

SCIENTIFIC LEGACY OF ABU ABDULLAH AL - KHWARIZMI

Gadayeva Mokhigul Mukhammadovna

Lecturer, Department of Foreign Languages

and Social Sciences, Asia international university

Annotation: The article examines the life and intellectual legacy of Abu Abdullah al-Khwarazmi, one of the prominent scholars of the 9th–11th centuries when science and culture flourished in Central Asia. Although biographical data about the scholar are limited, his influential encyclopedic work “«Mafotih al-ulum»” (Keys of the Sciences) provides significant insights into the structure and development of medieval Islamic and non-Islamic sciences. The author traces al-Khwarazmi’s classification of knowledge into “Arabic–religious” and “non-Arab–philosophical” disciplines and analyzes their content, including jurisprudence, theology, grammar, history, philosophy, logic, medicine, mathematics, astronomy, music, and mechanics.

Keywords: Abu Abdullah al-Khwarazmi, medieval Islamic science; classification of sciences; Central Asian scholarship; philosophy and theology; mathematics and astronomy; intellectual history.

Abstract: This article explores the intellectual heritage of Abu Abdullah al-Khwarazmi, a distinguished representative of the scientific renaissance that took place in Central Asia during the 9th–11th centuries. Although little biographical information about the scholar has survived, his encyclopedic treatise «Mafotih al-ulum» (“Keys of the Sciences”) remains an invaluable source for understanding the structure, terminology, and development of medieval Islamic and non-Islamic sciences. The study analyzes al-Khwarazmi’s dual classification of knowledge into “Arabic–religious” and “non-Arab–philosophical” disciplines, examining their content across fields such as jurisprudence, kalām, grammar, administrative sciences, history, philosophy, logic, medicine, mathematics, astronomy, music, and mechanics.

During the 9th–11th centuries, Central Asia experienced a high level of scientific and cultural development and became the era of great scholars. One of the well-educated and leading scholars of that period was Abu Abdullah al-Khwarazmi. Very little information about his life has been preserved. His full name is Abu Abdullah Muhammad ibn Ahmad ibn Yusuf al-Khwarazmi. He spent his youth in the cities of Khiva, Zamakhshar, and Qiyyat of Khwarazm, where he grew up, lived, and received his education. The scholar also lived in Khurasan. His fame reached its peak when he served as a secretary under the vizier Abu al-Hasan al-Utbi. Because of this service, he became known by the title “al-Kitāb al-Khwarazmi.”

In the course of his official duties, he frequently traveled to Bukhara and held discussions with many prominent scholars. During this period, being deeply devoted to knowledge, he also obtained the privilege of using the amir’s rich library. Abu Abdullah al-Khwarazmi passed away in the year 997. The scholar’s worldview was shaped under the influence of ancient Greek philosophy and culture, which were widespread in that era, as well as the works of Eastern thinkers such as Ya‘qub ibn Ishaq al-Kindi, Abu Nasr al-Farabi, and Abu Bakr al-Razi. Like most scholarly works of that time, Abu Abdullah al-Khwarazmi’s surviving writings were composed in Arabic, the scientific language of the period. His only known work is Mafātīḥ al-‘Ulūm (“The Keys of the Sciences”). The number of its manuscript copies is limited. Until recently, it was believed that only four copies existed. Of these four, three are preserved in the

British Museum under the catalogue numbers 7528, 23429, and 2524, and one in the Berlin Library under the number 1051. In the 1960s, the American scholar K. Bosworth discovered that an additional six copies of the work were preserved in libraries in Turkey. All six manuscripts are housed in libraries in the city of Istanbul.

Abu Abdullah al-Khwarazmi's work attracted the attention of many scholars as a rare source on the history of scientific development in the Middle Ages. The first researcher to study this manuscript and publish it in 1895 was the Dutch Orientalist Van Vloten. In addition, scholars such as I. Krachkovskiy, V. V. Bartold, K. Brockelmann, E. Wiedemann, G. Sarton, M. M. Khayrullaev, U. I. Karimov, G. P. Matvievsckaya, H. Hasanov, and A. Sharipov have also examined various aspects of the work..

"Mafātīḥ al-'Ulūm" is a unique encyclopedic work that encompasses nearly all major fields of knowledge of its time. The author explains each branch of science by clarifying its content as understood in the medieval scholarly tradition.

The scholar divides the sciences into two categories: "Arabic-religious" and "non-Arabic" sciences. This classification reflects his adherence to the scholarly tradition of his era, in which knowledge was commonly organized into these two principal groups. The first traditional group of "Arabic" sciences consists of the following: eleven chapters on fiqh (Islamic jurisprudence), seven chapters on kalām (Islamic theology), twelve chapters on grammar (ṣarf and naḥw), eight chapters on administrative practice, five chapters on poetry and 'arūḍ (prosody), and nine chapters on history. The second group, classified as "non-Arabic" sciences, includes the following disciplines: three chapters on philosophy, nine chapters on logic, eight chapters on medicine, five chapters on arithmetic, four chapters on geometry, four chapters on astronomy, three chapters on music, two chapters on mechanics, and three chapters on chemistry.

Thus, the work consists of two major sections and presents fifteen branches of knowledge across ninety-three chapters.

Abu Abdullah al-Khwarazmi's classification of the sciences is structured as follows:

I. Sharia and related "Arabic" sciences:

1. Fiqh — Islamic jurisprudence.
2. Kalām — the foundations of Islamic theology.
3. Grammar.
4. Administration (bureaucratic practice).
5. Poetry and 'arūḍ (prosody).
6. History.

