

The Pleiades and the Bears viewed from inside the Vedic texts

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N. Achar and his predecessors of the past hundred-odd years, definitely have a point when they state that several *nakṣatra* ('moon houses') can be viewed as being exactly situated on the eastern horizon at their various times of rising in the course of the night (and of the year), and that *Śatapatha Brāhmaṇa* 2.1.2.1 seems to describe the time when the Pleiades (*ḥṛttikāḥ*) were rising due east (at c. 2900 BCE). That means the Pleiades were rising in the east at nightfall at fall equinox, while the sun rises against their background at the spring equinox (heliacal rising at vernal equinox). The question here will be how to interpret this passage and how to place it against the background of Vedic star lore.¹

Investigating these basic facts is of special importance as a wide range of claims has been made for the Vedas, from the observation of planets (see, however, M. Yano, forthcoming) to that of precession, the 'wobbling' of the celestial north pole (now close to our Pole Star, Polaris) around the northern region, on a path that takes some 28,000 years for one turn. Understanding this particular item is important for any evaluation: the situation in 2900/2300 BCE is no longer the one we can observe today. Stars on/near the ecliptic (our Greek-Babylonian zodiac signs, and the Vedic *nakṣatras*) have moved on — for example the point where the sun rises at equinox on March 21 — in a generally east-northeastern direction, by some 47°. Our equinox now closer to the sign of Aquarius, compared to the situation in 2900 BCE when it was in Aries, close to Taurus .

Such detailed astronomical knowledge which can be gained only by very long term observations over the course of many hundreds if not thousands of years, is not to be expected, a priori, for the Vedic period.² The Vedic

¹ It has to be noted that lore about the (heliacal) rising point of the *ḥṛttikās*, Sirius, etc. is old; cf. for example Hesiod (*Erga* 383 sqq.) about the rising of the Pleiades as indicator for the right time to plough, or Sirius as the harbinger of the yearly flood of the Nile in old Egypt; for such data in Indo-Iranian and Indo-European, cf. Witzel 1984.

² Unless some very old and outdated astronomical observations had been transmitted, unchanged, over a long period of time and were then actively compared with contemporaneous observations.

statements about the rising point of certain *nakṣatras* thus must be viewed with circumspection, and most importantly of all, the ancient situation can by no means directly be compared with our modern night sky. On the other hand, it is important to note that the situations of 2900 or 2300 BCE do not differ that much from the one in 1000 BCE, as the situation of 2900 BCE differs from ours in 2000 CE, some 5000 years later! This point is usually lost in the discussion, and therefore stressed below.

The Vedic texts usually, though not exclusively, speak about the *nakṣatras* in connection with the moon. The moon, supposed to live with his 27(?) wives (KS 11.3) or 33 wives (TS 2.3.5.1-3),³ that is the goddesses in the *nakṣatras*. However, he loved *rohiṇī* (Aldebaran in Taurus) best and stayed only with her; he therefore was punished by the *yakṣma* disease of ‘consumption’ (i.e. the waning of the moon). Since then, he has to dwell each night of the month in another ‘moon house’ (*nakṣatra*). The same situation, of course, occurs when we look at the position of the full moon over the course of the year: it is in one of the 27 or 28 *nakṣatras*. (The sun, due to its opposition to the moon, always rises in the same *nakṣatras* where the moon sets, but six months earlier/later. The heliacal rising in *kṛttikāḥ* of the sun thus took place in c. 2927 BCE at the vernal equinox in March. The Vedic texts, however, are more concerned with establishing the lunar calendar for sacrifices and festivals).⁴

II. The rising point of the KRttikās, the Pleiades

While the ŚB quotation discussed by N. Achar and his predecessors indeed seems to point to a situation where *kṛttikā nakṣatra* was situated at true east at the equinox, i.e. in 2927 BCE. However, the exact wording of the sentence just indicates that the *kṛttikās* do not move away (*na cyavante*) from the east (*prācyai diśaḥ*). The Pleiades, just like any other *nakṣatra* close to the ecliptic, do of course rise in the east (during the course of one night or of the year), move upwards towards the south and set in the west. However, the Pleiades, even when the gradual changes effected by precession are taken into account,

³ Cf. also TS 3.4.7.1, KS 18.14, VS 18.40, ŚB 9.4.1.9, SB 3.12, etc.

