Origin of the Mesoamerican 260-Day Calendar

Abstract. *The sacred 260-day Mesoamerican calendar probably originated near a latitude of 15ºN, where there is a 260-day interval between transits of the zenithal sun. Archeological and faunal evidence favors an origin in the Pacific lowlands rather than in the highlands near Copán, Honduras, although Copán, which is located at the 15th parallel of latitude, later became the principal Mayan astronomical center.*

Although civilized peoples in all parts of the world, including Mesoamerica, developed calendars based on the length of the tropical year (365 days), in Mesoamerica a second calendar 260 days in length came into being. Variously known as the *tzolkin* or *tonalámatl,* this 260-day count served as a sacred almanac or ritual calendar for all peoples of Mesoamerica and has continued in use in some of the more isolated regions of southern Mexico and Guatemala to the present day (1, p. 55). The 260-day cycle was the most important measure of time among all Mesoamerican civilizations, for not only did it guide the daily rituals of the people but it also formed the basis for other measures of time of great astronomical and religious significance (2, p. 265). For example, a double *tzolkin* (520 days) equates almost exactly with three eclipse half- years (519.93 days) and therefore provided a means for predicting solar eclipses (3, p. 149). Furthermore, because each day had its own name and number, a period of 52 years would elapse before the 260-day almanac would come back into phase with the 365-day calendar. This period of 52 years has been called the calendar round, or "Aztec century" *(tonalpohualli),* and was responsible for the fatalistic belief among Mesoamerican peoples that history repeated itself on a cyclical basis.

Despite the central importance of the 260-day calendar in the life, art, and science of pre-Columbian Mesoamerica, no satisfactory explanation has yet been advanced as to how and where this original contribution to time-keeping began. In 1966, Coe (1, p. 55) stated: "How such a period of time ever came into being remains an enigma. . . ." Other investigators have debated the locational origins of this unique Mesoamerican calendar. Kidder (4) favors a highland origin, but Thompson *(5)* cites an observation by Gadow that "several of the fauna which serve as day-names and day -glyphs . . . are foreign to the Mexican plateau and, one might add, to the highlands of Guatemala." Satterthwaite *(6)* writes that Caso finds the earliest evidence of the sacred round count at Monte Albán in Oaxaca, whereas Vaillant (7) states that the 52-year cycle seemingly stems from the Mixteca Puebla area. Robertson (8) likewise sees no reason to question colonial accounts of Mixtec origins for the 260-day calendar. Moreno (9), on the other hand, assumes the calendar to be of Mayan origin but concedes that an Olmec origin "may turn out to be more feasible"; yet he concludes by suggesting the Yucatán Peninsula as its birthplace. Coe (1, p. 60) disagrees, arguing that the "Mayan" calendar had reached pretty much its final form "by the first century B.C. among peoples who were under powerful Olmec influence and who may not even have been Maya. From them, writing and the calendar were spread along the Pacific coast of Guatemala and into the Maya highlands, eventually reaching the developing states of the Petén forests." It is thus apparent that there is little agreement as to when, where,

or how the sacred almanac came into being or which people was responsible for its creation.

Although structures assumed to have been observatories have been identified at such sites as Monte Albán and Chichén Itzá the Mayan center at Copán, Honduras (Fig. 1), is generally recognized as having been of paramount importance in pre-Columbian astronomical studies (1, p. 161; 2. pp. 323 and 325; 3, p. 70; 10). It is my contention that Copán attained its distinction as the single most important center for astronomical studies in the New World because it was the only place within the Classic (lowland) Mayan realm where the sacred 260-day calendar could be calibrated. Because of Copán's preeminence in astronomy, there is a strong temptation to ascribe the origins of the *tzolkin* to this place a temptation that I feel impelled to resist on historical grounds. On the contrary, rather than arguing in favor of Copán as the birthplace of the calendar round, I would propose just the reverse, namely, that the calendar round was responsible for the founding of Copán.

