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# The Conception of Time in Maya Cosmology

**Bakalářská práce**

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# Content

# Introduction

Maya were one of the great civilizations of the Middle America. They lived in the regions of Mexico, Guatemala, Belize, El Salvador, and Honduras. Mayan history reaches back some 4,000 years to what is called the Pre-classic period, when civilization first began in Central America. However, it was during what came to be known as the Classic period (AD 250 to 900) that Mayan culture reached its peak and the Maya achieved their celebrated advances in architecture, mathematics, agriculture, astronomy, art, and other areas. What is my main interest in my work is the conception of time of this great civilization. In 19$^{th}$ century, the study of Maya science and religion has progressed by leaps and bounds. Archaeologists continued to uncover ancient ruins and excavated thousands of carved monuments, jade artifacts, rich burial tombs, painted ceramic vases, and examples of the hieroglyphic writing invented by the Maya. Scholars made enormous progress deciphering the Maya script. Specialists can now read almost all of these hieroglyphs, which reveal detailed histories for each Maya kingdom. In addition, scholars found and deciphered sacred texts that described events that occured during the world's creation and successive recreations. Maya creation myth describes those astronomical events. The Creation myth of the Maya, the Popol Vuh, recounts the adventures of their most important deities and culture heroes. Since these Maya deities represent astronomical objects such as stars and planets, their activities thus describe astronomical processes. These processes were inscribed via complex system of calendars which were fitting together in several calendar rounds. What is most important about Maya conception of time was its cyclical nature. Because of this nature of time, Maya engaged into several activities to ensure the renewal of the cycle.

In my thesis I want to mainly focus on the system of measuring each time period and it's cosmical paralell. To understand the cyclical conception of time, I think it is very important to describe our (European) vision of time as well. Compared to cyclical conception of time in Maya culture, European cultures (represented mainly by Christian and Hebrew heritage) had the conception of time quite opposite. That is why, in the first two chapters, I concentrated on conception of time in European philosophy. I wanted to describe the evolution of liner conception of time as well as the development of time measurement. I concentrated on the development of calendars as well as on aparatuses of time measurement. In chapter three I tried to outline the historical evolvement of Maya society. I think, the economics, social structure and political history are essential units of understanding the culture of Maya. In 4th, 5th and 6th chapter I concentrated on cosmology and world creation myth of Maya as well as on the description of their calendar system. At the end I tried to interpret the conception of the time which is coming out based on Maya cosmology and calendars.

# Chapter 1: The conception of time

The way that people interpret time is neither universal but it depends on various factors including culture and religion. In general, time is viewed in one of two ways, in the form of a line or in the form of a circle. The concept of time as a circle is an ancient one that has been incorporated into the mythology and religion of numerous cultures, from the Mayas and Aztecs to Hindu culture . Though different in description, each believes in some form of continuous time, either through life after death or rebirth. Others view the endless circle of time from the perspective of the universe as a whole. Whether concerned with human life cycles or the potential life expectancy of the world as we know it, the spinning and rotating of days and millennia have been noted by people of varying religious beliefs and cultural backgrounds since the beginning of time. The Hebrew view of time also includes the concept that time moves from event to event in a line towards a goal. The goal is always the future, yet the goal intended by God is always to be fulfilled in history. Bible prophecies frequently have both an immediate and a long-term fulfillment. In the Bible, sins are seen to have consequences that follow inevitably, moral choices lead to measurable results for good or for ill, and history proceeds towards the definite outworking purposes of God. In both ancient Greek culture, (among the Pythagoreans, Stoics and Neoplatonists)[1], and in Hindu culture (especially during the Vedic period, 1500-600 BC), one runs onto the concept of circular, or cyclical time. This is sometimes symbolized by the uroboros, the snake chasing his own tail. In this view of time, the beginning leads back around to the end, and the cycle starts all over again. The Babylonians, ancient Chinese, Aztecs, Mayans, and the Norse had cyclical calendars.

[1] Sokol Jan, Rytmus a čas, Praha 1996, pg. 37

Some religions such as Judaism and Christianity are based on a creation story where time begins in the act of creation.[2]

Greek philosopher, Zeno of Elea, gave a number of paradoxes which indicated aspects of time. In the paradox 'The Arrow' the argument rests on the fact that if in an indivisible instant of time the arrow moved, then indeed this instant of time would be divisible. [3]

Aristotle held that time and motion were independent, movement being measured by time and time by movement. He recognized that time cannot cease, whereas motion can except for the motion of the heavens and concluded that time must be associated closely with this motion, which he regarded as the perfect example of uniform motion. For Aristotle to deny that now exists as an instant which divides the past from the future seems also to go against intuition. On the other hand if the instant now does not exist then the arrow never occupies any particular position and this does not seem right either.[4]

Plato argued that time was created when the creator fashioned the world from existing material, giving form to primitive matter. Plato argues in the Timaeus that the creator: *„sought to make the universe eternal, so far as might be. Now the nature of the ideal being was everlasting, but to bestow this attribute in its fullness upon a creature was impossible. Wherefore he resolved to have a moving image of eternity, and when he set in order the heavens, he made this image eternal but moving, according to number, while eternity itself rests upon unity; and this image we call Time.*"[5]

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2 Sokol, Jan, op.cit.,pg. 69
3 Sokol, Jan, op.cit.,pg. 38
4 Sokol, Jan, op.cit, pg. 43
5 Timaeus by Plato. In Project Gutenberg. [cit. 2009-05-10] available at <http://www.gutenberg.org/files/1572/1572-h/1572-h.htm>

According to Plato then, time was created at the same instant as the heavens. Aristotle however, argues against Plato's idea that time was created. His ideas relate time to motion. In a sense this is reasonable since to Aristotle time was measured by the motions of the heavenly bodies so a period of time was represented by the movement of the sun across the sky. Other ways of telling time such as the water clock and the hour glass also identified time with movement, in these cases movement of water or sand. There is an argument, claims Aristotle to say that time does not exist, for the past no longer exists and the future does not yet exist. Having looked at this argument, he rejects it and defines time as motion which can be enumerated. From this we see why he argues against Zeno paradox. For Zeno, the arrow cannot move for it does not move in the instant. However, for Aristotle time itself is motion, the flow of time is the motion of the arrow or of the sun and moon across the sky. [6]

In pantheistic religious systems of thought the universe is often depicted as going through great long epochs of rebirth, growth, decay, and destruction. The Hindu cycles, for example, range from 360 human years, to 300 trillion years (which is the lifetime of the gods before their rebirth). Reincarnation springs from such an Eastern pantheistic point of view.

St. Augustine was among the first to insist on linear time as opposed to cyclical, since he observed that many important events in the Bible clearly happened one time only. He laid great emphasis on the idea that the crucifixion of Jesus Christ must be regarded as a unique event, not subject to repetition, implying that time is linear rather than cyclic. He was also the pioneer of the study of internal, or mental, time. Dissatisfied with Aristotel's close association of time with motion, St. Augustine chose to regard time as an activity of the "soul," or mind, endowed with powers of memory, attention, and anticipation.[7] St. Augustine

[6] Sokol, Jan, op.cit, pg. 45
[7] Sokol, Jan, op.cit.,pg. 55

was responsible for bringing much of Plato's philosophy into Christianity. He agrees with Plato that time begins with the creation. He answers the question of why the world was not created sooner by stating clearly that there is no 'sooner'.

Like Aristotle, St. Augustine questioned whether the past or future really exists. Surely only the present actually exists and this is instantaneous, only measured by its passing. Yet, like Aristotle, St Augustine says how could it be that past and future time does not exist. He tried to answer the apparent contradiction by claiming that past time can only be thought of as past if one is thinking of it in the present. He identified three times. St Augustine had reached conclusions that time does not exist without an intelligent being who is able to think in the present about things past, present and future

Next very significant publication trying to clarify the conception of time came out in the 14$^{th}$ century. It was De proportionibus proportionum by Oresme. In this Oresme discussed whether the celestial motions are commensurable or, expressed another way, is there a basic time interval so that the day, month, and year are all exact integer multiples of it. On the one hand Oresme says one might expect that a creator of the universe would have arranged things so that this is so. He ends his discussion, however, by coming down on the side that no two celestial motions are commensurable.

During the 16$^{th}$ century the solution of problems relating to time became of utmost importance because of its relation to finding the longitude. In an age of exploration on a world scale, determining position became a crucial problem and much effort was put into its solution. The realization that an absolute time standard for the world would allow the calculation of the longitude of any position by comparison with local time was a major driving force in efforts to devise accurate clocks. It also led to a clear distinction in people's minds between an absolute time and a local time.

In the 17th century Galileo discovered a clock in the sky which recorded 'absolute time', namely the times of the eclipses of Jupiter's moons. This was not the only contribution Galileo made to the study of time. Long before his discovery of Jupiter's moons he discovered the fundamental property of the pendulum in 1583. Around 1640 he did design the first pendulum clock.

Descartes used mathematical principles to explain the world and many followed his example. The ultimate version of the mechanical universe appeared in Newton's Principia in 1687. He took the view that time exists independently not only of human minds but also of all material objects, and that it flows uniformly of its own accord. The whole description of Newton's laws depended on time and so he began by defining time as: „*absolute, true, mathematical time,* [*which*] *of itself, and from its own nature, flows equably without relation to anything external''*.[8]

No longer was time determined by the universe, but rather Newton postulated an absolute clock, external to the universe, which measured time independently of the universe itself. With his ideas Newton put time into a new place in mathematics. No longer could time be said to be an illusion as some ancient philosophers had suggested, for now the whole of science was being built on laws based totally on the notion of time.

