

## Assessing scientific evidences in the Aryan debate

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*For a proper study of the controversy surrounding the Aryan invasion (migration) theory, it is essential to recognize the nature of this controversy. It is a multi-disciplinary controversy among specialist scholars with conflicting expert opinions. Widely accepted ground rules are essential to study such a controversy. Historians' criteria for expert opinion are validated with Indian judicial standards for expert testimony. They minimize subjectivity in the assessment of evidences. The Aryan debate must be conducted to be consistent with these criteria. Vedic rituals satisfy these criteria, which fundamentally alters the nature of the Aryan debate. Other scientific evidences can also qualify if scientists can demonstrate that they satisfy the criteria. The primary focus of the Aryan debate becomes a scrutiny of the reliability and credibility of the contradictory settled conclusions.*

### Introduction

William Jones first suggested the idea of a common Indo-European language family in a speech given to the Asiatic Society in 1786. Following further developments along these lines, Max Muller in 1858/59 proposed the Aryan invasion theory (AIT)<sup>1-4</sup>. According to AIT, Aryan tribes invaded India in the 2nd millennium BC. The *Rig Veda* was dated to ~1500 BC and the post-Rig Vedic Samhita and *Brāhmaṇa* texts were dated to ~1000–800 BC. Currently, AIT has been modified to the Aryan migration theory (AMT) due to the absence of any evidence for an invasion. However, the dates for the Vedic texts remain unchanged. Linguistic evidences remain the mainstay of AIT/AMT<sup>1-6</sup>.

However, AIT was opposed from the very beginning, including by several leading European Sanskrit scholars of the 19th century<sup>1</sup>. At present too, scholars in many disciplines have recognized that several evidences do not support AIT/AMT. Most experts in archaeology<sup>1-3,7-13</sup>, geology<sup>14-18</sup>, remote sensing<sup>19-21</sup>, etc. do not support AIT/AMT. Lately, genetic evidences have been analysed<sup>22-24</sup>. In addition, from the 1890s till date, several scholars have interpreted astronomical references in Vedic texts to high chronology contradicting AIT/AMT<sup>25-36</sup>.

Several books and articles discuss evidences in the Aryan debate<sup>1-6</sup>. Unfortunately, these discussions are not based on any explicitly stated criteria for the evaluation of evidences. Scholars' perspectives differ and unsurprisingly, the controversy persists. Clearly, such approaches will never find universal acceptability.

It follows that proper discussions are possible only if there is agreement on the ground rules. In this note, we show that criteria exist which all scholars must abide by when assessing evidences. This has enormous implications for the Aryan debate, as discussed here.

### Nature of the Aryan debate

It is essential to first recognize the nature of the Aryan debate, without which it cannot be properly studied. It is a multi-disciplinary controversy among specialist scholars with conflicting expert opinions. Trautmann<sup>3</sup>, a historian, has also implied the same without, unfortunately, recognizing its consequences. However, most scholars have not recognized this fundamental nature of the Aryan debate.

It is first necessary to establish the criteria to accept expert opinions outside one's area of expertise. The difficulty is that specialist scholars (linguists, archaeologists, scientists, etc.) mostly restrict themselves to evidences in their disciplines and are unfamiliar with this issue. Therefore, it is necessary to seek guidelines elsewhere.

### Standards for accepting expert or specialist opinion – historians and the courts

We note that historians must address all important evidences, including those in areas in which they have no expertise. For the latter, historians rely on expert opinion. Therefore, it is of interest to examine historians' criteria for accepting expert opinion. Fortunately, they have been explicitly described by Trautmann<sup>3</sup>

in the context of the Aryan debate as follows:

1. By the community of scholars I mean those who have been trained in the special skills for the analysis of historical evidence, who make arguments supported by careful reference to that evidence, and whose writings are tested by other scholars through processes of review and criticism in scholarly seminars and publications (p. xvi).
2. The community of scholars is not infallible, to be sure. It can be mistaken, and in fact has changed its collective mind on many occasions (p. xvi).
3. Nevertheless, the community of scholars who have the relevant expert knowledge, fallible though it is, remains the best source we have for testing interpretations and establishing historical truth (p. xvi).
4. Because it has been tested by the criticisms of scholars of many countries over a very long time, the consensus of the community of scholars deserves respect and credence (pp. xxxix–xl).