⁴ For a summary of older opinions on the origin of *nakṣatra* system (Babylonian, Chinese, Arab) see Macdonell and Keith, 1912, s. v. *nakṣatra*, p. 409-431; for a recent discussion (origin in the Indus Civilization), see Parpola 1994, p. 201-206, 241-246. Needless to say, the concept can be older than either the Indus or the Babylonian and Chinese astronomy and may go back to the often surprisingly sophisticated observations of the Neolithic.

move very little indeed from the eastern direction over many centuries after the above date.⁵ This is important. From 2900 to c. 1500, a period framing the whole of the Indus civilization, (2600-1900, thus with a margin of a few centuries before and after it), and even from 1500 to 500 (the usual date of the Vedic period), the *kṛttikās* indeed were situated close to the equator (see below).

We should not, as is always done, compare the (pre-)Vedic situation of 2900 BCE with today's, instead, we must investigate the difference between the starting point of this system at c. 2900 BCE, in the early copper/bronze age,⁶ with that of the ŚB, which is, after all, an iron age text. The iron age starts in India at c. 1200 BCE at the earliest, but the general linguistic, spiritual, social and political developments of the ŚB points to a time frame shortly before the lifetime of the Buddha (around the middle of the millennium, traditionally 563-483 BCE, or even only around 400 BCE).

The same is indicated the internal chronology of the Vedic texts, e.g. by quotations in ŚB from the RV (a text without iron); the RV is first followed by the Yajurveda Saṃhitā mantras (iron is attested) and their slightly later explicatory prose (in the same Yajurveda texts), to whose discussions ŚB often answers; these texts are, again, followed by the earlier and later Brāhmaṇas (Aitareya Br., Jaiminīya Br., Vādhūla Br., Baudhāyana ŚS etc.) with whom ŚB shares many cultural and linguistic characteristics. Indeed, the very phrase *prācyai diśo na cyavante* (also found in BŚS) gives itself away as a formulation of the post-Ṛgvedic period. The genitive/ablative in *-ai* of stems in *-ī* does not occur before the Taittirīya Saṃhitā (and a few cases in *śaunaka Atharvaveda*);

⁵ As N. Achar, indeed, also mentions in passing, and as I have done in a paper that was to be published in India in a popular science journal some two years ago, along with some papers by specialists on the Veda and the Indus civilization; this project seems to have been abandoned by now; my paper will now be published in a volume on the Aryan question, ed. by Bryant /Patton (forthcoming).

⁶ For hints of an old system starting with *rohiṇī* (Aldebaran), see Macdonell and Keith 1912 and Parpola 1994. — Incidentally, many of the names of the *kṛttikās* are 'foreign' i.e. *ambā*, *dulā* (*bulā*, MS), *nitatnī*, *cupuṇīkā*, while some others are connected with rain, e.g. *abharayantī*, *meghayantī* (*stanayantī*, MS), *varṣayantī* (cf. Parpola 1994; used as names of bricks in the Agnicayana) — which fits very well the location of KS, MS, TS in Haryana/U.P., where the rainy season starts only in mid-July (Delhi ~ MS, at c. 1000 BCE). A 'rainy' *kārttika* at c. 2900 BCE, however, makes no sense for the Indus civilization (in the Greater Panjab and Sindh), where there is no real monsoon. At any rate, even for Delhi, the rainy season begins in mid-July and ends in September/October. (Note also the relationship between the Pleiades star *cupuṇīkā* (YV) and *ni-cumpūṇa* in RV, KS, MS, *ni-caṅkuṇā* in TS, apparently 'effusion, bubbling, water spirit').

it is typical for the central north Indian (TB) and eastern texts (such as ŚB) of the Brāhmaṇa period, while it disappears in post-Vedic Sanskrit (Witzel 1989).⁷ In short, we have a statement, perhaps first made in c. 2900 BCE, in an iron age text that is close to the middle of the first millennium BCE (750-600 BCE?)

However, both Pingree and Achar do not undertake the important test, a countercheck to investigate how the Vedic people might have looked at the night sky of the very late Vedic period ŚB belongs to. D. Pingree, justifiably in is context, only looks at the situation in c. 2900 BCE and rightly indicates that several *nakṣatras* other than the Pleiades also are on the equator and thus “do not swerve from the east” when their heliacal rising point is observed in the course of a year and when it is compared with the many *nakṣatras* that are situated more off the equator. On the other hand, N. Achar has indeed noticed that the Pleiades do not divert much from the eastern direction for the next few centuries,⁸ but one needs to follow through for a late Vedic text such as ŚB (composed around 750-600 BCE).

On checking with similar astronomical software (Voyager II), we observe that during the years from 3000 BCE down to 500 BCE, i.e. close to the approximate date of ŚB, the Pleiades move very little from the eastern direction at their position at Spring Full Moon. At vernal equinox in 2900 BCE the *kṛttikās* were at 90° Azimuth, i.e. due east according to Achar, while at 1527 BCE they were at 81° 43", at 1027 BC at 74° 47", and at 500 BCE at 77° 38". These data were calculated for the Pleiades star Maia on Full Moon day; today they are off from the point of the vernal equinox (near lambda Piscis, phi Aquarii) by some 54° 23'; that means they are seen in the northeast.

