of permanence even before the Round City was completed.[5] The Round City had four equidistant gates lying one Arab mile apart from each other and from every gate went a high road.[6] The four gates of the Round City were:

1. The SE Basrah gate opening onto the suburbs along the Tigris bank where the various branches of the Isa canal flowed out

[1] http://www.ucalgary.ca/applied_history/tutor/imageislam/EricaImages/AbbPalace.jpg
[2] F.B. Artz: *The mind, The Mind of the Middle Ages*; Third edition revised; The University of Chicago Press, 1980; pp 149-50.
[3] J. Lasner: Baghdad; in *Dictionary of the Middle Ages;* vol 2; J.R. Strayer Editor in Chief; Charles Scribner's Sons; New York; 1982 fwd. vol 2; pp. 44-7; at p. 45.
[4] J. Lasner: Baghdad; p. 45.
[5] J. Lasner: Baghdad; p. 45.
[6] G. Le Strange: *The Lands of the Eastern Caliphate*; Cambridge University Press; 1930; vol 2; p. 30.

2. The SW-facing Kufah Gate opening onto the high road going south, which was the pilgrim road to Mecca
3. The NW Syrian gate where the high road branched left to Anbar on the Euphrates and right to the towns on the western bank of the Tigris north of Baghdad
4. The Khurasan Gate leading to the main bridge of boats crossing the river.[7]

Great suburbs were eventually built on these four roads and these, before long, came to be incorporated in the circuit of the great metropolis.[8] In time, the urban area grew around the original walls of the Round City and developed into a sprawling complex of interdependent elements, each containing its own markets, mosques and cemeteries.[9]

Throughout the history of the city, movement across the Tigris was funnelled onto a series of pontoon bridges that could be cut from their moorings, whilst the other canals similarly served as natural barriers in time of attack.[10] The river links with Baghdad had another role. Ibn Rustah wrote in the 9th century that

> *`sea going ships sailing from India came up the Tigris from Basra, and thence could attain to Madai (formerly Ctesiphon), for sailing on they came out above Fam as-Silh into the Tigris reach of Baghdad.*[11]

During the five centuries of the Abbasid caliphate, the plan of Baghdad with its suburbs changed considerably; in 836, the seat of the Caliphate was moved to Samarra but in 892 the latter was abandoned and the caliph re-established his court in the old capital. For the next four centuries up to the invasion of the Mongols (1258), the caliphs permanently established their residence on the east bank. [12]

In the tenth century, the surface area of Baghdad could have reached 7000 hectares (ha), which is five times larger than tenth-century Constantinople.[13] The population of Baghdad might have been 200 people per ha,[14] which gives a total of 1 400000 people, a number that fits figures from other sources.

Baghdad, besides its size, opulence and role at the centre of the caliphate, was also the capital of Islamic learning and science and remained so for centuries until all was extinguished in February 1258 by the Crusader-Mongol onslaught. This splendour and the manner it was ended will be looked at in turn.

The Splendour of Baghdad: its scholarly institutions

The rule of Harun ar-Rashid began in 786 CE and it has generally been considered as the zenith of growth of Baghdad. In the following century the city achieved greater strides in civilisation. The historical sources speak of magnificent residences, exquisitely appointed and featuring unusual elements, including a

[7] G. le Strange: The lands; vol 2; p. 30.
[8] G. le Strange: The lands; vol 2; p. 30-1.
[9] J. Lasner: Baghdad; op cit; p. 45.
[10] J. Lasner: Baghdad; p. 45.
[11] G. le Strange: The lands; op cit; p. 28.
[12] G. le Strange: The lands; vol 2; p. 32.
[13] J. Lasner: Baghdad; op cit; p. 47.
[14] J. Lasner: Baghdad; p. 46.

zoological garden and fantastic mechanical devices.[15] The city's scholarly glory can easily be seen in the fact that countless numbers of scholars involved in the sciences were nearly all connected in one form or another with the capital of learning and sciences - Baghdad.[16]

The city was at the height of the world in every single respect and possessed an innovative spirit in crafts and industries. Paper was originally brought by the Muslims from China. From an art, the Muslims developed it into a major industry.[17] In Baghdad many paper mills were built in 793. By 950 CE water power was used in the fibre pounding process in Baghdad.[18] From Baghdad the industry progressed west to Syria, Egypt, north Africa and eventually Muslim Spain. It paralleled the route generally followed by Muslim science from Baghdad to the Western shores of Islam.

In the ninth century, the potters of Baghdad, just as those of Samarra, distinguished themselves by making - perhaps inventing - lustered pottery; the decoration was painted in a metallic oxide upon the glazed coating of the clay and the vessel was then submitted to a smoky and subdued second firing, which reduced the pigment to a thin layer of metal and gave the glaze an iridescent glow.[19] Lovely monochromes were produced in this manner and still lovelier polychromes in gold, green, brown, yellow and red, in a hundred almost fluid tints. The luster technique was applied also to the ancient Mesopotamian art of decorative tiles.[20] The rich colours of these squares and their harmonious combinations gave unique splendour to the portals or mihrabs of a hundred mosques and to many a palace wall.[21] The gold-embroidered silks and mulhams are attributed to Baghdad on the basis of inscriptions, technique and richness of decoration. A significant but small group of such pieces is in the Museum of Fine Arts, Boston.[22] Despite the small number of surviving examples, the prestige of Baghdad can still be gauged from its impact on other centres. Iraqi textiles were reaching Spain in the tenth century and were much admired there; so great was their reputation that a famous silk, also in the Museum of Fine Arts, was falsely inscribed "made in the city of Baghdad" even though it was manufactured in Spain in the eleventh or early twelfth century. [23]

The intellectual fervour of Baghdad at the height of its glory is best expressed by one symbol: the library. In the thirteenth century, before the Mongols devastated the city in 1258, Baghdad had thirty-six public libraries and over a hundred book-dealers, some of whom were also publishers employing a corps of copyists.[24] Included amongst such libraries were Al-Mamun's Bayt al Hikma (House of Wisdom) founded in the 8th century; the Nizamiyyah College library named after its founder, the Seljuk minister Nizam al-Mulk (murdered 1092);

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[15] J. Lasner: Baghdad; op cit; p. 46.
[16] See, for instance G. Sarton: *Introduction to the history of sciences*, The Carnegie Institution; Baltimore, 1927 fwd; esp volume 1.
[17] For more accounts on the growth of the industry see:
- J.Pedersen; *The Arabic Book*, translated by Geoffrey French; Princeton University Press; Princeton, New Jersey (1984).
-M. M. Sibai: *Mosque Libraries*: An Historical Study; Mansell Publishing Limited: London and New York: 1987.
[18] F and J Gies: Cathedral, Forge, and Waterwheel subtitled "*Technology and Invention in the Middle Ages"*. Harper Perennial, 1995; p. 97; J. Mokyr: *The Lever of Riches* subtitled "Technological Creativity and Economic Progress". Oxford, 1990; p. 41.
[19] W. Durant: *The Age of faith*, Simon and Shuster, New York; 6th printing; 1950. p. 275.
[20] W. Durant: The Age; op cit; p. 275.
[21] W. Durant: The Age; op cit; p. 275.
[22] E. Whelan: Textiles; Dictionary of Middle Ages; op cit; pp. 715-8. at p. 717.
[23] E. Whelan: Textiles; Dictionary of Middle Ages; op cit; pp. 715-8. at p. 717.
[24] F. B. Artz: The Mind; op cit; 153.

the Mustansiriyah school library; the library of Muhammad ibn al Hussain of Haditha which contained a collection of rare manuscripts kept under lock.[25] The Mustansiriya college library was a fine one in which rare scientific manuscripts were kept.[26] Students were allowed to make copies of them and they were supplied with pens and paper for that purpose.[27] There were also 100 book-dealers.[28] We hear of a private library in Baghdad from as early as the ninth century that required a hundred and twenty camels to move it from one place to another.[29] Another scholar of Baghdad refused to accept a position elsewhere because it would take four hundred camels to transport his books; the catalogue of this private library filled ten volumes, which is the more astonishing when it is realized that the library of the king of France in 1300 had only about four hundred titles.[30]

Surrounded by the company of books, vast intellectual exchanges took place amongst the scholars of Islam in exact sciences and philosophy. Around 970 CE a pupil of one of al-Farabi's students established at Baghdad an association of savants - known to us only from its founder's place name as the Sidjistani Society - for the discussion of philosophical problems.[31] No questions were asked as to the national origin or religious affiliation of any member. The group seems to have drowned itself in logic and epistemology but its existence indicates that intellectual endeavour was very much alive in the capital.[32]

Caliph Al-Mamun (ruled 813-833 CE) sponsored philosophers, philologists, mathematicians, physicians, astronomers, chemists, traditionalists and other jurists.[33] He organized at Baghdad a sort of scientific academy called the House of Wisdom (Bayt al-Hikma) which included a library and an observatory.[34] It was primarily a research and translation institute; the first academy of science of its genre.[35] Artz lists its assets as including a library, scientific equipment, a translation bureau and an observatory.[36] Instruction in Bayt al-Hikma included rhetoric logic; metaphysics and theology; algebra; geometry; trigonometry; physics; biology; medicine and surgery.[37]

Baghdad soon became the place that launched the precursor of our modern university system: the Madrasa.[38] Madrasa (Turkish: medrese; Maghribi: medersa), commonly translated as "theological college" is derived from the Arabic verb darasa which means "to study".[39] It denotes an Islamic building usually erected under state patronage - but often by private benefactors - which housed students and the salaried

