

# The Calendrical Base of the Mesoamerican Calendar

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Due to the interest shown, my paper, "The Mayan Calendar- Why 260 Days?", has been re-formatted.

It can be seen at: [www.spiderorchid.com/mesoamerica/mesoamerica.htm](http://www.spiderorchid.com/mesoamerica/mesoamerica.htm)

It is proposed that the factual astronomical derivations are ipso facto sufficient to demonstrate the astronomical base for the Mesoamerican calendrical system

A summary follows.

The Mayan calendrical system uses a whole number ritual period, such that particular multiples of the ritual period interlock with particular multiples of the astronomical periods, or whole number approximations to them, making them individually commensurable. Maya interlocking cycles had the form:

$a \times \text{astronomical period} = b \times \text{ritual period},$

where  $a$ ,  $b$  and the ritual period are whole numbers.

In other words, they replaced a multiple of a non-commensurable astronomical period, which their arithmetic could not handle, with a corresponding commensurable whole number cycle. For example:

$52 \times 365 = 73 \times 260$

is known as the Calendrical Round

$405 \text{ LM} = 46 \times 260$

is from the Dresden Codex. LM is the lunar month.

The most important Mesoamerican ritual period was the Tzolkin, a calendar of great age in Mesoamerica, with a period of 260 days; made up of a repeating sequence of the numbers one to 13, and 20 day names. Thus each day was individually identified with a unique combination of name and number. The count was basic to Maya ritual and sacred life. Up to now no satisfactory explanation of the choice of 260 days has been given

The question is raised could a calendar in constant use for 2500 years survive on ritual significance alone or must there be some underlying astronomical reason that would account for such a long retention?

Interlocking cycles of the form:

$a \times \text{astronomical period} = b \times \text{interlock period}$ ,

were derived by computer analysis for the tropical year, and the synodic periods of the moon, Venus, Mars and Jupiter, where a, b and the interlock period are whole numbers and the interlock period is in days. In particular it is concluded that the 260 day ritual period of Mesoamerica is the optimum interlock period for creating such interlocking cycles. If cycles with a common interlock period and seeking accuracies better than one day in 100 years are required, 260 days is the only choice.

The full set of derived interlocking cycles, having a 260 day interlock period are as follows,

$$42 \text{ TY} = 59 \times 260 [0.4]$$

$$405 \text{ LM} = 46 \times 260 [0.3]$$

$$61 \text{ VY} = 137 \times 260 [0.8]$$

$$1 \text{ MY} = 3 \times 260 [2.8]$$

$$88 \text{ JY} = 135 \times 260 [0.3]$$

Figures in square brackets give the cycle accuracies in days in 100 years. TY is the tropical year, LM is the lunar month, VY the Venus year, MY the Mars year and JY the Jupiter year.

Note that in the first equation 59 is the the sum of 29 and 30, which is the Mesoamerican whole number way of expressing an approximate lunar month of 29.5 days. Hence this interlocking cycle links the tropical year, and the Maya approximation to the lunar month, with a 260 day interlock period. This cycle could track the tropical year for 200 to 300 years before a one day error accumulated and a correction would be necessary. It follows that if this cycle is in fact a previously unknown Mesoamerican cycle, then the 260 day Tzolkin could be considered as an accurate solar calendar

It was further discovered that:–

The Long Count is a lunar calendar with an accuracy of 0.8 days in 100 years.

$$256 \text{ LM} = 21 \times 360 = 7560 \text{ days}$$

The Accounting year of 364 days might be considered a Venus Calendar with an accuracy of 0.3 days in 100 years.

104 years is the natural and optimum intercalation time to correct both the solar and Venus calendars – and could be considered the basis for the Mesoamerican Calendar Round. The solar intercalation is virtually an exact intercalation and the Venus intercalation has an accuracy of 0.07 days in 100 years.

The solar intercalation is:

$$365.2423 = 365 + 63/260$$

$$= 365 + 1/4 - 1/130$$

$$= 365 + 1/4 - 1/104 + 1/520$$

With the tropical year given to four decimal places this is an exact intercalation. The best correction time for the natural solar intercalation, coincides with multiples of the 52 year Calendar Round and the ubiquitous number 260.

It is proposed that these factual astronomical derivations are ipso facto sufficient to demonstrate the astronomical base for the Mesoamerican calendrical system.

See: [www.spiderorchid.com/mesoamerica/mesoamerica.htm](http://www.spiderorchid.com/mesoamerica/mesoamerica.htm)

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