

Chaturyuga, Manvantara and Kalpa in the Light of Evidences from Astronomy, Archaeology, Genealogy, Genetics and Literature

BHARAT JHUNJHUNWALA

Formerly Faculty, Indian Institute of Management, Bengaluru. E-mail:

Abstract: *The Hindu texts divide historical time periods in kalpas, manvantaras and yugas. We have tried to match these periods with evidences from astronomy, archaeology, genealogy, genetics and literature. We find that the texts tell of one kalpa of 4320 human years. The first part of this, the Braahm Kalpa overlapped with the first sixmanvantaras and also overlapped with the Krita Yuga. The second part of the same kalpa, the Varaha Kalpa, overlapped with 7th to 14th manvantaras and with the Treta-Dwapar-Kali Yugas. The Varaha Kalpa, the second set of eight manvantaras and the Kali Yuga—all came to an end around 800 BCE along with the Dark Ages.*

Keywords: *Archaeology, Astronomy, Chaturyuga, Genealogy, Genetics, Kalpa, Literature, Manu, Manvantara, Yuga.*

Received : 28 January 2021

Revised : 10 February 2021

Accepted : 12 February 2021

Published : 30 August 2021

TO CITE THIS ARTICLE:

Jhunjunwala, B. 2021. Chaturyuga, Manvantara and Kalpa in the Light of Evidence Astronomy, Archaeology, Genealogy, Genetics and Literature. *South Asian History, Culture and Archaeology*, 1: 1, pp. 17-33

Purpose

Guide for the Present

The purpose of the division of past time into yugas was to help the rulers to follow the higher path. The Mahabharata says:

Whether it is the king that makes the age, or, it is the age that makes the king, is a question about which thou shouldst not entertain any doubt. The truth is that the king makes the age.²

The Mahabharata goes on to tell that the king applied full, $\frac{3}{4}$, $\frac{1}{2}$ and no justice in the four yugas respectively.³ The quote above indicates that the classification of the yuga at a particular time is fluid; while the latter reference states that classification of the yuga at certain times in the past has been fixed. These statements can be reconciled by positing that the governance in those past times followed a particular pattern hence it was treated as “fixed” in specific yugas; while governance and its categorization in a particular yuga at present time is fluid. The purpose of the yuga system is to bring

to the knowledge of the nature of governance in the past times to the attention of the present rulers and guide them to attain the highest level. We shall ascertain the durations of the yugas in the past keeping this objective in mind.

Birth Years of Divine Persons

We propose to use the anchor of the years of Vaivaswat Manu, Rama and Krishna for the determination of the yugas. We have referred to the three as “Divine Persons.” We shall first try to reckon their years on astronomical, archaeological, genealogical, genetic and literary considerations; then determine the yugas on the basis of the years so derived.

Astronomical Dates

K Srinivasa Raghavan gave the year 8576 BCE for the birth of Vaivaswat Manu on astronomical calculations.⁴ S B Roy has given the 2798 BCE as the late year for him.⁵ We take these as early- and late years for Vaivaswat Manu.

Various estimates of the date of the Ramayana War range from 7292 BCE to 1646 BCE.⁶ These are indicative early- and late dates for Rama. Various estimates of the date of the Mahabharata War range from 3300 BCE to 1124 BCE.⁷ These are indicative dates for Krishna.

Archaeology

The Valmiki Ramayana says: “There is a huge district by the name of Kosala located on the banks of the Sarayu... There is a city by the name of Ayodhya which is famous in all the worlds. That city was got made and inhabited by Lord Manu himself.”⁸ The use of the term “city” is important here. We should get archaeological evidences of structured habitations such as walls, roads, moats and parapets at the suggested time for this Manu, unlike the evidences of potsherds that could be left by pre-urban peoples.

Scholars have noted the continuity of the contemporary Hindu culture with the Indus Valley Civilization.⁹ Thus, in the first instance, we assume that the underlying yuga system relates to this Civilization. We do not foreclose the possibility that the yuga system may have evolved at another place but limit our study to the Indus Valley Civilization. We have to assess the time of beginning of urbanization in the Indus Valley in order to derive the possible year of the “city” established by Vaivaswat Manu. Khan and Lemmen give the beginnings at 3200 BCE for Harappa.¹⁰ Vahia and Yadav say that the “the first urbanisation begins” at 3000 BCE with “rise in several major cities” by 2600 BC.¹¹ Kenoyer has given the beginning at 2800 BCE for Kot Diji; and 2600 BCE for Harappa, Mohenjo Daro, Dhola Vira and Rakhigarhi.¹² The four years for the establishment of the first cities in the Indus Valley are accordingly 3200, 3000, 2800 and 2600 BCE. Our purpose is to assess the earliest year of establishment of a “city” by Vaivaswat Manu. The development of urbanism was a gradual process and this particular city may have been established earlier than 3200 BCE. Thus we arbitrarily stretch the earlier year from 3200 BCE to 3300 BCE to account for this possibility.

We ignore the last year 2600 BCE since our interest is in the beginnings of the Indus Valley Civilization. Thus we arrive at three possible years 3300, 3000 and 2800 BCE for Vaivaswat Manu.

The story of Krishna tells of ill omens appearing and he having abandoned Dwarka and left towards another country.¹³ The ill omens and abandonment of Dwarka indicate a time of troubles which could be correlated with the decline of the Indus Valley Civilization. Scholars appear to be in agreement that de-urbanization of the Indus Valley took place from 1900 to 1300 BCE.¹⁴ On the basis of this archaeological evidence we suggest that Krishna lived between 1900 and 1300 BCE.

Rama lived between Vaivaswat Manu and Krishna thus we place him in the years 3300-1300 BCE on archaeological evidence.

Genealogy

The number of generations from Vaivaswat Manu to Buddha are estimated variously. Thapar has noted that there is variation in the genealogies between the Puranas.¹⁵

William Jones was the first to argue that the Sanskrit and Greek languages came from a common extinct language now called Proto Indo-European. He had great respect for the Hindu culture. Indeed, modern scholars have pointed out the inadequacies of some linguistic conclusions drawn by him such as holding that Hindi bore no connection with Sanskrit.¹⁶ However, these inadequacies pale into insignificance in the light of his suggestion of the existence of a Proto Indo-European language which has stood the test of time. Thus we do not dismiss his estimates of the number of generations between Vaivaswat Manu and Buddha on the grounds that they could be motivated. The traditional estimates and those given by Jones are given in the table below.

Table 1: Generations from Vaivaswat Manu and Buddha

<i>S.I</i>	<i>Divine Persons</i>	<i>Traditional¹⁷</i>	<i>William Jones¹⁸</i>
1	Vaivaswat Manu to Rama	81	56
2	Rama to Brihadbala (Contemporary with Krishna)	35	29
3	Brihadbala to Gautama Buddha or to the Extinction of the Lunar Race	25	32 ¹⁹

We must mention here that Jones’ places Buddha at 1029 BCE²⁰ whereas modern scholarship places him at about 470 BCE.²¹ Despite this discrepancy, there is no reason why we may ignore his assessment of the number of generations which is a different template than the year of Buddha.

The mean length of generation for the Medieval Indian Kings has been estimated at 27 years while the mean length of reign has been estimated at 19 years.²² These high- and low estimates of numbers of generations and their high- and low lengths taken together provide us with high- and low bounds for the time of the Divine Persons on genealogical considerations as given in the last column of table 2.