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[25] M. Nakosteen: *History of Islamic origins of Western education A.D 800-1350;* University of Colorado Press, Boulder, Colorado, 1964. p. 69.
[26] A.Whipple: *The Role of the Nestorians and Muslims in the History of Medicine*. Microfilm-xerography by University Microfilms International Ann Arbor, Michigan, U.S.A. 1977, p.76.
[27] A. Whipple; The Role; op cit; pp.76.
[28] M. Nakosteen: History; op cit; p. 69.
[29] F.B. Artz: The Mind; op cit; 153.
[30] Artz: 153.
[31] W. Durant: The Age; op cit; p. 254.
[32] W. Durant: The Age; op cit; p. 254.
[33] G. Sarton: Introduction; op cit; I; 558.
[34] G. Sarton: Introduction; op cit; I; 558.
[35] F.B. Artz: *The Mind, op cit;* .p. 151.
[36] F.B. Artz: *The Mind,* p. 151.
[37] F.B. Artz: *The Mind,* p. 151.
[38] See George Makdisi: On the origin and development of the college in Islam and the West, in *Islam and the Medieval West*, ed. Khalil I. Semaan, State University of New York Press/Albany. 1980. Pp: 26-49.
[39] R. Hillenbrand: Madrasa; Dictionary of Middle Ages; op cit; vol 8; p. 11.

teaching staff.[40] A chain of madrasas were built during the later eleventh century in the major cities of the Seljuk empire by the celebrated Nizam al-Mulk (assassinated in 1092) who was the vizier of two Seljuk rulers, Alp-Arslan and Malik Shah. In his honour, the madrasas were named Nizamiyas.[41] For Abu Shamah, `the schools founded by Nizam al-Mulk are very famous all over the world. No single village lacks one of these schools...'[42]. The largest and most splendid of such was the Nizamiyah in Baghdad, founded in 1065. From the descriptions it seems that the Nizamiyah stood between the Bab al-Azaj and the Tigris bank, not very far from the Basaliyah gate of the town wall.[43] The Nizamiyah had celebrated lecturers that included the great theologian Al-Ghazali and Baha Eddin the celebrated historian of Salah Eddin al-Ayyubi[44]. Nearby the Nizamiyah was another college called the Bahaiyah next to which stood the hospital called the Tutushi, named after Tutush, one of the Seljuk rulers who fought the crusades (died in 1114).[45] A century after its founding, the Nizamiyah was still standing and was visited by Ibn Jubayr in 1185 who described it in `glowing' terms.[46] The traveller Ibn Jubayr attended prayers in the Nizamiyah on the first Friday after his arrival in Baghdad in the year 1185 and he describes it as the most splendid of all thirty colleges which then adorned the city of East Baghdad.[47] Ibn Jubayr reports that the endowments derived from the domains and rents belonging to the college amply sufficed both to pay the stipends of professors and to keep the building in good order besides supplying an extra fund for the sustenance of poor scholars.[48] Nizam al-Mulk himself visited the madrasas to interrogate the pupils and took it upon himself to guide the most intelligent in their choice of a career.[49] Those whom he considered would make good teachers were immediately installed as such; he opened a new school, complete with library, especially for them.[50] He was primarily concerned, however, with teachers of the religious scriptures, for religion was the dominant idea of the Seljuk minister, the object of his respect and veneration.[51] Thus, according to Wiet et al:

> *`it was the colleges, the madrasas that formed the minds of those who later substantially contributed to the resistance to Crusader and Mongol alike. It may be justifiably claimed that, politically, the madrasa saved Islam.'*[52]

[40] R. Hillenbrand: Madrasa; p. 11.
[41] R. Hillenbrand: Madrasa; p. 11.
[42] A Shalaby: *History of Muslim Education.* Beirut: Dar al Kashaf, 1954. p. 58.
[43] G. Le Strange: *Baghdad during the Abbasid Caliphate*; Oxford at the Clarendon Press; 1900; p. 298.
[44] G. Le Strange: *Baghdad*; p. 298.
[45] G. Le Strange: *Baghdad*; p. 298.
[46] J. Pedersen; *The Arabic Book*, tr by Geoffrey French; Princeton University Press; Princeton, New Jersey (1984). p. 127.
[47] G. Le Strange: *Baghdad*; op cit; p. 298.
[48] G. Le Strange: *Baghdad*; p. 299.
[49] J. W. G. Wiet et al: *History of mankind*; Vol III; The Great Medieval Civilisations. Part Two: section two; Part three; Translated from the French; UNESCO; 1975; p. 458.
[50] J. W. G. Wiet et al: *History of mankind*; Vol III:; p. 458.
[51] J. W. G. Wiet et al: *History of mankind*; Vol III: p. 458.
[52] J. W. G. Wiet et al; p.457:

The Mustansiriyah College, Baghdad[53]

In 1234 the Mustansiriyah college was constructed in Baghdad by the penultimate Abbassid Caliph, al-Mustansir. His son, al-Muatassim, was later to be put to death by Hulagu. Located immediately south of the Gharabah gate, on the eastern side of the Tigris River in a large walled-in compound, known as the Harim or Sanctuary,[54] the college, as described by many sources,[55] was built as a large two storied structure. It was oblong in shape with a great open court in the centre. Around the courtyard there were rooms for teachers and students, opening out to arched cloisters.[56] In close proximity, the Great Mosque of the Palace (Jami al-Kasr) was also restored by Mustansir who also restored the four platforms (Dikkah) on the Western side of the pulpit.[57] There, the students sat and held their disputations after the Friday public prayers. The remains of this mosque still exist to the present.[58] Lodging and food were provided to those who needed them and it was said that a monthly payment of a gold dinar was given to the poor students.[59] The students received medical care and financial aid in addition to free tuition, and daily rations of bread and meat were provided by means of a large kitchen.[60] There were store rooms, bathing facilities (hammam) and attached to the college was a hospital with a dispensary and rooms for teaching medicine.[61] One of the curiosities of the institution was a famous clock with twelve doors opening to announce the hours.[62] The students were taught by a head professor and his assistants, the curriculum including not only the traditional linguistic, legal and religious subjects but also arithmetic and the division of inheritance, land surveying, history, poetry, hygiene, the care of animals and plants and other phases of natural history.[63] There was also a course in medicine with a physician in charge.[64] There were smaller classes which consisted of ten students (like modern tutorials/seminars) and a librarian with an assistant and attendants.[65] According to Ibn al-Furat, the library (*Dar al-Kutub*) had

[53] http://www.iraqwho.com/Tourism_Center_Historical.asp
[54] A. Whipple; The Role; op cit; pp.76.
[55] I.e Yaqut: *Irshad al-Arib ila Ma'arifat al-Adib*, or *Muja'am al-Udaba* (Dictionary of learned men,), edt. D.S. Margoliouth (Luzac, 1907 ff), Vol.V, p. 231. Vol VI. p. 343.
A.Shalaby: *History of Muslim Education.* Beirut: Dar al Kashaf, 1954.
Ma'ruf, Naji, *al-Madrassah al-Mustansiryah*, Nadi al-Muthanna, Baghdad, 1935.
[56]Bayard Dodge: *Muslim Education in Medieval Times*; The Middle East Institute, Washington D.C, 1962; p. 23;
[57] Yaqut: *Irshad al-Arib* ed. D.S. Margoliouth; op cit; Vol VI. p. 343.
[58] Yaqut: *Irshad al-Arib* ed. D.S. Margoliouth p. 343.
[59] A. Whipple; The Role; op cit; pp.76.
[60] Bayard Dodge: *Muslim Education.*, pp 23.
[61] Bayard Dodge: *Muslim Education*, p 23.
[62] Bayard Dodge: *Muslim Education.*, pp 23.
[63] Bayard Dodge: *Muslim Education.*, pp 23.
[64] A. Whipple; The Role; op cit; pp.76.
[65] Bayard Dodge: *Muslim Education.*, pp 23.

rare books dealing with various sciences which were easily available to students either for consultation or copying. Pens and paper were supplied and so were lamps and due provision of oil.[66]

The Caliph al-Mustansir himself took great interest and passion in the work of `his' institution to the extent that he inspected it nearly every day. He also had a belvedere (Manzarah) overlooking the college, with a window opening upon one of the college halls from where he watched the building and heard the lectures of the professors and the disputations of the students.[67] Al-Mustansir insisted upon high criteria for admission to the college. Not more than 308 students were admitted and only ten were accepted as medical students.[68] Elgood says,

> *"It is, however, quite evident that the conception of al-Mustansir was an enormous advance not only in the teaching of medicine, but also in education in general".*[69]

According to Hitti, the Mustansiriyah is almost the only structure surviving from the Abbasid days and today it is used as a customs warehouse.[70]

Al-Hasan of Baghdad (fl.825) (known for his book on the measurement of the sphere) was one of the earliest scholars to build an astronomical observatory in his home.[71] His contemporaries, the Banu Musa brothers, made their observations from their house located on the Tigris River; studying the Ursa Major (or the Great Bear), measuring maximum and minimum altitudes of the sun and making observations of lunar eclipses.[72] In 829 the first observatory sponsored and financed by a ruler – Al-Mamun – was completed. It was located at Shammasiyah (Baghdad) and was associated with the scientific academy of *Bayt al-Hikma* (House of Wisdom) which was also set up by Al-Mamun. This observatory was, hence, a major landmark in the history of science and astronomy whereby an institution of scientific observation was established by the state. From this observatory, in the year 830, the position of the solar apogee was determined as $82^0 39'$.[73] Astronomers at al-Mamun's court also found the inclination of the ecliptic as equal to 23° 33' and tables of the planetary motions were constructed.[74] He ordered two degree-measurements to be made to determine the size of the earth, one of them near Tadmor (a degree = 56 and 2/3 Arabian miles, hence circumference of the earth = 20 400 Arabian miles).[75] Expressed in other equivalents, the earth circumference was found through the measurement of the length of the terrestrial degree equal to 111.812 km which brought the circumference to 40253.4 km (the accurate figure being 40068.0 km through the equator and 40000.6 km through the poles).[76] A large map of the world was drawn for Al-Mamun.[77]