The question of whether historians' views above are acceptable to other scholars needs to be addressed. We note that historians are not the only professionals who have to engage with diverse evidences. The courts consider diverse evidences on a routine basis. In particular, the courts routinely deal with conflicting expert testimony, though as part of broader cases. Therefore, it is of great interest to examine the standards for expert testimony in the courts.

The Supreme Court of India has in a recent judgment described as to who qualifies as an expert and under what conditions expert testimony can be admitted<sup>37</sup>. It states<sup>37</sup>

Section 45 of the Evidence Act which makes opinion of experts admissible lays down that when the court has to form an opinion upon a point of foreign law, or of science, or art, or as to identity of handwriting or finger impressions, the opinions upon that point of persons specially skilled in such foreign law, science or art, or in questions as to identity of handwriting, or finger impressions are relevant facts.

In order to bring the evidence of a witness as that of an expert it has to be shown that he has made a special study of the subject or acquired a special experience therein or in other words that he is skilled and has adequate knowledge of the subject.

The report submitted by an expert does not go in evidence automatically. He is to be examined as a witness in court and has to face cross-examination.

It is, however, trite that a document becomes inadmissible in evidence unless author thereof is examined; the contents thereof cannot be held to have been proved unless he is examined and subjected to cross-examination in a court of law... The document which is otherwise inadmissible cannot be taken in evidence only because no objection to the admissibility thereof was taken (pp. 43–46)

Trautmann's<sup>3</sup> criteria for expert opinion (points 1–4 above) are virtually identical to these criteria. In particular, we note that point 4 implies that the consensus of the community of scholars that has survived scrutiny and criticism must be accepted. This is entirely equivalent to expert testimony being accepted only after it has survived cross-examination in a court of law. The great value of consensus in expert opinion in legal proceedings has been recognized for more than a century<sup>38</sup>.

The similarity to judicial standards implies that Trautmann's<sup>3</sup> criteria for expert opinion must be considered to be established and well settled. This is an independent corroboration by legal stan-

dards. These criteria are widely used in different contexts. Therefore, all scholars (historians and non-historians) must accept the above criteria (points 1–4). Those who disagree must propose alternate standards that are also widely recognized.

### *Expert opinion binding on all scholars in the Aryan debate*

It is also important to recognize a fundamental difference in the role of expert opinion. The primary requirement in the courtroom is to ensure that all laws are complied with, even at the expense of scientific evidences. The Supreme Court of India has ruled that expert testimony is not binding on the courts<sup>37</sup> (pp. 43–46). This is also the position of the US Supreme Court and Justice Breyer<sup>39</sup> states (p. 537) 'A court proceeding, such as a trial, is not simply a search for dispassionate truth... Any effort to bring better science into the courtroom must respect the jury's constitutionally specified role, even if doing so means that, from a scientific perspective, an incorrect result is sometimes produced.'

In contrast, the primary goal of historians is to determine historical truths. There are no other overriding constraints that take precedence. A careful reading of the above criteria, especially points 3 and 4, leaves no doubt about their binding nature. Otherwise, there was no need to mention the criteria at all.

### **Current status of the Aryan debate**

Several linguists<sup>1–4</sup>, archaeologists<sup>8,9</sup> and historians<sup>3</sup> view the Aryan debate primarily as a dispute between linguists and archaeologists. Trautmann<sup>3</sup> gives the justification for this view. He frames the Aryan debate in terms of 'three fundamental discoveries'. He states<sup>3</sup> (p. xx) 'The three discoveries and the dates at which they were first published – for they were made at widely distant times – are

- The discovery of the Indo-European language family (1786)
- The discovery of the Dravidian language family (1816)
- The discovery of the Indus civilization (1924).'

We note that a historian has framed the Aryan debate in the above terms. Historians have not claimed expertise in the above disciplines. This justifies our claim that the Aryan debate is a dispute among specialist scholars.

The above framing is justified by Trautmann<sup>3</sup> (p. xx) as 'These discoveries are fundamental in the sense that the historical facts they uncovered have survived the critical scrutiny of the community of scholars worldwide and are therefore well-established truths of history today and as far as we can see into the future.' That is, they satisfy the criteria (points 1–4) for accepting expert opinion.

### **Scientific evidences must be included in the Aryan debate**

The above framing of the Aryan debate is extremely narrow. Indeed, it excludes evidences that satisfy all criteria for acceptance. This is due to two reasons. First, scientists are not even aware of these criteria for their conclusions to be accepted. Secondly, other scholars are not aware of the strength of the scientists' conclusions.

