

A LUMINARY OF SCIENCE AND GOVERNANCE

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Mirzo Ulugbek (1394–1449) was not only a significant ruler of the Timurid Empire but also an influential astronomer and mathematician whose contributions have had a lasting impact on science. His establishment of the Ulugbek Observatory in Samarkand played a crucial role in the advancement of astronomical knowledge during the 15th century. This article examines Ulugbek's multifaceted life, his dedication to fostering a scientific community, the innovative practices employed at his observatory, and the implications of his work for future generations. Ulugbek's story illustrates the intersection of science, culture, and governance in the Islamic Golden Age.

ANNOTATSIYA

Mirzo Ulug'bek (1394–1449) nafaqat Timurid imperiyasining muhim hukmdori, balki fan sohasida ulkan ta'sirga ega bo'lgan astronom va matematikdir. Samarkandda Ulug'bek Astronomiya Observatoriyasini tashkil etishi 15-asrdagi astronomik bilimlarning rivojlanishida muhim rol o'ynadi. Ushbu maqola Ulug'bekning ko'p qirrali hayoti, ilmiy jamiyatni rivojlantirishga bo'lgan sodiqligi, uning observatoriyasida qo'llanilgan innovatsion amaliyotlar va uning ishining kelajak avlodlarga ta'siri bilan tanishadi. Ulug'bekning hikoyasi islomning oltin davrida fan, madaniyat va boshqaruvning kesishgan joyini tasvirlaydi.

АННОТАЦИЯ

Мирзо Улугбек (1394–1449) был не только значимым правителем Тимуридской империи, но и влиятельным астрономом и mathematician, чьи вклады оказали долговременное воздействие на науку. Его основание Улугбекской обсерватории в Самарканде сыграло решающую роль в продвижении астрономических знаний в XV веке. Эта статья изучает многогранную жизнь Улугбека, его преданность развитию научного сообщества, инновационные практики, использовавшиеся в его обсерватории, и последствия его работы для будущих поколений. История Улугбека иллюстрирует пересечение науки, культуры и управления в золотом веке ислама.

KEY WORDS: Astronomy, Mathematics, Timurid Empire, Scientific Innovation, Islamic Cultural Renaissance, Legacy.

KALIT SO'ZLAR: Astronomiya, Matematika, Timurid imperiyasi, Ilmiy innovatsiya, Islom madaniy renessansi, Meros.

КЛЮЧЕВЫЕ СЛОВА: Астрономия, Математика, Тимуридская империя, Научные инновации, Исламское культурное возрождение, Наследие.

INTRODUCTION

Mirzo Ulugbek was born in Sultaniyeh, Persia, on March 22, 1394, into a family of significant political and cultural influence. As the grandson of the conqueror Amir Timur (Tamerlane), he inherited not only a powerful empire but also the responsibility of fostering

intellectual growth and cultural development. Ulugbek's reign (1409–1449) is marked by his deep commitment to science, particularly astronomy and mathematics. His most notable achievement, the Ulugbek Observatory, became a beacon of knowledge and innovation, attracting scholars from various regions and cultures. This article will explore Ulugbek's life, his contributions to science, the innovative practices at his observatory, and the lasting impact of his work on future generations.

MAIN PART

The legacy of Amir Timur significantly shaped Ulugbek's worldview. Timur was not only a formidable military leader but also a patron of the arts and sciences. This environment encouraged Ulugbek to view governance as a vehicle for promoting knowledge and culture. Under his grandfather's influence, Ulugbek embraced the importance of scholarship, recognizing that scientific advancement could lead to greater societal prosperity.

Ulugbek's mother, Gawhar Shah, also played a significant role in his upbringing. As a strong and educated woman, she was an advocate for education and the arts within the royal court. [3] Her influence helped foster Ulugbek's love for learning and his commitment to cultural pursuits. Gawhar Shah's support for scholarly activities in the household created an environment where Ulugbek could thrive intellectually.

Ulugbek married several times, and his unions were politically motivated, aiming to strengthen alliances within the empire. [2] His most notable marriage was to a woman from the local nobility, which helped solidify his power in Samarkand. Ulugbek had multiple children, including his son Abd al-Latif, who succeeded him. Tragically, the relationship between Ulugbek and his son became strained due to differing views on governance and the direction of the empire, culminating in Abd al-Latif's involvement in Ulugbek's assassination.

Ulugbek received a comprehensive education, studying various disciplines, including astronomy, mathematics, and philosophy. He was particularly influenced by the works of earlier Islamic scholars, such as Al-Khwarizmi and Al-Battani. His passion for astronomy was ignited during his studies, prompting him to pursue a deeper understanding of celestial phenomena.

In 1428, Ulugbek established the Ulugbek Observatory on the outskirts of Samarkand, strategically chosen for its elevated position, which provided clearer skies for astronomical observations. The observatory was equipped with sophisticated instruments, including a large azimuthal sextant and a quadrant, allowing for precise measurements of celestial bodies.

Ulugbek's vision was to create a collaborative environment where scholars could freely exchange ideas and conduct research. He invited some of the brightest minds of the time, including astronomers and mathematicians, to work at the observatory. This multidisciplinary approach led to significant advancements in astronomical techniques and methodologies.

