Records of sighting of Halley's Comet in the 1531 apparition and an eclipse in Guru Nanak's references

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Two celestial occurrences find place in the incidents related to the great poet – saint Guru Nanak (1469–1539 CE), founder of Sikhism, or in his teachings. The first one referred to as lamma tara (long star) figures in a hymn in the Sri Guru Granth Sahib and the other is a solar eclipse that occurred while Guru Nanak was visiting Kurukshetra. I conclude that the long star must be Halley's Comet in its apparition in 1531. This is significant considering that the record of sighting of a comet in an Indian scripture has so far not been identified. Further, among the many eclipses occurring during the relevant period of 1498–1521, that of 13 January 1507 is the most probable one. The eclipse is historical in the sense that it is the first observational record to be depicted in an Indian mural.

In ancient times, unexpected phenomena like eclipses, comets, meteors and earthquakes were regarded ill omens for rulers and emperors, and so recording such events in the political history was a well-established tradition in many cultures. Historians have also traced human history from such phenomena recorded in chronicles and other sources, particularly eclipses and comets. In India, while a number of records of eclipses have been found in stone inscriptions[1], there is an embarrassing silence in the literature and chronicles over records of celestial phenomena in real time. The references are very few and wherever one is made, it is either fleeting or jacketed in mysticism. In almost all instances, there is little information on the phenomenology or on the position of the object in question with respect to stars or asterisms. That makes correspondence of a particular reference with a similar one from elsewhere difficult, defying attempts at fixing the chronology of the events and the period of the texts. The conclusions arrived at can only be speculative.

In this note, I have made an attempt to extract the astronomical meaning in statements on the sighting of a comet and occurrence of a solar eclipse in a few non-astronomical sources, namely the *Ādi Guru Granth Sāhib* (*ĀGGS*), the sacred scripture of the Sikhs, and the *Janamsākhis*, the traditional accounts of the life of the first Sikh guru, Guru Nanak. This assumes significance, because the record of sighting of a comet in an Indian scripture has not been identified so far. The eclipse record gains importance because of its depiction in a mural in a place of worship that is the only pictorial representation of an eclipse in India and the fact that this was based on an actual observational record.

A comet and an eclipse in Guru Nanak's references

Guru Nanak (1469–1539 CE) was a great poet–saint and the founder of Sikhism. His teachings are enshrined in the form of poetry and extensive dialogue with the learned in the *Ādi Granth*, a work compiled in later times by Guru Arjun (1581–1606), the Fifth Guru of the Sikhs, and completed in 1604 (ref. 2). The account of Guru Nanak's life and teachings is found in the later traditional works called the *Janamsākhis*. These contain various incidents in his life. Here, a certain chronological order may also be seen, but while these refer to eyewitness accounts at places, the *sākhis* per se are not biographies. An important date that these give and generally agree upon is that of his birth – on *Vaisākh, Sudi 3, 1526 Vikrama Samvat* (15 April 1469)[3]. Some later biographies give his date of birth as *Kārtika Purṇimā* of that year (20 October), for which Trilochan Singh[4] cites several historical records in the appendices of his book on the life of Guru Nanak. That apart, the *sākhis* differ about the places Guru Nanak visited in the course of his long travels, as also the sequence of events. The *Purātan Janamsākhi* is the oldest of these and as the internal evidence alludes to, it was composed in 1634 (ref. 5). The other prominent *janamsākhis* are Sodhi Miharbān's (Guru Arjun's nephew, 1581–1640) and the ones by Bhai Bala (Guru Nanak's companion in his famous travels) and Bhai Mani Singh. According to Mann[6], the *Purātan* is pre-1600 and that its earliest known version is of 1640. The earliest copy of Bhai Bala's *sākhi* is of 1658 (ref. 5). The script of the *janamsākhis* is Gurumukhi and the language is Punjabi, as also a dialect called *Sant Bhāshā* (language of saints).

A number of scholars have analysed references to two celestial events that figure in incidents related to Guru Nanak in the *janamsākhis* or in his teachings. The references are without any phenomenology. First, there is reference in a hymn in the *ĀGGS* to the rising of a 'long star'. One is not sure if Guru Nanak meant it to be a shooting star or a comet as interpreted by some. However, the reference was most likely made on the basis of an actual sighting. Then, there is a reference in the *janamsaākhis* to a solar eclipse that occurred while Guru Nanak was visiting Kurukshetra. Historians have come out with different dates for the eclipse.

