

## Vedic rituals and the Aryan invasion theory

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*The main theme underlying Vedic rituals was the renewal of Prajāpati, the creator God, who was exhausted after creating the universe. This was developed in analogy with the cyclical year. The Year was sanctified as a counterpart of Prajāpati, making it the most important evidence. The combined expertise of Sanskrit scholars and scientists is necessary to understand Vedic rituals. They have interpreted Gavāmayana and Agnicayana, the most important rituals, and Mahāśivarātri to ~3000 BC (Indus Valley Civilization), contradicting the Aryan invasion/migration theory. This consensus validates Kane's contention that Vedic rituals must be preferred over linguistics to understand Vedic literature.*

‘The Year is the *pratimā* (image or counterpart) of Prajāpati.’

*Śatapatha Brāhmaṇa* SB 11.1.6.13

The Aryan invasion theory (AIT) was proposed by the 19th century European scholars on the basis of linguistic similarities between Sanskrit and European languages<sup>1-4</sup>. According to AIT, Aryan tribes invaded India in the middle of the 2nd millennium BC. The *Ṛg Veda* was dated to about 1500 BC. The later Vedic texts, *Samhitas* and *Brāhmaṇas* were to about 1000–800 BC.

AIT has been controversial from the very beginning with several scholars opposed to it. Even today, many scholars do not support this theory<sup>1-4</sup>. More recently, due to the absence of any archaeological evidences for an invasion, a modified Aryan migration theory (AMT) has been proposed with unchanged dates. However, several evidences are in conflict with these dates.

Many evidences have been discussed in the context of the AIT/AMT debate in several articles and books<sup>1-6</sup>. Here, we briefly mention some important evidences.

Linguistic evidences remain the mainstay of AIT/AMT<sup>1-6</sup>. Other textual evidences claimed in support are isolated words or passages, e.g. references to *aśva*, *kṛṣṇa ayas*, etc.

In contrast, most archaeologists<sup>1-3,7-11</sup> oppose AIT/AMT as archaeological evidences show continuity<sup>9,10</sup> from the earliest settlement in Mehrgarh ~7000 BC. Shaffer and Lichtenstein<sup>9</sup> (p. 93) state ‘The modern archaeological record for South Asia indicates a history of significant cultural continuity; an interpretation at variance with earlier eighteenth through twentieth-century scholarly views of South Asian cultural discontinuity... an identifiable cultural tradition has continued, an Indo-Gangetic Cultural Tradi-

tion, linking social entities over a time period from the development of food production in the seventh millennium BC to the present.’ Renfrew states ‘It is difficult to see what is particularly non-Aryan about the Indus Valley civilization<sup>7</sup>.’

For more than a century, scholars have continuously interpreted astronomical references in Vedic texts to high chronology (~3000 BC) that contradict AIT<sup>12-21</sup>. We have recently examined evidences from astronomy, mathematics and metallurgy and concluded that ‘There is no scientific basis for AIT’<sup>22</sup>.

Remote sensing and geological studies have discovered a dried river in north-west India that has been identified as the Saraswati, contradicting AIT<sup>23-25</sup>. Genetic studies also oppose AIT<sup>26,27</sup>.

Despite the evidences described above, Vedic rituals themselves have never been considered as evidences in the AIT debate<sup>1-6</sup>. Since Vedic texts are books of rituals, Vedic rituals must be the basis for any discussion of textual evidences. Other evidences must be interpreted in the context of Vedic rituals. In this note we present a basic description of key Vedic rituals, highlight their scientific aspects and discuss textual evidences in their context.

The approach adopted is the one proposed by Tilak<sup>12</sup>. In the preface to his book, *Orion*, Tilak<sup>12</sup> states (p. V), ‘It is the Sanskrit scholars who have first of all to decide if my interpretations of certain texts are correct, and when this judgment is once given it is not at all difficult to astronomically calculate the exact period of the traditions in the Rigveda. I do not mean to say that no knowledge of astronomy is necessary to discuss the subject, but on the whole it would be readily seen that the question is one more for Sanskrit scholars than for astronomers to decide.’

Indeed, we go one step beyond Tilak and simply summarize the views of Sanskrit scholars on Vedic rituals. An advantage of this approach is that we do not have to justify the interpretations of Vedic rituals. The results (on non-scientific aspects) presented by us are consistent with Sanskrit scholars’ views. However, the main Vedic rituals contain significant scientific aspects that have been overlooked by Sanskrit scholars. Here, we examine these aspects and show that the combined expertise of Sanskrit scholars and scientists leads to better understanding of key Vedic rituals.

That is, in our approach, the primacy of Sanskrit scholars is recognized in the interpretations of the non-scientific aspects of Vedic rituals. For the scientific aspects, the primacy of scientists is recognized. This approach respects the expertise of both groups of scholars. Hence, it is the proper approach to study Vedic rituals.

