

Medieval Islamic science in Western studies: A historical overview

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Abstract: The problem of studying the roots of modern science has always been one of the most debated issues, and there are various opinions on this. Some researchers seek the roots of science in the Greco-Roman civilization, some in the Islamic world, and some in the Indian and Chinese civilizations. Modern science is often presented under the name of Western science. It was not by chance that the West began to study the history of science in the Muslim East. Although the beginning of the study and analysis of scientific research in the Islamic world by the West is considered to be the 19th century, there were important stages that shaped this history. The study reflects important historical events that led to the study of Medieval Islamic science by the West, which as a result of these events began Islamic scientific research in Western historiography.

Keywords: Islam, science, west, historiography, study

Introduction

Each finding owes its existence to the idea that preceded it. When examining world history, it can be seen that no culture has developed independently of other cultures. Today's scientific level does not belong to any one area, but rather is the common heritage of humanity that creates scientific paradigms. Studying the history of science is, first of all, investigating human development. In the modern scientific paradigm, it is emphasized that the historical development of scientific knowledge began with the ancient Greeks, and to a lesser extent with ancient Egypt, and the contributions of other civilizations, especially Islamic civilization, to scientific knowledge were largely ignored. However, a number of historians of science have proven that this idea is not true and this process has laid the foundation for a new field.

Prominent historian of science Otto Neugebauer argues that the Greeks were not the first or foremost in the history of science, as

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modern scientific understanding claims, and that the Greeks also inherited scientific knowledge from earlier communities such as Egypt and Mesopotamia. A similar objection to Neugebauer is raised by his colleague and friend, the historian of science Edward Kennedy. Kennedy believes that the miraculous attribution of scientific knowledge to the Greeks and then to the Renaissance contradicts the published documents in history. Both historians of science compare the models of the physical-universe theory of Copernicus and Ibn Shatir to substantiate their claims. The reason for this is that the “drawings of the lunar model” and the calculated figures given in Copernicus’ work on astronomical mathematics and in the “Last Survey for the Correction of the Principles of Astronomy” by the Islamic astronomer Ibn Shatir, which is determined to have been published in 1375, are completely identical. Thus, it is determined that Ibn Shatir’s model may be a facsimile of the figures used by Copernicus in his 1543 work. This discovery was later published in the journal *Isis* by Kennedy’s student Victor Roberts and stunned the Western scientific community. (Ozcoshar 2019, 579)

Methodology

The research is multidisciplinary in nature, as two approaches are used here: the Eastern and the Western approach. This article uses the method of historical excursion and phenomenological approach. In accordance with the case method, in the first stage, fundamental data on the Western study of the history of science in the Islamic world are collected. In the second step, the data are summarized using a systematic method and historical stages are classified. In the third stage, the final results are analyzed using a comparative research method. The aim of the work is to systematically explain the important stage in Western historiography that led to the study of science in medieval Islamic civilization. The systematization of positive knowledge can be both cumulative and progressive. At the same time, if we want to understand intellectual development, we must first explain the progress of scientific thought, the gradual development of human consciousness, and determine the role of orientalists and historians of science who played an important role in the scientific transition.

Historical causes in studying Medieval Islamic science

In the Middle Ages, Islamic civilization expanded the boundaries of human knowledge, making science in the Muslim East a phenomenon worthy of study by researchers all over the world, especially in the West. From the presentation of Islamic studies in the academic world in the West, it can be concluded that the history of Islamic studies in English-speaking sources has long existed. This long historical stage divides Islamic studies into three parts according to their content: the theological stage, the political stage, and the scientific stage. Studies conducted in the theological stage began in the 8th century, where the main object of study was the religion of Islam, the Quran, and the life of the Prophet Muhammad (the peace be upon him). The political stage began in the 12th century, where the goal was to oppose Islamic civilization by translating the Quran and other Muslim texts. The scientific stage of Islamic studies began in the 19th century. The main necessity for conducting these studies was historical and ideological motives. Two motives play an important role in the history of the study of Islamic science in Europe:

- 1) Historical-ideological motives
- 2) Scientific motives

Historical-ideological motives include the *spreading of missionary activity* and the *beginning of the Crusades*. Scientific motives include the establishment of centers for studying the *Muslim East and the emergence of Oriental studies as a separate field*.