This note is an astronomer's attempt to resolve the mystery of the 'long star' and identify the eclipse.

The 'long star' in the *Ādi Guru Granth Sāhib*

The *ĀGGS* comprises of the teachings of the Sikh Gurus beginning with Guru Nanak, including several other saints. Its final redaction was prepared by the tenth guru, Guru Gobind Singh (1666–1708). In the teachings of the Gurus, one finds a beautiful blend of spiritual poetry and music, which all the Gurus were great connoisseurs of. Guru Nanak keenly observed natural phenomena and wove some of them metaphorically into his

poetry. In his hymns set in Tukhāri, a rāga sung in the evening, he refers to the rising of a long star in the sky (*ĀGGS*, First Mehl, pp. 1110–1111) so:

Tārā chadhiyā lammā kiū nadari nihāliā Rām ||
Sewak pūr karmā Satiguri sabadi dikhāliā Rām ||
[The meteor shoots across the sky. How can it be seen with the eyes? The True Guru reveals the Word of the *Shabad* (group of hymns) to His servant who has such perfect karma.]

A few lines later, Guru Nanak repeats the reference:

Nanak haumai māri patīṇe tārā chadhiyā lammā |
Gurumukhi jāgi rahe chūkī abhimānī Rām|
(O Nanak, killing his ego, he is satisfied; the meteor has shot across the sky. The Gurumukhs remain awake and aware; their egotistical pride is eradicated.)

The translation above is from an edition of the scripture on the internet[7], with Gurumukhi-to-English translation by Sant Singh Khalsa. The word *tārā*, translated above as meteor, actually means a star, so that the phrase '*Tārā chadhiyā lammā*' that literally means 'a long star has risen', would refer to a comet rather than a meteor that does not 'rise' and is only a momentary spectacle. Could the phrase – '*a long star has risen*' mean a fireball? Such an event will be accompanied by a sonic boom and may even harm structures and people. A great meteor shower would register, but then the scriptural observation would be different from the above. The words commonly in use in the northern regions of India for a comet, i.e. *puchchhal tārā* or a *dumtārā* (tailed star) have not been used. Guru Nanak's line is lyrical. He observed the celestial form and saw in it a spiritual meaning. According to some scholars like Dhillon[8], the long star referred to in the phrase may be the celebrated Halley's Comet that appeared around August–September 1531, and thereby they try to ascertain the period of the composition.

In the verses above, two facts are clear. The object in the sky is not just a star, and movement is implied. That accounts for a comet only. However, there is no phenomenology. Also, there is no pointer in the hymns to its being a dawn or dusk object, or to its location in the sky (constellation and the like), leave aside the year of occurrence. Can we deduce anything about the comet – the most basic facts like its position in the sky and the epoch of its sighting? It does not seem amenable at first, but a correspondence with other records and the orbital elements of the comet can help us narrow down the timelines for the sighting and thereby for the composition by Guru Nanak.

For the moment, let us focus on the Halley's Comet (1P/1531 P1). It was first seen by the Chinese on the morning of 4.8 August with a tail of over 1°, when it would have been in Auriga constellation[9]. The Japanese saw it in the northeast direction as a bluish-white object with a tail 5° long in the morning of 8 August. The Koreans saw it on 10 August, with a 10° long tail. The German geographer and astronomer Petrus Apianus (1495–1552), who first saw it on 13 August, estimated its tail to be 15° long[10]. The apparition is historic for another reason when Apianus showed in his famous work, *Cosmographia* from five consecutive observations of the comet during 13–17 August, that its tail was always directed away from the Sun. The comet passed closest to the Earth on 14 August from a distance of 0.4414 AU (0.1865 AU in its 1835 and 0.1514 AU in the 1910 apparition) and its perihelion on 26.239 August (UT). It was last seen on 8.5 September UT as an evening object. The comet was sighted for 34 days[11].

Table 1 presents an extract of the ephemeris of the 1531 apparition of Halley's Comet generated from the Horizons system of Jet Propulsion Laboratory, USA[12]. With it, it is possible to place the comet in the sky with respect to the Sun on a few dates in the month of August.

