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The Chinese 60-Day/Year  
and Mesoamerican 260-Day Calendars:  
A Comparative Study of Cyclical Calendrical Systems  
and Cosmology

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# The Chinese 60-Day/Year and Mesoamerican 260-Day Calendars: A Comparative Study of Cyclical Calendrical Systems and Cosmology

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This study intends to explain the unique cyclical calendrical systems used in China and Mesoamerica from ancient times on, and to lay out their intriguing similarities in structure, division of year, and associations with astronomy and astrology. As they are closely related with regard to their calendrical systems, Chinese and Maya cosmology are also compared, particularly their cosmograms, concepts of the universe, and the astrological association between the planet Venus and warfare. The purpose of the study is to demonstrate the similar cultural phenomena, to consider whether the two systems are related in any way, or if, alternatively, they represent a common pattern of human cognition. At a practical level, the goal is to find out if understanding one system can shed light on the other, particularly with respect to missing elements.

## THE CHINESE CALENDAR OF 60-DAY/YEAR CYCLE

### GAN-ZHI 干支

The sexagenary cycle of Gan-Zhi, or “stem” and “branch,” is a calendrical device inscribed on oracle-bones of the Shang dynasty (ca. 1600–1046 BCE) in China and that continued to be used afterward. It is a system that is composed of two numerical series: one is from one to ten (甲乙丙丁戊己庚辛壬癸 or 1···10), and the other is from one to twelve (子丑寅卯辰巳午未申酉戌亥 or A···L; Tables 1, 2). Once the two series are paired, it takes sixty pairs to cycle back to the beginning pair. That is to say, if one pair represents one day or one year, it would take sixty days or sixty years to complete the cycle. A

complete cycle of sixty signs was shown neatly aligned in the oracle-bone inscriptions by 1200 BCE. However, the system was not clearly named until about 200 BCE, when people started to use the system of *Gan* (stem) and *Zhi* (branch) to name the two series, also designated “Heavenly Stems” and “Earthly Branches.”

This system seems to be independent of astronomy, or at least at this point there is no direct indication of its relationship to any astronomical phenomenon except for the pure observation of day and night and some speculations. However, it is often used side by side with other calendars of either cyclical or sequential devices, such as solar and lunar combined calendars, or the years of dynasties. There is a common consensus among scholars of oracle-bone inscriptions that the Shang people had already put into use a lunar-solar calendar (Chang 2008, 38-54; Liu 2009). In many bone inscriptions, there is almost always a Gan-Zhi pair at the beginning of a sentence, indicating the day of the divination, then a month (using a lunar-solar calendar), such as the second or fourth or thirteenth month. In this combined calendar, there are normally twelve months, but every so often there is a thirteenth month inserted as a leap-month. During the Han dynasty (206 BCE – 220 CE), a calendar called *Zhuanxu Li* (颛顼历) was formally and officially established and has been used ever since, with some minor adjustments along the way. As might be expected, this calendar is accompanied by the 60-year Gan-Zhi calendar. The Gan-Zhi is still used in modern times together with other calendars. For example, the date of this writing would be indicated in a Chinese calendar as Geng-Zi (庚子), Nongli (agricultural calendar) xxth Day, xxth Month, June 1, 2020 CE.

In the oracle-bone inscriptions, the Gan-Zhi is mostly used to reckon days, and, at least since the Han dynasty, years (Xu 1996, 41). There is no indication that the twelve names in the Zhi branches represent twelve months. The main function of Gan-Zhi is to record the days and years for both secular and divination purposes. By the second century BCE, twelve animals were added to match the twelve branch names, as is neatly shown in the bamboo slips of the Qin tombs in Gansu Province (Gansu 2009).

In addition to their calendrical use, the names of the Gan-Zhi were adopted for personal names, mostly for the kings, princes, and their concubines. To name a few: Pan Geng (盘庚), Zu Geng (祖庚), Xiao Xin (小辛), Xiao Yi (小乙), Wu Ding (武丁), Di Yi (帝乙), and Di Xin (帝辛), etc. The second part of each name is in the order seven, seven, eight, two, four, two, and eight, in the Gan series (1...10). Interestingly, only the names of the heavenly stems were chosen to bestow upon people.

## THEORETICAL SPECULATIONS

Since the origin of Gan-Zhi is not clear, modern scholars have provided a few speculations.

Guo Moruo, a modern Chinese scholar of oracle-bone inscriptions, suggested two interpretations in his "Interpreting Zhi Gan" (1952). First, he postulated that the ten stems were simply a natural solution arising from the decimal system, based on the human hands, with their ten fingers.

Second, he explained that the twelve branches had to be from the Babylonian zodiac, reflecting its twelve divisions of the ecliptic. He compared the configuration of some words from the Zhi series with the outlined shapes of the Babylonian zodiac constellations, and thought they were surprisingly similar. He also found that some words naming the Chinese constellations had weird pronunciations, which might be from Sumerian and Akkadian. The problem with his interpretation is that it is speculation without any archaeological or historical evidence, and his supporters have also been unable to provide any evidence.<sup>1</sup>

Other scholars have also done studies related to the second theory. David Kelley (1960) summarized several of those studies and suggested that the Chinese lunar mansions had origins in Eurasia around 2500 BCE. He especially mentioned Needham's study in ancient Chinese astronomy in *Science and Civilization in China* (vol. 3, 1959). Further, Kelley expanded his application of this theory all the way into Pre-Columbian Mesoamerican calendrical systems, and he concluded that there was a Eurasian origin for Mesoamerican calendars. The phenomena Kelley laid out are very interesting, and the materials he dealt with are somewhat related to this study (e.g. constellations), but it is not my intention to reexamine them here. My focus is on the structure of the calendars. Interested readers should read his original publication. However, I would like to add that, since this publication, especially after the decipherment of the Maya inscriptions in the late 1970s and 1980s, to which Kelley himself also contributed substantially, there have been many new discoveries and intensive studies in both Chinese

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<sup>1</sup> I discuss this issue at length in another paper (to be published later in *Sino-Platonic Papers*), in which I examine materials related to Guo Moruo's basic idea of a Babylonian origin for the 12 Zhi 支. Some materials there seem to support his thesis, but more seem to argue against it. These demonstrate that the Babylonian constellations were not formalized to twelve stations until 700 BCE. This of course contradicts his identification of 12 Zhi with the twelve Babylonian zodiacs, since a complete Gan-Zhi had already appeared on the oracle bones by 1200 BCE.

and Mesoamerican astronomy and astrology. Therefore any studies from before the 1970s need to be updated significantly.

A third theory is based on mythology. As summarized in some general books on Chinese astronomy (e.g. Zheng 1979), a few authors have traced the Gan-Zhi to the mythical stories in *Shanhai Jing* (《山海经》), a classic book on geography and the customs of people in various places, compiled in the time of the Warring States (475–221 BCE). Among the many stories there are several about ten suns and twelve moons, such as “Xihe Giving Birth to Ten Suns” (羲和生十日), “Changxi Giving Birth to Twelve Moons” (常羲生月十有二), and “Yi Shot Ten Suns” (羿射十日), etc. In Chinese, the word for the sun and day is the same, “ri” (日), and the word for moon and month is also the same, “yue” (月). So the ten suns are understood as ten days, and the twelve moons are the twelve months. The major concern here is that these mythical stories or deities are not found on the oracle bones (i.e., before *Shanhai Jing*), except for one word, “E” (娥), the name of a goddess who is associated in the oracle bones with disasters. *E* could be related to the moon goddess Chang-E (嫦娥), as described in *Gui Cang* (《归藏》), a classic seen as early as *Zhou Yi* (《周易》) in the Zhou dynasty, about 1046–256 BCE.

#### THE YI CALENDAR OF EIGHTEEN MONTHS AND TWENTY DAYS

In the southwest of China, deep in the mountains of Liangshan (凉山), on the borders of Yunnan and Sichuan provinces, there is a large ethnic group named Yi zu (彝族), whose diviners (毕摩) were still using two different calendars in the 1800s, one of which continued into the 1980s. One is a calendar of ten months with thirty-six days in each, plus five unnamed days at the end of the year, and the other is a calendar of eighteen months with twenty days in each, plus five unnamed days to complete the year (Lu and Liu 1986).