Therefore, the responsibility of scientists is clear. It is incumbent upon them to show that their conclusions satisfy the criteria (points 1–4) for accepting expert opinion. Only then can their conclusions become part of the 'fundamental discoveries'.

An example is discussed in detail below. This is an essential demonstration for any conclusions to become binding on all scholars. In addition, it provides a guide for scientists in other disciplines who must adopt a similar approach to demonstrate any claims of consensus.

### **Consensus on Vedic rituals satisfies all criteria for consideration**

We have recently discussed the central themes underlying the key Vedic rituals described in the post-Rig Vedic *Samhitas* and *Brāhmaṇa* texts and summarized them as follows<sup>40</sup>

The central theme underlying Vedic rituals is the renewal of Prajāpati, the creator God, who was exhausted after creating the universe. This theme was

## HISTORICAL NOTES

**Table 1.** Various Vedic rituals linked to the year (reproduced from Prasanna)<sup>40</sup>

Ritual	Reference	New year beginning after	Interpreters
Dākṣāyaṇa	KB 4.4	Pūrva Phalguṇi, full-moon at winter solstice (~3000 BC)	Tilak <sup>25</sup> Sengupta <sup>29</sup> Witzel <sup>5</sup>
Caturmāsya	KB 5.1	Pūrva Phalguṇi, full-moon at winter solstice (~3000 BC)	Aiyar <sup>28</sup> Caland <sup>41</sup> Witzel <sup>5</sup>
Gavāmayana	KB 19.3	Amānta Māgha, new-moon at winter solstice (~3000 BC)	
	Ekāṣṭaka-TS 7.4.8, PB 5.9	Amānta Māgha, new-moon at winter solstice (~3000 BC)	Caland <sup>41</sup> Sengupta <sup>29</sup> Witzel <sup>44</sup> Einoo <sup>45</sup>
Agnicayana	SB 6.2.2.18	Pūrva Phalguṇi, full-moon at winter solstice (~3000 BC)	Tilak <sup>25</sup> Sengupta <sup>29</sup> Witzel <sup>5</sup>
Mahāśivarātri	TS 4.4.10 plus TS 5.3.9 Implies KB 19.3	Kṛttikā was Heaven or on true east (~3000 BC) Amānta Māgha, new-moon at winter solstice (~3000 BC)	Prasanna <sup>36</sup> Long <sup>46</sup>

expressed in two rituals, Gavāmayana and Agnicayana, making them of equal importance. This 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.

The combined expertise of Sanskrit scholars and scientists is essential to understand Vedic rituals. Hence, the approach adopted was described as<sup>40</sup>

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 (p. 1882).

This is identical to point 3 of the criteria on expert opinion and therefore acceptable.

Table 1 shows that several Sanskrit scholars (who support AIT/AMT) and scientists have interpreted key Vedic rituals to ~3000 BC.

### *Longstanding consensus on Vedic rituals since 1931*

Elsewhere<sup>36</sup>, we have discussed in detail that in 1931, Caland<sup>41</sup> correctly inter-

preted verses on ekāṣṭaka (PB 5.9), connected with one of the most important rituals, Gavāmayana, to ~3000 BC (ref. 36). Ekāṣṭaka was also one of the most important religious days in the Vedic period. It was considered to be the 'consort or wife of the year' (AV 3.10, TS 7.4.8, PB 5.9). We recall that the cyclical year was the most important theme underlying Vedic rituals. Calling ekāṣṭaka the 'consort or wife of the Year' indicates the religious importance of this day.

Caland's<sup>41</sup> comments result in a clear understanding of verses on ekāṣṭaka. It is also important to note the quality of his scholarship, in general, and in this particular context, Jamison and Witzel<sup>42</sup> state

Although many scholars over the last century or so have contributed to our knowledge of Vedic ritual, one must be singled out: W. Caland, whose unequalled command of the massive amount of textual material and inspired ability to make sense of it is always evident in the awe-inspiring flood of his text editions, translations, commentaries, and treatments of particular rituals and ritual types... Both in breadth and in detailed knowledge of Vedic ritual, he remains unsurpassed.

In the present context, Caland remains the only Sanskrit scholar to recognize that the verses on ekāṣṭaka in PB 5.9 and verses in KB 19.3 referred to the same beginning of the new year at winter sol-

stice in connection with Gavāmayana. Witzel has also interpreted these verses correctly without recognizing their connection (Table 1).

