

## STRUCTURAL EVIDENCE OF A LUNI-SOLAR CALENDAR IN ANCIENT MESOAMERICA <sup>1</sup>

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The Mesoamerican calendar, as we know it from ethnohistoric sources, the codices and archaeological manifestations, is an intricate system of intermeshing time cycles. Despite much scholarship on the subject, the origin of this extremely sophisticated system remains an intriguing and controversial problem. While most scholars view it as completely indigenous, some, most notably, Kelley (1960, 1974) have argued for significant Old World influences. Kelley (1980) also has argued, on the basis of astronomical implications of the system, that the calendar was purposefully invented, thus agreeing in general terms with the inventionist view of Spiden (1924:157-159) and departing from the developmental or evolutionary view (e.g., Satterthwaite 1965:605). But, regardless of viewpoint on the origins of the calendar system, probably everyone writing about its origins has believed that some simpler form of calendar must once have existed in Mesoamerica. They sometimes, nevertheless, express a degree of pessimism as to our ever being able to produce evidence of it. This doubt seems particularly associated with the belief that the Mesoamerican calendar system evolved in tandem with evolution of writing. For example, Hanns Prem, emphasizing archaeological evidence in the form of objects bearing calendrical glyphs states:

In the archaeologically investigated past a calendar becomes tangible only by being fixed in writing. But since the development of a calendar in the form of the solar year or even the Tonalpohualli did not require a fixing in writing (as demonstrated by ethnographic findings), early phases of the calendar may remain forever unknown to us. In spite of this, it may be assumed that the mere existence of a

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calendar facilitated the formation of a writing system and through the latter, the calendar received new stimulation to further develop in complexity (Prem 1971:115).

However, suggestions of a less strictly archaeological-epigraphical nature have been made from time to time. For example, among the recent spate of archaeoastronomical studies is one in which Malmstrom (1978) attempts to explain the development of the Mesoamerican calendar system in terms of hypothetical astronomical observations in Preclassic Mesoamerica. Both Thompson (1950:98-99) and Caso (1967:33, 79-85) have reviewed a number of earlier suggestions, mostly based on the codices and on structural features of the calendar system as we know it. Prominent in these discussions were possible evidences of some kind of lunar calendar. However, Caso had to conclude his review of these ideas on a skeptical note:

Tales datos podrían hacer pensar en la existencia de un calendario lunar de 13 meses de 28 días, pero con los datos que conocemos, consideramos muy hipotética su existencia (Caso 1967:85).

Of course, the eclipse table of the *Dresden Codex* and the Lunar Series of the monumental inscriptions leaves no doubt that the Maya recognized the synodic period of the moon and that they counted the days of this period (Sattethwaite 1965:619-623; Spinden 1924:68-73). Spinden (1924:158-159 and Fig. 8d) pointed out that 29-30 months were recorded by the moon glyph (which also means 20) with the numeral 9 or 10 beside it. The Aztecs also recognized lunar periods of 29 and 30 days (Caso 1971:348). However, the present paper has to do not with these advanced calendrical features but with a structural pattern in the calendar which I believe attests implicitly to the former use of a relatively primitive calendar of 12-13 lunar months. I have already called attention to this very briefly in my comment on a paper by Graulich (1981:54) but it requires elaboration.

First, we may recall that a basic cycle of the Mesoamerican calendar system, in its known form, is the so-called "month" of 20 named days which are combined with the numbers 1 to 13 to give a 260-day cycle ( $20 \times 13 = 260$ ), called *tonalpohualli* by the Aztecs. Running concurrently with this cycle is the so-called "vague year" of 365 days, comprised of 18 named rounds of the 20 days plus 5 unlucky days ( $20 \times 18 + 5 = 365$ ). The further mechanics of this system are

not of concern here. (For a recent and lucid explanation, see Kelley 1980.) What is of interest here are the names and pictorial symbols of the 18 months.

There is considerable variation among the lists as to which of the months begins the sequence but neither this nor where the *nemontemi* (5 unlucky days) occur in the sequence is germane to the present analysis, except to the extent that these factors may have led to confusion in the sequential ordering of the months in some ethnohistoric sources. There is also variation in the naming of and pictorial or glyphic symbols associated with individual months. In the present paper I tabulate only those data particularly relevant to the matter under investigation. Also I number all the sequences from 1) *Cuahuitlehua* (and equivalents), as this facilitates cross-reference with the most exhaustive tabulation of the lists available (Caso 1968: Cuadros x-xi), as well as with the extremely handy tabulation of the Nahuatl and Otomí lists by Nicholson (1971: Table 4). Nicholson's tabulation shows at glance the variant month names and their meanings, the major deities propitiated during each month, verbal descriptions of the pictorial symbols in various codices and the major festivals of the months. Orozco y Berra (1880:2:34-38) is still useful, particularly for his discussion of the pictorial symbols and Seler (1887) discusses the identities of the patron deities pictured in three of the Mexican sources. The brilliant comparative study of several Mexican sources by Kubler and Gibson (1951) is especially convenient for its reproductions of the pictorial symbols from several (but not all) codices. For discussions of the Mayan lists of month names and the glyphs of the months and their patron deities I depend primarily on Thompson (1950:104-118 and Figures 16-19) and Kelley (1976:27, 55, 84-88, Figures 5 and 15, and Plate 4) and certain other sources cited later. More recently, Acuña (1976) has attempted to find equivalences between the Mexican and Mayan months with reference to connotations of the names, associated ritual and other aspects of symbolism. Besides these published studies, two unpublished manuscripts by Kelley (1952, 1957), seen by courtesy of the author, have proved very useful.