Ethnologist Liu Yaohan, himself a Yi, has done extensive research since the 1940s on the calendars in use among the Yi people. These minority people are described in many historical documents as being one of the earliest among the groups who were pushed far to the south, deep into the mountains of central and west central China, before the Shang dynasty. It is believed that they retain some of the oldest traditions of China, because of their extreme isolation. According to the studies of Liu and his team, the 10-month 36-day plus 5 days calendar used by the Yi people might be traced back to the Xia Calendar (Chen and Liu 1983), a calendar believed to be made in the Xia dynasty (ca. 2070–

1600 BCE). The ten-month calendar was still popular among the Yi diviners in the 1980s. The 18-month 20-day plus 5 days calendar is said to be older than the ten-month calendar.

In the Yi eighteen-month calendar, the year is divided into 18 months with 20 days in each, with 5 extra days added for ceremonies (or not given a purpose). Each day and month has its own name (Table 3; Liu 2001). The names of the twenty days seem to be related to the deities and actions in the creation myths of both Yi and Han people, such as Fuxi (伏羲), the First Father; and the names of the months almost exclusively refer to seasonal phenomena. However, Mr. Liu and his team did not report anything about the annual celebration. Based on the Yi ten-month calendar, the Yi year starts around either the summer solstice, commencing with the Fire Festival on June 24 (火把节), or the winter solstice, with an "after ten months" celebration (过十月节) (Lu and Liu 1986, 47–48), and, apparently, these two celebrations complied with the eighteen-month calendar.

What is interesting about the Yi eighteen-month calendar is that it has the exact same structure as the Maya Haab calendar.

## THE MESOAMERICAN/MAYA CALENDAR OF A 260-DAY CYCLE

### TZOLKIN

The Tzolkin, to use its Yucatec Maya name, is a calendar composed of two series, a series of numbers from one to thirteen, and a series of twenty day-names fixed in order (Tables 1, 2). When the two series run in pairs, it takes 260 days to complete the cycle. This calendar was definitely used in 600 BCE, with earlier indications around 900 BCE. It was the most popular day-reckoning device throughout Mesoamerica until colonial times. It was used basically as a ritual almanac, but was also used together with other calendars such as the Haab and the Long Count for mythical descriptions and historical records of a dynasty's chronicles.

Many modern scholars have tried to figure out the origin of the two sets of numbers. There have been attempts to associate it with astronomy, myth, the human gestation period (approximately 266 days), etc., but according to a study by Anthony Aveni (2001, 140–145), none of these can be firmly proved. For example, many people think that the human body, because of its fingers and toes, would be

a natural source for a unit of twenty; but thirteen does not seem to have any natural sources. However, as Harvey and Victoria Bricker write, the 260-day unit does have some astronomical significance:

Both 260 days and some of its multiples have general astronomical significance. For example, 260 days approximately the length of time Venus is visible as a morning star or an evening star, two multiples of this period (520 days) closely approximate three eclipse half-years, three multiples (780 days) correspond well to the mean synodic period of Mars, and seven multiples (1820 days) are roughly equivalent to five tropical or sidereal years. It is perhaps for this reason that most of the almanacs and tables in the Maya codices are based on the 260-day *tzolkin* and its multiples, rather than on the 365-day *haab*. (Bricker & Bricker 2011, 69)

Although those are good reasons for the 260-day calendar to be used, they do not give direct astronomical phenomena to explain the numbers thirteen and twenty. The Brickers' interpretation sounds more like a mathematical convenience for astronomical use.

Other scholars considered the Maya and Aztec myths regarding the thirteen levels of the Upper World to be possible sources, but Aveni (2001, 19) pointed out that such a cosmological structure had not been found in any classical inscription until early Colonial times. In this regard, I would like to call readers' attention to the Temple of the Inscriptions (Fig. 1) at Palenque, Mexico. The Temple has nine tiered platforms externally, but hidden inside is the tunnel leading to the burial chamber of King Pacal, which has thirteen corbeled arch turns in its ceiling. It may be a coincidence, but considering that several nine-leveled temples have a burial underneath, e.g., Temple A at Tikal, and the Great Pyramid at Chichen Itza, we cannot ignore the significance of the number nine symbolizing the levels of the underworld and death. If classical Maya people intentionally built nine-level pyramids, they might have had the intention to represent the upper world as well. However, there is no mention of the levels of the sky in *Popol Vuh*, a Maya creation myth of the thirteenth-fifteenth centuries.

The so-called Maya Zodiac is also brought up. The Maya Zodiac is found in both the Madrid and Paris Codices (Fig. 2). In the layout, the Maya ecliptic is divided into thirteen constellations, and each is accompanied by an animal. I myself wondered for a long time if the thirteen zodiacs are the base of



use of the number thirteen, so I asked Dr. Victoria Bricker, a specialist in Maya astronomy and calendrical manuscripts. I quote below Dr. Bricker's email responses to my specific questions:

... there is an even closer link between the number 13 and the zodiacal constellations because the Sun passes through 13 constellations on its course through the year; however, only 12 constellations are recognized in Western astronomy because the year is divided up into 12 months, not 13, in our calendar. The 13th constellation is Ophiuchus, which lies between Scorpio and Sagittarius. So, the Maya recognition of 13 zodiacal constellations is astronomically more accurate than the 12 constellations represented in the Western zodiac.

However, this sophisticated division into thirteen constellations does not seem to appear before the Tzolkin. So, we still cannot be sure if the zodiac was the base for using thirteen in the Tzolkin.

In our conversation, Dr. Bricker also discussed the significance of the number thirteen in the Long Count calendar (see below), which gives the beginning day of the fourth era in Maya myth, 13.0.0.0.0, or August 11, 3114 BCE, and the end day, 13.0.0.0.0,<sup>2</sup> or December 21,<sup>3</sup> 2012 CE. The beginning and end days show exactly thirteen baktun completions and two astronomical phenomena. Again, I quote her here:

I have thought of an association of the number 13 with Maya astronomy. Although the Maya Long Count is fundamentally vigesimal in structure, the Maya Era itself, which ended on December 21, 2012, was composed of 13, not 20, baktuns, and it began on August 11, 3114 BC, approximating the date of a solar zenith passage that could have been witnessed two days earlier in the southern Maya highlands that year (see page 168 of the attached article [Bricker & Bricker 2015, 165–182] for a discussion of this date). In

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<sup>2</sup> To my knowledge, this date could be written also as 19.0.0.0.0.0, or 18.13.0.0.0.0. Ref. Bricker and Bricker 2015, 168.

<sup>3</sup> Schele (in Freidel, Schele, Parker 1993) gave August 13, 3114 BCE, and December 23, 2012 CE, instead.

other words, the 13-baktun period bracketed two kinds of astronomical events: the first a solar zenith passage in 3114 BC and the second a winter solstice in 2012 AD.

The second footnote in the attached article [Bricker & Bricker 2015, 179, note 2] points out that 13 baktuns would have consisted of 260 katuns, each composed of 20 tuns of 360 days, as an analogy of the number of days in a tzolkin.

It appears that the Maya decided to start an era on a day with an obvious solar phenomenon and a period of thirteen units on the calendar. The purpose of having the baktun (see next section under the Long Count) number place filled with 13 (instead of 20, which should be the normal way) might be to match the Tzolkin numbers 13, 20, and 260, as the Brickers noted. In this case, I would like to add another example to show that these numbers are indeed sacred concerns of the Maya people.

Koba Stela I is a stone monument (Fig. 3) from Koba (Coba), Mexico. It gives the day of Creation as a series of multiple numbers in the Long Count calendar. From the fifth place date unit *baktun* all the way up, there are no more nor less than twenty higher places, which all show thirteen times of earlier cycles. To make it simple, on this monument, the thousands of years before the Creation Day of the fourth era (just completed on Dec. 21, 2012) is set in a way of  $13 \times 20$  many times, obviously to echo the  $13 \times 20 = 260$  day Tzolkin.

This particular calendar arrangement brings us back to our question again: why thirteen? why 260? So far, it seems that besides serving a purely mathematical purpose, there is no direct indication to any astronomical phenomenon.