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[66] M. Nakosteen. History of Islamic origins; op cit; pp. 50-1. Bayard Dodge: *Muslim Education*, op cit; p 23.
[67] M. Nakosteen, History, op cit, pp. 50-1. B. Dodge: Muslim education, op cit, pp 23-4.
[68] A. Whipple; The Role; op cit; pp.76.
[69] C. Elgood: *A Medical history of Persia*; Cambridge University Press; 1951. p.*232.*
[70] P.K.Hitti: *History of the Arabs;* MacMillan, London, 1970; p. 411.
[71] World Who's Who, in B. Hetherington: *A Chronicle of Pre-Telescopic Astronomy;* John Wiley and Sons; Chichester; 1996. p.92.
[72] In L.A. Sedillot: *Histoire generale des Arabes*, 2 Vols., Paris, 1877. vol 2, p. 11.
[73] W. Hartner: The Role of Observations in ancient and medieval astronomy; in *The Journal of History of Astronomy*; Vol 8; 1977; pp 1-11; at p. 8.
[74] G. Sarton: Introduction; op cit; I; p. 558.
[75] Gustav Weil: *Geschichte der Chalifen*; vol. 2, pp. 198-294.
J. T. Reinaud: *Geographie d'Aboulfeda* (vol. 1, 269 sq., 1848).
J. L. E. Dreyer: *History of the Planetary System from Thales to Kepler;* Cambridge; 1906; p. 245, 249, 278.
R. A. Nicholson: *Literary History of the Arabs*; 1907; p. 359.
G. Sarton: Introduction; op cit; I; op cit; p. 558.
[76] M.A. Kettani: Science and technology in Islam: the underlying value system, in *The Touch of Midas; Science, values, and environment in Islam and the West* edited by Z. Sardar; . Manchester University Press (1984). pp 66-90; p. 75.

One of the astronomers was Habash al-Hasib (d.864) who had made observations of solar and lunar eclipses and of planetary positions at Baghdad, Samarra and Damascus. He compiled astronomical tables and gave the first instance of a determination of time by an altitude besides introducing the notion of shadow (umbra versa) corresponding to our tangent. He also compiled a table of tangents which were probably the earliest of its kind.[78]

Al-Farghani, of Farghanah in Transoxiana, was one of Caliph Al-Mamun's astronomers. He wrote on the astrolabe, explaining the mathematical theory behind the instrument and corrected faulty geometrical constructions of the central disc.[79] His most famous book *Kitab fi Harakat Al-Samawiyah wa Jaamai Ilm al-Nujum* contains thirty chapters including a description of the inhabited part of the earth, its size, the distances of the heavenly bodies from the earth and their sizes. Al-Farghani corrected Ptolemy on several points.[80] His *Compendium* of astronomy was translated into Latin by both Gerard of Cremona and Johanes Hispalensis.

Another scholarly institution of Baghdad was the hospital. To try and reproduce details about all Baghdad hospitals during the city's glory days deserves a work of its own. The focus here is on some such institutions and their dominant features. In 914 CE the minister Abul Hassan founded a hospital in Baghdad in the quarter called *al-Harbia,* near the tomb of Ahmad ibn-Hanbal. He assumed all the expenses in its construction. He appointed his physician, Abu Osman Said Ibn-Yaqub al-Dimashki, who at the same time was the director of other hospitals in Baghdad, Mecca and Medina, to be director of the hospital.[81]

In 918 Caliph al-Muqtadir Billah ordered Sinnan Ibn-Sabat to build a new hospital. Sinan chose the site of the hospital in the area of the Syrian Gate, in the quarter at the extreme western section of Baghdad and was named the al-Muqtadiri Hospital.[82] From his private funds the caliph gave the monthly sum of 200 dinars toward the support of the hospital. This must have been one of the great hospitals in Baghdad, judging from the list of distinguished physicians that were on the staff of that institution. Issa Bey mentions especially two of the famous ones. The first was Jibra'il ibn-Bakhtishu, the court physician of the caliph. He had come from Jundi-Shapur and had spent some thirty years of his life in Baghdad. At the hospital he spent two days and two nights each week caring for and studying the patients. [83] The other physician was Ar-Razi about whom Issa Bey says this,

> *"Ar-Razi was unquestionably the greatest savant of his century, for he knew all the sciences, especially that of medicine. He was a man of the first rank, generous, full of sympathy for the poor and their sick, whom he cared for grately, and to whom he gave generously in food and alms."*[84]

The Scholars of Baghdad

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[77] G. Sarton: Introduction; op cit; vol I; p. 558.
[78] G. Sarton: *Introduction*; vol I, p.545.
[79] C. Ronan: The Arabian Science, in *The Cambridge Illustrated History of the World's Science*; Newness Books, Cambridge University Press; 1983; pp 201-44; at p. 207.
[80] R. Morelon: Eastern Arabic astronomy, in *Encyclopaedia of the History of Arabic Science*; edited by R. Rashed; Routledge; London; 1996; vol 1; pp. 20-57; at p. 24.
[81] A Issa Bey: *Histoire des hopitaux en Islam*; Beyrut; Dar ar ra'id al'arabi; 1981. p. 175.
[82] A. Whipple: The Role; op cit; p. 84.
[83] Issa Bey: Histoire; op cit; p. 177.
[84] Issa Bey: p. 178.

It is impossible to list and deal with all the scholars who lived and worked in Baghdad in the centuries of Islamic scientific glory (7th-13th centuries CE). Thus, here we concentrate on some who represented diverse disciplines.

One of the earliest scholars of Islam was Al-Fazari Muhammad Ibn Ibrahim who was an astronomer that flourished around the second half of the 8th century CE in Baghdad. He is first heard of in connection with the building of Baghdad in the latter half of 762, when he was associated with the other early scholars of Islam: Nawbakht, Masha'Allah and Umar ibn al Farrukhan al-Tabari who were themselves involved in the same task.[85] The first work that al-Fazari completed was the *Zij al-Sindhind al-kabir* which bore much Indian influence. Probably around 790, al-Fazari completed the *Zij ala sinin al-Arab* (Astronomical tables according to the years of the Arabs) in which he apparently tabulated the mean motions of the planets for one to sixty saura days, 10 to 60 saura days (60 saura days being equal to one sideral year), one to sixty sideral years and an unknown number of sixty years periods; he obviously added tables for converting kalpa aharganas into Hijra dates.[86] Of this latter set of tables we still have copies of the Mujarrad tables for finding the day of the week with which each Muslim year and month begin.[87] Al-Fazari also gives a list of the countries of the world and their dimensions from this zij. Al-Fazari's other works, understandably, are little known.[88] They include, however, a few lines of his poem *Qasida fi ilm al-Nujum* (Poem on the science of the stars) which have been preserved by the 13th century traveller-geographer Yaqut al-Hamawi and al-Safadi. Bibliographers, more importantly, have recorded books on the use of the plane astrolabe with Al-Fazari said to be the first in Islamic civilisation to have constructed one.[89]

The three brothers of Banu Musa, the sons of Musa ibn Shakir, flourished in mid 9th century Baghdad and were involved in engineering, astronomy and mathematics.[90] Their father was a robber in his youth but later worked for Caliph al-Mamun who sponsored his children by enrolling them in the House of Wisdom (the first major scientific institution of the Abbasids).[91] The three brothers were particularly interested in geometry and led astronomical observations. It is difficult to distinguish the part played by each brother; the most important seems to have been Abu Jafar Muhammad ibn Musa (died in 872/3) who was particularly skilled in geometry and astronomy and eventually became a celebrated local leader (kaid).[92] Ahmed was especially interested in mechanics and Hasan in geometry; the latter, according to Hassan De Vaux, had extraordinary qualities with an incredible capacity for retention and a superior intellect.[93] Many mathematical, mechanical and astronomical writings are ascribed to them.[94] The most important are considered to be The Book on the Balance (*farastun* or *qarastun*) & and the Book on the measurement of the sphere, the trisection of the angle and the determination of two mean proportionals between two given quantities (translated into Latin by Gherardo da Cremona under the title *Liber trium fratrum de*

[85] D. Pingree: Al-Fazari; in *Dictionary of Scientific Biography;* Editor Charles C. Gillispie; Charles Scribner's Sons, New York, 1973 fwd. Vol IV; pp. 555-6; p. 555.
[86] D. Pingree: Al-Fazari; p. 556.
[87] D. Pingree: Al-Fazari;; p. 556.
[88] For these, see: D. Pingree: The Fragments of the works of al-Fazari, in *Journal of the Near eastern Studies;* vol 29; 1970; pp. 103-23.
[89] D. Pingree: Al-Fazari; op cit; ;p. 556.
[90] G. Sarton: Introduction; vol 1; op cit; p. 560.
[91] M. Steinschneider: Die Sohne des Musa ben Schakir; *Bibliotheca Mathematica,* pp. 44-48, pp.71-75, 1887.
[92] Barron carra de vaux; vol 2; p. 140.
[93] Barron carra de vaux; vol 2; p. 140-1.
[94] H. Suter: *Die Mathematiker und Astronomen der Araber* (20-21, 1900); Nachtrage (160, 1902).

geometria).[95] Of the many works attributed to the Banu Musa was the Book on Mechanical Devices (*Kitab al hiyal*) written in 850 CE which can be found in The Vatican Library, Gotha and in Berlin.[96] *Kitab al hiyal* includes the description of about a hundred devices, including trick vessels of various sorts, fountain lamps and other apparatuses and gears such as a gas mask for use in polluted wells. The mastery of aerostatic and hydrostatic pressures and the use of automatic control and switching systems, according to Hill, make the work a unique achievement to be surpassed only in modern times[97] (a great accomplishment considering that it dates from the 9th century). From the treatise, Wiedemann has focused his attention on an apparatus used to gather pearls from the depth of the sea, which is formed by two cylinders lowered to the deep sea and which close upon each other when raised above.[98] This is very similar to our modern techniques used in the deep oceans. The devices in the Banu Musa treatise also considerably influenced many aspects and operations of modern technology.

