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"ZIJ-I SULTANI" IN THE SCIENTIFIC ACTIVITY OF ULUGH BEG

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Annotation
At a time when there is a struggle for human consciousness in the international arena, it is important to pay attention to the advanced and creative ideas of encyclopaedic scientists, to study and promote them. In particular, the perspective of the nation and the country, behind which the future of our country, depends on the youth, and in the upbringing of such a generation, the spiritual heritage of the great thinker Ulugh Beg, life experience, suitable for all times, reflects the spiritual and moral development of a person, and their scientific and philosophical analysis today, the morality of society should be seen as an objective necessity in solving problems. This article will pay attention to the scientific heritage of the statesman and great scientist Ulugh Beg, who carried out social changes in society and people's lives through the development of science and culture, including scientific and philosophical issues outlined in the work "Zij-i Sultani".
It is also discussed that Ulugh Beg was not only an astronomer and mathematician, but that his work was fruitful in the fields of history, poetry and music.

Keywords: madrasa, Ulugh Beg, Kazi-zade ar-Rumi, Ali Qushji, Jamshid al-Kashi, philosophy, logic, astronomy, mathematics, Zij-i Sultani, Tarihi Arba' ulus, globe, astronomical table, stars, calendar.

INTRODUCTION

As a result of the reforms in the scientific and cultural spheres being carried out in our country, special attention is being paid to the research of the scientific heritage and teachings of our world-famous scientists. In this regard, as the President noted, "We are following the traditions of wisdom of our ancestors, deeply understanding their ideas, we are implementing strict reforms, we are on the way to form a new image of our country" [Mirziyoev Sh.M.]. In this sense, it becomes an objective necessity to deepen scientific and theoretical research and develop scientifically based criteria and mechanisms for introducing into the minds of young people the essence of the philosophical, spiritual and axiological views of the scientific heritage of Ulugh Beg.
Despite being a ruler, Ulugh Beg loved science and art. In particular, along with being a ruler, he was a great talent such as an astronomer, mathematician, historian, philosopher, musician, and poet. While Ulugh Beg's father Shah Rukh gathered priests around him in Herat, his son Ulugh Beg was more interested in science than in public administration and power. Exact information about Ulugh Beg's primary education and teachers has not been preserved.

LITERATURE ON THE SUBJECT ANALYSIS AND RESEARCH METHODS

According to the well-known mathematician and historian scientist A. Ahmedov, one of the greatest scientists in the court of Timur, Maulana Ahmad Ulugh Beg may have given the knowledge of early astronomy [Ahmedov A. 2011: P.28]. But Ulugh Beg calls Kazi-zade ar-Rumi "my teacher" in "Zij". Ulugh Beg became one of the great scientists of his time under the influence of astronomers and mathematicians such as Maulana Ahmad and Kazi-zade ar-Rumi.

In his turn, Ulugh Beg is among the ancient Greek scientists Plato, Aristotle, Hipparchus, Ptolemy [Ulugh Beg. 1994: P.3-19] and Muhammad Musa al-Khwarizmi, Abu Nasr Al-Farabi, Abu Rayhan al-Biruni, Ibn Sina, Nasir al-Din al-Tusi [Ulugh Beg. 1994: P.20] analysed his works and presented them to his contemporaries. According to Academician Bartold, "no king in the Islamic world was a scientist until Ulugh Beg" Vasily Bartold. 1964: P.134-146].

Despite being a ruler, Ulugh Beg created a number of scientific, natural and humanitarian works. In particular, if we pay attention to the opinions of the historian, professor A. Ahmedov, "There are not many scientific works related to the name of Ulugh Beg - they are four. The most important, well-known and famous scientific heritage of Ulugh Beg is called "Zij". In addition to "Zij", his mathematical work is "Treatise on the determination of the sine of a degree", astronomy "Risolayi Ulugh Beg" (the only copy is kept in India, in the library of Aligarh University) and the historical work "Tarihi Arba' ulus" ("History of Four Nations"). [www.e-tarikh.uz].

