



## MIRZO ULUGBEK'S SCIENTIFIC SCHOOL

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### ANNOTATION

*In this article, the author talks about Mirzo Ulug'bek, the leading scientist of the Timurid period, and his scientific school, and explains the activities of mature representatives of this school on the basis of sources.*

**KEY WORDS:** *Samarkand observatory, famous astronomer, Ulugbeka madrasa, Gijduvan madrasa, Zayniddin Vasifi, Sultaniya, Samarkand Academy, local schools.*

Timurid ruler Mirzo Ulugbek was among the thinkers and scholars who created in the 14th - 15th centuries, who entered world science as the second renaissance of the East. Ulugbek, a famous astronomer, mathematician, historian, founder of the Samarkand observatory and head of the scientific school, is one of the world's greatest astronomers. Mirza Ulugbek was the king of the country on the throne and a scientist, but he was also a high-spirited and just person. In this article, based on available sources and literature, we will briefly talk about Mirzo Ulugbek's scientific school.

So, the full name of Mirza Ulugbek is written in the introduction to his work "Zij": "Ulugbek ibni Shahrukh ibn Temur Koragon says this", [1] - if we rely on the sentence that begins Mirza Ulughbek ibn Shahrukh ibn Temur is Koragon. Ulugbek was born on March 22, 1394 in the city of Sultania, located in the western part of Iran, during the siege of the Mordin fortress during the "five-year war" (1392-1396) of his grandfather Amir Temur. According to Sharafiddin Ali Yazdi's work "Zafarnama"[2], Amir came to Temur and told him the good news about the birth of Ulugbek. Astrologers predict that the child will become a scientist and a ruler in the future. After this news, Amir Temur paid great attention to Ulugbek and stopped the siege of Mordin fortress and canceled all the demands placed on the inhabitants of the fortress.

Amir Temur's attention to science and art can be seen in his children and grandchildren. At the beginning of the 15th century, the king and scholar Mirza Ulugbek (1409-1449) ruled the throne of Movarounnahr in Samarkand. During this period, Samarkand became a major political, scientific and cultural center. As a scientist and enlightener, Ulugbek paid great attention to science and tried to gather great scientists in Samarkand. He built many madrasahs in Samarkand, Bukhara, Gijduvan. Mirza Ulugbek became a patron of science along with state affairs. He wrote works such as "Zizhi jadidi koragony" on astronomy, "Tarihi arba ulus" on the science of history. Ulugbek, in turn, can be called the "creator of Madrasahs" who opened his heart to the people of science in several cities.

Among these creative works, the most famous ones are located in Samarkand. The construction of the Ulugbek madrasa began in 1417 and was completed within three years. Famous scholars such as Qazizada Rumi and Taftazani were among the teachers who taught at this school. On the advice of Qazizada Rumi, Ulugbek Ghiyosiddin Jamshid invites Koshoni to Samarkand.

When the madrasa was opened in 1420, the number of scholars gathered here exceeded 100. In its time, this spiritual center in Samarkand was glorified with the name "Madrasay Oliya"[3]. Zainiddin Vasifi writes in the book "Badoi ul-Waqai" that "...Shamsiddin Muhammad Havofi was appointed as the head teacher", [4] and Qazizada Rumi, Ghiyazidin Koshi, Mirzo Ulug'bek, Ali Kushchilar were the main teachers of the madrasa. who read the lectures. Even today, this madrasa attracts the attention of the world community with its antiquity and grandeur in the "Registon Ensemble". In the list of such madrasahs there were madrasahs established in Bukhara in 1417 and in Gijdivan in 1433. They worked as a place of learning for the leaders of science.

In the madrasa in Samarkand, together with his teacher Qazizada Rumi, Ghiyaziddin Jamshid ibn Masud Ulugbek himself taught the words: "Education is a duty for every Muslim man and woman" in the building of the madrasa was a deep-meaning call to the people to learn. Ulugbek remained in the history not only of his time, but also as a scientist of humanity. Ulugbek's scientific activity and his efforts in the field of science in general became famous in Europe as "Samarkand Academy". This



academy fully met the requirements of that time, it had a well-equipped observatory, a rich library and a madrasa, the highest educational institution of its time.

