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Qūshjī: Abū al-Qāsim ʿAlāʾ al-Dīn ʿAlī ibn Muḥammad Qushči-zāde

İhsan Fazlıoğlu

Born **probably Samarqand, (Uzbekistan)**

Died **Istanbul, (Turkey), 1474**

ʿAlī al-Qūshjī was a philosopher–theologian, mathematician, astronomer, and linguist who produced original studies in both observational and theoretical astronomy within 15th-century Islamic and Ottoman astronomy. He contributed to the preparation of **Ulugh Beg**'s *Zīj* at the Samarqand Observatory, insisted on the possibility of the Earth's motion, and asserted the need for the purification of all the scientific disciplines from the principles of Aristotelian physics and metaphysics.

Qūshjī was the son of Ulugh Beg's falconer, whence his Turkish name Qushči-zāde. He took courses in the linguistic sciences, mathematics, and astronomy as well as other sciences taught by scholars in the circle of Ulugh Beg. These included **Jamshīd al-Kāshī**, **Qāḍīzāde al-Rūmī**, and Ulugh Beg himself. It has been claimed that he was also taught by **al-Sayyid al-Sharīf al-Jurjānī**; if so, Qūshjī would have been quite young.

In 1420, Qūshjī secretly moved to Kirmān where he studied astronomy (*circa* 1423-1427) with Mollā Jāmī as well as the mathematical sciences. Upon his return to Samarqand *circa* 1428, Qūshjī presented Ulugh Beg with a monograph *(Ḥall ishkāl al-muʿaddil li-l-masīr)* in which he solved the problems related to Mercury; Ulugh Beg was reported to have been quite pleased. Sources say that Ulugh Beg referred to Qūshjī as "my virtuous son" (= "ferzend-i ercümend" [Nuruosmaniye MS 2932, f. 2b]). Indeed, after the death of Qādīzāde, it was Qūshjī whom Ulugh Beg commissioned to administer the observational work at the Samarqand Observatory that was required for his *Zīj* (astronomical handbook). Qūshjī, often referred to as "ṣāḥib-i raṣad" (head of observation), contributed to the preparation and correction of the *Zīj*, but it is unclear to what extent and at what stage. This question becomes especially problematic in view of Qūshjī's criticisms of it, and his pointing out of mistakes, in his *Sharḥ-i Zīj Ulugh Beg* (Commentary on Ulugh Beg's *Zīj*).

Upon Ulugh Beg's death in 1449, Qūshjī, together with his family and students, spent a considerable time in Herat where he wrote his theological work, *Sharḥ al-Tajrīd*, a commentary to **Naṣīr al-Dīn al-Ṭūsī**'s work *al-Tajrīd fī ʿilm al-kalām*, which he presented to the Timurid Sultan Abū Saʿīd. After Abū Saʿīd's defeat by Uzun Ḥasan in 1469, Qūshjī moved to Tabrīz where he was welcomed by the latter. It is said that Qūshjī was sent to Istanbul to settle a dispute between Uzan

Ḥasan and Mehmed the Conqueror; after accomplishing the mission, he returned to Tabrīz. However, around 1472, Qūshī, together with his family and students, left permanently for Istanbul either on his own or because of an invitation from Sultan Mehmed.

When Qūshjī and his entourage approached Istanbul, Sultan Mehmed sent a group of scholars to welcome them. Sources say that in crossing the Bosporus to Istanbul, a discussion ensued about the causes of its ebb and flow. Upon arrival in Istanbul, Qūshjī presented his mathematical work entitled *al-Muḥammadiyya fī al-ḥisāb* to the Sultan, which was named in his honor.

Qūshjī spent the remaining two to three years of his life in Istanbul. He first taught in the Ṣaḥn-i Thamān Madrasa (founded by Sultan Mehmed); then he was made head of the Ayasofya Madrasa. In this brief period, Qūshjī educated and influenced a large number of students, who, along with his writings were to have an enormous impact on future generations. He was buried in the cemetery of the Eyyūb mosque.

Qūshjī, especially when compared with his contemporaries such as Kāshī and Qāḍīzāde, was a remarkable polymath who excelled in a variety of disciplines including language and literature, philosophy, theology, mathematics, and astronomy. He wrote works in all these fields, producing books, textbooks, and short monographs dealing with specific problems. His commentaries often became more popular than the original texts, and themselves became the subject of numerous commentaries. Thousands of copies of Qūshjī's works are extant, many of which were taught in the madrasas.

