

A SEARCH FOR THE EARLIEST VEDIC CALENDAR

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It is shown that the earliest Vedic calendar consisted of a six year *yuga* containing 6 years of 360 days divided into 12 months of 30 days each with an intercalary month (*adhika māsa*) of 30 days at the end of the sixth year. The first year of the *yuga* began at winter solstice, which coincided with the heliacal rising of the *Aśvinī nakṣatra*. The fourth and the seventh *yugas* had to be shortened to 5 years only making a total of 40 years in 7 *yugas*. The longer 40 year cycle is found to be related to the repetition of the heliacal rising of Venus along with the *Aśvinī nakṣatra* after that period.

The twelve months of the year from *Aruṇa* to *Sambhara* were named according to the prevailing seasonal conditions and the *adhika māsa* was called *Mahasvān*. The 12 months were grouped into three seasons, *Agnirtu*, *Sūryartu* and *Candramārtu* which corresponded to the modern *Śiśir-Vasanta*, *Griṣma-Varṣā* and *Śarad-Hemanta ṛtus*, respectively.

It is shown that the above calendar originated in India around 7000 BC. It is suggested that the present Gregorian Calendar can be made to conform with this ancient calendar by concurrently naming the months of January to December as *Aruṇa* to *Sambhara*, respectively.

1. INTRODUCTION

The structure of the present Indian Calendar (*Pañcāṅga*) was fixed about 1500 years ago during the Siddhantic period starting from Āryabhaṭa in the fifth century AD. Being sidereal in nature, this calendar is continuously sliding with respect to the seasons at the rate of one day in about 72 years. The difference has now accumulated to about 23 days during the last 1500 years. For example, *Makara Sankrānti*, which marked the beginning of *Uttarāyaṇa* during Āryabhaṭa's time, no longer coincides with that phenomenon, but occurs 23 days later. It is, therefore, necessary to deliberate on the improvement of the current *Pañcāṅga*. We can seek guidance in this task by probing into the historical development of Indian calendar from the remotest antiquity.

Siddhānta Jyotiṣa deals with the motions of the sun, moon and planets on the basis of the theory of deferents (*Madhyamagraha*) and epicycles (*Spaṣṭagraha*). This theory is quite advanced compared to the older *Vedāṅga Jyotiṣa* calendar of about 1200 BC. The latter dealt with only the mean motions of the sun and the moon. Most scholars believe that the *Vedāṅga Jyotiṣa* calendar contains a five year *yuga* of 62 synodic lunar months (*Tithimāsas*). Recently, Holay¹ has tried to show that it contains a more accurate 19 year *yuga* of 235 synodic lunar months. But

whichever view we hold, it is obvious that the *Vedānga Jyotiṣa* calendar must have been the culmination of many earlier experiments in calendar-making based on a long series of observations. The earlier calendars would have been much simpler, and it will be profitable to trace their evolution from the earliest epoch. The aim of this paper is to take the first step in this direction.

2. MAIN CHARACTERISTICS OF THE EARLIEST CALENDAR

(a) *Samvatsar* or the year

The basic units of a calendar are the day, the month and the year. Of these, the year or the *samvatsar* is the most important constituent, because it controls the seasonal growth of crops and other vegetation that are so important for human survival. It is, therefore, necessary to determine the length of the year. It was discovered quite early that the seasons are related to the position of the sun in the sky at noon, which in turn is related to the northward and southward motion of the rising sun on the eastern horizon. Such observations can be made easily with the help of a stick called *yupa*. Hence, the two halves of the year, namely, the *Uttarāyaṇa* and the *Dakṣiṇāyaṇa*, became the two basic divisions of the year very early in man's history. In India, the beginning of *Uttarāyaṇa*, i.e. the winter solstice, has been used for starting the year from remote antiquity, as is evident from the *Vedānga Jyotiṣa* calendar. In *Aitareya Brāhmaṇa* 18.18 and 18.22 also it is stated that on the *Viṣuvadin*, which occurred in the middle of the yearly sacrifice, the sun reached its maximum altitude. This corresponds to the summer solstice, i.e. the beginning of *Dakṣiṇāyaṇa*. *Viṣuvadin* is identified with the equinox at the present time. But according to late S.B. Dixit (*Bharatiya Jyotiṣ Śāstra*, English translation, Vol. 1, p. 40) "nowhere in the Vedas do we find a reference explicitly defining *Viṣuvedin* as the day on which the day and night are of equal length. It simply means interlude (midpoint) occurring in the course of *satra*. Now, if the *samvatsara-satra* is started on the winter solstice day, the *Viṣuvadin* would certainly occur on the summer solstice day. In fact, this is the interpretation given by Professor P.C. Sengupta to the passage in the *Aitareya Brāhmaṇa* (vide *Report of the Calendar Reform Committee* by M.N. Saha and N. C. Lahiri, page 266, Appendix 5-c). In fact, the year was started at winter solstice in most ancient civilizations. For example, the Gregorian Calendar, which begins the year only ten days after the winter solstice, is a relic of this ancient practice.