### Basic description of key Vedic rituals

The *Ṛg Veda* contains hymns to various deities and only makes rare references to rituals. The post-*Ṛg* Vedic (*Samhita* and *Brāhmaṇa*) texts are essentially books of rituals. It was in this period that Vedic rituals were fully developed. The key rituals are discussed below.

Keith<sup>28</sup> states (p. 442) ‘In the period of the *Brāhmaṇas* the god *Prajāpati* occupies without doubt the position of the creator god, the supreme god of the world.’ These are also the views of modern scholars<sup>29-34</sup>. Several scholars have discussed the transition from *Ṛg* Vedic deities to the primacy of Prajāpati in the *Brāhmaṇa* texts<sup>28,30-33</sup>.

Various Vedic rituals are described in Keith<sup>28</sup> and Gonda<sup>30</sup>. However,

*Baudhāyana Śrauta Sutra* BSS 24.5 describes various ‘model’ or ‘paradigm’ rituals<sup>35</sup> (p. 43) as (1) full and new-moon sacrifices for the *iṣṭis*, (2) the offerings to Indra and Agni for animal sacrifices, (3) the *Jyotiṣṭoma* for Soma sacrifices, (4) the *śyena-cita* for fire-altars (Agnicayana), (5) the two-day rite for sacrifices lasting several days, (6) the 12-day *Dvādaśāha* among the series of sacrifices, and (7) the *Gavāmayana* among the yearly *Sattras*. Some of these rituals have no substantial scientific aspects and are ignored in this note.

It is well known that *Yajña* (Agnicayana) is the most complete and important Vedic ritual<sup>28-34</sup>. Its central feature was the building of the fire-altar. Tull<sup>29</sup> states (p. 56) ‘Agnicayana ritual, (is) a rite that the *Brāhmaṇic* thinkers presented as the culmination of the Vedic rites.’ Tull<sup>29</sup> translates SB 10.1.5.1 as (p. 116) ‘this building of the fire [altar] rite is that which is all these sacrifices’. The main idea in Agnicayana was that *Prajāpati* was exhausted after creating the universe and had to be renewed<sup>29-34</sup>. Srinivasan<sup>33</sup> states (p. 64) ‘*Prajāpati* must again become reinvigorated and capable of begetting the world anew. This is one of the aims of Agnicayana’. Since *Yajña* renewed *Prajāpati* (SB 8.3.3.9-12), it was made a *pratimā* (image or counterpart) of *Prajāpati* (SB 11.1.8.3).

However, the idea of *Prajāpati*’s renewal originated in the cyclical Year that was interpreted as renewing the Year and making it immortal<sup>30-34</sup>. KB 20.1 states ‘The year is a revolving wheel of the gods; that is immortality’<sup>36</sup>. This analogy was sanctified by making the Year a *pratimā* of *Prajāpati* (SB 11.1.6.13). While several rituals renewed parts of *Prajāpati* (SB 1.6.3.35-36), *Gavāmayana* fully renewed him (SB 12.1.2.3, JB 2.427). See Gonda<sup>34</sup> for ‘a brief summary some of the main features, attributes, qualities and characteristics which the Year and *Prajāpati* have in common’.

The idea of renewal and immortality derived from the Year was extended to Agnicayana. SB 10.5.4.10 states ‘the Fire-altar also is the Year’<sup>37</sup>. Verses SB 10.4.3.5-8 clarify that to attain immortality aspects of the fire altar must be consistent with aspects of the Year. Snodgrass<sup>31</sup> states (p. 48) ‘(Agnicayana) is a repetition of the original act of creation. It is a ritual of renewal of the world. The universe is recreated anew in analogy of the year that exhausts itself in

completing its cycle and annually begins again.’

The main themes underlying Vedic rituals are (i) Year is the *pratimā* of *Prajāpati*, and (ii) *Yajña* is the *pratimā* of *Prajāpati*. They have been expressed in *Gavāmayana* and Agnicayana respectively.

Since the Year and Sacrifice were both *pratimā* of *Prajāpati*, they were *sammita* or had the same measure<sup>32</sup>. Eggeling<sup>37</sup> translates ‘*saṃvatsarā sammito vai yajñah*’ (SB 3.1.3.17, SB 3.1.4.5, SB 3.3.3.5, SB 3.4.1.14, SB 3.9.4.11) as ‘the Sacrifice is of equal measure as the Year’. (The primacy of the Year is evident.) Since the two *pratimā* have the same measure, it follows that the rituals that express them must also have the same measure. Thus, Agnicayana has the same ritual importance as *Gavāmayana*. This is confirmed (below) from the similar benefits to the sacrificer.