In brief, in Tzolkin, the twenty days may come from vigesimal numerical system which itself might be based on the natural count of human fingers and toes, and the number thirteen might be just convenient as being the least common multiple to match the period of 260 days or anything 260.

In the Maya inscriptions, calendrical numbers and names were also used for people's names, just as the Shang Chinese did. Here are some personal names in *Popol Vuh*, the Maya creation myth (Tedlock 1996): One Ahua and Seven Ahua, One Death and Seven Death, also Thirteen Rabbit, One Monkey, Cu-Ix or Cu Jaguar, Smoke-Imix or Smoke Crocodile, and then Aztec ones like One Reed, Thirteen Reed, Nine Wind, etc. The second parts of these names are all calendar day names.

## THE MAYA HAAB, CALENDAR ROUND, AND THE LONG COUNT

## HAAB

The Maya Haab (used as early as 100 BCE) is a solar calendar of 365 days. The same calendar was also used by other Mesoamerican people but with different names. The year is divided into eighteen months of twenty days each, plus five extra days. From its total number of 365 days, one can tell it is a solar-based calendar. In this calendar, days are indicated by numbers from zero to nineteen, and months are named individually, plus an extra "month" of five or six days, named Uayeb. The logic for this solar calendar's division of eighteen months of twenty days each is not very clear except that twenty days had already become a set unit, and it was convenient to use it. There are New Year and Half Year celebrations, and according to the Brickers' studies (2011, 539), in the Dresden Codex, in the pages of the Haab calendar, the New Year celebration, or Uayeb rituals, occurred in December, and the Half Year celebration usually happened in July.

The Haab does not have day names. Although the Tzolkin is used with the Haab very often, the Tzolkin day names do not go with the Haab days. The Haab months do have specific names, but their meanings do not necessarily correspond to the natural changes except two: Pax (planting time) and Kumku (ripe maize) (Fig. 4 and Table 3).

The peculiar division of eighteen months of twenty days each happens in both Yi and Haab calendars, and neither has an astronomical or natural base, except that twenty is the base of the vigesimal mathematical system in Mesoamerica. Such a random division of the year appearing in two geographically distant cultures makes one wonder if it is just a coincidence.

## CALENDAR ROUND

Among the Mayas and Aztecs, there was also the Calendar Round (so named by the modern scholars), in which the Tzolkin and Haab calendars run together. It pairs a system of 260 days with a system of 365 days, and it takes approximately fifty-two years to complete a full cycle (Fig. 4). The Aztecs were particular about this calendar, and the famous Mendoza Codex gives an exact fifty-two-year cycle on its cover page.

## THE LONG COUNT

The Long Count calendar is a linear time reckoning device independent of astronomy. It is based on the Haab division of twenty days and eighteen months, but leaves out the extra five days, making a total of 360 days for a *tun*, or year. Within normal time counting systems, there are five places for days (*kin*), months (*winal*), years (*tun*), 20-years (*katun*), 20x20-years (*baktun*). But there are more time unit places beyond *baktun* (Fig. 5). This is the calendar that helps our modern scholars match Maya time with the Gregorian calendar. Although the Long Count is a linearly sequential calendar, it gives larger cycles of the Maya Eras, especially the fourth era from its creation on August 11, 3114 BCE, to its end on December 21, 2012, which are both completions of cycles of 13 *baktuns*.

Interestingly, as on the Koba Stela 1 discussed above, the numbers 13, 20, and their multiple of 260 appear on a larger scale, in the Long Count calendar. After a long series of dates, along with the *Tzolkin* 4 Ahua and *Haab* 8 Kumku, the inscription describes the creation itself: the god *Hala Koh* appeared. This god also appears in several more inscriptions on monuments and ceramics (Freidel, Schele, Parker 1993, 62–68). What needs to be emphasized here is the repetition of the number 13 on the Long Count date for this particular day. The number is obviously particularly sacred and a part of the creation myth.

Now, with all the calendars introduced, we can see how the Creation Day is recorded in three calendars: the *Tzolkin*, *Haab*, and Long Count. On a neat inscription on Stele C at Quirigua, Guatemala (Freidel, Schele, Parker 1993, 62–68), the Maya Creation Day is written:

13.0.0.0.0 4 Ahua 8 Kumku

Converting this to the Gregorian calendar, the date is August 11, 3114 BCE. Written in a Chinese calendar, it would look like this:

Year 3000 (of a supposed king's dynasty), 4-8 (*ding-wei* in Gan-Zhi), 8 Celebration (the eighth day in the eighteenth month in the Yi eighteen-month calendar), (天子 3000 年 ,

丁未, 彝历 18 月 8 日)<sup>4</sup>

In brief, the Tzolkin and its numbers, especially the number thirteen, are indirectly associated with astronomy, astrology, and myth. However, none of these associations is dated before the use of the Tzolkin. Along with the Gan-Zhi in China, the Tzolkin appears to be the earliest day-reckoning device.

## THE CHINESE AND MAYA COSMOLOGIES

In comparing the calendrical systems of Chinese and Maya cultures, I simply cannot help bringing in their cosmologies, because they share even more tellingly significant similarities, many of which come purely from people's imaginations, and are not based on any common natural phenomena.

## FOUR DIRECTIONS AND FOUR WINDS IN THE ORACLE-BONE INSCRIPTIONS

In oracle-bone inscriptions as early as the Shang period, the universe was divided into four named cardinal directions, and each direction had an additional name and a wind bearing a name. They are understood as the deities of the four directions and four seasons. A large piece of a bull's shoulder bone (1200–1189 BCE) is inscribed with these four lines:

东方曰析风曰荔	East named Xi, Wind named Xie
南方曰夹风曰微	South named Jia, Wind named Wei
西方曰夷风曰彝	West named Yi, Wind named Yi
北方曰（宛 <sup>5</sup> ）风曰侵	North named Yuan, Wind named Yi (Hu 1941) <sup>6</sup>

Since the directions already have their proper names, the names given after the directions are

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<sup>4</sup> This is an entirely made-up calendar entry, to show the structure.

<sup>5</sup> This word was not identified at first by Hu Houxuan (1941), but added later by other scholars based on the same names found in *Shanhai Jing*.

<sup>6</sup> My English translation.

considered to be those of their deities; and the names of the winds might be the deities in charge of the changing seasons in their proper directional regions.<sup>7</sup>

These directional deities and their associations continued in *Shanhai Jing* (《山海经》), a classic on geography and myth, which was elaborated and added to in *Shangshu-Hongfan* (《尚书-洪范》), a classic on Wu Xing (五行), or Five Elements, around the time of the Warring States (475–221 BCE). While the *Shanhai Jing* basically kept the same four directions, winds, and gods, *Hongfan* added the fifth element for everything. So the fifth, or central, direction was added, together with associations of natural elements, colors, seasons, animals, and many more.

#### THE CHINESE COSMOGRAM IN THE CHU SILK MANUSCRIPT

The Chu silk manuscript (Fig. 6) is an illustrated calendar of twelve months made for the Chu State during the Warring States period. Discovered by accident in 1942 in Changsha, Hunan Province, the manuscript was brought some years later to an American dealer and is now housed in the Smithsonian Institution Libraries. Chen Mengjia (1984) dated it to 350 BCE.

The manuscript shows a square composition of writings and images of twelve deities. The center has a long and a short text section, written in opposing directions so the reader needs to turn the manuscript to read both. The short text gives the creation story of Fuxi (伏羲) and Nuwa (女娲), the first couple of the Chinese people, with the birth of their four children, who would govern the four quarters of the earth. The four children's names all started with a color, i.e., blue, red, yellow, and black. The four children walked step after step to measure precisely the four seasons before the sun and moon come into being (Li 1985; Li and Cook 1999, 171–176).

The longer section in the center describes some chaotic situations, such as the seasons, the sun, moon, and stars out of order, and evil spirits making trouble, such as causing mountains to collapse, heavy rains to fall, etc.; it also gives recommendations that the people should keep the months (calendar) in their correct places and make regular sacrifices, to prevent such terrible things from happening.

