Antiquity of the vedic calendar

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Abstract. Taking guidance from *Vedānga Jyotiṣ,* it is found that in ancient India the sacrificial year started near the winter solstice. As the position of the winter solstice retrogrades by 1° in about 71 years due to the phenomenon of precession, references to the solar and lunar positions at the beginning of the year in the Vedic literature allow one to trace the antiquity of the various Vedic epochs backwards upto about 7000 BC.

Key words : vedic calendar, shift of winter solstice

1. Introduction

The present Indian *pañchangas* are based on the *siddhāntic* principles. They start the year from *Meṣādi,* the first point of the Hindu zodiac, which is 180° in opposition to the *Chaitrā nakṣatra* i.e. α Virginis (M. N. Saha and N. C. Lahiri, 1955). It represents the vernal equinox of 285 AD. This year beginning was a radical departure from the earlier practice of starting the year either at the winter solstice or at the autumnal equinox. It is clear from *Vedānga Jyotiṣ* (S. B. Dixit 1968), which was composed for the sacrificial purposes, that the *saṃvatsarasatra,* i.e., the yearly sacrifice, was started at the winter solstice. This is further corraborated through *Aitareya Brāhmaṇa* 18.18 and 18.22, where it is stated that on the *viṣuvadin* which occurred in the middle of the year long sacrifice, the sun reached its maximum altitude on the summer solstice day. One the other hand, the autumnal equinox started the civil year as is evident from the statements like "*Jīvena Śardahśatam*" i.e. let us live for 100 autumns.

Now, the *Vedānga Jyotiṣ* is the oldest extant astronomical text of Hindu astronomy, may the world astronomy, as it is dated about 1300 BC (see below). Not only does it contain the elements of the calendar that existed before the advent of the *Siddhāntas* of the 5th and 6th century AD, but it also represents the culmination of the efforts in that direction made in the earlier times. Hence it incorporates the main features of the calendars that existed prior to itself. They are mainly three :

1. The division of the year into two halves known as *Uttarāyaṇa,* the northward march of the sun,

and *Dakṣiṇāyana,* the southward march of the sun; 2. Starting of the year at the beginning of *Uttarāyaṇa* i.e. at the winter solstics; and 3. Introduction of an intercalary month (*adhikamāsa*) for the adjustment between the adopted and the true length of the year.

Uttarāyaṇa and *Dakṣiṇāyana* represent the most natural divisions of the year based on the observations of the position of the rising and setting sun on the horizon, and its midday altitude by means of a gnomon. Further, the beginning of *Uttarāyaṇa* is the most convenient time of the year for the Indian conditions, because the weather is clear for observations as opposed to any other time of the year. Hence the above features must have been the cornerstone of the Indian calendar from the remotest antiquity. They can help us in tracing backwards the changes in the Hindu calendar. We shall start this quest from the *Vedānga Jyotiṣ* period itself.

2. *Vedānga Jyotiṣ* period

It is expressly stated in the *Vedānga Jyotiṣ* (*Yājus Jyotiṣ* verse 6) that the winter solstice occurred when the sun and the moon came together in the *Dhanṣṭhā nakṣatra* . Everyone agrees that it refers to the conjunction of the sun with β Delphini for which λ (1990) = 316°. Since λ = 270° at the winter solstice, there has been a precession of 46° since the time of *Vedānga Jyotiṣ* . Taking a mean rate of precession of 50".2 per year we get a epoch of about 1300 BC for the *Vedānga Jyotiṣ* calendar. At that time the lunisolar calendar year was started on *Māgha* S1 (the first day of the bright half of the lunar month of *Māgha*), and the intercalary month was introduced in such a way that the summer solstice occurred in the months of *Srāvaṇa*, and winter solstice in the month of *Māgha*, both being *amānta* (new moon ending) months. The correspondence of the seasons with the months was *Māgha-Phālgun=Śiśir ṛtu, Chaitra-Vaiśākha = Vasanta ṛtu, Jyeṣtha - Aṣādha = Grīṣma ṛtu, Srāvaṇa - Bhādrpada = Varṣā ṛtu, Aśvin-Kārtik = Śarad ṛtu, and Mārgaśīrṣa-Pauṣa = Hemanta ṛtu.* So the civil year would have started in the *amānta Kārtik* month.