*Prajāpati* was the first sacrificer (SB 2.3.1.22, SB 6.3.1.18). The sacrificer was identified with him and obtained similar benefits. On *Gavāmayana*, SB 12.1.2.3 states ‘whosoever thus knows that birth of the Year becomes more (and more) glorious to (the end of) it, he becomes possessed of a (new) body, he becomes the Year, and, as the Year he goes to the gods’<sup>37</sup>. It implies that the sacrificer is renewed (new body) and from SB 11.1.2.12 (‘only when they (gods) had gained the year they were immortal’), the last phrase implies that he attains immortality. On Agnicayana, SB 8.3.3.9-12 and SB 6.1.2.17-18 imply reconstruction of the body and SB 10.1.4.1 and SB 10.4.3.8 imply immortality. SB 10.1.4.1 states that by Agnicayana, the sacrificer ‘makes his body uniform, undecaying and immortal’. Snodgrass<sup>31</sup> states (p. 48) ‘When the sacrificer builds the altar he is renewing himself in unity. By the performance of the sacrifice he is reintegrated. Retracing the course of *Prajāpati*’s descent into the world he returns from multiplicity to unity. He passes beyond space and time, is reborn, and attains immortality’. Thus, *Gavāmayana* and Agnicayana conferred similar benefits to the sacrificer – renewal by becoming whole, leading to immortality. Clearly, they must have the same ritual importance.

Gonda<sup>34</sup> states (p. 64) ‘This much seems certain, first that the Year must already at an early date have been an important element of the ritualist philoso-

phy and those who conceived the idea to reconstruct *Prajāpati* and to achieve the sacrificer’s transcendence by constructing the great fireplace no doubt linked up with the advocates of the “year theory” in using, incorporating and assimilating their identifications.’ The equal importance of *Gavāmayana* and Agnicayana is consistent with these views.

#### *Gavāmayana – expression of ‘Year is the pratimā of Prajāpati’*

SB 11.1.6.13 states ‘*Prajāpati* reflected, “I have created here a counterpart (*pratimā*) of myself, the year;” whence they say, “*Prajāpati* is the year;” for he created it to be a counterpart of himself’<sup>37</sup>. Consistent with BSS 24.5, Keith<sup>36</sup> (p. 56) and Kane<sup>38</sup> (p. 1239) agree that ‘The model for the year rite was the *Gavāmayana*’. Smith<sup>32</sup> states (p. 55, 75):

‘*Prajāpati* is both time and space in their entirety, in their whole forms. He is “these worlds” and the worlds and spatial directions (the “quarters”) are, in turn, “this all”. This deity’s completeness and totality are also expressed by identifying him with the year, for the year is also said to be “all” or “this all” and contains within it both the past and the future – which is to say that the Year is Time itself... The *pratimā* of *Prajāpati* is the Year and the counterpart of the year is the sacrifice of twelve days duration, because “the year has twelve months and this is the *pratimā* of the year”. A sacrifice lasting a whole year would be more fully the form of *Prajāpati*, but one of twelve days can also serve the purpose and participate in the form albeit less completely.’

The *Gavāmayana* was a model ritual because the Year was the image (*pratimā*) of *Prajāpati* and the *Dvādaśāha* because the 12 months were the Year’s image.

#### *Gavāmayana re-examined – solstices represented the Year*

As seen above, *Gavāmayana* had the same ritual importance as Agnicayana. Yet, it has not been fully studied by Sanskrit scholars, especially in contrast to their extensive study of Agnicayana. We examine it afresh.

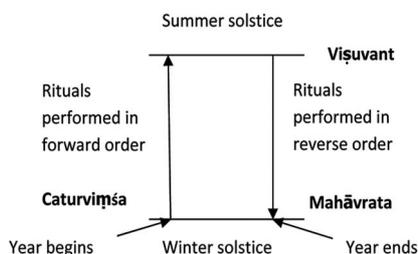
KB 5.1 recognizes the cyclical Year: ‘Just as the two ends of what is round may unite, these two ends of the Year are connected<sup>36</sup>.’ AB 17.8 states<sup>36</sup> ‘The Mahāvratā is the Caturviṃśā’, i.e. Gavāmayana recognizes the cyclical year. SB 12.1.3.23 states ‘That same year contains three great rites, the great rite on the Caturviṃśā day, the great rite on the Viṣuvant day, and the great rite on the Mahāvratā day<sup>37</sup>.’ The reason is explained below.

Figure 1 describes the main aspects of Gavāmayana. See Keith<sup>36</sup> and Eggeling<sup>37</sup> for details.

Gavāmayana ritualized (AB 4.17) the course of the Sun through the year. This is best understood from KB 19.3 which states<sup>36</sup>

‘On the new moon of Māgha he rests, being about to turn northwards... for the first time they obtain him; on him they lay hold with the Caturviṃśā.... He goes north for six months; him they follow with six-day periods in forward arrangement. Having gone north for six months he stands still, being about to turn southwards; these also rest, being about to sacrifice with the Viṣuvant day; thus for the second time they obtain him. He goes south for six months; him they follow with six-day periods in reverse order. Having gone south for six months he stands still, being about to turn north; these also rest, being about to sacrifice with the Mahāvratā day; thus for the third time they obtain him.’