The observations of *Uttarāyaṇa* and *Dakṣiṇāyaṇa* indicated that the year contains roughly 360 or 720 pairs of *Ahas* (days) and *Rātris* (nights) together. Considering another observed fact that the lunar phases repeat after a period of about 30 days, it was simple and convenient to divide the year of 360 days into 12 months of 30 days each. There are several quotations in the Vedic literature², which support that the earliest calendar was based on this plan. Some of these are given below.

- (i) द्वादशारं नहितज्जराय वर्वर्ति चक्रं परिद्यामृतस्य ।
आ पुत्रा अग्ने मिथुनासो अत्र सप्त शतानि विंशतिश्च तस्युः ॥

“The wheel (of time) having twelve spokes (months) revolves round the heavens, but it does not wear out. Oh *Agni*, 720 pairs of sons (*Ahorātras*) ride this wheel”.

(*Rgveda* 1-164-11)

- (ii) द्वादशं प्रथयश्चक्रमेकं त्रीणि नाभ्यानि क उतत्चिकेत ।
तस्मिन्त्साकं त्रिशता न शंकवोऽर्पिताः षष्टिर्नचलाचलासः ॥

“Twelve spoke-boards (months), one wheel (year), three navals (seasons). Who understands these? In these there are 360 *sankus* (rods, i.e. days) put in like pegs which do not get loosened”.

(*Rgveda* 1-164-48)

- (iii) त्रीणिच वै शतानि षष्टिश्च संवत्सस्याहानि -----
----- सप्त च वै शतानि विंशतिश्च संवत्सरस्याहोरात्रयः ।

“A year has 360 days, a year has 720 days and nights together”.

(*Tait. Brāh.* 7.17)

Thus, a year of 360 days, consisting of 12 months of 30 days each, formed the earliest Vedic calendar. It may be mentioned that the month was further divided into 5 *Śalahas* of 6 days each. *Samvastarasatra*, i.e. the year-long sacrifice itself served as a calendar for this purpose.

(b) *The Adhika Māsa*

A 360-day year is the crudest, or in mathematical language, the zeoreth approximation of the year which has nearly 365.25 days. As is well known, there is a small difference between the sidereal year (*Nakṣatra varṣa*) of 365.25637 days and the tropical year (*Rtu varṣa*) of 365.24220 days, amounting to about 20 minutes. This difference could not have been noticed by the ancient peoples who had yet to find the correlation between the seasons and the stars. Now, one has to allow for the difference of 5.25 days between the calendaric year of 360 days and the true year of 360.25 days. In the earliest days, this was achieved by performing the *Atirātra* sacrifices of 4, 5 or 6 days at the end of the *samvastarasatra*, so that the year could begin on the winter solstice day. *Taitirīya Saṃhitā* 7.1.8 mentions a controversy about the number of days on which the *Atirātra* sacrifices were to be performed. It says that 4 *Atirātras* make the year incomplete, while 6 *Atirātras* give excess, so 5 *Atirātras* are the best for obtaining unison with the seasons.

Once it was realised that the year contained close to 365 days, a concept arose according to which one had to add one *Adhikamāsa* (intercalary month) of 30 days after 6 years, as described in the following quotation:

अहोरात्रैर्विमितं त्रिंशद्भङ्गां त्रयोदशं मासं यो निर्मित्तीते ॥

“(Rohit), who created the thirteenth month made up of 30 *ahorātras*”.
(*Atharvaveda* 13-3-8)

This must have been the oldest method of introducing *adhikamāsas* mentioned in the quotation:

वेदमासो धृतव्रतो द्वादश प्रजावतः । वेदा य उपजायते ॥

“Dhrtavrata (Varuṇa) knew the twelve productive months; he also knew about the thirteenth additional month”.

(*R̥gveda* 1-25-8)

(c) *The three systems of Adhikamāsas*

The above concept of *adhikamāsa* is different from the presently prevailing method of introducing a synodic lunar month (*Tithimāsa*) as *adhikamāsa* in our lunisolar calendar. Actually, we find three different systems of *adhikamāsas* in the Vedic literature, which represent three different epochs during which they were in vogue.

