ON THE CAITRĀDI SCHEME

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A characteristic feature of the Hindu calendar is that the name of each month is based on a *nakṣatra* near which a full moon may be taken to have occurred. Some scholars have argued for establishing a historic chronology for this *Caitrādi* scheme of months on the grounds that it was not known in the Saṃhitās, but became well established in the Brāhmaṇa texts. Using the planetarium software SkyMap Pro in conjunction with another computer program PACANG2, it is demonstrated clearly that there is no basis for these arguments to establish a chronology. It is further argued that the basis for the *Caitrādi* scheme is the connection between Yajña and the important role of Agni in it. The beginning of the sequence of months with *Caitra* can be traced to *Ṛgveda*.

Keywords: Ancient Indian astronomy, *Caitrādi* scheme, Hindu calendar.

1. INTRODUCTION

One of the characteristic features of the Hindu calendar is that the name of each month is based on the *nakṣatra* near which a full moon may be taken to have occurred. The names of the months in this *Caitrādi* scheme are: *Caitra, Vaiśākha, Jyaiṣṭha, Āṣāḍha, Śrāvaṇa, Bhādrapada, Āśvayuja, Kārtika, Mārgaśīrṣa,*

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Pauṣa, Māgha, and *Phālguṇa.* The concept of the month as a unit of time, which measures the period of motion of the moon, has been known since the Vedic times:

samānāṃ māsa ākṛtiḥ (ṚV X. 85.5).

"Moon is the one who shapes the year."

The motion of the moon as it progresses eastwards along a path near to the ecliptic is marked by a system of *nakṣatras* :

atho nakṣatrāṇāṃ eṣāṃ upasthe soma āhitaḥ (ṚV X. 85.2).

"The moon is placed amongst the stars."

The list of 27 *nakṣatras* together with the presiding deities is also known:

kṛttikā nakṣatram agnir devatā ... apabharaṇīr nakṣatraṃ yamo devatā (TS IV. 4. 10).

A list in TS reads:

madhuś ca mādhavaś ca śukraś ca śuciś ca nabhaś ca nabhasyaś ca iṣasōrjaś ca sahaś ca sahasyaś ca tapaś ca tapasyaś ca upayām agṛhīto 'si saṃsarpo 'si āṃhaspatyāya tvā (TS 1.4. 14).

This gives the name of the twelve months as *madhu, mādhava, śukra, śuci, nabhas, nabhasya, iṣa, ūrja, sahas, sahasya, tapas* and *tapasya.* It also gives the name of the intercalary month as *saṃsarpa,* and *aṃhaspati* as the suppressed month. Apparently, the names quoted from TS above are not based on *nakṣatras.* However, names of months based on *nakṣatras* are to be found in the Brāhmaṇā and Kalpa Sūtra texts. For example, *Vaiśākha* occurs in ŚB:

yāsau vaiśākhasyāmāvāsyā tasyāṃ ādadhīta (ŚB XI. 1.1.7)

and *Māgha* occurs in KB (19.3), *Phālguṇa* occurs in TDB (5.9.7-12), *Mārgaśīrṣa* and *Śrāvaṇa* also occur in AGS (2.3.1; 3.5.2). It is obvious that *nakṣatra*-based names of months appear to be well established in the Brāhmaṇa texts. Some scholars have conjectured that the *Caitrādi* scheme was not in use during the Saṃhitā times, but came into vogue later. Hence, from their point of view, it would be of historic interest to know when the use of the names *Caitra,*

Vaiśākha, etc. came into vogue. Attempts have been made, therfore, to ascertain the date at which the systematic use of that scheme was introduced. While Jones[1] hinted at the possiblity of determining a date of this happenning, Bentley[2] opined that the systematic use of the *Caitrādi* system could not have been in practice earlier than 1181 BC. Weber[3] considered the possibility of fixing the date by noting a year in which the moon was full in each of its successive revolutions near the *naksatras* giving the names to the months. But Whitney[4] rejected any such possibility of ascertaining the date at which *Caitrādi* scheme came into vogue because of a fundamental problem. The full moon can occur at all points along the ecliptic in succession and hence no system of names derived from the *naksatras* containing the full moon could be continuously correct. Dikshit[5] has addressed the issue of the date from a somewhat different point of view. According to him even though the phenomenon of the moon becoming full near certain stars had been recognized even in the early Vedic times, the *Caitrādi* scheme came into vogue much later. Dikshit also recognizes the fact that the moon could become full near any of the twenty-seven *naksatras* and not just the twelve included in the *Caitrādi* scheme. He determines the date by looking at the change in the months associated with the seasons. Based on the shift of seasons because of precession, Dikshit surmises that the *Caitrādi* scheme came into vogue in those times when the vernal equinox actually took place in *Caitra.* He estimates the latter to have occurred in 1822 BC and concludes that the *Caitrādi* scheme came into vogue around 2000 BC.

In recent years there has become commercially available some very powerful astronomy software, the so-called Planetarium Software. The application of a planetarium software "SkyMap"[6] as a research tool to study the astronomical phenomena refered to in the Vedas has already been

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[1] W. Jones, *Asiatick Researches,* 2(1790) 373.