This verse has been discussed for more than hundred years to date the text. As discussed in detail elsewhere<sup>21</sup>, it refers to *amānta* Māgha new-moon that marked winter solstice around 3000 BC.



**Figure 1.** Schematic representation of Gavāmayana. The most important festival days in the Vedic period, Caturviṃśā, Mahāvratā and Viṣuvant, symbolically marked the winter and summer solstices.

However, its importance in understanding the incorporation of the Sun’s course in rituals has escaped attention. Since the Sun can be observed to be moving east-west every day, phrases such as the Sun ‘rests’ or ‘goes north’ or ‘goes south’ refer to the position of sunrise or sunset. At solstices the Sun ‘rests’ and they ‘obtain him’ with rituals. It is essential to note that the Sun first had to be at rest and only then could it be ‘obtained’ by rituals. Away from the solstices, the Sun moves and cannot be ‘obtained’ and is therefore ‘followed’ by rites. Since the rites ‘followed’ the Sun, they necessarily had to be in forward and backward order in imitation of the northern and southern movement of the Sun.

The ritual importance of solstices is clear, viz. the Sun could only be ‘obtained’ at solstices where it was stationary. It also explains why equinoxes were ritually unimportant; since the Sun was moving it could not be ‘obtained’ by rituals.

However, the ritual importance of solstices was even greater. KB 19.3 continues: ‘In that they obtain him thrice, and the year is in three ways arranged, verily (it serves) to obtain the year’. The phrase ‘the year is in three ways arranged’ is a reference to the earliest (*Rg Vedic*) division of the Year into 3 seasons<sup>22,39</sup>, which was continued in the Brāhmaṇa period<sup>40</sup> (p. 110; 259) in the three four-monthly sacrifices, Cāturmās-yas. We see that ‘obtaining’ the Sun thrice at solstices ‘served to obtain the year’. That is, solstices represented the Year. This is the reason why the most important festival days in the Vedic period (Caturviṃśā, Mahāvratā and Viṣuvant) marked solstices.

*Yajña or Sacrifice or Agnicayana – expression of ‘Yajña is the pratimā of Prajāpati’*

According to SB 11.1.8.3<sup>37</sup> ‘Having given his self (atman) up to the Gods, he created that counterpart (pratimā) of himself, the sacrifice: whence people say, ‘The sacrifice is Prajāpati; for he created it as a counterpart (pratimā) of himself.’

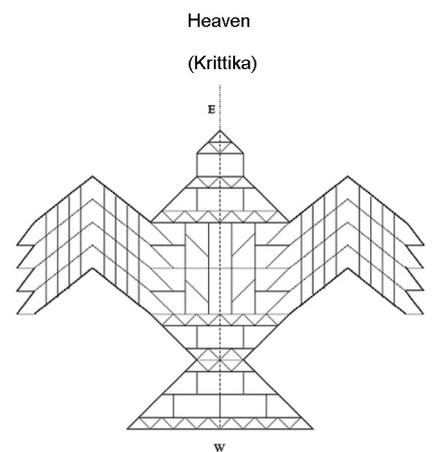
For detailed discussions of Agnicayana (see refs 29–34). As seen earlier, several ideas from the Year were incorporated. Gonda<sup>34</sup> states (p. 86) ‘The underlying philosophy of Agnicayana renders the repeated reference to the identity of Prajāpati and the year almost unavoidable’.

Sanskrit scholars have discussed several features of the Year incorporated in the fire-altar<sup>29–34</sup>. The aspects that they are unaware of and which require the expertise of scientists are highlighted below.

Verses in SB 10.2.3.18 state<sup>37</sup> ‘Seven-fold, indeed, was Prajāpati created in the beginning. He went on constructing (developing) his body, and stopped at the one hundred and one fold one...’ SB 10.2.4.7 mentions ‘101-fold passes into the 7-fold one and the 7-fold one passes into the 101-fold’. Since verses SB 10.2.4.1-3 identify Prajāpati with the solar year, the above verses imply a 95-year cycle and an accurate year of 365.25 days<sup>41</sup>, 2000 years before the Metonic cycle. They show that an accurate knowledge of one *pratimā* (Year) was incorporated in another *pratimā* (Yajña). This can be understood as an expression of *sammita*, same measure, between them.

The śyena-cita (Figure 2) was the model for fire-altars (BSS 24.5). SB 6.1.2.36 mentions that Prajāpati and the Gods became immortal through the bird-shaped fire-altar and the sacrificer should do the same to attain immortality<sup>37</sup>.

Regarding śyena-cita TS 5.4.11 mentions: ‘He should pile in hawk shape who desires the Heaven; the hawk is the best flier among birds; verily becoming a hawk he flies to the world of Heaven<sup>42</sup>. In the ritual fire-altars, Heaven was along the east-west axis. Taittirīya Saṃhita verses TS 4.4.10 and TS 5.3.9 imply that Kṛttikā was Heaven<sup>21</sup>, i.e. was on true east, which leads to ~3000 BC. This is another example of incorporating natural observations in Vedic rituals.