3. *Kṛttikādi nakṣatras*

The Vedic literature (*Taitirīya Brāhmaṇa/* 1.5.1 and *Atharvaveda* 19.7) gives the list of 28 *nakṣatras* starting from *Kṛttikā* and ending with *Bharaṇi*, which are identified by the author (Abhyankar 1991). It also refers to the *nakṣatras* from *Kṛttikā* to *Viśākhā* as Deva i.e. northern *nakṣatras* and those from *Anurādhā* to *Bharaṇi* as Yama i.e. southern *nakṣatras* . From this it is clear that the vernal equinox was at *Kṛttikā* (η Tauri), which has λ (1990) = 60°. At that time the winter solstice was opposite to *Maghā* (α Leonis), which has λ (1990) = 150°. Thus the winter solstice has λ (1990) = 330°; so the procession comes out to be 60° giving an epoch of about 2300 BD. At that time the winter solstice was marked by the full moon at *Maghā*. Hence the year was started on *Maghā Paurṇimā*, so the winter solstice would occur in the *Paurṇimānta* (full moon ending) month of Phalgun. *Kṛttikādi* list of *nakṣatras* tells us that the civil year started at the autumnal equinox on *Kārtika Paurṇimā* (full moon).

4. Epoch of *mahāsivarātri*

The night of K 13 (13th day of the dark half of the month) of every lunar month is called *śivarātri* for the following reason. After the whole night *Jāgaraṇa* (vigil) of *śivarātri* in the dawn of K 14 (14th day of the dark half of the month) we have the last visibility of the moon in that *amānta* (new moon ending) lunar month. At that time we see the crescent moon rising in the east, which is followed by the rising sun. So the sun of that morning represents the god Shiva with the crescent moon over his forehead. As this spectacle can be observed only in the dawn after *śivarātri* , the appallation *śivarātri* is the most appropriate for that night.

Having understood the significance of the *śivarātri* of every lunar month, it becomes clear that *Mahāśivarātri* must represent the longest *śivarātri* of the year, which would be naturally closest to the winter solstice. As the *amānta Magha* K 14, or *paurṇimānta* (full moon ending) *Phālgun* K 14, is called *Mahāśivarātri* , the sacrificial year would have been starting on *Phālgun* S1 during that epoch when the *Mahāśivarātri* festival was initiated. At that epoch the sun would be in *Satabhiṣag nakṣatra* at winter solstice and the vernal equinox would be at *Rohiṇi* (α Tauri), which has λ (1990) = 70°. It gives a precession of 70° and an epoch of about 3000 BC. This epoch is represented in the Mohenjodaro Seal No.420 as explained by the author (Abhyankar 1993b).

It may be mentioned that at the time the Holi festival which falls on *Phālgun* S 15 (*Paurṇimā*) occurred in winter. This stands to reason because a large common bonfire would be a natural method of protecting oneself from cold. It may be also noted that yule log festival of the Europeans, which is similar to Holi, is celebrated at Christmas near the winter solstice. Holi may also represent the beginning of the *saṃvatsarasatra*, the yearly sacrifice.

5. *Mṛgaśirṣa* period

As noted by us (Abhyankar 1993b), in order to understand the *lingum erectus* position of the central figure in Mohenjodaro Seal No. 420 we have to refer to a *puraṇic* story which is itself based on a *Rgvedic* tale. According to *Rgveda* 10.65.5 to 9, *Prajāpati* was enamoured by his daughter. When she took the form of a she-deer, *Prajāpati* went after her in the form of a he-deer. Seeing this heinous crime, Rudra killed him by shooting an arrow. This story is depicted in the sky with *Mṛga* (Orion) as *Prajāpati*, Rohini (Aldebaran) as his daughter, and *Vyādha* (Sirius) as Rudra. The three stars in the Orion's belt represent the Rudra's arrow. This story is actually an allegory to the sliding back of the vernal equinox from *Mṛgaśirṣa* (λ Orionis) to *Rohiṇi* (Aldebaran), or the autumnal equinox from the month of *Margaśirṣa* to the month of *Kārtik* . This brings us to an earlier epoch discovered by B.G. Tilak (1893).