[2] J. Bentley, *Historical View of Hindu Astronomy,* Calcutta, 1823.

[3] A. Weber, *Naxatra,* 1, 1860.

[4] W.D. Whitney, "Biot and Weber on Hindu and Chinese Systems of Asterisms," *Journal of the American Oriental Society,* 8.1 (1864).

demonstrated by the author in two papers. In the first paper,[7] some passages in ŚB have been re-examined in conjunction with the displays from SkyMap, and it has been shown that the ideas of Dikshit who had used these passages to propose a date of about 3000 BC for ŚB are fundamentally correct. In the second paper[8] a new scheme has been proposed for identification of the *nakṣatras* based on the actual (rather, computer simulated)view of the sky the Vedic people might have observed. This scheme solves trivially some of the problems that have plagued the identification of *nakṣatras*.

The SkyMap Pro is a more recent version of the software adapted to the Windows-98 systems. Like its predessor, it takes into account the precessional motion of the earth's rotation axis and produces the images of the entire sky at any location on earth and at any date from 4000 BC to 8000 AD. It is a very sophisticated mapping tool, which shows all the heavenly objects above the horizon at any given location at any given time within certain limits. It can display stars as faint as magnitude sixteen, and zoom into a practically unlimited extent to produce area maps giving details to any desired degree. Furthermore, the celestial coordinates, right ascension and declination, and a host of other astrophysical data can be determined for any object for the epoch corresponding to given date. The local and setting times for the object can also be determined.

In this paper, the SkyMap Pro software will be used to simulate the Vedic sky in order to investigate the question of historic beginnings of the *Caitrādi* scheme as claimed by various authors. Another program developed by Professor Yano and his collaborators called PANCANG2,[9] which is capable

[5] S. B. Dikshit, *Bhāratīya Jyotiṣaśāstra*, Calcutta, 1969.

[6] C. Marriot, SkyMap Software, 9 Seven Road, Culcheth, Cheshire WA3 5ED, UK 1993-1998. The latest version is SkyMap Pro.

[7] B. N. Narahari Achar, "On the Astronomical Basis of the Date of Śatapatha Brāhmaṇa: A Re-Examination of Dikshit's Theory," IJHS, 35.1 (2000) 1-19.

[8] B. N. Narahari Achar, "On the Vedic System of Nakṣatras, I: Identification," to be published.

of calculating the *tithi* and *nakṣatra* for any given [Gregorian] date based on the *Sūryasiddhānta,* will also be used in conjunction with SkyMap Pro in this study.

It will be known that Dikshit's date for the vernal equinox in *Caitra* cannot be confirmed. Moveover, his argument for the date of introduction of the *Caitrādi* scheme is shown not to be valid. While the astronomically significant claims can be easily verified, it begs a more fundamental question regarding the historicity of *Caitrādi* scheme, because authors have not taken into account the essential role played by the ritual Yajña in the Vedic culture. The strong connection between Yajña, and the concept of the year is emphasised here and it is argued that the *Caitrādi* scheme arises really as a result of this strong connection and not because the full moon occurs only near a chosen set of twelve *nakṣatras.* Furthermore, there is really no basis for assuming that *nakṣatra*-based names of months were unknown in the Saṃhitās. As a consequene, the whole question of when the *Cairādi* scheme was introduced is rendered mute. There is evidence in *Ṛgveda* for the sequence of months to begin with *Caitra.*

2. THE VEDIC SKY

We choose Delhi as the location and the year 2927 BC as the base year to refer to for the purposes of this paper. This was the year in which *Kṛttikās* were on the equator as discussed earlier[10] in verifying Dikshit's theory about the date of ŚB. The same year was also used elsewhere[11] in developing an identification scheme for the list of *nakṣatras.*

Using the SkyMap Pro program it is determined that a full moon occurs on 11October 2927 BC at 10:57 am and using the PANCANG2 program it is

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[9] M. Yano and M. Fushumi, PANCANG2, a program based on *Sūryasiddhānta,* available by ftp://ccftp.kyoto-su.ac.jp/pub/doc/sanskrit/

[10] Achar, "On the Astronomical Basis of the date of Śatapatha Brāhmaṇa," op.cit.

[11] Achar, "On the Vedic System of Nakṣatras, " op. cit.

determined that it is *Kṛttikā nakṣatra* on that day. A view of the sky that night is displayed in Figure 1. Clearly, it is the month of *Kārtika*. Again it is full moon on 18 March 2927 BC, and the *nakṣatra* is determined to be *Viśākha*. Figure 2 shows a view of the sky on that night of the month *Vaiśākha.*

In this manner one can determine the dates of all full moon days in the year together with the associated *nakṣatra* and the results are given in Table 1. The *tithi, pūrṇamāsī* agrees in most cases with the day of the full moon as determined by SkyMap Pro. In some cases, there is a difference of a day, because of overalp of the *tithi* over two days. In such cases, the *nakṣatra* listed corresponds to the day which is given as the fifteenth *tithi* at sunrise in the PANCANG2 program.

