

The Great Clock

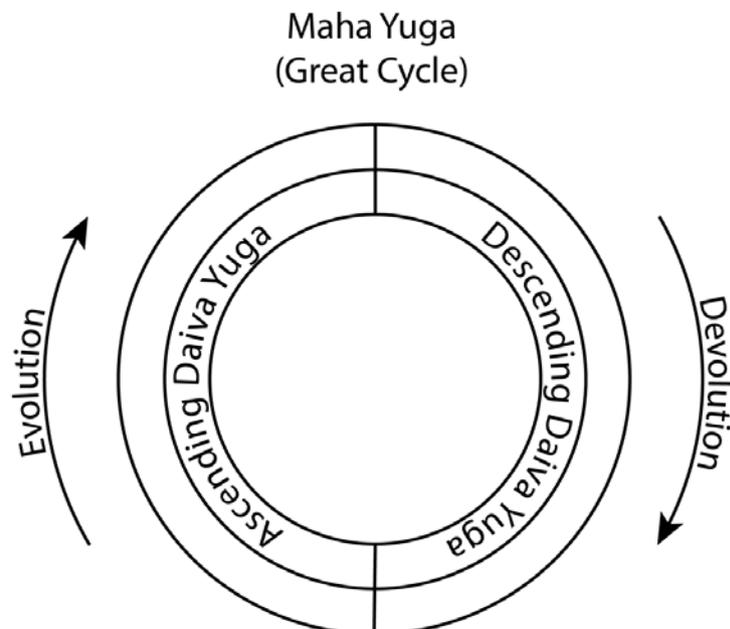
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The Yuga Calendar of India

The cycle of precession was known to the Hindu Brahmans of old as the “Maha Yuga” meaning “Great Cycle” or “Great Age”. The origin of the word “Yuga” and its astrological connotation is found in the very first kind of astronomy we have record of from India called *Jyotisha*. The *Jyotisha Vedanga* is the earliest document we have about the issues concerning the Hindu methods of studying time cycles and their parallel observation of the celestial motions. This work is attributed to the Vedic period of Hindu history spanning from 1750 BC to 500 BC, so it goes a long way back into a time where Ancient Egypt and Mesopotamia were flourishing and developing their own science of astronomy that we have later inherited from those cultures in the west through the Greeks and Romans.

The word “yuga” itself simply means “cycle” and it is used to refer to many kinds of cycles in the records of Vedic astronomy. The earliest uses of the term is found in the *Jyotisha Vedanga*, where a “yuga” is referring to the astronomical cycle we know in the west as the Metonic Cycle. This is a cycle or period in which the solar and lunar periods synchronize, matching 19 solar years with 235 Lunations.

However, another form of use for the Yuga is found in later works from India such as the Mahabharata and the Manusmṛti. The later is a text better known to the English speaking audience as the *Laws of Manu*, and this work is believed to have been composed between 200 BC and 100 AD.¹ The Manusmṛti holds references to yugas or time cycles lasting thousands of years and constituting a variety of divisions and subdivisions of astronomical periods. The text itself exposes the logic behind the Yuga periods as great ages of thousands of years in its very first chapter where it informs the reader of a cycle lasting some 12,000 years called a *Daiva Yuga* or “Divine Cycle”. This Daiva Yuga is actually the half portion of the Maha Yuga or “Great Cycle” which is the precessional cycle of the equinoxes we have been mentioning earlier.



¹ The date of composition for the Laws of Manu or Manusmṛti is quite uncertain as is the case for most Hindu scriptures. The main problem is that many of these scriptures were originally oral in form: memorized through the chanting of mantras, and thus their origins in history are obscure.

This first division of the Maha Yuga or Great Cycle into two halves is based on a philosophy that considers the **evolution and devolution** of humanity's state of consciousness through time. In particular, the consideration of "evolution" and "devolution" which have a positive and negative connotation are based on the concept of **Dharma**. The Dharma is basically the Cosmic Law of Good and Evil, and thus it is related to the more familiar term of *karma* which means "action". The Hindu concept of Dharma is very much like the Egyptian *Ma'at* or the Roman *Iustitia* (Justice): it is a Universal Law related to morality or ethics, but it has deeper philosophical meanings that will be explored further ahead in this work.

The basic idea is that mankind rises and falls into periods of *psychic* evolution and devolution. It is not the body that changes or mutates, but the *psychic* condition of mankind which undergoes a transmutation. The principle is simple: in one part of the Great Cycle or Maha Yuga mankind possesses an inborn or natural inclination towards virtue, while at the opposite side of the Great Cycle mankind is naturally inclined towards sin, and this phase of evolution and devolution by which we become more acquainted with the Dharma or less so is governed by that long astronomical period of precession lasting about 25,920 years. But we will now focus on the principles related to the calendar itself, and later come to develop the philosophical consequences of this way of understanding evolution and devolution in human affairs.

Now, the two Daiva Yugas or Divine Ages in the Hindu calendar divide the Great Cycle in two equal halves according to whether humanity's consciousness is on a course of *evolution*, or, on the contrary, whether humanity is undergoing a phase of *devolution* where general consciousness is contracting and Dharma is becoming gradually unrecognized. But this Great Cycle where consciousness of Dharma is phasing over periods of about 12,000 years or so also brings about smaller phases or epochs within it.

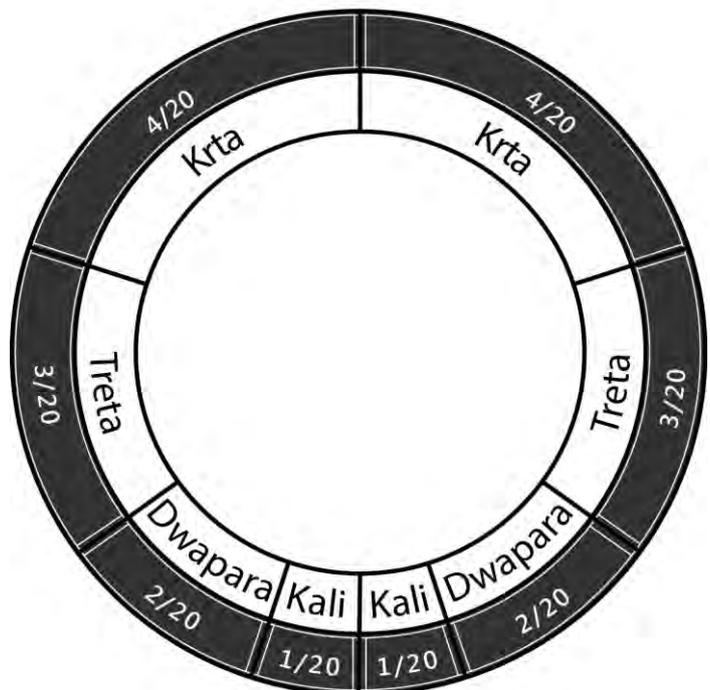
The Manusmṛti, Mahabharata, and Puranas of India speak of a further division of the Great Cycle into 4 basic Ages or Yugas commonly called *Caturyuga* (4 Ages). These have a particular *quality* referring directly to our natural or general state of consciousness or awareness of Dharma and these 4 ages are now of *unequal* duration:

As we see in the following diagram, the 4 ages or yugas are divided in accordance to fractions on the base of 20 for the whole cycle.