**Figure 2.** Schematic of a hawk-shaped altar that would symbolically carry the sacrificer to Heaven or Kṛttikā. This leads to a date of ~3000 BC for Agnicayana<sup>21</sup>.

*Origin of Śaivism and Mahāśivarātri*

Though unconnected with Prajāpati, the same ideas of renewal underlie this festival. We have discussed the origins of Śaivism and Mahāśivarātri in detail elsewhere<sup>21</sup>. Briefly, 19th century western Sanskrit scholars concluded that Śiva evolved from Rudra in the Brāhmaṇa period. This is also the view of modern scholars<sup>43,44</sup>. Since Śiva evolved from Rudra, it implies that Mahāśivarātri would be on the same day as *Śatarudrīya* (on Mahāvratā day) or just before winter solstice when it originated. The *Śatarudrīya* is even now recited 27 times on Mahāśivarātri<sup>45</sup>.

Long<sup>45</sup> interpreted the symbolism of Mahāśivarātri as: ‘Mythologically speaking, it is the dark night which immediately precedes the dawn of a new day, the death of the old world and the birth of the new’. That is, Mahāśivarātri was just before ‘the renewal of the world’, which links it to the Brāhmaṇa period when this idea was prominent. Since this idea was derived from the cyclical Year, Mahāśivarātri should be just before the ‘renewal of the Year’. This is indeed the case. Long<sup>45</sup> concluded that ‘it is the darkest time of the year in that it comes at the darkest time of the month and at the end of the lunar year’. It implies that Mahāśivarātri, i.e. *amānta* Māgha śivarātri, was just before winter solstice. That is, new year began as in KB 19.3. It is consistent with the views of the above scholars that Śiva originated in the Brāhmaṇa period.

Scientists have interpreted the origins of Mahāśivarātri from different perspectives and reached the same conclusion<sup>21,46</sup>. Thus, there is broad consensus on the origins of Mahāśivarātri.

**Various Vedic rituals and their links to calendar features**

As seen above, the great importance of solstices was that they represented the Year. The start of the Year at winter solstice was auspicious (SB 12.1.2.3) and several rituals (KB 4) were started at this time. Table 1 shows the important Vedic rituals that refer to winter solstice.

We have discussed elsewhere various methods to calculate dates from the above verses<sup>21</sup>, including errors in observations, and showed that they consistently lead to ~3000 BC. Here, it may be understood as 3rd millennium BC.

In keeping with the ritual theme, we describe another simple method (with minor corrections) to obtain dates<sup>46</sup>. Mahāśivarātri has been continuously celebrated on the same lunar day, *amānta* Māgha śivarātri, since it originated. When it originated, it was celebrated just before winter solstice, i.e. on the average on 20 December (with a spread). Currently, it is celebrated on the average on 26 February (with a spread), indicating a shift in the average of 68 days. The spread is not due to random occurrence of Mahāśivarātri, but due to a predictable (luni-solar) calendar scheme. It would be the same in any period and is irrelevant. At the rate of 72 years per one-day shift (due to precession of equinoxes), the shift of 68 days implies that Mahāśivarātri originated about 4900 years ago or around 2900 BC. This method does not depend on the identification of nakṣatras and independently confirms dates obtained from them.

In Table 1, we see that the interpretations of Western Sanskrit scholars and scientists are in agreement. For example, Witzel<sup>5</sup> states ‘In TS 7.4.8 and KB 4.4, the beginning of the year is on a full-moon night, and the months are pūrṇimānta. KB 19.2-3, however, already has *amānta* months’. Decades earlier, scientists had similarly interpreted these verses.

Witzel’s statement also implies that the verses are contemporary to the texts. Hock<sup>50</sup> explicitly states (p. 297) ‘What is certain from KB 19.3 is that at the time of the composition of our text the view was held that the winter solstice occurs at the new moon of Magha’. This has been the consensus view among Sanskrit scholars and scientists for generations.

This consensus can be validated from the above understanding of Gavāmayana. The lunar markers were important to the extent they marked winter solstice, which was all important. There was no reason to persist with outdated lunar markers that no longer represented winter solstice, as would be necessary if the verses were ancient memories. They were changed with the passage of time, e.g. from KB 19.3 to VJ 5,6.

Western Sanskrit scholars are unaware that they have interpreted Vedic rituals to ~3000 BC. This is not the first instance where humanities scholars’ understanding of ancient texts has been found wanting. Klostermaier<sup>4</sup> states (p. 27) that while translating Aristotle’s works ‘sixteenth-century humanists misunderstood

and mistranslated his scientific terminology’. Clearly, collaboration with scientists is essential.