Medieval Islamic science studies: Historical-ideological motives

Missionaries studied Islam as a cultural reality in the context of Muslim societies, thereby providing the West with the first glimpses of Muslim culture. British orientalist David Kerr also divided missionary activity into two parts:

- 1) Eastern - Christian missionary activity
- 2) Western - Christian missionary activity

Eastern Christian missionary activity

The beginnings of the study of Medieval Islamic science in Western historiography date back to the place where some Christians and Muslims first met - Palestine in the 7th century AD. The conquest of Jerusalem by the Rashidun Caliphate in 638 AD made Islamic culture accessible to Western lands. The first time that these studies were undertaken was at the Monastery of Mar Saba, where Arabic was

replaced by Greek as the language of Palestinian Christian theology can be taken as the starting date. (Kerr 1999, 4) The Monastery of Mar Saba was then a multilingual monastic community, with monks who knew Greek, Syriac, and Arabic. Thus, by the mid-9th century, apologetics, the justification of religious doctrines in accordance with rational thought, gave way to a more systematic Arab-Christian theology. (Casiday 2012, 95-96)

Western Christian missionary activity

If we look at Western historiography, we find the earliest Christian interest in the study of science in the Islamic world again in the monasteries. The Cluniac monks from France were the first Latin Christians to go as missionaries to Andalusia. It is no coincidence that what Montgomery Watt called "a synthesis between the indigenous and the accidental elements of the population" were Jews and Christians who had been in Andalusia since the second century, and the Muslims who conquered the Visigoths in the seventh century. By the eleventh century, the Monastery of Cluny already had a library of Islamic literature, and the twelfth Abbot, Peter the Venerable (1094-1156), employed a group of Cluniac scholar-monks in Toledo and commissioned them to translate Islamic religious texts, including the Quran from Arabic into Latin. The Toledo collection constituted the main source of textual knowledge about Islam in the medieval Christian world. (Kerr 1999, 7)

Another important event that brought the study of Islamic science into Western scientific literature was the Crusades. The Crusades introduced the Frankish people of Western Europe, during the Roman Empire and the Middle Ages, to the superior culture of Islam. Contact with Muslims in Spain and Sicily allowed the scientific heritage of the ancient world to continue in Europe after it had been translated into Arabic.

As the French Islamic scholar Maxime Rodinson said that the Western image of the Muslim world came into sharper focus in the eleventh century in his study of "Islamic European Perspectives". It was a period in which the papacy, despite the political fragmentation of Western Europe, succeeded in asserting its spiritual and even, to some extent, political supremacy. The period of the ninth and tenth centuries was characterized by the conversion of pagan peoples who had repeatedly invaded Western and Central Europe to Christianity, and their political and cultural integration. The population of Western

Europe began to grow, and economic life accelerated and local, regional and transregional trade expanded. In Spain, the kings of the small Christian states in the north took advantage of the fragmentation of Muslim-ruled Spain into numerous principalities to launch the Reconquista, the gradual “reconquest” of Spain for Christianity. The Byzantines suffered a disastrous defeat in 1071 by the Muslim Seljuk Turks, who had established their empire in Western Asia, and lost almost all of Anatolia. The Muslims now seemed poised to capture Constantinople, perhaps even to advance into southeastern Europe. These events led the Byzantine emperor to appeal to Western Christians for help. Pope Urban II in 1095 called on Christians everywhere to unite, mobilize, and attack the “enemies of God.” Thus began the Crusades. (Lockman 2010, 28)

After the capture of Edessa in 1144 and Jerusalem in 1187 from the three Crusader states that emerged in the East after the Minor Crusade in 1101 (the Kingdom of Jerusalem, the Hierarchy of Antioch, and the Province of Edessa), the idea arose to gain accurate knowledge about the Islamic religion and Islamic lands in order to fight the *Saracens* (Moors and Arabs who opposed the Crusaders).

European scientists began to recognize the great intellectual wealth of the Muslim world (including its Jewish communities) that their relatively poor cultures could benefit from. In Muslim Spain, and in Toledo, a major center of learning in Christian hands from 1085, as well as elsewhere in Spain, Christian scholars, with the help of Spanish Muslims, Christians, and Jews, began to translate, study, and disseminate texts on medicine, astronomy, and mathematics, as well as the many Arabic-language writings they found in Spanish mosques and palaces of philosophy. This was the first treasure trove of knowledge available in Europe at that time. Through this way Western Europeans first gained access to many works of Greek antiquity that had been lost in the West but had been preserved in Arabic translations. (Mirzabayova 2021, 60-61) In the process, they also encountered the Arabic-language writings of Muslim and Jewish thinkers who had assimilated the work of the Greeks but who were far more comprehensive than they were in opening up new avenues in medicine, philosophy, science, mathematics, and literature. Engagement with these texts had a profound impact on many arenas of Western European intellectual life. Translated Arabic texts on medicine, mathematics, astronomy, and other sciences were used as textbooks in medieval Europe for centuries. The writings of Muslim philosophers