To return to the problem at hand, the term "month" may seem a misnomer for the 20-day cycle as there is no apparent connection of this period with a lunar month, either synodic or sidereal. Nevertheless, the fact that the terms for the 20-day period mean 'moon' in several of the native languages of Mesoamerica is the most direct reason for suspecting the former use of lunar months (Caso 1967:34,

79).<sup>2</sup> In view of this, it is not surprising that a prototypical series of "moons" appears to be implicit in the series of the 18 *meztli*, to use the Nahuatl term. This becomes evident when one examines particularly the Aztec and other Nahuatl lists in which 10 of the 18 names seem to occur in 5 pairs, thus reducing the list to one of only 13 different terms, if each pair is counted as one item (Table 1). In the Nahuatl tradition this pairing pattern is clear and unequivocal for the first four pairs in Table 1 (3/4, 7/8, 9/10 and 12/13) where the suffix — *tontli* signifies 'little' and the prefix *huey* — signifies 'big'. We are fortunate in having several Nahuatl lists, for in some of them there are alternate names which do not show the pairing e.g., 9) *Tlaxochimaco* ('flowers are, given') 10) *Xocotlhuetzi* ('birth of Xocotl') and 12) *Teotleco* ('arrival of the gods') 13) *Tepeilhuitl* ('festival of the mountains'). The several sets of pictorial symbols for the months also are variable and sometimes bear no obvious relationship to the names, although a connection between name and symbol sometimes can be seen when one studies the descriptions of the festivals and patron deities of particular months. The point here, however, is that the pictorial symbols associated with the name pairs 3/4, 7/8, 9/10 and 12/13 are also paired in those sources where the names are paired, whether or not there is any apparent connection between the names and the symbols.<sup>3</sup>

Only the fifth pair of months in Table 1, 17) *Tititl*/18 *Izcalli*, requires extended attention because the pairing is not as evident as for the first four pairs. One possible indication of the pairing of these

<sup>2</sup> The most convenient, widely available illustration of a sample of the pictorial symbols of the months is probably that of Caso (1967: Figura 14, p. 36). It should be noted, however, that Caso's illustration (a composite sample from various sources) for some omits examples for *Pachtli*, or *Pachontli*. Also, the arrangement of the names *vis a vis* the three symbols in the upper left-hand corner of Caso's Figura 14 is misleading. Reading left-to-right in the first row, the first two symbols are variants for *Izcalli* and the third is a symbol for the following month, *Atlcachualo*, whereas the arrangement makes it appear that second and third symbols are variants for *Atlcachualo*. These errors, incidentally, have been repeated in both editions of Weaver's fine textbook on Mesoamerica (Weaver 1972, 1981). Far more helpful are the illustrations of individual sets of the figures from various codices in Kubler and Gibson (1951: Figures 7, 11-12 and 14-16, and Plates iv-xiv).

<sup>3</sup> Lothrop (1930:653) reported possible ethnographic support for Bowdich's suggestion (1910:267) that the Maya recognized that the *tzolkin* (260-day cycle) approximates nine lunations. Lothrop found the Quiché of Momostenango, Guatemala, to be still holding a *tzolkin* festival called *uajzaqip vats* ('8 Monkey') every 260 years. However, when asked how often this ceremony was held, a shaman told Lothrop "Every nine months."

TABLE 1

PATTERN OF PAIRED NAMES AND SYMBOLS IN THE NAHUAN SEQUENCE OF THE EIGHTEEN MEZTLI ('MOONS'). AFTER NICHOLSON (1971), CASO (1967, 1971) KUBLER AND GIBSON (1951) AND OTHER SOURCES, MEANINGS AND SYMBOLS ARE GIVEN ONLY FOR PAIRED ITEMS

