Astronomical Activity in Medieval India in Sixteenth-Seventeenth Centuries

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Özet

16. ve 17. yüzyıllar Hint tarihinde, Saltanat (1191-1526) ve Babür (1526-1857) saltanatlarının dönemleridir. Bu dönemde özellikle Orta Asya'dan getirilen el sanatları ve erkek sanatçıların ve bilginlerin sabit bir akışı olmuştu bilinmektedir. Bu çalışmada, bu dönemdeki Hint astronomi çalışmaları ve Osmanlı Türklerinin astronomi çalışmaları karşılaştırılmalı olarak ele alınacaktır.

Anahtar Kelimeler: Hint astronomisi, Osmanlı astronomisi, astronomi tarihi.

Ortaçağ Dönemi'nde Hint'te Astronomi Çalışmaları

Abstract

It is well known that during the medieval period of Indian history, the Sultanate (1191–1526) and Mughal (1526–1857) periods, there had been a constant stream of scholars, crafts men and artists particularly from Central Asia, who brought with them knowledge of all sciences into India. In this study, astronomical studies in the Indian astronomical studies and in the Ottoman Turks comparative studies will be discussed in astronomy.

Keywords: Astronomy in the India, astronomy in the Ottoman, history of astronomy.

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1. Introduction

It is well known that during the medieval period of Indian history, the Sultanate(1191–1526) and Mughal (1526–1857) periods, there had been a constant stream of scholars, crafts men and artists particularly from Central Asia, who brought with them knowledge of all sciences into India. As a matter of fact, we may recall that emperor Babur (prior to his conquest of India) had forged an alliance with the Shāh Ismāʿīl I of Persia and his son emperor Humāyūn had bonded a friendship with his son Shāh Tahmāsp (d.1576). Consequently, even during the following reigns of Emperor Akbar (d.1605), Jahangir (d.1627) and Shahjahan (ruled 1627-1658), the cordial relationship with Iranian Safavide rulers, namely Shāh ʿAbbās I (d.1629) and Shāh ʿAbbās II (d. 1666) strengthened further.[1] There exists in the literature an interesting reference that Shah ʿAbbās I sent to Jahangir on his request, as gift the *original* astrolabe of Sultan Ulugh Beg — the founder of the astronomical observatory at Samarqand in 15th c. The Shah of Iran kept for himself only its copy![2] Another noteworthy gift by the Shah was a large ruby inscribed with the name of Ulugh Beg, and which was presented to the then prince Shahjahan by the Iranian ambassador in about 1620–21.[3] Evidently in such a politico– cultural milieu, several scholars/scientists flocked to the courts of Medieval Indian Sultans and Emperors who patronized them liberally and immensely. In this perspective, one may understand the origin of exact science: astronomy and mathematics, the primary sources in Arabic and Persian of which were transmitted to India during the medieval period and which were further developed on the erstwhile Indian subcontinent.[4]

2. Babur (reign 1526–1530) and Humāyūn (d.1556)

Babur's interest in astronomy is corroborated by his visit to Ulugh Beg's observatory and its brief description in his *Memoirs.* He even noticed the difference in the direction of Qibla in the Ulugh Beg's Madrasa and Masjid al–Muqattaʿ, both in Samarqand. He even mentioned an observatory "... in India in the time of Rāja Bikarmājīt, the Hindu, in Ujayyin [modern Ujjain] and [... another] in Dahār, in the kingdom of Mālwa. The astronomical tables prepared there 1584 years ago are still in use in India...".[5] He might have promoted astronomy in India after Ulugh Beg's school of Samarqand, but for his untimely death.

1 Riazul Islam (1970), Preface, p. xxi; see also chapters IV-VI.

2 *Ibid. p. 72.*

3 *Ibid.* p.80. Riazul Islam quotes here *Tūzuk-i Jahāngīrī*, translated by Rogers and edited by Beveridge, Vol.II, pp. 195-196.