Ibn Sarayun, known in Latin as Ibn Serapion (fl. beginning of 9th century) and not to be mistaken with the physician Yahia Ibn Sarafyun, was a geographer. He authored a book on geography containing a description of the various seas, islands, lakes, mountains and rivers of the world. His descriptions of the Euphrates and Tigris and of the Nile are very significant. His account of the canals of Baghdad is our main basis of the reconstruction of the medieval plan of that city. This reconstruction was done by Guy Le Strange (1900) who also used many other authorities, chiefly Ya'qubi.[99] Ibn Serapion's account of the network of the water system and Ya'qubi's description of the highroads coming from Baghdad complete one another very well.[100] The Arabic text was edited from a manuscript in the British Museum with translation and notes.[101]

Abu-l-Faraj Muhammad Ibn Ishaq Ibn Abi Ya'qub al-Nadim al-Warraq al- Baghdadi; the two last names mean, the copyist or stationer from Baghdad (d. in 995). Ibn al-Nadim was a historian and bibliographer. He completed in 987-88 his "Index of the Sciences" or *Fihrist al-ulum.* It is, to use his own words, "*the index of the books of all peoples of the Arabs and non-Arabs whereof somewhat exists in the language and script of the Arabs, on all branches of knowledge*" together with biographies and appreciations of the authors.[102] It is divided into ten discourses (maqalat), which are subdivided into sections (funun). The subject of the discourses can be roughly defined as follows:

1. Languages, writings, Scriptures, Qur'an
2. Grammar and philology

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[95] Verba filiorum Moysi, filii Sekir, id est Maumeti, Hameti et Hasen. Der Liber trium fratrum de geometria. Nach der Lesart des Codex Basiliensis F. II, 33 mit Einleitung und Commentar herausgegeben von Maximilian Curtze; in *Nova Acta acad. germ. naturae curiosorum,* vol. 49, 105-167, Halle, 1885. in G. Sarton: Introduction; vol 1; op cit; p. 560.

[96] Eilhard Wiedemann: Bemerkungen zum Werk fi-l-hijal; Beitrage VI, 6, 55, 1906, deals with pneumatic tricks, hiyal; Beitrage X, 341-8, 1906, extracts from same treatise; Beitrage XII, 200-205, 1907; idem, lamps.
E. Wiedemann und F. Hauser: Uber Trinkgefasse und Tafelaufsatze nach al-Jazari und den Benu Musa; in *Der Islam,* vol. 8, 55-93, 268-291, 1918; *Isis*, III, 478.
Friedrich Hauser: Uber das Kitab al-hijal, das Werk uber die sinnreichen Anordnungen, der Benu Musa (*Abhdl. Zur Gesch. Der Naturwis. Und der Medizin, heft* 1. 188 p. 22pl. Erlangen, 1922; *ISIS*; V; p. 208.

[97] D.R. Hill: -`Arabic Fine technology and its influence on European Mechanical Engineering,' in *The Arab Influence in Medieval Europe*, edition D.A. Agius and R. Hitchcock, Ithaca Press, 1994. pp 25-43. p. 27.

[98] E. Wiedemann:Beitrage zur Geschichte der Natur-wissenschaften. X. *Zur Technik bei den Arabern*. Erlangen, 1906., p. 343.

[99] Guy Le Strange: *Baghdad during the Abbasid Caliphate*; Oxford, 1900; reprinted, 1924.

[100] G. Le Strange: *Description of Mesopotamia and Baghdad, written about the year 900 by Ibn Serapion*.

[101] Journal of Royal Asiatic Society; 1-76; 255-315; 1895.

[102] G. Sarton: Introduction; vol 1; op cit; p. 663.

3. History, belle Lettres, biography, genealogy
4. Poetry
5. Scholastic theology
6. Jurisprudence and tradition
7. Philosophy and "ancient sciences" in three sections (a. materialist philosophy and logic; b. mathematics, music, astronomy, mechanics, engineering; c. medicine)
8. Magic and fables
9. Sects and creeds
10. Chemistry.[103]

Because of the destruction of Baghdad in 1258 by the Mongols, not one in a thousand of the books quoted in the Fihrist remains. There is no complete translation in any language and no translation at all in English as noted by Sarton in 1927.[104] The scholar who would undertake a complete and annotated translation would be sure to win the gratitude of the whole Republic of Letters as Sarton adds.[105] This task was performed by Bayard Dodge in 1970.[106]

Abu'l Wafa al-Buznaji (940-998); as his name indicates, he was born in Buznaj (Quhistan) but he flourished in Baghdad where he died. He was an astronomer and mathematician.[107] Abu al-Wafa was the greatest mathematician of the tenth century, according to Kettani.[108] He wrote commentaries on Euclid, Diophantos and al-Khwarizmi (all lost); astronomical tables (*zij al-wadih*) of which we possibly have a later adaptation;[109] a practical arithmetic; "the complete book" (*Kitab al-kamil*) and a book of applied geometry (*Kitab al handasa)*.[110] He wrote on solutions of geometrical problems with one opening of the compass; constructions of a square equivalent to other squares; regular polyhedra; approximate construction of regular heptagon (taking for its side half the side of the equilateral triangle inscribed in the same circle); constructions of parabola by points; geometrical solution of $x^4 = a$ and $x^4 + ax^3 = b$.[111]

Abu-l-Wafa' contributed considerably to the development of trigonometry.[112] He was probably the first to show the generality of the sine theorem relative to spherical triangles; he gave a new method of constructing sine tables, the value of sin 30° being correct to the eighth decimal place.[113] He made a special study of the tangent; calculated a table of tangents; introduced the secant and cosecant; knew those

[103] G. Sarton: Introduction; vol 1; op cit; p. 663.
[104] G. Sarton: Introduction; vol 1; op cit; p. 663.
[105] G. Sarton: Introduction; vol 1; op cit; p. 663.
[106] B. Dodge: *The Fihrist of al-Nadim.* A tenth century survey of Muslim culture, Columbia Records of Civilisation: Sources and Studies, No LXXXIII, 2 Vols, New York and London; 1970.
See also M. Nakosteen, History... op cit, for extracts from *al-Fihrist*, pp 29-33.
[107] See, for instance, L. Am. Sedillot Decouverte de la variation par Aboul Wefa; *Journa1 Asiatique;* vol 16; 1835; pp. 420-38.
[108] M.A. Kettani: Science and technology in Islam: the underlying value system, in *The Touch of Midas; Science, values, and environment in Islam and the West* edited by Z. Sardar; . Manchester University Press (1984). pp 66-90. p 71.
[109] Carra de Vaux: L'almageste d'Abu-l-Wefa; in *Journal Asiatique,* vol 19, pp. 408-471, 1892.
[110] F. Woepcke: Analyse et extrait d'un recueil de constructions geometriques par AboulWafa; in *Journal Asiatique*,vol.5, 218-256, 309-359, 1855.
[111] G. Sarton: Introduction; op cit; vol 1; p. 667.
[112] A. Von Braunmuhl: *Vorlesungen uber Geschichte der Trigonometrie*; vol. 1, 1900; pp. 54-61.
[113] G. Sarton: Introduction; op cit; vol 1; p. 667.

simple relations between the six trigonometric lines which are now often used to define them.[114] Concerning some of the influence of Abu Al-Wafa on subsequent Western science, a return must be made to the work by Sedillot, unfortunately extant only in French and dating from the 19th century.[115] Baron Carra de Vaux holds that the secant can be found in Abu al-Wafa, something he calls `*the diameter of the shadow*' and whose introduction is credited to Copernicus.[116]

Al Karaji (al-Karkhi), Abu Bakr ibn Muhammad ibn al-Husayn (al-Hasan) (fl. ca. 1000) was a mathematician active in Baghdad. Virtually nothing is known of his origins, teachers or education, except what he himself wrote:

> *"When I arrived in Iraq and saw how both small and great people loved and venerated science, I began to write works on arithmetic and geometry, one quickly after another, until I went back to the mountain countries [cities located between Azerbaijan, Iraq, Kurdistan, Persia, and the lands bordering on the Caspian Sea] where I came to stay."*[117]

Al-Karkhi relates to Karkh, a suburb of Baghdad, where the author flourished under the vizierate of Abu Ghalib Muhammad ibn Khalaf Fakhr al-Mulk.[118] It is confirmed by others that al-Karkhi wrote all his mathematical and almost all his scientific works in Baghdad. Al-Karkhi's contribution is most important in algebra and arithmetic. His three extant treatises on mathematics have often been referred to by subsequent mathematicians and bibliographers: the algebra works of *al-Fakhri* and *al-Badi*, and *al-Kafi* on arithmetic.[119] His book on arithmetic (The sufficient on calculation, *al-kafi fi'l-hisab*) has been translated into German by Ad. Hochheim.[120] There are two other extant texts, a short elementary treatise on algebra - *'al-hisab al-jabr* (Oxford, Bodleian, 1, 986, 3) - and a fragment on the arithmetic triangle, cited by al-Karaji's thirteenth-century successor, the mathematician al-Samawal.[121] In addition to his books on mathematics, al-Karkhi wrote an engineering work on "extraction of underground waters" (*Intbat al-miyah al-khafiyyat*). Other works attributed to him seem to be lost.[122]

