

THE “BAYT AL-HIKMA” AND SCIENTIFIC ACTIVITY OF CENTRAL ASIAN SCHOLARS IN BAGHDAD

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The main aim this paper is to investigate the “Bayt al-Hikma” (“The House of Wisdom”), an important medieval centre for translation and science. In this paper, the author attempts to define the establishment, tasks and development of this institution and its place in medieval civilization. In addition, considerable attention is given to the scientific activity of the Central Asian scholars in Baghdad, who migrated there when caliph al-Ma’mun shifted his court from Marw to Baghdad in 819 CE.

The paper describes “Bayt al-Hikma” as an important institution for translation and science and describes some of the Central Asian scholars’ activities in Baghdad. Despite its brevity, this short overview shows that these scholars had an important influence on the development of medieval sciences.

Key words: “Bayt al-Hikma”, Central Asia, Uzbekistan, scholars, sciences

This paper is devoted to an investigation of the “Bayt al-Hikma” (The House of Wisdom), the famous medieval institution for science and translation. I shall attempt to define the establishment, structure, tasks and development of this centre and its place in medieval civilization. In addition, I plan to concentrate on the scientific activity and legacy of the Central Asian scholars in Baghdad during the 9-11th centuries. Therefore, considerable attention will be given to the scientific activity of the Central Asian scholars in Baghdad, who migrated there when caliph al-Ma’mun shifted his court from Marw to Baghdad in 819 CE. These scientific endeavours are best approached from a clear understanding of the context of medieval history in Central Asia and particularly in Uzbekistan.

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Uzbekistan is a land of great historic heritage and ancient culture. Cities such as Samarkand, Bukhara, Khiva and Tashkent have histories that stretch back for millennia. At various times they have been part of powerful states, important trade centres on international routes and places where trade, architecture, science and the art were highly developed. The region in Central Asia known as Transoxiana became part of the expanding Muslim empire during the year 715, which stretched from the North African west coast to the borders of the Chinese empire in Asia. The conversion of Central Asia to Islam was a significant event in the history of the region. The rise and spread of Islam was paralleled by an unprecedented upsurge of literary and educational activities. For this reason, Central Asia has had a long Islamic past in which a rich, diverse literature has been composed by the Central Asian scholars.

Its geographical situation has made Central Asia practically the last horizon of the civilizations of the South, having limited contacts with the South East Asian countries. Spain and Transoxiana had passed through a similar process of cultural evolution before the rise of Islam (e.g. Hellenistic culture). It is also known that there was extensive interchange between the different civilizations along the Silk Road routes.

Samarkand is located in a region that has been important since ancient times, when different peoples came into close contact with South East Asian civilization. The city functioned as an important commercial and cultural centre and was situated along the famous Silk Road. From 760, Samarkand became a centre for paper production, which it supplied to the whole Islamic world for almost two hundred years. The introduction of the paper industry gave an impetus to the spread of knowledge, since the Abbasid age saw a complete change to paper from papyrus and parchments, except where more durable documents were required. Samarkand has indeed produced a number of scholars who contributed very vigorously to several areas of science.

The second Central Asian city of Bukhara was also a well-known centre of learning. It is said that Zardusht, the prophet of Zoroastrianism, was born in Soghdiana. As stated above, the main centres of intellectual and scientific life in Central Asia were Samarkand, Bukhara, Khiva and Marw, where schools, libraries and other educational institutions were founded. There are many references to the riches of these libraries in the works of medieval Arab historians. For example, the medieval geographer Yaqut al-Hamawi (1178-1229) mentioned about twelve libraries in Marw, where he had been working for three years. Some other medieval historians also described the huge extant of the Khiva library. The library of the Samanids in Bukhara was very popular during medieval times. For example, Ibn Sina (980-1037) described it in the following words: "I entered the library, which consisted of many rooms. Each room was arranged for one particular science. I became familiar with the list of books available in it. I never saw a comparable collection of books, neither before nor after".

Similarly, Khiva and Marw became centres of learning. The complex of all these factors was conducive to the appearance in the 9-11th centuries of a galaxy of outstanding Central Asian scholars, so that Central Asian science and culture from the 9-11th centuries constitutes

an important stream of medieval Islamic thought. Some of the giants of these times belonged to this stream, including Imam al-Bukhari (810-870), Ahmad al-Farghani (d. 865), Abu al-Raikhan al-Biruni (973-1048), Abu Nasr al-Farabi (873-950), Ibn Sina (980-1037), Mahmud al-Zamakhshari (1075-1144) and many others.