The four sides of the picture show combined images and texts. Each side has three creatures in

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<sup>7</sup> There are several theories about the Four Winds. Most scholars, however, agree that they were intended to mean the four seasons. Ref. Wei 2002, 65-66.

the form of either a human, an animal, or a hybrid of the two, identified as month deities. Beside the head of each deity is the name of that month; below the name of the third month on each side, there are two words meaning "in charge of spring/summer/autumn/winter" respectively. Between the deities, there are texts of warnings and taboos for the specific months, such as noting in which month one should not get married, not build houses, or launch a war, etc.

In each of the four corners of the picture we see a tree with a particular color: for the northeast, a blue tree, for the southeast, red, for the southwest, yellow, and for the northwest, black. (A summary outline of the manuscript can be found in Fig. 6a.)

The manuscript is clearly a cosmogram combining time and space. It explains visually the Chinese concept of the universe, *Yu Zhou* (宇宙). In the book *Shi-Zi* (《尸子》 c. 390–330 BCE), definitions are given: "*Yu* means the above and below, and four directions; *Zhou* means the past, present, and coming future." (四方上下曰宇，往古来今曰宙).

This concept of *yu-zhou* with all directions and moving time also—amazingly—"explains" the map of the universe in the Maya Madrid Codex. I cannot find anything else that better explains the Maya cosmic map than the Chinese words for the cosmos.

#### THE MAYA COSMOGRAM IN THE MADRID CODEX

The Maya Cosmos is an illustrated calendar of the Tzolkin, possibly combined with the Haab, on two pages of the Madrid Codex (Fig. 7a). The center of the picture is framed in a square with twenty day-name signs on the frame, five names on each side, representing the appropriate direction. In it, there are two deities sitting back to back with a post or tree in between. The deities may be the sun god and moon goddess, or the first couple of the Maya people. Surrounding the central square, a larger square space is partitioned into eight sections, four quarters representing the four cardinal directions and the four corners indicating four sub-directions. In each directional quarter, there are a couple of deities making ceremonial offerings, and between and above the two deities, there is a glyphic word indicating the direction. What we know for sure is that the low part is the east, the upper is the west, the right is the north, and the left is the south. The four quarters and four corners are framed with the Tzolkin numbers and day names, showing exactly 260 days. All thirteen numbers are drawn in black dots except for representations of the number thirteen, which are all drawn fully in red. Between the dotted lines

on the four corners, there are footprints, all together eighteen in number, likely representing the eighteen months. The first day of the Tzolkin, 1 Imix, starts from the lower left corner, and then the days go counter-clockwise; the dot and day names run through all the quarters and corners, and the series ends at the lower left corner (Fig. 7a, Bricker & Bricker 2011, 390). On this cosmogram, there is no direct indication of particular given colors for the directions. But from other sources, we know that the Mayas employed red for representing the east, black for the west, yellow for the south, white for the north, and green for the center.

In a very similar Aztec/Mixtec cosmogram,<sup>8</sup> shown on the cover page of the Codex Fejérváry-Mayer, more associated emblems need mentioning, such as trees assigned to the four directions, and four different colors framing the four quarters, i.e., east in red, west in blue, north in yellow, and south in green.

Putting the Maya and Aztec cosmograms together, we get the clear outline in Fig. 7a.

The Mesoamerican cosmograms match the Chinese almost exactly in both concept and visual presentation. The most amazing part of this precise mapping is the footprint representing days or months moving, which exactly illustrates the Chinese Chu silk manuscript description of the four divine children “stepping” out the four seasons! What better illustration of the Chinese concept of the cosmos than this Maya cosmic map?

It is also interesting to see that, in visual presentations, besides the four quarters, four corners, four trees, four seasons marked by steps and footprints, and deities in each direction, etc., the ending word in both Chu and Madrid manuscripts is emphasized in the color red! In the Chu silk manuscript, the ending mark for a sentence is red, and in the Madrid Codex, the ending number of the series thirteen is also red.

#### ASTROLOGY - THE CHINESE CASES

Making decisions by watching the positions and motions of the stars, i.e., the planets and constellations, was particularly common in ancient China, and the system of such practicing is very well established and complex. The earliest and best compilation of physical texts was found in the Silk Manuscripts of

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<sup>8</sup> About similarities between the Maya and Aztec cosmograms, see Aveni 2001, 148–152.



Mawangdui, in Changsha, Hunan Province, in 1973, and was named by modern scholars *Wu xing zha* (《五星占》), or "Prognostics of the Five Stars/Planets." The tomb was definitely sealed by 168 BCE, but the contents of certain historical incidents give a relatively secure date of the Warring States period, around the fifth-third centuries BCE (Hunan 2013). Before the discovery of the manuscripts, there had also appeared numerous books on the same subject, including the very well-known *Gan Shi xingjing* (Astronomy and Astrology) by Gan and Shi (《甘石星经》), also around the fourth-third centuries BCE, and *Shiji-tianguanshu* (History book of the astronomers and astrologers (《史记-天官书》) from the second to the first century BCE. Since the subject is extremely complex and detailed, I will limit myself to a few cases that parallel the Maya ones.

In the *Wu xing zhan*, five planets are discussed: Jupiter, Venus, Mars, Saturn, Mercury, although Jupiter and Venus have much longer texts. Venus appears especially in the context of making military decisions. There are numerous lines about Venus's appearances, disappearances, motions, positions, color, brightness, etc., used to predict the proper attacking time, the correct method, the size and armory of both armies, and the possible results. I quote a few examples regarding Jupiter and Venus here (Cullen 2011).

... 所往之野有卿（庆），受岁之国不可起兵，是胃（谓）伐皇...

[the state corresponding to] the Field where [Jupiter] goes will have good fortune. A state that receives the Year [sc. Jupiter] may have no troops raised [against it]: this [would be] called "Attacking the Lord."

... 宜出而不出，命曰须谋。宜入而不入，天下偃兵，野有兵讲，所当之国大凶。

[If Venus] ... does not come out when it should come out, that is called "waiting to plot." If it does not go in when it should go in, then the empire will rest its troops, and in the fields there will be troops making peace. The corresponding state will be greatly unfortunate.

凡是星不敢经天；经天，天下大乱，革王。

In general, this star [Venus] does not dare to cross heaven; should it cross heaven, there will be great disorder in the empire, and the nation will change its king.

Actual cases have also been recorded. Liu Bang, the first emperor of the Han dynasty, made his final victorious attack on the Qin dynasty in the tenth month, 206 BCE, when all five planets—Venus, Mars, Jupiter, Saturn, Mercury—clustered in the east *jing* mansion (a constellation) as described in *Shiji* and *Hanshu*.<sup>9</sup> Also in *Hanshu*:

“Five Stars appear in the east now, this greatly beneficial to the Middle Kingdom: the barbarians will be defeated. Venus rises high, bringing good luck to those who dare to advance soldiers into enemy territory, and great misfortune to those who do not. The General immediately takes up arms, seizing this time, slaying the unrighteous. Everything is aligned perfectly; let there be no doubt.”<sup>10</sup>

Echoing the last two cases, in a piece of Eastern Han (25–220 CE) silk discovered in Hetian (Khotan), Xinjiang, in 1995, these words were woven: “It is beneficial to the Middle Kingdom when Five Stars are seen together in the east.” On a separate piece of cloth found in the same tomb, there is this: “(it is the right time) to fight against *nan-qiang* (a minority group).

There are also many records of the divinations of the constellations. In a pre-Qin document of the Warring States, it is said that the King of Jin Kingdom (Jin Xian-Gong 675–651 BCE 晋献公), when planning a military attack on the Guo Kingdom (虢), asked his servant Pu Yan: “Can I succeed?” Pu Yan answered “Yes.” “But when?” Pu Yan answered: “There is a children’s song that goes: ‘On the morning of *bing-zi* (in Gan-Zhi), when the sun goes to the *wei* mansion (a constellation), the moon is in the *tian-ce*

<sup>9</sup> 司马迁《史记》：“冬十月，五星见于东井，汉高祖进咸阳”。《汉书》：五星会东井。东井，秦之分野。

<sup>10</sup> 《汉书·赵充国传》记载：今五星出东方，中国大利，蛮夷大败。太白出高，用兵深入敢战者吉，弗敢战者凶。将军急装，因天时，诛不义，万下必全，勿复有疑。My English translation.