such as Avicenna and Averroes influenced several generations of medieval Christian philosophers and theologians. As Southern noted, the half-century after 1230 was a time when these developments transformed European worldviews. (Lockman 2010, 31) Thus, the late 11th and early 12th centuries were a period of Western scholars' first efforts to understand Islam more clearly, as well as Western Europe's first encounter with the vast cultural and intellectual wealth of the Muslim world. (Ibid, 34)

By the end of the 13th century, the Crusades had essentially ended. There was little interest or energy among Western European Christians for further alliances to reclaim the Holy Land. In Spain, the Reconquista continued only until Granada, in the far south, fell under Muslim rule. Nevertheless, many Muslims (and Jews) continued to live in the Christian kingdoms of Castile and Aragon.

Medieval Islamic science studies: Scientific motives

The other reason that brought Islamic science to the English-language scientific literature was the establishment of centers for studying the Muslim East and the introduction of manuscripts in Arabic, Persian, and Turkish to these centers. The first systematic study of Islam and its history in Western Europe dates back to the end of the 16th century. The most important events of this stage were the establishment of the Bodleian Library in 1602, the establishment of the Arabic department at the University of Leiden in the Netherlands in 1613 and the famous scholar Thomas Erpenius as its first head, and the establishment of Arabic departments in Cambridge in 1632 and Oxford in 1634. From this time on, serious and continuous study of the Arabic language began.

The fact that Islamic lands had been a major point of contact for European trade from ancient times on the route to India and the Far East was also a major factor in the development of Muslim science and culture. Under Selim I (1512–20), the Ottomans emerged as a new power in the Middle East, and under his successor Suleiman the Magnificent, they became a major threat to the Balkans. In 1529, the Turks first came into conflict with Vienna. In that year, Charles V sent a diplomatic mission to Iran, hoping to gain the Safavid Shah of Isfahan as an ally against the Ottomans. His rival, King Francis I of France, had more successful negotiations with the Turks. Their meeting bore fruit in both political and scientific fields. (Endress 2002, 8)

The Arabic department was established in 1539 at the Collège de France in Paris for the orientalist Guillaume Postel following these events. Postel, who came to Istanbul with the first French ambassador, Jean de la Forest, studied Ottoman Turkish and Arabic language. After that, Postel prepared the first grammar of classical Arabic and published it in an idealized form. In 1543, the king sent the orientalist Postel, who had acquired Arabic manuscripts in the East, to the Istanbul embassy. His student Joseph Scaliger (1540-1609) prepared a comprehensive chronology of history in his work “The Development of the Era” (1583) based on all the sources available at that time, even Eastern sources. (Bulut 2006, 60-61) In 1587, regular Arabic language teaching began at the Collège de France in Paris. (Saliba 2007, 22)

Moreover, the Postel manuscripts that came to the Heidelberg library reached Germany and the Netherlands, enriching Islamic studies. The Dutch orientalist Thomas Erpenius had studied the geography of Abu'l-Fida and the Persian chronicle of Merkhvand. He had a manuscript of al-Tabari's work in Turkic and with it had access to a major source for early Islamic history. The *Arabic-Latin Dictionary* (1653) of Jacobus Golius (1596-1667), Erpenius' successor and student in the Arabic department at Leiden, remained the standard work for Arabic studies for about 200 years. Moreover, he returned valuable manuscripts from the East to Leiden. Around 1609, Golius's student, the German orientalist Levinus Warner, who represented the Embassy in Constantinople, bequeathed about a thousand manuscripts to the Leiden library, and from then on Leiden became the Mecca of European Arabic studies. (Endress 2002, 8)

The Reformation had brought attention to the text of the Bible and its Eastern versions, and people had also come to appreciate the value of Arabic linguistic studies in explaining the cognate Semitic roots of the Hebrew Bible. Among them were William Bedwell (1563–1632), the first modern Arab scholar to bring the study of Arabic to England at Cambridge; Abraham Wheelock (1593–1654), who corresponded with Bedwell from Cambridge; and Edward Pocock (1604–91), the first Arabic professor at Oxford, who was himself a theologian and wrote extensively on the history of Islam. Their works contributed to a better understanding of the pre-Islamic history of Arabia and the dogmatic theology of Islam. He also studied the works of prominent Arab historians, providing much information on literature and science. (Holt 1957, 445)

