

ON THE ASTRONOMY IN THE MESOAMERICAN CALENDAR
-PRELIMINARY REMARKS-

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RESUMEN. Se realizaron observaciones astronómicas desde sitios arqueológicos para encontrar las relaciones astronómicas implícitas en el calendario mesoamericano. Este calendario reúne commensurabilidades astronómicas a través de ciclos artificiales que están basados en el calendario sagrado de 260 días. Los períodos que construye, son expresiones que cifran con notable exactitud los movimientos del Sistema Solar. Se discuten las interrelaciones entre números mesoamericanos, fechas y períodos astronómicos. Se observa que muchos de estos números, son miembros de triadas pitagóricas y que quizá expresan una relación con la expansión binomial.

ABSTRACT. The mesoamerican calendar gathers astronomical commensurabilities by means of several artificial cycles, based on the sacred calendar of 260 days. The periods which are built from it, are expressions which cypher, to the highest accuracy, the motions of the Solar System. Interrelationships between mesoamerican numbers found in inscriptions, codices, and the calendar, and astronomical periods and dates, are discussed. It is observed that several of these numbers are members of Pythagorean triples, and that they may express relation with binomial expansion.

Key words: ARCHAEOASTRONOMY

Astronomical observations were carried out from archaeological sites, to find the astronomical relations implicit in the mesoamerican calendar. From these observations, new meanings of the Initial Date, the Chronological Era, and the Five Eras were found. The Precession of the Equinoxes is found to be related to them, and to the positions of Orion's Belt and Sword, already identified by some scholars as the constellation Mamalhuaztli in the Florentine Codex. Figures 1 and 2. Two other of the five constellations mentioned there by Sahagún, were identified, their drawings in the sky. The first, Citlaxonecuilli, which includes Auriga and part of Perseus. Figures 3 and 4. The constellation is also found to be the Sceptre of Quetzalcóatl, both are the same starry glyph, in the sky and in the iconography. The deity has this constellation in his hand. Figure 4. Secondly, Citlalcólotl, designed in the sky not only by Scorpius, as previously accepted, but also by Sagittarius, which is the left half of the native constellation.

The present divisions of the Venus synodic period, were observationally established, during the four years covered by this project. To them were added their corresponding spatial intervals, fixed both in the true horizons of Teotihuacán, and with regard to the artificial horizons, which the architectural details of the temples and pyramids constitute. The configurations of Venus, and the phases of the Moon during 1505-1507 A.D., years of the last Fuego Nuevo ceremony, were established through a system of commensurability which relates them to their positions during the years 1983-1985, the years when they have been observed during this research. Other observations relate the peculiar orientation of Teotihuacán, with the rising of Mamalhuaztli, the Fire Drill, at the beginning of the Era. At the end of the Era, Mamalhuaztli rises on the Equator. Figure 1. A new pecked cross, -the petroglyphs on the marking stones- was discovered next to La Piedra de Chalco, itself designed with regard to the equinoxes. Another monolith on the same meridian was studied.

The 260 day sacred calendar was the nucleus of the mesoamerican calendar; combined



Fig. 1. Designing a cresting drawn of stars, Orion rises from the Pyramid of Quetzalcoatl in Teotihuacán. Photo: L. Maupomé.

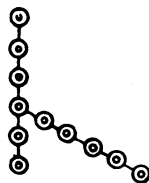


Fig. 2. The Fire Drill, the Mamalhuaztli Constellation in the Florentine Codex. This drawing, and the stars of Orion's Belt and Sword in Figure 1, emphasize their previous identification.

with the lengths of the year and of Venus'synodic period, it structured the centuries of 52 and 104 years, of 360 or 365 days each. As a number, 260 is a member of a Pythagorean triple; all the numbers which were built from it, also are. Some of the multiples of the 52 years (of 365 days) —called Calendar Round (C.R.)— can be expressed by the algebraic expressions: $(a+b)^2-1$; a^2+b^2-1 ; and axb . For a, b, equal to 584, 585 (two of their values for Venus'synodic period) $72 \text{ C.R.}=1366560 \text{ days}=(a+b)^2-1$; $36 \text{ C.R.}=a^2+b^2-1$; and $18 \text{ C.R.}=axb$. For a, b, equal to 364, 365 (two of their conventional values of the year) $28 \text{ C.R.}=(a+b)^2-1$; $14 \text{ C.R.}=a^2+b^2-1$ and $7 \text{ C.R.}=axb$. These are algebraic expressions involving astronomical periods. Their relations with binomial expansion are under further investigation.



Fig. 3. The starry glyph. The stars Capella, η , ζ , β , θ , ι , in Auriga, and β Tau, draw in the sky the volute of the Sceptre of Quetzalcoatl, identified here with the Citlaxonecuilli Constellation. Algol and ϵ Perseus form the handle. Photo: L. Maupomé.



Fig. 4. Quetzalcoatl in the Magliabecchi Codex, XIII, 3f, 89. The sceptre in the hand of the deity, is rolled up in one extreme, and is painted with Cicitlallo: the white circles which are the glyphs of the stars in the Codices.

This author has shown that the value of the Precession is $502 \times 52 \times 360 \text{ days} = 25729.338$ tropical years $= 36144 \times 260 = 251 \times 104 \times 360$ days. This expression differs with the present value in 53 days, or 0.00029 " (seconds)per year. A system of commensurability relating 251 tropical years, to 157 Venus synodic periods, is known in Palenque. The implicit ratio is very accurate in present values of the periods. A lapse of 251 day fits with the observed period of Venus as evening star. It is found that $100 \text{ V.Sy.Per.} = 259.86$ Venus sidereal periods; 259.98 Moon's synodic periods, are 281 of its sidereal periods. 20 C.R. is a period useful to commensurate the values 360, 364, 365, the leap year and the tropical year, through cycles of 260 or 251 days. These 1040 years are transformed by the ratio 251/260 into 1004 tropical years, equal to 628 Venus synodical periods. These numbers and many others, of an astronomical nature, structure the calendar, and their combinations cypher the motions of the Solar System to the highest accuracy. Astronomical research proves to be a powerful tool to decipher the native sources of Mesoamerican Civilization.

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