Claudius Ptolemy compiled an astronomical table of stars before the time of Ulugh Beg in the city of Alexandria, Egypt in the II century AD, and in this table the coordinates of 1029 stars in the sky were given. In the Islamic world, before Ulugh Beg, Abdurrahman Sufi of Shiraz (X century) listed 1017 stars in the table of stars called "Pictures of Fixed Stars", Abu Rayhan al-Biruni's "Kitab al-qanun al-Masudi" and Nasir al-Din al-Tusi Tusi's "Ziji Elkhani" were devoted to astronomy.

DISCUSSION AND RESULTS

After the Mongol invasion of Central Asia, not a single astronomical study or work was written. For this purpose, in 1424-1429, in addition to the madrasa, Ulugh Beg built a huge observatory in Samarkand and conducted astronomical observations. For example, the historian Abu Tahirkhoja in his work "Samaria": "Four years after the founding of the madrasa, Ulugh Beg, Kazi-zade ar-Rumi, Jamshid al-Kashi and Maulana Muyniddin Koshaniy consulted and built an observatory building on Kohak hill, near the Obi Rakhmat stream. High premises will be built around it" [Abu Tahirkhoja Samarkandi. 2009: P.336]. The joint scientific activities of the madrasa and the observatory led to the development of astronomy and mathematics at the Ulugh Beg Scientific School.

Ulugh Beg's astronomical observations continue the astronomical observations that began in Alexandria, Baghdad, Damascus, and Tabriz, but they are distinguished by their perfect theoretical and practical scientific accuracy. The work "Zij" consists of two parts: an introduction and an astronomical table, which was compiled in 1437, specifying the positions and positions of 1018 fixed stars. It is noteworthy that in the introduction of the work, the

author mentions verses from Qur'an about stars and planets and emphasizes that the mentioned sciences are theoretically and practically related to worldly knowledge and are adequate.

Today's researchers throw opinions among the scientific community whether the work "Zij" was written by Ulugh Beg himself or by others. But in the introduction to the work "Zij", it is necessary to note the following information in response to this question: "Then Ulugh Beg ibn Shah Rukh ibn Timur, the poor of God's servants, the most aspiring to God, says this". So, this sentence shows that the author of "Zij" was Ulugh Beg himself. However, we can know from the following comments that Ulugh Beg used the scientific views and work of many scientists in creating the work:

This time measurement, discovered by Ulugh Beg, was highly accurate for its time. It should be noted that the amount of this angle was of great importance for cosmologists of all times, and finding the exact coordinates of the stars and places of residence depended on the amount of this angle measurement. In order to show the difference of Ulugh Beg's work "Zij-i Sultani" from other tables, it is necessary to highlight his following points: "Astronomers before Ptolemy determined the position of one thousand and twenty-two stars. And Ptolemy listed them in his "Almagest" according to six sizes. Abdurahman Sufi wrote a special book on the determination of fixed stars, which all people refer to and accept. And until we observed the position of the stars in the celestial sphere, we were based on the table in Abdurahman's book about them. However, after our own observations, we found that the positions of some stars did not match his chart. After Allah granted us our observations, we witnessed that the conditions of these stars and other stars were contrary to what Abdurahman had said. When we placed these stars in the circle according to our observations, we saw that they did not contradict our observations. We believe in it. We observed stars in all constellations. But twenty-seven stars are excluded, because due to their great southern distance, they could not be seen in Samarkand.

Seven of the stars that cannot be seen in Samarkand are from the Mijmara constellation, eight from the Safina constellation, eleven from the Centaurus constellation, and one from the Sab' constellation. We bring these twenty-seven stars to our book with the date of Abdurrahman Sufi. About the remaining eight stars, Abdurahman Sufi stated in his book that Ptolemy saw them, but he did not find any stars there. Despite our best efforts, we did not find any stars in those places. That is why we do not mention those eight stars in this book" **[**Ahmedov A. 2011: P.40]. Therefore, the star chart of Ulugh Beg was the most perfect chart in accuracy for its time.

These sentences lead to the scientific conclusion that a star map and a celestial globe were made in Ulugh Beg's madrasa and observatory. Ulugh Beg's "Zij" was an excellent astronomical work for its time, and was mainly intended for practical use, and therefore quickly gained popularity among astronomers. Therefore, Ulugh Beg used the methods of observation, experiment, live observation, proof, comparison, induction, and deduction to study the universe. Ali Qushji, one of the scholars of the Samarkand madrasa, then Miram Chalabi and Husayn Birjandiy, interprets "Zij" scientifically and philosophically. First of all, due to the tragic death of Shah Rukh and then Ulugh Beg, due to mutual disputes between the Timurids, the mature scholars of Transoxiana were dispersed throughout the Eastern

countries. Among their scientific achievements, the scientists took with them the original copies of the work "Zij".