The import of manuscripts from the Islamic world to Europe and their study were the most important demands of that time. At that time, European libraries took great initiative to bring Arabic, Persian, and Turkish manuscripts to their libraries. They knew that these manuscripts, which belonged to various sciences, contained valuable scientific information, which would lead to the renaissance and prosperity of European science in the future. One of the first initiators of bringing such manuscripts to European libraries was the English diplomat and scientist Thomas Bodley. The Bodleian Library was founded by Thomas Bodley in 1602.

The Bodleian Library's bookshelves were largely enriched by contributions from private collectors. The English historian and orientalist Peter Malcolm Holt identified three main collections as the main pillars of the oriental manuscripts that came to Oxford in the 17th century. These were the large holdings of William Laud, a priest of the Church of England and Chancellor of Oxford University, containing hundreds of Arabic manuscripts; Pocock's private collection; and the third important source of Arabic manuscripts, the manuscripts presented by Robert Huntington. (Holt 1957, 450)

The last stage is the beginning of the historical study of science in the Islamic world in the West with the development of Orientalism as a separate field of science from the 18th century. In general, the 18th century entered the history of mankind as a period of rapid development of intellectual thought and changes in the scientific landscape of the world, which was associated with the expansion of cultural, trade and economic relations between Europe and other parts of the world, especially with the countries of the Muslim East. To strengthen these relations, it was necessary to know the ethno-confessional and scientific-cultural characteristics of these states. The leading center of Islamic and Oriental studies in Europe at this time was Great Britain. This was facilitated by the successful economic development of the country, the presence of trade in Muslim lands, as well as the beginning of colonial expansion in these territories and the desire to engage in missionary activities there. The East India and Levant companies sought to strengthen themselves in India and obtain as many privileges as possible. (Sergeevna 2015, 45)

The word "Orientalism" has been used in many senses, both in terms of the description of a geographical area and in terms of the comparison of civilizations. The main motivation in Orientalism during this period was the desire to know another culture, even a

culture that dominated itself. Pierro Martino, in his book on the rise of Orientalism written in 1906, points to the year 1453 as the birth of classical Orientalism. The conquest of Istanbul and the arrival of people of Greek origin to Europe accelerated the study of Orientalism. The efforts to recognize culture in the period from 1453 to 1780 can be cited as another factor. The second period is the period from 1780 to World War II. This century is also the period of formation of modern historical thought, Eurocentric history, Eurocentric philosophy, and the history of Eurocentric thought related to the Enlightenment. The third period began after World War II. (Davutoglu 2002, 41-43)

The first comprehensive studies in the research centers of European Orientalism were published in the first quarter of the 19th century. As the 19th century progressed, the works of scattered and isolated individual scholars were facilitated by the establishment of an international system for the exchange of ideas and information. The main impetus for this was the establishment of scientific societies. In 1784, the Royal Asiatic Society of Great Britain was established in Bengal. In 1822, the Paris Asiatic Society was established in France, and in 1823, the Royal Asiatic Society in London. France, the most important rival of England in the struggle for world hegemony, also tried to get to know the East, especially the Middle East, in the same years. In 1833, the Sanskrit Department and the "Oriental Studies Translation Agency" were established in Oxford, and more than fifty translated works were published in Hindi, especially between 1829 and 1834. (Tombul 2021, 929)

It should be noted that these societies also had scientific journals operating in connection with the study of the listed goals. It was through these journals that scientific knowledge and discoveries in the medieval Islamic world began to appear in Western scientific literature. This meant the formation of a new scientific direction - Orientalism. For example, since 1834, the journal of the Royal Asiatic Society, which studied the science, history, literature, art and culture of the East, began to be published and quickly gained popularity. In 1842, the American Oriental Society was founded and its journal began to be published from that year. In 1845, the German Oriental Society was founded and in 1847 the society published its Journal. Science in the Islamic world was one of the main topics in the research of all these societies.

