



The Indus. Andrew Robinson. Reaktion Books, 33 Great Sutton Street, London EC1V 0DX, UK. 2021. 208 pages. Price: £ 9.99.

Despite almost a century since its discovery, our understanding of Indus civilization is incomplete and many important aspects are still mired in controversy. It follows that it is no easy task to write a book for a general audience that is ‘an accessible introduction to every significant aspect of an extraordinary and tantalizing “lost” civilization’. Andrew Robinson has written an excellent book on the Indus civilization that lives up to its claim admirably well. He is a journalist and a non-specialist that has its own advantages and disadvantages in writing a book on this topic. The advantage is that the book is very well-written and readable. The main disadvantage is that he has had to rely on works of specialist scholars on controversial topics where they are not in agreement. Therefore, many scholars (and others) are likely to disagree with some of the author’s claims.

This book was first published in 2015 and has been the subject of three serious book reviews¹⁻³. An indication that the book has been well received is that the paperback edition has been recently published (in 2021) with minimal changes. This edition is being reviewed here. One might wonder about the need for yet another review. There are several reasons to review this book in light of recent developments.

We have recently shown that historians’ rules evidence is the most credible framework to evaluate diverse evidences in the Indo-Aryan debate in a consistent

manner^{4,5}. The study of Indus civilization is intimately linked to the Indo-Aryan controversy and historians’ rules of evidence can be used to scrutinize such works. However, the author of the book is not a professional academic. As has been mentioned in an earlier review³, the author has relied heavily on the works of a few scholars, Mark Kenoyer, Rita Wright, Greg Possehl and Asko Parpola. In particular, the author has relied heavily on Parpola’s scholarship for the most controversial issue of the relation between Indus and Vedic religions. (The book is inscribed to Parpola.) Parpola can be considered an isolated/contrarian scholar as his views, though respected, are not accepted by mainstream scholarship. Thus, the book under review, where a non-academic has relied heavily on an isolated scholar’s views, raises important questions of how it is to be scrutinized based on historians’ rules of evidence.

Further, the book was originally published in 2015 when the historians’ rules of evidence were not yet developed. Therefore, without any negative connotations on the author’s approach, we can discuss how the rules of evidence and its implications affect important issues discussed in the book. Consequently, this review will be of benefit to future authors and especially, professional scholars who have to abide by the rules of evidence.

Briefly, historians’ rules of evidence comprise two parts^{4,5} – Trautmann’s⁶ criteria to accept expert opinion and Schneider’s⁷ ‘guidelines for an objective historian’. Of particular interest here is Trautmann’s criteria to accept expert opinion, which is long-standing settled consensus. He describes those evidences^{4,6} that satisfy these criteria as ‘fundamental discoveries’ because ‘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.’ We have shown in detail elsewhere⁴ that at present there are four ‘fundamental discoveries’. They are (i) The discovery of the Indo-European language family (1786), (ii) The discovery of the Dravidian language family (1816), (iii) Joint-consensus on dates of ~3000 BC for Vedic rituals (texts) (1931) and (iv) The discovery of the Indus Civilization (1924). In particular, three of the

fundamental discoveries were listed by Trautmann⁶. We have recently shown that the joint-consensus on Vedic ritual dates of ~3000 BC also satisfies Trautmann’s criteria and becomes a ‘fundamental discovery’. Importantly, the joint-consensus is based on the scholarship of Sanskrit scholars who support Aryan Invasion/Migration Theory (AIT/AMT) and scientists who oppose it. Till date, Sanskrit scholars who support AIT/AMT have not been able to find scientists to analyse their interpretations of Vedic rituals to ~1000 BC, so as to be consistent with AIT/AMT. Thus, this joint-consensus is the only consensus that transcends support/opposition to AIT/AMT making it the most credible consensus.

By virtue of being a non-academic the author has more freedom in the treatment of evidences because he is not bound by Trautmann’s criteria. The drawback of this extra freedom is that claims that violate Trautmann’s criteria carry no credibility with professional academics.

We also need to address the question if a non-academic can rely on the scholarship of a contrarian/isolated scholar. Trautmann⁶ states: ‘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. 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.’ It follows that a non-academic can rely on the works of a contrarian/isolated scholar provided the claims are plausible. This is because the possibility that it may become the consensus opinion among the relevant experts in future cannot be ruled out. However, if the alternate claims are provably incorrect, especially with regard to scientific evidences, there is virtually no possibility that they may become correct in future. Hence, even non-academics cannot accept claims derived from incorrect interpretations.