'Therefore, 1931 is the year when for the first time Sanskrit scholars who supported AIT interpreted Vedic rituals to ~3000 BC, similar to scientists who opposed AIT.' Since then, several Sanskrit scholars have interpreted Vedic rituals to ~3000 BC (Table 1).

All ancient Sutra commentators and western Sanskrit scholars have recognized that ekāṣṭaka was intimately connected with winter solstice and new year. In 1894, Oldenberg<sup>43</sup> stated (p. 293) 'ekāṣṭaka, which is related to the winter solstice and the turn of the year.' More recently, Witzel<sup>44</sup> stated 'ekāṣṭaka – Au moment du solstice' and Einoo<sup>45</sup> stated (p. 102) 'ekāṣṭaka coincides with the winter solstice.' Ekāṣṭaka coincided with, or was near, winter solstice in ~3000 BC.

Also, as discussed in detail elsewhere<sup>36,40</sup>, western Sanskrit scholars (who support AIT/AMT) have for more than a century interpreted the origins of Śaivism and Mahāśivarātri to be in the Brāhmaṇa period. For example, Long<sup>46</sup> states 'It (Mahāśivarātri) 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', i.e. it was just before winter solstice (December 21) when it originated. This leads to ~3000 BC for the origin of Śaivism and Mahāśivarātri. Scientists have also interpreted the origins of Mahāśivarātri to ~3000 BC (refs 31, 32, 36).

Till now it was believed that only scientists had interpreted Vedic rituals to ~3000 BC. For example, Bryant<sup>1</sup> (p. 252) states ‘The Indian National Science Academy of New Delhi, for example, published a *History of Astronomy in India* in 1985, wherein the Indus Valley and the Brāhmaṇa period are correlated.’ This consensus among scientists should have been accepted or scrutinized<sup>30</sup>.

However, we have recently shown that there is a wider consensus among Sanskrit scholars and scientists, and not just among scientists, on Vedic rituals<sup>40</sup> (Table 1). This consensus transcends support or opposition to AIT/AMT. Thus, the consensus on Vedic rituals must be considered to be most credible.

### *Interpretations of Vedic rituals have stood the test of time*

The first attempt to counter the high chronology and to interpret Vedic rituals to be consistent with AIT was made in 1895 by Thibaut<sup>47</sup>. As discussed in detail elsewhere<sup>36</sup>, it was a failed attempt.

Recently, a conscious effort to interpret Vedic rituals to be consistent with AMT has been made by Witzel<sup>5</sup>. He provides interpretations of these verses which he believes reconcile them with AIT/AMT. He states<sup>5</sup> ‘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.’ He is unaware that several scholars have already interpreted these verses similarly and they lead to ~3000 BC (Table 1). Thus, a conscious effort to interpret Vedic rituals to be consistent with AIT/AMT (and believed to be so) actually leads to ~3000 BC. A better example of withstanding critical scrutiny would be difficult to come across.

Additionally, less than a handful of scientists support AIT/AMT. This issue has been discussed in detail elsewhere<sup>48</sup>. Briefly, Hunger and Pingree’s<sup>49</sup> interpretation of KB 19.3 contradicts several verses in Vedic texts<sup>48</sup>. In addition, even western Sanskrit scholars who support AIT/AMT do not subscribe to their interpretation<sup>36,48</sup>. Kochhar<sup>50</sup> supports AIT/AMT, despite interpreting Vedic texts to ~3000 BC just two years earlier<sup>51</sup>. Clearly, such an approach carries no professional authority. There are no other scientists, who have explicitly inter-

preted the key verses, who support AIT/AMT. The implications are clear, viz. scientists cannot support AIT/AMT in a professional capacity<sup>48</sup>.

It is also clear that Vedic rituals have (point 4) ‘been tested by the criticisms of scholars of many countries over a very long time’. They satisfy all criteria (points 1–4) for acceptance of expert opinion. Thus, Vedic rituals must be considered on par with linguistics and archaeology.

### **Other scientific evidences**

A similar approach must be adopted by other scientists (for example, in geology, remote sensing, genetics, etc.) to demonstrate the presence of consensus, if any, in their respective disciplines. Needless to say, we do not have the expertise to examine such evidences in detail. Therefore, the discussion below is brief and draws attention to some issues. There is no consensus on genetic evidences yet. Additionally, concerns have been raised about their role in the Aryan debate<sup>52–54</sup>. However, there is a longstanding consensus on the Sarasvati river evidences.