The 19th century was a period of widespread research on Islamic science and culture in the West. From this period, Western researchers

began to understand that many of the discoveries and inventions of the Renaissance were made by Muslims in the Middle Ages. Western research conducted in the 19th century on the study of science and culture in the Islamic world in the Middle Ages still has significant intellectual value today. While the aim of some of these studies was to understand the Eastern societies colonized by European powers and to assimilate them with a method of governance suitable to their own structures, another part aimed to study the history of the development of science and culture in the Islamic world in the Middle Ages, to highlight the contributions made by Muslim scholars to science during this period in Western scientific literature, and to familiarize Western readers with this science and culture, and to give Eastern languages and literature the prestige they deserve. It is the responsibility of Orientalists and historians of science to study the history of science in the Golden Age of Islam. If someone who studies the history of science is a historian of science, then someone who studies Islamic science in the West can be considered both an orientalist and a historian of science. There were prominent orientalist-historians of science who studied the above-mentioned field. These orientalist and historians of science worked in various research centers and universities. Elias John Wilkinson Gibb (1857-1901) was one of the most important and early pioneers of these figures. He translated many works from the world of Islam into English. With Sir Hamilton Gibb (1895-1971), a British historian and the most prominent English-speaking orientalist of his time, Oxford entered the mainstream and Islamic studies began to gain a firm institutional footing in Great Britain. (Hourani 1992, 33) The founder of the history of science as a modern academic discipline, and one of the geniuses who systematically studied the history of science, including the history of science in the Islamic world, was George Sarton (1884-1956). George Sarton made the world aware of the achievements of Muslim scientists and presented the initial chronology of science in the Islamic world.

The study of science in the Islamic world was conducted by orientalist and historians of science at the Department of Near Eastern Studies at Princeton University, the Middle East Center at Harvard University, the School of Oriental Studies at the University of London, the University of Pennsylvania, Yale University, the University of Michigan, the Near East Institute in Washington, and the Oriental Institute at the University of Chicago. (Lichtenstadter 2009, 58)

Conclusion

Thus, there were a number of factors that led to the study of the history of science in the medieval Islamic world in the West. These factors include the rise of missionary activity, the beginning of the Crusades, the establishment of centers for the study of the Muslim East, and the emergence of Orientalism as a separate field. All of these events marked an important stage in the historiography of Islamic science in the West.

As noted, the trade relations between the Ottoman Empire and the English further accelerated the development of scientific research in the Islamic world. Factories were established in Constantinople for English merchants. Merchants were the main intermediaries in the acquisition of manuscripts. In 1624, the Irish priest Robert Ussher wrote to the merchant Thomas Davies in Aleppo, asking him to bring manuscripts from there when he arrived. Davies said that the manuscript business was time-consuming and that travel in these countries was difficult. (Holt 1957, 448) One of the interesting facts is that Western researchers have been aware since the late 1950s of the rather intriguing connections between the details of Copernicus's "revolutionary" planetary theory and the work of Muslim astronomers of two or three hundred years earlier. In fact, it is clear that the only mathematical evidence used by Copernicus to support his claim that the universe revolves around the sun, even down to the use of identical symbols at its geometric points, is taken directly from Arabic manuscripts. This problem has never been satisfactorily studied and investigated, as is the case with the contents of hundreds of forgotten scientific manuscripts written over the centuries in the major Muslim languages - Arabic, Persian, Urdu and Turkish. Other orientalists and historians of science who brought science to Western readers in the Islamic world include Philip Hitti, Sir Thomas Arnold, William Montgomery Watt, Donald Hill, Franz Rosenthal, Seyyid Hossein Nasr, Abdulhamid Ibrahim Sabra, Marshall Hodgson, Dmitry Gutas, Linda George, Reynolds Nicholson, and Dorothee Metlitzky. Among the scientists who studied different fields of science in the Islamic world, those who studied chemistry include Eric Holmyard, John Eberly, Joseph Needham, Henry Stapleton, William Newman; those who studied physics include David Lindbergh, Mark Smith, and Roshdi Rashed; in mathematics, Richard Lorch, George Molland, Carl Boyer, and Gerald Toomer; in astronomy, George Saliba, Edward Kennedy, Francis Carmody, Marion Dolan, and Noel Swerdlow; in

medicine, Donald Campbell, Melville Hilton-Simpson, Peter Pormann, Cyril Elgood; and in geography, Ralph Brower, David King, and others.

Therefore, as a result of the scientific research of orientalists in the Islamic world, it became clear that the true Renaissance did not originate in Europe, but in Islamic civilization. And the Middle Ages, which Westerners called dark ages, turned out to be a brilliant era in the Islamic civilization.

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