Table 2: High- and Low Bounds of Years of the Divine Persons by Genealogy

<i>Sl</i>	<i>Names</i>	<i>High Years</i>	<i>Low Years</i>	<i>High- and Low Years</i>
1	Buddha			470 BCE
2	Buddha to Brihadbala (Contemporary with Krishna)	32 generations x 27 years = 864 years = 470 to 1334 BCE	25 reigns x 19 years = 475 years = 470 to 945 BCE	Krishna: 1334-945 BCE
3	Brihadbala to Rama	35 generations x 27 years = 945 years = 1334 to 2279 BCE	29 reigns x 19 years = 551 years = 945 to 1610 BCE	Rama: 2279-1610 BCE
4	Ram to Vaivaswat Manu	81 generations x 27 years = 2187 years = 2279 to 4466 BCE	56 reigns x 19 years = 1064 years = 1610 to 2674 BCE	Vaivaswat Manu: 4466-2674 BCE

Genetics

Genetic information indicates that human beings have evolved about 200,000 years ago from one woman who lived in Africa.²³ It follows that Swayambhu Manu, the first “Manu,” and his descendant

Vaivaswat Manu cannot be located before this time because they were evolved human beings. Therefore, the beginning of Treta Yuga, at the beginning of which Vaivaswat Manu was born,²⁴ has to be located after 200,000 BP.

Literature

The Rig Veda tells of the events at the time of Indra. Vaivaswat Manu was a descendant of Vivaswan brother of Indra.²⁵ The year of Vaivaswat Manu would, therefore, be after the year of Indra. Linguist Koenraad Elst says Vedic culture was incipient from the early 4th millennium.²⁶ Sanskrit scholar O P Bharadwaj says Rig Veda is to be placed before 3000 BCE.²⁷ Greek scholar N Kazanas places the events of the Rig Veda in 4th millennium BCE.²⁸ Thus we assume that the events of the Rig Veda took place and Indra lived in the 4th millennium BCE, say, in the mid-4th millennium BCE or around 3500 BCE. Accordingly, Vaivaswat Manu would have lived after 3500 BCE. It is clarified that the scribing of the Rig Veda in Sanskrit language around 1500 BCE should not be taken as the year of the events narrated in the text.

The situation of the epics Ramayana and Mahabharata is distinct from the Rig Veda. These are “Smriti” texts. They have been transmitted by memory before they were penned down after 500 BCE. The Rig Veda on the other hand is a “Shruti” text. It has been transmitted by oral recitation before it was written down. It was possible for linguists to reckon the time of the events of Rig Veda on the basis of the language since it was assumed that the language had not changed during transmission by recitation. It is not possible to similarly reckon the time of events of Ramayana and Mahabharata because the transmission was by memorization and the available texts are composed in the language prevalent at the time of composition sometime after 500 BCE. Thus, we are unable to draw an estimate of the year of the events narrated therein on literary considerations.

Years of the Divine Persons

The dates suggested on various considerations are summarized in Table 3. We extract the early-and late-estimates from this table. The early estimate is the lowest of the early estimates derived by different evidences. For example, the three early estimates for Vaivaswat Manu are 8576, 3300 and 4466 BCE. The lowest among these, i.e., 3300 is our final early estimate. The final late estimate is the highest of the late estimates derived by different evidences.

Table 3: Summary of Evidences for the Years of the Divine Persons

Sl	Person	Astronomy	Archaeology	Genealogy	Genetics	Literature
1	Vaivaswat Manu	8576-2798 BCE	3300-2800 BCE	4466-2674 BCE	>200k BP	>3500 BCE
2	Rama	7292-1646 BCE	3200-1300 BCE	2279-1610 BCE	>200k BP	NA
3	Krishna	3300-1129 BCE	1900-1300 BCE	1334-945 BCE	>200k BP	NA

Based on above summary, we have made an assessment of the earliest- and latest birth years of the Divine Persons below. The year according to genetics is consistent with the years according to all the other evidences, hence we ignore it for the ensuing discussion.

Vaivaswat Manu: The earliest- and latest years according to archaeology are 3300 and 2800 BCE respectively. These years are within the range of years determined by other evidences.

Rama: We cannot place Rama after 1646 BCE, being the low year according to astronomy; and we cannot place him before 2279 BCE, being the high year according to genealogy. The range of 2279-1646 BCE is consistent with archaeology and literature as well.

Krishna: We cannot place Krishna before 1334 BCE, being the high year according to genealogy; and we cannot place him after 1300 being the low year according to archaeology. His year is thus estimated at 1334-1300 BCE. Our purpose is to arrive determine the yugas on the basis of these estimates. This range of 34 years appears too narrow for this purpose. Therefore, we stretch the years arbitrarily by about 150 years on either side to arrive at the possible years for him at 1500-1150 BCE.

The range of the years for the Divine Persons are therefore reckoned as:

Vaivaswat Manu:	3300-2800 BCE
Rama:	2279-1646 BCE
Krishna:	1500-1150 BCE

We now work out the length of the yugas on these basis.

Determination of the Yugas

Various reckonings of the Yugas

The yuga is reckoned variously. The first issue is whether there are interregnumns between the yugas or not. The Vayu Purana gives both the measures: “the measure of the four yugas without sandhya and sandhyansh is remembered as 10000 divine years and the four yugas with sandhya and sandhyansh are measured as 12000 divine years.”²⁹

The second issue is whether the yugas are of declining lengths or equal. Aryabhata gives the total length of the four yugas as 12000 divine years in declining lengths as well as in equal yugas of 3000 divine years each.³⁰ Thus, we have three methods of reckoning the yugas:

Declining Length in 4:3:2:1 ratio with Interregnumns: 10000 divine years + 1000 sandhya + 1000 years sandhyansh, total 12000 divine years.

Declining Length 4:3:2:1 ratio without Interregnumns: 10000 divine years.

Equal Length: 12000 divine years consisting of four equal yugas of 3000 divine years each.

We add a fourth method to consider this possibility as well:

Equal length: 10000 divine years consisting of four equal yugas of 2500 divine years each.

We shall examine these four alternatives.

Yuga-Divine Person Linkage and the Dark Ages

Vaivaswat Manu lived at the beginning of the Treta Yuga as quoted previously. It follows that the preceding Krita Yuga came to an end at his time. Further, Rama was born in the Treta Yuga³¹ and Krishna towards the very end of Dwapar Yuga.³² An additional information available to us is that the people went through a “Dark Age.” This term refers to a period of history about which little information is available. Scholars have provided various estimates of this period. The earliest beginning is placed at 2200 BCE and the latest end at 1000 CE. The common period among four different estimates is from 1200 BCE to 800 BCE.³³ We accept this range for our study. Intuitively “Dark Ages” seems to reflect the Kali Yuga. However, the Dark Ages are not mentioned in the texts. Thus we discuss the Dark Ages as additional evidence only.