It is seen that only for four of the months of that year, the *nakṣatra* of the full moon corresponds to the name of the month, and off by one *nakṣatra* for

Table 1. Full Moon Days, Nakṣatras, and Months in 2927 BC

| Date as per		Universal Time	Nakṣatra	Month
Sky Map	PANCANG2			
18 January	19 January	23:32	*Pūrvaphālguṇi*	*Phālguṇa*
17 February	17 February	8:36	*Hasta*	*Caitra*
18 March	19 March	16:18	*Viśākha*	*Vaiśākha*
16 April	17 April	23:31	*Jyeṣṭhā*	*Jyaiṣṭha*
16 May	16 May	7: 04	*Mūla*	*Āṣādha*
14 June	15 June	15:50	*Śravaṇa*	*Śrāvaṇa*
14 July	14 July	2:46	*Śatabhiṣa*	*Bhādrapada*
12 Agust	13 August	16:43	*Uttarabhādrapad*	*Āśvayuja*
11 September	12 September	9:55	*Bharaṇi*	*Kārtika*
11 October	11 October	5:27	*Kṛttika*	*Mārgaśirṣa*
10 November	10 November	1:21	*Ārdra*	*Pauṣa*
9 December	10 December	19:34	*Puṣya*	*Māgha*
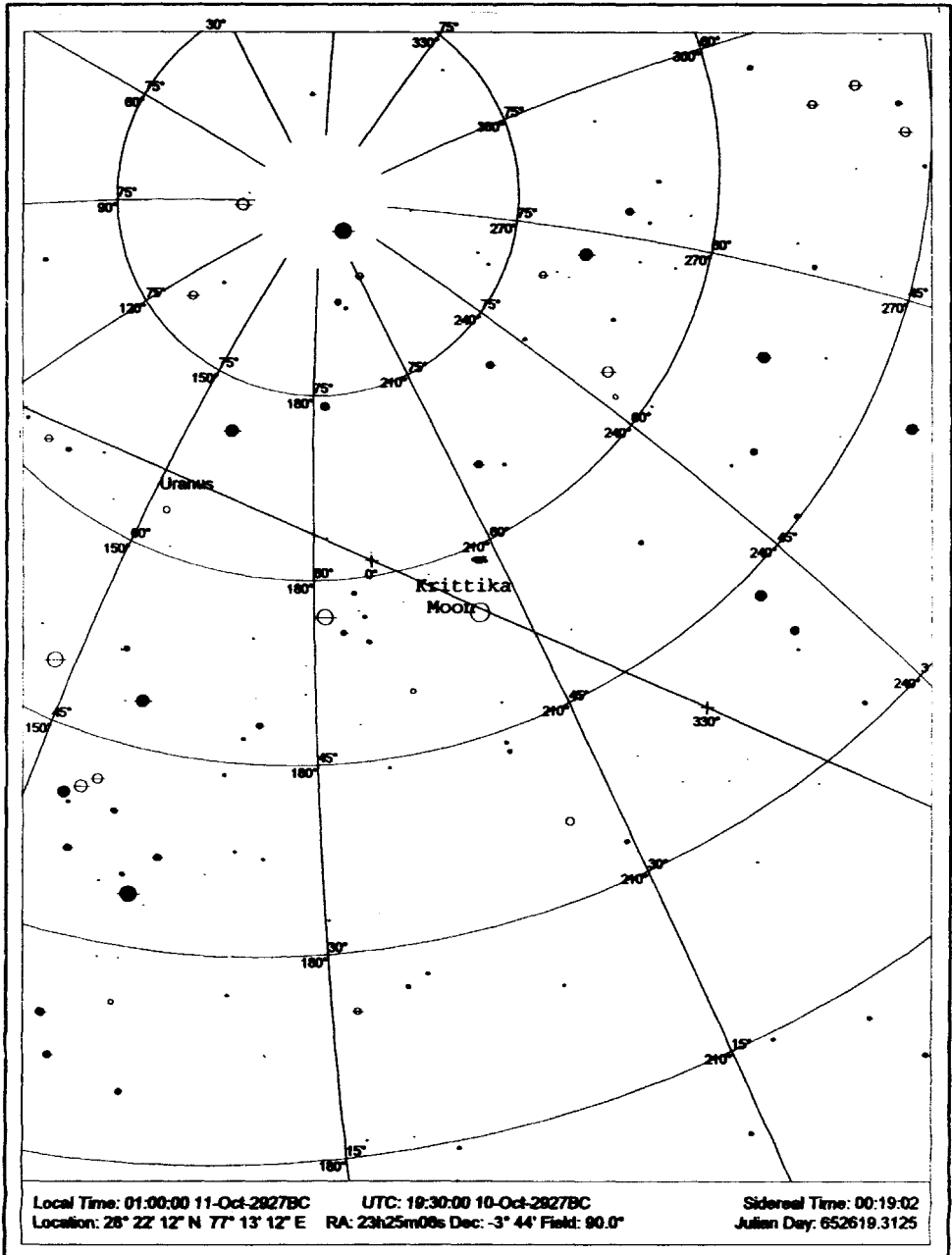
Figure 1. Star Map at Delhi on 11 October 2927 BC at 1: 00 am. Full moon at Kṛttikā nakṣatra.
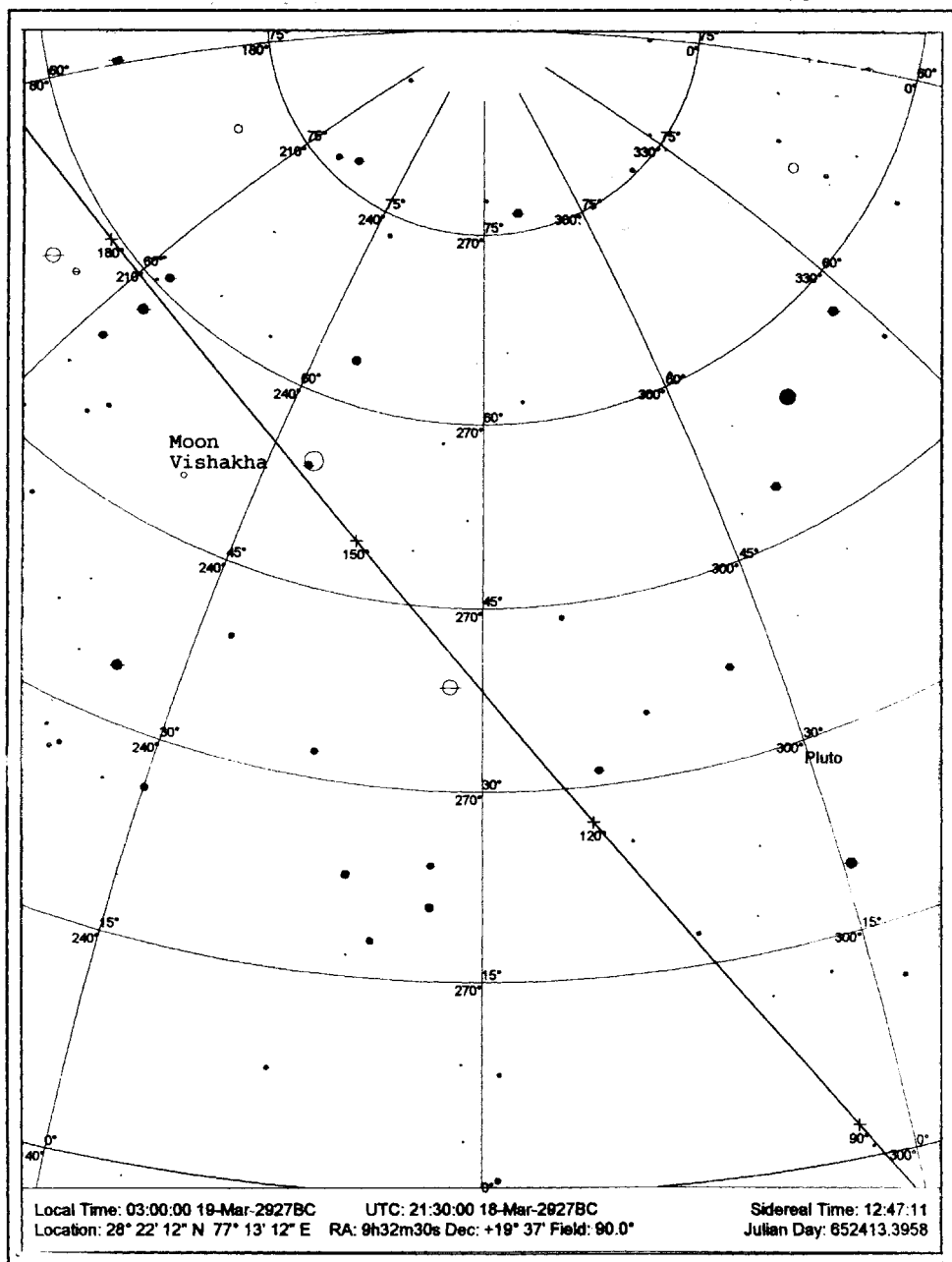
Figure 2. Star Map at Delhi on 19 March 2927 BC at 3: 00 am. Full moon at Viśākhā nakṣatra. Full Moon oculting Viśākhā (α, Librae).