4 For a review on Islamic Astronomy and its Transmission into India, see also Ansari (1995), Appendix I.

5 Sayili, pp. 264,275, 276, 358. Sayili concludes also that the Ujjain observatory dated back to the first century BC.

Humāyūn's Innovations

Naṣīruddīn Muḥammad Humāyūn bin Babar had been a poet,[6] an astronomer and a great patron of scholars and litterateurs. For instance, *Humāyūn Nāma* is a commentary on al–Qushchī's *Risālah dar ʿIlm-i Hay'at* (a tract on the science of astronomy),[7] written by Muṣlaḥuddīn al–Lārī al–Anṣārī (d.1571) and *Jawāhar al–ʿUlūm Humāyūnī* (an Encyclopedia of Sciences) written by Fāḍil Samarqandī, both dedicated to emperor Humāyūn.[8] The historian Badāyūnī calls Humāyūn a man "adorned with all excellencies and perfections ... unequaled in the sciences of astrology and astronomy...".[9] Similarly the historian Firishta has to say the following for Humāyūn:[10]

> *"... He devoted himself ... to the sciences of astronomy and geography; and not only wrote dissertations on the nature of elements, but had terrestrial and celestial globes constructed for his use. He also caused seven halls of audience to be built, in which he received persons according to his rank. The first, called the Palace of Moon, was set apart for ambassadors ... the second, called the Palace of Ootarid [correct spelling is 'Uṭārud, i.e. Mercury], civil officers, ... and there were five other palaces for the remaining five planets. In each of these buildings he gave public audience, according to the planet of the day. The furniture and paintings of each as also the dresses of household attendants, bore some symbol emblematicl [i.e. symbolic representation] of the planet."*

Firishta has not given any reference to the Humāyūn's planetary symbolism. However, it is known today that Ghiyāthuddīn alias Khwāndamīr (d.1535) was commissioned by emperor Humāyūn to write a history of "rules and ordinances and buildings erected by his order", also of his innovations and festive celebrations. The title of this uncommon history is *Qanūn-i Humāyūnī* or *Humāyūn Nāma.*[11] In this work, an account of a different yet similar ranking of Humāyūn's courtiers for the purpose of holding meetings/audiences according to planetary symbolism has been described by Humāyūn's innovation of a "carpet of merriment" (*Bisāṭ-i Nashāṭ*).[12] On this round carpet all planetary orbits (*Aflāk)* are represented two-dimensionally as concentric circles, the various colours of which correspond to astrologically as-

6 The manuscript of his Diwān is extant in Khuda Bakhsh Oriental Public Library, Patna (India), Ms. No. 1259. It was also edited and published by Hadi Hasan (Aligarh).

7 For details cf. Ansari (1995), Appendix I, p. 293.

8 Hadi (1985), and Ansari (1985)

9 Badayuni/ Ranking, p. 602.

10 Firishta / Briggs, pp. 44 – 45.

11 See the Bibliography for reference to text and its English translation.

12 See details with references in the first paper by Shaukat Ansari (pp. 259–262), and the recent work by Orthmann (2011, pp. 205–206), who has also given a layout of the carpet in Fig.11.3, p. 213. Cf. the remark about her interpretation above.

signed colours of planets: Saturn (black), Jupiter (brown), Mars (red), Sun (golden), Venus (green), Mercury (purplish) and Moon (white), followed by the sublunar arrangements of elements. The various courtiers were seated in circles according to their rank and status evidently.[13] Besides this carpet, another innovation of the emperor was a tent (*Khargāh*), the inner ceiling of which represented the divisions of zodiacal signs and the (fixed) stars as small holes. In sum it may be stated that even administrative (*Dīwānī)* work of Humāyūn had a cosmological bearing and astrological–astronomical elements were at the centre of his thinking. In this connection, I wish to underscore here two very significant articles by Eva Orthmann (Bonn) who has published in-depth studies and novel interpretation of Humāyūn's court culture. Her interpretation is based on astrology in the context of Islamic natural philosophy.[14]

> *"Humāyūn was deeply interested in sciences, astrology and cosmology....He is said to have ordered and undertaken astronomical observations and to have interpreted the horoscope of his son Akbar by himself. ... Humāyūn was however not only interested in science, but [also] made use of his knowledge to develope an ingenious staging of power which reflected the ideological foundation of his rule."*

His Interest in Astronomy

With regard to Humāyūn's keen interest both in theoretical and practical astronomy, it is also known that his one-time tutor, the astronomer-astrologer, Ilyās Ardbelī, and another astronomer Sheikh Abul Qāsim Jurjānī used to accompany him regularly and with whom he used to discuss, for instance, the difficult points of Quṭbuddīn Shīrāzī's *Durratul Tāj fī al–Dibāj* — an encyclopaedia of sciences and philosophy. Note the importance of Ilyās Ardbelī, who drew the one of the four birth horoscopes of Humāyn's son Akbar.