Not everyone was convinced by Newton's arguments, however, and Leibniz, german mathematician and philosopher, argued against Newton's notion of absolute time using religious reasoning. He regarded time simply as the order of succession of phenomena He believed that God was rational and therefore required a reason for every action. So how could God choose an instant to create the universe? If there was no way to distinguish one time from another, as Newton had claimed, God was faced with an impossible choice to decide rationally on the

[8] Newton Isaac, Mathematical principles of natural philosophy, New York 1846, pg. 79, available at <http://rack1.ul.cs.cmu.edu/is/newton/>

moment of creation. Leibniz used another argument too. If two things are identical in every respect then, claimed Leibniz, they are one. Newton's absolute space and time are identical everywhere at all times by their very definition so Leibniz claimed any two positions are one as are any two times.

The problem of reconciling these different ideas of time was tackled by the German philosopher Immanuel Kant in the 18th century. Kant was an enthusiastic believer in Newton's natural philosophy, but he rejected Newton's idea of time. Instead he argued that time is simply a feature of the way men's minds visualize the external world and is not a characteristic of external reality itself. He reasoned that if time were a characteristic of the world, equally good arguments could be advanced to show both that the world originated and did not originate in time. In view of this contradiction, ant decided that time does not apply to the universe but only to the way in which men think about the universe.

Despite the difficulties which still existed in understanding the notion of time, by the last part of the $19^{th}$ century one would have to say that Newton's universal time had proved extremely effective in providing a basis for laws which had been observed to hold to a high degree of accuracy.

In the 19th century, as a result of the arguments advanced by geological and biological evolutionists, the modern idea of time as linear advancement finally prevailed over the older, cyclic conceptions. Ideas about time have changed dramatically in the $20^{th}$ century. At the beginning of the century time was viewed as Newton’s universal, absolute, mathematical time. There had been remarkable progress towards more and more accurate measurement and at the beginning of the century pendulum clocks had been perfected to the extent that they recorded time to an accuracy of less than $^{1}/_{100}$ of a second error in a day.

In 1898 Henri Poincaré wrote a paper in which he asked two highly significant questions about time. Is it meaningful to say that one second today is equal to one second tomorrow? Is it meaningful to say that two events which are separated in space occurred at the same time?

Although Poincaré was thinking deeply about relativity before Albert Einstein, it was the latter who made the final breakthrough. Einstein decided that time was the whole key to understanding the universe. The impact of the special theory of relativity on the understanding of time was enormous. Einstein required the laws of physics to be the same for any two observers moving at a constant speed, that is not acted on by forces, and also that the speed of light is independent of the speed of its source.

Although the classical concept of universal time has been undermined, modern cosmologists have reintroduced the idea of a worldwide time that is common to an important but restricted class of observers. According to most cosmological theories, there is a preferential time scale at each place in the universe. This scale is associated with the "local" cosmic standard of rest determined by the "local" bulk of distribution of matter for example, the center of mass of the stars in our galaxy. The time scales of the observers associated with these local standards of rest, throughout the universe, "fit together" to form one worldwide cosmic time.

## Chapter 2: History of time measurement

Whether for agricultural, legal, or religious purposes, the ability to measure time was of the utmost importance in all ancient civilizations. The earliest evidence of timekeeping goes back around 20000 years It is and evidence from markings made on sticks and bones in Europe around this time are thought to be records of days between successive new moons. The historical record reveals that approximately 5000 to 6000 years ago great civilizations in the Middle East and North Africa began to make clocks to augment their calendars. With their attendant bureaucracies, formal religions, and other burgeoning societal activities, these cultures apparently found a need to organize their time more efficiently.

One of the key drivers of inventing methods of keeping track of time were the farmers needs to determine the best time to plant. A farmer dependent exclusively on his own perceptions of season is at a grave disadvantage when he plants his crops. A premature warm front, for example, could cause him to plant too early. Conversely, belated warm temperatures might cause him to wait too long before planting, resulting in his crop's destruction by winter frost before harvest time.

In around 3000 BC the Sumerians divided the day into 12 periods, and divided each of these periods into 30 parts. The Babylonian civilization, which grew up around 1000 years later, in the same area of present day Iraq as that of the earlier Sumerians, divided the day into 24 hours, each hour into 60 minutes, each minute into 60 seconds.[9]

Sumerians used sundials which measured the time of day by the direction of shadows cased by the sun. They measured the length of shadows to determine how much time had passed.

[9] Sokol, Jan, op.cit.,pg. 80

It was important for the Egyptians to know when the Nile would flood and so this played a large role in the way their calendar developed starting from an early version around 4500 BC which was based on months.[10] From 4236 BC the beginning of the year was chosen as the heliacal rising of Sirius, the brightest star in the sky. The heliacal rising is the first appearance of the star after the period when it is too close to the sun to be seen. For Sirius this occurs in July and this was taken to be the start of the year. The Nile flooded shortly after this so it was a natural beginning for the year. The heliacal rising of Sirius would tell people to prepare for the floods. The year was computed to be 365 days long and by 2776 BC it was known to this degree of accuracy. A civil calendar of 365 days was created for recording dates. Later a more accurate value of $365^{1}/_{4}$ days was worked out for the length of the year but the civil calendar was never changed to take this into account. These two calendars ran in parallel, the one which was used for practical purposes such as the sowing of crops, harvesting crops etc. being based on the lunar month. The Egyptians, by 2100 BC, had invented a means to divide the day into 24 hours using sundials or shadow clocks to measure the time of day.[11] The Sundial indicated the time of day by the positioning of the shadow of some object on which the sun's rays felt. The shadow clock consisted of a straight base with a raised crosspiece at one end. A scale with time divisions is inscribed on the base. The clock was set east-west and was reversed at midday.

The Egyptians also divided the day into 12 parts as well. They used huge granite columns called Cleopatra Needles, a trio of obelisks, to keep track of time periods. They had 12 marks on the ground that equaled 12 parts of the day. When the sun touched the top, a shadow was created and the length and position of the shadow told the Egyptians how much daylight remained. They invented a portable piece called a sundial. It contained 3 parts: a circular dial, a needle and a style

[10] Sokol, Jan, op.cit.,pg. 77
[11] Sokol, Jan, op.cit.,pg. 83

(gnomon) to keep the needle in place. This was necessary mostly because the Cleopatra's Needles were inconvenient and impractical for the average person.[12]

Another Egyptian shadow clock or sundial, possibly the first portable timepiece, came into use around 1500 BC. This device divided a sunlit day into 10 parts plus two "twilight hours" in the morning and evening. When the long stem with 5 variably spaced marks was oriented east and west in the morning, an elevated crossbar on the east end cast a moving shadow over the marks. At noon, the device was turned in the opposite direction to measure the afternoon hours.

The merkhet, the oldest known astronomical tool, was an Egyptian development of around 600 BC. A pair of merkhets wes used to establish a north-south line by lining them up with the Pole Star. They could then be used to mark off nighttime hours by determining when certain other stars crossed the meridian. The Merkhet, known as the "instrument of knowing" was a sighting tool made from the central rib of a palm leaf and was similar in function to an astrolobe. The merkhet was used for aligning the foundations of the pyramids and sun temples with the cardinal points, and was usually correct to within less than half a degree.

For more year-round accuracy sundials evolved from flat horizontal or vertical plates to more elaborate forms. One version was the hemispherical dial, a bowl-shaped depression cut into a block of stone, carrying a central vertical gnomon and scribed with sets of hour lines for different seasons. The hemicycle, said to have been invented about 300 BC, removed the useless half of the hemisphere to give an appearance of a half-bowl cut into the edge of a squared block.

Water clocks (clepsydras) were among the earliest timekeepers that didn't depend on the observation of celestial bodies. Water clocks were used in ancient Babylon,

[12] Sokol, Jan, op.cit.,pg. 84

Mesopotamia, China, Korea, Egypt, Greece and India. One of the oldest water clocks was found in the tomb of Amenhotep I, buried around 1500 BC.

Egyptian clepsydras were cylindrical or bowl-shaped containers designed to slowly fill with water coming in at a constant rate. Markings on the inside surfaces measured the passage of "hours" as the water level reached them. These clocks were used to determine hours at night, but may have been used in daylight as well. Another version consisted of a metal bowl with a hole in the bottom; when placed in a container of water the bowl would fill and sink in a certain time. In order for a water clock to work properly, someone had to keep an eye on it; to make sure that no pebbles were in the bowl to increase talking time. These clocks were never exact; each clock had its own pace. And they couldn't be used in winter. These clocks were used for nearly 3,000 years and grew more and more sophisticated. Water clocks were designed with ringing bells, moving puppets and mechanical singing birds.

More elaborate and impressive mechanized water clocks were developed between 100 BC and 500 AD by Greek and Roman horologists and astronomers. The added complexity was aimed at making the flow more constant by regulating the pressure, and at providing fancier displays of the passage of time. Some water clocks rang bells and gongs, others opened doors and windows to show little figures of people, or moved pointers, dials, and astrological models of the universe. The Romans, prior to the reformation of Caesar, used a system of months of irregular length giving a 355 day civil year, into which an extra month of 22 or 23 days was intercalated every other year. On the 1st January 45BC, after tacking 90 days onto the end of 46BC in order to bring the seasons back into line, Caesar introduced his Julian calendar, which did not so much reform the ancient Roman calendar but abandon it, instituting instead the familiar solar calendar of 365¼ days. The ten extra days required to bring the Roman year into line with the

solar year were divided up and added to the end of several separate months so as not to interfere too much with the existing festival schedule. In addition, an extra day was intercalated every four years in February.