Baghdad at that time was the scene of intense intellectual activity. With the active encouragement of the caliphs, a number of eminent scientists worked in the "House of Wisdom" (Bayt al-Hikma) – the first and most famous Islamic centre for translation and science. Preliminary investigation shows that the total number of the above-mentioned scholars was about 20 persons. The most famous of them were Muhammad al-Khwarizmi, Ahmad al-Farghani, Abu Nasr al-Farabi, al-Abbas al-Jawhari, Ahmad al-Marwazi, Ahmad al-Sagani, Ahmad al-Sarahsi, Abu-l-Fadl ibn Turk al-Khuttali, and Khalid al-Marwarruddi. The majority of these scholars were members of the "House of Wisdom".

During the last decades of the Hellenistic epoch, Alexandria in Egypt became a centre for culture and science and a place where the greatest developments in Islamic science occurred, in the time called the "Golden Age of Islam" (the centuries), before moving to Khurasan, as well as to Mawarannahr, presently known as Central Asia. This country was the motherland of scholars like Muhammad al-Khwarazmi, Abu Nasr al-Farabi, Ahmad al-Farghani, Imam al-Bukhari, Imam at-Termizi, Ibn Sina, and Mahmud al-Zamakhshari, who contributed greatly to the development of Islamic science. Depending on the political, economic and scientific situation of that period, most of these scholars had lived in several cities of the Arab Caliphate and the majority of them had worked in the "Bayt al-Hikma" in Baghdad. The "Bayt al-Hikma" was the main scientific center of that epoch, where scholars from different parts of the world exchanged their experiences and knowledge, and it became the point where different cultures combined. For those reasons, this scientific and translation centre can be compared to a kind of Academy of Sciences in modern scientific literature.

It is commonly accepted that the "Bayt al-Hikma" was established during the reign of the famous caliph, Harun al-Rashid (786-809). However, it should be taken into consideration that the foundation of the "Bayt al-Hikma" had already been created by caliph Abu Ja'far al-Mansur (754-775), after which it was developed by Harun al-Rashid in many different directions, finally reaching its peak of activity during the reign of his son caliph al-Ma'mun (813-833). Caliph al-Ma'mun's government mostly consisted of people who originally came from the eastern borders of the caliphate, such as Mawarannahr and Khurasan. In general, al-Ma'mun was a famous historical personality who was a respected caliph and religious leader, being smart, flexible and to some extent a very clever politician, as well as one of the great patrons of sciences. Al-Ma'mun gave a great deal of attention to the development of the sciences and scholars, at the same time creating optimal conditions for their work. He provided scholars with all the necessities of life, so that they were able to devote all their time to study and the pursuit of knowledge. These scholars were greatly obliged to this royal patronage and were dependent on it. Al-Ma'mun was keen to gather scholars at his court and discuss dif-

ferent scientific questions with them. The famous scholars of that time participated in these discussions. These scholars were invited from different parts of the world and among them were Christians, Jews, and representative of other religions, together with Muslims. These representatives of different cultures, faiths and states, gathered in al-Ma'mun's court, shared their knowledge with each other and enriched their spiritual and scientific experience. Consequently, comfortable conditions for the development of sciences and culture in that period were created and the basis for future scientific discoveries prepared.

Al-Ma'mun increased the number of books in his library, above and beyond those brought to the court by his father Harun al-Rashid and his grandfather al-Mansur. In addition, many aspects of scientific research were improved during his reign and much theoretical information was revised and tested in practice. In this way, the "Bayt al-Hikma" became a huge centre where many books written in Latin, Indian, Persian and Turkic languages and were gathered together, along with the scholars of these regions. The caliph himself invited many interpreters to his court, in order to translate and to study these books, which were kept in his library. Among these were such famous interpreters as Hunayn ibn Ishaq (809-877), Yuhanna ibn Masawieh (777-857), Abu Sahl al-Fadl ibn Nawbakht (d. 815), Yaqub al-Kindi (800-873), Banu Musa (803-880), Thabit ibn Qurra (836-901), and Qusta ibn Luka al-Ba'labaki (d. 912). At the beginning, the books were translated from Latin into Syriac, and then into Arabic. The works of famous ancient scholars such as Archimedes, Euclid, Aristotle, Plato, Galen, Hippocrates and Ptolemy were translated from Latin into Arabic and introduced into the Muslim world. Al-Ma'mun gave special attention to translating ancient books into Arabic by being their sponsor, and he often made a gift of gold for each book translation according to its weight.