(i) In *Vājasena Samhitā* 22.30 and 22.31, we find 12 month names starting from *Madhu* and ending with *Tapasyā*, and three kinds of *adhikamāsas* called *Saṃsarpa*, *Malimlucha* and *Ahmaspati*, the last one being applied to the *Kṣaya Māsa*. This system is the closest to the modern practice and it is related to the *Vedānga Jyotiṣa* calendar in which the *Adhikamāsa* was added either before the winter solstice, or before the summer solstice. The names *Saṃsarpa* and *Malimlucha* would be applicable to them. The name *Ahmaspati* indicates that the practice of introducing *Kṣaya Māsa* ought to have been prevalent during the *Vedānga Jyotiṣa* period. In fact, one needs it for correcting the error in the five year *yuga* calendar.

(ii) In *Taitirīya Samhitā* 1.4.14, we have again the 12 month names from *Madhu* to *Tapasyā*, but only two types of *adhikamāsas*, namely, *Saṃsarpa* and *Ahmaspati*. Here also, *Ahmaspati* must be referring to *Kṣaya Māsa*, while *Saṃsarpa* would be the *adhikamāsa* added before the winter solstice only. This would have been the system prevalent before the *Vedānga Jyotiṣa* period, perhaps during *Mahābhārata* period.

(iii) In *Taitirīya Samhita* 3.10.1, the month names are entirely different. They start with *Aruṇa* and end with *Sambhara*. The *adhikamāsa* also has the different name of *Mahasvān*, and that is the only name for *adhikamāsa*. This must be the oldest system referred to in *R̥gveda* 1-25-8 quoted above. The same *Taitirīya Samhita* gives the names of six years as *Samvatsara*, *Parivatsara*,

Idāvatsara, Iduvatsara, Idvatsara and *Vatsara*. It is thus the six year *yuga* system described by us. It must also be the *yuga* system mentioned in

‘दीर्घतमा मामतेयो जुजुर्वान् दशमे युगे ।’

– (*Rgveda* 1-158-6)

It makes *Dīrghatamas* old at the age of sixty years, which is more reasonable than the fifty years normally inferred from an assumed five year *yuga*.

(d) *Error and Corrections*

The six year *yuga* has 73 months of 30 days each, which make a total of 2190 days. But the six years of seasons have approximately 2191.5 days. Thus, there is a shortfall of 1.5 days in one *yuga*. After three *yugas*, the error accumulates to 4.5 days. In the next five years, there would accrue an additional error of 26.25 days at the rate of 5.25 days per year, making a total of 30.75 days. Therefore, one has to have an extra *adhikamāsa* at the end of 23rd year. So one has to drop the sixth year in the fourth *yuga*, at the end of which we have an error of 0.75 day only. The error increases to 3.75 days at the end of the sixth *yuga*. Finally, adding the error of 26.25 days in the following 5 years we get a total of 30 days. So, we add an *adhikamāsa* at the end of the fortieth year and drop the sixth year in the seventh *yuga*. At the end of forty years, we return to the original position and the whole cycle is repeated. This longer cycle of 40 years is found to be related to Venus as explained below.

40 sidereal/tropical years of 365.25 days = 14610.00 days.

25 synodic periods of Venus of 583.92 days = 14598.25 days.

65 sidereal periods of Venus of 224.7 days = 14605.50 days.

So, the relative positions of the sun, Venus and stars (*Nakṣatras*) would repeat closely after 40 years. The *adhikamāsas* in the longer 40 year cycle are shown in Fig.1.

3. THE ROLE OF AŚVINĪKUMĀRS

We have already noted that the year was started at the winter solstice by actual observations of the beginning of *Uttarāyaṇa*, the northward motion of the sun. A little later it was realized that this coincided with the heliacal rising of the *Aśvinī nakṣatra* just before sunrise. So also, *Dakṣiṇāyaṇa*, the southward motion of the sun, started when the *Aśvinī nakṣatra* rose in the east after sunset in the west. Certainly, the *Aśvinīkumars* of the Vedic fame must have been discoverers of this correlation. That is why they were given the honour of being the deities of that *nakṣatra* which is named after them. The two bright stars Alpha and Beta Arietis in this constellation represent the twin *Aśvinīkumārs*, who are perhaps the originators of the 6/40 year *yuga* calendar. We give below the Vedic evidence for such a hypothesis.