The names of the yugas or ages themselves in the Hindu calendar system have a clear numerical implied in their very names.² Such numerical references in the names of the Hindu Ages link the Yugas to their appointed duration within the Great Cycle, but they also refer to the quality of the ages themselves with respect to the moral and intellectual condition of mankind.

In the **Manusmṛti or Laws of Manu**, there is a short but clear explanation about the duration of each of the 4 yugas. The 4:3:2:1 ratio for Krta, Treta, Dvapara, and Kali yugas accompany the description of the Daiva Yuga being 12,000 years long. Each age is a fraction of that period according to a 4:3:2:1 ratio. First the text says that Krta is 4000 years, Treta is 3000, Dvapara 2000, and Kali 1000. Then it goes on to explain that each age also has a fraction called a "twilight" (*sandhi*) added to them both at the beginning and end of the period.

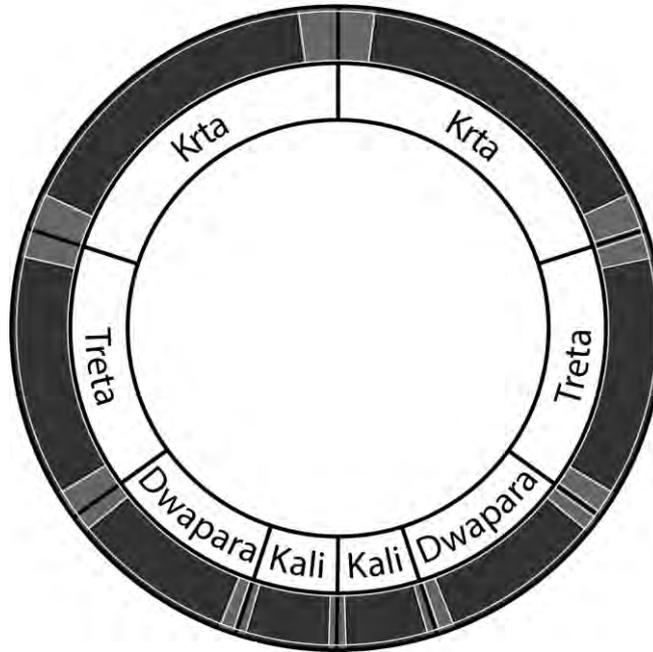
Proportion of the Yugas in the Great Cycle



² In Sanskrit, the word *Treta* means "three-fold" or "triple", while *Dva* or *Dwa* means "dual" or "two-fold". *Kali* also means "one-fold", but in this case it also has a connotation with respect to the quality of the age as it means "quarrel, strife/discord". Contrary to this age is the Krta Yuga also called Satya Yuga. Krta means "virtuous/cultivated/good", while Satya means "Truth".

Each twilight or *sandhi* is $1/10^{\text{th}}$ of the length given for each yuga, so in the case of the Krta age, its *sandhi* or twilight is of 400 years. Hence there is 400 years added to the 4000 both *before and after* the period, which makes 4800 years. The same is true for the Treta, Dvapara, and Kali, and so the values for each age are given as 4800, 3600, 2400, and 1200 years in the Manusmrti or Laws of Manu.

Yugas with their Sandhi Proportions



The geometrical composition of the system only demands a division of the circle into 20 fractions and the according divisions of Ages as we have shown, but in order to recompose the calendar itself, we need to anchor this system with real astronomical references to the background stars in order to reveal their appointed dates. This will allow us to determine what Yuga is currently passing by, and also what kind of astronomical cues signal the beginnings and ends of the Ages so as to determine their true duration and dates according to our Gregorian calendar.

In order to come to this dating of the Yugas we have several references in Hindu literature as well as modern literature, but there have been many mistakes made in other calculations for the duration and dates of the Yugas. The main problem that has lead to mistakes in dating has been the unawareness of the relation these ages hold to the Great Cycle of precession. But even when this calendar has been related to the precession of the equinoxes, the dating has been rather sloppy and careless. This is one of the reasons we decided to write about this calendar, because it is a great astronomical calendar, but it has been somewhat abused and falsely dated without the care and seriousness it deserves. In order to find the correct dates for the yugas or ages of this Hindu system we will go step by step through the process that we have taken so as to illustrate how this calendar must be dated according to real and true astronomical cycles.

4.1 – Finding the Dates

The ancient scriptures of India provide very specific astronomical data in reference to the events that took place some 5000 years ago. In particular, we meet the astronomical references of the *Mahabharata Epic*, one of the most ancient texts of India which holds on to a tradition spanning 5000 years.³ Fortunately, and unlike many texts of the ancient world, the Brahmins of the time took careful note so as to recall the planetary configurations in heaven when there was a shift of an Age on the calendar, and this has allowed us to recompose this calendar and fix the dates of each Yuga with good precision.

However, it has come to our attention that many false dates have been put forwards concerning this calendar, especially because it has been neglected that the Yugas spoken of in the Manusmrti refer to the Great Cycle itself as an astronomical phenomenon. Other versions who have taken this into consideration have made mistaken astronomical calculations which offer false dates for the Yugas, and the matter is all but simple, but it is best to go over this problem for the sake of transparency and clarity concerning how it is that we will make this calendar work again. If we are to identify where we are in the Great Cycle and what Age or Yuga we are currently transiting through, we must go over the reconstruction of this calendar step by step and observe some mistakes commonly made concerning it in the past, both distant and recent.

The event which coincided with the turning of the age in Hindu history is the Mahabharata or *Great War of the Bharatas*. Such is the name of the most famous Epic of Ancient India compiled into several books which include the most famous of all sacred texts in India, the *Bhagavad Gita*: the Gospel of Lord Krishna.