### *Assessing evidences for River Sarasvati*

The first suggestion that a dried river observed between the Yamuna and Sutlej was the Sarasvati mentioned in Vedic texts was made by the French geographer Louis Vivien de Saint-Martin in 1855 (ref. 14). Subsequently, Oldham in 1870s and 1890s also made similar observations<sup>14,16</sup>. Since then, several studies have supported this view<sup>14–18</sup>. Since the 1980s, remote sensing studies have also provided additional support<sup>19–21</sup>.

For example, Giosan *et al.*<sup>17</sup> state ‘Did a glacier-fed Himalayan river, identified by some with the mythical Sarasvati, flow along the interfluvium between the modern courses of Sutlej and Yamuna and, if yes, when?’ (p. 888). They answer their question as follows (p. 889)

A novel analysis of the *Rig Veda* (rather than later secondary sources) by Aklujkar paints exactly such a picture of a benevolent river with multiple courses affecting a wide area, which would certainly explain the amazing density of settlements across

the S–Y (Sutlej–Yamuna) interfluvium rather than only along definite river courses. This description conforms well to the model that is slowly emerging for the Sarasvati: a perennial monsoonal river with many feeding streams in its headwaters with mild and nourishing floods when compared to the Indus or its large Himalayan tributaries. This is a testament to the acuity of the *Rig Veda* composers who transmitted to us across millennia such an incredibly accurate description of a grand river!

They<sup>17</sup> are in agreement with other geologists<sup>14–21</sup> that evidences for ‘the large perennial river system that was once active on the Sutlej–Yamuna interfluvium’ (p. 888) are those of the Sarasvati river described in the *Rig Veda*. Since geologists believe that the Sarasvati river started drying up ~2000 BC, the above comments imply that the *Rig Veda* is much older than 2000 BC. In contrast, according to AIT/AMT, the *Rig Veda* is dated to ~1500 BC. Hence, this consensus among geologists, that goes back 150 years, contradicts AIT/AMT. However, there is a lack of consensus on whether the Sarasvati was a monsoon-fed or a snow-fed river<sup>15–21</sup>.

Geologists need to present their consensus in a manner that is consistent with Trautmann’s<sup>3</sup> criteria (points 1–4) for it to be included in the Aryan debate as a ‘fundamental discovery’.

### **Explicit criteria essential for minimum subjectivity**

As seen above, the criteria for accepting expert opinion by historians and the courts are virtually identical. There are other similarities to the legal process as well. The legal process is adversarial in nature. Trautmann<sup>3</sup> explicitly acknowledges the adversarial nature of the Aryan debate. He states (p. xxix) ‘These two broad positions are very different indeed, and both cannot be true.’ It is important to note that the adversarial nature is driven by evidences and not because of any interest among scholars for such an approach.

However, the full implication of the adversarial nature of the Aryan debate has not been recognized. It is virtually impossible for scholars to ensure the equivalent of a ‘judicial fair trial’

(especially) in an adversarial dispute without explicitly stated criteria. The charges of bias are an inevitable consequence. The judicial process is acceptable because *a priori* all parties are fully aware of the laws and rules of evidences. This serves to eliminate charges of bias because the criteria have to be applied in a consistent manner. Clearly, it is far less subjective than any approach with unstated criteria.

Therefore, to ensure a 'fair study' of an adversarial dispute, a similar approach is essential. Since the criteria (points 1–4) have been provided by Trautmann<sup>3</sup> and validated above, the Aryan debate must be conducted to be consistent with them. Such an approach has many advantages.

First, it minimizes subjectivity in the consideration of evidences. The criteria must be applied consistently to all evidences. This allows Vedic rituals to become part of the 'fundamental discoveries' as shown above.

Secondly, it allows scholars from relevant disciplines (geology, remote sensing, genetics, etc.) to become aware of the criteria required for 'admissibility' of expert opinion. This leads to an inclusive approach to evidences, subject to rigorous standards.

Thirdly, the central importance given to the consensus views of specialist scholars eliminates any tendency to cherry-pick evidences to reach conclusions that are contrary to those of domain experts.

Fourthly, similar to the above, it eliminates any tendency to cherry-pick the views of isolated specialist scholars that are not supported by the majority of experts in the particular discipline.

Fifthly, consensus that has withstood critical scrutiny is privileged over speculative or contested claims, which are inadmissible. This is important because the latter do not have the same credibility as the former.