In order to understand al-Karkhi's importance and the meaning of his contribution, it is necessary to review briefly the conception of algebra since it had been established as an autonomous discipline by al-Khwarizmi at the beginning of the ninth century. In his Algebra, al-Khwarizmi conceives of algebra mainly as a theory of equations of the first and second degrees.[123] He examines associated binomials and trinomials and then discusses the solution of arithmetic and geometric problems which, according to his view, can all be reduced to one of six basic equations. The elaboration of the tools of abstract algebraic calculus made it

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[114] G. Sarton: Introduction; op cit; vol 1; p. 667.
[115] L. Am. Sedillot Sur les emprunts que nous avons faits a la science arabe, et en particulier a la determination de la troisieme inegalite lunaire ou variation; *Boncompagni's Bullettino*, vol. 8, 63-78, Rome, 1875.
[116] Baron Carra de Vaux: Astronomy and mathematics, in The Legacy of Islam, op cit, pp 376-97. note 1, p 390.
[117] R. Rashed: Al-Karkhi; *Dictionary of the Middle Ages;* vol 7; J.R. Strayer Editor in Chief; Charles Scribner's Sons; New York; 1986; pp. 211-2; at p. 211.
[118] G. Sarton: introduction; vol 1; op cit; p.718.
[119] H. Suter: *Die Mathematiker und Astronomen der Araber*; 1900; p. 84.
[120] *Al-Kafi fi'l hisab;* ed and tr by A. Hochheim; published in three parts, Halle, 1878- 1880.
[121] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 211.
[122] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 211.
[123] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 2112

possible for al-Karkhi to conceive a new mathematical project: the arithmetisation of algebra.[124] In the words of one commentator, he enabled the algebraist "*to work with unknowns with all the arithmetic instruments, just as the arithmetician works with the knowns*". This involves a transposition and extension of elementary arithmetic operations - the algorithms as well as Euclidean division or the extraction of roots - to algebraic terms and expressions and particularly to polynomials. Thanks to the arithmetisation of algebra, al-Karkhi arrived at the construction of the algebra of polynomials and also gained a better understanding of the algebraic structure of real numbers.[125] One of the consequences of this new project was the algebraic interpretation of Book X of Euclid's Elements. Previously considered a geometry book by most mathematicians, it was reinterpreted by al-Karkhi as a book on algebra.[126] According to this new view, its concepts refer not only to geometric magnitudes but also to magnitudes in general, numerical as well as geometric.[127]

Al-Karkhi's work marked forever arithmetic algebra. He stands at the beginning of a whole tradition which brings together the most important algebraist-arithmeticians from the twelfth until the fifteenth century such as al-Samaw'al, al-Farisi, al-Kashi and also the most notable Western mathematicians such as Leonardo of Pisa (Leonardo Fibonacci).[128]

It was not only to algebra that al-Karkhi contributed. Al-Karkhi defines points, lines, surfaces, solids and angles. He also gives rules for measuring both plane and solid figures, often using arches as examples. He also gives methods of weighing different substances. [129]

Al Ghazali, known in Europe as Algazel, was one of the most illustrious Muslim scholars. He was born in 1058 near the city of Tus and died in 1111. He was the son of a poor, illiterate man and as a youth he studied law, theology and philosophy before becoming a teacher of law. He became famous throughout Islam for his eloquence and learning.[130] Al-Ghazali spent much of his life teaching and writing, staying in Jerusalem, Damascus and Baghdad where he flourished and where he taught at the Nizamiyyah College. Al-Ghazali wrote:

> *`It has always been my practice, as a youth and as a man, to thirst for knowledge of the true nature of things…. So that I can be freed from the bond of imitation.'*[131]

For al-Ghazali, personal knowledge should spur on to good deeds which please God and lead to salvation. He was also a very influential scholar. His *Maqasid al-Falasifah* (The Aims of the philosophers), translated into Latin in the 12th century, became very influential amongst scholastic Christian theologians.[132]

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[124] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 212.
[125] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 212.
[126] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 212.
[127] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 212.
[128] R. Rashed: Al-Karkhi; Dictionary of the Middle Ages; p. 212.
[129] J J O'Connor and E F Robertson: Arabic Mathematics, a Forgotten brilliance; at http://www-history.mcs.st-andrews.ac.uk/history/Mathematicians/Al-Karaji.html
[130] F.B. Artz: The Mind; op cit; 146.
[131] In *Al-Munquidh min al-dalal*,p.13; referred to by A. Diyab in Al-Ghazali; op cit.
[132] M.Alonso quoted by A. Diyab: Al-Ghazali; op cit.

In his thirties, al-Ghazali became the principal teacher at Madrasah Nizamiyyah of Baghdad, the most renowned institution of learning in eastern Islam (Cordova was its Western equivalent). His ideas on education dominated Islamic educational thought for centuries after his death. He studied the education of the child and the role of the master. According to Al-Ghazali,

> *`knowledge exists potentially in the human soul like the seed in the soil; by learning the potential becomes actual.'*[133]

The child, al-Ghazali also wrote,

> *`is a trust (placed by God) in the hands of his parents, and his innocent heart is a precious element capable of taking impressions.'*[134]

One of the elements al-Ghazali insisted upon is that a child should be taught the words of the creed in his earliest days and be taught the meaning gradually as he grew older; corresponding to the three stages of memorising, understanding and conviction.[135] The way the child relates to the world at large occupies a large concern in al-Ghazali's mind.[136] In concert with Ibn al-Hajj,[137] he stresses that a child must not boast about his father's wealth and must be polite and attentive to all. He should be taught not to love money for love of it is a deadly poison. The perspective of al-Ghazali is centred upon personal effort in the search for truth; and this presupposes, he insists, a received education and the direction of a master.[138] Education (tarbiya), Al-Ghazali states in *Ayyuha l-walad* is like

> *`the labour of the farmer, who uproots the weeds, trims wheat so as it grows better and gives a better harvest.'*[139]

The religion al-Ghazali preached was a vivid one, full of the love of God on the one hand and of the horrors of sin and hell on the other.[140] Al-Ghazali's views on religion and faith were written largely in Jerusalem after he secluded himself in the Aqsa Mosque and details on such views are found in the article on the said city. But briefly here, it should be pointed out that his most influential books were the Destruction of Philosophy and the Revival of the Science of Religion (*Ihya Ulum Addin)*. In these he argues that sensation is illusory and that reason, based on sensation, is deceptive and leads only to doubt.[141] Logic and science cannot prove God the only great reality. Only a life of prayer and good works can bring man to know God while at the same time, without a belief in God and a desire to do his will, there can be no moral order in society. [142]

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[133] Al-Ghazali in A.Tibawi: *Islamic Education*, Luzac and Company Ltd, London, 1972. p. 40.
[134] In A. Tibawi: Islamic, op cit, p. 40.
[135] From A.S. Tritton: *Materials on Muslim Education in the Middle Ages*; Luzac and Company, London, 1957. p. 16.
[136] Al-Ghazali: *Ihya ul'Ulum*, part I, book 2, section 2.
[137] Ibn-Al-Hajj: Madkhal, in A. Tritton, Materials, op cit, p. 21.
[138] C. Bouamrane-L. Gardet: *Panorama de la pensee Islamique*; Sindbad; 1-3 Rue Feutrier; Paris 18 (1984) , principally chapter 10, by Louis Gardet (Notion et principe de l'education en Islam: pp 205-226), p.207.
[139] *Ayyuha l'walad*: UNESCO, Beyrut 1951 (Arabic text, Fr trsl, p. 36-7.
[140] F.B. Artz: *The mind, op cit; p.* 146.
[141] Artz 146.
[142] Artz 146-7.

Al Baghdadi is sometimes known as Ibn Tahir, whose full name is Abu MansurAbr al-Qahir ibn Tahir ibn Muhammad ibn Abdallah al-Tamini al-Shaffi al-Baghdadi (980-1037). We can deduce from al-Baghdadi's last three names that he was descended from the Bani Tamim tribe which was one of the Sharif tribes of ancient Arabia and that he belonged to the Shafi'i school of religious law or *madhab*.[143] In Asfirayin, al-Baghdadi taught for many years in the mosque on several subjects whilst never taking any payment. Although he was one of the greatest theologians of his age and many works are attributed to him, none has been studied scientifically. Here we look at two of his mathematical works.[144]

The first book is a small treatise on mensuration: *Kitab fi'l-misaha,* which gives the units of length, area and volume and ordinary mensuration rules.[145] The second treatise, *al-Takmila fi'l-Hisab*, is a work in which al-Baghdadi notes in the introduction that earlier works are either too brief to be of great use or are concerned with only one chapter (system) of arithmetic. In this work, therefore, he seeks to explain all kinds of arithmetic in use.[146]

Several important results in number theory appear in the *al-Takmila* as do comments which allow us to obtain information on certain texts of al-Khwarizmi which are now lost.[147] In *al-Takmila,* Al-Baghdadi gives an interesting discussion of abundant numbers, deficient numbers, perfect numbers and equivalent numbers.[148]
The Greek mathematician Nicomachus had made claims about perfect numbers around 100 CE which were accepted, seemingly without question, in Europe up to the 16th century. However, al-Baghdadi knew that certain claims made by Nicomachus
were false.[149]