The scriptures of the Mahabharata relate how the Pandava clan battled against the Kuru clan in the regions of Northwest India known as *Kurushethra* over 5000 years ago. The epic is the story of this battle and its outcome which concluded with the turning of a Yuga and Lord Krishna's disappearance from our world.

The scriptures state that the Mahabharata war ended with a victory for *King Yudhishtira* and the *Pandavas*, whereas the King and the clan inherited the great kingdom of Ancient India after the unjust occupation of the throne by Duryodhana and the Kurus. After the war was over and the Pandavas defeated the Kurus, King Yudhishtira ruled for some 26-27 years, but after this time the king decided to abandon his Kingdom and retired to the Himalaya Mountains in order to search for higher spiritual wisdom. The decision was carried about because Lord Krishna –the great incarnation or avatar of Vishnu– had decided to leave this world after staying here for 120 years. Krishna's departure was seen as symbolic of a higher state of consciousness abandoning the world, and the king then sought to search for higher wisdom in solitude and by the practice of renunciation to worldly desires.

Herein lays the first problem of the story as it is told in scripture. The scriptures state that the Age which dawned 5000 years ago was Kali Yuga: the Iron Age in western cosmology, but as we will seek to demonstrate ahead, it was not Kali Yuga but Dwapara Yuga (Bronze Age) which dawned at that time some 5000 years ago, and we will have good opportunity to demonstrate why.

The scriptures of the Mahabharata fortunately reveal a very particular astronomical occurrence during the time of the war, and they also mention a peculiar sequence of solar eclipses during that time. Hence, many historians of India have been interested in discovering when this could have occurred based on astronomical calculations, because it would enable one to date the Mahabharata war with great precision as long as the planetary configurations described in the text are found to match the particular dispositions of the planets at a given date. According to experts on the subject, such as Dr. S. Balakrishna, the Mahabharata war took place in the year 3129 BC. Following the astrological descriptions of the Mahabharata text, and by following the statements of a 27 year reign for King Yudhishtira, Balakrishna concludes that in the year 3102 BC the age would have shifted on the Hindu calendar.

The manner in which Dr. Balakrishna fixed this date will help us get a glimpse at how astronomy plays a fundamental role in determining historical dates when sufficient information is given in a given text. Firstly, there is mention in the Mahabharata texts of an anomalous 13 day interval between eclipses. Normally, a Solar Eclipse is followed by a Lunar Eclipse (or vice versa) with a 14-15 day margin, because the moon needs to make it halfway around the zodiac between one eclipse and the other. In order to have a 13 day margin between eclipses as we find in the text, there needs to be a very specific coincidence between the geometries

³ The texts of the Mahabharata are not as old as the story itself. Much of the ancient wisdom of India and the millenary traditions they embody have actually been written down in Sanskrit much later in time compared to the times from which the tradition itself speaks of. For example, the Mahabharata relates an occurrence dated to around 3100 BC, but it was actually written down as late as 400 BC and made to constitute a specific book or collection of texts as late as 400 AD.

of the Moon, Earth, and Sun, but there must also be a very specific geographical location for the observer to bear witness to only 13 sunrises between two consecutive eclipses. It is indeed, very rare to witness two eclipses in 13 days, but it is nevertheless something that can happen and the Mahabharata text does specify that a rare 13 day interval between eclipses took place when the Mahabharata war occurred.

With this information at hand, Dr. Balakrishna sought to reveal which date in history this event refers to. Knowing the geodesic coordinates for Kurushetra, any modern astronomical software is capable of simulating the patterns of heaven for that location.

Now, the Gupta Period sage **Aryabhata (c.476 - c.550 AD)** had already made a calculation of the time of Mahabharata war and the shift of the Age by which he came up with the date of **February 27, 3102 BC**.⁴

In our own days, Dr. S. Balakrishna sought to verify this dating using the latest knowledge of astronomy and modern software. So Dr. Balakrishna took all the eclipse pairs that could have served as candidates for the 13 day interval and found that the Solar Eclipse of August 11, 3129 BC and the lunar eclipse of September 25 of the same year were the actual dates referenced in the Mahabharata scripture. Then, 27 years later, when Lord Krishna departed from our world according to the Mahabharata scriptures, the age is said to have shifted and so Dr. Balakrishna related his calculations to those of Aryabhata quite nicely. The problem is that both Aryabhata and Balakrishna are unaware of the yuga's relation to the Great Cycle of precession, and Aryabhata in particular made inaccurate calculations for the lengths of the ages.

Aryabhata was a very celebrated intellectual in his days, but he actually made a gross mistake concerning the length of the Yugas. The Manusmṛti had been compiled some 400 years before the time of Aryabhata, and it clearly suggests the division of the Great Cycle as we have exposed with the 4:3:2:1 ratios for Krta, Treta, Dwapara, and Kali Yugas. Moreover, in the Manusmṛti, the Kali Yuga is clearly stated to last some 1200 years and no longer, but when Aryabhata went on to figure what age was actually passing by in his own time (around 400-500 AD), he was faced with a serious problem.

Aryabhata knew that he was in the Kali Yuga or Iron Age from earlier references, but he could not understand why the scriptures spoke of Kali Yuga commencing in 3102 BC at the time of the Mahabharata War. When he calculated the time passed between his days and 3102 BC, he naturally came to a length of some 3600 years, and this could not be true considering that the Kali Yuga was not meant to last more than 1200 years... Thus Aryabhata could not comprehend why the Manusmṛti only gave 1200 years for the length of Kali Yuga whilst the Mahabharata epic stated that Kali Yuga had begun over 3600 years from his time. There was an obvious mistake in the records, but Aryabhata failed to recognize it and instead attributed the mistake to the Manusmṛti's values for the Yugas.

In this confusion, the mentioned astronomer made a further fault by imagining that the Manusmṛti was actually speaking of "years" as periods which should be multiplied by 360: a completely invented figuration which is still used today, most unfortunately we might add, by many scholars of Hindu texts. A reading of the passages in the Manusmṛti that mention the Yuga cycles will make it clear that this multiplication by 360 is definitely not a solution to the problem faced by Aryabhata, but the astronomer nevertheless multiplied the original values of each age by 360, making the monstrous and absurd figures one most often finds in reference to the yuga system today.

For example, the Kali Yuga, originally measured at some 1200 years according to the Manusmṛti text was, after Aryabhata's change, supposedly 432,000 years in length !!! It becomes obvious at this point that the calendar loses all links to the actual astronomical cycle of precession it was originally based upon by these miscalculations. The Kali Yuga was originally made to be 1/10th of the Great Cycle, but after Aryabhata's mistaken multiplication by 360 for each age, the whole calendar became corrupt because it became completely departed from its real astronomical origins.