In Table 1, the comet positions are apparent right ascension (RA) and declination (Dec) with respect to the true equator and true equinox of date, T-mag. is the computed total magnitude and Delta is the geocentric distance in AU (astronomical units). The altitudes and azimuths (Alt, Az.) of the various solar system objects are as at Kartārpur Sahib (32°.09N, 75°.02E; see later in the text) at sunrise, the latter measured N–E. The Sun (in Leo) moved eastwards, whereas the comet moved southeast through the month. For an unusual celestial form, a great comet would be noticed normally when it is in the Sun's or the Earth's vicinity. A post-perihelion close approach of a comet can present a more developed dust tail with a spectacular view. However, for 1P/1531 P1 Halley, the recorded observations belong more to the pre-perihelion phase and around the Earth fly-by time. From the Chinese records, we learn that by 24 August the comet had begun to fade[9]. Being a retrograde, it was noticed first in the morning skies. At discovery, the comet rose about 3 h before the Sun. It was not yet spectacular, but it was also approaching the Earth. It moved southeast and increasingly became a striking object until around 14 August when it still rose before the Sun, being at a relatively higher declination. Thereafter, the comet lay to the east of the Sun.

The desired clue to the events in the sky is probably vested in the lines in the *ĀGGS* that follow the ones quoted last – 'Night and day, it is dawn for them; they merge in the True Lord. The Gurmukhs are merged in the True Lord; they are pleasing to His Mind'. To see in these verses a parallel with the celestial form may be subjective but, in its pre-perihelion phase, the long star was surely getting progressively spectacular and appearing to rush for a grand union with the Sun.

After 14 August, the comet moved away from the Earth and gradually lost in brilliance. We may therefore take the comet to have been noticed around the times it flew by the Earth when with its noticeable movement and the developing form and brilliance it would have made a lasting impression. That makes it to be in the period 10–14 August. We presume clouds of a rainy season permitted the sighting, early in the morning and near the horizon, and more than once. After 14 August, the comet headed southeast moved up high into the evening sky, losing some brilliance. It brightened up to 1.3 mag on 1 September but began fading again, reaching 2.4 mag on 11 September[13]. There are hardly any observations around this period.

The other notable comets appearing in Guru Nanak's lifetime are: C/1490 Y1 discovered on 31.5 December by the Chinese in the evening in the constellation of Vulpecula, C/1499 Q1 discovered on 16.6 August by the Chinese in Hercules, C/1500 H1 discovered on 7.8 May

Table 1. Position in the sky of a few objects on certain dates in August 1531

		RA			Dec				Delta	Alt	Az	
	UT	h	m	s	°	′	″	T-mag	AU	°	°	
1531-08-05												
Comet	00:22	06	30	57	+39	06	32	3.43	0.623	45.98	65.68	
Sun		09	33	18	+14	33	18		1.012	–0.49	72.25	Rising
Venus		07	09	10	+21	52	48		1.260	32.74	83.58	Up
1531-08-11												
Comet	00:26	08	38	25	+41	26	01	2.	0.469	28.20	56.82	
Sun		09	55	48	+12	38	18		1.010	-0.53	74.54	Rising
Venus		07	39	40	+21	10	54		1.297	31.84	83.99	Up
1531-08-14												
Comet	00:28	10	05	45	+37	15	43	2.	0.442	13.63	54.18	
Sun		10	06	56	+11	38	00		1.010	-0.54	75.74	Rising
Venus		07	54	52	+20	41	42		1.315	31.34	84.33	Up

by the Chinese near the Capricornus–Aquarius–Pisces region, and C/1506 O1 discovered on 31.5 July by the Chinese within the region around Draco–Ursa Major–Camelopardalis[9]. There is no comet in Guru Nanak's lifetime that would have been as magnificent as the Halley's, notwithstanding the fact that in this particular return, it was not very bright and may have reached about +1 mag in brilliance[13,14]. Still, pre-perihelion, it registered a notable performance. Note that the New Moon was on 12 August. Venus was a morning star through the month of August and high enough in altitude to be noticed from Kartārpur Sahib before sunrise.

The solar eclipse at Kurukshetra

Guru Nanak undertook three extensive travels (the *Udāsis*) in his life, four and even five as according to some scholars[15]. He undertook the first *Udāsi* together with his companions Bhai Bala and Mardana from Sultanpur Lodhi, a major trade centre in the Kapurthala district, Punjab, where he had lived and worked for several years, towards the eastern parts of India and south, specifically to visit prominent Hindu pilgrimage centres. The second *Udāsi* was to the north and the third one towards West Asia. Guru Nanak may have taken the main trade routes and river paths in his travels through the country.