The last of Al-Baghdadi's seven systems, business arithmetic, begins with business problems and ends with two chapters on curiosities that would find a place in any modern book on recreational problems or the modulo principle. One example is provided here: your partner thinks of a number not greater than 105. He casts out fives* and is left with a; he casts out sevens and he is left with b; he casts out threes and is left with c; Calculate 21a+ 15b+ 70c; cast out 105's, and the residue is the number.[150]

'Ali ibn 'Isa was a notable oculist (kahhal) of Baghdad whose life falls in the first half of the 11th century. His main work is *Tadkirat al-kahhalin* (Manual for Oculists or Note-book of the Oculists). It is the classical handbook of Muslim ophthalmology, translated once into Hebrew and twice into Latin, and was printed with the title of *Tractatus de oculis Jesu Halis* in Venice in 1497, 1499 and 1500.[151] It is the oldest Muslim work on ophthalmology that is complete and survives in the original state.[152] It would be of interest to the modern reader to quote Elgood on the three sections of the Tadkirat:

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[143] J J O'Connor and E F Robertson: Arabic mathematics; op cit.
[144] A. S. Saidan: Al-Baghdadi; in *Dictionary of Scientific Biography*; Vol 15; supplement; pp. 9-10; at p. 9.
[145] A. S. Saidan: Al-Baghdadi; p. 9.
[146] A. S. Saidan: Al-Baghdadi; p. 9.
[147] J J O'Connor and E F Robertson; Arabic Mathematics; op cit.
[148] J J O'Connor and E F Robertson
[149] J J O'Connor and E F Robertson
* [i.e. divide by five and take the remainder]
[150] A. S. Saidan: Al-Baghdadi; op cit; p. 10.
[151] F. R. Farag: Why Europe responded to the Muslims; in *Arabica,* vol XXV, pp. 292-308. at p. 300.
[152] F. R. Farag: Why Europe; p. 300.

> *`The first part is devoted to anatomy, the second to the external diseases of the eye, and the third part to internal diseases of the eye which are not visible upon inspection. This last section is perhaps the most interesting from a modern point of view, for it shows the very definite limitations of Greek and Arab ophthalmology. The ophthalmoscope and the power of seeing the retina have revolutionized ophthalmologic practice. When Ali speaks of internal diseases of the eye, he literally means diseases confined to the eye. The possibility of first diagnosing diabetes, kidney disease and cerebral tumour in the ophthalmic consulting room is not conceived of by the oculists of those times. The nearest approach that Ali makes to the modern conception of eye disease as a manifestation of general disease is when he urges the practitioner to realize that defective vision may be due to a disease of the stomach or brain just as much as to an incipient cataract. And with that he leaves the question.* [153]

Despite this limitation which was common to all oculists of Ibn Isa's day and which continued for many centuries later, his *Tadkirat*, passed over to Europe and became the foundation of Western practice.[154] It has been used on a large scale by later Muslim oculists until the present day, both for the practical and theoretical portions, and whole chapters have frequently been quoted. A German translation of the Manual for oculists' based on the Muslim manuscripts can be found.[155]

Ibn Jazla was born of Christian parents at Baghdad in 1074 and converted later to Islam.[156] His *dispositio corporum de constittutione hominis, Tacuin agritudinum,* as the name implies, was translated into Latin. There is a story which says that he was the physicist for Charlemagne and that he wrote his Tables or Tacuin at the instigation of the latter.[157] This story by Browne has no historical foundation unless Ibn Jazla was born two centuries earlier, for indeed, Charlemagne was emperor up to 814. The Tacuin was translated by the Jew Farragut and the Latin version was published in 1532. A German translation was published at Strasbourg in 1533 by Hans Schotte.[158] Ibn Jazla also wrote another work which was translated by Jambolinus and was known in Latin translation as the *Cibis et medicines simplicibus.*

Al-Badi al-Asturlabi (d. 1140) died at Baghdad; he was a Muslim astronomer and director of astronomical observations in the palace of the Seljuk Sultan of Iraq, Mughith al-Din Mahmud; he compiled astronomical tables known as the *Zij al-Mhamudi* (The Mahmudic tables); the greatest expert of those times in the knowledge and construction of astrolabes.[159] He made astronomical observations in Baghdad in 1130.[160] He also wrote a complement to the book of Al-Khujandi on the universal instrument which is kept in a few places such as at Birmingham (560) and Tehran (Nasiri A2).[161]

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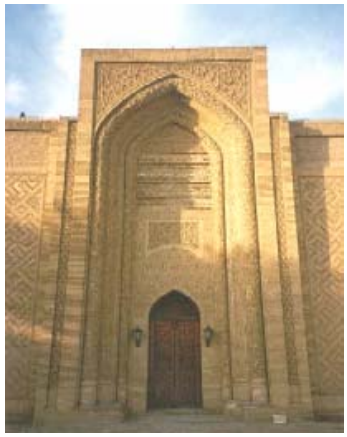
[153] C. Elgood: *A Medical History of Persia.* Cambridge University Press, 1951. p. 141.
[154] F. R. Farag: Why Europe; op cit; p. 301.
[155] In J. Hirschberg; J. Lippert and E. Mittwoch: *Die arabischen Augenarzte nach den Quellen bearbeitet*; vol 1; Leipzig; 1904.
[156] D. Campbell: *Arabian Medicine and its Influence on the Middle Ages*; Philo Press; Amsterdam; 1926. p. 82.
[157] E.G. Browne: *Arabian medicine*; 1921; pp. 60-1.
[158] E. Egass: Bulletin Historique Antique; University of Paris; Vol 573; quoted by J.Friend: *History of Physick*; two parts; London; 1750. p. 228.
[159] G. Sarton: Introduction; vol 2; p. 204.
[160] B. Rosenfeld and E. Ihsanoglu: *Mathematicians, astronomers and other scholars of Islamic civilisation*; Research Centre for Islamic History, art and Culture; Istanbul; 2003; p. 174.
[161] B. Rosenfeld and E. Ihsanoglu: p. 174.

The Fall of Baghdad



An Abbassid Castle[162]

Baghdad fell in February 1258. The massacre of its million or so inhabitants and the disastrous impact this had on the civilisation of Islam is recognised by older Western historical sources in particular whether they were sympathetic to Islam or not. Thus, Sir Thomas Arnold comments:

> *`Muslim civilisation has never recovered from the destructions which the Mongols inflicted upon it... Under the command of Hulagu, they appeared before the walls of Baghdad, and after a brief siege the last Caliph of the Abbasid house, Mustassim, had to surrender, and was put to death together with most of the members of his family; 800,000 of the inhabitants were brought out in batches from the city to be massacred, and the greater part of the city itself was destroyed by fire.*[163]

Glubb's outline of the capture of the city is as follows:

> *`On 10th February (1258), the Khalif Mustassim gave himself up. Hulagu ordered him to instruct the whole population to gather on the plain outside the walls, where they also were shot, slashed and hacked to death in heaps, regardless of age or sex. Not until 13th February did the Mongols enter the city. For a week, they had been waiting on the walls, not a man daring to leave his unit to plunder. Such iron discipline, unknown in the Middle Ages, goes far to account for their invincibility. The city was then systematically looted, destroyed and burnt. Eight hundred thousand persons are said to have been killed. The Khalif Mustasim was sewn up in a sack and trampled to death under the feet of Mongol horses.*[164]

Glubb concludes:

[162] http://zorak.monmouth.edu/~intlclub/events_files/image002.jpg
[163] Sir Thomas W. Arnold: Muslim Civilisation during the Abbasid Period; in *The Cambridge Medieval History*, Cambridge University Press, 1922 (1936 reprint):Vol IV: Edited by J. R. tanner, C. W. Previte; Z.N. Brooke, 1923. pp 274-298; at p.279.
[164] Sir John Glubb: *A Short History of the Arab Peoples*; Hodder and Stoughton, 1969; p. 207.

> *`For five hundred years, Baghdad had been a city of palaces, mosques, libraries and colleges. Its universities and hospitals were the most up to date in the world. Nothing now remained but heaps of rubble and a stench of decaying human flesh.'*[165]

Baghdad would never recover.

For a while now, Western history has been distorting the history of this fall on a number of grounds and suppressing fundamental facts of history. This is, of course, not the place to resolve this issue. But the briefest of outlines is necessary to highlight this issue for others either to follow up or to challenge this author if they wish to.

In the following section we look at two essential aspects of distortions regarding the fall of Baghdad and its impact on Islamic civilisation. First we examine the distortions relating to the decline of Islamic civilisation, with particular regard to Baghdad and then we investigate the true reasons for such decline.

The Fallacies Regarding the Fall of Baghdad and the Decline of Islamic Civilisation

The responsibility for the decline of Islamic civilisation in nearly all modern works dealing with Islam and its civilisation is blamed on the religion itself and its most `orthodox' followers, i.e. those who abide by the faith with commitment. Amongst those who apparently caused much harm to Islamic civilisation are the Caliph al-Mutawakil and the theologian al-Ashari after he converted to Sunni Islam. Multhauf, for instance, echoing most Western historians, says:

> *`Abbasid metaphysical toleration began to break down under the caliph Mutawakkil (847-61) who backed the Orthodox Sunnite sect against Muslim liberalism.'*[166]

The reason for this Caliph causing the end of Muslim civilisation is outlined for us by Durant:

> *`The whole structure of Islam, resting on the Koran, seemed ready to collapse. In this crisis three factors made Orthodoxy victorious: a conservative caliph, the rise of the Turkish guard, and the natural loyalty of the people to their inherited beliefs. A1-Mutawakkil, coming to the throne in 847, based his support upon the populace and the Turks; and the Turks, new converts to Mohammedanism, hostile to the Persians, and strangers to Greek thought, gave themselves with a whole heart to a policy of saving the faith by the sword.'*[167]

Al-Ashari, (born in Basra in 873-874 and died in 935-6) as Sarton tells us, was a Mu'tazilite at first, he was

> *`reconverted to Sunnite orthodoxy in 913 and henceforth his whole activity was devoted to the rationalization and the defence of his faith.'*

[165] Sir John Glubb: A Short History; op cit; p. 207.
[166] R.P. Multhauf: *The Origins of chemistry*; Gordon and Breach Science Publishers; London, 1993. p.123.
[167] W. Durant: The Age of Faith; op cit; p.252.