What Aryabhata failed to recognize was that his estimated turn of the age in 3102 BC actually commenced the Dwapara Yuga, not Kali Yuga, and that the mistake had crept into the records of the recording of the Mahabharata scriptures... This was the problem which Sri Yuktesvar Giri, the guru of Yogananda, noticed and pointed out in the late 19th century.

Surely enough, Aryabhata, after having multiplied the original values by 360 could now fit his 3600+ years for Kali Yuga into the scheme quite comfortably, but through that single arithmetic maneuver he managed to ruin the astronomical link between the precessional cycle and the yuga calendar, and at the same time he delivered a completely false set of values for the ages.

This mistake by Aryabhata crept into some of the most sacred scriptures of India such as the Puranas. Even though the spiritual and philosophical value of the Puranas and Mahabharata texts are unquestionable, their dating mechanism for the Yugas is completely distorted. The values of the Yugas, being multiplied by 360

⁴ Burgess, E., *Translation of the Sūrya-Siddhānta: A Text-book of Hindu Astronomy* (1860), p.18.

leave monstrous periods which hold no basis on astronomical cycles whatsoever. Thus, the original astrological analogy between the Yugas and the Great Cycle of precession was no longer appreciable because of the absurdly long estimates made by Aryabhata some 1500 years ago.

Here are the mistaken values compared to the ones given in the Manusmrti for reference:

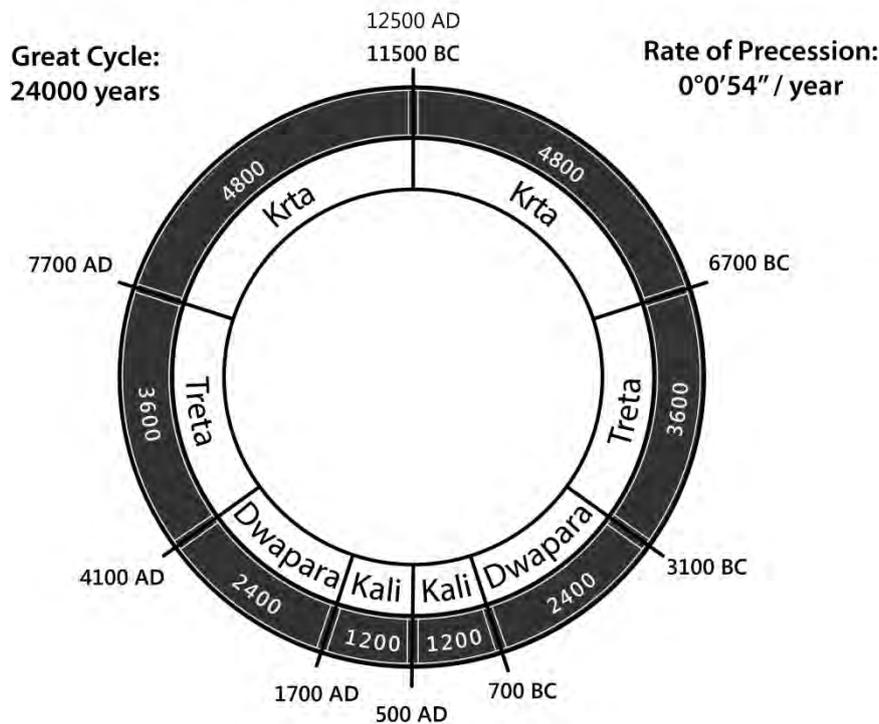
Yuga	Original		Aryabhata
Maha	24000	x360	8,640,000
Daiva	12000	x360	4,320,000
-	-		-
Krta	4800	x360	1,728,000
Treta	3600	x360	1,296,000
Dvapara	2400	x360	864,000
Kali	1200	x360	432,000

Aryabhata performed an operation which would estimate the amount of days, and we will later come back to dating by days when we go over the methods of the Mayan calendar and Distance Numbers.

In 1894, Sri Yuktesvar Giri noticed this mistake of Aryabhata and tried to fix it by returning to the original values provided in the Manusmrti. He also linked the Yugas back to the Great Cycle of precession, and this was a great breakthrough in bringing back this calendar to its appropriate arrangement.

However, Sri Yuktesvar correlated the calendar taking the Manusmrti values literally, and this brought forth a correlation to the Yugas or Ages which is once again mistaken: this time in the *dating*.

Sri Yuktesvar's Dating



The original mistake concerning the age which shifted around 3100 BC was never attended in his arrangement either, and this brings inevitable flaws to the Yugas and their appointed dates as Sri Yuktesvar presented them in his 1894 book the *Holy Science*. Even Balakrishna and other scholars faced with the challenge of fixing this ancient calendar with true dates and periods have passed by the fact that it was not the Kali Yuga which commenced around 3100 BC, but rather the Descending Dwapara Yuga. We noticed this fundamental problem by observing the dates given by Yuktesvar himself in 1894.

It is awkward to see how Yuktesvar correlated the calendar so as to show 3100 BC as an anchor date for the beginning of Descending Dwapara, yet he makes no mention to how Aryabhata's estimates had already signaled this time mistakenly addressing the beginning of Kali Yuga. After reading Yuktesvar's work on the issue, it is obvious that he overlooked the true historical facts concerning the history of Ancient India. For example, he believed that the Mahabharata war had taken place in 700 BC, when this is clearly not the case. Throughout the 20th century, the history of Ancient India has been recomposed showing quite clearly that the Mahabharata Epic refers to the pre-vedic period of 3100 BC, and this is attested by astronomical calculations as well as King Lists recovered from India which makes Yuktesvar's arrangement impossible.

Today we know that the Kuru kingdom prospered in India during the Vedic period, and it is believed to have begun around 1200 BC and ended in 500 BC.⁵ Sri Yuktesvar thought that the Kurus had begun their rule in 700 BC with their first king known as Parikshit, and the reason was that he believed the end of the Mahabharata war had initiated the Kali Yuga (as the Mahabharata epic and Puranas state). It is obvious that the Mahabharata and Puranas mistakenly relate the beginning of Kali Yuga after the war when in fact it was Dwapara yuga that begun in that time. But as if these oversights were not enough, Yuktesvar furthermore presented mistaken dates for the yugas themselves based on flawed astronomical calculations.

We explain how this is so.