Al-Ma'mun lived in Marw for ten years. Marw was the cultural centre of that epoch, and is nowadays located near the Bairam-Ali region in the modern Republic of Turkmenistan. Al-Ma'mun's complete reign was twenty years (813-833); for the first six years of which (813-819), he spent time in the city of Marw, ruling the whole Caliphate from there. As a result, Marw became the capital of the caliphate at that time, and this situation reflected positively on the political, economic and cultural life of Central Asian peoples.

As stated before, another important aim of this paper is the investigation of the activity and scientific heritage of Central Asian scholars in the centuries in Baghdad. In this context, it is interesting to point out that a large majority of scholars who worked at the "Bayt al-Hikma" were from Central Asia and Khurasan. They became acquainted with al-Ma'mun during his stay in Marw and later they moved to Baghdad by his invitation. Medieval sources confirm that about twenty scholars from in the "Bayt al-Hikma" were from Central Asia.

Among them, Muhammad ibn Musa al-Khwarazmi was the most famous scholar. He spent most of his life in the "Bayt al-Hikma", though he became scholar in Khwarazim. Some medieval sources also attest that he ruled the "Bayt al-Hikma". Beside, al-Khwarazmi was the author of more than ten works, which were compiled in the "Bayt al-Hikma". He made a huge impact on mathematics, astronomy and geography. Muhammad al-Khwarazmi is the

founder of several concepts of modern mathematics. In particular, he was the first founder of the contemporary science of algebra. He was able not only to systematize this discipline but also to solve complicated equalization formulas. In fact the word 'algebra' was taken from the first word of scholar's famous treatise entitled "The Compendious book by Completion and Balancing" (Al-Jabr wa-l-Muqabala). It was changed and pronounced as 'algebra' in European languages and remains an important branch of modern mathematics. The improved "two mistake" calculation method created by this scholar led him to the concept of differentiation. He also officially introduced the concept of zero to arithmetic, which resulted in the ten digit system now used worldwide. Also one of the scholar's works on the system of calculation became famous in Europe under the title of "Algorithm", which came from his name, and afterwards became an independent discipline. He took some series of arithmetic calculations to a new stage, such as completing a task with the use of fractions.

Beside mathematics, al-Khwarazmi also successfully worked in astronomy. He composed different treatises regarding this subject, among which his "Astronomical tables" (Zij) was the most famous. It is important to note that al-Khwarazmi's "Zij" was based on his personal observations. He provided ephemeral tables of the Sun, Moon and planets, in which he combined Ptolemy's system with that of Indian and Iranian astronomers. According to one researcher, Al-Khwarizmi's great achievement in this subject was that "he composed his work when it was highly demanded and by this he could standardize astronomy till Mirza Ulughbek's (1394-1449) epoch. Many scholars while making their "Zij" used al-Khwarazmi's "Zidj" as a main and basic source"¹.

Al-Khwarazmi also made a significant contribution to geography. His work "The picture of Earth" (Suwrat al-ard) was an early and important geographical source in the Arab caliphate. In this work, the author not only gave some commentary on Ptolemy's geographical views, but also he developed and changed some of them. While describing geographical conditions of Central Asia, Iran and the Arab states, he provided full information to compare with Ptolemy. As some sources have described, more than 70 scholars carried out their investigations under al-Khwarazmi's supervision and created the world's first map. Al-Khwarazmi died in ca. 850 CE in Baghdad.

Another Central Asian astronomer and mathematician who worked in Baghdad was Ahmad ibn Abdullah al-Marwazi, known by the name of "Black accountant" (al-Habash al-Hasib). Originally, this scholar was from Marw and he carried out his scientific investigation in the "Bayt al-Hikma" in the court of al-Ma'mun. His date of birth was approximately 864-870 CE². According to Ibn al-Nadim, he lived more than a hundred years³. Ahmad al-Marwazi

¹ Akhmedov Ashraf. *Muhammad ibn Musa al-Khwarazmi*. The Selected books. Tashkent, 1983. P.24. (in Uzbek language).