(a constellation) area, and *dun-huo* (a constellation) is just between the sun and the moon, and so the king of Guo Kingdom would be defeated.” So this would probably be at the turn of the ninth and tenth months.”<sup>11</sup> And indeed, in that year’s twelfth month, *bing-zi* in Gan-Zhi, Jin Kingdom defeated the Guo Kingdom.

#### ASTROLOGY—THE MAYA CASES

In Mesoamerica, it was not until the 1980s and 1990s, after more Maya inscriptions were deciphered, that we learned that the ancient Maya people were keen on practicing astrology. Venus is particularly important to the Mayas into making war-related decisions. And Jupiter and Saturn seem to have been associated with dynastic accession to the throne. In the chapter called “Star Wars” — in *A Forest of Kings* (1990)—Linda Schele and David Freidel gave us a number of examples.

According to them, on June 20, 693, the day before summer solstice, when Venus as the Evening Star made its last appearance, Smoking-Squirrel, King of Naranjo, Guatemala, attacked the kingdom Ucanal, Guatemala, and captured a lord of that kingdom. Two years later, when Venus rose helically as the Morning Star, Smoking-Squirrel struck Ucanal again, and this time took captive the lord Shield-Jaguar. The two captives were kept alive for years for ritual occasions. On another summer solstice day (June 22, 711), when Venus as the Evening Star was at its maximum elongation, after eighteen years of suffering and humiliation, the lord Shield-Jaguar was very likely sacrificed.

Also, on March 23, 710, Smoking-Squirrel attacked a nearby kingdom at Yaxha, Guatemala, and probably captured its king. On this day, Venus was making its last appearance as the Morning Star and Jupiter and Saturn hung in conjunction at their second stationary points. On June 8 of the same year, when Jupiter, Saturn, Mars, Venus, and Mercury were in a spectacular alignment, Smoking-Squirrel conducted a ritual with the prisoner from Yaxha involving blood scattering. About a year later, on April 12, 711, when Venus again appeared as the Morning Star, the king attacked another kingdom.

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<sup>11</sup> 《春秋左传·僖公五年》八月甲午，晋侯围上阳。问于卜偃曰：「吾其济乎」？对曰：「克之。」公曰：「何时？」对曰：「童谣云：『丙之晨，龙尾伏辰，均服振振，取虢之旂。鹑之贄贄，天策焞焞，火中成军，虢公其奔。』其九月、十月之交乎。丙子旦，日在尾，月在策，鹑火中，必是时也。」冬十二月丙子朔，晋灭虢，虢公丑奔京师。师还，馆于虞，遂袭虞，灭之，执虞公及其大夫井伯，以媵秦穆姬。而修虞祀，且归其职贡于王。 My English translation.

The best evidence of such practices may be found at Bonampak, Mexico (Fig. 8). In one of its famous mural paintings, sacrificial victims are displayed with a few constellation signs above their heads: Gemini, Mars, Saturn (or Venus<sup>12</sup>), and Orion. On this day of sacrifice, August 2, 792, Venus rose as the Morning Star. In the same mural paintings, a number of other ritual events are also connected to Venus as either the Morning or Evening Star.

At Palenque, Mexico, King Chan-Bahlum, son of the Great King Pacal, conducted a four-day ritual, in relation to his own accession, to dedicate the Temples of the Cross Group. On the first day, July 23, 690, Jupiter, Saturn, Mars, and the moon appeared in a spectacular conjunction with all four planets less than 5° apart in the constellation of Scorpio. At Copan, Honduras, one of the last kings of its dynasty, Yax-Pac had his accession on February 10, 822, which was the day of disappearance for the Morning Star and a time of conjunction between Mars and Jupiter.

On and on, we see such special dates and events recorded in Maya history. There is no doubt that the Mayas (as well as other Mesoamerican groups) timed their battles and war-related rituals according to the positions of Venus, and picked their accession days and dynastic rituals according to other planets and constellations.

#### RITUAL ALMANACS IN CHINA AND THE MAYA WORLD

This category may deserve a separate study on its own, because of its numerous details and complexity. I will give here only an outline of the research I conducted years ago (Zhang 1997). In *Li Ji-Yue Ling* (《礼记-月令》), or the Book of Rituals: Monthly Rituals, from the third century BCE, rituals for twelve months are recorded in relation to the constellations, natural phenomena, directions, and seasons, etc. It gives the position of the sun's conjunction with certain constellations and the signs of the natural phenomena of each month, and instructs people what things they should do or not do, such as what a ruler should wear and eat, which room he should live in, what rituals he should conduct, what offerings he should make, etc.. For example, the first lunar month is the month of Spring, associated with East, Blue, and Dragon; so in this month, the ruler should live in the east room, wear blue clothes and green jade jewelry; he should also fast for three days. On a selected day, the ruler, accompanied by officials,

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<sup>12</sup> Brickers (2011, 716) confirmed that this sign was Venus.

should go to the eastern suburb to welcome the ancestral emperor and the directional god and make offerings and prayers to them, and then give presents to all the officials and charity to the common people. Female animals must not be sacrificed for fear of hurting the *yang* force, nor should people cut trees, kill young birds, or destroy birds' nests, for it is the growing season for life and plants. War must not be declared, for war causes death, which is against *yang* (as opposed to *yin*), which is associated with the ruler; if it were, the ruler's throne would be overthrown. And people must not practice other seasons' rules, or else wind and rain will not come at the proper time; instead, disease will come, and grains will not grow.

In the Maya codices and Landa's description of the Yucatan Maya rituals, we see similar practices. In the Dresden Codex, on pages 25–28, the New Year's ceremonies of four years are shown. Each of these four years is associated with a direction, color, and a day-name (representing a period of five day-names). For example, according to Thompson's decipherment (1972), in the year of Ben (or Muluc in the Paris Codex and Landa's notes), the god is Bolon Dz'acab, direction east, color red; cacao, maize, rubber (?) should be offered, fire kindled, turkey sacrificed; muddy water is the attribute; woe to the maize god, there will be drought. For the same year's ceremonies, Landa (1978) recorded as follows: On the occasion, people would make a statue of the god Chac-uvayeyab and carry it to the east gate of the village, prayers and offerings would be made to the god, fowls and people's blood would be sacrificed. If they do not do these things properly, illness, scarcity of water, buds on the maize, and the like, would happen. A virgin puppy dog with a black back might be sacrificed, too.

## SUMMARY

In summary, I put together major parallels discussed in this study.

- *Gan-Zhi and Tzolkin*: The structure of the two calendars is the same. Two series of unequal numbers run together in pairs, eg., 10-12 and 13-20, in repeating cycles. Each is independent of natural seasons and other calendars, but is also exclusively used together with other calendars. Each is used to record days for both secular and ritual/divining purposes. The day-names are used for people's names. They even have similar problems: no clear origins.
- *Yi eighteen-month Calendar and Haab*: The two calendars are almost exactly the same. Although

both are solar-based with 365 days for a year, the division of the year into eighteen months and twenty days plus five days is peculiar. The unusual and arbitrary division appearing in two distant locations and cultures is even more peculiar.

- *Cosmology*: In both Chinese and Maya cosmology, the concept of the universe in the union of time and space, with time represented in walking steps or footprints and day names, and space partitioned in four directions and corners plus above and below.
- *Cosmogram*: The illustrations of the cosmos are squared and four-parted, with indications of cardinal directions, seasons, colors, animals, days, and deities.
- *Astrology*: In both Chinese and Maya astrology, the planet Venus is prominently associated with warfare and killing. Decisions are made according to the position, motion, and angle of Venus, and its relation to other planets and the sun, etc.
- *Ritual Calendars*: In both Chinese and Maya ritual calendars, the monthly rituals and offerings are associated with directions, deities, colors, planets, and constellations, etc.

## CONCLUSION

In the 1970s, Joseph Needham and Lu Gwei-Djen delivered a paper on some trans-Pacific issues at an international conference, and published it in 1985, in which they raised a theoretical concept: collocative traits. To explain with an example, they wrote: “The jade amulet painted red and placed in the mouth of the corpse would be precisely such a collocative trait.”<sup>13</sup> “Here, an enthusiasm for jade alone will not qualify, but painting the jade corpse-amulet red will.”