In addition to local scientists, visiting astronomers and mathematicians from a number of different countries and peoples also worked at the observatory. The mutual cooperation of astronomers and mathematicians was seen in the fact that astronomers observed the positions of planets and stars in the sky, and the determined data were mathematically processed by mathematicians at the scientific institute. In this way, astronomical and trigonometric tables were created.

Mirzo Ulugbek also built a peaceful garden near the observatory, i.e. in the far part of Kuhak hill. In its time, this garden was known as Bogi Maidan. It is said in "Boburnoma" about the Maidan garden: "(Ulugbek Mirzo) again planted a garden in the foothills of Kuhak near Farb. Season to Boge Maidan is in the middle of this garden, he built a high building, called Chilsutun, with two floors and all the pillars are stone. At the four corners of this building there are towers like four manors, the roads leading up are these four towers. In all other places, there are stone pillars, some of them are carved by morpech. The four sides of the upper floor are porches, the columns are made of stone. They have completely destroyed the building's chair. He built another garden on the side of Kuhak, built a large porch, and inside the porch he placed a large stone throne. - eight years old, one year old in height. They bring a huge stone from a long way. There is a gap in the middle. I think that it happened after you were mentioned here. In this garden, there is another attic, the structure is completely ceramic. They say china shop, Chinese people send and bring back" [5].

The scientists of this "academy" led by Ulugbek achieved remarkable success in astronomical observations, by the standards of that time. In particular, a table containing the inclination of the ecliptic, the annual movement of the five planets - Zuhra (Venus), Zuhal (Saturn), Mirrih (Mars), Mushtari (Jupiter) and Utorud (Mercury), the length of the sidereal year, 1018 stars and finally, they compiled the geographical coordinates of 683 populated points. Ulugbek Ali Kushchi, Chalabiy and other students scientifically studied the secrets of the universe and wrote the scientific work "Zizhi Koragony". He determined that a year consists of 365 days, six hours, 8 minutes, and 12 seconds, and according to today's scientific progress, he was wrong by 58 seconds. After the death of Ulugbek in 1449, the employees of this observatory dispersed to different regions as the rain of knowledge.

One of them was Ali Kushchi. If we talk about the favorite student of Mirza Ulugbek, Alaviddin Ali ibn Muhammad al-Kushchi, it is appropriate to say that he, like his nickname, carried out serious work in the activity of the observatory with his cheerfulness. After the death of Qazizada Rumi and Jamshid al-Koshi, the scientific work at the observatory was entirely entrusted to Ali Kushchi, and he successfully completed these tasks. In 1438, Mirza Ulugbek Ali sent Kushchi as his representative to the Chinese emperor as an ambassador. After returning from China, Ali Kushchi wrote his work "Mathematical and Astronomical Geography". All the information and news presented in it are the result of several years of scientific research.

In 1908 and 1914, as a result of V. L. Vyatkin's research, the remains of the Ulugbek observatory were found and excavations were carried out. Research M. Ye. It was continued by Masson in 1941, by A.A. Pulyavin in 1943, and by V.A. Shishkin in 1948. European astronomers became aware of Ulugbek's star catalog after it was published in Oxford in 1648. The work was published at the initiative of Oxford University professor John Greaves (1602-1652), who also wrote a commentary on it. 17 years later, Thomas Hyde (1636-1703), a scholar-keeper at the Bodleian Library in Oxford, prepared and published the work in Persian and Latin.

Jamshid al-Koshi has a special place in Ulugbek's scientific academy. His knowledge of mathematics was very high. Although Koshi's biography has not reached us, two of his works – "Miftakh al-hisab" ("Key of Arithmetic") and "Risola fil-muhitiya" ("Treatise on the Circle") have reached us [6]. Al-Koshi wrote the work "The Key of Arithmetic" as an answer to the questions asked by experienced accountants to test it or because they really did not know, and donated it to Ulugbek's library. The purpose of writing the "Treatise on the Circle" was to calculate the number  $\pi$  [7], that is, the ratio of the length of the circle to its diameter, with greater accuracy than was known before Cauchy. Through these works, al-Koshi made a great contribution to the development of mathematics.