As discussed elsewhere<sup>21</sup>: (i) verses on *ekāṣṭaka*, (ii) KB 19.3 plus SB 11.1.1.7, and (iii) the origin of Mahāśivarātri are three independent references that imply that *amānta* Māgha new-moon marked winter solstice, making the conclusion robust. They lead to ~3000 BC for the Brāhmaṇa period. Kṛttikā on true east<sup>13</sup> and as Heaven in Agnicayana (Figure 2) also lead to ~3000 BC and provide independent confirmation.

**Vedic rituals are the proper context to interpret evidences in Vedic texts**

While several evidences (mentioned earlier) have been considered in the AIT/AMT debate, there is no consensus as to which evidence must be privileged. It is now clear that Vedic texts themselves describe the most important evidence as ‘the Year is the pratimā of Prajāpati’ (SB 11.1.6.13), ‘Yajña has the same measure as the Year’ (SB 3.1.3.17 etc.) and ‘the Fire-altar also is the Year’ (SB 10.5.4.10). PB 10.3.6 states ‘The house-lord of the Gods is the Year; he is Prajāpati...<sup>48</sup>’. Gonda<sup>30</sup> states (p. 69) ‘Prajāpati, the Year and the Sacrifice are different forms or aspects of Totality’. No other evidence can match the religious importance of the Year. This has two consequences: (1) unfamiliarity with the Year and its scientific aspects is not a valid justification for scholars studying Vedic texts, and (2) scholars can no longer contradict Vedic texts and propose any other evidence to be the most important

Vedic rituals are the proper context to interpret various evidences in Vedic texts. Material evidences are incidental to Vedic rituals. They would have been used if available and not used if unavailable. Some examples below clarify this approach.

*Ayas vs Year*

Witzel<sup>5</sup> states (p. 67) ‘For, the first appearance of iron, the “black metal” (*kṛṣṇa/śyāma ayas*) in S. Asia, well known to the Brāhmaṇa style texts, is only at c. 1200 BCE... To date Brāhmaṇa texts at 1900 BCE (see below on astronomy) is simply impossible.’

**Table 1.** Various Vedic rituals and their key link to the Year

Ritual	Reference	New year beginning after	Interpreters
Dākṣāyaṇa Caturmāsya	KB 4.4 KB 5.1	Pūrva Phalguṇi full moon at winter solstice (~3000 BC) Pūrva Phalguṇi full moon at winter solstice (~3000 BC)	Tilak <sup>12</sup> Sengupta <sup>15</sup> Witzel <sup>5</sup>
Gavāmayana	KB 19.3	<i>Amānta</i> Māgha new moon at winter solstice (~3000 BC)	Aiyar <sup>14</sup> Caland <sup>48</sup> Witzel <sup>5</sup>
	<i>Ekāṣṭaka</i> - TS 7.4.8, PB 5.9	<i>Amānta</i> Māgha new moon at winter solstice (~3000 BC)	Caland <sup>48</sup> Sengupta <sup>15</sup> Witzel <sup>58</sup> Einoo <sup>59</sup>
Agnicayana	SB 6.2.2.18	Pūrva Phalguṇi full moon at winter solstice (~3000 BC)	Tilak <sup>12</sup> Sengupta <sup>15</sup> Witzel <sup>5</sup>
	TS 4.4.10 plus TS 5.3.9	Kṛttikā was Heaven or on true east (~3000 BC)	Prasanna <sup>21</sup>
Mahāśivarātri	Implies KB 19.3	<i>Amānta</i> Māgha new moon at winter solstice (~3000 BC)	Long <sup>45</sup>

The issue of *kr̥ṣṇa/śyāma ayas* is discussed in detail elsewhere<sup>22</sup>. Here, the issue is the relative importance of evidences, Year and *kr̥ṣṇa/śyāma ayas*. Privileging *kr̥ṣṇa ayas* reflects a lack of awareness about its negligible religious importance compared to the Year. Clearly, evidences have been interpreted out of context. Additionally, since Witzel<sup>5</sup> himself has dated the Year to ~3000 BC (Table 1), his claim that it is ‘simply impossible’ is invalid.

### *Aśva vs Vedic rituals*

Western Sanskrit scholars have interpreted references to *aśva* as horse and concluded that it supports AIT/AMT. In contrast, several archaeologists (cited in ref. 49) believe that evidence for horse in India pre-dates 1500 BC. Experts on ancient horses are divided and have expressed divergent opinions<sup>3</sup>. This issue has been discussed several times<sup>1,3,11,49</sup>. Here we discuss the issue in the context of Vedic rituals.

The *Samhita/Brāhmaṇa* texts describe Aśvamedha and it has been well studied<sup>28,38,50</sup>. Keith<sup>28</sup> states (p. 343) ‘It is an old and famous rite, which kings alone can bring, to increase their realms’. Kane<sup>38</sup> states (p. 1237) ‘Even in ancient times this sacrifice must have been rare’. Except for a few powerful kings, all others would never have performed this ritual. It has all the hallmarks of a political ritual unconnected with the main religious concerns.