|      | <i>Name</i>                                    | <i>Meaning</i>                                         | <i>Pictorial Symbol</i>                                                                |
|------|------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------|
| (1)  | 1. <i>Cuahuitlehua</i>                         |                                                        |                                                                                        |
| (2)  | 2. <i>Tlacaxipehualiztli</i>                   |                                                        |                                                                                        |
| (3)  | 3. <i>Tozoztontli</i>                          | little vigil                                           | maize deity; bird pierced by pointed bone<br>maize plant; bird pierced by pointed bone |
|      | 4. <i>Hueytozoztli</i>                         | big vigil                                              |                                                                                        |
| (4)  | 5. <i>Toxcatl</i>                              |                                                        |                                                                                        |
| (5)  | 6. <i>Etzalcualiztli</i>                       |                                                        |                                                                                        |
| (6)  | 7. <i>Tecuilhuitontli</i>                      | little festival of lords                               | noble figure; various insignia (of rank?)                                              |
|      | 8. <i>Hueytecuilhuitl</i>                      | big festival of lords                                  | noble figure; various symbols similar to N° 7                                          |
| (7)  | 9. <i>Miccailhuitontli</i>                     | little festival of the dead                            | mummy bundle; death symbols                                                            |
|      | 10. <i>Hueymiccailhuitl</i>                    | big festival of the dead                               | mummy bundle; death symbols similar to N° 9                                            |
| (8)  | 11. <i>Ochpaniztli</i>                         |                                                        |                                                                                        |
| (9)  | 12. <i>Pachontli, Pachtli</i>                  | little Spanish moss (or grass?)                        | pachtli plant                                                                          |
|      | 13. <i>Hueypachtli</i>                         | big Spanish moss (or grass?)                           | pachtli plant                                                                          |
| (10) | 14. <i>Quecholli</i>                           |                                                        |                                                                                        |
| (11) | 15. <i>Panquetzaliztli</i>                     |                                                        |                                                                                        |
| (12) | 16. <i>Atemoztli</i>                           |                                                        |                                                                                        |
| (13) | 17. <i>Tititl</i><br>( <i>Tititl-Izcalli</i> ) | stretching, contraction shrunk wrinkled, etc.          | aged goddess of weaving <i>Ilamatecuhtli</i> ; various                                 |
|      | 18. <i>Izcalli</i>                             | growth, resurrection vivacity, etc. (cf. calli, house) | fire god, <i>Xiuhtecuhtli</i> ; house and plant; other figures                         |

months comes from two lists of the chronicler Cristobal del Castillo, where the relevant part of the sequence is given as follows:

*Atemoztli* ..... *Atemoztli*  
*Izcalli-Tititl* ..... (*Nemontemi*)  
*Xochilhuil* ..... *Izcalli*  
 (*Nemontemi* omitted) ..... *Xochilhuil*

However, Kubler and Gibson (1951:47-48) argue persuasively that this part of Castillo's lists merely reflects Castillo's confusion over the beginning of the year and "the corrupt and derivative character" of his calendars. They note that Castillo's errors were carried over into the Otomí Codex from Huichapan.

Still, there are other suggestions that *Tititl* and *Izcalli* form a conceptual pair, though not in terms of 'big' and 'little' or 'first' and 'second'. Instead, they seem to form a contrastive set. With regard to *Tititl*, Kubler and Gibson (1951:34) discuss how it has the apparently contradictory semantic senses of 'stretching' and of 'contraction' or 'tightening'. The notion of stretching may be a sort of cosmic one, associated with severe winds and weather, as in the interpretation of Juan de Tovar (Kubler and Gibson 1951), but it has more concrete associations with rope-stretching ceremonies and, also, with weaving (the patron goddess of *Tititl* being *Ilamatecuhli*, the goddess of weavers). Kubler and Gibson, noting that contraction is a response to cold, conclude that both the 'stretching' and the 'contraction' senses may be valid. This also makes sense in terms of rope-stretching and weaving, wherein the act of stretching the fibers has the effect of tightening the weave. Caso (1971:340) prefers the meaning 'shrunk' or 'wrinkled' for *Tititl*, which is an allusion to elderliness of the deity *Ilamatecuhli* (cf., Corona Núñez 1964:m:162). Perhaps these senses of *Tititl* also have a seasonal allusion, considering that the following month name, *Izcalli* is generally interpreted as 'growth', 'revival', 'resurrection', 'vivacity', etc., referring to the first sprouting of plant growth following the dead season. Literally, the Nahuatl *calli* means 'house' and *Izcalli* is sometimes pictorially symbolized as a house or temple associated with a growing plant. The alternate symbol for *Izcalli* is a figure of its patron deity *Xiutecuhli*, the fire god. The pictorial symbols for *Tititl* are more variable but, generally, either the goddess *Ilamatecuhli* is portrayed or some scene suggesting 'stretching' or 'contraction' is pictured. The only example of which I am aware in which the pictorial symbols

suggest a pairing of *Tititl* with *Izcalli* occurs on Lámina CXXXIII of the *Codex Rios* (*Vaticanus A*, 3738) where the month signs are laid out in association with pictures of events from Cortés's conquest of Mexico. (Corona Núñez 1954:III:287) has a color reproduction, while Kubler and Gibson (1951:Figure II) provide line drawings (repeated by Caso 1967:Figure 14). Here *Tititl* and *Izcalli* are represented by the heads of their patron deities (most of the other months being represented by other symbols, rather than their deities). The head of *Ilamatecuhtli* has a strained expression and protruding tongue suggestive of her old age and the 'wrinkled' sense of *Tititl*. The head of *Xiutecuhtli*, on the other hand, has a fierce, lively expression in accord with the various senses — 'resurrection,' etc., — of *Izcalli*. Perhaps this is reading too much into these figures, particularly as the much more elaborate portrayals of these deities elsewhere in the *Codex Rios* (Láminas LXXI-LXXII) do not emphasize these details in similar fashion. Presently, it will be seen that there is some additional evidence supporting the *Tititl/Izcalli* pairing but, even if this be denied, the rest of the pattern is enough to suggest a former, shorter list of months implicit in the 18-month series.