The Julian calendar remained unchanged until the time of Pope Gregory the Thirteenth, who in 1582 introduced an emendation which stated that the intercalation should be performed at the turn of each century only if the century was exactly divisible by 400. This amendment was required because the tropical year, as explained above is not exactly 365¼ days long.[13]

When the Gregorian calendar was first implemented it was to cause uproar throughout the Roman-Catholic world because it required the deduction of thirteen days in order to bring the calendar back into line with the seasons, and many uneducated people rioted in the streets thinking that these days had somehow been deducted from their lifespans.Progress in timekeeping in Europe was non-existent from around 500 AD to 1300 AD. However the invention of the verge escapement in Europe in the 14th century led to a revolution in mechanical clocks. The verge escapement worked by having a wheel with cogs which was prevented from spinning by a pair of metal leaves which moved up and down to allow the cog wheel to move forward one cog at a time. The leaves were attached to a foliot, a weighted crossbar, on which the small weights could be moved back and forward to adjust the rate at which the bar oscillated. The whole of the mechanism was powered by heavy weights which drove the cog wheel.

Medieval religious institutions required clocks to measure and indicate the passing of time because, for many centuries, daily prayer and work schedules had to be strictly regulated. This was done by various types of time-telling and recording devices, such as water clocks, sundials and marked candles, probably used in combination. Important times and durations were broadcast by bells, rung

[13] Sokol, Jan, op.cit.,pg. 79

either by hand or by some mechanical device such as a falling weight or rotating beater.

The astrolabe was used both by astronomers and astrologers, and it was natural to apply a clockwork drive to the rotating plate to produce a working model of the solar system.[14]

Simple clocks intended mainly for notification were installed in towers, and did not always require dials or hands. They would have announced the canonical hours or intervals between set times of prayer. Canonical hours varied in length as the times of sunrise and sunset shifted.

The more sophisticated astronomical clocks would have had moving dials or hands, and would have shown the time in various time systems, including Italian hours, canonical hours, and time as measured by astronomers at the time. Both styles of clock started acquiring extravagant features such as automata.
The first major advance in clock construction occurred in Europe during the 14th century. It was found that the speed of a falling weight could be controlled by using a oscillating horizontal bar attached to a vertical spindle with two protrusions on it which acted like escapements, (cliff like ridges). When the protrusions meshed with a tooth of a gear driven by the weight, it momentarily stopped the revolving wheel and weight. These oldest type of mechanical clocks can still be seen in France and England.

In 1504 the first portable time piece was invented in Nuremberg, Germany by Peter Henlein. Replacing the heavy drive weights permitted smaller (and portable) clocks and watches. Although they slowed down as the mainspring unwound, they were popular among wealthy individuals due to their size and the fact that they could be put on a shelf or table instead of hanging from the wall.

[14] Sokol, Jan, op.cit.,pg. 85

These advances in design were precursors to truly accurate timekeeping.
During the 15th and 16th centuries, clock making flourished, particularly in the metalworking towns of Nuremberg and Augsburg, and, in France, Blois. Some of the more basic table clocks have only one time-keeping hand, with the dial between the hour markers being divided into four equal parts making the clocks readable to the nearest 15 minutes. Other clocks were exhibitions of craftsmanship and skill, incorporating astronomical indicators and musical movements.
Around 1675 Huygens developed the balance wheel and spring assembly, still found in some of today's wrist watches. This improvement allowed 17th century watches to keep time to 10 minutes a day. And in London in 1671 William Clement began building clocks with the new "anchor" or "recoil" escapement, a substantial improvement over the verge because it interferes less with the motion of the pendulum.[15]

In 1670, the English clockmaker William Clement created the anchor escapement, an improvement over Huygens' crown escapement. Within just one generation, minute hands and then second hands were added.

The most important reason for improving the accuracy and reliability of clocks was the importance of precise time-keeping for navigation. The position of a ship at sea could be determined with reasonable accuracy if a navigator could refer to a clock that lost or gained less than about 10 seconds per day.

In 1721 George Graham improved the pendulum clock's accuracy to 1 second a day by compensating for changes in the pendulum's length due to temperature variations. John Harrison, a carpenter and self-taught clock-maker, refined Graham's temperature compensation techniques and added new methods of reducing friction.

[15] Sokol, Jan, op.cit.,pg. 102

Over the next century refinements led in 1889 to Siegmund Riefler's clock with a nearly free pendulum, which attained an accuracy of a hundredth of a second a day and became the standard in many astronomical observatories. A true free-pendulum principle was introduced by R. J. Rudd about 1898, stimulating development of several free-pendulum clocks.

One of the most famous, the W. H. Shortt clock, was demonstrated in 1921. The Shortt clock almost immediately replaced Riefler's clock as a supreme timekeeper in many observatories. This clock consists of two pendulums, one a slave and the other a master. The slave pendulum gives the master pendulum the gentle pushes needed to maintain its motion, and also drives the clock's hands. This allows the master pendulum to remain free from mechanical tasks that would disturb its regularity.

Watches run by small batteries were introduced in the 1950s. The balance of such an electric watch is kept in motion electromagnetically by a coil that is energized by an electronic circuit.

The development of electronics in the twentieth century led to clocks with no clockwork parts at all. Time in these cases is measured in several ways, such as by the vibration of a tuning fork, the behavior of quartz crystals, the decay of radioactive elements or resonance of polycarbonates. Even mechanical clocks have since come to be largely powered by batteries, removing the need for winding.

# Chapter 3: History of Maya

To describe history of the Maya is a very difficult task. Not only because of the chronological and local differences, but also because of the lack of archive material. Our knowledge thus must be based mostly on archeological evidence, which is not very accurate and makes a place for speculations. We can see various periods in Maya history: Pre-classic or Formative (c. 2000 BC – 300 AD); Classic (300-900AD); Post-classic (900-1519AD)[16].

## Pre-classic period (c. 2000 BC – 300AD)

The beginnings of every ancient culture are always more cloaked than its collapse. The Maya aren't an exception. There will always be disputation about the archeological evidence and almost every historian will create his own version of events that led to foundation one of the greatest ancient cultures of America.

From the scarce evidence we have, we can say that first people who started steady life in Maya Lowlands, a nucleus region of the classical Maya, inhabited the region in fourth century BC. These so called Pre-Maya used cultivation of maize and manioc for living, but it wasn't an intensive agriculture, for they were also hunters and fishermen.

For reasons unknown, first Maya people didn't inhabit Maya Lowlands, but Pacific Coast of Guatemala and Mexico. Here they developed in 1800BC their own language and pottery.

In Maya Lowlands we identify first Maya people around 1000BC. These people used pottery[17] and built timber houses which had plaster floors to control

[16] There are some differences in chronology of Maya civilization. In this work I am using chronology from: McKillop, Heather, The Ancient Maya: New Perspectives, Santa Barbara 2004

[17] Mc Killop states, that Mayan pottery didn't come to Maya Lowlands until 1000BC. McKillop, Heather, The Ancient Maya: New Perspectives, Santa Barbara 2004, pg. 77. However, authors such as

the problems of drainage and mud. Pottery was used as cooking pots, storage jars, serving dishes and as transportation vessels. The conditions also changed with the development of intensive agriculture at the beginning of first millennium BC. Intensive farming was the main reason for population growth. In these times, also known as Middle Formative (1000-300 BC), rose the first farming communities all over of the Yucatan peninsula. Some of these villages contain formal architecture and special buildings dedicated to rituals. At Dzibilchaltun were some stone structures as well as three buildings on platforms which created a plaza used as a temple zone for another 14 hundred years. Another example of ritual architecture is the first temple structure made from cut stone at Nakbe. The temple was held together with mortar covered with plaster and decorated with modeled stucco masks. It is dated to 750BC, which is very important because it means that this temple is contemporary with the Olmec civilization.

Contacts between Maya and surrounding cultures like the Olmec are a matter of continued debate, but there is evidence, that two hallmarks of Maya civilization, writing and calendar, had their origin outside the Maya area. Calendar and numeric system was derived by Olmec living in the area of the Gulf Coast of Mexico and the writing system was derived from the Olmec or the Zapotec of Oaxaca[18]. The Olmec pottery and another artifacts found in Maya Lowlands is also proof of trade routes between these two ethnics.

Late Pre-classic period (300BC – 300AD) is marked by the rise of Lowland Maya civilization. This era is noticeable by change from village-centered and more or less egalitarian society to one with urban centers containing elite residents. About the time of Christ also the landscape was changed. The

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Richard Adams predates usage of pottery before 1000BC. Adams, Richard E. W., Prehistoric Mesoamerica, University of Oklahoma 2005, pg. 130

[18] We have to add here, that the influence of the Olmec is questioned by some authors. Some mention only limited influence (Morley), some concur with the influence of the Olmec, but go further stating, that there were more factors that interacted (Adams).

continuing growth of population required clearing forests, rectifying watercourses, and leveling the land. In the area of northern Belize was density of settlement so high, that some villagers had to use swamp drainage. But it was in the cities where we can see most remarkably changes that occurred. We already mentioned Dzibilchaltun and Nakbe which were important from earlier period, but now we must add Tikal, Lamanai and the most important city of Late Formative, El Mirador.

El Mirador is very important for us to view the changes that occurred during Late Formative in Mayan city. Unlike other cities this one wasn't rebuild during classic era. The city was inhabited by thousands of people and controlled by elite that could plan the construction of several groups of very large buildings. El Mirador's dominant are the temples measuring up to 70 meters. They are embanked by a wall measuring more than one kilometer and is 20 meters wide and 6 meters high. Important are also elevated causeways which radiate from the city center.

Important changes didn't affect only the country and cities, but Mayan society as well. Differentiation of classes is best seen in the appearance of luxury objects made of obsidian or jade and fine made ceramics in elite class burials. During this same period, Maya writing and the mathematical system were developed. These methods were applied on astronomy and time and led to first set of calendars[19].

