

[DOI: 10.20472/IAC.2015.017.019](https://doi.org/10.20472/IAC.2015.017.019)

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MUSTAFA BIN ALI AL-MUVAQQIT'S RUB'- I DĀ'İRE RISĀLE

Abstract:

The subject of our study which we prepared thinking that it would benefit Ottoman Turkish and the studies in the field of astronomy is the work of Mustafa bin Ali al-Muvaqqit, who lived in the sixteenth century and made major contributions to astronomy in Ottoman era and also who was the chief astrologer of the Ottoman sultan, named " Risâle- i Rub'-ı Dâîre". Rub'-ı daire is a hand tool used in the calculation of prayer times, measurement of height and some trigonometric calculations.

The astronomy studies in Ottoman era, the places where astronomy science was carried out and the people who studied have been briefly mentioned.

The known things about the life and works of Mustafa bin Ali al-Muvaqqit, the author of the work, have also been tried to summarize generally.

Terms related to astronomy in the work have been presented in the form of dictionary in order to shed light on the studies in the field of astronomy and determine the level of astronomical knowledge of the Ottomans in that century.

Keywords:

Ottoman Turkish, Mustafa bin Ali al-Muvaqqit, Rub'-ı daire, Astronomy.

Introduction

The astronomy in the Ottoman was continued from the Islam World which has been before the Ottoman. However, Islam scholars couldn't suggest theories which could make important changes as medicine, mathematics, and physics about astronomy. Their works usually were experimental. Many books were written about not only general astronomy but also astronomy tools and determination of time.

The first scholars who were interested in astronomy in Ottoman age lived at the beginning of 15th century. They were representatives of Eastern Astronomy. The first effects of Western Astronomy was started to be felt at middle of 16th century. (Fazlıoğlu et al., 1997)

Çelebi and, Fethullah el- Şirvani were people who contributed to books which about astronomy with explaining and translation in Ottoman age. It is seen that the number of books which about astronomy was increased at the beginning of 16th century. Most of the books whose Muhammed b. Katib Sinan, Mustafa bin Ali al- Muvaqqit, and Seydi Ali Reis are in Turkish. When Yavuz Sultan Selim conquered Damascus and Egypt, the astronomer who lived in the area became Ottoman citizen. Thus the centers of astronomy in Ottoman became Istanbul and Cairo. The famous astronomer Takiyüddin is from Şam. (Fazlıoğlu et al., 1997)

16th century was the era when Ottoman reached to summit in all points. Also this era was the best time of Ottoman about science, culture, and art. Eighty five of six hundreds astronomers and writers who formed Ottoman astronomy literature lived in this century. The most important books about astronomy of Ottoman were written in this century and nearly sixty books of them were written in Turkish. In 17th and 17th century scholars as Ridvan el- Feleki, Hasan el- Ceberti, Salih el- Mimari, Cinari İsmail Efendi, and Bahaeddin el- Amili worked on astronomy in Istanbul and Egypt. (Fazlıoğlu et al., 1997)

All kind of astronomy books were written but especially a lot of books were written about "rub el- müceyyeb, rub el- mukantar, and usturlab". These tools and zics (a tool which help to show stars' location) was been important because they helped to form calendar. Determination of times of religious festivals, fasts, prayers, and hajj were very important for religion and religious scholars. Many works were done which not about science; however, for determination of time easy methods were putted forward as calculation schedules. (Fazlıoğlu et al., 1997)

While traditional astronomy books were written, Ottoman scholars started to hear the developments in the West until 16th century. Practical astronomy attract attention much than key works about astronomy in the West. (Fazlıoğlu et al., 1997)

In the first half of the 19th century the old astronomy was neglected and the new one was accepted. Furthermore, old astronomy books were still written until the beginning of 19th century. The works which after this work are in the form of the science history. Ottoman always trained astronomy scholars and were interested in some degree in the developments about astronomy in the world. Ottoman didn't live a dark age as every sciences and literatures, the scientific tradition was continued. (Fazlıoğlu et al., 1997)