The ‘traditional’ Vedic situation, thus, holds out for long enough that ŚB still can speak of the Pleiades as ‘rising in the east’ — maybe not true east, but ‘east enough’ at some 8-13° off true east. It must be underlined that the text

⁷ Further, the text must be viewed in context; other *nakṣatras* (*rohiṇī*, *mṛgaśīrṣa*, *phalgunī*, *hasta*, *citra* in ŚB, *citra/svāti*, *śravaṇa* in BŚS, etc.) are discussed for various reasons, some of which include the usual ‘etymology’ based ones of Brāhmaṇa style discussions. It is, however, significant that some of the *nakṣatras* identified by Pingree as being on the equator (*hasta*, *viśākhe*, *śravaṇa*) are preferred by BŚS (*hasta*, *śravaṇa*); cf. also the list of equatorial *nakṣatras* mentioned by Achar, above in section III (*rohiṇī*, *hasta*, *anurādhā*, *jyeṣṭhā*, *aśvinī*), and the partly corresponding list of ŚB (*rohiṇī*, *hasta*). Clearly, equatorial *nakṣatras* were preferred.

⁸ Cf. the position of the *kṛttikās* and the full moon on his map of Delhi as late as July 1200 BCE.

actually does not speak of ‘true east’, — that is only Sāyaṇa’s interpretation (14th c. CE), i.e. of someone living just some 500 years before our own times. Instead, the observation made above, just as the contemporary ones of the Baudhayāyana Śrautasūtra 27.5 (cf. *mānava* ŚS 10.1.1.3)⁹ refer to certain prominent *nakṣatras* or even to their stars, all of which allow to fix the eastern direction for a particular ritual purpose, i.e. the orientation of a hut on the offering ground.

III. East, North East, South East

This point becomes important when we investigate what “east” actually means in the Vedic texts. First of all, and obviously so, the eastern direction (*pūrvā diś*) of the sky, that is true east. However, the matter is more complex. While the older Vedic texts do not speak of intermediate directions of the sky (northeast, southeast, etc.), this distinction begins to emerge in the post-RV texts (*avāntaradiśā* MS, KS, TS, *avāntaradeśa* ŚB, *antaradeśa* AV, *upadiśā* KS). One of the earliest cases is AV 15.5.1 sqq. where the southeastern region is described as *tasmai prācyā diśo ‘antaradeśād ...* “from the intermediate direction of the East”, the SW as *‘dakṣiṇāyā diśo...’*, etc.¹⁰ Again, we can decide the question on basis of contemporary texts.

By the time of the ŚB 11.6.1.2 we get such circumscriptions as: *etayoḥ pūrvayor uttaram anv avāntaradeśam vrajatāt* “then go to the upper (northern) one of the two eastern intermediate regions!”¹¹ We should translate (*ava-*)*antaradeśa* as ‘intermediate region’ (between N and NE, NE and E, etc.) and

⁹ It must be underlined that ŚB, BŚS, MŚS 10.1.1.3 have alternative dates for the setting up of the sacred fires, e.g. BŚS 27.5 (Karmānta) “The *kṛttikās* do not move from the eastern quarter; after their complete appearance he should measure (the offering hut), that is one possibility. After the appearance of *śravaṇa* (Alpha of Aquila), that is the next; between *citrā* (Ear of corn, in Virgin) and *svāti* (Arcturus), that is one more.” They are all located on the equator, and could serve as alternative points which clearly provide options three or six months later than the (ancient) equinox. However, these dates have nothing to do with the rules established for the *kṣatriya* and *vaiśya* in ŚB: spring for Brahmin, Summer for *kṣatriya*, Rainy Season for the *vaiśya*. This does not coincide with the BŚS locations.

¹⁰ The oldest cases of intermediate directions are found in the explicatory prose of the Yajurveda Saṃhitās, with e.g. *uttarataḥ purastāt prāyaṇa-* ‘the northeastern entry’ (of the hut), MS 3.6.1: 60.13.

¹¹ Actual compounds such as N-E, S-W are late Vedic, e.g. SB 2.10 *prāg-udāk-prāyaṇa*, etc. For details on all types of circumscriptions and actual compounds for the intermediate directions, see Witzel 1972: 179-180

distinguish it from **avāntara-diś* ‘intermediate direction’ (NE, etc.). The northern and the southern *avāntaradeśas*, situated north and south of true east, form the eastern *deśa* (later, and nowadays, meaning ‘province, country’). In other words, Vedic ‘east’ comprises the area between northeast and southeast, or to be more specific, the area (starting from E = 90°), between 90° and +45° (northeast), and -45° (southeast).