Several scholars have attempted a comprehensive study of evidences, without being aware of the above criteria. Unsurprisingly, it can be readily seen that such studies are unsatisfactory. Therefore, the main significance is that all future comprehensive studies must be consistent with these criteria and will be scrutinized by these standards.

In particular, several scholars are extremely uncomfortable with scientific evidences and have underplayed or

ignored them. This is most likely due to unfamiliarity with the sciences. In contrast, the courts deal with scientific evidences routinely even though judges acknowledge themselves to be non-experts. Justice Breyer<sup>39</sup> (US Supreme Court) states

A judge is not a scientist, and a courtroom is not a scientific laboratory... But the law must seek decisions that fall within the boundaries of scientifically sound knowledge and approximately reflect the scientific state of the art. Even this more modest objective is sometimes difficult to achieve in practice. The most obvious reason why is that most judges lack the scientific training that might facilitate the evaluation of scientific claims or the evaluation of expert witnesses who make such claims... In this age of science, we must build legal foundations that are sound in science as well as in law (p. 537).

Therefore, scholars' apparent unfamiliarity with sciences is not a valid justification for underplaying or neglecting the importance of scientific evidences. Once it is demonstrated that they satisfy the criteria for accepting expert opinion, they must be considered. This aspect is well recognized by the Supreme Court of India<sup>55</sup>.

The explicit criteria require a general scholar, i.e. one who seeks to address the Aryan problem in totality, to consider all qualifying evidences. This minimizes subjectivity and ensures that the issue is studied in its broadest perspective.

### **New framing of the Aryan debate and its implications**

As seen above, Vedic rituals satisfy all criteria (points 1–4) for accepting expert opinion. Thus, the terms of the Aryan debate must be expanded to 'four fundamental discoveries'. They are:

- The discovery of the Indo-European language family (1786).
- The discovery of the Dravidian language family (1816).
- Consensus on date of ~3000 BC for Vedic rituals (texts) (1931).
- The discovery of the Indus Civilization (1924).

The consensus on the Sarasvati river evidences should be included after the relevant experts, geologists, make the case for it on the basis of Trautmann's<sup>3</sup> criteria (points 1–4).

Trautmann's<sup>3</sup> justification (p. xx) now applies to all four discoveries: 'These discoveries are fundamental in the sense that the historical facts they uncovered have survived the critical scrutiny of the community of scholars worldwide and are therefore well-established truths of history today and as far as we can see into the future.'

The new framing of the Aryan debate has important implications. For example, Trautmann<sup>3</sup> states

The burden of proof, as the lawyers say, must be on the shoulders of those who are urging us to abandon the standard view. They need to reinterpret facts in a new way and their arguments must be a powerfully convincing one for them to succeed. Here are the obstacles they face (pp. xxxix–xl).

The main obstacles are stated to be (1) Indo-European languages, (2) Dravidian languages and their connection to the Indo-European languages and (3) horses and chariots. We will discuss horses and chariots later and show that they are inadmissible according to Trautmann's<sup>3</sup> criteria. Trautmann elaborates

The alternative view (*viz.* the Harappan civilization is Vedic) would have to explain why both Dravidian and the Indo-Aryan branch of the Indo-European language family have retroflexion, but not the other Indo-European languages, which are also, in this view, supposed to have come from India. This is a very serious obstacle to the alternative view. It is not at all evident that the proponents of the alternative view recognize this problem, let alone provide a plausible answer to it (p. xl).

We first discuss the issue of 'burden of proof', a legal term used by Trautmann<sup>3</sup>. Historian Richard Evans<sup>56</sup> after testifying as an expert witness in a court case<sup>56,57</sup> in England in which the issue of historical methodology was central stated (p. 190) 'as it turned out the rules of evidence observed by the Court were not so different

from the rules of evidence observed by historians... Here, in a civil trial, the issue hung on the balance of probabilities, much as it does in history.’ We note that both Trautmann<sup>3</sup> and Evans<sup>56</sup> refer to the similarities in historians’ and judicial assessment of evidences, since both are based on assessing the ‘balance of probabilities’. It is clear that Trautmann’s<sup>3</sup> use of the phrase ‘burden of proof’ implies that it is on the side not favoured by the ‘balance of probabilities’.