Yuktesvar took the Great Cycle to be of 24,000 years, meaning that the precessional displacement of the solar Cross should be estimated at a rate of $0^{\circ}0'54''$ per year. But this is totally incorrect, for the actual displacement is of $0^{\circ}0'50.29''$ per year, leaving some 25,770 years to fulfill the entire Great Cycle. The estimation of the Great Cycle is a complicated subject, because we know it varies in time and the calculations are very sensitive.

Sri Yuktesvar mistakenly estimated his own time of 1894 AD to coincide with Ascending Dwapara 194, meaning that he believed Kali Yuga had ended in 1700 AD. This is, however, a mistake we will emend shortly when we date the yugas according to true astronomical phenomena. Yuktesvar's chronometry of $0^{\circ}0'54''$ per year for the precession of the equinoxes makes the estimates in his model to run too quickly; his clock is running too fast and out of sync with the Great Cycle of precession itself: the very astronomical cycle to which the Yuga Calendar is originally based upon, and this error is found in his taking the precessional cycle to be 24,000 years when in fact it is longer.

The basis of chronometry for the Great Cycle and its true values depend on astronomical observations and calculations which are quite delicate and require an in depth study of the Solar system's cycles. It is a study which Yuktesvar unfortunately did not make, leaving a mistaken correlation of this sacred calendar since 1894 AD, despite having noticed Aryabhata's earlier mistakes and having observed that the yugas are related to the precession of the equinoxes.

The basis of Yuktesvar's miscalculation stems from a problem concerning ancient astrology. It was common in ancient days to use *rational numbers* and discard irrational values in arithmetic formulas. The figure of 12,000 years given in the Manusmrti as the value of the Daiva Yuga or half precessional cycle should not be taken literally, but only as *a model*, that is, *a rational approximation* that would expose to any astronomer that the cycles of the yugas hold a synchrony with the Great Cycle or precession of the equinoxes.

When we encounter the 360 day year in ancient texts, we know it refers to the cycle of the Solar Year, even though 5 days are left out, but if we are to make actual estimates for the length of each yuga, the 360 day rationalization for the solar year will bring about serious errors in long period dating. With respect to these rational numbers, the same may be said for the Yugas which are estimated in the Manusmrti according to a perfect 24,000 year cycle of precession. As we will see later, the Mayan approximation of 26,000 years and their use of a 360 day period exposes a similar problem that contemporaneous scholars have not been able to understand and interpret correctly. This problem of ancient rationalizations of astronomical data has inevitably resulted in modern interpreters making mistaken calculations based on miscomprehensions of the reasoning behind the ancient sciences.

Now, after going through these problems with the Hindu Yuga Calendar, it became evident that the true dates for this calendar have never actually been found. While modern scholars such as Dr. Balakrishna neglect the mistake of the actual Yuga or Age which was set in motion around 3100 BC, the followers of Yuktesvar's fix have failed to notice how his chronometry based on a literal estimation of 24,000 years is flawed. The followers of Aryabhata's huge estimates for the yugas are also mislead, and the reader will notice that this is

⁵ It is obvious that this estimate of 1200 BC is a modern historical guess. If we take the relation of the Mahabharata about king Parikshit's reign beginning after the Mahabharata war, it is obvious that his reign begun between 3100 and 3000 BC.

quite a mess... One could notice with this example how the Kali yuga seems to affect us in our understanding of archaic knowledge like this.

Today, most descriptions of this calendar continue to state that 3102 BC initiated a Kali Yuga of 432,000 years in accordance to Aryabhata's estimates. This would mean that 2000 AD would leave another 426,898 years for the darkest period of the cycle to be completed... As Yuktesvar states in his *Holy Science*, this prognostication is "fortunately not true", and it is simply a flaw appended to the Yuga system by Aryabhata some 1500 years ago as we have just noticed earlier. Despite this mistake, Aryabhata did notice that the Mahabharata war had occurred around 3102 BC: a rather correct estimate as we will see later on. However, he (like Yuktesvar) were convinced that the end of the Mahabharata war had commenced the Kali yuga, when it had actually commenced Dwapara yuga.

The problem at hand unfortunately extends to the fact that even the most prominent of gurus from India, like Swami Prabhupada, for example, have overlooked this issue and have thus provided false values for the Yugas in their relations of the outstanding doctrines of Hindu philosophy and religion. Although the most important aspects of the texts which are of a spiritual nature are not affected at all by the errors in calculation of the yugas as historical references, the dates for the yugas themselves are definitely mistaken, both by Aryabhata's estimates as those of Yuktesvar.

The unfamiliarity of sages of India with astronomy seems to be the fundamental cause of such errors. The Puranas exhibit the same flaws of Aryabhata's calculations, whereas the Mahabharata text already places the beginning of Kali Yuga in the epoch of the Mahabharata war. The Manusmrti is the sole source among these which suggests a link between the Yugas to the Great Cycle of precession, but it was Sri Yuktesvar Giri in 1894 AD who made the link to the precessional cycle and hence opened the way to the reconstruction of this long lost science. The matter is not precisely simple as it concerns the most valued scriptures of India, and the opinions of highly estimated gurus of that noble country in relation to the ages and periods of the yugas themselves.

For example, it is sometimes stated that the ancient texts of India relate estimations for the age of the universe that is quite similar to our modern studies of astrophysics and the Big Bang theory, but in reality such large estimations of billions of years really come from the mistaken calculations by Aryabhata wherein he multiplied the original figures of the yugas by 360... The very long periods of Aryabhata are found repeated in the Puranas, but these figures do not appear in the Mahabharata. As we have said, the Manusmrti offers the original values without Aryabhata's multiplication by 360, and this in itself shows that the Puranas are compositions that were written after Aryabhata's time... It should be noted, however, that the Mahabharata epic, the Manusmrti, and the later Puranas are all Kali yuga texts, meaning here that they were all composed in the Kali yuga. The Vedas, on the other hand, and the brilliant Upanishads are Dwapara yuga compositions.

Here in this first presentation of the yugas, the reader might become confused because of the many mistakes that have crept into this calendar. In any case, it is important to note that everyone implied in making a mistake has in fact helped enormously in recomposing the yuga system. Even though Aryabhata multiplied the figures and made a mess of the values in this sense, he nevertheless calculated the Mahabharata war to around 3102 BC, which as we will shortly see is quite correct.