Further study of the codices and manuscripts with pictorial symbols of the months, their festivals, patron deities, etc., might provide more evidence of the pairing of *Tititl/Izcalli*. I have not had access to all of the sources containing such material. Glass (1975:30-31 and Table 8, p. 42), who lists these sources, divides them into two types, "18-month festival calendars" and "calendar wheels." He notes that the former have been studied thoroughly by Kubler and Gibson (1951) but that the latter have not received thorough, systematic attention.

The Nahuatl-style pairing pattern shows up in lesser and varying degree in several non-Nahuatl lists reported in Caso's Cuadro XI (Otomí, Matlatzinca, Tarascan, Mije and Chiapanec lists). In this group (Table 2) the pattern is strongest in the Otomí list, which has four of the five pairings. The Matlatzinca and Mije lists each preserve three pairings, though not exactly the same three. Also, the Mije list shows some variation from the Nahuatl pattern in that there is actually a tripling corresponding to the Nahuatl pair 3/4. Only the pair corresponding to Nahuatl 7/8 is fully attested in the Tarascan list but Tarascan 12) 'Little Spanish Moss' partially corresponds to Nahuatl pair 12/13. One of the two Chiapanec lists tabulated by Caso (both Chiapanec versions reported by the Fray Juan de Albornoz in 1875) has the pair 7/8. The other Chiapanec list has been

TABLE 2

PAIRING OF MONTHS IN NON-NAHUATAN LISTS, OTHER THAN MAYAN, AFTER CASO (1976), NICHOLSON (1971), KUBLER AND GIBSON (1951) AND OTHER SOURCES

| <i>Nahuan Pattern</i> | <i>Otomí</i>                | <i>Matlatzinca</i>  | <i>Tarasco</i>          | <i>Mije</i>  | <i>Chiapanc</i>                |
|-----------------------|-----------------------------|---------------------|-------------------------|--------------|--------------------------------|
| 2                     |                             |                     |                         |              |                                |
| 3                     | little flying <sup>1</sup>  |                     |                         | cold or hot  |                                |
| 4                     | big flying                  |                     |                         | cold or hot  |                                |
| 7                     | little festival of lords    | little change       | <i>uzcata consuaro?</i> | less hot     | the fish grows the little fish |
| 8                     | big festival of lords       | big change          | <i>caheri consuaro?</i> |              | the fish turns(?)              |
| 9                     | little festival of the dead | little death        |                         | silent viper |                                |
| 10                    | big festival of the dead    | big death           |                         | silent viper |                                |
| 12                    | little Spanish moss         | little Spanish moss | little Spanish moss     |              |                                |
| 13                    | big Spanish moss            | big Spanish moss    | ?                       |              |                                |
| 17                    |                             |                     |                         | moist        |                                |
| 18                    |                             |                     |                         | moist        |                                |

<sup>1</sup> Cf., Cakchiquel Maya names for months 3/4, Table 4.

so drastically reordered or, rather, disordered that the sequential order of the members of this pair (7/8) is reversed and the two are separated from each other by nine positions! Only three of the non-Nahuan, non-Mayan lists tabulated by Caso—Chinantec, Mazatec and the fragmentary Huastec (linguistically related to Mayan)—appear to have no trace of the pairing pattern. Caso has a heading in his Cuadro xi for Totonac but with only the one month name reported the Totonac cannot be compared.

Turning to the various Mayans lists, the pairing pattern is obvious only where there is evidence of Mexican influence (Cakchiquel and Quiché). Caso (1967:37-38), among others, has pointed out that some of the Cakchiquel and Quiché month names are Nahuatl loanwords and that others, though not phonological loanwords, are semantic borrowings. It was this that enabled Caso (1967:74-77) to partially reconstruct a "Toltec" calendar (as the Nahuatl presence in Central America predates the Aztecs). The pairing of the month names was carried over in the borrowing into the Quiché list, except for the positional equivalents of the Mexican pair 3/4 (Table 3). In the Cakchiquel list the evidence of pairing at 17/18 is about as vague as in the Nahuatl lists. *Izcal k'ih* is an obvious borrowing of the Nahuatl 18) *Izcalli*, but with a shift of meaning, as we see in Table 3. On the other hand, 17) *Katic* is not a phonological borrowing but Caso's Cuadro xi gives the meaning, 'Drying' or 'Burn'. 'Drying' refers to drought, 'Burn' to slash-and-burn field clearance (Recinos and Goetz 1953:31). In the case of the Quiché sequence, there is a tripling over positions 16/17/18 but, neither the phonology nor the meanings of the terms suggest borrowing from Nahuatl. One would suspect borrowing on the basis of Nahuatl intrusions elsewhere in the Quiché list, but in this part of the sequence the tripling might reflect a Mayan tradition, as will be seen later (text and Table 4).

Except in the Quiché list of Brasseur de Bourbourg, there are also some slight positional displacements of the Cakchiquel and Quiché equivalents of the Mexican pairs 7/8, 9/10 and 12/13. The Quiché reconstruction by Brasseur (tabulated by Caso but not repeated here) is probably correct in its implication that Brinton's Quiché list has these displacements as a consequence of shifts of the months *Botam* and *Tzitzilagam* from positions 6 to 15 and 11 to 12, respectively. In the Cakchiquel list a displacement by one position of the pair equivalent to Mexican 9/10 reflects the doubling of *Tok'* rather than of *Ligin ka* as in the Quiché.