The eclipse incident as stated in the *janamsākhis* happened during the first *Udāsi*. According to these, Guru Nanak came to know that a religious fair at Kurukshetra, a holy place for the Hindus, was going to take place around the time of a solar eclipse[16]. Eclipses in India are special occasions when the Hindus throng to the nearest river, engage in ceremonial ablution and oblation, and offer charity. The *janamsākhis* mention that at Kurukshetra, Guru Nanak used the occasion to address the pilgrims gathered there and sought to dispel fears and superstitions associated with eclipses, mentioning that they were celestial phenomena that had no influence on man's affairs on the Earth[17,18]. The incident is beautifully depicted in a mural at the Gurudwara Baba Atal Sahib Ji at Amritsar (Figure 1). The inscription at the bottom is in Gurumukhi script, and mentions that Guru Nanak came to Kurukshetra and encamped there on the day of the eclipse of the Sun. There, during the eclipse, he lighted a fire and began to cook a pot of meat of deer offered to him by a disciple. As he was severely reproached for the act, he attempted to enlighten the people saying that it is the planets lining up such that when one of them comes in between the other two, it brings darkness, a natural occurring that carries no religious value in it[19]. The text does not carry any information on the time of occurrence of the eclipse (dawn, noon or dusk), or the period of the painting. The Sun is shown half-eclipsed, possibly for emphasis, as the artists would not know of how the actual event proceeded. Figure 2 shows a closer view of the mural. The mural has been touched upon, with the inscription re-written right in its body. The wording near the eclipsed Sun means 'solar eclipse'. The period of the series of murals at the Gurudwara should be 19th century[20]; see also a discussion by Sodhi[19]. The eclipse incident is depicted in another painting as well (Figure 3), which also shows the core of the story told in the *sākhis*[21]. The painting is of a later period compared to the mural.

According to some *janamsākhis*, Guru Nanak subsequently proceeded towards Māyāpur (Haridwar), a holy place on the banks of the River Ganges, and reached around the time of the following Baisākhi. In Punjab, Baisākhi heralds harvest time and is one of the most important festivals alongside Deepāvali, the festival of lights, celebrated to mark the beginning of the year with the Sun's transit (*samkrānti*) into *Meṣa* (Aries). Guru Nanak then proceeded in his travel towards the east.

The Sikh literature, let alone the accounts of Sikh history, is wanting in respect of a robust chronology and the exact routes taken by Guru Nanak. All the routes constructed by scholars for the *Udāsis* factor in an eclipse of the Sun at Kurukshetra, but no general consensus on the dates is seen. A few such exercises are summarized below. In this matter, Guru Nanak's visit to Jagannath Puri is of direct interest to us (as will become clear later in the text).

Twarikh Guru Khalsa is an acclaimed work on the history of the Sikhs since their origin until the occupation of Punjab by the British. Its author Giani Gyan Singh (GGS; 1822–1921) is said to be a descendent of the brother of Bhai Mani Singh, a contemporary of Guru Gobind Singh. The work is in five parts, where the first part contains biographies of the

ten Gurus. Herein, Guru Nanak in the course of the first *Udāsi* visited Pehoa, a Hindu pilgrimage centre on the 14 *Chet*, 1561 *VS* (29 March 1504) and then proceeded to the neighbouring Kurukshetra on the occasion of the solar eclipse[22] (pp. 89–92). He arrived at Haridwar the following Baisākhi. There indeed was an eclipse in 1504 around the time, but it was on 16 March and its shadow did not fall over India. GGS[22] (p. 124) dates Guru Nanak's arrival in Jagannath Puri on 27 *Chet* 1565 *VS* (28 March 1508). After returning to Sultanpur he left for the second *Udāsi* in the beginning of *Vaisākh*, 1567 *VS* (9 April 1510)[22]. Thereafter, he reached Sirsa on 14 *Āṣādha*, 1567 *VS* (20/21 June 1510) and stayed there for four months and 11 days. According to GGS, the date is duly entered in the books of the *Bhats* of that place.