As for practical astronomy, the poet Sayyid Najmuddīn Aḥmad Kāhī (d. 1580) wrote an eulogy (*Qaṣīda*) in praise of the emperor and his expertise in the use of astrolabe. In this connection the following is noteworthy. The founder of the Lahore School of astrolabe-makers was Ustād Alahādād known as Asṭurlābī Humāyūnī (flourished ca. 1567), who was invited to Lahore by the Mughal Emperor Humāyūn. He is known today for his two surviving astrolabes. Alahādād's son, Mullā 'Īsā Humāyūnī is credited with three extant specimens, though none in India. One undated astrolabe is in a private collection in Cambridge, England.

Finally as a tail piece, I wish to add that emperor Humāyūn was also admired for his keen interest in astronomy by the Turkish admiral 'Alī Ra'īs in his *Travelogue* (*Mir'āt al–Mamālik*). After his shipwreck near India, he planned to

13 Orthmann (2011), pp. 204–205. For more detailed interpretation, refer to Orthmann (2008), pp. 299 – 303.

14 Orthmann (2011), p. 203, emphasis mine.

return to Turkey by the land route. Evidently he visited Humāyūn, who appreciated him and wished that Ra'īs remained permanently at his court as an expert astronomer. On Ra'īs's insistence to return to his native land, Humāyūn agreed on one condition, cited below in Ra'īs's own words:

> *"After three months of [Indian] rainy season (Barsāt), ...I may go back. However, during this period I should indulge myself in the calculation of lunar and solar eclipses, and should teach and help [Indian] astronomers to understand the concepts of solar motion and equator. ... I engaged myself accordingly and carried out astronomical observations."*

Humāyūn used to carry out his own planetary observation with the help of an astrolabe. In fact, on the day of his death, he was making observation of Venus on the roof of his Library in Delhi. On hearing the call of the prayer he wished to come down and slipped from the stairs; he did not survive the accident and died. His sudden demise did not let the realization of his planned observatory around Delhi, for which even the instruments were acquired.

3. Abul Fatḥ Jalāluddīn Akbar (reign 1556–1605)

Emperor Akbar under the influence of his chronicler Abu'l Faḍl (d.1602) and Fatḥullāh Shīrāzī (d. 1588–89) proclaimed a decree, according to which it was obligatory for all madrasas to teach the rational sciences, including logic, natural philosophy, mathematics and astronomy etc. Fatḥullāh joined the court of Akbar in AD 1582. He had been a student of astronomer–mathematician Ghiyāthuddīn Manṣūr Shīrāzī (d. 1506) and the logician Jalāluddīn Dawwānī (d.1502). In fact he became famous particularly as a scholar of rational sciences, which he promoted in Mughal India. He headed also a team of Hindu and Muslim scholars to supervise the translation of *Zīj-i Ulugh Beg* into Sanskrit, as recorded by Abū al-Faḍl in *Ā'īn-i Akbarī.* Fatḥullāh rose to the highest post of '*Aḍud al–Dawlah,* ('Arm of Empire'), awarded to him by Akbar. Note also that Fatḥullāh drew also the birth horoscope of Akbar.

Ilāhī Calendar

Fatḥullāh devised the Ilāhī (Divine) calendar and introduced it during Akbar's reign, which was even continued during the reigns of his son Jahāngīr and grandson Shāhjahān. It is a true solar calendar; its epoch date was Wed. 28 Rabī' II, AH 963/ 11 March 1556 (Julian), which coincided with the *vernal equinox* (VE) of that year.

To note is that Akbar acceded to the Mughal throne actually 26 days before, i.e. Fri. 2 Rabī'II, AH 963/14 Feb. 1556. However, the Ilāhī era was announced on the day of VE, Wed. 8 Rabī' I, AH 992/ 11 March 1584 (Julian) or 21 March 1584 (Gregorian), i.e. the 29th year of Ilāhī era. The *farmān* (order) was undated,

but this date was cited by Abū al-Faḍl in his *Akbar Nāmah.* Therefore, in the Ilāhī era the year begins strictly with the VE as in Iranian Calendar. The month–names are Persian/Zoroastrian with the difference that the epithet of *Ilāhī* is added. For instance, Farwardīn Māh-i Ilāhī, Urdibīhisht Māh-i Ilāhī etc. *Māh* means month in Persian. Alvi and Rahman (appendix VIII, p. 33) have tabulated these month-names along with their corresponding zodiacal sign. Thus each month begins when the Sun enters in the the corresponding sign. The number days in any month vary between 29 and 32 days, they are *not* fixed and can be determined by astronomical calculation.