According to Needham and Lu, the above clustered traits I put together seem to fit very well their term “collocative trait,” meaning: the two cultures might be related in some way. However, as the two authors were very cautious about the “Trans-Pacific” issues, I also hesitate to suggest at this time a direct connection between the Chinese and Maya cultures until more hard evidence is found to demonstrate such a connection. As a student of both cultures, I see how in each culture there is its own deep, complex, and unique system that requires hundreds and even thousands of years of knowledge

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<sup>13</sup> They referred to the Chinese customs of putting a piece of jade, carved in the shape of a cicada in some cases, and a case of the Olmec corpse in a similar fashion. However, I could not have the Olmec case confirmed.

to compile. Any simplistic comparison and conclusion would not justify each side's great accomplishment in knowledge. There are indeed very intriguing similarities that should not be ignored, which is the reason for this study. But there are also many more diverse and unique ways of thinking and creating that show clear independent invention.

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#### CHINESE CLASSICS

《汉书》 *Book of Han*

《汉书-赵充国传》 *Book of Han—Story of Zhao Chongguo*

《归藏》 *Guicang* (Return to the Hidden; an older version of *Yijing*)

《礼记-月令》 *Book of Rites—Proceedings of Government in the Different Months*

《山海经》 *Shanhaijing*, or *Classic of Mountains and Seas*

《尚书-洪范》 *Shangshu-Hongfan*, or *Book of Documents*

《史记-天官书》 *Records of the Grand Historian—Book of Astronomers and Astrologers*

《尸子》 *Shi Zi* (Book written by Shizi)













《周易》 *Zhouyi*, or *Yi of Zhou Dynasty* (an older version of *Yijing*, or *Book of Changes*)









TABLES AND FIGURES

**Table 1.** Basic structure of Chinese Gan-Zhi and Maya Tzolkin calendars. *Gan-Zhi*: Two series of number-words 1...10, and A...L, to be paired to run together. It takes 60 pairs to get back to the beginning pair. *Tzolkin*: Two series of numbers and names 1...13, and A...T, to be paired to run together. It takes 260 pairs to get back to the beginning pair.

CHINA		MAYA	
Gan (Stem)	Zhi (Branch)	Number	Day-Name
1	A	1	A
2	B	2	B
3	C	3	C
4	D	4	D
5	E	5	E
6	F	6	F
7	G	7	G
8	H	8	H
9	I	9	I
10	J	10	J
	K	11	K
	L	12	L
		13	M
			N
			O
			P
			Q
			R
			S
			T

**Table 2.** Detailed signs, names, animals, and meanings in the Chinese Gan-Zhi and Maya Tzolkin systems

CHINA			MAYA			AZTEC
Gan	Zhi	Animal	Tzolkin	Tzolkin	Meaning	Meaning
Stem 干	Branch 支		Number	Day Name		
jia 甲	子 zi	Rat	1	 Imix	Crocodile	Alligator
yi 乙	丑 chou	Ox	2	 Ik	Wind, breath, life	Wind
bing 丙	寅 yin	Tiger	3	 Akbal	Night	House
ding 丁	卯 mao	Rabbit	4	 Kan	Ripe, maize god	Lizard
wu 戊	辰 chen	Dragon	5	 Chicchan	Twisted Snake, serpent	Serpent
ji 己	巳 si	Snake	6	 Cimi	Death God	Death
geng 庚	午 wu	Horse	7	 Manik		Deer
xin 辛	未 wei	Ram	8	 Lamat		Rabbit
ren 壬	申 shen	Monkey	9	 Muluc	Hidden, ruled by Xoc/shark	Water
gui 癸	酉 you	Cock	10	 Oc	Dog	Dog
	戌 shu	Dog	11	 Chuen	Monkey	Monkey
	亥 hai	Pig	12	 Eb	Twist, points	Grass

CHINA			MAYA			AZTEC
Gan	Zhi	Animal	Tzolkin	Tzolkin	Meaning	Meaning
Stem 干	Branch 支		Number	Day Name		
			13	 Ben		Reed
				 Ix	Jaguar	Jaguar
				 Men	Old moon goddess (?)	Eagle
				 Cib	Bacabs-supporters of heaven	Buzzard
				 Caban	Young earth and moon goddess	Movement
				 Etznab	Flint knife	Flint Knife
				 Cauac	Storm, rain dragon	Rain
				 Ahua	Lord, sun god	Flower
					Kelley 1960, 326-7, with my minor modification	Aveni2001, 141, Table 15

**Table 3.** Yi 18-month Calendar day and month names and Maya Haab month names

Day	Yi 20 Day Name	Month	Yi Month Name	Maya Haab Month Name
1	开天 Opening the Sky	1	风吹 Wind Blowing	Pop – Mat
2	辟地 Laying the Earth	2	鸟鸣 Birds Twittering	Uo – Frog
3	男子辟地 Men Laying the Earth	3	萌芽 Germinating	Zip – Red
4	女子辟地 Women Laying the Earth	4	开花 Blossoming	Zotz – Bat
5	天黑 Dark Sky	5	结果 Fruiting	Tzec – Death (?)
6	天红 Red Sky	6	天乾 Dry Sky (?)	Xul – Dog
7	天紫 Purple Sky	7	虫出 Worms out	Yaxkin – First/Green Sun
8	火烧天 Burning Sky	8	雨水 Raining	Mol – Water/Jade
9	水冷 Cold Water	9	生草 Grass Growing	Chen – Cave/Well
10	洪水 Flood	10	鸟窝 Birds Netting	Yax – Green/First
11	葫芦 Gourd	11	河涨 River Rising	Zac - White 白
12	伏羲皇帝 Fuxi Emperor	12	虫鸣 Bugs Humming	Keh – Red/Deer
13	伏羲姐妹 Fuxi Sisters	13	天晴 Clear Day	Mac - To Enclose, to cover
14	寻觅人 Person Looking for Things	14	无虫 No Bugs	Kankin - Yellow Sun
15	野蜂 Wasp	15	草枯 Grass Dried	Muwan - The Moan Bird
16	蜜蜂 Bee	16	叶落 Leaves Fallen	Pax - Planting Time
17	人出 Beginning of Human	17	霜降 Frosting	Kayab - Turtle
18	天窄 Narrow Sky	18	过节 End Year Celebration	Kumku - Ripe Maize
19	地宽 Broad Earth	(19)	五天无名日 Five Unnamed Days	Wayeb - Misfortunate or Nameless Days
20	地缩 Shrunk Earth			
Liu 2001, my English translation				Barnhart: <a href="https://mayan-calendar.com/ancient_haab.html">https://mayan-calendar.com/ancient_haab.html</a>