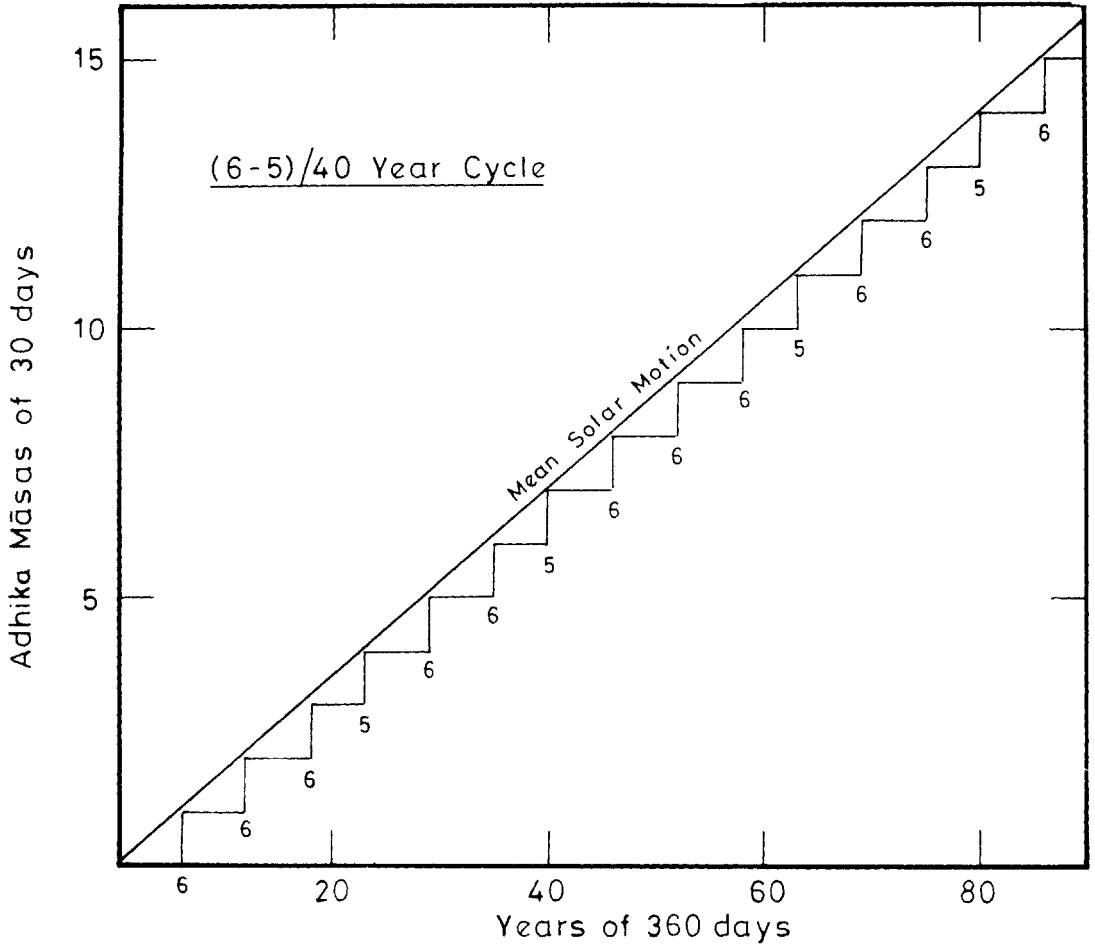


Fig. 1. (6-5)/40 year yuga cycle.

(a) *Importance of Aśvinikumārś*

Out of the 1024 hymns in the *Rgveda Saṃhitā*, about one-fourth, i.e. 251 hymns, are in praise of *Indra*, the supreme god, who is the personification of the life-giving sun. He has his maximum power at summer solstice, the northernmost point, when he causes the rain. Next in order comes *Agni*, who is praised in 193 hymns. *Agni*, i.e. fire, represents the sun on the earth. Then we have 113 hymns devoted to *Soma*, the personification of the moon, who is the form of the sun in *antarikṣa*. These three most important gods are followed by *Aśvinikumārś*, who are praised in 53 hymns, *Maruts* in 33 hymns and *Usha* in 21 hymns. Thus, the importance of *Aśvinikumārś* is next to *Indra*, *Agni* and *Soma*, because they were the first astronomers of India. It may be noted that the *Svāti nakṣatra*, whose deity is *Vayu* or *Marut*, rose heliacally before sunrise at *Dakṣiṇāyana*, which was heralded by the fierce monsoon winds.

(b) *Heliacal Rising of Asvini*

The arrival of the *Aśvinikumārs*, or *Nāsatyas*, in the early morning is described in several hymns of the *Rgveda*, such as 1-46-14, 1-157-1, 1-183-6, 1-180-1, 1-184-1, 2-39-2, 4-45-2, 5-76-1, 5-77-1 and 2, 8-5-2, 8-9-18, etc. We shall quote a couple of them here.

- (i) प्रातर्यावाणा प्रथमा यजध्वं पुरा गृध्रादररूषः पिबातः ।
प्रातरहि यज्ञमश्विना दधाते प्रशसन्ति कवयः पूर्वभाजः ॥ .

“Oh *Rtviks*, first worship those who come at early morning. Let the Twain drink (*soma*) before the giftless niggards. The sages of old extol that the *Aśvins* claim the sacrifice at daybreak.”

(*Rgveda* 5-77-1 & 2)

- (ii) युवोरुषा अनुश्रियं परिज्मनोरूपचरत् । ऋतावतयो अक्तुभिः ।

“Oh circumambient (those who move in circles) *Aśvins*, dawn follows the brightness of your way.”

