ASTRONOMY IN TERMEZ IN THE ISLAMIC PERIOD

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ABSTRACT

This article is devoted to the history of astronomy in our country, in particular, the work of scientists of Mowarounnahr in this area. Although Musa al-Khwarizmi and Ahmad al-Farghani are the first Uzbek astronomers, their work in Iraq, Syria and Egypt is a priority. In this context, monitoring local schools and their development is also important.Termez and Chaghaniyan regions, located in the present-day Surkhandarya region, have a special place in this process. In particular, about 70 years after the introduction of the usturlob into the Islamic world, it began to use in the territory of Termez through Muhammad Hakim Termizi (ca. 820-932). Then, in the late tenth century, Ahmad Usturlabi Chaghani's work in the observatories of Baghdad was particularly noteworthy, and his manuscripts are preserved in Turkey, India, Damascus, England, and Paris. Their study will undoubtedly make a worthy contribution to the study of the history of our country's scientists and local astronomy, which has not yet been sufficiently studied. Termez, in general, the astronomical school operating in the Surkhandarya oasis, reached its peak in the form of an observatory built in Termez for 10 years during the reign of Sayyid Abul-Qasim Majdiddin Ali ibn Jafar from 1135 to 1146.It is noteworthy that local scientists such as Adib Sabir Termizi also worked at this observatory.

Haji Khalifa (1609-1657) gives information about Sayyid Jamal al-Din Abu Ja'far Husayn ibn Majd Ali ibn Ahmad Husayn al-Tirmidhi Ayni's book on astronomy in Turkish "Mazaq al-ushshaq fiy ilm al-ofaq" (The taste that lovers find in the science of horizons. In addition, some of the information given by Haji Khalifa about the measurement patterns in Haqqiq al-Irsad means that the observations mentioned in it were in Termez or that these lengths and measurements were according to Termez standards. Because of the research, it can be said that the astronomical school of the Surkhandarya oasis has also been formed at the level of a school that has a place in our country and the Islamic world.

Keywords: *Damascus, Bagdad, Termiz, Chaganian, Hakim Termizi, Madjiddin, Ahmad Sagani, observatory, astrolabe.*

АННОТАЦИЯ

Данная статья посвящена истории астрономии в нашей стране, в частности работе ученых Мовароуннахра в этой области. Муса аль-Хорезми и Ахмад аль-Фергани - первые узбекские астрономы, их работа в Ираке, Сирии и Египте является приоритетной. В этом контексте также важен мониторинг местных школ и их развития. Особое место в этом процессе занимают Термезская и Чаганиянская области, расположенные в современной Сурхандарьинской области. В частности, примерно через 70 лет после появления устурлоба в исламском мире его начали использовать на территории Термеза через Мухаммада Хакима Термизи (ок. 820–932). Затем, в конце X века, работа Ахмада Устурлаби Чагани в обсерваториях Багдада была особенно примечательна, и его рукописи сохранились в Турции, Индии, Дамаске, Англии и Париже. Их изучение, несомненно, внесет достойный вклад в изучение истории ученых нашей страны и отечественной астрономии, которая еще недостаточно изучена. Термез, вообще астрономическая школа, действующая в Сурхандарьинском оазисе, достигла своего пика в виде обсерватории, построенной в Термезе за 10 лет во время правления Сайида Абул-Касима Маджиддина Али ибн Джафара с 1135 по 1146 год. В этой обсерватории также работали местные ученые, такие как Адиб Сабир Термизи.

Хаджи Халифа (1609-1657) дает информацию об астрономической книге Сайида Джамал ад-Дина Абу Джафара Хусейна ибн Маджда Али ибн Ахмада Хусейна ат-Тирмизи Айни по астрономии на турецком языке «Мазак аль-ушшак фий илм аль-офак» (Вкус, который любители находят в науке о горизонтах.Кроме того, некоторая информация, предоставленная Хаджи Халифой о схемах измерения в Хаккик аль-Ирсад, означает, что упомянутые в ней наблюдения проводились в Термезе или что эти длины и измерения были в соответствии со стандартами Термеза. По результатам исследований можно сказать, что астрономическая школа Сурхандарьинского оазиса также сформировалась на уровне школы, имеющей место в нашей стране и в исламском мире.

Ключевые слова: *Дамаск, Багдад, Термез, Чаганян, Хаким Термизи, Маджиддин, Ахмад Сагани, обсерватория, астролябия.*

INTRODUCTION

It is known that the sky has always interested in people with the land on which they live. After all, people have always naturally understood that the root cause and

reasons their existence is inextricably linked with the sky. For this reason, the history of interest in the sky and the objects in it, as well as their scientific analysis, is also ancient. There is no doubt that the systematic study of the history of astronomy in our country as a separate topic is an important part of the study of our history. The following is an analysis of the history of astronomy in Termez, one of the ancient centers of science in the country, in the III / VIII centuries and beyond.