In the second case, Sri Yuktesvar fixed Aryabhata's mistake and noticed that this is a calendar based on the precession of the equinoxes. However, he mistakenly attributed the Manusmrti values instead of fixing real astronomical values related to the precession of the equinoxes, and he was also confused about the dates of historical events such as the reign of king Parikshit. What both scholars failed to notice is that the end of the Mahabharata war brought forth the descending Dwapara yuga, not the Kali yuga as most texts (including the Mahabharata itself) propose. The error crept into the Mahabharata itself because it was composed in Kali yuga, and the authors thought it was the very same age as theirs which the end of the war and Krishna's departure had brought forth, when in fact it was Dwapara yuga around 3100 BC. Aryabhata noticed this problem, but instead of believing the scriptures to be mistaken in this sense, he thought they were mistaken in the lengths of the yugas.

Sri Yuktesvar was also confused by the relation of Kali yuga setting in after the end of the Mahabharata war, so he had to guess a 700 BC date for the war which as we know is impossible. Today, in our own time, Dr. Balakrishna made a very interesting dating attempt for the Mahabharata war, and this is what we will look into next in order to set these problems straight once and for all.

4.2 - The Mahabharata Eclipse Cycle

The Mahabharata eclipse cycle is about a very rare astronomical occurrence of 13 days between eclipses that is registered in the ancient Mahabharata epic of India. Thanks to the information recorded in antiquity by astronomer priests in the Mahabharata epic, we can today recompose the dates in which the historical clash between the Kurus and Pandavas took place.

Dr. S Balakrishna⁶ estimated that the rare occurrence of 13 days between eclipses related in the refers to an actual astronomical event witnessed initially on **Aug. 11, 3129 BC** from the location of **Kurukshetra, India, (30 N, 77 E)**.

The method used by Dr. Balakrishna in order to determine the historical date of the Mahabharata War of ancient India is very ingenious and shows how important astronomical information can be from an archeological point of view in recomposing our human history.

The ancient scriptures of the Mahabharata speak of a rare astronomical phenomenon which is the sighting of two successive eclipses with only a 13 day interval between them. Since the moon needs to revolve at least half way around the Earth before another eclipse may occur, it is generally between 14 and 15 days before the Sun, Earth, and Moon are configured to produce subsequent eclipses, but the text of the Mahabharata epic speaks of the rare occurrence of only 13 days of interval between eclipses. The phenomenon is noted in the text to be rare, and it is clearly not a mistake or a slip in the relation.

What Dr. S. Balakrishna has done is pinpoint several moments when this phenomenon can in fact occur according to the modulations and variations of the Moon's orbital parameters. His analysis, Dr. Balakrishna shows that although there are many candidates for the occurrence in our history, one needs to be reminded that the actual observation was made in India, and in a specific geographic location, and this diminishes the candidates quite considerably. Since many of the 13-day anomaly possibilities could not be observed from Kurushethra, Dr. Balakrishna singled out the solar eclipse of **Aug. 11, 3129 BC and the following Lunar Eclipse of Aug 25 which occurs before the 14th sunrise.**⁷

Now, in studying Dr. Balakrishna's work carefully, we will appreciate that this dating of 3129 BC for the Mahabharata eclipses has two important problems. First, the lunar eclipse of Aug 25, 3129 BC is not visible from Kurushethra as it occurs below the horizon, and second, the Mahabharata text offers a number of further astronomical details which do not fit the dates proposed by Dr. Balakrishna.

For example, the astronomical references given by the Mahabharata text⁸ explicitly state that Jupiter and Saturn are in conjunction under the same constellation, and this was the first sign of trouble in Balakrishna's correlation. In the year 3129 BC –where Dr. Balakrishna sets the 13 day eclipse anomaly- there was no Jupiter-Saturn conjunction, and we also see that the mention of Mars near the star Regulus in the Mahabharata script is also missing in this correlation to the Gregorian date of 3129 BC which Dr. Balakrishna attributed to the Mahabharata eclipses.

There are, in fact, a number of details referring to planetary positions given by the texts and none of them match the date provided by Dr. Balakrishna. Hence we decided to continue on Dr. Balakrishna's work, and we payed special attention to the description of Jupiter and Saturn in conjunction since it was used by the Gupta period astronomer Aryabhata to determine the approximate date of 3102 BC for the Mahabharata War. However, we observed that the most important Jupiter-Saturn conjunction in the constellation of Capricorn according to the texts falls on a date of December 7, **3105 BC**. This information about the position of Jupiter and Saturn is crucial in determining dates in long-term periods like the *yugas* of India because they allow us to pinpoint the precise year in which the astronomical event was observed.

Next we describe a synthesis of the astronomical information provided in the Mahabharata texts, but translated to western astronomical terms:

⁶ Dr. Balakrishna's work can be found online: <http://www.vedicastronomy.net/mahabharatha.htm>

⁷ The idea of 13 days means 13 sunrises, so the Lunar eclipse occurs before the 14th sunrise.

⁸ These 18 pieces of data are analyzed in depth at the end of this work and are presented so the reader who is curious might corroborate the information with astronomical software.

Ascending Lunar Node approaches the Sun.
Descending Lunar Node beyond Spica (α Virgo).
A Fierce Comet rises in Cancer.
Mars around Regulus (α Leo).
Jupiter in Capricorn.
Saturn in Capricorn.
Venus near α Andromeda.
Venus and Mars in conjunction under Pegasus (Pisces in the Zodiac).
Descending Lunar Node in Scorpio.
Pole Star is blazing fiercely (α Draconis at the time)
Moon and Sun near α Taurus.
Mars in Cancer and in opposition to Jupiter Capricorn (Mars in Cancer).
Jupiter and Saturn stationary in Libra.
13 Days between Eclipses.

As we can see, the 13 day eclipse is only one among many astronomical references that allow us to know what time it was when the Mahabharata war took place about 5000 years ago. The analysis of the text clearly shows that **the scripture dates several astronomical events, not one single event, and herein is the true genius of the description of the ancient texts.**

If the texts were to determine one single planetary configuration, then looking for this event would be practically impossible, but since the Mahabharata texts give *several* planetary configurations for the same planets, we are helped in pinpointing a more certain location in time where we must look. In order to find the date, one needs to search for a matching planetary configuration along with the 13-day eclipse anomaly.

For example, the notion of a fierce comet in Cancer is most probably referring to the most famous of comets: the one we know today as Halley's Comet. This comet is known to make itself recurrently visible in the constellation of Cancer after it returns from its long parabolic orbit around the Sun. Its period is between 75 and 76 years, so the sight of Halley's Comet is literally a once in a lifetime event. As we see in the in depth analysis of the data at the end of this work, this sighting of Halley's Comet 5000+ years ago may be calculated to have happened sometime around 3105 BC with some degree of error which is somewhat considerable and clearly insufficient to settle a date. But since there are clear planetary configurations that need to be met, the uncertainty factor will hopefully be diminished until we can speak of a match of all or at least an abundant majority of the events described.