In the context of the Aryan debate, the ‘balance of probabilities’ implies that the larger consensus is to be preferred. With the new framing in terms of ‘four fundamental discoveries’, there is a much larger consensus involving Sanskrit scholars (western and Indian), scientists and archaeologists. In addition, if geologists demonstrate the consensus on the Sarasvati river, it will broaden and strengthen this consensus. In contrast, only linguists support AIT/AMT. In addition, the linguists’ position is weakened since many of the same scholars have also interpreted Vedic rituals to ~3000 BC. Therefore, the broader consensus, or in Evans’ words, ‘the balance of probabilities’ supports higher chronology for the Vedic texts. Thus, it is clear that the burden of proof shifts to the proponents of AIT/AMT with the new framing of the Aryan debate in terms of ‘four fundamental discoveries’.

It is important to note that assessing diverse evidences to establish the ‘balance of probabilities’ or the ‘burden of proof’ does not imply a final resolution of the dispute. It simply implies that considering the evidences on record, one outcome is more probable than the other. For a final resolution of the Aryan controversy, all scholars in diverse disciplines must be in agreement, a prospect unlikely in the foreseeable future.

Given the above reassessment of the ‘burden of proof’, Trautmann’s<sup>3</sup> claims in favour of the AIT/AMT based on linguistics, Indo-European and Dravidian languages and the presence of retroflexion are severely affected.

We provide two examples from Vedic rituals that adversely affect the standard view: (1) ekāṣṭaka, and (2) origins of Śaivism and Mahāśivarātri. As discussed earlier, all Sanskrit scholars have interpreted them to ~3000 BC. Thus, Trautmann’s<sup>3</sup> comments can be modified to highlight the strength of Vedic rituals as well

The interpretations of ekāṣṭaka and the origins of Śaivism and Mahāśivarātri are very serious obstacles to the standard view. It is not at all evident that the proponents of AIT/AMT recognize this problem, let alone provide a plausible answer to it. Indeed, there is no recognition of the contradiction that Sanskrit scholars who support AIT/AMT have interpreted Vedic rituals to ~3000 BC.

This recognizes the fact that historians must consider all qualifying evidences and cannot overemphasize any one particular category of evidences<sup>56,57</sup>. Thus, it is no longer feasible to make statements such as the above by Trautmann<sup>3</sup>.

### Future direction of the Aryan debate

The ‘four fundamental discoveries’ lead to contradictory conclusions and yet are binding on all scholars. Thus, it is essential to recognize that no single evidence can settle the Aryan debate. Therefore, the central theme of Aryan debate is to address these contradictory conclusions. There are several aspects that are discussed below.

### Re-examination of settled conclusions

Trautmann<sup>3</sup> states (pp. xv–xvi) ‘Unfortunately, the facts of ancient history are not hard facts, for a couple of reasons. One of them has to do with the many steps in the scholarly processing of such facts before they become recognized facts – there can be disagreement about every stage of such processing, and hence the fact it establishes.’

Since contradictory conclusions are binding, it is essential to scrutinize the process of establishing historical facts in each category, including the number and reliability of each of the steps. These aspects for Vedic rituals are discussed elsewhere<sup>36,48</sup>.

### Classification of evidences

It is also essential to classify evidences so that they are properly considered. Some examples are given below.

*Vedic texts in totality:* Certain evidences pertain to Vedic texts in totality.

They are (1) linguistic evidences that are based on the language of Vedic texts, and (2) Vedic rituals that are based on the contents of Vedic ritual texts. Indeed, Kane<sup>58</sup> implied the same 75 years ago. He stated

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 (p. 976).

This corroborates our suggestion that linguistic evidences and Vedic rituals must be classified to be in the same category.

*Isolated words/phrases in Vedic texts:* Other evidences refer to isolated words in Vedic texts, e.g. Ayas, Aśva, Sarasvati river, etc. and they must be grouped in another class. Indeed, all important isolated words or phrases in Vedic texts must be included in any such discussion. For example, it is improper to discuss the importance of horses without even referring to the Sarasvati river.

Scholars who support AIT/AMT favour the (absence of) horse evidence<sup>1–6</sup>. Trautmann<sup>3</sup> states

The *Rig Veda* largely consists of poetic addresses to the Gods, and in their nature there is little reference to material objects that will leave an unambiguous archaeological trace... However the abundant references to horses and chariots are one feature for which we can expect archeological confirmation... So far the evidence is that horses were not used in the Indus Civilization (pp. xl–xli).