Inasmuch as the Mesoamerican cultural hearth lies entirely within the tropics, the most critical fixed points of the solar year are less likely to have been the solstices and equinoxes (11) (as they are in higher latitudes) than the 2 days of the year when the sun is vertically overhead at a given place. The interval between such positions could be calibrated simply by taking note of the number of days which elapsed between the times that a given pillar or post failed to cast a shadow. Obviously, because the Mesoamerican area lies in the Northern Hemisphere, a 260-day span of time between zenithal sun positions could only be measured in the winter half-year, because the sun would complete the shorter 105-day part of its cycle during the Northern Hemisphere summer. Thus, if we accept the thesis that the critical fixed points of the *tzolkin* must be the zenithal sun positions, the only question that remains is to determine where such an interval could be measured. This is found to be slightly south of the 15th parallel of latitude, a line that intersects only the southeastern corner of Mexico but runs through the entire width of Guatemala and Honduras. Because the sun's declination changes about 18' of arc per day at this stage in its annual circuit, it is more accurate to speak of a band within which, rather than a line along which, such a calibration is possible. Thus, any site between 14º42'N and 15ºN will experience a 260-day interval between zenithal sun positions. Within this band, the sun reaches the zenith each year on or about 12-13 August on its apparent journey into the Southern Hemisphere and again on or about 30 April-1 May as it "moves northward." The former date is in perfect accord with the month and day of the zero starting point of the Mayan long count calendar as calculated by both the Goodman-Martínez-Thompson and Spinden correlations, although the year in which the count began remains an open question (12). [Although the beginning of the tzolkin postulated here does not favor one of the above correlations over the other, since they are exactly 260 years apart, it does render unlikely any other correlation that does not arrive at a zero point of 12-13 August. For example, the Kreichgauer correlation (11) is 164 days out of phase with it.]

Although several important post-Classic cities fall into the latitudinal band described above, all in the highlands of west-central Guatemala, in view of the great antiquity of

Fig. 1. Map showing a portion of Mesoamerica near 15°N. The dotted lines denote elevations over 300 m; the hatched horizontal band represents the area in which the 260-day zenithal interval is found.

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the tzolkin it seems more rational to look for a site which dates back at least into Late Formative times. [Moreover, in my opinion, Gadow's argument (5) is sufficiently strong to rule out any highland site for faunal reasons alone.] Copán, at an elevation of 600 m above sea level, is the only Classic site of importance which lies within the band, but a much more likely point of origin is the large Late-Preclassic ceremonial center of Izapa (Fig. 1), which lies just over the western border of Guatemala in Mexico. Located at the edge of the foothills which border the Pacific coastal plain, Izapa is situated at an elevation of about 250 m. In point of time Izapa is not only far older than Copán but it is spatially far closer to the original cradle of Mayan culture as hypothesized by Coe. Indeed, he makes the point that the Izapan civilization “occupies a middle ground in-time and in space between the Middle Formative Olmec and the Early Classic Maya” 1, p. 60). However, Coe observes that,writing and the calendar are absent" in Izapa, but that, "as one moves along the Pacific slopes east into Guatemala, one finds sites with inscribed monuments and Baktun 7 dates." One of the latter, from El Baúl, has been equated to A.D. 36, "some 256 years prior to the first such date in the Maya lowlands" (1, pp. 61-62). Somewhat later in the same work (1, p. 76) Coe states that "the Izapan

culture of the highlands must have had a good deal to do with the adoption of civilized life in the central and northern areas" of the Mayan realm and that both monuments with long count dates and writing "were present among the coeval Izapan centers of the Highlands and Pacific Coast," 'whereas they were either "missing or exceedingly rare" in the lowlands before the dawn of the Classic era. The oldest long count date known from the Mayan area is Stela 29 from Tikal, which bears an inscription equated to A.D. 292, whereas "the custom of erecting sculptured stone monuments probably spread to Copán *as early as* [A.D.] 465" (italics are mine) (2, p. 59). On the other hand, the oldest recorded long count dates appear on monuments outside the Mayan area, to the northwest (1, p. 59). If, as Coe states, "It is generally agreed that the Long Count must have been set in Motion long after the inception of the Calendar Round" (1, p. 59), then the 260-day sacred almanac must date well back into the pre-Christian era. Furthermore, if the hypothesis for its origin presented.here is correct, the diffusion of this idea appears to have been more rapid to the northwest -- into Mexico -- than it was to the northeast into the Mayan area. On the other hand, once they had adopted the concept of the tzolkin, the Mayas, alone among the peoples of Mesoamerica, were in a position (latitudinally) to calibrate, test, and refine the measurements based on this sacred almanac. Even though their principal economic and political centers developed in the Petén region of northern Guatemala, the Mayas saw fit (perhaps one should say, felt religiously obliged) to erect an astronomical center more than 320 km to the southeast, virtually on the frontiers of their domain, in the most accessible site which met the requirements of the 260-day interval. Thus, although the Mayas are indebted to the Izapans for the original idea of the sacred calendar (as are all other Mesoamericans as well), the credit for developing it into a highly complex and precise system for reckoning time and predicting celestial events is entirely their own.

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