Although the first observatory is attributed to the Greeks, the first written information on the subject dates back to mil. avv. It belongs to the 13th century Alexandria Observatory. Later, in the Muslim era, the word "observatory" was derived from the Arabic word "rasad" and came in the form of "rasad" or "rasd" (observation, inspection) or "marsad" (place of observation, control). It is also known from history that this structure was called differently in different nations. One of the main tools of this observation building is the usturlob.

LITERATURE REVIEW AND METHODS

The meaning of the Greek word "usturlob" (hastrolábon) is said to be "ustur, astr" and "labun", which means "window of the stars". It is also said to consist of the phrases "illumination" and "receiving" or "stars" and "receiving". It is a goniometric shell used for astronomical and geodetic observations. The time of his invention is not clearly limited. However, its first mention belongs to the Greek scholar Aristarchus of the Alexandrian school (ca. 310-230 BC). It is also said that the first person to make usturlob was the Greek Hipparkus (ca. 180-125 BC). But this instrument became world famous and perfected in the hands of Muslims.

The history of usturlob in Movarounnahr is undoubtedly the case of Musa al-Khwarizmi (780-850) (including the book "Working with Usturlob", "The Book of Making Usturlob", "Determining Azimuth Using Usturlob") It goes back to Ahmad Fergani (797-865) ("A Book on Making Usturlob" - manuscripts in the libraries of Berlin, London, Mashhad, Paris and Tehran, on the example of "Book on Making Usturlob"). Musa Khorezmi worked in Baghdad[1], while Ahmad Fergani allegedly worked at an observatory in Damascus and later in Syria and Egypt[2].

At the same time, it is important to study the activities of scientists living directly in Movarounnahr and engaged in astronomy. In particular, Abu Abdullah Muhammad ibn Ali ibn Hasan ibn Bishr ibn Harun al-Tirmidhi (d. 205-318 / 820-932), known as Hakim al-Tirmidhi, was one of the first to use the usturlab to make

[1] Ahmedov A. Muso al-Xorazmiy. Ma'naviyat yulduzlari. 1999, p. 36-44.
[2] Ahmedov A. Ahmad al-Farg'oniy. Ma'naviyat yulduzlari. 1999, p. 44-49.

calculations about the fall and the constellations. possible. He says in his autobiographical pamphlet: “Then one of these years I was busy measuring the work of the fall, studying these calculations from the work of the constellations, and doing the usturlob. So I started working on it with deep disappointment”[3]. The use of the term "usturlob" is very important here. Who made this pillar? Where did he come from? The answer to these questions is still unknown to us. However, one of the first people in our country to use usturlob was Hakim Termizi. If we take into account that this was at the beginning of the author's life, as is clear from the text, it is at least the second quarter of the III / IX century. According to Ibn Nadim (d. 438/1047), Usturlab was first used by Muslims during the time of the Abbasid Caliph Mansur (95-158 / 714-775, caliphate from 136/753). It was made by Abu Ishaq Ibrahim ibn Habib Fazari (d. 180/796), a descendant of the Companion Samura ibn Jundub ibn Hilal Fazari (r.a.) (d. 58/678). He also made mitbah (instruments for latitudes) and mistah (instruments for levels) and wrote books on the science of nujum, the measurement of zawals, and the use of zij and usturlob[4]. It is also possible that Muhammad Hakim Termizi read these works. It follows that this device was also used in Termez for about 70 years after it was first made in the Muslim world.

Born in Egypt and living in Aleppo, he served as a judge and minister, had a library of fifty thousand dinars, and devoted his life to science, avoiding family worries. the Christian Ibn Abri (623-685 / 1226-1286) Abu Hamid Ahmad ibn Muhammad Soghani gives information about Usturlabi. Ibn Ibri used the nickname "Logic" instead of "Usturlabi". He says he is a master at handasa and astronomy. He has disciples who are attributed to him and are proud of it. He was extremely skilled in making usturlob and other observatory instruments, adding to the ancient usturlob and thus surpassing the scientists in this field in a way that no one else has. His instrument is well-known in this time and time in the hands of the masters of this field. He was built by Abu Sahl Wayjan ibn Rustam Kuhi in Baghdad (originally from the mountains of Tobaristan, d. 390/1000), built by Sharofuddavla Sherovayh Abulfavoris (340-379 / 951-989), the son of Azduddawla, who is recognized as a righteous emir. provided special services in the construction and operation of the plant. He finished his letter with the sun's two constellations. This Abu Hamid died in Baghdad in the month of Dhu'l-Hijjah, or Dhu'l-Hijjah (late January-February or March 990), on the date of the three hundred and seventy-ninth. He was one of the