I. Muvaqqithanes

In the Ottoman-Turkish civilization, muvaqqithane the name of the public buildings known as the imaret; almost every city and town, are institutions that in one or two rooms

in the mosque yard. Muvaqqithane, it is governed by the külliye's foundation. Muvaqqit who was serving these places.(Aydüz, 2004:92)

In the muvaqqithane where established to determine prayer times, this work was be done with help of sundials. Muvaqqithane is a simple observatory and astronomy education place according to information of muvaqqits. Moreover, muvaqqits taught simple astronomy whoever want. Some of muvaqqits prepared the yearly calendars and fasts for Ramadan month. All muvaqqits could use simple astronomy tools, and some of them had knowledge as much as to could write astronomy books.(Aydüz, 2004, p.92)

Although mechanic clocks became widespread in the XIX. century, muvaqqithanes kept their existence until Ottoman's end. Muvaqqithanes which transferred a new institution called as "chief muvaqqit" when Turkish Republic was announced and then they were closed on September 20, 1952.(Aydüz, 2004, p.92)

II. Chief Astrology

People who explain stars' movements, cast horoscopes and work on astronomy called as "astrologer". Person who leads astrologers in the Ottoman palace called as "chief astrologer". Chief Astrology was an institution which emerged in the late 15th century and the early 16th century.

Chief astrologer had many duties about astronomy and astrology in Ottoman palace in the 16th century. Since 16th century, chief astrologer has worked on calendar, prayer time, zayıçe(a scale that show stars' locations and movements at a certain time) for leading dignitaries. Their the most important duty was prepare the calendar. Moreover, every Ramadan months ago, they had to prepare fast time and zayıçe. They determined auspicious times as cülus(when sultan accession to the throne), birth, wedding, ship launching, releasing of special horses to meadow, sultan's going time to the summer and winter resorts. Furthermore, Chief astrologers worked on comets' movements, earthquakes, fires, solar and lunar eclipses times and then they had determined them before informed dignitaries. Chief astrologershad management of muvaqqithanes.(Fazlıoğlu et al., 1997, p.196)

Thirty seven people as Seydi İbrahim b. Seyyid, İshak Sadi Çelebi, Yusuf b. Ömer, Mustafa bin Ali al- Muvaqqit, Takiyüddin Râsıd, Hüseyin Hüsnü, Sadullah Efendi, Hüseyin Hilmi Efendi and Derviş Ahmet Dede have been chief astrologer in the Ottoman Empire. Chief Astrology has continued according to a certain system from 16th century to end of the Ottoman Empire. It is rendered null and void in 1924 and then "chief Muvaqqithane" was established in 1927.(Fazlıoğlu et al., 1997, p.198)

III. Mustafa bin Ali al- Muvaqqit

Mustafa bin Ali al- Muvaqqit was muvaqqit and geographer and the one of the most important astronomers in the 16th century who practical astronomy establisher with ilm-i mikat (science of determination of prayer times). He followed and finished almost all of works of Muhammed İbni Katib Sinan al- Konevi who had started to translate Hellenistic and classical İslamic astronomy literature to Turkish. However, he worked on mathematical geography. Because of his technical and practical works which about ilm-i mikat and astronomy tools' technic, he was named as "el- Muvaqqit" . (Fazlıoğlu et al., 1997,p. 161-179)

Mustafa bin Ali al- Muvaqqit was born in İstanbul in the earth of the 16th century. He took lessons from best scholars in that era as Mirim Çelebi(Ali Kuşçu's grandson). Mustafa bin Ali al- Muvaqqit grew up in a development scientific area when was built on

Fatih Sultan Mehmet era and then developed on 2nd Bayezid era. After that, he has been muvakkıt in Sultan Selim Mosque for a long time. So he was named as “Koca Saatçı” and “Selimi”. After that, he was appointed as chief astrologer. (Fazlıođlu et al., 1997,p.161-179)