Astronomical Writings

1. At Akbar's court a manual (*karaṇa* in Sanskrit) for astronomical/astrological calculations was composed by Rāmachandra, entitled *Rāmavinoda,* with epoch 11 March 1590. A commentary on the same manual was written after 1602 by a follower, Viśvanātha.

2.The famous commander and Governor of Gujrat of Akbar's administration, 'Abdur Raḥīm Khān-i Khānān (1556–1622) is known to be himself a Sanskrit scholar and writer. "He wrote a *Kheṭakautuka* on *Tājika* in verse at the close of sixteenth century". That is a tract on the "wonders of motion of heavenly bodies" in the Islamic astrology or precisely speaking on the effect of different planets in different houses in one's horoscope. It is a very interesting mixture of Sanskritized Persian astrological terminology.

3. As mentioned above, Sanskrit translation of *Zīj-i Ulugh Beg* (ZUB) was carried out by the order of emperor Akbar. The court astrologer-astronomer Mullā Chānd ibn Bahāuddīn wrote an commentary on *ZUB,* entitled *Tashīl Zīj-i Ulugh Begī.* The unique copy of the manuscript is extant in Maharaja Mansing II City Palace Library (Jaipur). Mullā Chānd was also present by the order of Humāyūn to be present at the time of birth of his son Akbar, in order to observe the exact time and to make his horoscope. One of the four horoscopes described by Abul Faḍl in his *Akbar Nama* is in fact by Mullā Chānd.

I may add in passing that these four horoscopes of Akbar, viz. cast by Mullā Chānd, a Hindu court astrologer Jotik Rai, Fatḥullāh Shīrāzī, and Ilyās Ardbīlī, have been thoroughly discussed by Eva Orthmann recently, particularly "their ideological contents and their association with the *Dīn-i Ilāhī* of Akbar and... finally the importance of astrology in Abul Faḍl's book and the cause of of its prominence". Undoubtedly Prof. Orthmann's recent papers on the importance of astrology have opened a new vista in the study of Mughal history in India.

4. Ṭayyab Ibrahīm Dihlawī, a respected astronomer during Akbar's reign wrote a short tract: *Risālah dar Taqwīm*, of which two manuscript copies are extant in Raza Library, Rampur. In this tract, the dates are according to Ilāhī calendar. He also translated a Sanskrit manual withe title: *Muntakhab Ratan Mālā*,

which he dedicated to ʻAbdur Raḥīm Khān-i Khānān. Its manuscript copy is also extant in Raza Library, Rampur.

5. ʻAbdul Majīd bin Muḥammad Quṭbuddīn Munajjim Akbarshī wrote a tract: *Risālah dar Hay'at,* during Akbar's reign. One manuscript is extant in Rampur, and 3 in Pakistan.

Practical Astronomy or Observations

Abul Faḍl has reported in his *Akbar Nāmah* sighting of a number of comets of AD 1264, 1400, 1433, which were however seen outside India. I mention here his account of the comet of 1577 seen in the Indian cities of Agra, Delhi and Lahore and which was also reported by ʻArif Qandhārī and Badāyūnī in their "Histories of Akbar's reign". The exact date of the appearance of the comet was Nov. 7, 1577. It disappeared on Jan. 1, 1578. It was characterized by its long tail and brilliance.

Abul Faḍl reported only one solar eclipse, occurring on Akbar's 35th regnal year (Ilāhī), which corresponds to AD 1590, precisely speaking on Tuesday July 31, 1590 (Gregorian)/ Ramaḍān 29, AH 998. Strangely enough, although 39 solar eclipses were visible in India during Akbar's reign, none except the above-mentioned was reported by Abul Faḍl *et al.* In any case, Abul Faḍl had a keen interest in astronomy. For instance, in his *Ā'īn-i Akbarī* (Vol. III), he presents a summary of known world "Calendars (*Taqāwīm)* and Zijes", in which a short account 19 calendars (*Tawārīkh*) and a list of 86 *Zījes* known to him is given. For want of time, we can not go into details.

4. Nūruddīn Jahāngīr (reign 1605–1627)

Emperor Jahāngīr was himself a keen observer of natural history. However, he was also interested in natural phenomena. His observations are presented in his *Memoirs* (*Tuzak-i Jahāngīrī*).