(*Rgveda* 1-46-14)

(c) *Aśvinī Nakṣatra as the Maker of Winter Solstice*

Hymns 1-112 and 1-116 to 1-120 of *Rgveda* describe the many health-giving powers of the *Aśvins*, such as restoration of youthfulness, removal of blindness, lameness and other handicaps, healing of injuries, giving of strength, lengthening of life, etc. According of Muir³, they refer to certain physical phenomena with which the *Aśvins* are supposed to be connected. It is easy to identify this phenomenon as the occurrence of the heliacal rising of *Aśvins* at the winter solstice after which the sun, who had become weak in winter, starts gaining strength. That the *Aśvinī nakṣatra* represented the southernmost point of the sun's travel is borne out by the following references:

- (i) वि वां रथो वध्वा यादमानोऽन्तान्दिवो बाधते वर्तनिभ्याम् ।

“Your car on which your spouse is wont to travel marks with its track the farthest ends of heaven.”

(*Rgveda* 7-69-3/2)

- (ii) याभिः सूर्य परियाथः परावति ।

“Wherewith ye compass round the sun when far away.”

(*Rgveda* 1-112-13)

- (iii) In *Mahabharata*⁴, we have

एकं चक्रं वर्तते द्वादशारं प्रधिषण्णाभिमैकाक्षममृतस्य धारणम् ।
यास्मिन्देवा अभि विश्वे विषक्तास्तावच्चिनौ मुञ्चतो मा विषीदतम् ॥

In this prayer to *Aśvinīkumārs* by Upamanyu on the advice of his preceptor Dhomya, he says "There is a wheel with twelve spokes. It has one nave for every six spokes and one axle. It bears nectar. All the gods in the universe are attached to it. The twins *Aśvins* save from it. Oh you twins, do not be negligent about us."

(*Ādiparva* 3-65)

This is a description of the ecliptic, the path of the sun, which is also traversed by all the planets. The *Aśvins* keep these luminaries from falling by returning them northwards from the southernmost point in the ecliptic.

The healing power of *Aśvinīkumārs* becomes evident at the summer solstice in a different way if we adopt the interpretation of the *Vandanā* episode, as given by P.V. Holey. After traversing half of the celestial sphere during the six months of *Uttarāyaṇa*, the *Aśvinī nakṣatra* is seen rising in the east after sunset at the time of summer solstice. According to Holey, *Aśvinīkumars* determined the day of summer solstice at this point of time by looking at the reflection of the sun in a deep well from a place slightly south of the tropic of cancer. The reflection of the sun (*Vandanā*) was visible in the well 4 days before the summer solstice. Thereafter, it could not be seen (*Vandanā* was hidden in the well) for 9 days because of the northward shift of the sun. It travelled northward for 4 days, reaching the northernmost point on the fifth day. It took another 4 days to return to its original position, when its reflection (*Vandanā*) was seen again in the well. This is how *Aśvinīkumārs* resurrected *Vandanā* from the well after 9 days by turning the well upside down and *Vandanā* came out as bright as the sun.

(d) Introduction of the *Adhikamas*

We have seen that the six-year *yuga* starts with the heliacal rising of the *Aśvinī nakṣatra* at the winter solstice. Since the year is of 360 days, its heliacal rising will be delayed by 5 days every year. At the end of the sixth year, they do not rise at all during the whole month. This is described in the following prayer by Atri:

कूष्ठो देवावञ्चिनाद्या दिवो मनावसू ।
तच्छरवथो वृषण्वसू अत्रिर्वामा विवासति ॥
कुत त्या कुह सुश्रुता दिवी देवा नासत्या ।

"Where in the heaven are ye today, Gods, *Aśvins*, rich in consistency? Hear this, ye excellent bestowers: Atri invites you to come. Where are they now? Where are the Twain, the famed *Nāsatyas*, Gods in heaven"

(*Rgveda* 5-74-1 & 2/2)

So, the month in which they did not show up before sunrise was treated as an *Adhikamāsa* and the next year was started only after their heliacal rising.

(e) *Correlation with Venus*

The observations indicated that the *Adhikamāsa* had to be introduced at the end of the 6th, 12th, 18th, 23rd, 29th, 35th and 40th year, as we saw above. Now, if the planet Venus had appeared along with the *Aśvinī nakṣatra* at the time of its heliacal rising at the beginning of the first *yuga*, then it would again do so at the end of the 40th year on account of the commensurability of the sidereal year with the synodic and sidereal periods of Venus. This beautiful sight is described in various hymns, in which *Suryā*, the daughter of the sun, namely, Venus, who was supposed to be married to *Aśvinikumārs*, is said to have ascended their three-wheeled car (Alpha, Beta and Gamma Arietis). We cite two quotations here.