The above discussions address the question of how to scrutinize a book where a non-academic has relied heavily on the works of an isolated scholar. The scope of applicability of the rules of evidence has been expanded to scrutinize serious but non-academic works.

We now come to the discussions about the book.

The book begins with the introductory Ch-1, ‘An enigmatic world’ that is

followed by Ch-2, 'Discovery' of the Indus civilization. They are followed by several chapters on various aspects of Indus civilization that are relatively less controversial – Ch-3–7 – 'Architecture', 'Arts and crafts', 'Agriculture', 'Trade' and 'Society' respectively. In the subsequent chapters, the author discusses topics that are highly controversial, Ch-8, 'Religion', Ch-9, 'Decline and disappearance', Ch-10, 'Deciphering the Indus script', Ch-11, 'Indus origins of Hinduism?'. He finally closes the book in Ch-12 with a summary of 'The Indus inheritance'.

It is evident that the author has sought to cover all aspects so that the book is 'an accessible introduction to every significant aspect of an extraordinary and tantalizing "lost" civilization.' In our view, the author has succeeded admirably in his task. The discussions on various aspects of Indus civilization that are less controversial, Ch-2–7, are very informative and the real strength of the book.

A correction is suggested in Ch-3, 'Architecture', where the author discusses the orientation of the streets along cardinal directions in Mohenjo-Daro and Harappa. He states (p. 51) that this may have been derived from observation of the rising and setting of Pleiades (Kṛttikā) that, according to (unnamed) astronomers, rose exactly at the equinoctial point (or true east) around 2240 BC (zero ecliptic longitude). However, as early as 1895, Dikshit⁸ had analysed that this observation implies zero declination and dates to 2990 BC. This has been confirmed by Achar⁹ who obtained a date of 2926 BC using astronomical simulation software.

Chapter-6, 'Trade' is very interesting and includes extensive discussions on trade with Mesopotamia. We suggest minor clarifications. In 'Chronology' (p. 7) the author states 'c. 2600 BC, trade between Mesopotamia and Indus valley begins'. In Ch-1, (p. 15) the author states that the trading links date to around 2500 BC. A reading of Ch-6 gives the impression that the earliest evidences for trade date to ~2300 BC, during the rule of Sargon. The picture in Ch-4 (p. 69) of Indus jewellery found in the Royal Cemetery at Ur dates the latter to 2150–2000 BC. However, it is dated to 2600 BC by Chakrabarti¹⁰ and 2600–2450 BC by McIntosh¹¹. There is no discussion of these evidences in Ch-6 on 'Trade', an

unfortunate oversight as they represent the earliest evidences for trade with Mesopotamia. If nothing else, they should have been discussed for the sake of completion. Perhaps the author may revisit these clarifications in future editions.

We now discuss the latter half of the book that discusses highly controversial topics related to Indus religion, script and relation to Vedic religion, chapters 8–11. In these chapters, the author has relied heavily on Parpola's works. Thus, before discussing these chapters, it becomes imperative to examine whether Parpola's views on important evidences are plausible or outright incorrect.

Briefly, Parpola's interpretations of evidences are made to fit his pre-conceived hypothesis that the Indus civilization was Dravidian. We note that the mainstream view among archaeologists is not in agreement with either his claims or his approach^{12–14}. For example, Renfrew¹⁵ states 'it is difficult to see what is particularly non-Aryan about the IVC.' Interestingly, Renfrew¹³ also comments that 'the suggestion by Bridget and Raymond Allchin that the fire altars of Kalibangan and Lothal are an indicator of Indo-Aryan presence is readily accepted' by Parpola. The author appears to be unaware of this aspect.

However, our main interest is in the joint-consensus on Vedic rituals. Of the experts the author has heavily relied upon, only Parpola can be considered to be a professional Sanskrit scholar. There are only two possibilities before any Sanskrit scholar when dealing with the joint-consensus that interprets Vedic rituals to ~3000 BC. The first is that every Sanskrit scholar is, by default, party to the joint-consensus because Sanskrit scholars have, as a professional community, contributed to the joint-consensus. The second possibility is that the only way for any Sanskrit scholar not to accept the joint-consensus is to present alternate interpretations of the relevant evidences.