[3] Hakim Termiziy. Buduvvu sha’n. Xatm al-avliyo. 1965, p. 27. O’zbekcha tarjima: Buduvvu sha’n. Muhammad Hakim Termiziy risolalari. 2017, p. 37.
[4] Ibn Nadiym. Al-Fihrist. 1971, VII, p. 332.

key figures in evaluating the activities and findings of this observatory. Qiftiy mentions his name during one of these observatory meetings, including his full name in the list of those present, and adds the nickname "sahib al-usturlob" (owner-author of usturlob).[5] Modern scholars who later referred to this Saghani Usturlabi relied on Ibn Ibri and Qifti [6].

DISCUSSION

According to the information, this Ahmad ibn Muhammad Soghani Usturlabi's book "Kitab fi-t-tastihit tamm" (Complete Measurement of Levels) under the number 4/3342 in the Topkapu Palace Library in Istanbul, Turkey, and also in the Khudabahsh Library in Patna, India, under the numbers 90/22 and 49/2468 There are works under the title "The mood of the book is confirmed by the level of the kurra 'ala sathil usturlob" There is also information about Usturlabi's other works preserved in Damascus, England, and Paris, as well as Beruni's views on him and his scientific observations in his works[7].

What about the place of comparison of "Sogoni" in this place? According to Samani, the Sogoni ratio is given in two places and is written in two ways: So (o) go (o) niy (صاغاني) and Sogo (o) niy (صغاني). The first is, “It is one of the villages of Marv, also called Jo (o) go (o) n (جاغان). The next one is in Movarounnahr, the name of the place adjacent to Termez. Chaghaniyon is located in Altynsay, Denau, Boysun, Kumkurgan, Sariosiyo and Shurchi districts of the present-day Surkhandarya region.[8] But the problem is not solved by this. Because Samani says that the first ratio also applies to the second place. There is even sometimes confusion about it. For example, Abu Bakr Muhammad ibn Ishaq Sogha (o) niy is also called “So (o) go (o) niy” and he is actually from Soghaniyan. Muslim historians and geographers, including Samanids, mainly use "Sogo (o) niyo (o) n" (صغانيان)[9]. Thus, according to sources, the above Usturlobi may also belong to the Sogoni in Movarounnahr. Because the village in Merv is relatively small, while that in Movarounnahr is known and popular and covers a large area. Beruni also calls him Abu Hamid Soghani[10]. Furthermore, as noted above, Muhammad Hakim al-Termizi mentions in his autobiography that he used the usturlob. It is possible that this Usturlobi continued this work. It should be

[5] Qiftiy. Tarix al-hukamo. 1903, p. 79, 353. Ibn Ibriy. Tarix muxtasar ad-duval. 1994, p. 307.
[6] Farshux. Mavsu’atu abaqirotul islam. 1995, V, p. 93. Zirikliy. Al-A’lom. 2002, I, p. 210.
[7] Abduhalimov B. Ahmad Usturlobiy. Ma’naviyat yulduzlari. 2001, p. 62-64. Abduhalimov B. Bayt al-hikma va O’rta Osiyo olimlarining Bag’doddagi ilmiy faoliyati. 2004, p. 188-190.
[8] Kamaliddinov Sh. Istoricheskaya geografiya Yujnogo Sogda i Toxaristana. 1996, p. 132.
[9] Sam’oniy. Al-Ansob. 1980-1984. VIII, p. 9, 68-70.
[10] Beruniy. Al-Asar al-boqiya. 1878, p. 357.

noted that the observatory work in Termez continued. A future study of the above-mentioned manuscripts of this Soghani may also resolve the controversy in this regard. In general, the fact that Sogani reached this level in terms of the observatory and its instruments, and Hakim Termizi's use of the usturlob and his deep frustration with it, testify to the development of astronomical knowledge in the present-day Surkhandarya oasis, especially in Termez. According to some sources, Muhammad Hakim Termezi and this Usturlabi were cousins and mentor disciples. However, these sources have not yet been studied in detail and critically.