आ वां रथं दुहिता सूर्यस्य कार्ष्णेवातिष्ठदर्वता जयन्ती ।
विश्वेदेवा अन्धमन्यन्त हन्दिः समुश्रिया नासत्या सचेथे ॥

“The Daughter of Sun (Venus) ascended your car, first reaching as it were the goal with coarsers. All deities within their heart assented, and ye, *Nāsatyas*, are closely linked with glory.”

(*Rgveda* 1-116-17)

(ii) आ वां रथं युवतिस्तिष्ठदत्र जुष्टवी नरा दुहिता सूर्यस्य ।

“The youthful Daughter of the Sun (Venus), delighting in you, ascended there your chariot, Heroes.”

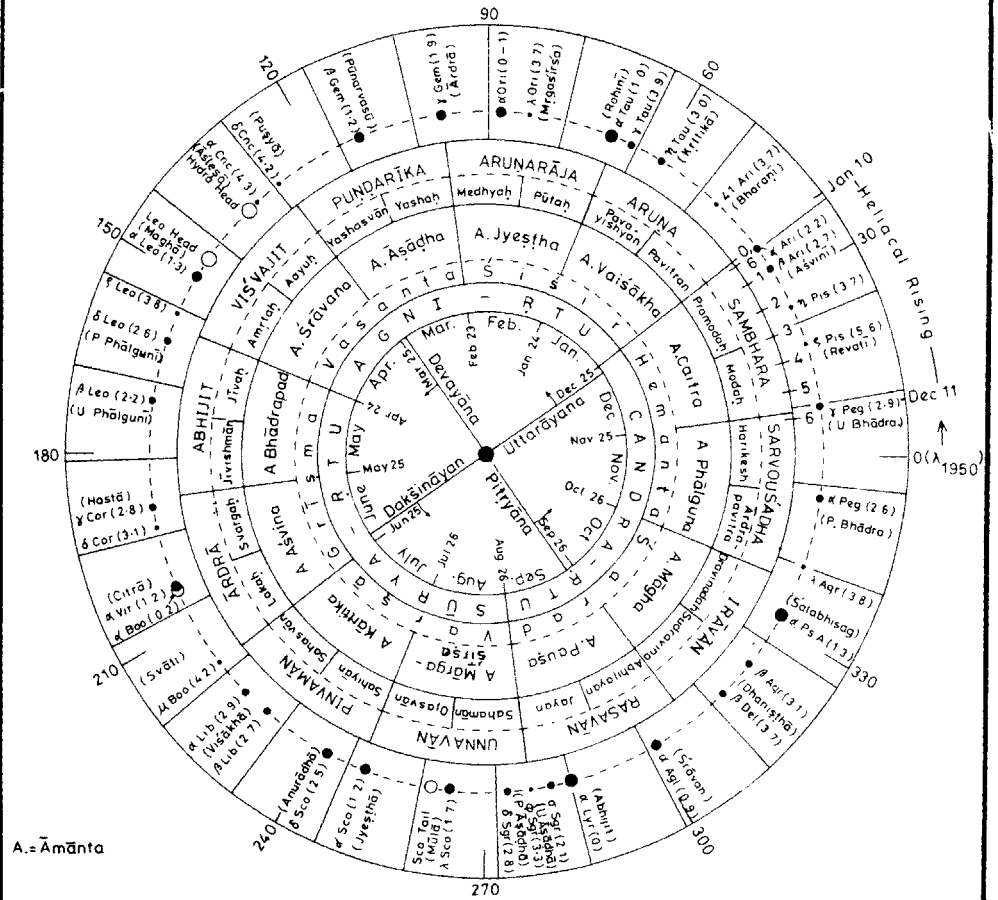
(*Rgveda* 1-118-5/2)

4. THE AŚVINĪ CALENDAR

(a) *The six year yuga*

Fig. 2 shows the six-year *yuga* calendar, which we have called the *Aśvinī* calendar. The first year of the *yuga*, namely, *Samvatsara*, started with the heliacal rising of *Aśvinī*. If the winter solstice occurred when the sun was near *Aśvinī nakṣatra* (Alpha and Beta Arietis), that *nakṣatra* will be seen rising heliacally before sunrise on about the 10th of January, as shown by mark ‘O’ in Fig. 2. The second year, *Parivatsara*, will start on the 5th of January, as shown by mark ‘1’, with *Aśvinī* rising 5 days later in the first month. Similarly, The third, fourth, fifth and sixth years (*Idāvatsara*, *Iduvatsara*, *Idvatsara* and *Vatsara*) will commence at points ‘2, 3, 4 and 5’ on 31st December, 26th December, 20th December and 15th December respectively, with the *Aśvinī nakṣatra* rising 10, 15, 21 and 26 days later during the first month *Aruṇa*. Now if one started the 7th year at point ‘6’ on 11th December, it would be found that

Six Year Yuga Cycle in ≈ 7000 B.C.