two more. In fact, the full moon can occur near any of the 27 *nakṣatras,* a fact that can be easily demonstrated as follows. One can consider all of the full moons occurring in a period of nineteen years (i.e., one Metonic cycle) starting from 2927 BC, and determine the dates on which the full moons occur by using SkyMap Pro. One can also determine the *nakṣatra* of each of the full moon days using the PANCANG2 program. It is then easy to determine how many full moons occur at or near a given *nakṣatra* in one Metonic cycle. The results are displayed in Figure 3, where the number of times full moon occurs is plotted against the *nakṣatras* (labeled 1 - 27, starting with *Kṛttikā*). As can be seen, full moon can occur at any of twenty-seven *nakṣatras* and there is no preferential occurrence of full moons at *Citrā, Viśākhā* etc. Moveover, there could not be found any single year in which the full moons would occur sequentially at all the twelve *nakṣatras,* giving rise to the *Caitrādi* scheme. Twice it was found that the full moon would occur in about ten of the twelve *nakṣatras* of the *Caitrādi* scheme and that the remaining were off by just one *nakṣatra.* One could make a case for using the *Caitrādi* scheme in these two cases, but it would be difficult to make a convincing case for the introduction of a general scheme for naming the months. Thus it would appear that it is not possible to arrive at the *Caitrādi* scheme, let alone the problem of determining the historic date, on the basis of astronomical observation. This fact was also noted by Whitney.[12] It may be pointed out that it is sufficient to examine one Metonic cycle, as the basic pattern would essentially repeat itself. Examing over a longer period of time would smoothen out the graph even more.