Hyperbole of Thousands of Years

The Mahabharata tells of the length of the four yugas as 4000, 3000, 2000 and 1000 years. The Hindi translation in the Gita Press version renders these as “divine years.”³⁴ The Linga Purana says that one divine year is equal to 360 human years.³⁵ Thus, the Krita Yuga is equal to 4,000 divine years as told

in the Mahabharata, multiplied by 360 being the number of human years in one divine year as told in the Linga Purana. This makes the Krita Yuga of 144,000 human years. Plus we add 10 percent each for the beginning- and end transition periods where required.

These lengths, however, exceed the years of the three Divine Persons as determined by us above by thousands of years. Thus we suggest that the “000’s” were added to the divine years are a hyperbole. The length of the four yugas was 4, 3, 2 and 1 divine year only. This possibility has been noted by scholars. Alberuni wrote around 1000 CE: “I conclude that the author... had to invent a vast number of years, for the more outrageous it was, the more impression it would make.”³⁶ William Jones wrote in 1799: the Hindus “contend, that he [Vaivaswat Manu] actually reigned on earth one million seven hundred and twenty-eight thousand years of mortals, or four thousand eight hundred years of the Gods; and this opinion is another monster repugnant to the course of nature and to human reason, that it must be rejected as wholly fabulous...”³⁷ Historian Romila Thapar says: “The magnification to millions was almost a fantasy on ciphers.”³⁸ These observations lend credence to our suggestion that “000” years were added as a hyperbole. Therefore, we suggest that the Krita, Treta, Dwapar and Kali Yugas were accordingly of 4, 3, 2 and 1 divine year smultiplied by 360, or 1440, 1080, 720 and 360 or human years respectively excluding sandhya and sandhyansh.

Vedic scholar Swami Shanti dharmananda has objected to our considering “000” as hyperbole saying: “It is not possible to correctly interpret the scriptures deviating from the traditional meanings on the basis of physical and geographical information.” I agree that the possibility of finding physical, i.e., archaeological evidence form an earlier period cannot be ruled out. However, genealogical information from the Puranas gives the earliest year of the Divine Persons as 4466 BCE as given in the Table above. Further, the genetic evidence indicates that the existence of *Homo sapiens* before 200,000 years is not possible. Thus Vaivaswat Manu cannot be placed before 4466 BCE on the basis of Puranic genealogy and cannot be placed before 200,000 BP on the basis of genetic considerations. Estimates earlier than 200,000 BP must, therefore, be rejected.

Three Variables

We have noted four scenarios of the length of the yugas at the beginning of this section. We now develop the four scenarios for the latter three yugas—Treta, Dwapar and Kali. We have not discussed the Krita Yuga here because it falls outside the range of the years of the Divine Persons. We shall consider the Krita Yuga subsequently.

1. Declining lengths in 3:2:1 ratio with sandhya and sandhyansh or 1296, 864 and 432 human years. This scenario is mentioned as 432x in rest of the paper.
2. Declining lengths in 3:2:1 ratio without sandhya and sandhyansh or 1080, 720 and 360 human years. This scenario is mentioned as 360x in rest of the paper.
3. Equal lengths of 3:3:3 divine years with sandhya and sandhyansh or 1296 years each.
4. Equal lengths of withouts andhya and sandhyansh or 1080 years each.

We have to determine the years of the yugas such that they match with the years of the Divine Persons. The difficulty is that that both the lengths of the yugas and the years of the Divine Persons are variable. We propose to overcome this challenge by anchoring our assessments on three possible years of Vaivaswat Manu at 3300, 3000 and 2800 BCE. In this way we develop 12 scenarios—three anchor years of Vaivaswat Manu and four scenarios of lengths of the yugas within each of these. We shall develop these 12 scenarios and then assess which of these scenarios fit with the years of Rama and Krishna. Additionally we shall examine in which of these scenarios the years of the Kali Yuga match with the years of the Dark Ages.

12 Scenarios

We now present the 12 scenarios below. Then we shall summarize the results in a table.

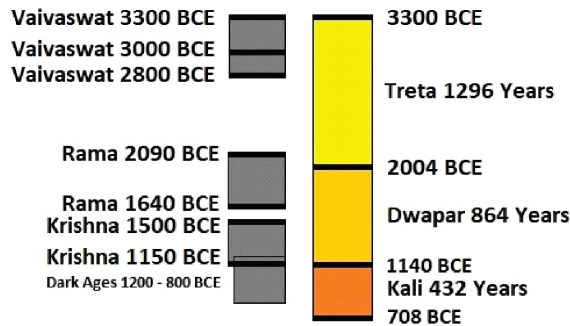


Figure 1: Vaivaswat Manu @3300 BCE, Declining Yugas @432x.

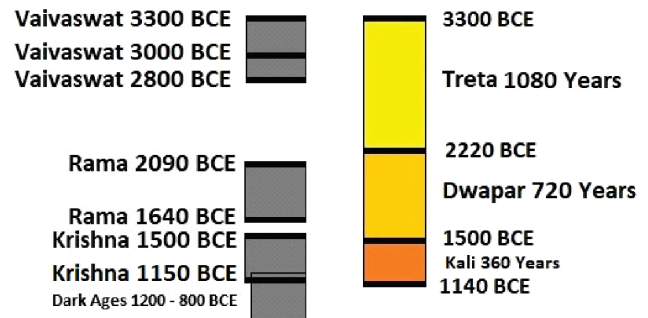


Figure 2: Vaivaswat Manu @3300 BCE, Declining Yugas @360x.

Figure 1: Vaivaswat Manu @3300 BCE with declining yugas @432x. We can see that Rama falls towards the end of Treta Yuga and Krishna falls towards the end of Dwapar Yuga as stated in the texts. The Dark Age at 1200-800 BCE matches with the Kali Yuga at 1140-708 BCE which also matches. Thus, this scheme fits on all three counts.

Figure 2: Vaivaswat Manu @3300 BCE with declining yugas @360x. We can see that Rama falls in Dwapar Yuga which is a misfit since he lived in the Treta Yuga. The early year for Krishna is 1500 BCE which is the same year as the end of the Dwapar Yuga. This is a marginal fit because Krishna lived towards the end of Dwapar hence his years should have fallen before the end of Dwapar Yuga. The Dark Age begins at 1200 BCE while the Kali Yuga ends at 1140 BCE which is a marginal fit. Thus, this scheme misfits on one count and marginally fits on two counts.

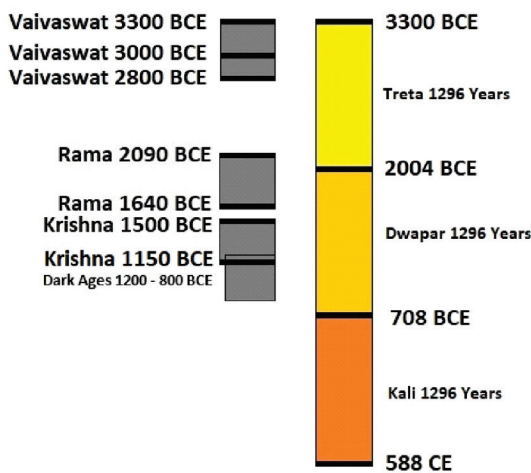


Figure 3: Vaivaswat Manu @3300 BCE, Equal Yugas @432x.