For example, Ali Qushji went to Turkey in 1473 and built an observatory there, causing the spread of the "Zij" work to the Middle East, Turkey and Europe. Today, there are about one hundred and twenty Persian and Arabic copies of "Zij" in world libraries. No work on mathematics and astronomy created in the Middle Ages was as famous as "Zij". This work has been studied and interpreted in most of the Islamic countries. The famous scientist B. A. Rosenfel said that "Zij" was interpreted by the following scientists in different periods: Scientists such as Shamsiddin Muhammad ibn Abul Fath as-Sufi al-Misri (XV), Abulqadir ibn Royani Lahiji (XV-XVI), Miram Chalabi (XV-XVI), Abdulali Birjandi (XV-XVI), Ghiyasiddin Shirazi (XV-XVI) studied the work and wrote reviews using it in their research [Matvievskaya et al. 1983: P.136].

According to the researchers, in their research, they noted some evidences that prove that the work of "Zij" was spread in India through Zahir ud-Din Muhammad Babur. The Babur rulers continued the traditions of Samarkand scientists and gathered scientists around them to continue scientific work related to astronomy and mathematics. Indian astronomers imitate the scientists of the Samarkand madrasa.

For example, Farididdin Mas'ud al-Dehlavi (XVI-XVII), who was involved in scientific activities in Lahore and Delhi during the reign of Shah Jahan, wrote a work on astronomy called "Ziji Shah Jahani" and copied most of the scientific data and tables from Ulugh Beg "Zij". In addition, Savoy Jai Sing (XVII-XVIII) used Ulugh Beg's "Zij" when writing "Zij-i Muhammadshahi".

CONCLUSION

People and countries of Western Europe knew about Amir Timur and the Timurid kingdom, especially Ulugh Beg, since the XV century.

Especially, thanks to Ali Qushji's work in Turkey, news about Ulugh Beg's scientific school spread widely to the European scientific community. In 1638, Oxford University orientalist professor John Greaves visited Istanbul and took a copy of Ulugh Beg's "Zij" to England. In 1648, John Greaves published the 98 stars and geographical table in "Zij" in Britain, and in 1650-1652, some parts of "Zij" were published in Latin. In 1665, English orientalist Thomas Hyde published the table of fixed stars in "Zij" in Persian and Latin. An interesting aspect of these publications is that Hyde and Greaves were completely unaware of each other's scientific work. In 1680, the Polish scientist Jan Hevely published some parts and tables of "Zij" in Danzig. In 1847-1853, the French orientalist L.A. Sediyo publishes some parts of "Zij" in French.

American scientist E.B. Noble in Washington, 1917 publishes a star chart in English based on the twenty-eight manuscripts of "Zij" preserved in Britain. Ulugh Beg's work "Zij-i Sultani" has not been completely translated into any modern languages despite being studied in different periods. With the honor of independence, in 1994, on the occasion of the 600th anniversary of the birth of Ulugh Beg, the work "Zij-i Sultani" was published in Russian and the work "Tarihi Arba' ulus" was published in Uzbek. In addition to astronomical works, Ulugh Beg also wrote historical works. In 1425, in his work entitled "Tarihi Arba' ulus", the

collapse of the Mongol Empire of the XIII-XV centuries provides socio-political information about the peoples and countries occupied by the Timurid Empire.

There is information that Ulugh Beg also wrote narratives and poems telling about exemplary events. His work called "Risolayi Ulugh Beg" is now preserved in the library of Aligarh, India, and has not been studied until now [Ahmedov A. 2011: P.28]. In this way, social-political, economic life, science and culture in Movarounnahr and Khorasan developed at a high level during the time of Ulugh Beg. This period was defined by the famous scientist N.I. Conrad calls it "the last period of the Muslim Renaissance and part of the Universal Renaissance" [Konrad N.I. 1966: S.227]. Today, one of the urgent tasks before scientists is to conduct new research on the spiritual heritage of Ulugh Beg, to publish his scientific works, and to convey them to the wider scientific community.

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