3. DIKSHIT'S THEORY : CAITRĀDI SCHEME WAS INTRODUCED AROUND 2000 BC

Dikshit's arguments[13] can be summarized as follows: One finds the statement (i) that the months *Caitra* and *Vaiśākha* constitute the *Vasanta ṛtu* (spring season) in some of the earliest Vedic texts and the statement (ii) *Phālguna* and *Caitra* consitute *Vasanta* in some later texts. At the present time, however, *Vasanta* actually occurs in the months of *Māgha* and *Phālguna.*

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[12] Whitney, op.cit.

[13] Dikshit, op.cit., pp. 131-133.

Table 2. Naksatras and Deities of the Months in the Caitrādi Scheme

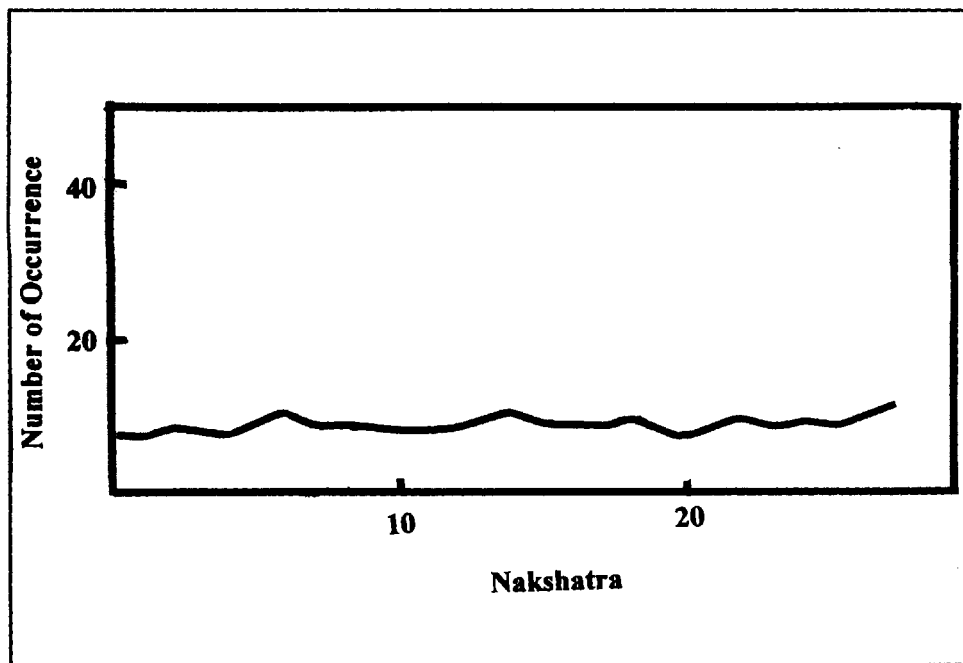| Months	Naksatras	Deities
Caitra	*Citrā*	Indra, Tvastā
Vaiśākha	*Viśākhā*	Indrāgni
Jyaistha	*Jyesthā*	Indra
Āsādha	*Āsādhās*	Āpah, Viśvedevāh
Śrāvana	*Śrona*	Visnu
Bhādrapada	*Prosthapadas*	Ajaekapāda, Ahirbudhnya
Āśvayuja	*Aśvinī*	Aśvinau
Kārtika	*Krttikā*	Agni
Mārgaśīrsa	*Mrgaśira*	Soma
Pausa	*Tisya*	Brhaspati
Māgha	*Maghā*	Pitr
Phālguna	*Phalgunī*	Aryamān, Bhaga

Figure 3. Graph of Number of Occurrences of Full Moon vs. Naksatra in one Period of 19 years. Naksatras are labelled from 1 to 27 starting with Krttikā.