TABLE 3

PAIRING OF MONTH NAMES IN MEXICAN-INFLUENCED CAKCHIQUEL AND QUICHÉ LISTS. QUICHÉ AFTER CASO (1975), FF. BRINTON AND BRASSEUR DE BOURBOURG; CAKCHIQUEL AFTER REYNOS AND GOETZ (1953) AND CASO (1967)

| <i>Nahuan<br/>Pattern</i> | <i>Cakchiquel</i>                                                                                       | <i>Quiché<br/>(Brinton)</i>    | <i>Quiché<br/>(Brasseur)</i>                                        |
|---------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------|
| 3                         | <i>Nabey tumuzuz</i> , first flying ants or grubs                                                       |                                |                                                                     |
| 4                         | <i>Rucab tumuzuz</i> , second flying ants or grubs                                                      |                                |                                                                     |
| 6                         |                                                                                                         | <i>Nabey mam</i>               |                                                                     |
| 7                         | <i>Nabey mam</i> , first old man                                                                        | <i>Ucab mam</i>                | <i>Nabe mam</i>                                                     |
| 8                         | <i>Ru cab mam</i> , second old man                                                                      | <i>Nabe linguinca</i>          | <i>Ucab mam</i>                                                     |
| 9                         | <i>Liguin ka</i> , earth muddy from rains; softness of the hand? (Caso "Lo blando de la mano")          | <i>Ucab linguinca</i>          | <i>Nabe liginga</i> , first sweet hand? (Caso "Primera mano dulce") |
| 10                        | <i>Nabey tokic</i> , first harvest (of cocoa); first cut (ref. to pruning, or tapping of trees for sap) | <i>Nabey pach</i>              | <i>Ucab liginga</i>                                                 |
| 11                        | <i>Ru cab tokic</i> , second second <i>tokic</i>                                                        | <i>Ucab pach</i>               |                                                                     |
| 12                        | <i>Nabey pach</i> , <sup>1</sup> first hatching, incubation (ref. to chickens or other birds)           |                                | <i>Nabey pach</i>                                                   |
| 13                        | <i>Ru cab pach</i> , second <i>pach</i>                                                                 |                                | <i>Ucab pach</i>                                                    |
| 16                        |                                                                                                         | <i>Nabey zih</i><br>first word | <i>Nabe zih</i>                                                     |

<sup>1</sup> Cf., *Nahuatl*, *pachtli*, *pachontli*

| <i>Nahuan<br/>Pattern</i> | <i>Calchiquel</i>                                                                                                                             | <i>Quiché<br/>(Brinton)</i>    | <i>Quiché<br/>(Brasseur)</i> |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------|
| 17                        | <i>Katic</i> , drying (drought)<br>burn (slash-and-burn)                                                                                      | <i>Ucab zih</i><br>second word | <i>Ucab zih</i>              |
| 18                        | <i>Izcal</i> <sup>2</sup> <i>k'ih</i> , day of bad<br>way? (Caso: "Día de mal<br>camino"); (this month a<br>time of sowing in high<br>lands). | <i>Rox zih</i><br>third word   | <i>Rox zih</i>               |

In the various other Mayan lists we are sometimes faced not only with obscure meanings but also with uncertain or confused sequential ordering. This is especially true of the Ixil list, as can be seen by comparing the radically different orderings suggested by Caso 1967: Cuadro xi, and Thompson (1950: Table 8, p. 106). There are exceptions. The Tzeltal-Tzotzil subtradition seems to have preserved the pre-Hispanic names and sequential ordering of the months fairly well (Gossen 1974:230-231). The order of the Yucatecan list seems well-preserved, even if the individual names of some of the months still defy interpretation.

Despite some confusions and uncertainties, traces of the pairing pattern are apparent in some of the Mayan lists. Seler (1898) drew attention to two pairings in the Tzeltal list of Emeterio Pineda and pointed out that this resembles, in general, the pairing in the Mexican lists and, as Kelley has pointed out, pairing provides one of the best clues for aligning the Mayan lists with the Nahuatl and other Mesoamerican lists:

Apparently the [Matlatzincan] *Ynthu*-prefix has a value corresponding to Otomí *Anttzen*-, Aztec - *tonlli*, Quiché *Nabei*, Ixil *Tal*-and Zotzil *Bikit*, while the *Ynthu*-prefix corresponds to Otomí *Atan*-, Aztec *Hue*, Quiché *Mam*, Ixil *Nim*- and Zotzil *Mukta*. The presence of these "little" and "big" months is one of the biggest helps in cross-correlating month names (Kelley 1952:5-6).