A. = Āmānta

- | | |
|------------------------|------------------------|
| 0 Samvatsara (Jan.10) | 4 Ijvatsar (Dec.20) |
| 1 Parivatsara (Jan.05) | 5 Vatsar (Dec.15) |
| 2 Idāvatsara (Dec.31) | 6 Mahasvān (Dec.10) |
| 3 Iduvatsara (Dec.25) | 6' Samvatsara (Jan.09) |

Fig 2. Aśvini calendar of 7000 BC.

Aśvinī will not rise during the whole month of 30 days. Hence, that month will be treated as *Adhikamāsa* with the name *Mahasvān*. And the new cycle or *yuga* of six years will be started from *Samvatsara* beginning on the 9th of January at point 6.

Continuing in this fashion, the 3rd and 4th *yugas* will start on 7th and 6th January, respectively. Then, the 2nd, 3rd, 4th, 5th and 6th years of the fourth *yuga* would commence on 1st January, 27th, 22nd, 16th and 11th December, respectively. Thus, we would be again in the same position as we were at the end of the first *yuga*. Therefore, we have to add one *Adhikamāsa* at this stage, namely, at the end of the 23rd year and drop the 6th year *Vatsara* from the 4th *yuga*. The 5th, 6th and 7th *yuga* will then start on 10th January, 8th January and 7th January, respectively. And the successive years of the 7th *yuga* would start on 1st January, 26th December, 21st December, 16th December, and 11th December, respectively. So, we again introduce an *Adhikamāsa* at the end of the 40th year and drop the sixth year from the *yuga*.

Now, if Venus rose with the *Aśvinī nakṣatra* at the beginning of the first *yuga*, then, as we have seen, it will do so again at the beginning of the 41st year. Thus, a new cycle will start again from that date with the same configuration of Venus and *Aśvinī* at dawn.

From the above discussion, it will be seen that on an average the year will start on 25th of December.

(b) *The Months*

The 30-day months were, according to *Taitīriya Brāhmaṇa* 3-10-1, *Aruṇa* (25 Dec. to 23 Jan. on an average), *Aruṇaraja* (24 Jan. to 23 Feb. on an average), *Puṇḍarīka* (24 Feb. to 25 March on an average), *Viśvajit* (26 March to 25 April on an average), *Abhijit* (26 April to 25 May on an average), *Ārdra* (26 May to 25 June on an average), *Pinvamāna* (26 June to 25 July on an average), *Unnavāna* (26 July to 25 Aug. on an average), *Rasavāna* (26 Aug. to 24 Sept. on an average), *Irāvāna* (25 Sept. to 25 Oct. on an average), *Sarvouṣadha* (26 Oct. to 24 Nov. on an average) and *Sambhara* (25 Nov. to 24 Dec. on an average). As can be seen, the names of the months are seasonal in character. The names of the first five months from *Aruṇa* to *Abhijit* give a description of the growing power of the sun, while *Ārdra* means the humid season, *Pinvamān* means the wet season, *Unnavān* means the sprouting season, *Rasavāna* means the juicy season, *Irāvāna* means the season of fruition, *Sarvouṣadha* means the season of abundant vegetation, and *Sambhara* means the season of prosperity. Each of these months is further divided into 24 half months, as indicated in Fig. 2. Their names are related to the activities pursued during the corresponding periods. For example, the first month *Aruṇa* is divided into *Pavitran* and *Pavayīṣyan*, which pertain to the activity of getting consecrated at the beginning of the yearly sacrifice, the *Samvatsara-satra*.

Similarly, the last month *Sambhara* is divided into *Modah* and *Pramodah*, which pertain to the festivities at the end of the yearly sacrifice marked by agricultural prosperity.

(c) *The Seasons*

In ancient times, the year was divided into three seasons of four months each, i.e. *cāturmāsyā*, as is evident from *Rgveda* 1-162-2 (त्रिनाभिक्रम) and *Rgveda* 1-64-48 (त्रीणि नाभ्यानि). These were later divided into the six familiar seasons, as noted in *Taitirīya Samhitā* 4-4-11 and in *Mahābhārat Ādiparva* 3-65 (प्रधिषण्णाभिम्). Even now, we recognize three main seasons of summer, rains and winter, which are divided further into the six seasons of *Vasanta*, *Grīṣma*, *Varṣā*, *Śarada*, *Hemanta* and *Śīsira*.