² Ibn al-Nadim. *Kitab al-Fihrist*. Beirut, 1989, p.334.

³ Ibid. p.334.

was the author of many treatises devoted to astronomical instruments and geometry, such as “Astronomical tables” (Zij), which was compiled in three volumes – “Zij”, “Damascus Zij” and “Checked Zij of al-Ma’mun”. Al-Marwazi’s contribution to trigonometry was his most well-known accomplishment. The first table of tangent and cotangents, the table of cosines to the first degree were given in the unique copy of his book “Damascus Zij”, which is preserved in Berlin⁴.

The Next scholar who had a major role in the development of mathematical sciences in 9th century Baghdad was Abd al-Hamid ibn Turk al-Khuttali (8-9 CE). He belonged to the Khuttalan area between the Panj and Vakhsh rivers in the modern Republic of Tajikistan, and was successful as a mathematician. Some authors have concluded that Ibn Turk al-Khuttali composed his work related to algebra even before al-Khwarazmi. However, modern experts have rejected this point of view.

Astronomy was one of the leading subjects in Baghdad. The development of astronomy could be explained by understanding Muslims’ everyday needs. It was especially important for Muslims to know the direction and time of prayer, particularly when announcing the beginning of the holy month of Ramadan, as defined by the position of the moon. This required a good knowledge of astronomy. As a result, astronomy developed rapidly. Many scientists became interested in this subject, and they composed many works and studies in this field. In order to evaluate the theories, observatories were established and furnished with instruments for practical investigations.

The role of Central Asian scholars in the astronomy of that period was also significant. In particular, Yahya ibn Abu Mansur (9 CE), a scholar from Marw, in the modern Republic of Turkmenistan, established the first astronomical observatory in the al-Shammasiya district of Baghdad. His colleague Khalid ibn Abd al-Malik al-Marwarrudi (9 CE) built led the second observatory on the Qasiyun hill area, near Damascus.

Ahmad al-Farghaniy, whose 1,200th anniversary was celebrated in Uzbekistan in 1998 by UNESCO, was among the famous scholars of the Baghdad astronomical school. His works had a significant impact on the development of astronomy, geography and mathematical sciences and he was an expert in the making of astronomical tools and instruments. Additionally, he was a capable engineer of hydro projects, as shown by his supervision of the construction of the Nilometer in Rawda island on the river Nile. This scholar wrote several works on astronomy, which was published in Uzbekistan, due to his above-mentioned anniversary.

Medical sciences and philosophy were among the sciences most in demand during the time of Caliph al-Ma’mun and indeed the entire Abbasid caliphate in Baghdad. The Central Asian scholars actively participated in this field as well. Among the Central Asian scholars, Ali ibn Rabban al-Tabari, born in 808 in Marw, was a medical doctor who worked in Baghdad. He has

⁴ Bulgakov Pavel. “The Central Asian scholars in Baghdad.” *The Journal of Oriental Studies*. Tashkent, 1990. p.23. (in Russian language).

left some works related to medical sciences, the most important of which is "Garden of Wisdom" (Firdaws al-Hikma). In this early and important book, the author described many issues related to the treatment of human health and how to preserve it according to the achievements of Greek, Indian and Central Asian practitioners who lived before him⁵.

Abu Bakr al-Razi was an encyclopedist scholar in Central Asian and Khurasani scientific traditions and culture in Baghdad. Al-Razi, who was born in 865 in Ray, studied literature and music during his childhood, and later philosophy, mathematics, astronomy and alchemy. When he was about 30 years old, he started practicing medical sciences and then he became a famous practitioner and headed hospitals in Baghdad and Ray⁶.