<sup>2</sup> Cf., *Nahuatl*, *izcalli*

TABLE 4

NAHUAN-STYLE PAIRING PATTERN COMPARED TO PATTERNS OF REDUPLICATION IN MAYAN MONTH LISTS, OTHER THAN CAKCHIQUEL AND QUICHÉ. AFTER CASO (1967), THOMPSON (1950), KELLEY (1976) AND GOSSEN (1974). SEE TEXT FOR DISCUSSION OF MEANINGS

| Nahuan<br>Pattern | Maya<br>Glyphs<br>(Yucatec Names) | Maya<br>Month<br>Pairs | Chol (?)<br>or<br>Kekchi (?) | Tzeltal              | Tzotzil               | Ixil | Kanahobal               |
|-------------------|-----------------------------------|------------------------|------------------------------|----------------------|-----------------------|------|-------------------------|
| 7                 |                                   |                        |                              |                      |                       |      |                         |
| 8                 |                                   |                        |                              |                      |                       |      |                         |
| 9                 |                                   | Jaguar                 |                              |                      |                       |      |                         |
| 10                | Uo                                | Jaguar                 | Icat                         | 7 uincil<br>6 uincil | Nichilkin<br>1 uincil |      |                         |
| 11                | Zip                               |                        | Chacat                       | 5 uincil             | 2 uincil              |      |                         |
| 12                |                                   |                        |                              | 4 uincil             | 3 uincil              |      |                         |
| 13                |                                   |                        |                              | 3 uincil             | 4 uincil              |      |                         |
| 17                |                                   |                        |                              |                      |                       |      |                         |
| 18                | Ch'en<br>Yax                      |                        |                              |                      |                       |      | Khak Sihom<br>Yax Sihom |
| 1                 | Zac                               |                        |                              | *(Sisac)             | Zizac                 |      | Sah Sihom               |
| 2                 | Ceh                               |                        |                              | (Muctasac)           | Muctazac              |      | Khak Sihom              |
| 3                 |                                   |                        |                              |                      |                       |      |                         |
| 4                 |                                   |                        |                              |                      |                       |      |                         |

\* Sisac and Muctasac occur only in the Tzeltal list of Emeterio Pineda, discussed by Seler (1898); the other Tzeltal lists, cited by Thompson (1950:106), all have Zacab and Ahelchac or similar terms in these positions

The correspondence of paired names in the Cakchiquel, Quiché, and Mexican lists was one of the pieces of evidence which enabled Spinden (1924:98-111) to demonstrate not only the structural correspondence between the Mexican and Mayan month series but, also, to align the various lists on the basis of chronological data. In view of this, and of the possible phonological relationship between *Tumuzuz* and *Tozoztontli* is difficult to accept the positional displacements postulated by Acuña (1976) which would move the Cakchiquel pair *Nabe-tumuzuz/Rucab-Tumuzuz* out of position with respect to the Mexican *Tozoztontli/Hueytozoztli*.

Thompson also has commented on pairings in some Mayan lists:

The Tzeltal name, *Mucuch*, pairs with *Alauch*, just as *Žizac* and *Muctazac* do in the Tzotzil calendar. The prefix *muc* means "great" in Tzeltal, just as does *mucta* in Tzotzil (Thompson 1950:117; see also p. 111).<sup>4</sup>

Tzeltal *Alauch/Mucuch* and Ixil *Talcho/Nimcho* (in Thompson's alignment, which seems preferable to Caso's) correspond structurally to Nahuatl 7/8. Tzotzil *Žizac/Muctazac* is a good pairing but occupies a sequential position intermediate between Nahuatl pairs 17/18 and 3/4. Without any apparent linguistic or semantic resemblance it is not possible to determine which of the Nahuatl pairs corresponds structurally to this Tzotzil pair. In this same part of sequence (corresponding to Nahuatl 17/18, 1, 2), we find a sequence of names (and glyphs) is several of the Mayan lists which form a grouping in that they refer to colors. Any relationship of this Mayan grouping to the Nahuatl pairing pattern seems tenuous. However, it may be noted that *Yax* in Yucatan means not only 'blue' or 'green' but also 'new' or 'strong' (Thompson 1950:111), perhaps a distant semantic relationship to the corresponding Nahuatl *Izcalli*, 'revival', 'resurrection' or 'growth'. A similar parallel is that between the group of Tzeltal-Tzotzil names 1-*uincil*, 2-*uincil*, etc., corresponding in position to Nahuatl 9/10, 11 and 12/13. The term *uincil* simply refers to the

<sup>4</sup> In his analysis of the Tzotzil month names from Chamula, Chiapas, Gossen (1974: 233) translated *sisak* as 'white firewood' and challenged Thompson's implication that it means 'little *sak*', as Gossen himself knew of no root similar to *si-* (or *zi-*) meaning 'little'. Gossen's doubt is supported by the lack of such a root in the Tzotzil dictionary of Laughlin (1975). Still, *sac* (or *zac*) does mean 'white', and *mucta-zac* is 'big-zac' so *Žizac* and *Muctazac* do constitute a pairing. David H. Kelley (personal communication, 1982) doubts that *si-* means 'firewood' as Gossen suggests.