In Parpola's case, the second possibility applies because he has interpreted astronomical references in Vedic texts. They are discussed in Ch-11 ('Astronomical and astrological background') of his (1994) book¹⁶ titled *Deciphering the Indus Script*. He states 'The origins of ancient Indian astronomy and time-reckoning is a complex and controversial issue, but of the greatest impor-

tance for the study of the Indus Civilization.' (We note that it is also central to understanding Vedic rituals.)

According to Parpola¹⁶, Vedic texts contain ancient memories of Harappan astronomy. The nakṣatras were first observed by Harappans. They developed a 'primary' calendar scheme with solar nakṣatra months that began at vernal equinox. (We are not aware of any other Sanskrit scholar or scientist who agrees with this claim. This is one reason we refer to Parpola as an isolated scholar.)

Parpola further claims that the Vedic texts also refer to 'secondary' luni-solar calendar schemes that were developed by Vedic ritualists. He states¹⁶

'However, several Vedic texts clearly attest to a different (and undoubtedly secondary) scheme of celebrating the Visuvat and Mahāvratā festivals during the summer and winter solstice respectively (cf. AB 18, 8). In this case the sacrificial year started at the winter solstice with the new moon (and the sun) in the asterism of Maghā (cf. KB 19, 3), or in the next asterism of Phalguṇi (e.g. KB 4.4., 5.1) ... Even in this scheme, the vernal equinox coincided with the Pleiades: for when the asterisms Kṛttikā and Viśakha defined the equinoxes, the asterisms Maghā (also called agha) and Śraviṣṭhā (also called Dhaniṣṭhā) defined the solstice. The Buddhist texts Mahāvastu (3,305-10) and Lalitavistara (24) also single out these very asterisms: they head the four groups of nakṣatras allotted to the four cardinal directions.'

His statements reflect a basic misunderstanding of the luni-solar calendar schemes. At winter solstice, the full-moon and not new-moon (and sun) was near Maghā (KB 19.3) and Phalguṇi (KB 4.4, KB 5.1). The sun was approximately 180° opposite to these asterisms at winter solstice. While his statements imply that the sun in Dhaniṣṭhā marked summer solstice, it marked winter solstice. This dates KB 19.3 to ~1000 BC making it contemporaneous to the Vedic text and consistent with AIT/AMT. However, it also implies that the pūrṇimānta (full-moon ending) scheme was in vogue in KB 19.3. This was proposed by Keith a century ago and is incorrect as discussed elsewhere¹⁷.

For example, SB 11.1.1.7 clearly implies that the months are amānta (new-moon ending) and not pūrṇimānta (full-moon ending). Consideration of (i) KB 19.3 plus SB 11.1.1.7, (ii) verses on ekāṣṭaka and (iii) the festival of Mahāśivarātri, all imply that amānta Māgha new-moon marked winter solstice, which dates to ~3000 BC. Parpola also seems to be unaware that KB 4.4 and 5.1 can be dated either to ~3000 BC (winter solstice) or ~1200 AD (spring, two months later) and dates of ~1000 BC is not an option as it would be one month after winter solstice and not correspond to any calendar marker¹⁷. (The references in Buddhist texts follow from the later Vedāṅga Jyotiṣa verse VJ 5,6 and not KB 19.3, contrary to Parpola's claims.)

In contrast to Parpola, Witzel¹⁸ 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.' They date to ~3000 BC and there is a difference in dates of ~2000 years between the two interpretations of KB 19.3. Clearly, both cannot be correct.

We recall Parpola's statement¹⁶ that ancient Indian astronomy is 'of the greatest importance for the study of the Indus Civilization'. His Dravidian hypothesis depends crucially on his incorrect interpretation of KB 19.3. It is proved to be incorrect by the correct interpretation of KB 19.3 (and other verses), i.e. the joint-consensus on Vedic rituals. *Thus, even non-academics who are not bound by historians' rules of evidence cannot rely on Parpola's scholarship (in future) to claim that the Indus civilization was Dravidian.*

The digression to discuss Parpola's views is essential for a proper review of the book because the author has relied heavily on them. The benefits are already evident. We now know that some of Parpola's claims are outright incorrect which will have a cascading effect on some of the author's discussions in the latter half of the book.