First, Trautmann<sup>3</sup> acknowledges that (p. xli) ‘An argument from absence, of course, is not as strong as an argument from presence...’ Clearly, horse cannot be the definitive archaeological evidence.

Secondly, historians have to assess the ‘balance of probabilities’ or the ‘burden of proof’ on the basis of admissible evidence. Trautmann<sup>3</sup> states that there is no evidence for the horse. Hence, it is not admissible evidence and cannot be considered at all in assessing the ‘balance of probabilities’. The same applies to chariots as well. For chariots, also see the discussion by Bryant<sup>1</sup> (pp. 175–177).

Thirdly, several scholars disagree with the above claim on the absence of horses<sup>1–3,13</sup>. This is also evident from several articles in the book edited by Trautmann<sup>3</sup> that give evidences for horses in the Indus Civilization. It is clear that experts are divided on this issue. Since there is no consensus on horses, they do not satisfy the criteria (points 1–4) and are inadmissible. In general, contested claims do not add value to the Aryan debate, where the central issue is to address contradictory settled consensus.

Fourthly, it is clear that material evidences have been cherry-picked in support of textual evidences to reach a conclusion contrary to that held by archaeologists. This contradicts the criteria (points 1–4) that the consensus views of the specialist scholars must be accepted. Archaeologists have formed their opinions that oppose AIT/AMT by considering the totality of material evidences<sup>7–13</sup>. It is not just archaeologists who specialize in South Asian archaeology, but even those who specialize in Central Asian archaeology<sup>9</sup> oppose AIT/AMT dates.

It is clear that Trautmann’s<sup>3</sup> comments on horses are inconsistent with his own criteria point (1–4) and are inadmissible in the Aryan debate.

In contrast, even from a preliminary assessment (discussed earlier), it is clear that the Sarasvati river is much more credible as evidence than the horse. Indeed, it is the most credible in this class of evidences.

#### *Criteria to correlate textual and archaeological evidences*

Importantly, the basis of selecting textual evidences to be correlated with material evidences was not described. This issue is not addressed by Trautmann’s<sup>3</sup> criteria (points 1–4) and requires a fresh discussion.

We suggest that a proper approach would be to rank textual evidences in order of importance to the composers of the *Vedas*. This is the most plausible

approach for which consensus can become possible. Clearly, no consensus is possible for individual scholars’ rankings of evidences because perspectives differ.

After ranking textual evidences in the order of importance to the composers of the *Vedas*, an assessment must be made of their historical importance by correlating with material evidences.

In the *Rig Veda*, the Soma plant is the most important material aspect. An entire book (IX) is devoted to its praises. However, it has become extinct and is of no historical value.

Next in importance to the composers of the *Rig Veda* is the Sarasvati river, which is referred to and praised several times. As discussed earlier, there is a consensus among geologists that the dried river between the Yamuna and Sutlej is the Sarasvati mentioned in the Vedic texts. We note that the horse is much lower ranked in importance than the Sarasvati river for composers of the *Rig Veda*.

#### *Proper assessment of evidences is central to the Aryan debate*

The above precautions are essential for a proper conduct of the Aryan debate, where the classification, relevance, credibility and robustness of evidences and conclusions are the main means to address the central theme, viz. contradictory binding conclusions.

It is also essential to recognize that the main disputants – linguists, archaeologists, Sanskrit scholars and scientists – are also interested parties in the Aryan debate. Their perspectives are influenced by evidences in their domain. Hence, no meaningful discussions are possible without agreement on common ground rules.

The explicit criteria (points 1–4) proposed by Trautmann<sup>3</sup> are widely used. They are evidence-neutral and minimize subjectivity making them acceptable common ground rules. All qualifying evidences must be considered in the Aryan debate. This brings scholars with diverse perspectives on a common platform, thus ensuring the broadest perspective to the discussions. Hence, it is the most promising approach to take the Aryan debate forward.

#### **Conclusions**

The Aryan debate is a multi-disciplinary dispute among specialist scholars with

conflicting settled expert opinions. Widely accepted ground rules are essential for meaningful discussions among diverse scholars. Historians’ criteria for accepting expert opinion have been validated using judicial standards. These criteria minimize subjectivity in the discussion of evidences. Vedic rituals satisfy all criteria and become a central part of the Aryan debate. This completely alters the nature of the Aryan debate. Other scientific evidences can also qualify if scientists can demonstrate that they satisfy these criteria. The central theme of the Aryan debate now becomes an examination of the reliability and credibility of settled evidences and conclusions.

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