20-day period (*uinal*). As in the preceeding case, to suggest any relationship between this Mayan grouping and the Nahuatl pattern would be tenuous but, again, there may be a faint echo of some relationship. The Tzotzil list has in position 9 *Nichilkin*, instead of *-uincil*. *Nichilkin*, means 'festival of flowers', thus recalling one of the alternate names *Tlaxochimaco*, 'flowers are given', for the ninth Nahuatl month. This semantic correspondence is commented upon by Thompson (1950:107), citing an earlier observation by R. P. C. Schultz.

There are two further Mayan pairings that seem to relate to the Nahuatl pattern, although the evidence again is not unequivocal. One is the two glyphs of jaguars as patron gods of the Mayan months (Yucatecan *Pop* and *Uo*) corresponding in position to Nahuatl 9/10. Another Mayan pairing, offset by one position (10/11) is constituted by the Chol (?) or Kekchi (?) names *Icat* and *Chacat*. This pair corresponds in position to the paired glyphs for *Uo* and *Zip* (black and red crossed bands, respectively).

Table 5, based on the preceding discussion and on Tables 1-4, summarizes the Nahuatl-style pairing pattern through the other Mesoamerican lists showing any possible trace of it. From this we see that the pattern is fully attested (if the pairing of *Titil/Izcalli* is valid) only within Nahuatl tradition. In the Mayan tradition the pattern is represented strongly in only the Nahuatlized Cakchiquel and Quiché lists, leaving us with scattered evidence in some of the other lists. Looking beyond the Mayan material, we find partial representations of the pattern in the Otomí, Matlatzincan, Tarascan, Mije and Chiapanec lists. As far as I can see, the evidence of the Chiapanec and Mije lists consists of structural parallels without indications of either phonological borrowing from or semantic relationship to the Nahuatl tradition. The structure is better represented in the Otomí and Matlatzincan lists where there are close semantic correspondences to some of the Nahuatl names. The Tarascan pair 12/13 also parallels the Nahuatl semantically.

The distinction between the possible *preservation* of a proto-pattern in these various lists and the presence of a pattern due to *diffusion* from Nahuatl sources is an important one. In the case of the Cakchiquel-Quiché lists, the lexical borrowings from Nahuatl prove conclusively that diffusion was involved, and at a relatively late date. In other non-Nahuatl lists the several semantic resemblances to Nahuatl names constitute evidence either of preservation of proto-meanings or of semantic diffusion from Nahuatl, as suggested in several cases by

TABLE 5

SUMMARY OF PAIRING PATTERN IN MESOAMERICAN MONTH SEQUENCES, BASED ON TEXT AND TABLES 1-4. LINES INDICATE DISPLACEMENTS FROM NORMAL MESOAMERICAN POSITIONS

| Nahuan Pattern | Otomí | Matlatzinca | Tarasco | Mije | Chiapanec | Cakchiquel | Quiché A | Quiché B | Maya Glyphs | Maya Month Patrons | Chol (?) Kekchi (?) | Ixil | Tzeltal | Tzotzil | Kanhobal |
|----------------|-------|-------------|---------|------|-----------|------------|----------|----------|-------------|--------------------|---------------------|------|---------|---------|----------|
| 1              |       |             |         |      |           |            |          |          |             |                    |                     |      |         |         |          |
| 2              |       |             |         | +    |           |            |          |          |             |                    |                     |      |         |         |          |
| 3              | +     |             |         | +    |           | (P)        |          |          |             |                    |                     |      |         |         |          |
| 4              | +     |             |         | +    |           | (P)        |          |          |             |                    |                     |      |         |         |          |
| 5              |       |             |         |      |           |            |          |          |             |                    |                     |      |         |         |          |
| 6              |       |             |         | +    |           |            |          |          |             |                    |                     |      |         |         |          |
| 7              | S     | +           | +       |      | +         | (S)        | S        | S        |             |                    |                     | +    | +       |         |          |
| 8              | S     | +           | +       |      | +         | (S)        | +        | +        |             |                    |                     | +    | +       |         |          |
| 9              | S     | S           |         | +    |           |            | +        | +        |             | (+)                |                     |      | ?       | (S)     |          |
| 10             | S     | S           |         | +    |           |            | +        | +        | (+)         | (+)                | (+)                 |      | ?       | ?       |          |
| 11             |       |             |         |      |           |            | +        | +        |             |                    |                     |      | ?       | ?       |          |
| 12             | S     | S           | S       |      |           | P          | +        | +        |             |                    |                     |      | ?       | ?       |          |
| 13             | S     | S           | (S)     |      |           | P          | +        | +        |             |                    |                     |      | ?       | ?       |          |
| 14             |       |             |         |      |           |            |          |          |             |                    |                     |      |         |         |          |
| 15             |       |             |         |      |           |            |          |          |             |                    |                     |      |         |         |          |
| 16             |       |             |         |      |           |            |          |          |             |                    |                     |      |         |         |          |
| 17             |       |             |         |      |           | (S)        | +        | +        |             |                    |                     |      |         |         |          |
| 18             |       |             |         | +    |           | P          | +        | +        | (S)         |                    |                     |      |         |         |          |
| 1              |       |             |         | +    |           |            |          |          |             |                    |                     |      | (+)     | (+)     |          |
| 2              |       |             |         |      |           |            |          |          |             |                    |                     |      | (+)     | (+)     |          |

P Phonological (but not semantic) relationship to Nahuatl.