He may be called the founder of Muslim scholasticism and he re-established theological unity and `orthodoxy'.[168]

The `destructive' role of al-Ashari is reported to us by Wiet et al:

> *`His (Al-Ashari) ideas were seized on by the pious bigots, and it was this group that precipitated the decline of Islamic intellectual life. Its pietist rigour could lead nowhere but to the enslavement of thought; its ideas were imposed on the believer in the form of a catechism.'* [169]

For E.G. Browne, the destructiveness of al-Ashari's influence compares to that of Genghis Khan and Hulagu.[170]

Multhauf also acknowledges that:

> *`An Orthodox and anti intellectual reaction gained momentum in Baghdad during the lifetime of al-Farabi (b.ca 870; d. Damascus 950), and the great philosophers of Islam subsequently appeared elsewhere.'* [171]

It is also the malefic Mamluks who devastated the land of Islam. Hence for Ashtor:

> *`The Mamluks were foreigners ruling over millions of people who were excluded from the higher ranks of the feudal hierarchy. They had no interest in developing the economic forces of their countries. So their rule degenerated into reckless exploitation, which ruined once flourishing countries.'* [172]

Whilst Al-Mutawaqil, the Turks, al-Ashari and the Mamluks seemingly have destroyed Islamic civilisation, the Mongols, on the other hand, are reported as having hardly committed any harm and in fact as having done Islamic civilisation much good. Ashtor narrates that the Mongols only killed 100 000 people and,

> *`the blood letting that accompanied the Mongol conquest was followed by a sort of recovery. The administration of Irak by Ata Malik Djuwaini, who held his post for 24 years (1258-82), brought relief to the sorely afflicted country.'* [173]

In this "pax Mongolica" trade also allegedly thrived:

> *`On the other hand, the trade of Iraq with Persia and the countries of central Asia was considerably intensified after the Mongol conquests. Iraqi merchants began to regularly visit Khwarizm and to travel through Turkestan to China. Others took advantage of the Pax Mongolica to carry on trade with Kiptchak, the great Mongol kingdom north of the Caucasus.'* [174]

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[168] George Sarton: Introduction; vol I, op cit; p.625.
[169] G. Wiet; P. Wolff; and J. Naudu: History of Mankind: Vol III: *The Great Medieval Civilisations*; Trsltd from the French; first published 1975.; p.567.
[170] E.G. Browne: *Literary history of Persia*, vol 1,1908; p. 286.
[171] R.P. Multhauf: *The Origins of chemistry*; Gordon and Breach Science Publishers; London, 1993. p.120.
[172] E. Ashtor: *A Social and Economic History of the Near East in the Middle Ages*; Collins; London; 1976; p. 280.
[173] E. Ashtor: *A Social*. 251.
[174] E. Ashtor: *A Social; p.* 264.

Before addressing this nonsensical view related to the Mongols, first, the issue of al-Mutawakil and Al-Ashari is addressed. The list of scholars above has shown us that scholars and scholarship thrived around and after the time of both men. Thus, why they should be accused of having ended Islamic civilisation is one of the mysteries this author cannot come to terms with.

Every single contemporary that depicted the Mongols' devastation of the land of Islam[175] and the accounts of the many scholarly deaths at their hands or the cities that were burnt down (Merw, Nishapur etc...) whose ruins still remain today, appear to be fiction in the pens of our modern 'scholars'.

This is only one aspect of the distorted history of the causes of decline of Islamic civilisation. The real reasons for its decline and the devastation of Baghdad, which the near totality of modern Western history of Islam fails to tell us, follow now.

The true reasons for the decline of Islamic science and the fall of the Caliphate

One fundamental reason for the decline of Islamic civilisation owes to the decadence amidst the Abbasid Caliphs themselves. The 18th century historian, Gibbon, traces this decadence:

> *`The caliph Al-Mamun might proudly assert, that it was easier for him to rule the East and the West, than to manage a chess-board of two feet square, yet I suspect that in both those games he was guilty of many fatal mistakes; and I perceive, that in the distant provinces the authority of the first and most powerful of the Abbassid's was already impaired. The analogy of despotism invests the representative with the full majesty of the prince; the division and balance of powers might relax the habits of obedience, might encourage the passive subject to inquire into the origin and administration of civil government. He who is born in the purple is seldom worthy to reign; but the elevation of a private man, of a peasant, perhaps, or a slave, affords a strong presumption of his courage and capacity. The viceroy of a remote kingdom aspires to secure the property and inheritance of his precarious trust; the nations must rejoice in the presence of their sovereign; and the command of armies and treasures are at once the object and the instrument of his ambition. A change was scarcely visible as long as the lieutenants of the caliph were content with their vicarious title; while they solicited for themselves or their sons a renewal of the Imperial grant, and still maintained on the coin and in the public prayers the name and prerogative of the commander of the faithful. But in the long and hereditary exercise of power, they assumed the pride and attributes of royalty; the alternative of peace or war, of reward or punishment, depended solely on their will; and the revenues of their government were reserved for local services or private magnificence. Instead of a regular supply of men and money, the successors of the prophet were flattered with the ostentatious gift of an elephant, or a cast of hawks, a suit of silk hangings, or some pounds of musk and amber.`*[176]

Gibbon also blames:

[175] Such as Ibn al-Athir: *Kitab al-kamil*; ed K.J. Tornberg; 12 vols; Leiden; 1851-72.
[176] E. Gibbon: *The Decline and Fall of the Roman Empire*; Vol VI; 1925 Edition; pp. 51-2.

> *`The luxury of the caliphs, so useless to their private happiness, relaxed the nerves, and terminated the progress, of the Arabian empire. Temporal and spiritual conquest had been the sole occupation of the first successors of Mahomet; and after supplying themselves with the necessaries of life, the whole revenue was scrupulously devoted to that salutary work. The Abbassids were impoverished by the multitude of their wants, and their contempt of economy. Instead of pursuing the great object of ambition, their leisure, their affections, the powers of their mind, were diverted by pomp and pleasure: the rewards of valour were embezzled by women and eunuchs, and the royal camp was encumbered by the luxury of the palace. A similar temper was diffused among the subjects of the caliph. Their stern enthusiasm was softened by time and prosperity. They sought riches in the occupations of industry, fame in the pursuits of literature, and happiness in the tranquillity of domestic life. War was no longer the passion of the Saracens; and the increase of pay, the repetition of donatives, were insufficient to allure the posterity of those voluntary champions who had crowded to the standard of Abu Bakr and Omar for the hopes of spoil and of paradise.'*[177]

Personifying this decadence of Abbasid power is the last of their caliphs: Mustassim. The Mongols had already slaughtered millions in the east by the time they reached the capital of the Caliphate - Baghdad - in January 1258.[178] Mustassim was the ruling caliph. Mustassim, in the words of Baron d'Ohsson:

> *`lacked good judgment and energy; and left it to his ministers the levers of power, whilst he spent his time in frivolous deeds, passionate for music, the spectacles offered by passing singers, mimes, and other games of the sort. His pride equalled his poor mental state. The princes who came to pay homage to him were not admitted to his presence, but could only kiss a piece of cloth of black silk, representing a piece of the Caliph's robe, which was suspended to the palace door. And they had to prostrate themselves to kiss it. This way the Caliph sought to imitate the pilgrims kissing the black stone of the Kaaba. And whenever he ventured outdoors, the caliph did in a luxurious suite, his face covered by a black veil.'*[179]

The weakness of the caliph was compounded by betrayal around him, in the person of his vizier Ibn al Camiyi (also spelt as Ibn al Aqlami among others) who sent many secret letters to a reticent Hulagu informing him of both his loyalty and undermining the character of the Caliph, insisting that the conquest of Baghdad would be very easy. Ibn al Camiyi pressed Hulagu to advance on Baghdad.[180] The same minister pressed the Caliph, against Turkish officers' advice, to cut down the numbers of the military to save on expenses and the Caliph gave him all powers to do so.[181] Hulagu himself was advised by his Muslim astrologer, Nasir Eddin al-Tusi to advance and destroy Baghdad as a favour written in the stars.[182] Hussam Eddin, who was another Muslim astronomer, sought to dissuade Hulagu but al Tussi was the more convincing of the two and Hulagu moved on Baghdad. [183]

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[177] E. Gibbon: The Decline; Vol VI; 1925 Edition; pp. 26-7.
[178] E.G. Browne: *Arabian medicine*; Cambridge University Press, 1962. p.439.
[179] Baron G. D'Ohsson: *Histoire des Mongols,* in four volumes; Les Freres Van Cleef; la Haye and Amsterdam; 1834. vol 3; pp. 207-8.
[180] Baron G. D'Ohsson: *Histoire des Mongols*; p. 212.
[181] Baron G. D'Ohsson: *Histoire des Mongols*; p. 213.
[182] Baron G. D'Ohsson: *Histoire des Mongols*; pp. 225-6.
[183] Baron G. D'Ohsson: *Histoire des Mongols*; pp. 225-6.