Ulugbek's observatory was instrumental in several key scientific developments. The observatory produced the *Zij-i-Sultani*, a comprehensive astronomical catalog that documented the positions and movements of over 1,000 stars. This work was notable for its accuracy and served as a crucial reference for astronomers for centuries.

Trigonometric Advancements in Ulugbek's work in mathematics included the creation of highly accurate trigonometric tables, which were essential for astronomical calculations. His emphasis on empirical observation set a new standard for scientific inquiry.

Astronomical Instruments are the observatory featured advanced instruments, some of which were unique to Ulugbek's time. The precision of these instruments allowed scholars to make groundbreaking discoveries, such as calculating the length of the solar year with remarkable accuracy. 3. Instruments and Technologies

The Ulugbek Observatory was equipped with an array of advanced astronomical instruments, setting new standards in observational accuracy. Among the most significant were the large Sextant is massive azimuthal sextant, with a radius of approximately 40 meters, was one of the largest astronomical instruments of the medieval world. It enabled astronomers to measure the altitude of stars and planets with extraordinary precision, laying the groundwork for subsequent astronomical calculations. [1] The Quadrant is another key instrument, the large quadrant, was used to determine the position of celestial bodies relative to the horizon. This instrument was essential for calculating the angles of stars, allowing for more accurate astrological predictions and navigation. Astrolabes and Armillary Spheres are the observatory also featured various smaller instruments, including astrolabes and armillary spheres. These devices were crucial for navigation, timekeeping, and understanding the movement of celestial bodies, reflecting the sophisticated understanding of astronomy prevalent among the scholars of the time. Observational Techniques are the astronomers at the Ulugbek Observatory employed various observational techniques, including naked-eye observations and the use of these instruments to gather data. They meticulously recorded their findings, which would later contribute to significant advancements in the field.

The Ulugbek Observatory not only contributed to scientific knowledge but also facilitated cultural exchanges. Scholars from diverse backgrounds collaborated, sharing their insights and perspectives. This blending of ideas fostered an environment where innovation thrived, and the synthesis of different scientific traditions enriched the research conducted at the observatory.

Despite his scientific accomplishments, Ulugbek faced opposition from conservative factions who viewed his progressive ideas as a threat. His assassination in 1449, reportedly orchestrated by his own son, marked a tragic end to his reign. However, his legacy lived on through his works and the knowledge cultivated at the observatory. The Ulugbek Observatory is remembered as a symbol of the scientific achievements during the Islamic Golden Age, influencing future generations of astronomers and mathematicians.

In the 20th century, the rediscovery of the Ulugbek Observatory and its contributions sparked renewed interest in Ulugbek's life and work. Archaeological excavations revealed the sophistication of the instruments used and the advanced knowledge possessed by the scholars who worked there. [4] Today, Ulugbek is celebrated as a pioneer of science, with institutions and research centers bearing his name, reflecting the enduring impact of his contributions to the world of knowledge.

There are many novels and articles about Ulugbek. One of the most important novels are Maqsud Shayxzoda's novel "Mirzo Ulugbek" is not merely a historical narrative but a profound exploration of themes such as the pursuit of knowledge, the tension between tradition and progress, and the moral complexities of leadership. Below is a detailed analysis of the novel, focusing on its themes, character development, historical context, and its significance in contemporary literature. One of the most prominent themes in the novel is the pursuit of knowledge. Ulugbek's dedication to astronomy and mathematics symbolizes the broader

intellectual ambitions of the Islamic Golden Age. Shayxzoda portrays Ulugbek as a visionary who understands the importance of knowledge for societal advancement. This theme reflects the historical reality of the era, where science and scholarship flourished in cities like Samarkand. The novel vividly illustrates the conflict between progressive ideas and conservative values. Ulugbek's scientific endeavors and educational reforms face resistance from traditionalist factions within society. This tension is critical in understanding the dynamics of his reign, as it leads to political strife and ultimately his tragic fate. Shayxzoda emphasizes that innovation often comes at a cost, a relevant message in any era. Ulugbek's character embodies the complexities of leadership. He is portrayed as a ruler who prioritizes the welfare of his people and the advancement of knowledge over personal power. However, this idealism leads to challenges, including betrayal and political conflict. The novel invites readers to reflect on the moral dilemmas faced by leaders, particularly when their vision conflicts with the prevailing societal norms. Ulugbek is presented as a multidimensional character—intelligent, passionate, and deeply committed to his ideals. Shayxzoda delves into his inner conflicts, revealing moments of doubt and vulnerability. This depth allows readers to empathize with Ulugbek's struggles against external pressures and personal sacrifices. His dedication to science often isolates him from his peers and family, highlighting the personal costs of his pursuits. The supporting characters in the novel, including Ulugbek's family members, advisors, and political rivals, are crucial in shaping his narrative. His relationships with family members, particularly his son, illustrate the generational conflict between progressive and conservative values. These dynamics add layers to the story, showing how personal relationships influence political decisions and outcomes.

CONCLUSION

Mirzo Ulugbek's life is a testament to the profound relationship between governance and intellectual pursuit. His commitment to science and education transformed Samarkand into a hub of knowledge and innovation during the Islamic Golden Age. Despite the challenges he faced, Ulugbek's legacy endures, highlighting the importance of scientific inquiry and collaboration in advancing human understanding. The story of Ulugbek serves as a reminder of the power of knowledge and the timeless pursuit of truth in the face of adversity.

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