II. "Non-Arabic" sciences (Greek and other traditions):

1. Theoretical philosophy:
2. a) Natural sciences — medicine, celestial phenomena (meteorology), mineralogy, alchemy, and mechanics — the lower division;
b) Mathematical sciences — arithmetic, geometry, astronomy, and music — the middle division;
c) Divine science (metaphysics) — the highest division;
d) Logic.
3. Practical philosophy:
a) Ethics — the governance of the individual;
b) Household management — the governance of the household;
c) Politics — the governance of the city or the state

In Mafātīḥ al-'Ulūm, the classification of the sciences is presented together with clear and concise explanations of each discipline's subject matter and fundamental terminology. As noted earlier, Abu Abdullah al-Khwarazmi follows the scholarly tradition of his era by dividing knowledge into two categories — religious (shar'ī) and philosophical sciences.

In the section on the traditional “Arabic” sciences, particularly *fiqh*, the author discusses the foundations of Islamic jurisprudence. He outlines the permanent sources upon which Islamic legal doctrine is based: the Qur’an, the Sayings of the Prophet, wise statements and accounts of the Prophet’s life contained in the Sunna, the Hadith and its various types, as well as *Ijma’* — the consensus of the Muslim community. He also explains the rules of applying Sharia law, including ritual purification, prayer, the call to prayer, fasting, and the payment of *zakāt*.

In the second section, devoted to *kalām*, information is provided about the numerous religious schools that existed in the Near and Middle East during that period. The division of these schools into seven groups, particularly the detailed account of the Mu’tazilites, is of great significance. In addition, the work describes Greek-Christian sects, the religious beliefs of pre-Islamic Iran and Yemen, several dualistic doctrines prevalent in India, as well as Zoroastrianism. These materials hold exceptional importance for the study of the history of religions in the Near and Middle East and Central Asia.

The grammar section presents the rules and principles of classical Arabic literary language. At the same time, the author also provides a detailed discussion of Arabic poetry and its structural component, *‘arūd* (prosody). The section on administration (bureaucratic practice) is particularly important, as it explains the structure of the state chancery, the types of taxes and methods of collection, the duties of tax collectors, the registers of soldiers, their clothing and salaries, terminology used in irrigation systems, types of canals, water-management devices, and the irrigation networks found between the two rivers (the Syr Darya and the Amu Darya).

In the history section of the work, detailed information is provided—beginning with legendary kings and continuing systematically—about rulers from various periods and regions, the Umayyad and Abbasid caliphates, the pre-Islamic history of Yemen, as well as Roman and Greek history. This section also mentions the social stratification of communities in the medieval period. Among the non-traditional, or “non-Arabic,” sciences, philosophy is listed first, where the terminology of this discipline is explained alongside a discussion of the classification of the sciences. In the section on chemistry, al-Khwarazmi also provides highly valuable information about the chemical knowledge of the medieval Eastern world, which is of great importance for studying the development of natural sciences in the region.

In the mathematics section, the state of mathematical sciences in the medieval East is described. Al-Khwarazmi interprets mathematical concepts not as arbitrary creations of the mind, but as reflections of certain aspects of the objective world and the relationships between objects. For example, continuing the ideas of al-Farabi, the author divides arithmetic into theoretical and practical branches. By examining cubic numbers alongside figurate numbers, he enriches certain aspects of theoretical arithmetic. Geometry is likewise divided into theoretical and practical parts, indicating that, like other mathematical sciences of the time, it had reached a high level of development. In the section on astronomy, both its functions and its historical development are discussed. In his classification, al-Khwarazmi includes music among the mathematical sciences. In this section, he describes musical instruments, the proportional relationships between sounds, their arrangement, their tonal characteristics, and concludes with a discussion of the theory of rhythm.

In the section on mechanics, devices used for lifting heavy loads and for irrigating fields—namely simple machines—are described, along with their structure and functions. When discussing the secular sciences, al-Khwarazmi strives to demonstrate their practical significance. Overall, the work reflects Abu Abdullah al-Khwarazmi’s deep knowledge of the natural and mathematical sciences of his era. By incorporating these disciplines into theoretical philosophy, he sought not only to emphasize and elevate their importance, but also to enrich philosophical

thought. Al-Khwarazmi's *Mafātīḥ al-'Ulūm* is of great significance for the study of medieval culture and intellectual history.

References:

1. Khayrullaev, M. M. (1971). *Thinkers of Central Asia and Their Scientific Heritage*. Tashkent: Fan.
2. Sodiqov, Q., & Namozov, A. (2000). *History of Uzbekistan*. Tashkent: Uzbekistan Publishing House.
3. Karimov, U. I. (1983). *The Development of Science in Medieval Central Asia*. Tashkent: Fan.
4. Halimov, Z. (1999). *The Cultural Heritage of Uzbekistan and the Development of Science*. Tashkent.
5. Rahimov, A. (2005). *The Renaissance of Central Asia and the Development of Scientific Thought*. Tashkent: University Publishing
6. Alimova, D. (2002). *The Scientific and Spiritual Heritage of the Uzbek People*. Tashkent.
7. Gadayeva, M. (2025). The Role of Abdulhamid Cholpon in the Jadid Movement. *Modern Science and Research*, 4(2), 1013–1019.
8. Gadayeva, M. (2025). The Brave, Courageous, and Patriotic Turkestani Woman General — Mother of the Nation Qorbonjon Dodkhoh. *Modern Science and Research*, 4(1), 344–352.
9. Mukhammadovna, G. M. (2024). The History of the Paranja: Clothing of Medieval Women.
10. Gadayeva, M. (2024). The History of Jadid Women in Central Asia. *Modern Science and Research*, 3(12), 652–658.