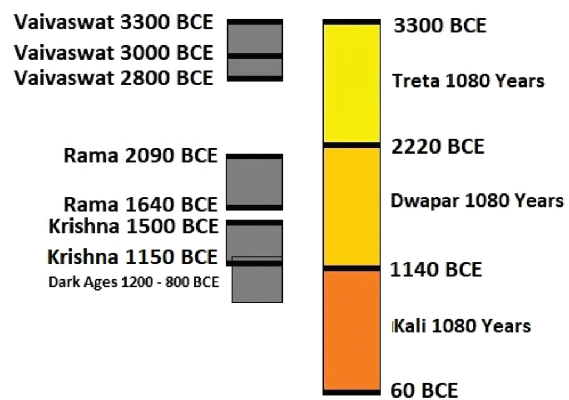


Figure 4: Vaivaswat Manu @3300 BCE, Equal Yugas @360x.

Figure 3: Vaivaswat Manu @3300 BCE with equal yugas @432x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls in the early part of Dwapar Yuga which is a misfit since he lived towards the very end of Dwapar Yuga. The Dark Age ends at 800 BCE while the Kali Yuga begins at 708 BCE which too is a misfit. Thus, this scheme fits on one count and misfits on two counts.

Figure 4: Vaivaswat Manu @3300 BCE with equal yugas @360x. We can see that Rama falls in Dwapar Yuga which is a misfit. Krishna falls in the later part of Dwapar Yuga which fits. The Dark Age begins at 1200 BCE while the Kali Yuga begins at 1140 BCE which too fits. Thus, this scheme fits on two counts and misfits on one count.

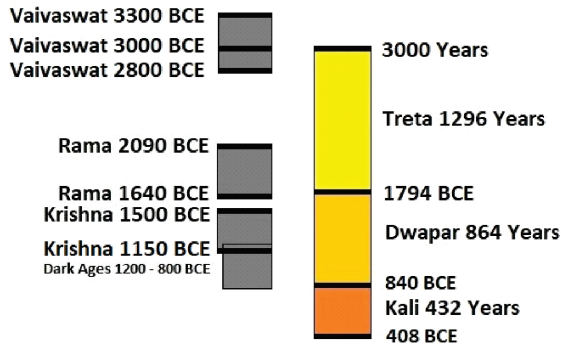


Figure 5: Vaivaswat Manu @3000 BCE, Declining Yugas @432x.

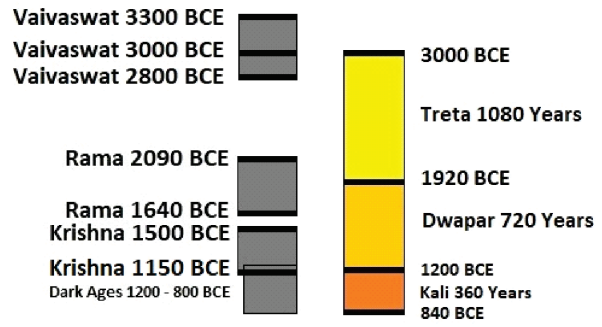


Figure 6: Vaivaswat Manu @3000 BCE, Declining Yugas @360x.

Figure 5: Vaivaswat Manu @3000 BCE with declining yugas @432x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls in the early-middle part of Dwapar Yuga is a misfit since he was born towards the end of the Dwapar Yuga. The Dark Age ends at 800 BCE while the Kali Yuga begins at 840 BCE which is a marginal fit. Thus, this scheme fits on one count, misfits on one count and marginally fits on one count.

Figure 6: Vaivaswat Manu @3000 BCE with declining Yugas @360x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls towards the end of Dwapar Yuga which fits. The Dark Age at 1200-800 BCE and Kali Yuga at 1200-840 BCE also fits. Thus, this scheme fits on all three counts.

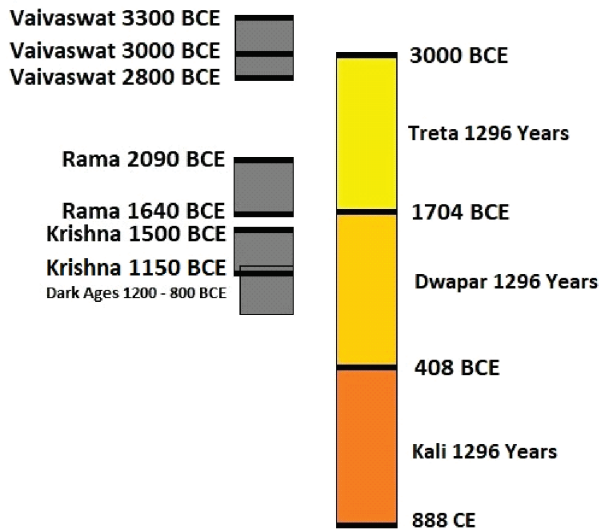


Figure 7: Vaivaswat Manu @3000 BCE, Equal Yugas @432x.

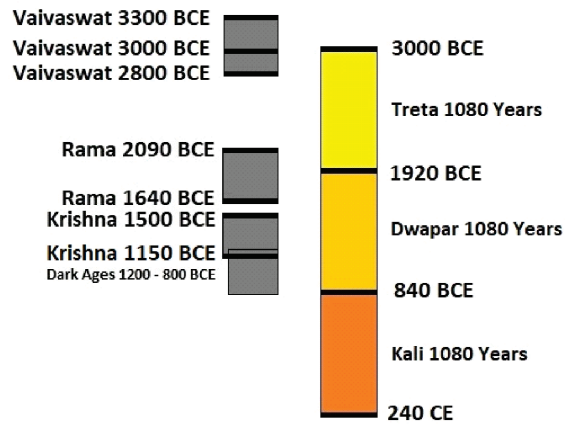


Figure 8: Vaivaswat Manu @3000 BCE, Equal Yugas @360x.

Figure 7: Vaivaswat Manu @3000 BCE with equal yugas @432x. We can see that Rama falls towards the last part Treta Yuga which fits. Krishna falls towards the beginning of Dwapar Yuga and

the Dark Ages fall towards the middle of Dwapar Yuga which are misfits. Thus, this scheme fits on one count and misfits on two counts.

Figure 8: Vaivaswat Manu @3000 BCE with equal yugas @360x. We can see that Rama’s early date falls towards the end of Treta Yuga which fits. Krishna falls towards the middle of Dwapar Yuga and the Dark Ages fall towards the end of Dwapar Yuga which are both misfits. Thus, this scheme fits on one count and misfits on two counts.

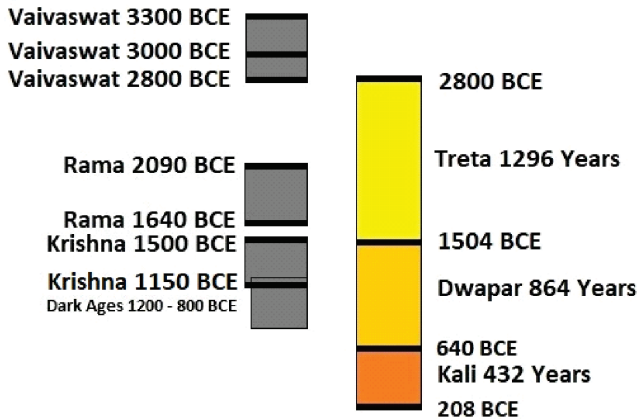


Figure 9: Vaivaswat Manu @2800 BCE, Declining Yugas @432x.