The destruction of Baghdad was not however just due to factors such as Caliph Mustassim's weakness, his vizier's betrayal, Hulagu's own initiative or Nasir Eddin Tussi's advice. It resulted from another crucial factor: the Crusader alliance with the Mongols which was central to the destruction of the Caliphate in 1258.

Indeed, the Crusades had been going on since 1095. The crusaders had sought in 1101 to reach the centre of the Caliphate - Baghdad - and terminate Muslim power. This 1101 crusade, consisting of nearly one million soldiers divided into four great armies, was destroyed by the Seljuk Turks in 1101-2.[184] The subsequent crusades faced determined continuous resistance by the Seljuks and the armies of Imad Zangi (ruled 1127-1145), his son Nur Eddin (ruled 1146-1178) and Salah Eddin al-Ayyubi (1178-1193). After that the rising Mamluk power held the crusaders in check until the latter built an alliance with the Mongols. This alliance with the Mongols was arranged in the period of 1240 - early 1250s by the Crusader leadership and the popes. It was made possible by the fact that not just both sides hated Islam but most importantly because Nestorian Christianity held a great place alongside Shamanism amongst Mongol beliefs.[185] Hulagu, the Mongol leader who was to take Baghdad in 1258, and his general Kitbuka had affinities with Nestorian Christianity.[186] It was Hulagu's protection of the Nestorians and the respect with which he welcomed and promoted the Katholikos Nestorian of Baghdad which was to play a major role in the alliance between Mongols and Crusaders.[187] Hulagu's wife, Doqouz Khatoun, was also a Christian and she ferociously loathed Islam.[188] She had great personal influence[189] and in order to please her, Hulagu supported and promoted this community so that it was able to build new churches everywhere.[190] All the wives of Mangou, Kubilai and Hulagu were Christians and played leading parts in the favours shown by the Mongols to the Christians.[191] The Popes in Rome were aware of this and in order to achieve their aims, they worked very hard to stimulate the zeal of these Christian wives.[192] The Latin envoys to the Mongols did not just find churches in very large numbers, they also discovered that Christians had great influence in the local Mongol communities.[193] There were also Christian soldiers employed as archers or sailors and adventurers in the Mongol court.[194]

To cement the Christian alliance with the Mongols, a strong number of Christian envoys were sent to the Mongols by St Louis, King of France and the Popes.[195] In 1245, Pope Innocent IV commissioned Giovanni de Carpini to explore the alliance with the Mongols against Islam.[196] Equally, in 1253, St Louis sent the Franciscan William of

[184] Z. Oldenbourg: *The Crusades*; trans from the French by A. Carter; Weinfeld and Nicolson; London; 1965. pp. 174-5.
[185] B. Spuler: *History of the Mongols*; London, Routledge& kegan Paul, 1972. p.2.
[186] B Spuler: *Les Mongols dans l'Histoire*, Payot, Paris, 1961.
[187] A. Mieli: *La Science Arabe et son role*; Leiden; 1966:p.147.
[188] A. Mieli: La Science Arabe; p. 147.
[189] B. Spuler: *Les Mongols dans l'Histoire*, in Yves Courbage, Paul Fargues: *Chretiens et Juifs dans l'Islam Arabe et Turc*, Payot, Paris, 1997. p. 100.
[190] B. Spuler: History of the Mongols; op cit; p.121.
[191] Hayton, Saint Martin Brosset quoted in W. Heyd: *Histoire du Commerce du Levant au Moyen Age;* A.M.Hakkert Editor; Amsterdam; 1967.Vol II; p. 66.
[192] Jean Richard: *La Papaute et les Missions d'Orient au Moyen Age*; Ecole Francaise de Rome; Palais Farnese; 1977. p. 104.
[193] G. de Rubruc.; pp 292; 301; Abul-Faraj: Hist.dynast; edt Pococke; p. 321, Ohsson: Hist des Mongols; ii; p. 234 and fl; all in W.Heyd: *Histoire; op cit;* p. 66.
[194] J. Richard: La Papaute; op cit; p.104.
[195] Innocent IV: *Statuta capitulorum generalium ordinis Cisterciensis*, ed. J. canivez, Vol II, Louvain, 1934, ad. ann.1245, & 28, p. 294. in J. Richard: La Papaute et les Missions d'Orient; op cit; p.66.
[196] G. Sarton: Introduction; Vol II; op cit; p.37.

Rubrouck to the Mongols.[197] Rubrouck was then sent to meet the great leader himself, Mangu Khan further to the east.[198] These envoys were mainly Franciscan and Dominican missionaries.[199] Ironically, they generally passed through the lands controlled by Muslim rulers with their blessings and help.[200]

The Mongols acknowledged the Christian messages for an anti-Muslim alliance and sent their replies. In 1249 at Cyprus, there came Mongol envoys to the devout French king, St Louis, offering alliance against the Muslims.[201]

The details of such an alliance has been partly uncovered by Pelliot,[202] Spuler,[203] Saunders[204] and by the Swedish diplomat and scholar: Baron d'Ohsson in the best work on the subject.[205] But the Vatican remains silent on the details of this alliance.[206] Western religious or scholarly authorities remain, on the whole, silent about such an alliance, seeking to detach the Christian role from the Mongol atrocities committed against the Muslims.[207] What is definitely known is that, three years after the return of the Pope's envoy Rubrouck, Hulagu crossed Persia and devastated Baghdad.[208] Christian quarters, on the other hand, were spared.[209] It did not stop there; the Mongols destroyed nearly the whole of Syria (see the entries on Damascus and Aleppo) and advanced on Egypt to destroy the last power standing in front of them: the Mamluks. This advance and devastation of the land of Islam followed a promise by Mongke, the Mongol general and brother of Hulagu, to the King of Armenia to conquer the Holy land and give it straight back to the Christians.[210] For the Christians, however, it was not Jerusalem that was the aim but to turn the Mongols *`into a major asset for the West'*[211] and *`to deal the mortal blow to the Muslims and thus guarantee the rule of the cross over the Holy Land.'*[212] For the Christian West, the Mongol invasions were, indeed, aimed at *`the final and long awaited fall of Islam.'*[213] Maybe reaching even further, such invasions were a response to a dream *`of a world from which the Arabs had been eradicated.'*[214]

As the Muslim armies were routed and the Muslim populations were slaughtered en masse, only one force stood ready and determined to fight back: the Mamluks of Egypt. It is they who crushed the Mongols at Ain

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[197] *William of Rubrouck, envoye de Saint Louis, Voyage dans l'empire Mongol (1253-1255)*, Payot, Paris, 1985.
[198] C.R. Conder: *The Latin Kingdom of Jerusalem;* The Committee of the Palestine Exploration Fund; London; 1897. p. 372.
[199] C. Cahen: *Orient et Occident au temps des Croisades*, Aubier Montaigne, 1983. p.200.
[200] G. Sarton: *Introduction*, Vol II, op cit; p.37.
[201] C.R. Conder: *The Latin Kingdom*. p. 350.
[202] P. Pelliot: *Mongols and Popes; 13th and 14th centuries;* Paris; 1922.
-P. Pelliot: *Les Mongols et la Papaute*; In *Revue d'Orient Chretien*; 1923-1924; and 1931-2.
[203] B. Spuler: *Les Mongols dans l'Histoire*, Payot, Paris, 1961.
[204] J.J.Saunders: *Aspects of the Crusades*; University of Canterbury publishing; Canterbury; 1962. 1962.
[205] Baron G. D'Ohsson: *Histoire des Mongols,* in four volumes; Les Freres Van Cleef; la Haye and Amsterdam; 1834.
[206] J. Richard: La Papaute; op cit; p.281.
[207] Whether Saunders who has been referred to here, or other historians such as Richard, who dealt with the issue, and even those seemingly favourable to the Muslims, such as Daniel (*The Arabs and medieval Europe)*; all deny that the alliance between the Christians and Mongols to exterminate the Muslims worked on the ground, whilst it did.
[208] C.R. Conder: *The Latin Kingdom*. Op cit; p. 381.
[209] Yves Courbage, Paul Fargues: *Chretiens et Juifs dans l'Islam Arabe et Turc*, Payot, Paris, 1997; p. 29
[210] Hayton; in W. Heyd: Histoire; Vol II; op cit; p. 68.
[211] R.W. Southern: *Western Views of Islam in the Middle Ages*, Harvard University Press, 1978. p.44:
[212] Jean Richard, `l'Extreme Orient legendaire au Moyen Age: Roi David et Pretre Jean,' in *Annales d'Ethiopie*, Vol II (Paris, 1957), pp 225-42.
[213] M. Rodinson: *Europe and the Mystique of Islam*; tr: R. Veinus; I.B. Tauris and Co Ltd; London; 1988. p.27.
[214] N. Daniel: *The Arabs and medieval Europe*; Longman Librarie du Liban; 1975. p.218,

Jalut in September 1260. It is they who, led by one of Islam's greatest figures, Baybars (d. 1277), launched the re-conquest and liberation of Syria and the lost lands, before eventually crushing the crusaders and removing them and soon afterwards the Mongols.[215] Thus, now can be understood why in modern history, the Mamluks are portrayed as evil, and why the Mongols are portrayed as good, and why Nasir Eddin Al-Tusi is considered the greatest scholar of Islam, and so many other fallacies which crown and cram the unfortunate writing of the history of Islam.

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[215] See, for instance:
-U. and M.C. Lyons: *Ayyubids, Mamluks and Crusaders, selection from the Tarikh al-Duwal wal Muluk of Ibn al-Furat*; 2 vols, W. Heffer and Sons Ltd, Cambridge, 1971.
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