## Classic period (300-900AD)

Creation of classic Maya culture is for the historians almost same mystery as the arrival of the Maya. Classic Maya didn't create one state, but several city-states which were politically independent. We can identify five regionalized

[19] Morley, Sylvanus Griswold, Mayové, Praha 1977, pg. 33

variants of Maya culture (northern and central Yucatecan, central Peten zone, Pasion River zone and northern Belize[20]). Most authors agree that main reason for unification of these centers was trade between them, but they differ in the reason for this trade. Another theory is based on new style of pottery similar to one from El Salvador. This led to interpretation of the origin of Maya culture as coming from outside the Maya Lowlands.[21] But in present days exists a trend that tries not to focus on only one reason for development of Maya culture. Modern theories state, that the rise of the classic Maya was caused by population growth and the consequent need for more social organization leading to creation of elites. These elite groups tried to reinforce their status by various symbolic means (luxury pottery, jewelry and costume) which led to creation of trade.

When we want to speak about the history of classical Maya primarily we have to focus on the common trends that united these centers of power. These were the economics, culture and social structure.

***Economics and urban development***

First thing common to all centers of power in Maya empire was agriculture as base of society[22]. During Middle Formative period farmers used shifting cultivation. This was based on clearing and afterwards burning part of the jungle. In these times was cultivated corn, beans, squashes, pumpkins, tomatoes, chili peppers and another vegetable. The main problem with this method was that after three years of cultivation the soil was exhausted and needed recovery from four to eight years. However in the Late Formative period population grew and needed innovation of this cultivation system. This innovation was also caused by moving to wetland areas. There the Maya built raised fields, canals, drainage and terraces

[20] Adams, Richard E. W., Prehistoric Mesoamerica, University of Oklahoma 2005, op. cit., pg. 139

[21] On this matter see McKillop, op. cit., pg. 88-90 or Adams, R. E. W., op. cit., pg. 140

[22] After 1970‘s have started a revision of old theories about shifting agriculture as the only agricultural system of the Maya. This studies are important for our view on Maya society as they provide vital information about density of population. In some case the estimated population rises 7 times. Adams, R. E. W., op. cit., pg. 158

on the hills. This method was very successful and we can see that largest Maya cities are located near the largest swamps.

Maya cities varied from region to region, but important thing is, that they had common characteristics, mainly the public buildings. These were temples, palaces, marketplaces, ball courts, raised road systems, reservoirs. In some cases it was also fortifications.

The temples are relatively small structures elevated on high and wide platforms. Inside these temples are altars and benches. The roof of the temple was often encircled by a stucco decorated wall. The Maya used the temple as a religious place where burned fire during rituals and where the brought offerings. These consisted of jade, seashells and other symbolic material. Close to the temples were often *stelae*, carved blocks of stone in low or high relief. *Stelae* are important because they preserve valiant historical information.

Palace is called practically every huge building in Maya cities. Problem is that some had function as luxury residencies, but some were administrative buildings and some had so dark rooms, that it is considered of them as storage buildings.

Almost every town from Middle Formative had its marketplace, because trade was one of the unifying forces of the independent Maya centers and the main reason for their progress. Main objects of trade were pottery, textile, feathers, obsidian tools, salt, food, drink, raw materials, sculptures and many more. As we are now making progress in identifying certain functions of the so called palaces, we can also identify some of those as markets.

Another typical structure not only in Maya cities, but in almost all cities in Mesoamerica, was ball court. It was used for famous game played with rubber ball. The game varied from region to region and so did the ball courts.

These entire objects were in Maya towns connected by elevated roads, called *saches*. These roads can we find not only in the cities, but also between them. Function of these pathways has been commercial, military and religious. It is suggested, that the roads were not used during day, because of intense heat, but in night, for the Maya word *saches* means "white ways", meaning visible even during night.[23]

As stated above, important structures in some Maya cities were fortifications. They are important mainly for changing our view on the Maya as a peaceful ethnicity. From these fortifications we can learn once more, that the Maya had regional differences, and that some of them were at war.

Archaeologists classify Maya cities by the account of courtyards of major architecture. Tikal is the largest Maya city, having 85 these courtyards. Second on is Calakmul with 55 courtyards. On the next level size are centers with 30 to 20 courtyards. These are famous Copán, Palenque and some others.

***Culture***

Second element unifying the classical Maya was their culture. One part of it was religion common to all the Maya. The Maya were very religious people and had high percentage of religious building in comparison with secular ones[24]. It is no surprise that we think of Maya establishment as of theocracy. Close to religious ceremonies were other aspects of Mayan culture: numerology and astronomy. This knowledge led to creation of calendar.

Another cultural aspect that all the Maya share was language and writing. We can learn their writing from three codices, that weren't destroyed by the Spanish. These are Dresden, Paris and Madrid codices. Another possibility to learn

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[23] Adams, R. E. W., op. cit., pg. 169-170

[24] Katz, Friedrich, Staré americké civilizace, Praha 1989, pg. 87

Maya hieroglyphs are pottery and the *stelae* mentioned above. These *stelae* contain historical deeds of Maya elites. Unfortunately even today we are unable to decipher all of the texts.

***Social structure***

For many years it was thought, that on the top of Maya social structure stood peaceful philosopher-kings. However these theories are now revised and we may say that the rulers were also warriors. These kings were chosen probably after their father's death. Below the king was aristocracy which had also paternal lineage. This aristocracy occupied posts in administration and was counseling the king. Under this leading class was minor nobility occupying bureaucratic, construction and military posts. Into this caste also belong merchants, craftsmen and even musicians. Below the craftsmen were of course farmers and the lowest class were dispossessed.

***Political history***

Now, when we have basic knowledge about classic Maya society, we can describe their political history. In the Late Formative a number o villages made coalitions to support regional centers. We have no idea how many of them actually were at Lowlands, but they established base for latter Maya society. Mayor center in these times was El Mirador. Less important was Peten and Tikal. These centers focused more on their own population grow than on trade between them. This change came in the Classic period. As the population grew, appeared bigger tension between the cities. This led to fall of some centers at the beginning of Classic period such as El Mirador. It is possible that this powerful city was overwhelmed by another, possibly Tikal.

At this time around 350AD came outside intervention. Teotihuacan had trade connections with Tikal, they were interested in feathers, cacao, salt or honey. But

Teotihuacan leaders needed better organized population and that's why they displaced ruler of Tikal. The new ruler, who took despotic measure so well known in Teotihuacan, soon gained edge over the rest of Maya cities.

Tikal was the leading force between the Maya city-states, expanded to Rio Azul and Calakmul region and in Copan they used old method of displacing the king. As stated above Tikal became the largest Maya city. But in the sixth century AD rulers of Teotihuacan halted their support and this led to crisis and civil war in Maya Lowlands.[25]

Around 650 AD finally the life went back to normal, but Maya society was changed. The turmoil in the sixth century led to creation of more states than before. In the north flourished Coba and Dzibilchaltun, in south Copan and Palenque. Also rised old rival of Tikal, Calakmul.

But we must state that it was again Tikal that in these times rose to magnificent city. The texts mention so called Ruler A, who began a rich building program, which included giant temples. He was also buried in a rich tomb full of jade. The example of Tikal was followed by other cities, which started to build temples and palaces. Wetland cultivation reached its maximum, but the deforestation started to be a problem. Nevertheless at the heights of the Maya civilization suddenly came and end.

## Post-classic period (900-1519AD)

Because of very little evidence we can't say exactly why the Maya culture collapsed. Therefore we have many theories, however there are three most popular: ecological collapse model, political/warfare model and drought model.

[25] For further information about interaction between the Maya and Teotihuacan see Braswell, Geoffrey E., The Maya and Teotihuacan, Austin 2003

But the question isn't why the Maya collapsed, but what was the result of this collapse, because we can still find Maya descendents in Mexico or Guatemala.

As collapse we mean abandonment of the cities in southern Maya Lowlands area. Among them were great centers like Tikal, Copan or Peten. It affected only cities because in the country Maya people persisted. This collapse lasted about 150 years. What is important, that this didn't affect northern areas, where we can proof population growth, possibly thanks to migration from south.

Northern centers still flourish as we can see from the continuous use of *saches* as roads and ritual pathways. We can see one important change thou. It is the increase of warfare, battle themes and fortifications. For instance Chichen Itza was fortified and on the buildings there we can see battle scenes as well as racks of skulls carved on stones. Chichen Itza, Uxmal and Labna lay in so called Puuc Hills region, which rose to importance in the final century of the classic period. It was also thanks to rich agricultural soil. These cities were characterized by their own architectonical style, that differed from the classic Maya. At the end of 9$^{th}$ century these center began to fall, perhaps due to warfare. The only exception was Chichen Itza, city that became the principal power in Maya Lowlands.

Some authors claim, that Chichen Itza era was largely influenced by Toltec[26], however new researchers are cautious in stating the decree and form of it and we can say that influence of Toltec remains among other disputable questions about the Maya[27]. We can state here that some buildings were in Maya style and some were in Toltec. The main Toltec architecture are Temple of Warriors, El Castillo and the great ball court. We can find similar buildings in the site of Tula in central Mexico. We don't know exactly when was Chichen Itza abandoned. The time

[26] Waldman, Carl, Encyclopedia of Native American Tribes, New York 2006, pg. 156 or Adams, R. E. W., op. cit., pg. 292

[27] For questioning the Toltec influence see McKillop, op. cit., pg. 102

varies from 1000AD to 1200AD. But we can say that Chichen Itza was never abandoned completely.