As mentioned above, we know Mirzo Ulugbek as a scientist who has worked in the field of historical sciences. His work "Tarihi arba' ulus" on the science of history holds a special place among his works. It should be said that "Tarikh-i arba' ulus" was created under the scientific guidance and personal participation of Mirzo Ulugbek. The work was completed in 1425. This work is also known as "Ulus-a arba'-yi Chingiziy" ("Four Nations of Genghis") and "Tarikh-i arba' ulus" ("History of Four Nations"). However, Colonel Miles, who was one of the first among European orientalists to study this work and published an abridged English translation of it, calls this book "Shajarat ul-atrok" ("Genealogy of the Turks") without



sufficient justification. [8]. The results of a deep and detailed study show that only Yofas oğlan and his son Turk Khan and their children Tatar-Mongol and Turkic classes, as well as their kings, were written in “Shajarat ul-atrok” written on the basis of only. The work is called “Ulus-i arba-yi Chingiziy” or “Tarikh-i arba-ulus”, which includes the history of the great-grandfather of Chingiz Khan, Buzunjour Kuturan, and Chigatai Khan's generation, who ruled Movarounnahr in the first half of the 13th - 14th centuries. . This part was written by Mirzo Ulugbek and his assistants.

“Tarikh-i Arba' ulus” is to some extent based on “Shajarat ul-Atrok”. In another place, it is said: “The history of the four tribes of Genghis Khan” mentions the names of kings from the descendants of Turk Khan ibn Yofas ibn Nuh alayhissalam. The names of Turkestan zamin khans mentioned in this pamphlet were taken from the collection about the khans of the four nations written by the martyr Sultan al-Sa'id Ulugbek Mirzai. These notes, especially the last one, firstly show that the exact name of the work is “Ulus-i Arba'yi Chingiziy” and secondly that it belongs entirely to the pen of Mirzo Ulugbek.

Based on the information given above, it can be said that Tarikh-i Arba' ulus, like Rashiduddin's famous work “Jami' ut-tavarikh”, was written by a team of historians under the direct participation and guidance of Mirza Ulugbek.

There are very few copies of Tarikh-i Arba' ulus. As research scientist B. Akhmedov mentioned, a complete copy of the work has not yet been found. Today, four abridged (collective) copies of it are preserved, two of which are kept in England, one copy is kept in the library of Bankipur, India, and the fourth copy is kept in Harvard University in the USA.

Along with science, Mirzo Ulugbek greatly appreciated poetry, music, and the art of painting. On the walls of the observatory, he painted images of nine heavens, sky domes, planets, and stars.

In the Samarkand library, under the leadership of Abdulhai from Baghdad, the artist Jahangir of Bukhara origin (a student of Ustad Gung, who was called “Umdat-ul musavvirin” – “Captain of artists”, he mentored K. Behzad's teacher Pir Ahmed Tabrizi), Maulana from Herat Many calligraphers and painters, such as Shahabeddin Abdullah, Mawlano Zahiriddin Azhar, Haji Abduqadir Gulyandi, Pir Ahmad Bogishamaly, Muhammad al Hayyami, and Junayid Sultan, who were of local origin, created works. The manuscripts of Al-Sufi's “Treatise on Astronomy” (1437), A. Firdavsi's “Shahnama”, and Nizami's “Khamsa” were copied and illustrated here.

In the time of Mirzo Ulugbek, in addition to secular sciences, history, literature and art, especially visual arts, developed in Muvarounnahr. It is known that Ulugbek discussed the topics of scientific literature in his correspondence with his brother Boysunkur. Ulugbek wanted to prove that the style and school of the great Azerbaijani poet Nizami Ganjavi is superior in poetry, while Mirzo Boysunkur argued that it is a true product of the genius poet and thinker Amir Khusrav Dehlavi. In addition to his mother tongue (at that time, Chigatai-Turkish language), Ulugbek knew Arabic and Persian perfectly. Muhammad Haidar writes in his famous work “Tarihi Rashidi” that Mirza Ulugbek “was a wise historian and also wrote down the history of “turu ulus”. This work is Ulugbek's book “Tarihi arba' ulus”, in which the political life of the countries once conquered by Genghis Khan in the 13th century - the first half of the 14th century was reflected [9].