Clearly, it is less important compared to the main religious rituals. This is supported by BSS 24.5 that mentions several

‘model’ or ‘paradigm’ rituals, including Agnicayana and Gavāmayana, but does not mention Aśvamedha. Hence, the claim that *aśva* as horse supports AIT/AMT effectively privileges Aśvamedha over the most important Vedic rituals that have been interpreted to ~3000 BC even by Western Sanskrit scholars. This is clearly incorrect. *Aśva* must be interpreted in the context of Vedic rituals and not vice-versa. In this context, *aśva* could refer to a horse if it was present in India, or else to some other animal.

### *Linguistic evidences vs Vedic rituals*

Kane<sup>38</sup> began his long discussion (pp. 976–1255) of Vedic rituals with the Introductory statement (p. 976) ‘A deep study of Vedic sacrifices is quite essential for the proper understanding of the Vedic Literature, for arriving at the approximately correct statements about the chronology, the development and stratification of different portions of that literature ... Early European scholars generally paid scant attention to the deep study of the Vedic sacrifices and endeavored to understand the meaning of the Vedas principally by reference to grammar, comparative philology and the comparison of several passages containing the same word or words.’

Kane has raised the fundamental question of what is the proper approach to study Vedic literature, Vedic rituals or linguistics. This has not been addressed till date. To address this question, it is necessary to assess the reliability of these approaches.

The connection between Indo-European languages is unquestioned. However, this connection cannot directly give absolute dates as no scientific principle is involved. Bryant<sup>51</sup> states (p. 345) ‘given the history of criticism against linguistic paleontology, linguistics can only establish relative chronology’. In contrast, the dating of Vedic rituals to ~3000 BC is direct and robust.

As objected to by Kane, other than the linguistic aspects, isolated words or passages that supposedly favour AIT/AMT have been privileged. However, they cannot overturn the settled interpretations of Vedic rituals, especially since these rituals are unconnected with such words. The interpretations of Gavāmayana, Agnicayana and Mahāśivarātri do not depend on the interpretations of say *aśva* or *ayas*. Hence, overemphasizing isolated words or passages is unhelpful since they cannot deny the interpretations of Vedic rituals to ~3000 BC.

Implicit in Kane’s statement is that the later Vedic ritual texts are more important than the *R̥g Veda*. One reason is the transition from *R̥g Vedic* deities to the primacy of Prajāpati in the post-*R̥g Vedic* period<sup>28,30–33</sup>. Important rituals, e.g. Agnicayana were developed in this period. Another reason is the relative opaqueness of the *R̥g Veda*. The very title (and contents) of a recent article<sup>52</sup> on *R̥g Veda*, validate Kane’s view. Jamison<sup>52</sup> (p. 25) states ‘Given its enigmatic style, the *R̥g Veda* has very little direct evidence for anything.’ *R̥g Veda* is privileged by scholars whose priority is studying Indo-European languages and not Vedic literature<sup>52</sup>.

Vedic literature must be understood on its own merits. As seen earlier, the combined expertise of Sanskrit scholars and scientists is essential for the proper understanding of Vedic rituals. It shows that even Western Sanskrit scholars have interpreted Vedic rituals to ~3000 BC. Thus, Vedic rituals lead to consensus, while linguistics leads to (AIT/AMT) controversy. This is the final validation of Kane's contention (see also later in the text).

### Vedic rituals and Indus Valley Civilization

As mentioned earlier archaeologists believe that this civilization is part of the continuous Indian cultural tradition<sup>1-3,7-11</sup>. The discussion below is limited to Vedic rituals.

As seen earlier, Western Sanskrit scholars have interpreted the origins of Śaivism and Mahāśivarātri to be in the Brāhmaṇa period around 3000 BC. Since there is no dispute that Vedic texts were composed in northwest India, this implies a Harappan origin for Śiva worship. This is also archaeologically attested. As early as 1931, Marshall<sup>53</sup> (p. vii) stated 'Among the many revelations that Mohenjo-Daro and Harappa have had in store for us, none perhaps is more remarkable than this discovery that Śaivism has a history going back to the Chalcolithic Age or perhaps even further still'. This is also the current view among archaeologists<sup>11,54</sup>.

Several Harappan 'Proto-Śiva' seals led scholars to conclude that Śaivism originated in Harappa (see Dhyansky<sup>55</sup>) for details. However, since they subscribed to the AIT, they proposed that Śiva was a non-Aryan deity who was later incorporated in Vedic texts.