1. Jahāngir reported at length the comet of 1618, which was also reported by his chronicler Muʻtamid Khān (d.1639). It was first observed on 26 Oct. 1618, looked like a spear, " thin at the two ends and curves in the middle like a sickle". After 16 nights it lost its tail and possessed the luminous head." As a matter of fact, three comets appeared in 1618: (i) Aug.25-Sept.25, (ii) Nov.11-Dec.9, and (iii) Nov.25-Jan.22, 1619. Jahāngīr's observation falls in the category C-1618 (ii), for which there exist Chinese, Korean and Philippine reports also. The European keen interest in this comet is indicated by the writing of 28 monographs, which set includes a short monograph by Kepler himself.

2. Jahāngīr has reported two solar eclipses, namely one occurring to on 5 December, 1610 (Julian), corresponding to his fifth regnal year, and another one occurring on 19 March 1615 (Julian). According to Schram's tables each of these entries coincides with an annular solar eclipse. Note that Jahāngīr gave dates in

Ilāhī calendar and the timing of the ingress and egress of the eclipses in *gharīs,* the Indian unit of time.

3. Emperor Jahāngīr in his *Memoirs,* reported a total lunar eclipse occurring on Saturday 13th *Shawwāl,* AH 1018, corresponding to December 29, AD1609 (Julian)/ January 8, 1610 (Gregorian). The Emperor also recorded the beginning of the eclipse as 4 *gharīs* (1^h 36^m) after dusk and its duration as 5 *gharīs* (2^h). This duration does not agree with another report of the same eclipse by ʿAbdul Ḥamīd Lāhor, who in his *Pādshāhnāma* (History of Emperor Shāh Jahān) gives the duration as 1h 52 m.

4. The last observation of Jahāngīr concerns a meteorite. He wrote in his *Memoirs* an account of a meteorite fall in Jalandhar (Punjab), on Rabīʿ II, AH 1030 / April 19, AD1621. The stone was about 2 kg. It was a stony iron or siderolite. Later a sword and a dagger was made out of that meteorite.

Interest in Astrolabe and Astrology

I have already mentioned that Shah ʿAbbās I sent a gift to Jahāngīr on his request, viz. the original astrolabe of Sultan Ulugh Beg, and the Shah of Iran kept for himself only its copy! Another noteworthy gift by the Shah was a large ruby inscribed with the name of Ulugh Beg, and which was presented to the then prince Khurram (later Shāhjahān) by the Iranian ambassador in about 1620-21. Recently S.R. Sarma (Aligarh/Düsseldorf) found a bilingual astrolabe with Persian and Sanskrit legends by a Brahman apprentice, named 'Pandit', who was an employee of a Muslim astrolabe maker at Jahāngīr's court. This is a very interesting astrolabe made in the 11th regnal year of Jahāngīr (AD 1616–1617). It is is extant at the Sampuranand Sanskrit University in Benaras (modern Varānasī).

Jahāngīr visited Ujjain in 1617; where he was told about the observatory of Raja Bikarmājīt, about which Bābur mentioned also in his Memoirs. Note that meridian of Ancient India passed through Ujjain (in Arabic *Arīn)*, which was actually the Greenwich of India.

According to recent works, there is evidence that astrology gained momentum during Jahāngīr's rule. He was proud of his birth under the conjunction of Mercury, Jupiter and Venus in the sign of Scorpio. "He had coins struck showing the signs of Zodiac along with the date of issue and the titles of Emperor. These gold *mohurs* were distributed from 1020–1030 AH."

Finally it may be added that Jahāngīr was undoubtedly a learned man. His teacher had been Abul Fayḍ Fayḍī, the brother of Abul Faḍl ʿAllāmī. Jahāngīr knew many languages, was a poet, patronized historians, lexicographer and predominantly artists, since his main interest lay in fine arts, ornithology and zoology, as apparent from numerous entries in his *Memoirs*. However to my knowledge today,

no work on sciences written during this period has come to light to-date.

Fig. 1. Jahāngīr (1605-1628 AD), Zodiac Silver Rupee, 11.36g, Cancer, Ahmadabad Mint, AH 1027/13the regnal year.

A crab emerging from the sun, stars visible on the body of the crab with the regnal year at bottom, rev. Zar Ahmedabad ra dad zewar, Shah Jahāngīr Shahenshah Akbar with the date in Hijri. A classic Mughal rarity. Jahāngīr struck five zodiacal signs in Silver from the Ahmedabad mint apart from a few from other mints. A detail explanation of this event has been given in the *Tuzuk-e Jahangiri* by the Emperor himself." - From Online Catalogue.

[Note by the moderator Abhay, Reference:http://www.worldofcoins.eu/forum/index.php?topic=14292.0] This beautiful rupee was listed for Auction at New Delhi on 24th March, 2012.