According to Kohli[23], Guru Nanak's first *Udāsi* was during 1499–1509. He first travelled through Punjab, together with Bhai Bala and Mardana, and passing through several places arrived in Kurukshetra on the occasion of eclipse of the Sun. The date of the eclipse is not given. Thereafter, Guru Nanak visited Haridwar in 1501 CE around the time of the Kumbha fair. This is an important religious fair of the Hindus held once in 12 years at four holy places, namely Haridwar, Allahabad, Ujjain and Nashik. The Haridwar fair is the most important and is held when the Sun transits into *Meṣa rāsi* (Aries), Jupiter transits into *Kumbha* (Aquarius) and the Moon is in *Dhanu* (Sagittarius; all sidereal). Working the celestial circumstances, I find that 1499 and not 1501 was a Kumbha year. Kohli[23] further states that in the course of his extensive travel towards east, Guru Nanak arrived at Jagannath Puri in the middle of 1509 around the time of the famous Rath Yātrā (the chariot festival); the latter is held on the second day of bright fortnight of the month of *Āṣādha*. Here, Guru Nanak also had a joyous meeting with Sri Chaitanya Mahāprabhu (1486–1534), the great Vaisnava saint of Bengal. He undertook his next long travel in 1510, and the third one in 1514, etc.

In his *History of the Sikhs*, Gupta[2] gives an account of the travels by Guru Nanak that are generally accepted and according to which his first travel, to the east and south, was undertaken with Bhai Bala during the years 1501–1514. Gupta[2]

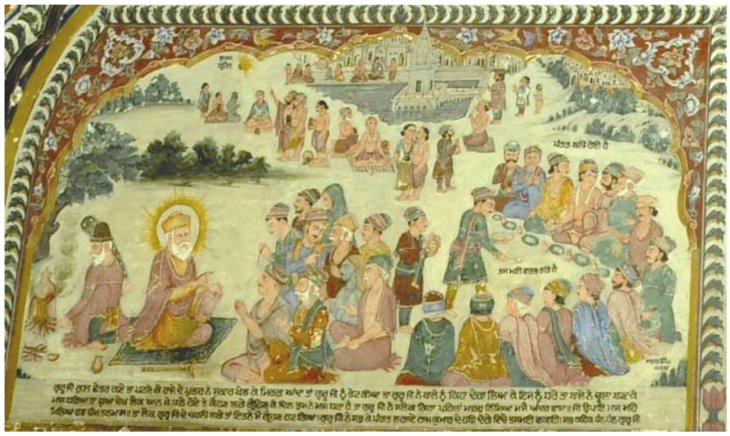

Figure 1. Guru Nanak at Kurukshetra on the occasion of a solar eclipse, depicted in a 19th century mural at the Gurudwara Baba Atal Sahib Ji, Amritsar (adopted from Sodhi[19]).

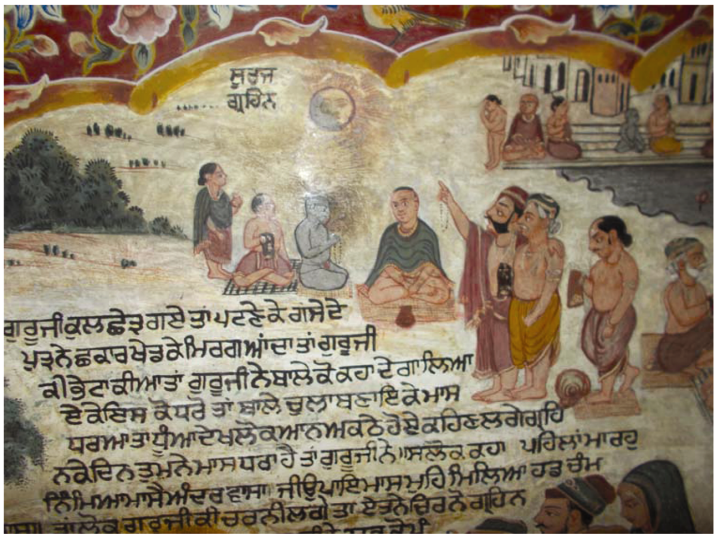

Figure 2. A closer view of the mural depicted in Figure 1. The overwriting in black in Gurumukhi script is recent; the text is the same as that shown in Figure 1. Photograph by the author, 11 March 2017.

Figure 3. Guru Nanak at Kurukshetra on the day of a solar eclipse, with Jagat Rai, son of the King of Hansi in attendance. The painting, adopted from Singh[21], is credited to Sikandar Singh Bhayee.

states that Guru Nanak was at Kurukshetra 'on the occasion of a great festival', but does not specifically mention if the occasion was a solar eclipse. Thereafter, Guru Nanak travelled east and south, and finally back home treading the west coast. The second *Udāsi* to the north was undertaken during 1515–1517, and the third one towards west Asia from 1517 to 1521.