In the development of Samarkand visual art, artists from Herat play a major role. In 1447, Ulugbek brought a group of artists from Herat to Samarkand. As a result of merging the works of local and Herat painters, Samarkand, under his influence, the Bukhara school of elegant art was formed at the beginning of the 16th century.

At the same time as Mirza Ulughbek, Herat, the capital of Khorasan (Afghanistan, the lands from Western Iran to Delhi), the second part of Amir Temur's state, became a major center of literature, fine arts and culture. Khorasan was ruled by Ulugbek's father Shahrukh Mirza (1409-1447). In addition to being a very religious person, he was the head of the development of science and culture in Herat.

According to the description of Great Alisher Navoi, Ulugbek was also a great poet. The book "Tukhfatu Surur" is proof that he is a great connoisseur of music. The book “Muhit Attafviq” shows that Ulugbek created great musical works such as “Shodiyona” (this work has reached us), “Akhloqi”, “Tabrizi”, “Usuli Ravon”, “Usuli Bahri”. It is written in the work “Muhit ut-tavarikh” that Ulugbek Mirzo was also an excellent shnavan musicologist. He created musical works such as balujji, shodiyana, moral, ulusi and usula ravan performed on large and small drums. Also, the author of “Tarihi Rashidi” Muhammad Haidar described Mirza Ulug'bek Mirza as an accomplished scholar and said, “Mirza Ulug'bek was a wise historian and wrote down the history of “Tarihi arba' ulus”, - he says. The historian Fyosiddin Khondamir (1475-1534) also informed about this[8].

Under Ulughbek's patronage, Darvesh Ahmad Samarkandi, Sultan Ahmad Noi, Hasimi Abuwafa, Muhammad Ali Garibi, Yusuf Burkhan Naqqorachi (Navoi's uncle), Mawlana Sahib Balkhi, Abul Baraka and other artists were busy with their work



in Samarkand. Also, prominent teachers of the Ulugbek madrasa - encyclopedic scholars Maulana Muhammad Havofi, Said Imoeddin, famous medical scientist Hoja Burhoniddin Nafis, great literary critic and linguist Hoja Fazlullah, and Abulqasim Samarkandi were renowned as leading scientists of the era [1].

Apart from being a great scientist, Ulugbek Mirza led the development of science in his time and patronized the people of science. During his time, the city of Samarkand became a center of science and culture, and many talented scientists, dozens of sensitive poets and eloquent writers got their deserved position in the palace. For example, the great mathematician and astronomer Qazizada Rumi, Fiyosiddin Jamshid, Maulana Mu'iniddin Koshani and Ali Kushchi, accomplished mudarris Said Imodiddin and Maulana Muhammad Khawafi, famous commentator and medical scientist Burkhaniddin Nafis ibn Awaz Kirmani, great poets Sakkoki, Maulana Hiyali, Ismatullah Bukhari, Kamal Badakhshi, a great literary critic, and Khoja Fazlullah Abullaysi, a linguist, are among them. Ulugbek Mirza also made a great contribution to the study of ancient monuments written in Turkish and their dissemination among the people. In particular, in 1444, the famous "Hibat ul-haqaiq" (Gift of Truths) by Ahmad Yugnaki (XI-XII centuries) was copied anew. Also, at that time, translation works were well developed in the palace of Ulugbek Mirza, and several valuable works were translated from Arabic and Persian into Turkish [10].

Mirzo Ulugbek studied not only contemporary writers, but also the works of many poets who lived several centuries before his time, and gained a reputation as a great admirer and connoisseur of poetry. One of the noteworthy aspects is that the works of some poets who read Ulugbek's books with great pleasure contain a lot of explanations of astronomical concepts, names of stars and planets, and descriptive descriptions.

In conclusion, it can be said that the academy created by Mirzo Ulugbek is proud today due to its scientific activity and the work of a number of scientists who worked in it. The fact that a number of works created in that period have not lost their importance from today's point of view is a clear proof of our opinion. Therefore, the great people who lived at the historical turning point are always worthy of pride for their achievements.

Mirzo Ulugbek can rightfully be called the leader of the science of stars. His great contribution to the science of his time, both as a ruler and a scientist will live in the memory of generations forever, and they will still refer to Ulugbek's rich scientific heritage many times in their scientific work.

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