Qūshjī's philosophy of science, which had important repercussions for the history of astronomy, is contained in his commentary to **Ṭūsī**'s *Sharḥ al-Tajrīd*. Besides being one of the most important theological works in Islam, Qūshjī lays down the philosophical principles of his conception of existence, existents, nature, knowledge, and language. As for the mathematical sciences, Qūshjī in general tried to free them from hermetic–Pythagorean mysticism and to provide an alternative to Aristotelian physics as the basis for astronomy and optics. He sought to define body (*jism*) as being predominantly mathematical in character. Qūshjī claimed that the essence of a body is composed of discontinuous (atomic) quantity while its form consists of continuous (geometrical) quantity. When a body is a subject of the senses, it then gains its natural properties (qualifications).

One consequence of Qūshjī's anti-Aristotelian views was his striking assertion that it might well be possible that the Earth is in motion. Here Qūshjī followed a long line of Islamic astronomers who rejected **Ptolemy**'s observational proofs for geostasis; Qūshji, though, refused to follow them in depending on **Aristotle**'s philosophical proofs, thus opening up the possibility for a new physics in which the Earth was in motion. Qūshjī's views were debated for centuries after his death, and he exerted a profound influence on Ottoman–Turkish thought and scientific inquiry, in particular through the *madrasa* and its curriculum. His influence also extended to Central Asia and Iran, and it has been argued that he may well have had an influence, either directly or indirectly, upon early modern European science to which his ideas bear a striking resemblance.

Qūshjī wrote five mathematics books, one in Persian and four in Arabic. His *Risāla dar ʿilm al-ḥisāb* (Persian), written during his stay in Central Asia (along with his enlarged Arabic version of this work, *al-Risāla al-Muḥammadiyya fī al-ḥisāb*), were taught as a mid-level textbook in Ottoman *madrasas*. In these works, in accordance with the principles he laid down in the *Sharḥ al-Tajrīd*, he tried to free mathematics from hermetic–Pythagorean mysticism. As a result, Ottoman mathematics took on a practical character, which hindered traditional studies such as the theory of numbers.

In the field of astronomy, one of Qūshjī's most important contributions is in the observational program for the *Zīj-i Ulugh Beg* and in his corrections to the work, both before and after

publication. In addition, he has nine works on astronomy, two in Persian and seven in Arabic. Some of them are original contributions while others are pedagogical. In his theoretical monograph entitled *Ḥall ishkāl al-muʿaddil li-l-masīr*, Qūshjī criticizes and corrects opinions and ideas pertaining to Mercury's motions mentioned in Ptolemy's *Almagest*. Another work is his *Risāla fī anna aṣl al-khārij yumkinu fī al-sufliyayn* that deals with the possibility of using an eccentric model for Mercury and Venus, which, as he says, goes against both Ptolemy and **Quṭb al-Dīn al-Shīrāzī**.

Qūshjī's *Risāla dar ʿīlm al-hayʾa* (Persian), written in Samarqand in 1458, was commonly used as a teaching text; there exist over eighty manuscript copies of it in libraries throughout the world. It was also translated into Turkish. Two commentaries were written on it, one by **Muṣliḥ al-Dīn al-Lārī**, the other by an anonymous author. Lārī's commentary was widely taught in Ottoman *madrasas*. Qūshjī's *Risāla* was also translated into Sanskrit and thus represents the transmission of Islamic astronomy to the Indian subcontinent. Qūshjī wrote an enlarged version of the work in Arabic under the name *al-Fatḥiyya fī ʿilm al-hayʾa*, which was presented to Sultan Mehmed in 1473. This work was taught as a middle-level textbook, and was commented on by Gulām Sinān (died: 1506) and Qūshjī's famous mathematician-astronomer great-grandson **Mīram Čelebī**. It was also translated into Persian by Muʿīn al-Dīn al-Ḥusaynī and into Turkish by Seydî Ali Reîs. In the *Risāla* and the *Fatḥiyya*, Qūshjī followed the principles he had laid down in his *Sharḥ al-Tajrīd* and excluded an introductory section on Aristotelian physics that had customarily introduced almost all previous works of this kind.

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