Mars, for example, has three different positions in the texts: one in Leo (4), another in Cancer (12), and another in conjunction with Venus (8). The latter is said to have occurred in our Zodiac sign of Pisces, and this indeed happened on April 4, 3106 BC. Later, in time, in the year 3105 BC, Mars would circle around the Zodiac passing through Cancer to reach its fundamental location in Leo as is suggested by point (4).

Jupiter and Saturn are mentioned to have two locations, and as we already mentioned, this is essential in knowing the period in question is correct. The description of points 5 and 6 fit the gas giants in Capricorn while the other (13) is in Libra. **Knowing about the triangular configuration of conjunctions between Jupiter and Saturn, it is easy to see that the Great Conjunction of Jupiter and Saturn according to the text of the Mahabharata epic was falling in the Zodiac Signs of Capricorn, Libra, and Taurus. These Great Conjunctions happened in the years 3144 BC (Libra), 3124 BC (Taurus), and 3105 BC (Capricorn).**

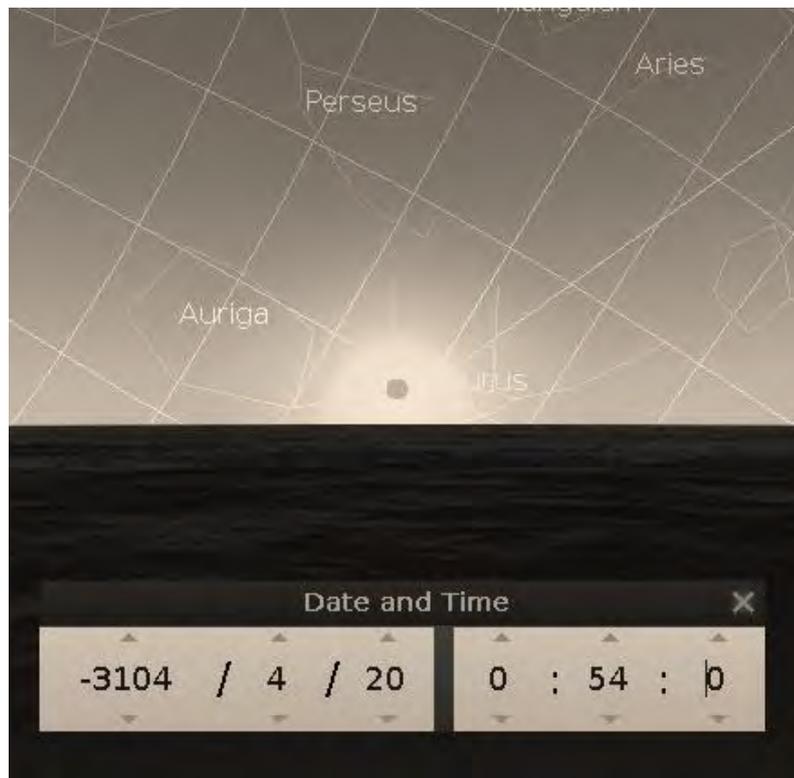
With this information we can attain the date for the switch of the Age in the traditional history of India with an accuracy pinpointing the year, but the last piece of data about the 13 day eclipse phenomenon allows us to find the very month and day of the sighting. As we have seen quite briefly, the position of Mars near the star Regulus (α Leo) in 3105 BC and the Great Conjunction between Jupiter and Saturn in Capricorn which also falls in 3105 BC point to the fact that this is probably the year of the phenomenon. But did the 13-day eclipse anomaly occur in this year? The answer is *yes*,

and in perfect conditions which allow for both the solar and lunar eclipses to be sighted from Kurushethra, India (30 N, 77 E).

The texts says (11) that the Sun and Moon are to be located in Taurus, or more precisely, next to the star Aldebaran (α Taurus) which is the eye of the Zodiacal Bull. This Soli-Lunar reference gives us a notion of where the Solar Eclipse took place in the Zodiac, and it moreover shows us the place of the year which is during the first Full Moon after the Vernal Equinox.⁹

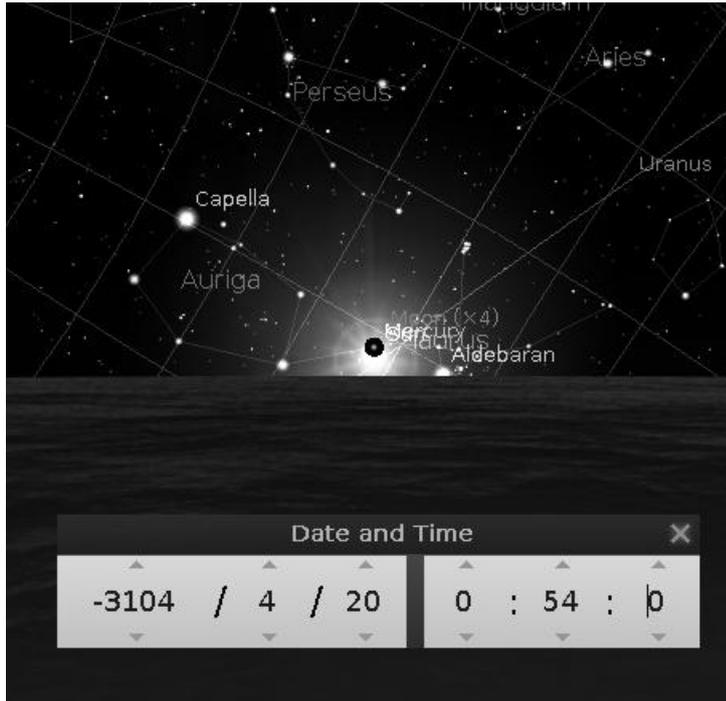
One more piece of evidence in the texts hinted that the 13 day eclipse occurred “from the first lunation”, that is, on the first New Moon after the Vernal Equinox, and with all this information at hand, it was not all that difficult to locate the precise date given in the Mahabharata texts.

We stand at the geographical location of Kurushethra, India on **April 20, 3105 BC**. It is the first New Moon after the Vernal Equinox where the indicated Solar Eclipse is indeed seen to occur right at the break of dawn as modern astronomical software *Stellarium* shows. The Sun rises that day partially eclipsed by the Moon, and, as expected, and in complete accordance to the indications of the Mahabharata texts, there are precisely 13 days between this Solar Eclipse and the next Lunar Eclipse of May 3 which occurs right before the 14th sunrise. On May 4, 3105 BC (third image), the shadow of the Earth partially eclipses the Moon as it comes to descend below the horizon, offering any astronomer of the time the unique opportunity to actually witness two eclipses within the margin of a 13 day (sunrise) interval.