The overall approach of the author in chapters 8–11 is that AIT/AMT is settled and that Vedic religion and Sanskrit were introduced around ~1500 BC. He discusses the issue of the correlation of Vedic texts and Indus civilization based mostly on the works of Parpola in Ch-11 – 'Indus origins of Hinduism' and implicitly in Ch-8 – '(Indus) Religion'. The line of thought in Ch-10 –

'Deciphering the Indus script' and in Ch-11, where the author eventually settles on the Dravidian hypothesis of Indus civilization, cannot be possible without implicit support for Parpola's views in Ch-8.

The whole train of thought begins in Ch-8, '(Indus) Religion', where after discussing and eventually dismissing evidences for fire altars as indicators for the presence of Vedic religion, the author begins the discussion proper (p. 118) by stating 'In the absence of scriptures and temples, speculation about Indus religion must rely on imagery: in figurines and sculptures and on pottery and seals...' In these categories, he discusses at length evidences for Shiva worship. He eventually concludes that these categories of evidences cannot be correlated with Vedic religion. Developing this line of thought, the author believes that Indus language and script (Ch-10) was Dravidian. Following the migration of Indo-Aryans in the 2nd millennium BC, Vedic religion was introduced. The two eventually 'mingled and fused to form the foundation of classical Hinduism' (p. 180, Ch-11).

We now know that Parpola's Dravidian hypothesis is incorrect, as seen above. However, even before that, the mainstream views of archaeologists are the opposite of the author's views. Regarding Indus religions, starting from Marshall to Chakrabarti¹⁰, archaeologists have agreed upon Siva worship in Indus civilization. Secondly, the vast majority of archaeologists agree that the fire-altars in Indus civilization indicate Indo-Aryan presence. For example, the most recent book on south Asian Archaeology¹² states 'a number of scholars have more recently tried to place the arrival of Indo-European languages (and people) within South Asia much earlier in the sequence by arguing that the cities of the Integration Era were already populated by practices and traditions which are associated with Brahmanism, such as fire altars.' (One wonders what the author would have made of Parpola's agreement that fire altars indicated Indo-Aryan presence in Indus civilization, as mentioned by Renfrew¹³.) Of direct relevance is the fact that the joint-consensus on Vedic rituals interprets Mahāśivarātri (Siva worship) and Agnicayana (fire altars) to ~3000 BC. Thus, the correlation of Vedic rituals with Indus civilization is fully justified and is discussed in detail elsewhere⁵.

For example, the author closes the long discussion (beginning in Ch-8) on Indus and Vedic religions in Ch-11 (p. 183) with the statement 'Until the Indus signs are made to speak, "proto-Shiva" must continue to be the most intriguing, but unverifiable, Indus ancestor of one of the primary forms of God in modern Hinduism.' This reflects the author's admirable open-mindedness, despite his preference for the Dravidian hypothesis. We now know that the festival of Mahāśivarātri has been interpreted to ~3000 BC by Sanskrit scholars and scientists. This can be considered to be (Vedic) textual verification of Indus material evidences related to Shiva worship.

We must remember that in 2015 the author was unaware of (i) the joint-consensus that dates Vedic rituals to ~3000 BC and (ii) Parpola's outright incorrect views, because they had not yet been established. But we now know that the Vedic ritual texts date to ~3000 BC. Hence, the 'absence of scriptures', as mentioned by the author, is no longer a valid claim. Therefore, in future, if anyone would like to deny any relation between Indus and Vedic religions, they must first acknowledge the 'presence of scriptural evidences' and make their case afresh. For the book, in either case, several chapters – 'Religion', 'Deciphering the Indus script' and 'Indus origins of Hinduism' – will have to be completely rewritten in future editions.

The author discusses socio-cultural issues related to scholarship in chapters 1 and 11 and suggests that nationalist bias accounts for some scholars' correlation of Indus and Vedic cultures. We note that suggestions of 'reverse bias' have also been made. For example, Chakrabarti¹⁰ states: 'All that I would say that the roots of some major Hindu religious beliefs and rituals can be traced back to that (Indus) period. As far as the early scholars were concerned, that was obvious... Doubts have been expressed in the modern context because there are scholars who will not like to see the continuation of Hinduism in any form from this early period.'