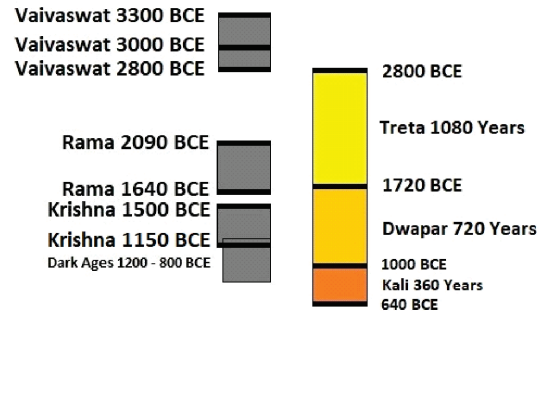


Figure 10: Vaivaswat Manu @2800 BCE, Declining Yugas @360x.

Figure 9: Vaivaswat Manu @2800 BCE with declining yugas @432x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls towards the beginning of Dwapar Yuga and the Dark Ages fall towards the middle of Dwapar Yuga which are both misfits. Thus, this scheme fits on one count and misfits on two counts.

Figure 10: Vaivaswat Manu @2800 BCE with declining yugas @360x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls towards the middle of Dwapar Yuga which is a misfit. The Dark Ages cover the Dwapar and Kali Yugas which is a marginal fit. Thus, this scheme fits on one count, marginally fits on one count and misfits on one count.

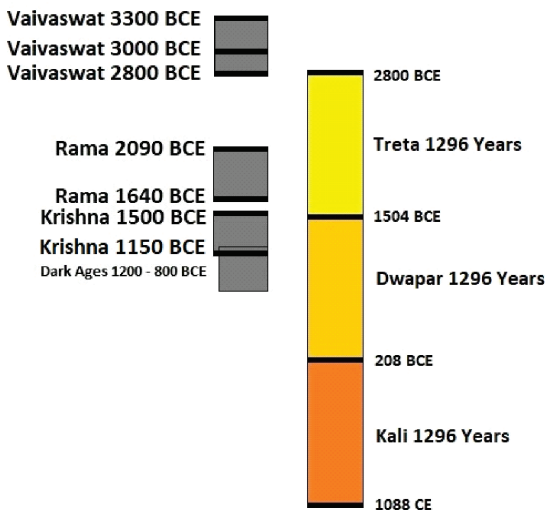


Figure 11: Vaivaswat Manu @2800 BCE, Equal Yugas @432x.

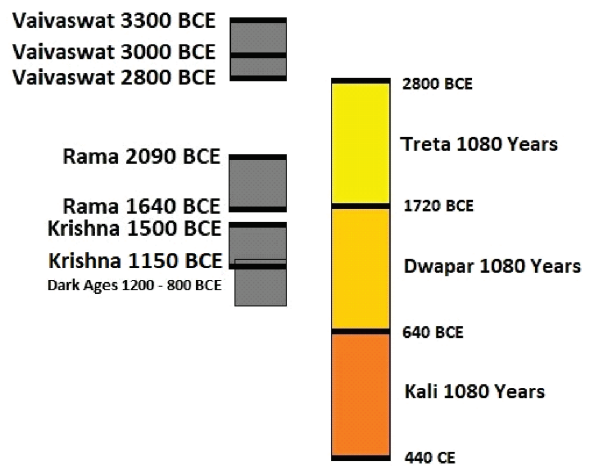


Figure 12: Vaivaswat Manu @2800 BCE, Equal Yugas @360x.

Figure 11: Vaivaswat Manu @2800 BCE with equal yugas @432x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls towards the beginning of Dwapar Yuga and the Dark Ages fall towards the middle of Dwapar Yuga which are both misfits. Thus, this scheme fits on one count and misfits on two counts.

Figure 12: Vaivaswat Manu @2800 BCE with equal yugas @360x. We can see that Rama falls towards the end of Treta Yuga which fits. Krishna falls towards the beginning of Dwapar Yuga and the Dark Ages fall towards the middle of Dwapar Yuga which are both misfits. Thus, this scheme fits on one count and misfits on two counts.

Summary of Findings

Summary of the twelve scenarios is given in Table 4. In order to summarize the conclusions, we have given points as follows: Fit=1, Marginal fit=0.5 and Misfit=0. In Column 6 we have given the fits for only Rama and Krishna limiting ourselves to the Divine Persons mentioned in the scriptures. It is seen that only scenario numbers 1 and 6 fit on all three counts and get 2 points each. All others get 1 point or less. In Column 8 we have given the fits after including the Dark Ages as a parameter. We have given this separately recognizing that the Dark Ages are not scripturally attested. Once again it is seen that only scenario numbers 1 and 6 fit on all three counts and get 3 points. All others get 2 points or less.

Table 4: Summary of 12 Scenarios

<i>Vaivaswat Manu at 3300, 3000 or 2800 BCE</i>	<i>Yuga: Declining or Equal</i>	<i>Yuga Length @432x or @360x</i>	<i>Rama: 2090-1640 BCE</i>	<i>Krishna: 1500-1150 BCE</i>	<i>Fit Rama and Krishna</i>	<i>Dark Ages (Kali Yuga): 1200-800 BCE</i>	<i>Fit Including Dark Ages</i>	<i>Scenario No</i>
1	2	3	4	5	6	7	8	9
3300 BCE	Declining	432x	Fits	Fits	2	Fits	3	1
		360x	Misfit	Marginal	0.5	Marginal	1	2
	Equal	432x	Fits	Misfit	1	Misfit	1	3
		360x	Misfit	Fits	1	Fits	2	4
3000 BCE	Declining	432x	Fits	Misfit	1	Marginal	1.5	5
		360x	Fits	Fits	2	Fits	3	6
	Equal	432x	Fits	Misfit	1	Misfit	1	7
		360x	Fits	Misfit	1	Misfit	1	8
2800 BCE	Declining	432x	Fits	Misfit	1	Misfit	1	9
		360x	Fits	Misfit	1	Marginal	1.5	10
	Equal	432x	Fits	Misfit	1	Misfit	1	11
		360x	Fits	Misfit	1	Misfit	1	12

The fact that inclusion of the Dark Ages gives the same fit as its exclusion suggests that the results match with archaeological evidences. We suggest, therefore, that the Kali Yuga came to an end-, and the new Krita Yuga started around 800 BCE. Buddha was born in the fifth century BCE in the new Krita Yuga according to this assessment. This may not have been acceptable to the Hindu scholars of that time. Thus they may have extended the length of the Kali Yuga to place Buddha in that yuga. For this reason, Aberuni, without specifying the sources, says that according to the Hindus “Buddhodana

son of Suddhodana lived in the Kali Yuga,³⁹ and Vishnu Purana says that Ashokvardhan lived in the Kali Yuga.⁴⁰

We conclude that the only yugas in declining lengths are plausible. Secondly, Vaivaswat Manu at 3300 BCE with yugas @432x; or Vaivaswat Manu at 3000 BCE with yugas @360x are both plausible. Thirdly, the Dark Ages at 1200-800 BCE matches with the Kali Yuga. The information available to us does not allow determination of the yugas with greater precision.

The Krita Yuga

We have suggested the years of the Treta, Dwapar and Kali Yugas above. Now we extrapolate these backwards to suggest the respective years of the chaturyugas.