The first Muslim observatory was built by the Umayyads in Damascus. But Ma'mun (170-218 / 786-833, caliphate: 198-218 / 813-833) was the first to establish the use of appropriate instruments in the observatory and ordered the construction of a large observatory on Mount Qasun in Damascus and Shammasia in Baghdad. After Ma'mun, observatories spread throughout the Muslim world[11]. Mamun's observatory was built in 215/830 and lasted until 218/833, ie until his death[12]. According to reports, the first observatory in the caliphate Until the middle of 828, it was built in the Shammosiya neighborhood of Baghdad, and the other on Mount Qasun near the Deir Murrai Church near Damascus. The first was founded by Yahya ibn Mansur of Marwah, and the second by Khalid ibn Abdulmalik Marvirrudi[13].

RESULTS

There is clear information that an observatory was also built in Termez, one of the important political and cultural centers of Movarounnahr. According to medieval sources, the territory of Termez as a region is a small tributary of the Surkhandarya River to the Amu Darya and a triangular area bordering the Zang Canal in the north, ie its present-day Termez, Angor, Muzrabat (old Gagarin region, along the present railway tracks along the Amudarya). Dzharkurgan, Sherabad region (up to Darband)[14]. It is known that in Termez, sayyids played an important role in cultural life, among other things. According to the sources, Majdiddin, one of the Sayyids of Termez, established an observatory dealing with astronomy. Ibn Funduk Zahiriddin Bayhaqi (499-565 / 1106-1170), who was engaged in the sciences of arithmetic and astronomy and is said to have completed 74 books, provided information in this regard. He says in the chapter "Termez Naqibs" of Lubab al-Ansab (Original of Nasabs): Then, from

[11] Farshux. Mavsu'atu abaqirotul Islam. 1995, V, pp. 23-25, 32-35.
[12] Zirikliy. Al-A'lom. 2002. VIII, p. 173.
[13] Bulgakov P. O'rta Osiyo olimlarining Bag'doddagi faoliyati. Sharqshunoslik, 1990. №1, p. 25.
[14] Kamaliddinov Sh. Istoricheskaya geografiya Yujnogo Sogda i Toxaristana. 1996, p. 114.

the thirties to the forty-first year, he trained the philosopher Abdurazzaq Turk and a group of engineers and spent a lot of money on it.

In the edition of Lubab al-Ansab that we used, the death of this sayyid was given as Shawwal 505 / April 1112. But this is a mistake in the manuscript. It turns out that in Lubab al-Ansab, the word "forty" was dropped after "five hundred." Such errors have been observed in genealogical books published in Iran. It is known that the well-known scholar Shahristani (479-548 / 1086-1153) worked in the office of this sayyid and dedicated such famous works as “Al-Milal van nihal” (Beliefs and sects) and “Musora'atul falasifa” (Controversy with Philosophers) to him. In fact, these two works, and especially the last one, were written at the suggestion of this sayyid. According to sources, the book Al-Milal was written in 521/1127. Shahristani's researcher Suhayr Muhammad Mukhtor studied Shahristani's book "Musora'a" and prepared it for publication, and at the beginning of the book there is an introduction by Shahristani dedicated to this sayyid. According to the researcher, Sayyid Ali ibn Ja'far died in 545/1150, and he was the governor of Termez, attracting scholars from different countries and conducting scientific work. Shahristani was one of those involved[15]. Therefore, the phrase “from the thirtieth to the forty-first year” about the time of construction of the observatory above refers to the years 530-541 / 1135-1146. This observatory has been built for a long time, many specialists have been involved and, as mentioned, a lot of goods have been spent, so it can be assumed that it has a large and well-equipped structure and meets the demand for serious research. He also had nicknames such as "Raisu Khurasan" (Chairman of Khurasan) and "Sodrul Mashriq" (Honorable Man of the East)[16].

Ibn Funduk gave the full name of the Sayyid who built the observatory as the Naqib of Termez: Majdiddin Abul Qasim Ali ibn Fakhriddin Ja'far ibn Ali ibn Ja'far ibn Muhammad ibn (Isa ibn) Musa ibn Ja'far ibn Ibrahim ibn Musa ibn Ibrahim ibn Musa Kozim ibn Ja'far ibn Muhammad ibn Ali ibn Husayn ibn Ali ibn Abu Talib (r.a.). The author calls him the master of the east and the west[17]. Fakhriddin Razi (544-606 / 1150-1210) gives his name as follows: “Sayyid Ali ibn Ja'far ibn Ali ibn Ja'far ibn Muhammad ibn Isa ibn Musa ibn Ja'far ibn Ibrahim Asghar ibn Musa Kozim. He has a son named Muhammad. ”

Qazi Marwazi and Fakhriddin Razi reported on Muhammad, the son of this Sayyid. According to Qazi Marwazi (572-614 / 1176-1217), this person, who was the

[15] Shahristoniy. Musora’a al-falasifa. 1976, p. 13, p. 31.
[16] Nasiyriddin Tusiy. Musori’ al-musori’. 1984, muqaddima, p. 17.
[17] Ibn Funduq. Lubob al-ansob. 2007, p, 566, pp. 573-575.

chairman of Termez, is one of the most famous in the world in virtue and generosity. Like his text, he has delicate and subtle poems at the same time. His goodness is the same over time. He is praised with Arabic and Persian poems. The last to praise him was Adib Sabir Termezi[18].