Taitirīya Samhitā 3-10-1 also mentions three seasons: अग्निर्ऋतुः सूर्यऋतुश्चन्द्रमाऋतुः ॥. These can be easily identified as follows. The first four months from *Aruṇa* to *Viṣvajita* (roughly 25 Dec. to 25 April) comprise the *Agniṛtu*, because they coincide with the cold season in north India, when *Agni* is the most important of the three main deities. The next four months from *Abhijita* to *Unnavāna* (roughly 26 April to 25 Aug.) comprise the *Sūryarṛtu*, because during this period we experience the maximum power of the sun, first in the form of severe summer and then in the form of abundant rains. The last four months from *Rasavāna* to *Sambhara* (roughly 26 Aug. to 24 Dec.) comprise the *Candramārtu*, because during these months we have the most beautiful full moons, which are supposed to provide nourishment to the crops and vegetation produced in that period. Thus, *Agniṛtu* would cover what we call *Śīsira* and *Vasanta*, *Sūryarṛtu* would cover *Grīṣma* and *Varṣā*, while *Candramārtu* would cover *Śarad* and *Hemanta* ṛtus. This division is slightly different from our present *cāturmasyā* system in which we club *Vasanta* and *Grīṣma* in the summer, *Varṣā* and *Śarada* in the rainy season and *Hemanta* and *Śīsira* in the winter; but the logic of the old system is equally powerful. It may be noted that in the traditional *cāturmasyā* period covering *Varṣa* and *Śarada*, the gods are supposed to sleep. It is an allegory of the fact that it is difficult to see the stars (gods) during this period due to cloudy weather. In fact, our modern optical telescopes do become inactive at this time (July to September) for the same reason.

(d) *Correspondence with the Lunar Months*

It is quite understandable that the *Aśvinī* calendar based on seasons came into existence before the advent of the luni-solar calendar based on *nakṣatras*. But since we are now familiar with the lunar months, it will be instructive to note the correspondence between the *Aśvinī* calendar and the lunar months. A glance at Fig. 2 will show that the *Aruṇa* month corresponds to *Amānta Vaiśākha*, because when the sun lies between Alpha Arietis and Alpha Tauri

(Rohini), the full moon will occur near *Viśākhā nakṣatra*. The correspondence of the other months follows automatically, as *Aruṅaraja* with *Amānta Jyeṣṭha*, *Puṇḍarika* with *Amānta Aṣāḍha*, etc.

5. CONCLUDING REMARKS

(a) *Place of Origin*

We have seen that the *Aśvinī* calendar speaks of three seasons. Now, if we look at the climates of the various regions of the earth, we find three main categories. In the equatorial belt, we have only one hot humid season throughout the year. In the polar regions, there are only two seasons of summer and winter. And, in the temperate zones, we find four seasons of spring, summer, autumn and winter. It is only in the lands of the monsoon climate, like India and Mexico, that we experience three seasons with hot, rainy and cold weather. Since we are dealing with the Vedic literature of India, it is obvious that the *Aśvinī* calendar must have originated in India, which has typical monsoon climate. This is a strong evidence to show that the Vedic civilization developed indigenously in India and it is not the implant of any alien invaders.

(b) *Epoch*

At present, the winter solstice occurs when the sun is in the *Mūla nakṣatra* with the *nirayana* longitude of 247 degrees. As *Aśvinī* has a *nirayana* longitude of 14 degrees, there has occurred a precession of 127 degrees. At the rate of $50''2''$ per year, we get an elapsed time of 9100 years. Thus, the epoch of the *Aśvinī* calendar comes to about 7000 BC, as shown in Fig. 2.

(c) *Span or duration*

Winter solstice would remain near *Aśvinī nakṣatra* for about 1000 years for practical purposes. After that, it would shift to *Revati*, which is not a bright star. Thus, it would be difficult to note its heliacal rising. However, there would be the bright star *Citrā* (Alpha Virginis) near the summer solstice. Hence, one can start the year by observing its nocturnal rise after sunset. A few years of observations of this type will show that a full moon near *Citrā* can easily herald the beginning of the year. In fact, we find such a mention in the *Taitīriya Saṃhitā* 7-4-8, which states:

चित्रापूर्णमासे दीक्षेन् मुखं वा एतत्संवत्सरस्य ।

i.e. *Citrā* full moon is the mouth of the year. This would have happened in about 6000 BC, when *Paurṇimānta Vaiśākha* would be the first month of the year. It was after this that people began to observe the position of the full moon among the *nakṣatras*, and thus became acquainted with the *Nakṣatras*. The identification of the original 28 *nakṣatra* is made by the author elsewhere⁵. The

subsequent development of the Indian calendar will be discussed in another paper.

We will end this discussion by making a suggestion that we can make the present Gregorian calendar conform to our ancient tradition by calling the months of January as *Aruṇa*, February as *Aruṇaraja*, etc. up to December as *Sambhara*.

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