Dhillon[24] states that Guru Nanak came to Kurukshetra on 20 September 1503, the day of a solar eclipse; subsequently, he reached Haridwar on 27 March 1504 on the occasion of Baisākhi. There was an eclipse on the date but its shadow did not pass over India.

Kirpal Singh[5] has intensively analysed the routes as given in the *janamsākhis*. As read off Miharban's *Janamsākhi* that he considers relatively more realistic in respect of chronology and the routes, Guru Nanak commenced his first *Udāsi* in 1504. The *sākhis* by Miharban and Bhai Mani Singh mention Guru Nanak's presence at Kurukshetra on the occasion of a solar eclipse and at Haridwar on the following Baisākhi. To ascertain which eclipse it could be, Singh[5] looked into Swamikannu Pillai's *Indian Ephemeris*. He zeroed in on the solar eclipse of 24 January 1506 and the following Baisākhi of 29 March 1506 (should be 27 March)[25] as the likely occasions. There was an eclipse on the date, but its shadow did not pass over India. However, in a note, Singh[5] also mentions the following:

> 'According to Miharban, Guru Nanak went to Kurukshetra from Kartarpur which shows that the episode took place much later. According to the *Miharban* version, the Guru came from Mathura and according to Bhai Mani Singh, he came from Sultanpur.'

After travelling extensively through the east, Guru Nanak arrived in Jagannath Puri, where he had a meeting with Sri Chaitanya and the two are said to have sung hymns together. Quoting from the *Puri District Gazette* (Calcutta, 1908, pp. 87–95), Singh[5] says this should be in or after 1510. Sri Chaitanya came over to Puri in that year and then stayed on.

Notably, the *Jeevan Britant – Sri Guru Nanak Dev ji*, an acclaimed biography of Guru Nanak by Sahib Singh[17], meticulously gives the dates of incidents in Guru Nanak's life. Here, the first *Udāsi* period is from 1507 to the end of 1515 and the second one was undertaken to cover the north beginning 1517, etc. Singh[17] considers 1510 as the year of arrival of Guru Nanak at Puri around the time of the Ratha yātrā, though he does not refer to his meeting with Sri Chaitanya. Towards the end of the first *Udāsi*, according to Singh[17], Guru Nanak was at Kurukshetra on the day of a solar eclipse, on 14 September 1515. There was no eclipse on this date. There were three solar eclipses in 1515, all partial but with shadows falling near the polar region only – none observable from India. I find that many of the *Samvat* dates converted by Singh[17] are in error by several days (note 1).

Purewal[26] examined solar eclipses over India during 1498–1521 CE more critically. While referring to the itinerary worked out by Sahib Singh[17], Purewal suggested that the eclipse to be considered should be that of 20 August 1514, and that the itinerary of Guru Nanak should be re-worked accordingly. The shadow of this eclipse passed over India.

In the above, the disparity in the route points and dates is just baffling, knowing that these have been worked out from the same handful of sources, casting doubt on the very methodology. The beginning dates of the *Udāsis* differ by several years, though the upper limit is the year 1521. After his first *Udāsi*, Guru Nanak decided to found a new central place to serve his mission and chose one near Pakhoke on the banks of the Ravi, on 13 *Māgh* 1572 *VS* (17 January 1516)[17]. He named the place Kartārpur (32°.09N, 75°.02E). It is 4.7 km from the Indo-Pak border in Narowal district, now in Pakistan, and was his abode since 1521.

The few solar eclipses of interest

The prediction of a solar eclipse in the desired detail was always difficult. Errors in the data employed, particularly about the Moon, led to failed predictions at times. The accuracy depended on the astronomical parameters used to obtain the true latitudes and longitudes of the Sun and the Moon and their velocities and the precise geographical location. How did a commoner in the medieval ages come to know of an impending eclipse? Information, if any, lay in the *panchāngas*. These were prepared by individuals skilled in the art, but the contents were not for circulation. Kurukshetra eclipse is a partial one and would have been visible from any other nearby place. All we may say is that Guru Nanak was there at Kurukshetra either on a planned visit or by chance.