Simulation of the sunrise at Kurushethra, India, on April 20, 3105 BC (or -3104 in Astronomical Year dating).
The sun rises eclipsed in the morning.

⁹ The Vernal Equinox was placed in Taurus 5000 years ago which confirms that the date in question is neither more recent nor older than 5000 years before our time.



The solar eclipse occurs in Taurus. The eye of the celestial bull –the star Aldebaran– marks the location of the equinox point and the Hindu asterism of Rohini. The eclipse occurs on Rohini as the original text says, but also on the first new moon of the year as the Mahabharata text also makes specific.

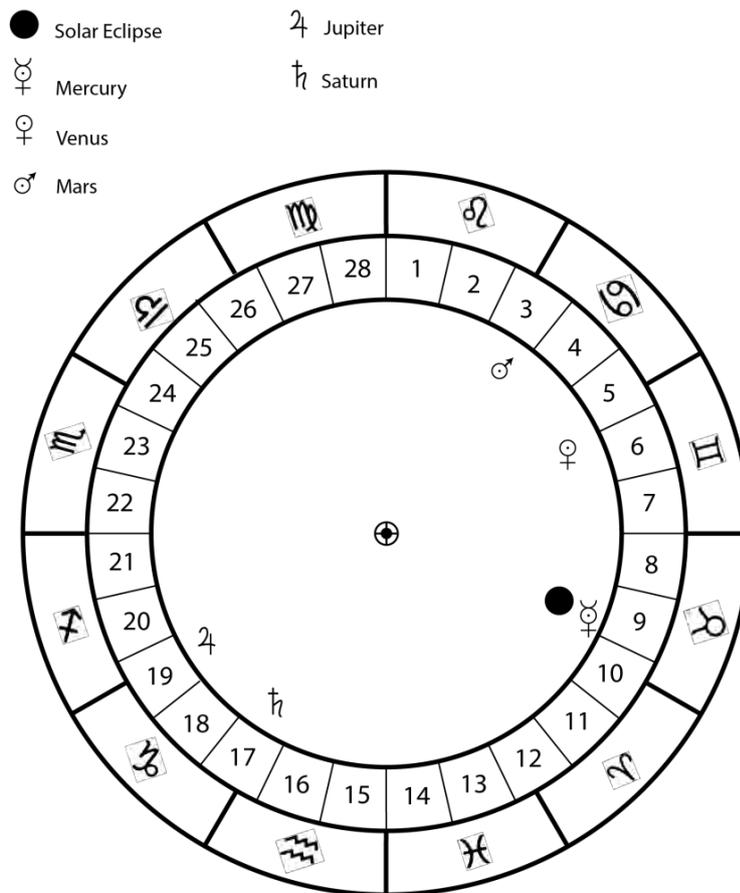


Right before the 14th sunrise, the Moon begins to be overshadowed by the Earth with a red hue appearing just before it descends below the horizon, and this makes for the Lunar Eclipse falling within 13 days (sunrises) according to the testament of the Mahabharata.

There is no question from the descriptions offered in the Mahabharata that the date given for the event that signaled turning of the Age is **April 20, 3105 BC**. It is the only date that matches the planetary configuration of the texts: Mars next to α Leo (Regulus), Sun and Moon next to α Taurus (Aldebaran), and both Jupiter and Saturn (in Capricorn) will come into full conjunction that year on December 7.

The next day after the solar eclipse, **April 21, 3105 BC would be the very first day of the Bronze Age or Dwapara Yuga in the Great Cycle**, and not Kali Yuga or the Iron Age as is commonly repeated based on mistaken records.¹⁰

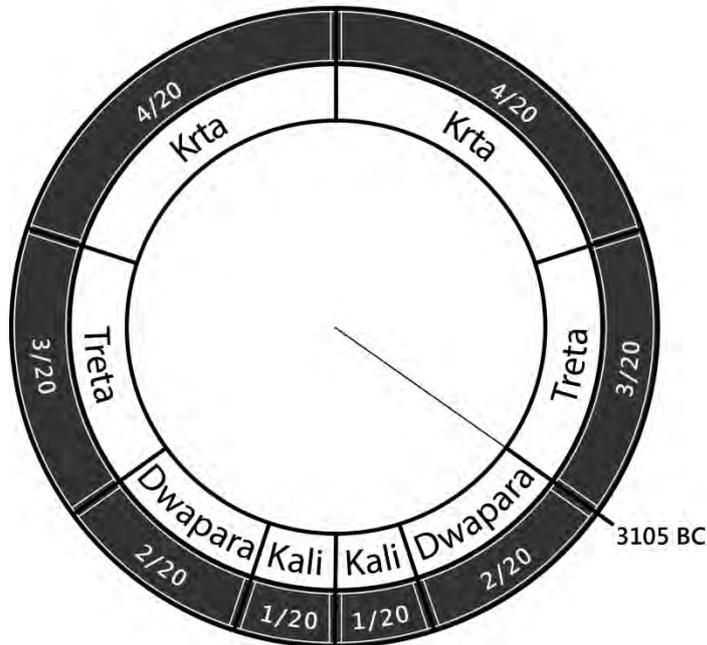
Planetary configuration on April 20, 3105 BC.



The Mahabharata Texts use the 28 Nakshatra system based on observation of Sidel Lunar Cycles. The coordination of this with the Mesopotamian Zodiac System still in use today. Thanks to the specific data in the Mahabharata Books 5 and 6 (Udyoga & Bhishma Parvas, we were able to locate the specific moment with modern astronomical software.

¹⁰ For a thorough examination of the Mahabharata texts and the astronomical correlation, see our work online: *Dating the Mahabharata War to 3105 BC: Astronomical references in the Ancient Texts of India*.

Anchor Date for Descending Dwapara Yuga:
April 20, 3105 BC



With this anchor date of 3105 BC set as an anchor date of reference, we can begin to reconstruct the dating system of the Great Cycle of precession according to real astronomical phenomena. But before we fix the dates properly, we must introduce the reader to the basic techniques used to set dates according to real astronomical phenomena, and we will learn as we did, by studying ancient calendar systems.

Next we will learn how to chronometer the Great Cycle by Great Conjunction cycles as we go through the basics of the Mayan calendar and its relation to astronomical cycles.