The shift in the season is due to precession and takes place at the rate of one *nakṣatra*-month in about two thousand years.[14] Dikshit points out that no text has been found to contain a statement such as (iii) *Vaiśākha* and *Jyaiṣṭha* constitue *Vasanta*, which would have pointed to a time period earlier than the one implied by statement (i). Dikshit concludes, therefore, that the *nakṣatra*-based names were not known before the period corresponding to the statement (i) and that these names must have been introduced at a time when *Vasanta* actually occurred in the months of *Caitra* and *Vaiśākha*, i.e. vernal equinox actually took place in *Caitra*. Since the spring season commences about a month before equinox, the longitude of the sun must be 330° at the commencement of spring. For the month to be named *Caitra*, *Citrā nakṣatra* (Spica) must be 180° from the sun, hence the longitude of Spica must be 150°. One can determine the date by means of this astronomical event.

Dikshit estimated that Spica would have a longitude of 150° at about 1822 BC and concluded that the *Caitrādi* scheme must have been introduced around this period (~ 2000 BC). It is easy to verify using the SkyMap Pro, as shown in figure 4, that the longitude of Spica was indeed 150° in 1822 BC. The full moon on 12 March 1822 BC was near *Citrā*, so it was *Caitra* according to both SkyMap Pro and PANCANG2 calculations and the new moon occurred on 27 March. It was equinox on 6 April 1822 BC. However, it should be noted that equinox occurred not in *Caitra*, but in *Vaiśākha*. Dikshit had made a mistake in assuming *Citrā* to be at a longitude of 150°, when the sun is at a longitude of 330°. It would have been obvious that equinox would occur a month after the occurrence of *Citrā pūrṇimā*, i.e., it would have been in *Vaiśākha* and not in *Caitra*. However, this is not much consequenc. The argument that the *Caitrādi* scheme was introduced at this time is not very convincing. Even if the *Citrā* full moon occurred near the equinox, and the month *Caitra* formed the beginning of *Vasanta*, the consecutive months would not follow the sequence of the *Caitrādi* scheme. If indeed one finds a year when almost all the full moons occur according to the *Caitrādi* scheme, the

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[14] This is based on the precessional period of about 26000 years, and there are 12 *nakṣatra*-months (i.e., months whose names are based on *nakṣatras*) in a year (sometimes 13).
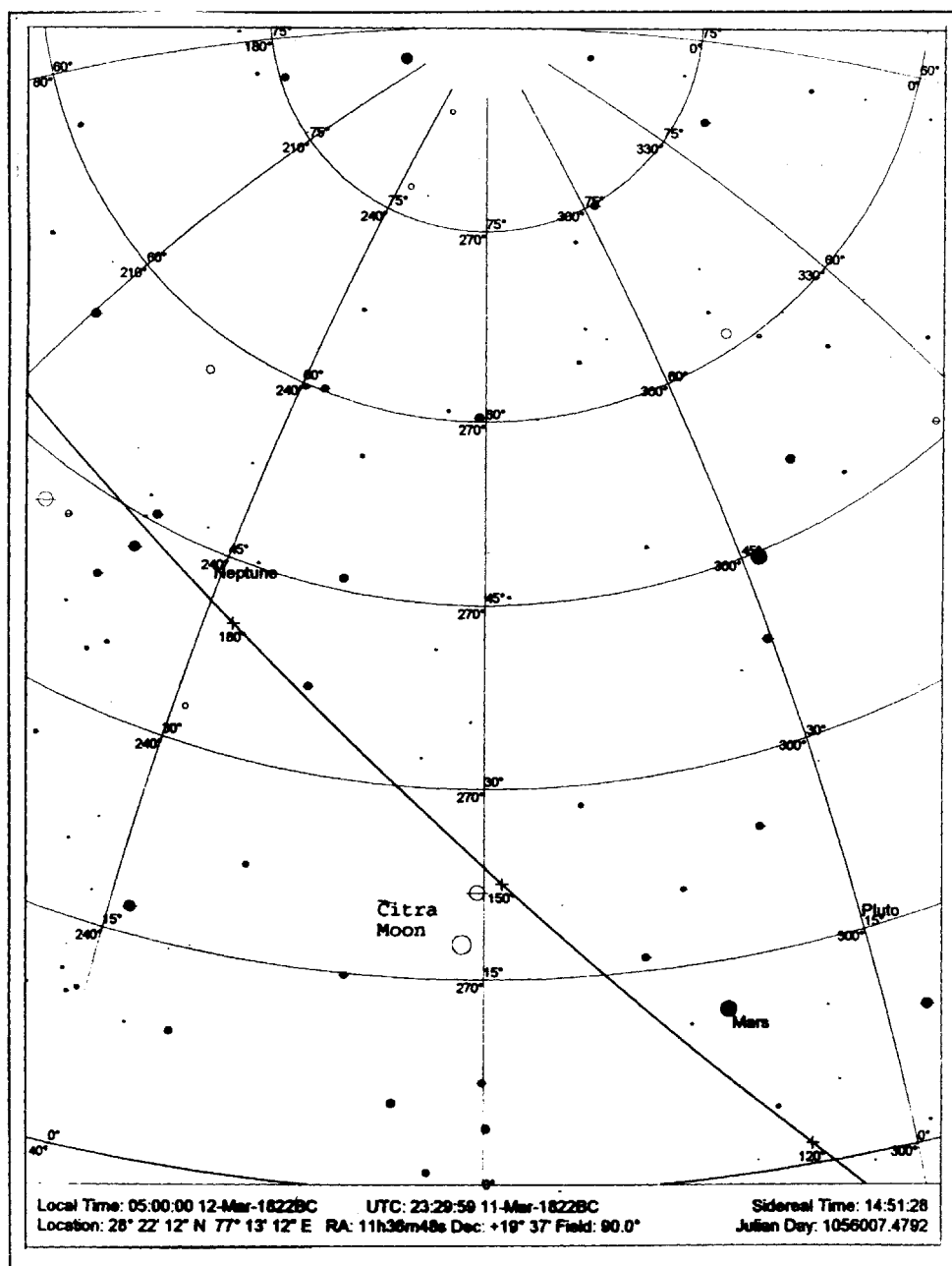
Figure 4. Star Map at Delhi on 12 March 1822 BC at 6: 10 am. Full moon at Citrā. Citrā at a longitude of 150°.