**Figure 1.** Temple of the Inscriptions, Palenque (Miller 2006)

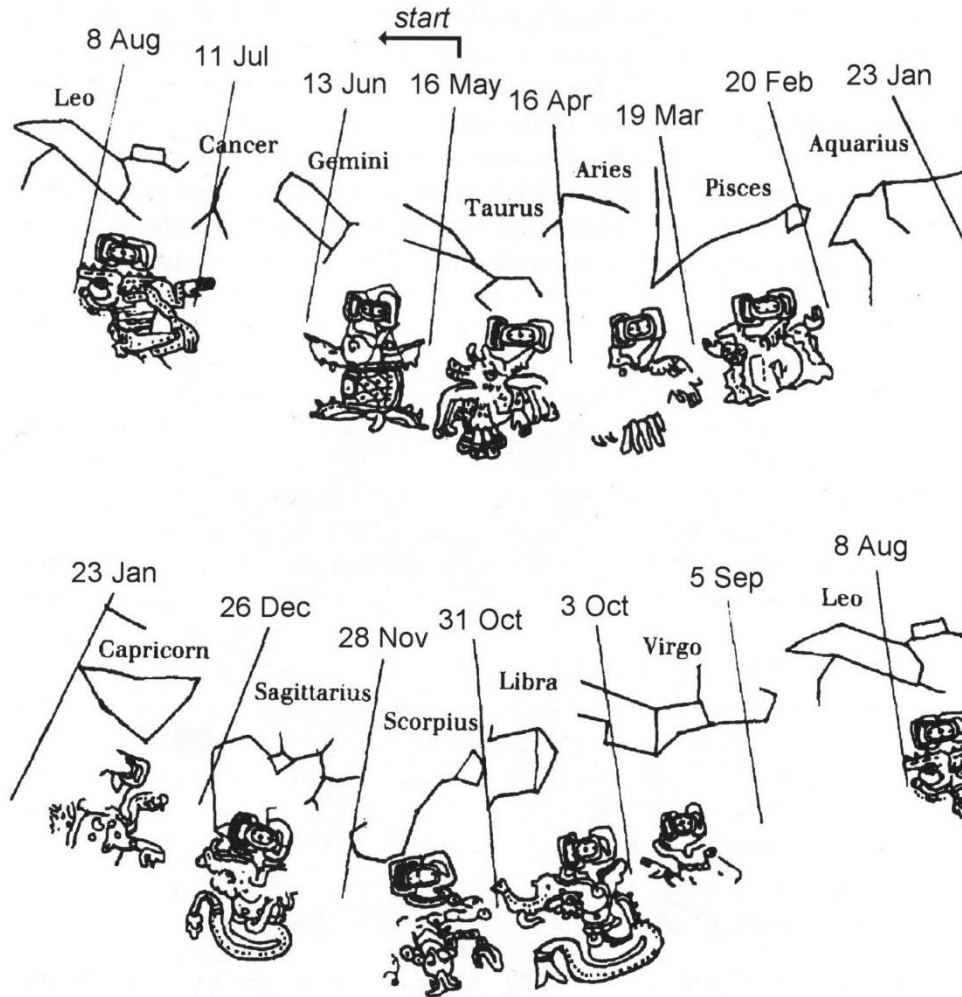


Figure 2. Maya Zodiac (Bricker and Bricker 2011)



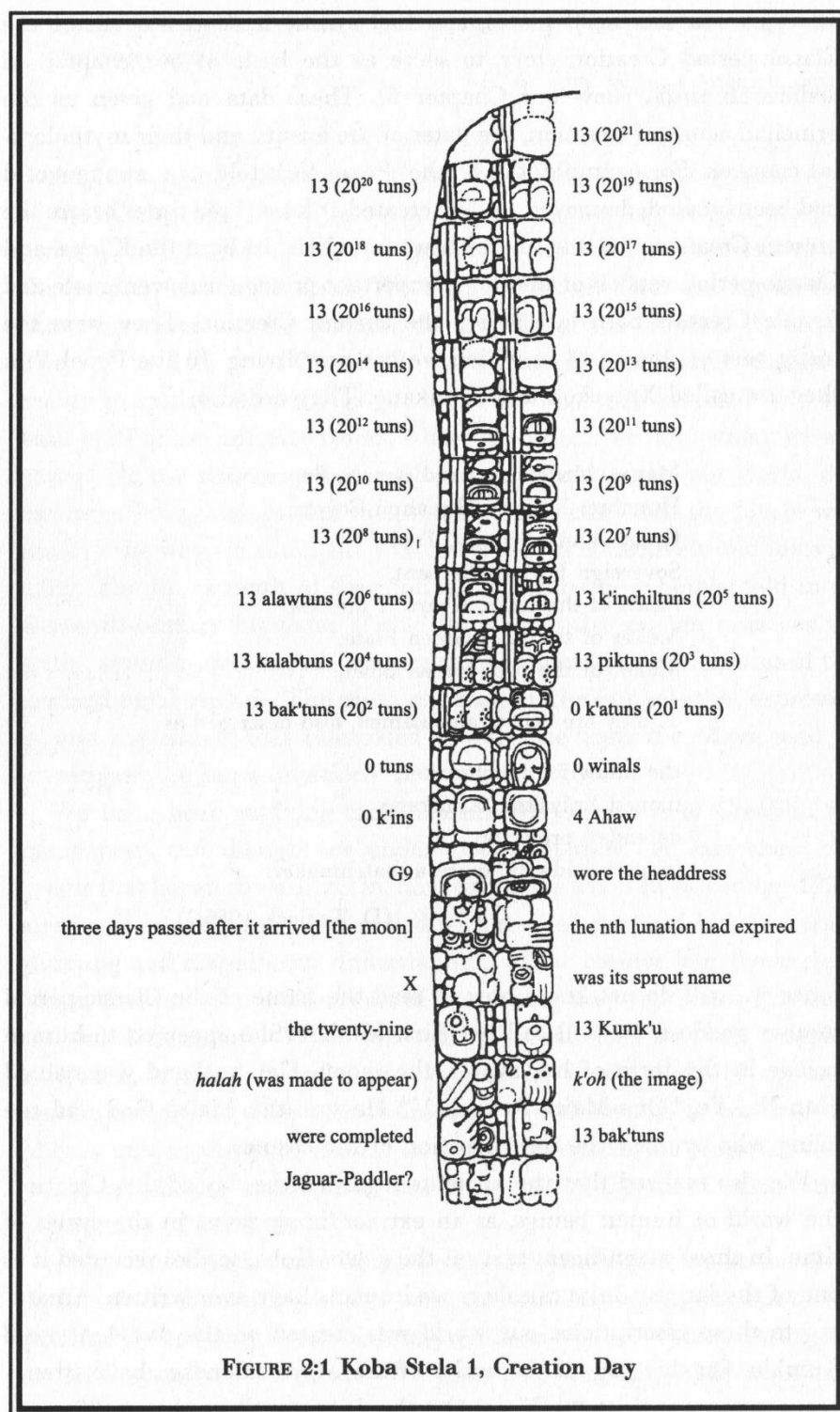


Figure 3. Inscriptions of a Creation Date on a stone monument at Koba (Freidel, Schele, Parker 1993)

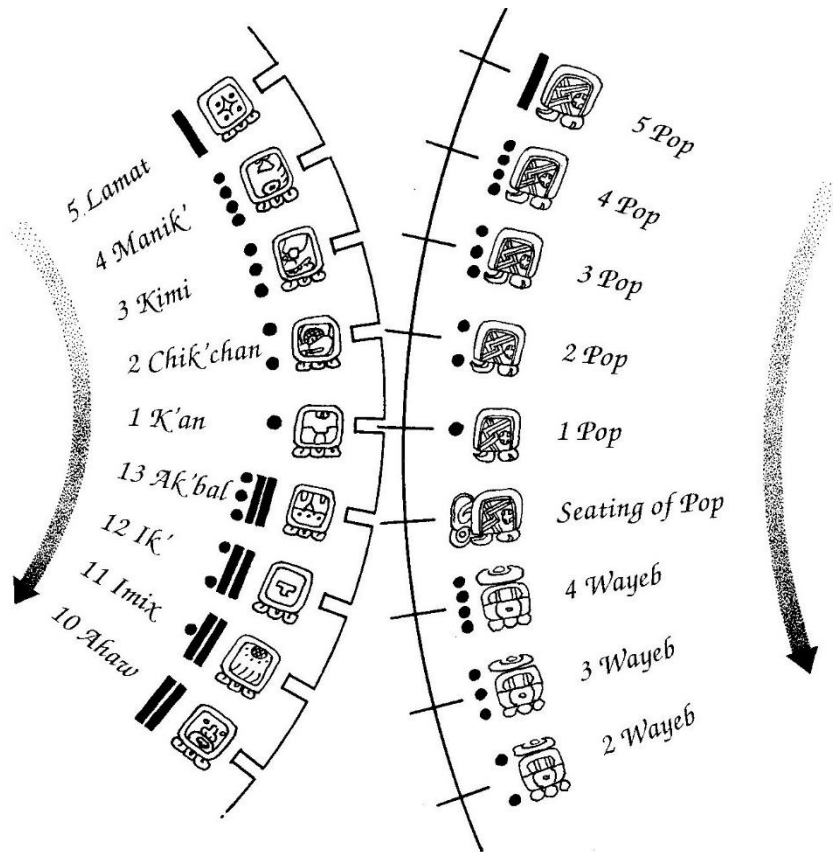


Figure 4. Schematic representation of part of the 52-year Calendar Round (Coe 2011)

20 <sup>5</sup> yrs	1600000 yrs	8000 yrs	400 yrs	20 yrs	Year	Month	Day
Kinchiltun	Calabtun	Pictun	Baktun	Katun	Tun	Uinal	Kin

Figure 5. The Long Count Calendar with signs and places.