432x: Chaturyuga of 4320 Years (including sandhya and sandhyansh) with Krita Yuga beginning at 5048 BCE, breaks at 3300, 2024 and 1160 BCE and end at 728 BCE.

360x: Chaturyuga of 3600 Years (without sandhya and sandhyansh) with Krita Yuga beginning at 4440 BCE with breaks at 3000, 1920 and 1200 BCE and end at 840 BCE.

Cosmic Chaturyuga

Yuktshwar speaks of ascending- and descending chaturyugas of 12000 human years each in ratio 4:3:2:1. According to him, the descending chaturyugas started at 11501 BCE and ended at 499 CE. The ascending chaturyugas started at 499 CE in ratio 1:2:3:4.⁴¹ Somewhat similarly, Bibhu Dev Mishra speaks of ascending- and descending chaturyugas of 12000 human years each with four equal yugas of 3000 years each. The descending chaturyuga started at 12675 BCE and ended at 675 BCE according to him. The ascending chaturyuga started at 676 BCE.⁴²

The basis of these suggestions is mainly astronomical. It is supported by changes in climate⁴³ and in the development of new technologies.⁴⁴ However, the astronomical evidence is challenged by the evidences from archaeology, genealogy, genetics and literature that we have given above. Further, an assessment of changes in climate or technologies was not the purpose of the yuga scheme. The purpose was socio-political—to help determine the dharma for a particular yuga. Thirdly, this scheme does not sync with the years of Vaivaswat Manu, Rama and Krishna as arrived at above. Fourthly, the Hindu texts unanimously tell that a new chaturyuga beginning with Krita Yuga would start after the end of the Kali Yuga.⁴⁵ I have not found a suggestion for ascending chaturyuga in the Hindu texts. Indeed the Jaina texts speak of gradual decline and ascendance of the yugas but that is beyond the scope of this paper. We do not find these suggestions credible for these reasons.

Manvantara: Parallel or Sequential

The Hindu system posits 14 sequential manvantaras each presided by a Manu. Vaivaswat Manu, whose year we have taken as the anchor for the determination of the yugas above, was the 7th Manu. The tradition holds that we are presently in this manvantara and the 8th to 14th manvantaras are yet to come. However, the descriptions of the 8th to 14th Manus in the texts suggest they could be contemporary with Vaivaswat Manu. He fathered Savarni Manu, the eighth Manu.⁴⁶ Savarni Manu, in turn, had six sons. These six sons—Daksha Savarni, Meru Savarni, Surya Savarni, Chandra Savarni, Rudra Savarni and Vishnu Savarni⁴⁷—became the next six Manus in their second births.⁴⁸

There is no dispute that Savarni Manu was son of Vaivaswat Manu hence these two Manvantaras were coterminus in the larger time scale. Savarni Manu's six sons became the next six Manus in their second births. The second births can be interpreted in two ways. One interpretation is that the second

births took place soon after the deaths of the six brothers and and their respective manvantaras were contemporary in the larger time scale. An alternative interpretation is that these six manvanataras were sequential. These six Manus were reborn sequentially after the reign of the previous Manu came to an end. Though technically plausible, such is unlikely to have happened because (1) Rebirths are unlikely to follow such a programmed timing; (2) The seventh Vaivaswat Manu and his son the eighth Savarni Manu admittedly ruled at the same larger time scale hence these two were not sequential according to the texts; (3) As we shall show in the next para, the five sons of Swayambhu Manu ruled at the same time thus it is plausible that the seven sons of the Vaivaswat Manu also ruled at the same time. On these considerations we suggest that the latter eight Manus—Vaivaswat, his son Savarni, and his grandsons or their rebirths namely, Daksha Savarni to Vishnu Savarni, were contemporary. These eight manvantaras were accordingly coterminus. Now we come to the first manvantara ruled by Swayambhu Manu. The second to fifth, namely, Svarocisa Manu, Uttama Manu, Tamasa Manu and Raivata Manu were all grandsons of Swayambhu Manu.⁴⁹ The sixth Chakshusha Manu was great grandson of Swayambhu Manu.⁵⁰ The latter five Manus, therefore, were biological grandsons or great grandsons of Swayambhu Manu indicating they were contemporaneous with Swayambhu Manu in the larger time scale.

On this evidence we suggest that the first six Manus were contemporaneous with Swayambhu Manu and eight later Manus were contemporaneous with Vaivaswat Manu. This information may have been modified at a later time and the fourteen manvantaras may have been made sequential.⁵¹ We find support for the possibility of such a transformation from an altogether different source. In his study of Jewish genealogies, Steven Weitzamn says that the Jewish text Seder Olam Zuta “takes members of David’s family who are described as contemporaries in 1Chronicles 3 and recasts them as successive generations.”⁵² Similarly, the two sets of six- and eight Manus may have been recast as 14 successive Manus in the Indian tradition. In view of above, we suggest that the first six manvantaras were contemporaneous and took place in the Krita Yuga; and the next eight manvantaras, were contemporaneous and began in the Treta Yuga.

The Integer Problem

The Bhagwata Purana says:

1000 Chaturyuga = 14 Manvantara (71-plus chaturyugas in each manvantara, sequential).⁵³

On the other hand, our study suggests:

1 Chaturyuga = 14 Manvantaras (6+8, coterminous).

We may note that if “000” in the numbers of the chaturyugas are considered to be a hyperbole, and reduced to “1” as we have done for the length of the yugas above, then the two understandings become the same: 1 chaturyuga = 14 manvantaras. This may be the correct situation that was expanded at a later time. The expansion of 1 chaturyuga to 1000 chaturyugas came up with the problem of divisibility because 1000 chaturyuga divided by 14 manvantaras = 71.43 chaturyuga per manvantara. Thus Bhagwata Purana says that a manvantaras, consists of a length in small excess of 71 chaturyugas.⁵⁴ This problem has been noted by Hayashi who says that the number of 1000 chaturyugas was varied to either 994 or 1008 to make it divisible by 71 or 72.⁵⁵

Kalpa

The texts say that one kalpa covers 14 manvantaras. The Vishnu Purana additionally says that one kalpa is equal to 1000 chaturyugas:

With the passing of these fourteen manvantaras, a kalpa that comprises of one thousand yugas will come to an end.⁵⁶

We consider the “000” in the numbers of chaturyugaas a hyperbole as discussed in the previous sections. Hence we read the 1000 chaturyugas as one chaturyuga which, in turn, is equal to 14 manvantaras.

In order to clarify, sometimes the kalpa is divided in two halves and each half is also mentioned as a “kalpa.” For example, the Bhagwata Purana says that there is one kalpa. Within this there are two halves. The first half is known as Braahm Kalpa. The latter part of the Braahm Kalpa is known as Padma Kalpa. The second half is known as Varaha Kalpa:

The first half [of the present kalpa] has passed and the second is running. A great kalpa named Braahm happened in the beginning of the first half. The kalpa that happened at the end of that (previous) kalpa is called Padmkalpa. At this time the lotus from the navel of Lord had appeared. Vidur Ji, The kalpa running at present is said to be the beginning of the second half. This is known as Varaha Kalpa. The Lord had appeared in the form of the boar at this time.⁵⁷

The purana says that there were two kalpas named Braahm and Varaha. This is parallel to our suggestion that there is only one Kalpa with two halves named Braahm and Varaha. Only a semantic difference remains as to whatever we call it two kalpas or one kalpa with two halves.