I therefore submit that all positions of the Pleiades (*kṛttikāḥ*) at vernal equinox during the Vedic period (c. 1500-500 BCE) fell well within this limit; they are indeed much closer to true east than the northeast (-45°) which is reached only in c. 650 CE. In short, the *kṛttikās* did not swerve (much, 8-13°) from the eastern direction (*pūrva diś*) and remained well within the eastern *deśa* and its two *avāntaradeśa* (NE-SE)!¹²

However, the ŚB passage has another surprise in store, when viewed against the background of the extant Vedic texts.

IV. The Seven *ṛṣis*

Curiously, discussants of the ŚB passage in question have not paid close enough attention to the phrase a few lines later, ŚB 2.1.2.4, which speaks of the Seven *ṛṣis*, the Great Dipper (Ursa maior, the great bear/wain). The Seven *ṛṣis* are said to have been called *ṛkṣāḥ* “formerly” (*saptarṣīn u ha sma vai pura ṛkṣā ity ācakṣate*). This name of the Big Dipper is found just once before ŚB, at the RV 1.24.10.¹³

This evidence strongly indicates that ŚB authors, after the passage of up to a thousand years after the RV, still had a good ‘traditional’ memory of the rare, old Ṛgvedic name. Indeed the name is much older, it is (pre-?)IE, cf. Latin Ursa maior the great bearess’, Greek *arktos* ‘the bearess’ with her cubs, etc.¹⁴

¹² Note also the Old Iranian system as preserved in the Avesta, with four *karsuuar* ‘climes’ covering the same areas as in Vedic, i.e. from NE-SE, SE-SW, SW-NW, NW-NE, but with the later(?) additions by an eastern and a western sector, see Witzel (forthc. in Münchener Studien zur Sprachwissenschaft, 2000).

¹³ The RV line is quoted once more, verbatim, in another—very late—Vedic text, TA 1.11.2: *ṛṣayaḥ saptātriś ca yat | sarve ’trayo agastyāś ca | nakṣatraiḥ śamkṛto ’vasan | atha savituḥ śyāvāśvasyāvartikāmasya | amī ya ṛkṣā nihītāsa uccā* | The last *pāda* seems to refer back to RV verse 7 which describes the *nyagrodha* tree. For the date of TA 1 see Witzel 1972.

¹⁴ This seems to reflect stone age mentality, cf. Schadewaldt 1970, Scherer 1953; later on, with the advance of technology, the ‘Bear’ was also called ‘wagon, Wain’ (Witzel 1972). In Avestan, the asterism is called *haptO iringa* (acc.) ‘the seven signs’, which

So, why can the ŚB authors not have transmitted another piece of traditional knowledge, that about the exact rising point of the *kṛttikās*, — astronomical lore that dates back to the third millennium BCE?¹⁵

V. Conclusion

The combination of the two observations from the same text, —actually from the same section of ŚB— are powerful arguments for giving a straightforward, and not a very involved astronomical interpretation to both passages in ŚB 2.1.2 : that is, the retention of traditional (pre-)Ṛgvedic lore about the *saptarṣis* (Ursa maior) and the observation that the *kṛttikās* do not swerve from, i.e. rise, in the east or closely nearby for a very long period (c. 2900 BCE down to even 500 BCE and beyond). The first is about a traditional rising point of the Pleiades at a certain moment in time, the memory of which was preserved;¹⁶ the second, a traditional name of an important asterism, the marker of the northern direction, ‘up there’ (*uttara*, Witzel 1972), where the (great) bear(s) are found. Both passages are traditional priestly lore, orally transmitted over many centuries; they were used in ŚB at the precise moment when a particularly important ritual¹⁷ was discussed and performed, that is, the first setting up of one’s sacred fires.

In sum, it simply cannot be maintained, with the confidence B. Dikshit once had and that some of his successors still have, “that the corresponding portion in *Śatapatha Brāhmaṇa* was written about 3100 years before the Śaka era” (i.e. about 3043 BCE). First, there was no S. Asian writing at the time, except for the enigmatic Indus script which has not been read with confidence, a script that certainly did not reflect Vedic Sanskrit (see the last number of EJVS).

would be Vedic **sapta *lingā(ni)*, but the identification with the Seven (Ṛgvedic) *ṛṣis* is only Indo-Aryan and not even found everywhere in Vedic yet (see above).