5. Abul Muẓaffar Shahābuddīn Muḥammad Shāhjahān (1627/28 –1658)

Emperor Shāhjahān is evidently very famous for the mausoleum of his wife Mumtāz Maḥal at Agra, known as Taj Mahal. Besides that he is also known as *Ṣahib-i Qiran-i Thānī* (Second Lord of the Conjunction), which refers to the conjunction of Jupiter and Venus. His court astronomer was Faridūddīn Munahjjim, who joined him just about Emperor's coronation in 1627. Besides Faridūddīn, another notable natural philosopher, Mullah Maḥmūd Jawnpūrī, famous for his treatise: *Shams-i Bāzigha,* flourished also during Shāhjahān's reign.

Farīduddīn Munajjim Dihlawī (d. 1629)

Farīduddīn bin Ḥafiẓ Ibrāhīm Dihlawī was born in a famous learned family. His elder brother Ṭayyab Ibrahīm Dihlawī had been an astronomer and also astrolabe maker. Farīduddīn attended the famous madrasa of Shāh Niẓām of Nārnol.

Later he became a disciple of Fatḥullāh Shīrāzī in mathematical sciences and renowned himself as an expert of astronomy (*Ḥay'at*) and astrology (*Nujūm*), so much so that he was commissioned to cast horoscope of the son of Sultan Ibrāhīm ʻĀdil Shāh, born in AD 1613. It is extant in Berlin (MS. 83/4). ʻĀdil Shāh II ruled Bījāpūr (1580–1627). The historian Farishtah dedicated his famous History of India to the Sultan, hence its title: *Gulshan-i Ibrāhīmī*.

Farīduddīn started his career in the service of Emperor Akbar's Governor, ʻAbdur Raḥīm Khān-i Khānān up to AD1615. His three well known writings are as follows.

1. *Sirājul Istikhrāj,* a short manual for astronomical calculation, dedicated to his patron Khān-i Khānān. He wrote it in 1597-98. Three manuscripts are extant in Indian libraries (2 in Hyderbad, 1 in Aligarh), 1 each in National Museum Karachi (Pakistan), British (formerly in India Office) Library (London), and St. Petersburg (formerly Leningrad) Library.

2. *Zij-i Raḥīmī,* compiled in in 1615/1617, and dedicated again to Khān-i Khānān. A unique copy of this *Zīj* is extant in the Library of Āstān-i Quds Raḍawī (Mashhad).

3. *Zij-i Shāhjahānī* dedicated to Emperor Shāhjahān was compiled about in 1629, when he joined his court. It was written in collaboration with his elder brother Ṭayyab Dihlawī and under the supervision of Emperor's grand Vizier, Āṣaf Khān. It is one of the most important *Zij* of Mughal India. Out of its 14 manuscripts in world libraries, 5 mss. are extant on the erstwhile Indian subcontinent. They are in the manuscripts libraries in Lahore, Hyderabad, Rampur, and Jaipur (acquired by Raja Jai Singh in 1725). To note is that on the advice of Āṣaf Khān, Shāhjahān ordered that the Persian text of this *Zīj* should be translated into Sanskrit. The order was carried out in 1630 by Nityānanda, the Brahman Court astronomer of Shāhjahān. Four copies of this text are extant in the royal library in Jaipur.

In passing, I may add that the philosopher and expert of physical science, Mullā Maḥmūd Jawnpūrī wished to establish an astronomical observatory. He went to Delhi and convinced the emperor of the importance of his project. However, he did not succeed but for the intrigues of ministers.

6. Conclusion

I wished I had time to present here a comparative study of Indian and Turkish scientific scenario during the sixteenth–seventeenth centuries. However, it is sufficient to add that the court administration and culture were somewhat different in the two countries. Mughal emperors did not exercise any force or pressure on the madrasa education system generally. Learned scholars teaching in madrasa and those attached to the courts were working independently and some time almost without any interaction. This was presumably not the case in Ottoman's empi-

re. The Sultans were in proximity with the well developed neighboring Islamic Countries and by the end of eighteenth and nineteenth centuries also with West European countries, whose influence and interaction could not be overlooked. The result was that the Turkish educational system felt the pressure of development and was forced to change gradually. This compulsion was completely absent in Medieval India and the educational system became stagnant and obsolete. Despite these remarks, I hope that more detailed comparative studies are required in order to understand the complex scenario of the Indian and Turkish societies.

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