sequence would not be followed in successive years. Dikshit's argument that the statement "*Vaiśākha* and *Jyaiṣṭha* constitute *Vasanta*" is not found in any of the texts, hence the *Caitrādi* scheme was introduced around 2000 BC is also not valid, as the absence of that statement by itself is not evidence of absence of the scheme. Moreover, it is well known that a lot of Vedic texts have been lost in course of time and it is quite probable that the same fate has befallen to texts pointing to a period removed by an additional 2000 years in time scale. Furthermore, it cannot be said that the scheme of naming on the basis of the proximity of full moon to the *nakṣatras* was not known in the Saṃhitās. For, terms as *Phālgunī pūrṇamāsī* and *Citrā pūrṇamāsī*, which refer to full moon falling on the days of *Phālgunī* and *Citrā nakṣatra* respectively, do occur in TS (VII. 4.8) in connection with the *Gavāmāyana* sacrifice. It may also be recalled that the complete list of *nakṣatras* also appears in TS as has already been noted earlier. It will be shown later that the order of the sequence of months beginning with *Caitra* can be traced to *Ṛgveda*.

4. YAJÑA AS THE BASIS OF THE CAIRTRĀDI SCHEME

It is obviously difficult to understand why such a scheme as the *Caitrādi* scheme came into vogue when there is no basis for choosing a particular set of twelve *nakṣatras* as the preferred set, since the full moon can occur equally near any of the twenty-seven *nakṣtras*. It is all the more surprising that the scheme has endured the passage of thousands of years in time and is still in vogue. It follows therefore, that whatever the basis is, it must be very fundamental. It is argued here that there is an intimate connection between the *Caitrādi* scheme and the ritual Yajña and that it is this connection that forms the fundamental basis.

The ritual of Yajña is of paramount importance in the Vedic culture, and it is declared in VJ: *vedā hi yajñārtham abhipravṛttāḥ*. The *Caitrādi* scheme simply describes a sequence of the names of the months which are the components of the year or *saṃvatsara*. But, TB (1.6.2.2) identifies the year with Prajāpati: *saṃvatsaro vai prajāpatiḥ* and in TB (1.3.10.9), it is stated that Yajña is indeed Prajāpati: *yajño vai prajāpatiḥ*. ŚB (1.2.3.13) states even more explicitly: *saṃvatsaro vai yajñaḥ prajāpatiḥ*, identifying the year with both Yajña

and Prajāpati. This is the important connection between the year and Yajña, which must be considered in any discussion of time and its divisions.

Another important connection is with Agni. TB (1.6.1.8) declares Agni as the "mouth" or the "face" of Yajña: *agnir vai yajñamukham*. It is through Agni that the gods are pleased. Agni is the one who knows the division of the seasons (*vidvān ṛtūn*, RV X.2.1) and is called the lord of seasons, *ṛtupati*. Agni is the "hotṛ" of the devas, Aśvini is the adhvaryu and Tvaṣṭā is the agnīdhra. It is in fact Agni that plays an important role in the *Caitrādi* scheme. Both Agni and Prajāpati are identified with each other, (hence with the year), with other deities, and with different aspects of Yajña. These identifications (indicated in parentheses below) have been explicity stated in various texts: *eṣa vai prajāpatiḥ yad agniḥ* TB (1.1.5.5) (Prajāpati and Agni); *saṃvatsaro vai prajāpatir agniḥ* ŚB (10.3.1.1) (Year, Prajāpati, and Agni); *saṃvatsaro varuṇaḥ* ŚB (4.4.5.18) (Year and Varuṇa); *savitā prajāpatiḥ* JB (1.6) (Savitā and Prajāpati); *prajāpatiḥ viśvedevāḥ* JB (1.6) (Prajāpati and Viśvedevas); *ya eṣa tapati eṣa indraḥ eṣa prajāpatiḥ* JB (1.8) (Sun, Indra, and Prajāpati); *sa tvaṣṭā* JB (1.259) (with Tvaṣṭā); *bṛhaspati brahma brahmapatiḥ* TB (2.5.7.4) (with Bṛhaspati). Agni is also identified with the months and the Pitṛs: *dvādaśa māsāḥ saṃvatsaraḥ* PB (18.2.14) (Twelve months make a year); *agnir vāva saṃvatsaraḥ* TB (1.4.10.1) (Agni is the Year); *dvādaśa evāgniḥ syād ity āhuḥ* TB (3.8.21.1) (Agni is said to be twelve-fold); *māsāḥ pitaraḥ* TB (3.3.6.4) (Pitṛs are the months) and finally, *aindrāgno yajñaḥ* JB (1.109) (Indrāgni is Yajña).