Ascending and Descending Kalpas

A variation of this scheme is to stipulate two kalpas—descending and ascending—of 12,000 years each. Yuktेश्वर follows this system on the basis that the sun “takes some star for its dual and revolves around it in about 24,000 years of our earth.”⁵⁸ This length of a kalpa of 12,000 years, however, is not attested in the texts. The 12,000 years mentioned in the texts are reference to 12000 divine years with each divine year being equal to 360 human years.

Conclusion

The Bhagwata Purana says that a kalpa consists of 14 manvantaras presided over by a Manu. Each manvantara consists of 71 chaturyugas. We are in the Kali Yuga of the 28th chaturyuga of the 7th Vaivaswat Manvantara of the 2nd Varaha Kalpa.⁵⁹ The understanding here is that the 2 kalpas, 14 manvantaras in each kalpa and 71 chaturyugas in each manvantara are sequential. Accordingly, the total time elapsed from creation to present would be about 6.2 billion years.⁶⁰

Our suggestion instead is that there is one kalpa of 4320 human years. The first part of this, the Braahm Kalpa overlapped with the first six manvantaras and also overlapped with Krita Yuga. The second part of the same kalpa, the Varaha Kalpa, overlapped with 7th to 14th manvantaras and with the Treta-Dwapar-Kali Yugas. The Varaha Kalpa, the second set of eight manvantaras and the Treta-Dwapar-Kali Yugas all came to an end around 800 BCE along with the Dark Ages. This chronology is consistent with the years of the three Divine Persons as determined by evidences from astronomy, archaeology, genealogy, genetics and literature and is shown in the picture below.

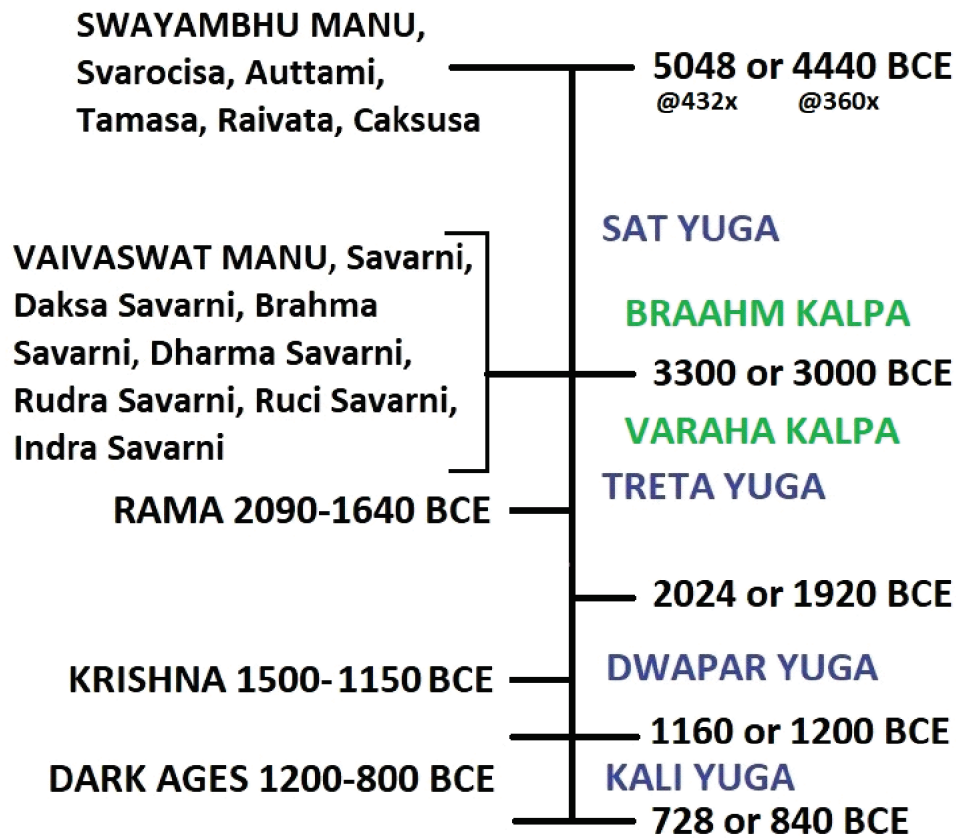


Figure 15: Summary of Yuga, Manvantara and Kalpa

Acknowledgements

I wish to thank Sarvashri Pranav Srinivas Guttal, Robert Geraci, Sai Venkatesh, Shrisha Rao, Swami Shantidharmananda and Thomas Trautmann for their valuable guidance and comments on an earlier version of this paper.

Notes

1. Formerly Faculty, Indian Institute of Management, Bengaluru
2. *Mahabharata*, Gita Press, Gorakhpur, Samvat 2067, 12:69:79.
3. *Mahabharata*, 12.69.80-91.
4. Raghavan, K Srinivasa, *Chronology of Ancient Bharath*, Sri Aurobindo Study Circle, Madras, Saka 1896, Part IV, Page 4n.
5. S B Roy, "Scientific (Astro-Dynastic) Chronology of Ancient India," in C Margabandhu et. al., Editors, *Indian Archaeological Heritage*, Agamkala Prakashan, Delhi, 1991, Page 702-703.
6. Vartak, P V, *Astronomical Dating of the Ramayan*, <http://www.shivashram.tripod.com/id14.html>, retrieved June 26, 2019, gives date of 7292 BCE. Bala, Saroj and Kulbhushan Mishra, *Historicity of Vedic and Ramayana Eras*, I-Serve, Delhi, 2012, Page 228 gives the year as 5114 BCE. S B Roy *ibid* gives the year 1996 to 1646 BCE. We have not referred to Oak, Nilesh Nilkanth, *Astronomy Lynchpins: Ramayana & Mahabharata*, <https://nileshoak.wordpress.com/2017/08/02/astronomy-lynchpins-ramayana-mahabharata/>, Retrieved June 26, 2019 who gives the date of 12209 BCE which is far from most other studies.