In 13th century the center of power moved to eastern coast of Yucatan, especially to city of Mayapan a densely nucleated and walled city. In the centre we can find buildings of Maya nobility. The political system probably wasn't centralized, but it was more like cooperative government of Mayapan and its surrounding cities. This fact also stated Spanish chronicles from 16th century. But the problem is, that in these times Mayapan was also abandoned, possibly in 1441AD.

With the fall of Mayapan ends Maya culture as big cities culture. From now on in consisted only of small cities and villages. So was the situation when Spanish arrived firstly Cortez in 1519 in Mexico and from 1525 we can prove Spanish presence at Yucatan. This is also a date which most historians use as the end of Post-classic period. Mayas however lived through colonial age and in present time are still occupying Mexico, Guatemala, Belize, Honduras and El Salvador.

## Chapter 4: The Maya cosmology and the world creation

At the beginning of the world there was nothing except the sky. *There is not yet one person, one animal, bird, fish, crab, tree, rock, hollow, canyon, meadow, or forest. All alone the sky exists. The face of the earth has not yet appeared. Alone lies the expanse of the sea, along with the womb of all the sky. There is not yet anything gathered together. All is at rest.“*[28]

World was according to Maya mythology created by a pair of gods, man and a woman, the supreme pair. Ixpiyacoc and Icmucane were grandparents of the Maya and of humanity as whole as well. This story is carved into the walls of three temples in Palengue during the reign of Chan-Bahlum (684-702).[29] The creator grandparents of the sea and the lightning bolt gods of the sky were the first generation of gods. The second generation consisted of the creator grandparents' sons Hun Hunahpu and Vucub Hunahpú. Hun Hunahpú had two wives and two sets of sons. Ixmucane was the mother of the Ahpu twins, One Hunahpu and Seven Hunahpu, who were each one and seven: three male/female duals and one unity. They decided that they want someone to praise them. They begin by saying "Earth", which appears on demand from the sea. *”Then the earth was created by them. Merely their word brought about the creation of it. In order to create the earth, they said, “Earth,” and immediately it was created. Just like a cloud, like a mist, was the creation and formation of it.“*[30]

The Maya cosmology conceives Earth as flat and the universe as a multi-tiered square surrounded by the body of a crocodile. Within this cosmic square are three levels: the Sky (Caan) the Earth (Cab) and the underworld (Xibalba). From

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28 *Popol Vuh: Sacred Book of the Quiché Maya People,available at:* Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

29 Kenneth Johnson, Svět starověkých Mayů, Praha 1997, pg.16

30 *Popol Vuh: Sacred Book of the Quiché Maya People,available at:* Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

the centre of the Earth emerges the yaxche, the sacred Maya Ceiba tree. Its branches support the Sky and the trunk rests on the Earth, while its roots reach down to the underworld. The cosmological parallel of the sacred Ceiba tree was Milky Way. The World Tree was erect when Sagittarius was well over the horizon. At this time the Milky Way rose up from the horizon and climbed overhead into the North. The star clouds that form the Milky Way were seen as the tree of life where all life came from. The first half of the Popol Vuh contains a collection of highland Maya legends concerning the creation of the world, the nature of life and death, and an extensive description of the underworld and its perils. Ceiba tree is one of the most important symbols connected with Maya cosmology. In Mesoamerican mythology, the world tree grew at the locus of creation, all things flowing out from that spot into four directions. The tree thus forms part of what Mircea Eliade refers to as the "symbolism of the centre." The centre is, first and foremost, the point of "absolute beginning," where the latent energies of the sacred world first came into being.[31] This source of all creation was often seen as a vertical axis, or axis mundi, which stands at the centre of the cosmos and passes through each of the three major layers of existence (underworld, terrestrial plane, and sky). As the symbolic expression of this axis mundi, the world tree at once connected and supported heaven and earth while firmly fixed in the world below. In addition to serving as the vertical pivot point of the cosmos, the world tree also oriented the horizontal plane of the world by extending its branches outward toward the four cardinal directions.[32] In ancient Maya inscriptions, the human soul was called sak nik' nal *(*"white flower thing"), referring to the white flowers of the ceiba tree. The implication is that the soul first came into being as a sacred flower on the branches of the world tree, thence to be clothed with flesh at birth.

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31 Eliade, Mircea, Mýtus o večném návratu, Paříž 1969, pg. 15

32 Thompson S, Eric J., Sláva a pád starých Mayů, Oklahoma 1966, pg. 300

The presence of the ceiba in the underworld is a very ancient concept throughout the Maya world. This tree was the conduit of communication between the supernatural world and the human world. In the sixteenth century, Diego de Landa, first bishop of Yucatan, recorded that the souls of the benevolent dead entered "*a place where nothing would give pain, where there would be abundance of food and delicious drinks, and a refreshing and shady tree they called Yaxché, the Ceiba tree, beneath whose branches and shade they might rest and be in peace forever*."[33]

The ceiba tree is still revered by the modern Maya as a manifestation of the world tree. Many villages have a carefully tended ceiba tree growing in their main plazas. This tree marks their homeland as the centre place of the world. Inhabitants often refer to their village as *u muxux kaj, u muxux ulew* ("navel of the heavens, navel of the earth") because of the presence of the tree and other sacred objects that center their community in relation to the rest of the world.[34] The Maya name for the tree reflects the importance it holds. The K'iche' Maya of the highlands call it raumlx che', while the Yucatec Maya call it the yax che′. Both mean "first, green, new, or pre-eminent tree." The souls of the dead are said to follow its roots into the underworld, while ancestors may return in the same way to visit the living on special occasions.

The four corners and centre of the square are considered five cardinal points, each with its own colour. The centre point of the cosmic square is green and from it grows the yaxche, The North is white, South is yellow, West (chik'in) as a direction of the sunset is black and East (Lak'in) as a direction of the sunlight is red. The latter is of utmost importance, for this is where the sun rises. [35]

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[33] Landa, Diego de, Zpráva o věcech z Yucatánu in Ratsch Christian, Bohové starých Mayů, Mnichov 1986

[34] Kováč, Milan, Slnko jahuára, Bratislava 2002, pg. 116

[35] Ratsch, Crhristian, Bohové starých Mayů, Mnichov 1999, pg. 39

Each of the cardinal points is supported by a Bacab, the Atlantean gods who also see to it that the stars and all the celestial planets remain in place for eternity.[36]

The sky is called Caan. For the Maya, this sphere represents peace, goodness and light. Caan is the masculine force who joined with the feminine Earth so that life could be brought forth into the world. Upon death, it is towards Caan that upright humans ascend, climbing the trunk and branches of the great yaxche tree. Men who died in battle and women who died during childbirth also ascended the tree of life.

Caan is divided into thirteen levels, represented graphically by a pyramid with six steps located in the east, six in the west and a seventh step acting as a pinnacle in the centre of the cosmos. The thirteen levels are governed by Oxlahuntiku gods, also considered as a single god. Not all their full names and glyphs known. What has been possible to decipher is that these celestial gods interrelate closely with the inhabitants of the earth as with the gods of the underworld.[37] These 13 gods were an opposite to nine Gods of Underworld. The number thirteen also represents thirteen day hours (approximately from 5am to 7pm).[38]

Ruling over the various sky gods (inhabiting the seventh level) is the creative divinity Hunab Ku, who being incorporeal, is one of the few gods lacking an actual graphic representation. When honored, the associated rituals were a standard part of any priest's duties and so sacred that they remained hidden from the average Maya.

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36 Kováč, Milan, op.cit., pg.119
37 Morley, Sylvanus G., op. cit., p.109
38 Kováč, Milan, op. cit., pg.120

Earth, the middle world, is the back of a great reptile. Since reptiles are considered divine animals, earth itself constitutes a deity. According to this belief, the Maya live inside a god who provides food, water and all the materials necessary for creating clothing and buildings.

Of all that the earth produces, there is one plant that the Maya think represents life itself: maiz (corn) According to the Popol Vuh the original Gods used maiz to create man, after two attempts with clay and wood failed; as humans are made of maiz, each time we consume it we renew ourselves[39].

On Earth live the Tzultacah gods (whose name means mountain plain). Their number is undetermined, though in some regions they are invoked as the Thirteen Tzultacah. Each of these gods lives within the mountain it watches over. Male and female, Tzultacah exist side by side, taking on an almost worldly life. They fall in love, marry, separate, reunite, and the celebrations that take place inside the Earth. These events were thought to be so excessive that they according to Maya caused rivers to overflow and lands to flood.

The Tzultacah are protective gods, helping humans by watching over their harvests and cattle. They are also owners of all game animals, they set prey free to assure men of good hunting. In return, humans worship and offer gifts to the mountains where the gods dwell, including the blood of small sacrificial animals.

The ancient Maya all shared the same concept of the universe, in the sense that every human action was meant to please the gods and maintain the natural balance of the world. As long as humanity followed this basic premise, the gods would continue to protect the community.

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39 *Popol Vuh: Sacred Book of the Quiché Maya People, available at:*. Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

This code remains in effect today: the belief that goodness, loyalty, abstinence from physical pleasures, respect for nature, and care of children and the cornfields all lead to the thirteen levels of the Sky, where one will enjoy peace and rest.[40]

Those not complying are destined for a prolonged stay in the underworld, perhaps in the form of dogs or mules who work incessantly until (after sufficient suffering) their souls are finally allowed back to Earth for another chance.