Hindu astronomy texts seldom delved into eclipse phenomenology, but some works do set eclipse limits (magnitude thresholds). Here, an eclipse is considered to have commenced or ended when a certain obscuration is reached, below which the eclipse may not be noticeable because of the intense light. The *Tantrasangraha* (1500 CE) of Nīlakantha Somayājī (1444–1545 CE), an important text from the Kerala school of astronomy[27], sets the eclipse limit at 1/12 of the disc of the Sun; it is 1/8 according to Parameśvara[28]. Keeping this in mind, we choose from among the many eclipses that occurred over the period of the *Udāsis*, including fringe eclipses that may not have been predicted but actually occurred.

We use Espenak's[29] Javascript solar eclipse explorer to generate the circumstances of solar eclipses over Kurukshetra through 1498–1521 (Table 2).

The timings are in Universal Time, where also given is the magnitude of the eclipse at maximum as at Kurukshetra (29°58′10.25″N, 76°52′42″E). The local mean time is UT + (longitude in degrees/15) h. The magnitude of the eclipse is the fraction of the Sun's disc covered by the Moon. Notably, the eclipse of 20 August 1514 was a total one; the path of totality touched the northernmost parts of India, e.g. Gilgit, etc. There are three eclipses where the relevant parts of northwestern India lay near the edge of the Moon's shadow (the fringe eclipses; magnitude <~0.1). The eclipse of 1513 commenced at Kurukshetra at 12:39 UT, whereas the Sun set at 12:59 UT. That gives only 20 min to the eclipse, still in progress at sunset. If we ignore the fringe eclipses and that of 1513, we have six eclipses to consider. In the absence of definite dates, one eclipse is as probable as the other.

The first eclipse in the list, namely that of 13 December 1498, a total over South India but partial at Kurukshetra, is interesting in that it was followed a few months later by the Kumbha fair at Haridwar, in 1499. The Kumbha is a rarer event and compared to a Baisākhi, a far more important occasion for the Hindus. The time interval between the eclipse

and the Kumbha is enough for a circuitous travel to Haridwar on foot, knowing that the shortest stretch of roads between the two places today is ~140 km. The first historical reference to a Kumbha fair is found about the one held at Prayāg (Allahabad) and mentioned in the accounts of the Chinese monk Hiuen Tsang, who travelled through India during 630–644 CE. That was in the times of the King Harshavardhana[30,31].

In a commemorative volume, *Punjab Past and Present*, Ganda Singh[32] included some material not very much known until then. One such was an Oriya manuscript of the *Chaitanya Bhāgvat* of Ishwar Dass, which Biman Bihari Mazumdar used in his *Chaitanya Chariter Upādān*. This work provides quotes where Guru Nanak is partaking in devotional singing and dancing in the company of Sri Chaitanya and others at Jagannath Puri. Singh[32] discusses the work in detail and concludes that Guru Nanak and Sri Chaitanya would have met in July 1510. However, referring to the same work, Trilochan Singh[4] differs about the date of the meeting:

> 'In Chapter 47 the author relates how Shri Chaitanya instructed his disciple Udyata to act as personal attendant of Guru Nanak, which shows the tenderness, personal affection which the great Vaishnava saint showed for the Guru. Taking the dates of Guru Nanak's movements and tallying them with the corresponding dates of Sri Chaitanyas life, the most probable year of meeting was 1512 AD or there about. The exact date can be found if the year of Rup Sanatan's visit to Puri is found. These disciples visited Puri to meet their Master only on the ratha-yatra festival.'

Besides, the July 1510 date for Puri conflicts with Guru Nanak's sojourn of four months and 11 days at Sirsa ever since he arrived there on 14 *Āṣādha*, 1567 *VS* (20/21 June 1510), a date duly entered in the books of the *Bhats* of that place[22].

The routes of the *Udāsis* have been variously worked out, but in the matter of the first *Udāsi* in particular, the relevant dots are connectable in more ways than one. In such a state of uncertainty, Guru Nanak's Sirsa sojourn in 1510 and his meeting with Sri Chaitanya as referred to in the *Chaitanya Bhāgvat* are the only important independent records. The eclipse date can be the third one. Let us take Puri as roughly a mid-point in the entire route of the *Udāsi*. That allows two solutions for the eclipse episode at Kurukshetra. For 1512 ('or thereabout') as the date of the Puri visit and the possible travel time either way, the solar eclipses of 13 January 1507 and of 20 August 1514 are the closest to qualify.