Mustafa bin Ali al- Muvaqqıt worked and wrote books based on that era’s astronomic necessities. Furthermore, he translated not only astronomy but also especially all of practical Greek- Hellenistic and Islamic astronomy heritages to Turkish. Moreover, he provided that astronomy language to become Turkish language. His books were used in Ottoman area as İstanbul, Balkans, and Anatolian because of their practical characters and being Turkish language. His works could be understandable widespread and long-term useful from their lots of copy came to nowadays. (Fazlıođlu et al., 1997,p.161-179)

Mustafa bin Ali al- Muvaqqıt who following the line of practical astronomy used to high level of geometry, trigonometry, spherical trigonometry, and numerical analysis. Furthermore, he explained the questions in easy and understandable language and then solved them with easy and practical ways. (Fazlıođlu et al., 1997,p. 161-179)

IV. Rūb’- ı Dā’ıre (Rubu Board)

Prayer times are determinate according to location of sun in the sky in the Islam. Location of sun in the sky is known with hour degree of the sun. Islamic astronomers paid attention to determination of time because of their religion. They worked on not only theoretical solution but also practical determination of this problem. As a result of, they inverted sundials and some tools and developed them. Rubu board is a tool that using for determination of time with observation of sun height. (Dizer, 1987, p.10)

Rubu board is a hand tools that using for determination of prayer times, measuring of height, and calculating of some trigonometric values. It includes geometric shapes and it has a quadrant shape so its name is rubu (quadrant) board. (www.turkcebilgi.com)

Rubu board consists of a quadrant that has parts on its periphery and a swivel bar in the center. Rubu board was designed as two sides. One side is called as rub el- müceyyeb (sinus and cosine parts) the other side is called as rub el- mukantara (gradual partitions). Sinus side consists of lines which taken as the unit circle radius divided into sixty parts and then quarter circle degrees show sinus and cosine values. Gradual partitions side shows projections of equator and circles that is kept on height and lowness based on the observation point. (www.bul2.com// encyclopedia)

V.About Risāle-i Rūb’- ı Dā’ıre

The book is worked on Risāle-i Rūb’- ı Dā’ıre that is saved as Kifayetü’l -Vakt Marifeti’d- Daire ve Fadla Ve’s- Semt in Konya Region Manuscript Library 4166 number. The first line of the book, as the title begins with Heza Risāle-i Rūb’- ı Dā’ıre phrase.

There is a page that includes pictures before text. Katib el- Hac Abdullah Zihni is registered here as author. After a pray part which is at the beginning of book author introduce himself as “... this helpless İbadullah Mustafa bin Ali al- Muvaqqıt”. This copy of the book which was written by Mustafa bin Ali al- Muvaqqıt in 16th century was written by el- Hac Abdullah Zihni.

Book was drawn up as thirteen lines which include legible and without vowel points letters. The book includes twenty four pages. The book is about using of the rūb'- ı dā'ire tool.

VI. Contents of the Book

The book starts with “Bismillahirrahmanirrahim” and then continues with pray. After that author is introduce himself as. The book consists of a foreword and twelve chapters. The chapters of the book are as the follows:

- 1.Mukaddime (Foreword)
- 2.El- bâb el- evvel, fî ma'rifet-i cümel el- kebir (first part)
- 3.El- bâb el- sani, fî ma'rifet-i ahz el- irtifa (second part)
- 4.El- bâb el- salis, fî ma'rifet-i vaz el-mürî 'ala derecetü'ş-şems fî ecza el-mıntaka (third part)
- 5.El- bâb-i rabi', fî ma'rifet-i meyl el- şems ve gayet-i irtifa'ha ve cihete külli minha (fourth part)
- 6.El- bâb el- hamis, fî ma'rifet- iarz el-beled mine'l- gayete ve'l meyl (fifth part)
- 7.Ve'l- sadis, fî ma'rifet-i nisf el-fadla ve nisf-ı kavs el-nehâr ve'l-leyl (sixty part)
- 8.El- bâb el- sabi' fî ma'rifet el-dâir ve fadle'l- dâire (seventh part)
- 9.El- bâb el-samin, fî ma'rifet-i irtifa' el-'aşr ve'l-dâir bine'l zahir ve'l-'asr ve'l- dâir bine'l-'asr ve'l- gurub (eighth part)
- 10.El- bâb el- tasi', fî ma'rifet-i havl evvel-i vakt-i magrib ve hasiyeti el-şafak ve'l- fecr (ninth part)
- 11.El- bâb el- a'şer, fî ma'rifet-i el-semt mine'l- irtifa' (tenth part)
- 12.El- bâb el- hadi-'aşer, fî ma'rifet-i ihrac el-cihad el- erba'a ve nasb el-kible (eleventh part)
- 13.El- bâb el- sâni- 'aşer fî ma'rifet-i ihrâc el- cihâd el- erba'a ve naşb el- kıble (twelfth part)

The book's chapters are explained in Turkish after are given in Arabic. Titles of chapters are written in red ink. Not only titles of chapters but also some words as “dahı, pes, eger, amma”, zodiac names, and examples are written in red ink, too. Some important statements are crossed to attract attention to them.

Mustafa bin Ali al- Muvaqqit used understandable and nice Turkish in the book. The author's effort which trying to Arabic and Persian language words translate to Turkish is remarkable. When Arabic and Persian language terms are used, their Turkish synonymies are used also to make the book understandable. If there is not Turkish synonym, Turkish meanings of them are used right after Arabic terms. The chapters of the book are completed with their Turkish meanings right after Arabic.

VII.Dictionary

Terms related to astronomy in the work have been presented in the form of dictionary in order to shed light on the studies in the field of astronomy and determine the level of astronomical knowledge of the Ottomans in that century.

'**aḳreb** : hour hand.

'**aḳreb** : scorpia.

'**ām** : year.

'**aşr** : midafternoon .

'**aşr-ı evvel** : time of the midafternoon namaz.

burç : astrological sign.

burūc : astrological signs.

cānib : direction.

cedī : capricorn.

cenūbī : southerly.

cenūbiyye : southerly.

cevzā : gemini.

delv : aquarius.

esed : leo.

faḳl-ı dā'ir : meridian angular distance from the sun.

faḳle'l- dā'ire : meridian angular distance from the sun.

faḳla : The difference between the meridians with arc.

fecr : dawn.

felek : sky.

ḫamel : aries.

ḫūt : pisces.

irtifā'ha : height.

istivā : noonday.

'**itidāl-i vaḳt** : equinox.

i'tidāleyn : equinox.

ḳavs : sagittarius.

ḳavs : arc.

ḳavse'l- irtifā' : arc of height.

ḳavs-i irtifā' : arc of height.

ḳavs-i leyl : arc of night.

maḡrib : west.

maşrık : east.

medār : orbit.

medār-ı cedī : tropic of capricorn.

medār-ı serātān : tropic of capricorn.

medārā : orbit.

medārā-ı ḫamel : aries orbit.

medārā-ı i'tidāl : equinox.

medārāt : orbits.

merkez : midpoint.

mınṭaḳa : area at the top of a round.

mınṭaḳa-ı cenūbiyye : eastern region.

mınṭaḳa-ı felek : globe.

mīḳat : time.

mizān : libra.

mürī : thread.

müsteviyye : plane.

nışf : half.

nışf-ı ḳavsü'n- nehār : meridian circle.

nışfi'n- nehār : meridian.

noḳta : location.

rub' : dial.

rub'-ı dā'ire : Wall dial.

şākūl : plum.

sema' : sky.

şems : sun.

seretān : cancer.

şimālī : northern.

sevr : taurus.

şimāliyye : northern

sumūt : direction.

tan : dawn.

şafaq : dawn.

ufuk : horizon.

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