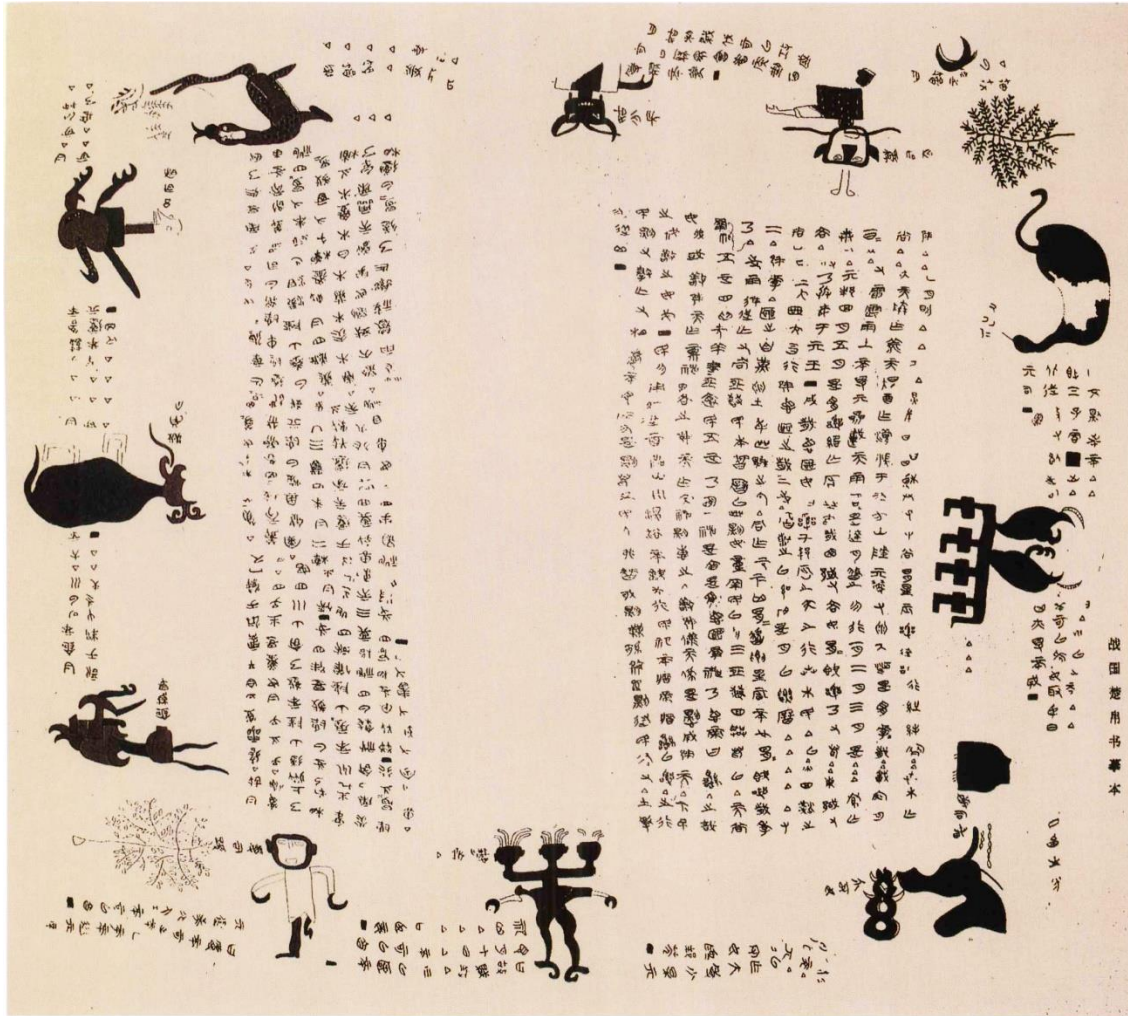


Figure 6a. A copy drawing of the Chu Silk Manuscript (Li 1985)

Direction	Color	Season	Corner/Tree	Deity	Children
Center				Fuxi Nuwa, the first couple	
East	Blue	Spring charge	Blue tree	3 gods (Mon. 1, 2, 3)	Qinggan
South	Red	Summer charge	Red tree	3 gods (Mon. 4, 5, 6)	Zhudan
West	Yellow	Autumn charge	Yellow tree	3 gods (Mon. 7, 8, 9)	Huangnan
North	Black	Winter charge	Black tree	3 gods (Mon. 10, 11, 12)	Mogan

Figure 6b. Summary outline of the Chu Silk Manuscript

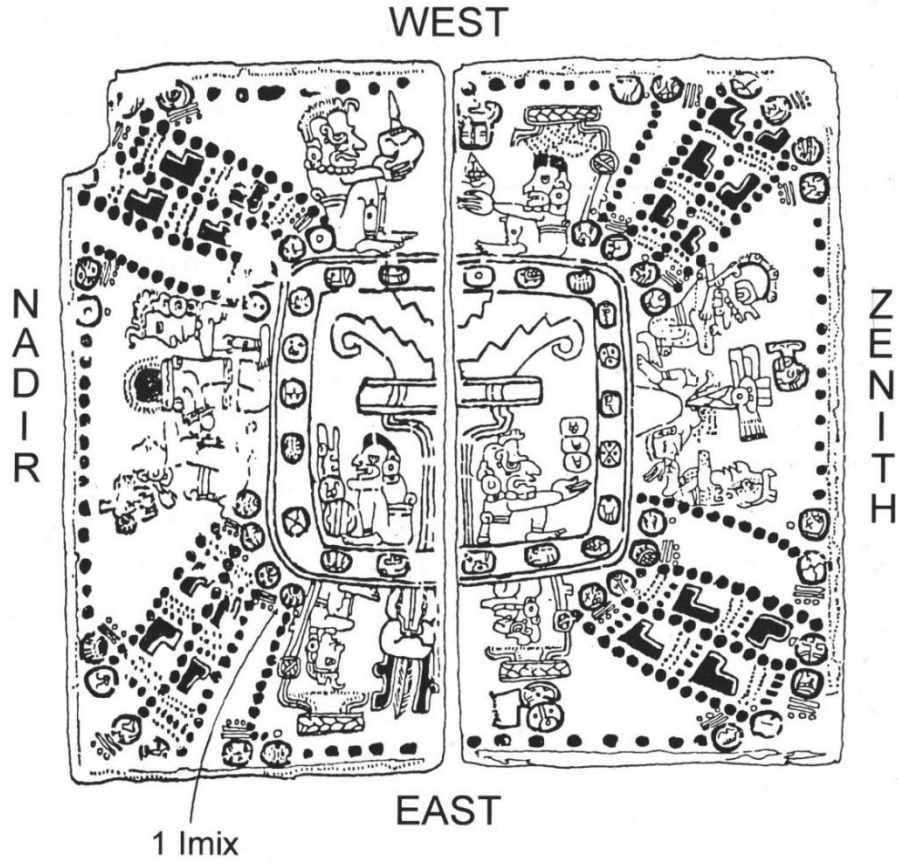


Figure 7a. Two connected pages from Madrid Codex (Bricker and Bricker 2011)

Direction	Color	Season/Tree	Corner/Bird	Deity	Tzolkin Day
	Maya/Aztec	Aztec	Aztec	Maya	
Center	Green/?			Sun, Moon	
East	Red/Red	Blue tree	Quetzal	Pair of deities	Chen, Eb, Ben, Ix, Men
South	Yellow/Green	Cacao	Parrot	Pair of deities	Cimi, Manik, Lamat, Muluk, Oc
West	Black/Blue	Maize	Blue bird	Pair of deities	Imix, ik, Akbal, Kan, Chicchan
North	White/Yellow	Cactus	Eagle	Death, Underworld	Cib, Kaban, Etznab, Cauac, Ahua

Figure 7b. Summary outline of Figure 7a with combination of Aztec elements





Figure 8. Mural. Presentation of captives to Lord Chan Muwan, Maya, room 2, structure 1, Bonampak, Mexico, ca. 790 CE (Miller 2006)

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