All such suggestions are settled by the joint-consensus on Vedic rituals because it includes the scholarship of Sanskrit scholars who support AIT/AMT. For example, as seen above, Witzel¹⁸ has interpreted key Vedic rituals to ~3000 BC. He is well known for his enthusiastic support for AIT/AMT and can hardly be

accused of nationalist bias. Therefore, scholars (and others) cannot deny the joint-consensus on any socio-cultural grounds and give their own opinions on Vedic rituals, especially if they lack expertise. The only professional course of action available is to write to Sanskrit scholars seeking clarifications about their contradictory scholarship.

In summary, the book presents an excellent account of the Indus civilization for a general audience. It poses new questions of whether historians' rules of evidence can be used to review it. We show that historians' rules of evidence can be extended to scrutinize works by non-academics that rely on the views of contrarian/isolated scholars. Importantly, without any negative connotations on the author's approach, in 2015, we discussed the changes caused by the rules of evidence that must be included in future studies, especially the joint-consensus on Vedic rituals dates of ~3000 BC and its implications. In particular, scholars can no longer propose the Dravidian hypothesis of Indus civilization without new justifications.

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T. R. S. PRASANNA

*Department of Metallurgical
Engineering and Materials Science,
Indian Institute of Technology Bombay,
Mumbai 400 076, India
e-mail: prasanna@iitb.ac.in*

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The volume under review is an interesting and informative potpourri of recent advances in basic, clinical, public health and therapeutic nutrition. The book begins with a biographical chapter – An accidental nutritionist by Alfred Sommer. It is interesting to note that Sommer's medical training at Harvard, included a formal course in nutrition. Alas, nutrition is no longer a formal course in medical education in India today, leaving our doctors to learn this important subject of nutrition by accident.

Sommer calls himself an accidental nutritionist because his journey began in Bangladesh with 'cholera control, cyclone disaster, smallpox epidemic, and formal training in ophthalmology and epidemiology'. His subsequent meticulous work in the area of blindness prevention led to research in the area of vitamin A deficiency and link between vitamin A deficiency, blindness and mortality. This has led to the WHO recommended vitamin A supplementation programme. While vitamin A deficiency still persists in India, the massive dose supplementation programme in India has become controversial, and recommended only in areas where there is clinical deficiency,

regardless of dietary deficiency. This is unfortunate because recent advances show that vitamin A has numerous other genomic roles beyond prevention of night blindness and xerophthalmia.

One such recently researched role of vitamin A and retinoic acid, is in cognition and cognitive disease, discussed by Woloszynowska-Fraser *et al.* Brain actively converts retinol (vitamin A) to retinoic acid (RA). RA activates retinoic acid receptors (RAR). Controlled synthesis of RA in brain helps regulate synaptic plasticity in regions of brain involved in learning and memory. Vitamin A deficiency affects these functions.

Adiposity coupled with cardiovascular and central nervous system diseases are increasing in developed and developing countries. Two reviews discuss the protective role of Omega-3 fatty acid (Ω -3FA) – a PUFA, against these conditions. Ω -3FA have hypotriglyceridaemic and cardioprotective effects. They also moderate between white adipose tissue (WAT) and brown adipose tissue (BAT) and whole-body energy homeostasis and metabolic regulation. Ω -3FA also modulate gut microflora which impact WAT and obesity. Kulpahana *et al.* discuss molecular mechanisms and potential of these fatty acids in weight loss management. Zirpoli *et al.* discuss the novel approaches for Ω -3FA therapeutics, and linked molecular mechanisms in cardiovascular and central nervous system diseases. Among the Ω -3 FA, the long chain ones found in fish oil are more effective. Indian diets are heavily loaded towards 6-FA-linoleic acid as compared to 3-FA-linolenic acid, because most commonly consumed vegetable oils like groundnut, sunflower, sesame are deficient in Ω -3FA. Soybean and mustard oils (to a lesser extent rice bran oil), which are good source of Ω -3FA, are not so popular except in some parts of India. Nuts like walnut and linseed (flax seed) are good source of Ω -3FA.

The cellular homeostasis by nutrients is at various levels. Two such control points are discussed in chapters – Nutrient control of mRNA translation (Shu *et al.*) and Roles of regulatory RNAs in nutritional control (McNeill and Hirschi). The first review describes recent advances in translational control through nutrient sensing mechanisms and the dysregulation involved in diseases such as diabetes, cancer and ageing. Small RNAs including micro RNAs (miRNA)