According to the "Islamic Encyclopedia", al-Razi was the most honored practitioner of medical sciences until the 17th century. Some medieval authors mentioned that al-Razi was a very talented scholar and according to them, when Adud al-Dawla (936-983), the governor of Baghdad, asked him where to build city's hospital, al-Razi advised him to hang a piece of meat in every part of Baghdad and in the location where the meat rotted most slowly to build a hospital for the city⁷. Al-Razi had a favorite disciple from Bukhara, called Muhammad ibn Yunus, who was an expert in mathematics, philosophy and other sciences. This suggests that there were strong connections between the scientific environments in Bukhara and Ray. In his "Comprehensive book" (Al-Kitab al-Hawi) al-Razi detailed many important innovations related to different subjects in the medical sciences.

"Al-Hawi" was an encyclopedia of all the medical science up to that time. According to some experts, he was the author of more than 200 innovations in different fields, half of these being related to medical sciences, twenty-one related to alchemy, and the rest related to physics, philosophy, astronomy, optics, mathematics, and so on.

Another scholar of encyclopedias, the offspring of Central Asian science, was born in Farab (Utrar in the modern Republic of Kazakhstan, on the bank of the Sirdarya river). Abu Nasr al-Farabi also worked in the Arab caliphate's major cities such as Baghdad, Damascus and Aleppo. According to the views of experts, al-Farabi left more than 160 works related to different fields of medieval sciences⁸. Although al-Farabi dedicated his scientific capabilities to philosophy, logics, and sociology, he also made valuable contributions to mathematics, the medical sciences, music and other subjects. The main point in his philosophical thought was that "... first of all to re-establish the teaching of Aristotle and to enrich it with the lat-

⁵ Karimov Ubaydulla. *Essays on the History of Medicine of Central Asia from the ancient times until 19 century*. Tashkent, 1993, p.33. (in Russian language).

⁶ Ibid. p.34.

⁷ Ibn Abi Usaibi'a U'ayn , *al-Anbai fi Tabaqat al-Atibba'* . Cairo, 1882, Vol. 1. p.309.

⁸ Khairullaev Muzaffar, *Abu an-Nasr al-Farabi* [The great scholars and personalities.] Tashkent, 1995. p.33. (in Uzbek language).

est changes occurring in Islamic philosophical thought. In this way, he established Oriental Aristotelian teaching traditions. He had worked out the main method of these traditions, their major issues and categories as well”⁹.

Al-Farabi’s “Persuasion of citizens of the perfect city” (*Ara’ ahl al-madina al-fadila*) was a major addition to sociology and political sciences. In this work, the author “established the teaching regarding the foundation theory of society, its reasons and objects. This teaching included many aspects of social life – ruling of the state, education, ethics, culture, religion, war and peace, work and etc.”¹⁰. Al-Farabi was also an expert in the field of music. As well as writing some works about music, he himself was a capable musician, composer and innovator of musical instruments. His title as “The second teacher” evidences his high-level popularity after Aristotle. Al-Farabi was the first Muslim thinker to provide an overall picture of science in his time.

In the 9th century, other Islamic subjects such as “*tafsir*” (Quranic exegesis), “*fiqh*” (Islamic jurisprudence), “*hadis*” (various reports describing the words, actions, or habits of the prophet Muhammad), “*kalam*” (cosmological argument) also developed rapidly. The works left by Central Asian scholars in these fields are considered to be very important sources. Indeed, the sultan of Hadith – Imam al-Bukhari - also lived in Baghdad. Mahmud al-Zamakhshari was an invaluable linguistic scholar from Khwarazm. His works devoted to Arabic language and literature have impressed many scholars with their deep analysis. Though he stayed in Baghdad for several years, he died in Khwarazm.

This rich literary and scholarly background coupled with the works of these Central Asian scholars paved the way for the flowering of the local genus in the eleventh century, when Abu Ali Ibn Sina and Abu al-Raikhan al-Biruni led the vanguard. In many aspects of scientific discoveries, they were the original pioneers.

While the close ties and constant scientific exchange between scholars in Baghdad and Mawarannahr have been mentioned in scientific literature, this paper briefly describes some of the Central Asian scholars’ activities in Baghdad, where their activity was wider, multifaceted and fruitful. Even this very short overview proves that these scholars had an important influence on the development of medieval sciences. Thus, it can be seen that Central Asian scholars have made a lasting contribution to Islamic civilization in almost all fields of Islamic science. At the same time, it is evident that the history of science in Central Asia remains one of the most poorly studied areas of international oriental studies.

⁹ Ibid. p.38.

¹⁰ Ibid. p.38.

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