7. Mukhopadhyay, Subhodep, <http://www.thetinyman.in/2015/09/date-mahabharata-war-astronomical.html?m=1>, Retrieved June 26, 2019 gives various dates from 3300 BCE to 1478 BCE. S B Roy, "Scientific (Astro-Dynastic) Chronology of Ancient India," in C Margabandhu et. al., Editors, *Indian Archaeological Heritage*, Agamkala Prakashan, Delhi, 1991, Page 702-703, gives a date of 1445 to 1124 BCE.
8. *Valmiki Ramayana*, Gita Press, Gorakhpur, Samvat 2044, 1:5:5-6.
9. Danino, Michel, *The Lost River: On the trail of the Sarasvati*, Penguin Books, 2010; B B Lal, *The Sarasvati Flows On: The Continuity of Indian Culture*, Aryan Books International, New Delhi, 2002.
10. Khan, Aurangzeb Khan and Carsten Lemmen, Bricks and urbanism in the Indus Valley rise and decline, Research Gate, February 2013, <https://www.researchgate.net/publication/235784941>, Retrieved December 20, 2019.
11. Vahia, Mayank N and Nisha Yadav, Reconstructing the History of Harappan Civilization, *Social Evolution & History*, Vol. 10 No. 2, September 2011.
12. Kenoyer, Jonathan Mark, Indus Urbanism: New Perspectives on its Origin and Character, Arthur M. Sackler Colloquium of the National Academy of Sciences, October 1, 2005.
13. *Mahabharata, Mausala Parva* 6:17, 24-25.
14. Kenoyer, Indus Urbanism..., Page 28, for example.
15. Thapar, Romila, *Time as a Metaphor of History: Early India*, Oxford University Press, New Delhi 1996, Page 28. She reports that Megasthenes writing in 4th century BCE said that Indians counted 153 generations from his time to the earliest settlement which was established by Bacchus. We do not rely on this because the generations from Megasthenes to Krishna; and from Vaivaswat Manu to earliest settlement are not specified hence the numbers are not comparable.
16. Campbell, Lyle, Why Sir William Jones got it all Wrong, or Jones' Role in how to Establish Language Families, *International Journal of Basque Linguistics and Philology [ASJU]*, XL, 2006, 245-264.
17. IPFS Distributions, Ikshvaku dynasty, https://ipfs.io/ipfs/QmXoypizjW3WknFiJnKLwHCnL72vedxjQkDDP1mXWo6uco/wiki/Ikshvaku_dynasty.html, Retrieved June 26, 2019.
18. Jones, William, *The Works of Sir William Jones in Six Volumes*, Vol I, G G and J Robinson, London, 1799, Page 297, 302 and 304.
19. Jones has not estimated the generations from Brihadbala-Krishna to Buddha. However, he has estimated the numbers of generations from Janmejaya to extinction of the Lunar Dynasty to 30 generations; or from Krishna to extinction to 32 generations. We accept Jones' numbers since the extinction would have taken before Buddha.
20. Jones, *The Works...*, Page 310.
21. Violatti, Cristian, The Dates of the Buddha, *Ancient History Encyclopedia*, <https://www.ancient.eu/article/493/the-dates-of-the-buddha/>, Retrieved March 18, 2020.
22. Trautmann, Thomas R, Length of Generation and Reign in Ancient India, *Journal of the American Oriental Society*, 1969, 89:3 Pages 564-577, Table 1.
23. Holloway, April, "Genetic 'Adam and Eve': All Humans are Descendants of One Man and Woman Who Lived over 100,000 Years Ago," <https://www.ancient-origins.net/news-evolution-human-origins/genetic-adam-and-eve-all-humans-are-descendants-one-man-and-woman-who-021536>, 29 July, 2017, Retrieved March 18, 2020.
24. *Mahabharata*, 12:348:51: "Then in the beginning of Treta Yuga, the Sun gave the teaching to his son Manu; and Manu gave the teaching for the welfare of the entire world to his son Ikshvaku."

25. Mani, Vettam, *Puranic Encyclopedia*, Motilal Banarasidas, Delhi, 1979, Page 879.
26. Elst, Koenraad, The Vedic Harappans in writing, koenraadelst.bharatvani.org/articles/aid/vedicharrapans.html, Retrieved July 16, 2015.
27. Bharadwaj, O P, *Studies in the Historical Geography of Ancient India*, Sundeep Prakashan, Delhi, 1986, Page 34.
28. Kazanas, N, Final Reply, www.omilosmeleton.gr/pdf/en/indology/Final%20Reply.pdf, Retrieved July 16, 2015, Page 29.
29. *Vayu Purana*, e-copy, 57.29–32.
30. Aryabhata 3:9 in Hayashi, Takao, The Units of Time in Ancient and Medieval India, *History of Science in South Asia*, 2017, 5.1.
31. *Valmiki Ramayana*, 7:17:43.
32. *Mahabharata*, 1:2:13, *Bhagwata Purana* 12.2.29.
33. Wabash Center, Pre-Aryan Religious Heritage, <http://www.wabashcenter.wabash.edu/syllabi/g/gier/306/vedalec.htm>, Retrieved July 16, 2015. Young, Wise, Dark Ages and Science, sci.rutgers.edu/forum/showthread.php?82847-Dark-Ages-and-Science, Retrieved January 10, 2015; IndoPaedia, Chronology of Indian History, http://www.geocities.ws/india505/chnr_ihs.htm, Retrieved July 16, 2015 [9794]; Chew, Sing C., Dark Ages in World System History, Encyclopaedia of Life Support Systems, www.eolss.net/sample-chapters/c04/e6-94-12.pdf, Retrieved July 16, 2015.
34. *Mahabharata*, 3:188:22-26.
35. *Linga Purana*, Gita Press, Gorakhpur, Samvat 2012, 5:22-23.
36. Alberuni, *India*, Edited by Edward C Sachau, Low Price Publications, Delhi, 1996, Page 352.
37. Jones, *The Works...*, Page 295.
38. Thapar, *Time as Metaphor...*, Page 15.
39. Alberuni, *India...* Page 380.
40. *Vishnu Purana*, Chapter 6, e-copy, *Opening Paras*.
41. Yuktishwar Giri, *The Holy Science*, Yoagoda Satsang Society, Kolkata 1990, Page 14.
42. Mishra, Bibhu Dev, The end of the Kali Yuga in 2025: Unravelling the mysteries of the Yuga Cycle, <https://grahamhancock.com/dmistrab6/>, retrieved March 18, 2020.
43. Sai Venkatesh, email dated January 18, 2020.
44. Yuktishwar Giri, *The Holy...*, Page 16, for example speaks of the development of concept of gravity by Newton as a proof of ascending Kali Yuga.
45. *Mahabharata*, 3:190:97.
46. *Vishnu Purana*, e-copy, Chapter 2.
47. *Devi Bhagwata Purana*, Gita Press, Gorakhpur, Samvat 2009, 10:13:25-30.
48. *Devi Bhagwata Purana* 10:13:24
49. *Devi Bhagwata Purana* 10:8:6-21.
50. *Vishnu Purana*, e-copy, Chapter 8.
51. *Bhagwata Purana*, Gita Press, Gorakhpur, Samvat 2060, 3:11.
52. Weitzman, Steven, *The Origin of the Jews*, Princeton University Press, Princeton 2017, page 38.

53. *Bhagwata Purana*, 3:11:24.
54. *Bhagwata Purana*, 3.11.24.
55. Hayashi, *The Units of Time...*, Page 23.
56. *Vishnu Purana, e-copy*, 3.2.
57. *Bhagwata Purana*, 3.11.33-36.
58. Yuktेश्वर, *The Holy...*, Page 8-10.
59. *Bhagwata Purana*, 3.11.
60. 1st kalpa of the 2 kalpa, consisting of 14 manvantaras, each consisting of 71 Chaturyugas, each consisting of 4320k years = 4294,080k years. Plus, 6 manvantaras of present kalpa, each consisting of 71 Chaturyugas, each consisting of 4320k years = 1840,320k years. Plus 27 Chaturyugas of present manvantara, each consisting of 4320k years = 116,640k years. Plus the first 3 Yugas of present Chaturyuga (In the ratio 4+3+2=9 of 10 parts) of 4320k years = 3,960k years. Total = 4294,080k + 1840,320k + 116,640k + 3,960k = 6255,000k years.