The Underworld is both feared and respected by the Maya. Filled with beings bearing malice towards humans, Xibalba is made up of nine levels of darkness and shaped like an inverted pyramid. Each level has a step: four descending from the West, four ascending to the East and a fifth step sitting over the centre of the Underworld.[41]

All humans must make a dangerous passage through the Underworld on their way up to the Sky. In recognition of the arduous journey, the dead are buried with a new pair of shoes, wood to fend off wild animals and food, usually corn. The voyage takes them across lakes and rivers, crossings that can only be accomplished with the help of a dog as a guide. This belief is strong among the Ttzotzil, Tzeltal and Lacandon tribes of Chiapas, Mexico.[42]

The nine levels of the Maya Underworld are governed by the Bolon Ti Ku, consisting of nine ruling deities. In the fifth level, deepest of all, resides Ah Puch, God of Death, represented by a skull with it's spine and ribs exposed, always wearing bells. Helping him in his evil endeavors is the Jaguar God, the animal most revered and feared by the Maya.

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40 Thompson S., Eric J., op.cit., pg. 346

41 Morley, Sylvanus G, op.cit., pg. 110

42 Kováč, Milan, op.cit, pg. 334

The Jaguar also helps the sun complete its nightly journey through the darkness, its spotted fur symbolizing the starry skies. The Lacandon Indians of Chiapas believe that one day the Jaguar will devour the sun, thereby obliterating life on Earth. In the meantime, the Sky and the Underworld continue their perpetual antagonism as the thirteen gods of the Sky combat the nine lords of the Underworld.

Very important factor in Maya cosmology and mythology was the symbol of twins. Ixmucane was the mother of the Ahpu twins, One Hunahpu and Seven Hunahpu, who were each one and seven: three male/female duals and one unity. Together the twins represented the highest qualities and aspirations of their world. *"They were seers here upon the face of the earth. They were good by their nature, and in their birth as well."*[43] They had all the knowledge accumulated by their race, but were devoid of malice and unaware of their own powers. Not knowing evil, their actions were completely innocent and their pleasure was to pitz, the ancient Maya Game. On one level the ball game is an allegory for the movements of the celestial bodies. Perhaps this is why they could play the game in any combination of seven, up to three on one side and four on the other, representing the five closest planets plus the sun and moon, depending on their position in the night sky.

Xibalba, the Underworld, was ruled by Lords who embodied very different knowledge and values. They were upset with the noise of the ball game, so they issued an invitation to the boys to play a game against them in the bowels of the Underworld, with the intention of killing them. *"What is happening on the surface of the earth? They are just stomping about and shouting. May they be summoned here therefore. They shall come to play ball, and we shall defeat them. They have simply failed to honor us. They have neither honor nor respect. Certainly they act*

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43 *Popol Vuh: Sacred Book of the Quiché Maya People, available at:*. Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

*arrogantly233 here over our heads," said therefore all those of Xibalba.*[44] The boys politely accepted. After an arduous trip to Xibalba, the twins were asked their names, which they politely gave the Lords. The Maya believe that once someone knows your name, he knows you and your thoughts. This allowed the Lords to victimize the boys with many trials and humiliations before the ball game itself which, of course, was rigged in favor of the Lords. After losing the game, the twins were decapitated and their bodies buried under the surface of the ball court, except for the head of One Hunahpu which was hung on a calabash tree at the entrance of Xibalba as a warning. The story of these first twins reveals the failure of purely spiritual beings to bring their evolution to more material levels. They would need a sphere full of desires and free will to continue their slow descent on the downward arc of evolution, as the next story in the *Popol Vuh*, concerning the hero twins Hunahpu and Ixbalamque, seems to indicate.

After the head of One Hunahpu was hung on the calabash tree, Blood Woman, the virgin daughter of one of the Lords of Xibalba, heard the story and was curious about the skull. One day she wandered around the tree and tried to touch the skull, which spat on her hand. Thus, without her knowledge, she became pregnant. As time went by, her pregnancy became obvious, so her father questioned her angrily, fearing dishonour for him and his family. She truthfully answered that she had been with no man and cried her innocence in vain. But her father did not believe her and ordered two of his servants to take her into the woods and bring back her heart in a container. The servants took her to the edge of Xibalba, but decided to let her go. They put a red fruit and red sap in the container and took it to their master instead.

Blood Woman now knew that One Hunahpu was the father of her children, and she went to his home and pleaded with his mother Ixmucane, explaining that

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44 *Popol Vuh: Sacred Book of the Quiché Maya People,* available at: Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

she was carrying her grandchildren. Ixmucane did not believe her, but finally accepted her as the household servant, giving her the most miserable tasks to do until she bore male twins, Hunahpu and Ixbalamque. The grandmother rejoiced in the twins and tried to protect them as they grew into youngsters with exceptional powers. She hid the ballgame gear that had belonged to their father and uncle because she blamed the game for their early demise.

The hero twins, however, were not as innocent as their father. They had acquired some of the cunning qualities of the Underworld through their mother's line, while retaining their father's and uncle's power and knowledge, somewhat magnified by curiosity. Known for their intelligence and heroic virtues, they performed many acts for the benefit of the Cha-Chan, their imperfect world of chaos. For example, they separated the future humanity from the monkeys by sending their own half-brothers into the trees. They punished Itzam Ye (Venus), a boisterous bird with bright plumage who committed the sin of pride by boasting that he was the Sun. They killed Itzam Ye's two sons who were wreaking havoc in the world of matter by "moving and squashing mountains." They revived the 400 boys and set them in the sky as the Pleiades. Finally they discovered their father's ballgame gear and played noisily, moving celestial bodies to their proper places, the ball game being an allegory for these movements.

The Lords of Xibalba were disturbed by the noise, as they had been before, and invited the hero twins to the Underworld for a game in which the winners would take all and the losers would lose their lives. But hero twins were successful in avoiding all the traps that the Xibalbans prepared for them before the game. During the game itself, after solving many schemes and enduring the Lords' bad calls, they seemed to give up. Convincing the Lords that the only way to kill them was by grinding their bones and throwing the powder into the river, they held hands and jumped into a fire. The Lords pulled out their bones, ground them up,

and threw the fine grains into the river. From the powdered bone emerged a pair of catfish. The catfish were transformed into two small boys who became performing magicians. They were invited to the Underworld for to entertain Lords of Xibalba. They urged the youngsters to perform their most difficult feats: after a house was burned with one of them inside, it suddenly appeared as if nothing had happened. Then the youngsters, seeming eager to please the Lords, did the following: one of them cut the other in pieces and threw the parts into the air, where they disappeared. After a long pause the twin materialized unharmed, to the amazement of the Lords. The principal Lord, wishing to show off his daring in front of his vassals, begged the twins to perform the trick on him. The twins agreed most willingly. After dismembering the Lord, they did the same with the other Lords, but none returned alive after their limbs and bodies were thrown into the air. After thus defeating them, the twins put several conditions on the return of the Lords, which were irrevocably accepted. The twins returned the Lords unharmed, and all agreed to many restrictions, such as no longer intentionally harming other beings, although they were allowed random acts such as storms, famine, and floods, but only impersonally and when absolutely necessary. *"You shall surely eat only the creatures of the grass and the creatures of the wastelands. No longer will you be given the children of the light, those begotten in the light. Only things of no importance will fall before you. "Only the sinner and the malevolent, the wretch and the molester who clearly have sinned, will be given to you. No longer will you be able to seize suddenly just any person. You will be called upon only over the sap of the croton," they were told, all they of Xibalba."*[45] The Lords also promised to live in the Underworld without ever stepping on the earth's surface.

The twins ordered the Lords to reveal the burial site of their father and uncle so that they could bring them back to life. The Lords revealed that they were

45 *Popol Vuh: Sacred Book of the Quiché Maya People, available at:* Mesoweb: www.mesoweb.com/publications/Christenson/PopolVuh.pdf.

buried under the floor of the ball court, which by extension represents the earth's surface. The boys exhumed the corpses and prepared a magic ritual that brought both of them back to life. At this point there is a significant event: the twins asked their father and uncle the names of various parts of the body, and they could not identify some of them. This passage seems to indicate that they were from a former race and that even their physical forms were different, perhaps lacking some of the physical or mental capacities that had evolved since their demise. At this point the hero twins decided that their ancestors were not fit to live in the current world, but being deities of their own race, they were reburied with great respect, and the twins built a temple so they could be properly worshipped.

As soon as the temple was completed on the floor of the ball court, the Tree of the World erupted from the bowels of Xibalba, breaking through the ball court floor, pushing Xibalba down with its roots, pushing the sky above the world of matter with its branches, and leaving the world of matter between the Underworld and the Heavens. Cha-Chan, the flat heavens, was no more, as the third dimension was born from that creation. Now there were different regions (spiritual, material, and underworld)[46] connected only through the World Tree, whose roots are in the Underworld, its branches in the world of matter, and its crown in the spiritual realm of the Heavens. The ancestral twin One Hunahpu ascended to become the Sun, while his brother Seven Hunahpu became the Moon. This change represents us cosmological connections. During the game, the underworld god Kamazotz nibbled head of One Hunahpu. They gave him turtle mail instead of his head. One Hunahpu eventually got his head back, but this part of the myth represents the every-day “death of the Sun” when it falls into the Underworld. The turtle (Ak) was a symbol of a first entity and Earth. In that case it represented earth in which

[46] Carrasco Davíd, Náboženství Mezoameriky. Kosmovize a obřadní centra, San Francisco 1993, pg.75

were Hero twins trapped. Their breaking of the mail and returning to the Sun was then a symbol of new life and defeat of the Underworld.[47]

## Chapter 5: Maya Calendars

The Maya were a people obsessed with the notion of time and its relationship to the spatial reality that they perceived around them. They are well known for their precise calendar and astronomy. It is impossible to launch into a study of Mayan chronology and calendars without incorporating not only astronomy and mathematics, areas of obvious relevance to any calendar system, but also religion, folk history, linguistics, writing systems, architecture, and social structure. Quite uncharacteristic of Western astronomy, the paramount aim of the Maya astronomers' endeavors seems to have been to discover commensurate relationships both among celestial cycles and between astronomically derived periodicities and non astronomical cycles. The Mayans had an elaborate calendar system, no longer in use, which obviously evolved in complete isolation from those of the old world. This system ended with the fall of the Mayan civilization. Most of the remaining knowledge of it was destroyed by the Spanish during the conquest. It was not until very recently, during the 1990s, that archaeologists have finally been able to fill in many of the gaps in our knowledge of Mayan civilization, including the calendar system.