Tilak has called attention to the statement in *Satapatha Brāhamaṇa* 6.2.2.18 and *Gopatha Brāhamaṇa* 1.19 like *Phālguni Poornamāsi* (*Phālguni* fullmoon) is the month of the *saṃvatsara* i.e. the year. They indicate an epoch in which the winter solstice occurred when the sun was

opposite to *Uttarā Phālguni* (β Leonis) with λ (1990) = 351°. It gives a precession of 81° and an epoch of about 3800 BC. At that time the autumnal equinox occurred in the month of *Mārgaśirṣa* . Since autumn is the best time of the year in India and the autumnal full moons are the most beautiful full moons, *Mṛgaśirṣa* has been called the best *māsa* i.e. the month of *Bhagavatgitā* 10.35.

6. Aditi era

Just as *Rohiṇī* is considered to be the daughter of *Prajāpati* - *Brahmā*, similarly *Dakṣa-Prajāpati* is consider to be the son of Aditi, the mother of Devas (gods) and Daityas (opponents of the gods). As Aditi is the deity of the Punarvasu *nakṣatra* , this relation points to s sliding back of the vernal equinox from Punarvasu (β Geminorium) to *Mṛgaśirṣa* (λ Orionis). That earlier epoch is referred in theTaitiriya *Saṃhitā* 7.4.8, according to which one should get consecrated for the yearly sacrifice on the Chaitri *Paurṇimā* (full moon near α Virginis), because it is the month of the *saṃvatsara* i.e. the year. Thus the winter solstice occurred when the sun was opposite to *Chitrā* (α Virginis), which has λ (1990) = 204°. It gives a precession of 114° and an epoch of about 6000 BC. It may be noted that Punarvasu is 90° behind *Chitrā*, so it represents the vernal equinox of that time. As Punarvasu was then at the boundary of the northern and southern halfs of the ecliptics, it separated *Devayāna*, the path of the gods, from *Pitṛyāna*, the path of the names who were earlier identified with Daityas. That is why Aditi, the deity of Punarvasu, was called the mother of both the Devas and the Daityas.

7. *Aśvinī* era

Now we come to the earliest epoch of the Vedas when the year was started at the winter solstice with the heliacal rising of the *Aśvinī nakṣatra,* i.e. α and β Arietis, which represent the Vedic deities *Aśvinīkumars* or *Nāsatyas*. We can infer this from several *Ṛgvedic* hymns. They are mainly of two kinds (K. D. Abhyankar 1993a) :

1. In about a dozen hymns it is stated that *Nāsatyas* come and claim their share of sacrificial offerings at the dawn or daybreak.

2. Several hymns describe the many healing powers of the *Aśvinīlumārsor* or *Nāsatyas* such as restoration of youthfulness, removal of blindness, lameness and other handicaps, healing of injuries, giving strength, lengthening of life, etc. According to Muir (see R.T.H. Griffith, 1976), they refer to certain physical phenomenon with which *Aśvinīkumars* are supposed to be connected. We have identified this phenomenon as the heliacal rising of the *Aśvinī nakṣatra* at the winter solstice after which the sun, who had become weak in winter, starts getting strong again. There are also a few quotations in *Ṛgveda* which indicate that *Aśvinīkumars* represented the farthest, i.e. the southernmost point of the sun's travel.

It is this importance of *Aśvinīkumars* which has provided for them 53 hymns in the *Ṛgveda*,

which are next only to Indira (the sun) with 251 hymns, Agni (fire) with 193 hymns and Soma (the moon) with 113 hymns. As λ (1990) = 36° and 38° for α and β Arietis, we get a precession of 126° to 128° and an epoch of about 700 BC.