S Semantic relationship or similarity (but no phonological relationship) to Nahuatl.

+

( ) Around any of the above, indicates likely but not certain relationship to Nahuatl.

? Possible but tenuous relationship to Nahuatl pattern.

Kubler and Gibson (1951). Only a thorough linguistic analysis, which is beyond my competence, offers any hope of resolving this question. On the basis of present study we can conclude that the Nahuatl tradition best preserves the *pattern* but this does not necessarily mean that it also preserves the *set* of original Mesoamerican month names. Before the development or invention of the known calendar system with its 18-month cycle, there doubtless already existed numerous luni-solar calendars throughout Mesoamerica that were similar in structure and function but variable with respect to the names of the 12-13 months in the various local languages. When the new system appeared it was the system itself that diffused, not necessarily all of the individual elements. The daynames, incidentally, show considerably less variation through Mesoamerica than the 18 month names (Stewart 1977).

Admittedly, it is an assumption that the pattern I have been discussing represents an ancient series of 12-13 "moons" that was expanded to give the series of 18 months of 20 days but it makes a great deal of sense calendrically and astronomically. Spinden (1924) very strongly presumed the former existence of such a calendar but apparently did not notice the implications that the pairing pattern held for his opinion. Marshack (1974:268-269) also has argued, on general grounds, that lunar, and then solar, reckoning probably preceded the elaborate Mesoamerican calendar system. On the basis of analogy with the worldwide ethnographic record (Cope 1919; Nilsson 1920), one would expect the early calendar to have been based in astronomy and to have involved a cycle of 12-13 "moons" (lunations) loosely correlated with the seasonal cycle of the sun.<sup>5</sup> Movements of the fixed stars and planets probably would have been observed and linked into this luni-solar calendar, which leads me to take cognizance of another interpretation by Kelley (1957:105-113), who implicitly and partially recognized the pairing pattern in his discussion of the 12-month calendars of the Southwest. In these calendars the months

<sup>5</sup> The fact that some of the Mesoamerican month names have several connotations itself suggests an earlier calendar in which the months were correlated with the seasons. The seasonal connotations of the month names are otherwise puzzling in the Mesoamerican calendar of 365 days in which the months, because intercalation was not practiced, inevitably moved through the tropical year at the rate of about one day per every four years. Many writers, from the Spanish chroniclers onward have speculated that intercalations were made but none of these speculations appears to have substantive support, according to a review of the questions by Broda de Casas (1969:46-54, 63-64). Recently, Graulich (1981) has attempted to date the inception of the Mexican 365 day "year" on the basis of seasonal denotations and connotations, and Bricker (1982) has followed his lead and attempted to date the Mayan system.

are often correlated with the dawn risings of certain stars. Kelley argues that these Southwestern sequences have a common origin and that the Mesoamerican calendar developed out of the same milieu. In his comparative table (Table VI, ff. p. 106) of the Southwestern lists of 12 months and associated stars he suggests a corresponding alignment of the Aztec 18 *meztli* in which they had to be grouped in order to fit into the 12 Southwestern positions. In that grouping he recognized all of the pairings except the least obvious one, 17) *Titiil* /18) *Izcalli*. Instead his alignment shows two pairings which I do not recognize 18) *Izcalli*/1) *Cuahuitlehua* (*Atlcahualo*) and 14) *Quecholli*/15) *Panquetzaliztli*. Here Kelley is suggesting that an ancient star calendar, rather than a lunar calendar, is implicit in the list. In fact, he had noticed the considerable degree of overlap in the symbolism of the various Mesoamerican sequences (20 days, 18 months, etc.) and believed them all to have once had stellar associations:

I think the evidence presented has been ample to indicate that all these different lists originated from a single principle of early Mexican cosmology and to strongly suggest that this integrating principle was series of constellations (Kelley 1957:103).

The lunar and stellar hypotheses are not really contradictory, as stars can be and have been used to regulate lunar calendars. I simply would see the lunisolar reckoning as primary in the sense it explains why the number of items implicit in the 18-*meztli* series is probably 13. (In operation, the ancient calendar probably was reckoned with 12 "moons" in some years and 13 in others, in order to stay roughly in step with the seasons.) With regard to possible stellar associations, the Southwestern model emphasized by Kelley is plausible and another analogue is provided by the calendrical astronomy of the Skidi Pawnee of the American Prairie. In the 19th century these people had an extremely elaborate, if not rigidly formalized, luni-solar calendar in which the lunar months were keyed to the movements of stars. This was not merely a practical time-reckoning device but was deeply embedded in an annual economic and ceremonial cycle, and astronomically based cosmology and a symbolic system, or theory, of the cosmic interrelationships of stars, directions, colors, primal elements and other components (Chamberlain 1979; Stewart 1979).

Luni-solar calendrical reckoning and attention to the stars probably extends far back into the Paleolithic, forming part of human cultural

heritage on a very ancient and world-wide scale. Thus a calendar of 12-13 "moons" in ancient Mesosamerica is almost presumable on general grounds. The specific evidence discussed in this paper makes that supposition a virtual certainty, however the complex Meso-american calendar system known to us may have come to supercede it.

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