The Mayans were skilled mathematicians, and this shows in their calendar. In the field of mathematics alone, the Mayans were far more advanced than any other contemporary civilization. By the third century AD, Mayan scholars had discovered the mathematical concept of the zero, an idea not to be considered in the Old World until it was explored by Hindu thinkers five hundred years later (the

[47] Kováč, op. cit., pg.167

zero would not arrive in Europe for several more centuries) and a positional, vigestimal counting system that enabled the Mayans to make highly accurate calculations of astronomical and temporal periods. The counting system was based upon fives and twenties, evidence indicates that the Maya used multiplication and division, as well as addition and subtraction. Numbers were written using a dot to represent one and a bar to represent five. They were written both vertically and horizontally, with the dots for ones being either to the left or on top, respectively. The numbers one through thirteen also had representative glyphs that could be used either individually or in conjunction with the dot-dash system.[48] However, despite their great skill at observing the heavens, their calendar has no relationship to lunar or seasonal cycles, and is only synchronized with the solar cycle year approximately.

The Mayans used three separate calendars which were connected as three cycles. The 260-day cycle Tzolk'in, was the calendar of day-to-day life for the Maya and wais based on the cycles of the Pleiades. Their calendar year began when the Maya priests first remarked the asterism rising heliacally in the east, immediately before the sun's dawn light obliterated the view of the stars. The cycle of the Pleiades uses 26,000 years, but is reflected in the calendar we are using by encompassing 260 days. In Mayan cosmology the precession of the Pleiades is tracked using the Calendar Round (52 years). The Tzolk'in was the most fundamental and widely-attested of all the Maya calendars and a pre-eminent component in the society and rituals of the ancient Maya. The Tzolk'in is still in use by several Maya communities in the Guatemalan highlands. Its use is marginal but spreading in this region, although opposition from Evangelical Christian converts has erased it from some communities.[49]

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48 Ratsch, Christian, op.cit., 1986

49 Kenneth, Johnson, op. cit.9, pg. 62

Tzolk'in uses the sacred numbers 13 and 20. The 13 represented with numbers and 20 represented with sun/glyphs. The Tzolk'in has four smaller cycles called seasons of 65 days each guarded by the four suns: Chicchan, Oc, Men and Ahaw. There are also Portal days within the Tzolk'in that create a double helix pattern using 52 days and the mathematics of 28, this calendar was used to give the name of the new born. The days were composed of twenty day names combined with thirteen numbers, each of which, depending upon the name and number, had its own unique character. The day names correspond to the god who ruled the day. The character of each day was a representation of the god and the attached number, the two were inseparable, although the name carried more weight than the number[50]. Throughout the cycle, no two days were exactly alike, as the days and numbers continued in succession and each combination would not be repeated until the end of 260 days. The day names are, in order: Imix, Ik, Akbal, Kan, Chicchan, Cimi, Manik, Lamat, Muluc, OC, Chuen, Eb, Ben, Ix, Man, Cib, Caban, Etz'nab, Cauac, Ahau.[51] Mayan scholars understood, of course, that the solar year lasted a great deal longer than 260 days. The Tzolk'in was used for religious and ceremonial purposes, but more pragmatic matters required a different form of chronology. It remains unclear what are the origins of Tzolk'in calendar. According to today's Maya, it is connected to the 260 days long period of a pregnancy. But Zelia Nuttalova stated that these 260 days are one of the intervals between passages of zenith of the Sun on the 15$^{th}$ degree of northern latitude.[52] It would be an accurate theory, but that would mean that this calendar has origins in area of 15$^{th}$ degree of northern latitude. This theory was rejected by J. Eric. S. Thompson. He did not assume that this area was a possible birth-place of sacred Mayan calendar, due to the reason that it was not as advanced as other Mayan territories at that time.

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50 Kováč, Milan, op. cit., pg.107

51 Kenneth, Johnson, op. cit., pg. 52

52 Nutallova, Zelia, Nouvelles lumiéres sur les civilisations americanes et le systéme du calendrier, Rome 1926, pg.119-148 in Kenneth, Johnson, op. cit., pg. 61

The Haab was a civil calendar based on a year of 360 days consisting of 18 periods of 20 days. Five days were added at the end of the Haab year to approximately synchronize it with the solar year. The Haab was based in the cycles of earth. It has 360 + 5 days or kins, totaling 365 days[53]. The Haab used 18 uinals or months with 20 days in each month. There was a 19th month called a Wayeb and used the 5 extra and nameless days, considered evil or bad luck days. Each month has its own name/glyph. Each day used a sacred sun/glyph.

Each Haab date consisted of a one of twenty day numbers, (numbered from 0 to 19), and a 'month' or uinal name, of which there are 18. The uinal names were as follows:

| | |
|---|---|
| 1 Pop | 10 Yax |
| 2 Uo | 11 Zac |
| 3 Zip | 12 Ceh |
| 4 Zotz | 13 Mac |
| 5 Tzec | 14 Kankin |
| 6 Xul | 15 Muan |
| 7 Yaxkin | 16 Pax |
| 8 Mol | 17 Kayab |
| 9 Chen | 18 Cumku |

Each day in the Haab calendar was identified by a day number within the month followed by the name of the month. Day numbers began with a glyph translated as the "seating of" a named month, which is usually regarded as day 0 of that month, although a minority treat it as day 20 of the month preceding the named month. In the latter case, the seating of Pop is day 5 of Wayeb'. For the

[53] Kováč, Milan,op. Cit., pg.110

majority, the first day of the year was 0 Pop (the seating of Pop). This was followed by 1 Pop, 2 Pop ... 19 Pop, 0 Wo, 1 Wo and so on.[54]

The five nameless days at the end of the calendar called Wayeb' were thought to be a dangerous time. During Wayeb, portals between the mortal realm and the Underworld dissolved. No boundaries prevented the ill-intending deities from causing disasters. To ward off these evil spirits, the Maya had customs and rituals they practiced during Wayeb'. For example, people avoided leaving their houses or washing or combing their hair. Wayeb' days preceded the first day of the New Year, always 0 Pop in the Maya ja'ab'. The ja'ab' closely approximated the solar or seasonal year and governed secular events.

As a calendar for keeping track of the seasons, the Haab was crude and inaccurate, since it treated the year as having 365 days, and ignored the extra quarter day (approximately) in the actual tropical year. This meant that the seasons moved with respect to the calendar year by a quarter day each year, so that the calendar months named after particular seasons no longer corresponded to these seasons after a few centuries.[55]

Although Mayan astronomers had calculated the year to a high degree of accuracy (365.2422 days) they did not incorporate this into the calendar itself. They did, however, make careful calculations and records of the error that occurred with reference to the seasonal cycle. Leap days were not incorporated because of the importance of the coincidence of the various days of each cycle.

The Tun'Uc was the moon calendar. It used 28 day cycles that mirrors the women's moon cycle. This cycle of the moon was broken down into 4 smaller cycles, of 7 day each. These smaller cycles were the four phases of moon cycle. A 104 years Haab-Venus Calendar was very important as well.

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[54] Sylvanus, G. Morley, op. cit., 1956, pg. 136

[55] Kenneth, Johnson, op. cit., pg. 61

Venus (Noh ek) was the astronomical object of greatest interest, the Maya knew it better than any civilization outside Mesoamerica. In Maya myth, Venus was the companion of the sun. This reflects the fact that Venus is always close to the sun in the sky, rising not long before sunrise as morning star (Ah-Chicum-Ek') or after sunset as evening star (Lamat). To Maya it was even more significant than the Sun. They watched it carefully as it moved through its stations, it takes 584 days for Venus and the Earth to line up in their previous position as compared to the Sun. It takes about 2922 days for the Earth, Venus, the Sun, and the stars to agree.[56] Venus had a psychological effect upon the Maya, it has been shown that the Maya were timing some of their wars based on the stationary points of Venus and Jupiter. Humans were sacrificed on first appearance after Superior Conjunction when Venus was at its dimmest magnitude but they most feared the first Heliacal Rising after Inferior Conjunction. In the Dresden Codex the Maya had an almanac that displayed the full cycle of Venus. Venus cycles were the mean synodic Venus year of 584 days and a "great cycle" of 37960 days (the lowest common multiple of the Tzolk'in, and the Venus year, equal to 104 calendar years or 2 calendar rounds).[57]

Maya calendar system was not just a method to track various celestial cycles. It was a complex system used to establish which of many gods were ruling a each moment of their lives. The role gods was to create, control and renew the world and all the beings within it.

## Long count

The Haab and Tzolk'in dates did not have a year component, however, a combined Haab and Tzolk'in date specify a unique day within a 52 year cycle.

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[56] Morley, Sylvanus G., op. cit, pg.153
[57] Kováč, Milan, op. cit., pg. 149

The long count was broken down into five components:

| | Baktun | Katun | Tun | Uinal | Kin |
|---|---|---|---|---|---|
| Equals: | 20 Katun | 20 Tun | 18 Uinal | 20 kin | |
| Days | 144,000 | 7,200 | 360 | 20 | 1 |
| Years | 394.3 | 19.7 | 0.97 | | |

These components were more then sufficient in recording all dates[58]. The zero day of the Mayan calendar is the date given above as the 'Mayan Epoch'. The significance of this particular date, which far exceeds any known historical horizon for Mayan civilization, is unknown. No recorded Mayan date precedes baktun 7, and most of the historical Mayan events occurred during baktun 9 (from 435-830 C.E.).