The Termez Observatory is also mentioned in the poems of Adib Sabir Termezi (ca. 471-542 / 1078-1147) dedicated to Sayyid Ali ibn Ja'far:

Расад, ки аз хулафою мулук асар монад,
Ба рўзгори ту ўро падид шуд итмом.

Contents:
The observatory monument will be a symbol of caliphs and rulers,
That is why this magnificent structure was built in your time.

Расад, ки рост ниҳодй миёни аҳли нужум,
Вужуд ёфт ҳисобе, ки дошт бими адам.

Contents:
At the observatory, you restored it for the astrologers,
As a result, all extinction accounts were restored[19].

From this and the above information, it can be concluded that the Naqibs of Termez were appointed from the descendants of Imam Husayn (r.a.). They played a special role in the scientific and spiritual environment of Termez and also led the work in this area.

The judge and philosopher Muhammad Afzal Abdurazzaq gave information about the Turks to Ibn Funduk about the rulers of the V-VI / XI-XII centuries and the "Tatimmatu sovan al-hikma" (Wisdom) known as "Tarikh al-hukamo al-Islam" (History of Islamic Rulers). shelf improvement). He said that he was a student of the writer Abulabbas and was a master in the art of handasa (geometry), a scholar of mental sciences. There was some scholarly debate between him and Amir Sayyid Sharafuzzaman Muhammad Ilaqi. He was the hafiz of most of the books of Abu Ali (Ibn Sina) and the one who demanded his books. But he did not go as deep in the mental sciences as the scholars of his time. Bayhaqi then says that there were correspondences between him and himself and that he included them in his book Aroisun nafois. Then he gives two views on public administration, reason, and

[18] Qozi Marvaziy. Al-Faxriy. 1989, p. 13. Faxriddin Roziy. Shajara al-muboraka. 1988, p, 87.
[19] Abdullaev A. Adib Sobir Termiziy. 2003, p. 11-12.

imagination as examples of his wisdom. In the end, he says: "Qazi Abdurazzaq taught medicine and arithmetic in the mosque of his mahalla in Bukhara until his death, and he was a respected and honorable person"[20].

Haji Khalifa (1017-1067 / 1609-1657) “Sayyid Jamaliddin Abu Ja’far Husayn ibn Majd Ali ibn Ahmad Husayn al-Tirmidhi Aini” in Turkish “Mazaq al-ushshaq fiy ilm al-ofaq” The book “The taste that lovers find in the science of horizons”). But his life date is not given[21].

The observatory in Termez may also have been operating around 800/1397. The point is that Haji Khalifa Sheikh Tajiddin Abulfath Ahmad Ali (Lari) ibn Badr Muhammad ibn Hajjaj, referring to Imadi Kamali's work entitled "Haqoiqul irsod fiy daqoiqul irshad" (proportional, symmetrical position) According to the length of the termite ”and gives some signs and measurements of width and height. Then it is said that the author was freed from these measurements and observations in 800/1397[22]. These observations may indicate that they are in Termez or that these lengths and measurements are in accordance with Termez standards.

Based on the above, it can be said that later the experiments in Ulugbek Observatory were usевdin the construction of the Termez. It is noted that the inscription on the back of the instrument found in the Ulugbek Observatory reads: "This instrument was made by the master of Termez Hashim Muhammad”[23].

CONCLUSION

So, although the sources' information on this subject is fragmentary, important conclusions can be drawn from them. According to written sources, astronomical research was carried out in Termez, in the III / IX centuries, in the present-day Surkhandarya oasis. In the VI / XII centuries there was a huge and well-equipped observatory, where works on astronomy were written. Termez had its own template and dimensions in this regard, which means that it was formed as a separate school. There is no doubt that the search, study and scientific analysis of specific sources or information on the sources of astronomy written in our country is an important task. It should be noted that large-scale research in this area of science serves to understand and raise the level of intellectual potential of our people, as well as an important basis for our scientific achievements today and in the future.

[20] Ibn Funduq. Tarix hukama al-islom. 1996, p. 217.
[21] Hoji Xalifa. Kashf az-zunun. II, p. 1645.
[22] Hoji Xalifa. Kashf az-zunun. I, p. 671.
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