This view was rejected by Srinivasan<sup>43</sup>, who concluded that Rudra-Śiva was a Vedic deity. She states (p. 555) 'The very characteristics previously judged to be non-Vedic, turn out on closer examination to knit Rudra into the Vedic fabric'. Since she was working within the AIT framework, she denied that the Harappan seals represented Śiva. However, she was unaware that Western Sanskrit scholars' interpretations of Śaivism and Mahāśivarātri correlated the Brāhmaṇa and Harappa periods. In reality, her work supports the conclusion that Vedic Śiva was part of Harappan religion.

Srinivasan<sup>43</sup> further states (p. 555) 'The most prevalent and important early Śaivite icon is the linga...'. Joshi<sup>11</sup> states 'the general concept of religion was earlier based on the finds of seals, sealings, lingas, yonis, and innumerable terracotta mother goddesses'. Chakrabarti<sup>54</sup> states "That Śiva was worshipped in this civilisation is proved not merely by the phal-lus-shaped stone objects found at Mohenjodaro and Dholavira but also by the find of an indisputedly Śivalinga set in a Yonipatta at Kalibangan'. Comparing these statements, it is clear that Śiva worship was part of Vedic religion in Harappa.

Jamison and Witzel<sup>44</sup> state 'New gods also arise in this (Brāhmaṇa) period... Śiva developed from the horrifying lord of cattle, Rudra Paśupati'. They also state 'There is, however, no connection with the so-called Śiva on some Harappa seals'. Witzel is unaware that he himself has interpreted the Brāhmaṇa period and hence Śaivism to ~3000 BC, i.e. to Harappa. Clearly, his objection is invalid.

We have similarly resolved elsewhere the dispute over the Harappan origins of Agnicayana<sup>22</sup>. It is clear that the root cause of Western Sanskrit scholars' objections is a lack of awareness that they have themselves interpreted Vedic rituals to Harappa. While Gavāmayana and Agnicayana have become antiquated, the festival of Mahāśivarātri is living proof of the incorrectness of the AIT/AMT. The same *Śatarudrīya* recited in the present times was recited during the Harappan civilization on *amānta* Māgha śivarātri.

### Consensus in the interpretations of Vedic rituals

For traditional scholars, the commentaries of Sāyana (14th century Vijayanagar) are the most important sources, indeed the last word, in understanding Vedic texts. Early European scholars referred extensively to Sāyana's commentaries and this practice still continues<sup>29-35</sup>. There is also much agreement in the interpretations of Vedic rituals irrespective of positions on the AIT/AMT. For example, Kane<sup>38</sup> did not subscribe to the AIT (p. 976), but his interpretations are similar to those of Western Sanskrit scholars. There is consensus between traditional and modern Sanskrit scholarship on Vedic rituals.

Scientists are also in agreement and have contributed especially in areas where Sanskrit scholars lack expertise. As discussed above, archaeological evidences support the interpretations of Vedic rituals to ~3000 BC and to the Indus Valley Civilization. Thus, there is consensus on Vedic rituals among diverse scholars who are usually in disagreement – Western Sanskrit scholars, scientists and archaeologists. Its importance cannot be overstated.

Lamberg-Karlovsky<sup>56</sup> states (p. 75) 'Linguists cannot associate an archaeological culture with words, syntax, and grammar, and archaeologists cannot make their sherds utter words. We need a third arbiter, which may or may not offer some degree of resolution to the relationships between archaeological culture and language. Perhaps that arbiter will be in our genes'.

There are two ways to resolve the impasse. One is an assessment of the different approaches for their reliability. This suggestion has been made earlier in a different context<sup>57</sup>. The second is if there is consensus among the disputants, which is currently lacking for genetics or most other 'third arbiters'.

Vedic rituals are exceptional in that there is consensus among the main disputants. Western Sanskrit scholars cannot reject their own interpretations of Vedic rituals to ~3000 BC. Thus, Vedic rituals are the only universally acceptable 'third arbiter' at present. That is, Vedic rituals must be the bedrock of any study of Vedic literature and associated topics, as contended by Kane. They 'offer some degree of resolution to the relationships between archaeological culture and language' and show that Vedic religion was part of Harappan culture.

### Conclusion

Kane had stated decades ago that Vedic rituals, and not linguistics, are the proper basis to understand Vedic literature. The present work validates Kane's contention with a distinction that the combined expertise of Sanskrit scholars and scientists is essential to understand Vedic rituals. The central theme underlying Vedic rituals is the renewal of Prajāpati, the creator God, who was exhausted after creating the universe. This theme was expressed in two rituals, Gavāmayana and Agnicayana, making them of equal importance. This

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theme was derived from the cyclical Year, making the Year the primary evidence in Vedic texts. Solstices represented the Year, due to which the most important festival days in the Vedic period marked them. Sanskrit scholars and scientists have interpreted the most important Vedic rituals, Gavāmayana and Agnicayana (and Mahāśivarātri) to ~3000 BC contradicting AIT/AMT. Their conclusions are supported by archaeological evidences from the Indus Valley Civilization. Other evidences in Vedic texts must be interpreted in the context of the robust consensus on Vedic rituals and not in isolation.

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