Even longer dates with more components have been found. This includes enough additional base 20 components to write dates millions of years in the past or future, even though no such dates actually occur in the Mayan inscriptions, just contemporary dates with more digits in front of them. Imagining that kind of chronological depth to the universe is another Mayan accomplishment, similar to Hindu and Buddhist chronologies which encompass not just millennia, but billions of years of cosmic history.

[58] Kenneth, Johnson, op. cit., pg. 38

## Chapter 6: The conception of time according to Maya

The katun was a basic unit of time in the Maya calendar, a period of 7200 days, just short of 20 years in the European calendar. This was a time period which was the centre of Maya interest. The Maya Kings timed their accession rituals in tune with the stars and the Milky Way. They celebrated Katun's endings approximately every twenty years. At the end of the 20-year k'atun period, Maya rulers regularly erected a stela (Te' Tun) or stone tree, to commemorate the event. At the time of the Spanish Conquest, the longest calendrical cycle kept by the Maya was a cycle of 13 katuns, about 256 years. The Maya called this cycle u kahlay katanob, "the count of katuns". Writers on the Maya calendar often refer to it as the "short count" to distinguish the "long count" kept in the Classical era (200-900 AD) which counted time from creation of the present world[59].

Each katun in the cycle is identified by the date of its final day in the Tzolk'in, a cycle of 260 days used to make auguries and time rituals. Days in the Tzolk'in are assigned one of 20 day names and one of 13 day numbers. The mathematics of the Maya calendar dictate that katuns always end on a day named Ahaw.

The day Ahaw on successive katun ends cycles through the 13 day numbers in this order: 11 Ahaw, 9 Ahaw, 7 Ahaw, 5 Ahaw, 3 Ahaw, 1 Ahaw, 12 Ahaw, 10 Ahaw, 8 Ahaw, 6 Ahaw, 4 Ahaw, 2 Ahaw, 13 Ahaw. These are names of the katuns of the u kahlay katanob[60].

The u kahlay katanob was used both to record historical events and to predict the character of future katuns. Due to the cyclical nature of time events in one katun were expected to mirror those of another with the same position in the cycle of 13.

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[59] Sylvanus, G. Morley, op. cit., pg. 145

[60] Ratsch, Christian, op. cit., pg. 40

Knowledge of katun prophecy comes primarily from the Books of Chilam Balam, manuscripts written in the native language using the Latin script after the Spanish Conquest. The Chilam Balam, "Spokesman of the Jaguar", was charged with both recording the past and present for the instruction of successors, and predicting the character of future katuns from knowledge of the past.[61] Books from eleven Maya towns in the Yucatan have survived. The oldest manuscript likely dates to no later than 1595, but they were recopied and expanded down to at least the end of the 18th Century.

It is important to understand that the sequence of katuns did not dictate specific events: The cycle determined only the quality or character of each katun. Katun prophecy was not a simple matter. The Chilam Balam was required to interpret the past to divine the future, not simply read a prognostication from an ancient book. According to the Book of Chilam Balam of Tizimin, prophecies where made in a trance state, during which a deity spoke to the unconscious Chilam.

The passages in the Books of Chilam Balam that contain katun prophecy also allude to history, contemporary events, and ritual prescriptions. Although this mixing of history and prediction makes it difficult to sort out the fate of each katun, it is possible to extract a summary account of the character of the katuns.

Longer cycles can be incorporated in the Maya calendar, we do not know how they used the largest numbers in billions of years. A K'atún consists of 20 Tun (about 19.7 years), and was celebrated with twin pyramids complex in Tikal and Yaxhá, a Bak'tún of 20 K'atún (about 394 years), a Pik'tún or 20 bak'túns (about 7,885 years), a Kalab'tún or 20 piktuns (about 157,703 years), a Kinch'il'tún or 20 Kalab'túns (about 3.2 million years), Alautún or 20

[61] Ratsch, Christian, op. cit., pg. 93

Kinch'il'tún (64 million years), and the Hablatún or 20 Alautún (About 1.26 billion years ).

A total of 18,980 days, or 52 of the 365-day years, elapsed before any particular number and day in one calendar coincided again with a particular day and month in the solar calendar. [62]

This 52-year permutational cycle of the Mesoamerican calendars is called the Calendar Round, or junab'[63]. Because Calendar Rounds ended and began only once every 52 years (probably once in most humans' lifetimes), this renewal event at the end of the dangerous Wayeb' days was grandly celebrated, and the celebrations were accompanied by lighting new fires. There was also renovation of old sacral buildings and building of new pyramids in which case the new one was always bigger.[64] "*This renovation shows us the close connection of time and universe where the round of 52 years might come to an end or restore"*[65].

Kihn, the Mayan term which can alternately mean sun, day, or time. The word kihn, while larger in scope, is related to the word kin, which forms a part of the long term system the Mayans used for marking period of time. 1 kin = 1 day. 20 kins = 1 uinal (1 365 day calendar month). 18 uinals = 1 tun (the 360 day year). 20 tuns = 1 katun (7,200 days). 20 katuns = 1 cycle (144,000 days). 400 cycles = 1 great cycle (2,880,000 days). [66]

Kihn describes the notion of the sun and its relationship to the unaltering reality of the universe. The sun defines this reality In the Popol Vuh, where the rising of the sun is the dawn of humanity. The pattern of the suns movement

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62 Ratsch, Christian, Bohové starých Mayů, op. cit., pg. 37

63 Sylvanus, G. Morley, op. cit., pg. 136

64 Kováč, Milan, op. cit., pg.110

65 Rice, Prudence M., Maya politicals cience, Time Astronomy and the Cosmos, Austin pg 56??

66 Ratsch, Christian, op. cit., pg.36

across the sky is constant.[67] It forever rises up from Xibalba (the Mayan underworld) to cross the sky and be devoured in the west, but only to rise again. The passing of each successive day brings forth a new, clearly defined world. It is defined by the day name and number. The concept of time is an inextricable part of this process, the sun forever being consumed and returned once again. By combining the two calendar cycles, a conception of the nature of the world at any point in the past or future was possible. The Maya, be he peasant or priest, could rest assured that by following these patterns he could understand the universe about him.

As I mentioned above, each day had name and number . The character of each day was a representation of the god and the attached number. Individual units of time were representing burden which gods carried strapped to their foreheads. At the end of each day when the god was "finished" with his cycle, he sat down and waited until it was his turn to carry the time again. Each god was different (had different character) and so were their burdens. That is why were Maya so careful with registering each burden. It was awaited that after certain cycle, the same god will come back with the same burden and that is how they could be prepared for it. This was very closely connected to everyday life of Maya. Nor celebration or any more significant step (longer journey) could be done without knowing exactly the description of god of each day and his burden.

Toward the end of the Late Classic, the Maya began to simplify their accounting of time from the typical Long Count and Initial Series format. Instead, they recorded only the katun and day-month names and numbers in the two calendars, as, for example, Katun 18, 11 Ajaw 18 Mak. By the Postclassic and Colonial periods, after about a.d. 950, dating was abbreviated even further to the

[67] Leon-Portilla, Miguel, Tiempo y realidad en el pensamiento Maya, Mexico 1986, pg. 63

Short Count, referencing only the passing of katuns along with the Ajaw ending day, as, for example, Katun 8 Ajaw[68].

The cosmology of the Maya was a living, religious philosophy that permeated their lives to a degree that might seem excessive to modern people. They were astute observers, sensitive to the cyclical nature of the sun, moon and planets. The creation of the world and its passing was only one act in the eternal cycle of birth, death and renewal. Their calendars and conception of time was a reflection of cycles of the seasons and the stars.

[68] Rice, Prudence M., Maya political science. Time, Astronomy and the Cosmos, op. cit., pg. 66

# Conclusion

The cyclical conception of time was a widely spread among most of the great agricultural societies. These societies were not “living in past“ and hoping for the Golden Age to cyclicali some back to them, but rather thinkink about their future survival and ways how to secure stability and permanency.

There was no other civilization with such complex view on time as was Maya civilisation. Their calendars and abilities in fields such as mathematics were without any doubt highly superior to any other culture. Their astronomical knowledge, even though they did not have any special equipment was even more extraordinary. They were able to calculate synodic cycle of Venus or of eclipses. We might state that their calendas was more exact that the Julian calendar which was used in that time.

These abilities were improved mainly due to religious purposes. They needed to know the characterictics of each day (exactly according to the cycles of celestial bodies) in order to behave in such way that would ensure them, that the cycle will continue. For example they believed that the Gods guided the Sun and Moon across the sky. Even in the night, Sun and Moon continued with their journey through Xibalba (Underworld). Here they had to fight the battle with Underworld gods that would try to stop them. That is why Maya established a complex and wide sets of sacred rituals which would ensure them that the cycle will not end. Participation on these rituals was simply paying the price for the continued survival of the universe. According to Maya, they had inherent responsibilty to the gods who created them and continued with carrying their burdens of time.

Maya were preoccupied with cosmic order. They have seen disorder as an evil, which was representing the chaos that is a constact threat. Time was acornig

to Maya cosmic order that fought with its cyclical feature against the chaos (evil).[69]

[69] Farris, Nancy, Remembering teh Future, Anticipating the Past: History, Time and Cosmology anmong the Maya of Yucatan, Cambridge 1984, pg. 574

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