However, before one can ascertain where Guru Nanak could be a certain time before and after the eclipse, we should keep in mind the limitation medieval travellers would have faced to keep track of the festivals and other dates while journeying through unfamiliar lands for years due to language and cultural disparities. Information on an impending eclipse would normally emerge from those dabbling in the *panchāngas*, that too a few months prior to the event, unless one was such a keen observer of the Moon's path that he could foresee an eclipse a fortnight ahead.

Guru Nanak knew that the ritualism around eclipses is deep-rooted in the Hindu way of life. It is more likely that he came over to Kurukshetra in the initial phase of his missions. That suggests it to be the eclipse of 13 January 1507. This date gives sufficient travel time for one to be at Haridwar on the following Baisākhi that fell on 27 March 1507. The observable eclipses prior to this date are those of December 1498 and October 1502. For any one of these to be in the reckoning would only add as many years to Guru Nanak's travel to Sirsa and Jagannath Puri, if reckoned on the course of the first *Udāsi*. To be witness to the eclipse of 1514, he would have to leave Puri to return to Kurukshetra, but then give up his tour further south.

There is only one eclipse episode spoken of in the *janamsākhis*. Table 2 has many more. Some of these Guru Nanak would be witness to, each time being at a different place. Interestingly, the later Sikh Gurus too came over to Kurukshetra on the occasions of solar eclipses, such as that of 14 January 1553, etc. and preached Guru Nanak's mission while the devout gathered in large numbers to take a holy dip. The Special Guru Nanak Number, *Punjab Past and Present*[32] was brought out by the Punjabi University, Patiala in 1969 on the occasion of the 500th birth anniversary of Guru Nanak. It is a valuable source on Guru Nanak, as it carries articles on him by prominent scholars. There is one by an astrologer that tackles his horoscope and even gives in detail the astrological aspects of the important events of his life. Guru Nanak was a reformer who sought to dispel superstition. Such inclusion in a commemorative volume makes for an antithesis only.

Table 2. Solar eclipses over Kurukshetra during 1498–1521 CE

Date	Eclipse type	Time*		Magnitude
		Beginning	Ending	
1498 December 13	Partial	02:50	05:13	0.589
1501 October 12	Partial	06:59	08:02	0.052
1502 October 01	Partial	07:01	10:10	0.571
1507 January 13	Partial	07:01	09:43	0.430
1513 March 07	Partial	12:39	12:59 (s)	0.315 (s)
1514 August 20	Partial	01:52	04:09	0.822
1516 January 04	Partial	02:06	02:31	0.015
1517 June 19	Partial	03:28	06:31	0.534
1518 June 08	Partial	04:49	06:02	0.054
1521 April 07	Partial	05:18	07:55	0.860

*Eclipse timings are in UT.
The time/circumstance followed by (s) indicates event still in progress at sunset.

Conclusion

Identifying and dating astronomical events in the Indian non-astronomical sources from their references, often cryptic, is difficult. A holistic approach is necessary, but the interpretation may still be regarded as speculative. In the present case, I have explored two specific celestial references in the life of Guru Nanak, namely a long star so referred to in a hymn in the *ĀGGS*, and a solar eclipse during his visit to Kurukshetra. There is no phenomenology given. I have worked

out the astronomy around the events using independent information. I conclude that the long star must be Halley's Comet in its apparition in 1531. Its importance lies in that the record of sighting of a comet in an Indian scripture has so far not been identified. Further, there were as many as ten solar eclipses between 1498 and 1521, the period that overlaps Guru Nanak's missions ending in 1521 and his settling down in Kartārpur. I find the eclipse of 13 January 1507 the most probable one. The eclipse is historical in the sense that it is the first such observation to be depicted in an Indian mural.

There are no parallel accounts of these events by any foreign travellers in India[33], contemporary or later. Notably, there are descriptions of the sighting of three comets in *Rājatarangiṇi* (The River of Kings), the great Kashmiri historiography in Sanskrit, namely, those of 1468, 1531 and 1533. These are duly identified by Kak[34], of which the comet of 1531 is Halley's. This is an independent reference to the apparition, but being a record in a work of history, I intend to consider it in a separate communication.

Note

1. The dates cited here are in *Vikrama Samvat*; the *Samvat* year referred to is an elapsed (expired) one. For conversion to modern dates, I have referred to Table 1 in Sewell and Dikshit[25], keeping in mind that they use concurrent year. I have cross-checked the conversions with Yano and Fushimi's program (version of March 2014) in CalendarHome.com.

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