It is well known that associated with each *nakṣatra* is a presiding deity. Table 2 displays the months of the *Caitrādi* scheme, the corresponding *nakṣatras*, and the associated deities. It is obvious that this list of deities includes Agni, and those deities that are identified with Agni, or associated with Agni in connection with Yajña, according to the discussion above. This clearly suggests a basis for the *Caitrādi* scheme in which the names of months are derived from the full moon occurring at certain *nakṣatras*. These *nakṣatras* are chosen not because full moons occur only at these, but because their presiding deities are identified with Agni, Prajāpati, and Yajña. This is the fundamental connection that is responsible for the endurance of the scheme over all these years.

5. FURTHER DISCUSSION

Clearly the *Caitrādi* scheme has been in use for a long time and the origin of the names of the months in this scheme has been explained by Pāṇini: *nakṣatreṇa yuktaḥ* (IV. 2. 2) and *sāsmin paurṇamāsīti* (IV. 2. 22). It does not mean that full moon occurs only at these *nakṣatras*. It is suggested in this paper that the scheme arises naturally because of the intimate connection with Yajña, in fact Agni. This should dispel at once many of the misconceptions and statements about the *Caitrādi* scheme that have been repeated endless number of times. This applies specially to such statements as (i) it is known only in the Brāhmaṇas, (ii) it is unknown in the Saṃhitās, and (iii) hence, one can determine a beginning for the scheme. The fact that the *Caitrādi* scheme is intimately connected with Yajña shows that it must be traced to the Vedas, for *vedā hi yajñartham abhipravṛttāḥ.*

There is no reason to assume that it is unknown in the Saṃhitās, as has already been pointed out. Once it is realized that Indra is the presiding deity for *Citrā nakṣatra*, the fact that the list begins with *Caitra* can be understood. Furthermore, this beginning can be traced to *Ṛgveda* (X. 89. 13): *anvaha māsāḥ . . .anvindraṃ ... .. ajihata jāyamānam.*

Sāyaṇa explains: *jāyamānaṃ prādurbhavantam indraṃ māsāḥ caitrādayaḥ anu ajihata anu gacchanti.* This mantra which is in praise of Indra, explains all the months as following him. Griffith[15] translates this part of the sūkta as "Him, verily the moons followed", with of course, "Him" referring to Indra. It really makes more sense when one considers Indra as the presiding deity for the *Citrā nakṣatra*, and he symbolizes the month of *Caitra*. The moons refer to the other months, which follow *Caitra*. In other words, *Caitra* is the leading month of the sequence of months, as explained by Sāyaṇa. This indeed is the basis of the *Caitrādi* scheme.

The fact that there exists an alternate set of names for the months (*madhu, mādhava* etc.) does not necessarily make one list earlier than the other. There exists yet another set of names for the months also found in TB (3. 10. 1.4)

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[15] Ralph T.H. Griffith, *The Hymns of the Ṛg Veda*, Delhi, reprint 1995, p. 601.

which starts with *aruṇarajāḥ*, etc. and is different from the two we have been discussing. It is rather pointless to engage in analysis and discussion of which came first.

It is worth pointing out that it is the strong connection with the ritual Yajña that explains the continued use of the five-year Yuga of VJ[16] for thousands of years.

6. CONCLUSION

It has been demonstrated, by using the modern computer sofware SkyMap Pro in conjunction with another program called PANCANG2, that there is no basis for determining a historical date when the *Caitrādi* scheme of naming the months of the year came into vogue. It is argued that the scheme itself is based on an intimate connection with Agni, and the sequence of the months in the scheme beginning with Caitra is already hinted in *Ṛgveda*.

ACKNOWLEDGEMENT

The following Abbreviations have been used:

AGS	*Āśvalāyana Gṛhya Sūtra*
JB	*Jaiminīya Brāhmaṇa*
KB	*Kauṣītikī Brāhmaṇa*
PB	*Pañcaviṃśa Brāhmaṇa*
ṚV	*Ṛg veda*
ŚB	*Śatapatha Brāhmaṇa*
TB	*Taittirīya Brāhmaṇa*
TDB	*Tāṇḍya Brāhmaṇa*
TS	*Taittirīya Saṃhita*

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[16] B. N. Narahari Achar, "Enigma of the Five-Year Yuga of Vedāṅga Jyotiṣa," IJHS 33(1997) 101-109.