¹⁵ Whether its source is Indo-European star lore, as is the case of the *ṛkṣāḥ* (‘the bears’ = Ursa maior), cf. Scherer 1953 and Schadewaldt 1970, or whether it stems from the observations of the Indus people as Parpola 1994 maintains, or whether from some other possible source, e.g. the Bactria Margiana Archaeological Complex (2100-1800/1700BCE) which seems to have influenced both the Old Iranians as well as the Indo-Aryans (for linguistic evidence, see the last number of EJVS).

¹⁶ Though for practical purposes and for other classes such as the *kṣatriya* and *vaiśya*, the rising points of other asterisms were used as well, see above note 9 and cf. the treatment in ŚB 2.1.2, BSS, MSS etc.

¹⁷ Note that the *agnyādheya* is, from the point of view of the development of the solemn *śrauta* ritual and its texts, a late ritual.

Second, the very form of the sentence (using the middle/late Vedic form *prācyai*) betrays the phrase as having been composed in iron age time, and, with the rest of the ŚB, fairly close to the time of the Buddha. The original observation about the Pleiades, however, can go back to the third millennium BCE.

Retention of such outdated data in ritual is not unusual; to use a contemporary item, the time for Annual Meeting of the American Oriental Society depends on the date for the Christian Easter festival, which is determined as the first Sunday after the Full Moon in Spring (after March 21) and thus is based on a remnant of the lunar calendar; the basis for this date ultimately goes back much further in time, to the date of the ancient Hebrew Passover festival.¹⁸

VI. Some further notes.

Additionally, a few stray remarks may be appended that are connected with the preceding discussion. During the Indo-Iranian period, the ‘bears’ (*ṛkṣāḥ*) were not, of course, always visible in the night sky and rise from a partial position below the horizon (especially if we think of a BMAC or of a still more northern location): that would not be possible even for most of the Panjab, and is only possible South of Delhi, below c. 30° N.

The present tense of *ud i, udyanti*, however, which would point, in some scholars’ opinion, to c. 3000 BCE, is easily explained, when we actually look at the Big Dipper when it appears in the early evening even today; it moves towards the north pole, surpasses it and sets in the west, (see sky maps in Witzel 1996).

This observation solves N. Achar’s problem of the Ursa maior “rising” in the North. It actually rises, when it gets dark, in the north (nowadays with its easternmost stars from below the horizon, for late Vedic times cf. ŚB 13.8.1.9); Ursa maior then turns upwards, and is, after a few hours actually higher than the north pole (now situated at c. 30° in the southern Panjab/Delhi)... So why

¹⁸ Note for example that our present Gregorian calendar is only some five hundred years old (and was not accepted in Russia until well after the October revolution, which actually took place in November); it was preceded by the Julian calendar which was in force for some 1500 years. Caesar’s reform was instituted because the date of the Roman calendar had become out of tune with the seasons, just as a *kṛttikā* date for spring would be nowadays.

can the Vedic texts not speak of ‘*ud-yanti*’, especially so, as the north is also called *ut-tara* (‘situated on the side of *ud* “up”’), and as the northern direction includes all regions from to $45^\circ = \text{NE}$ to $90^\circ = \text{E}$ and $315^\circ = \text{NW}$.

Generally speaking, the use of the actual term ‘to rise’ (*ud i*) is not strange at all, as the stars close to the north pole move ‘upwards’ towards the pole (thus northwards), while the stars not so close to the pole, such as the *kṛttikās* and other *nakṣatras* on the equator, move in the opposite direction, towards the zenith (thus southwards). This explains the Brāhmaṇa story of a separation between the seven *ṛṣis* and their six wives (the *kṛttikās*), while only *arundhatī* (Alcor in Ursa maior) remains with them (cf. Parpola 1994).

Abbreviations

AV	<i>Atharvaveda Saṃhitā</i>
BŚS	<i>Baudhāyana Śrautasūtra</i>
JB	<i>Jaiminīya Brāhmaṇa</i>
KS	<i>Kaṭha Saṃhitā</i>
MS	<i>Maitrāyaṇi Saṃhitā</i>
MŚS	<i>Mānava Śrautasūtra</i>
RV	<i>Ṛgveda Saṃhitā</i>
TS	<i>Taittirīya Saṃhitā</i>
SB	<i>Ṣaḍviṃśa Brāhmaṇa</i>
VādhB	<i>Vādhūla Brāhmaṇa</i>
VS	<i>Vājasaneyi Saṃhitā</i>
ŚB	<i>Śatapatha Brāhmaṇa</i>
YV	<i>Yajurveda</i>

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