8. Continuation of the tradition.

Table 1 (See Abhyankar, 1994) traces the changes in the beginning of the sacrificial year as required by the observed changes in the positions of the winter solstice on the ecliptic from the most ancient times. We have already noted that the year beginning was shifted from the winter solstice to the vernal equinox during the siddhantic period. However, the older memory about the importance of the winter solstice is preserved in the festival of *Makarasankrānti*, which coincided with the winter solstice in 285 AD. But its astronomical significance is now lost, because it occurs about 24 days after the winter solstice at the present time. Similarly the year is now started about 24 days after the vernal equinox due to precession. This clearly shows the need of introducing a radical calendar reform in the Indian panchanga in consonance with its ancient tradition.

Table 1. Changes in the Vedic year beginning from antiquity.

Epoch	Naksatra of winter solstice	Sacrificial year		Naksatra of vernal equinox	Civil year		Notes
7000 BC	*Aśvinī* (α & β Ari)	*Viaśākha*	S 1	*Puṣya* (δ Cnc)	*Māgha*	S 1	1
6000 BC	Opposite *Chitrā* (α Vir + 180°)	Chaitra	S 15	Punarvasu (β Gem)	*Pauṣa*	S 15	2
5000 BC	*Uttarā Bhādrapadā* (α Peg)	Chaitra	S 1	*Ārdrā* (α Gem)	*Pauṣa*	S 1	3
3800 BC	Opposite Uttara Phalguni (β Leo + 180°)	Phalgun	S 15	*Mrgaśirṣa* (λ Ori)	*Margaśirṣa*	S 15	4
3000 BC	*Satabhiṣag* (α PsA)	Phalgun	S 1	Rohini (α Tau)	*Margaśirṣa*	S 15	5
2300 BC	Old *Dhaniṣṭhā end* (ϵ Peg)	Magha	S 15	*Kṛttikā* (η Tau)	*Kārtik*	S 15	6
1300 BC	New *Dhaniṣṭhā* (β Del)	Magha	S1	Bharani (35 Ari)	*Kārtik*	S 1	7
800 BC	New *Śravaṇa* (α Aql)	*Pauṣa*	S 15	*Aśvini* (β Ari)	*Aśvin*	S 15	8
285 AD	*Uttarāṣadhā*	*Makarasankrānti*		*Meṣādi* (α Vir + 180°)	Chaitra	S 1	9
2000 AD	*Mula end*			*Purvā Bhādrapadā*	*Phālgun*	S 15	10
2450 AD	*Mula* (λ sco)	*Dhanursankrānti*		*Meenādi*	*Phālgun*	S 1	11

1. Composition of the Aśvinikumār hymns of Ṛgveda.
2. Taitiriya Saṃhitā identification of the nakṣatras.
3. Story of Agastya, Rāmāyaṇa Era?
4. Śatapatha Brāhmaṇaera
5. Mahāśivaratri festival introduced, Mahābhārat era?
6. Nakṣatra lists with the names of their deities.
7. Compilation of Vedānga Jyotiṣ.
8. Jain Jyotiṣ period begins.
9. Aryabhatiya Suryasiddhanta changes the year beginning to the vernal equinox.
10. Sliding of the seasons amounts to 24 days.
11. Future of tropical year beginning.

References

Abhyankar K.D., 1991, Indian J. History Sci., 26,1.

Abhyankar K.D., 1993 a, Indian J. History Sci., 28, 1.

Abhyankar K.D. 1993 b, Bull. Astr. Soc. India, 21, 475.

Abhyankar K.D., 1994, In Dr. Sampurnananda Smriti-Granth (Hindi and Sanskrit), Sanskrit Vishvavidyalaya, Varanasi, pp.571-591.

Dixit S.B., 1968, Bharatiya Jyotish Sastra, Part I, English translation of the original Marathi book of 1896, (Published by Government of India), p. 114.

Griffith R.T.H., 1976, The Hymns of the Vedas, Motilal Banarasidas, New Delhi, p.298.

Saha M. N., Lahiri N.C., 1955, Report of the calendar reform committee, C.S.I.R., New Delhi.

Tilak B.G., 1893, Orion, Pune.