

Evidence of Haab Associations in the Madrid Codex¹

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ABSTRACT

Recent studies suggest that almanacs occurring in the prehispanic Madrid Codex may be concerned with the commensuration of two calendars, the 260-day *tzolkin* and the 365-day *haab*, as a means of scheduling ceremonies relevant to both the Maya ritual cycle and the solar year. This interpretation directly contradicts the traditional view of codical almanacs as devices used solely for divination within the 260-day calendar. Utilizing data from ethnohistoric sources, this paper establishes linkages between activities represented in the Madrid Codex and *haab* ceremonies described in the Colonial literature. It concludes with a model demonstrating how a series of almanacs that picture the manufacture of deity images were interrelated. Calendrical models such as these offer the opportunity to better understand how the codex was used on a day-to-day basis by Maya priests and day-keepers in Postclassic times.

Key words: Maya, Sacred Almanacs, Madrid Codex.

RESUMEN

Los estudios recientes sugieren que los almanaques que aparecen en el códice prehispánico de Madrid tienen que ver con la coordinación de dos calendarios, el

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tzolkin de 260 días, y el *haab* de 365 días, como una manera de programar las ceremonias pertinentes tanto al ciclo ritual como al año solar. Esta interpretación contradice directamente la opinión tradicional de que los almanaques de los códices fueron herramientas empleadas únicamente para adivinación dentro del calendario de 260 días. Usando información de fuentes etnohistóricas, esta investigación establece vínculos entre las actividades representadas en el código de Madrid y las ceremonias del *haab* descritas en la literatura colonial. Concluye con un modelo que ilustra cómo una serie de almanaques que muestran la confección de imágenes de deidades estaban relacionados entre sí. Modelos basados en calendarios, como este ejemplo, ofrecen la oportunidad de adquirir una mayor comprensión de cómo era usado el código diariamente por los sacerdotes mayas y los adivinos de la época posclásica.

Palabras claves: Mayas, almanaques sagrados, Código de Madrid.

INTRODUCTION

The Postclassic Maya codices, compiled between the thirteenth and sixteenth centuries, contain ritual and astronomical texts embedded within a calendrical framework. Four manuscripts from this tradition survive: the Dresden, Paris, Madrid, and Grolier screenfolds. The Madrid Codex differs from the others in that it consists almost entirely of almanacs based on the 260-day sacred calendar known as the *tzolkin*. It contains no Long Count (or absolute) dates and only one Calendar Round permutation that can be tied to a longer (52 year) cycle. Nevertheless, evidence accumulating over the past several years suggests that almanacs from this manuscript record events and ceremonies that relate to the 365-day *haab* and/or tropical year in addition to the *tzolkin* calendar (Bill *et al.* 1999; H. Bricker *et al.* 1997; V. Bricker and Vail 1997; Paxton 1997). These findings imply that the Madrid Codex may be concerned with the commensuration of the *tzolkin* and *haab* cycles as a means of scheduling ceremonies relevant to both calendars, as well as to the solar year. Such a model directly contradicts traditional interpretations of codical almanacs as devices used solely for divination within the 260-day calendar (Thompson 1960: 26, 1972; Love 1994).

In this article, I provide additional evidence in support of the idea that almanacs could function on multiple levels and were not limited to uses based solely on the 260-day cycle. Specifically, I relate a series of almanacs from the Madrid Codex to the yearly (*haab*) ceremonies discussed in the ethnohis-

toric literature. I then summarize a model developed by Victoria Bricker (1997b: 16-17) to demonstrate how *tzolkin* almanacs could be utilized to schedule *haab* events, concluding with a test of this model against data from the manuscript.

My discussion is based on the following understanding of codical almanacs and their relationship to the Maya calendar. Almanacs generally have two or more vertical frames, each of which contains a hieroglyphic text, bar and dot numerals, and often a picture (Figure 1). *Tzolkin* dates form the framework for organizing almanacs temporally. They are expressed in terms of a numerical coefficient ranging from 1 to 13 and a day name from a series of twenty. The combination of the name and the number places each date within a repeating cycle of 260 days. Day 1 of the cycle is 1 Imix, followed by 2 Ik, 3 Akbal, etc., and ending with 13 Ahau (day 260)².

Tzolkin dates are represented in the codical almanacs in two ways: through the initial column of glyphs (see *a* on Figure 1), which includes day signs in combination with a numerical coefficient, and by the bar and dot numerals associated with each frame (in the form of a black distance number, followed by a red coefficient [see *b* on Figure 1])³. Together, this information specifies the series of dates associated with each frame (see Table 1). Each frame may refer to four, five, or ten dates, depending on the number of day glyphs in the introductory column.

Whereas *tzolkin* dates record where each day falls within the ritual cycle of 260 days, the prehispanic Maya were also concerned with scheduling events (such as planting and harvesting) within the solar or tropical year. To do this, they made use of a 365-day calendar called the *haab*, which contains 18 months of 20 days, followed by a five-day period known as *Uayeb* at the end of the year. This approximates the length of the solar year, which is equivalent to 365. 2422 days. The two calendars were combined to form a larger cycle known as the Calendar Round, which represents a period of 52 years. In his *Relación de las cosas de Yucatan* (Tozzer 1941), written in c. 1566,

² The orthography used throughout this study for transcribing the names of the days and months in the Maya calendar is that developed by the chroniclers during the Colonial period. For the sake of consistency, other Yucatec words are also transcribed using the Colonial orthography.

³ In the Villacorta and Villacorta (1976) drawings of the codices reproduced here, distance numbers are represented by solid black numbers whereas coefficients are drawn in outlined form.

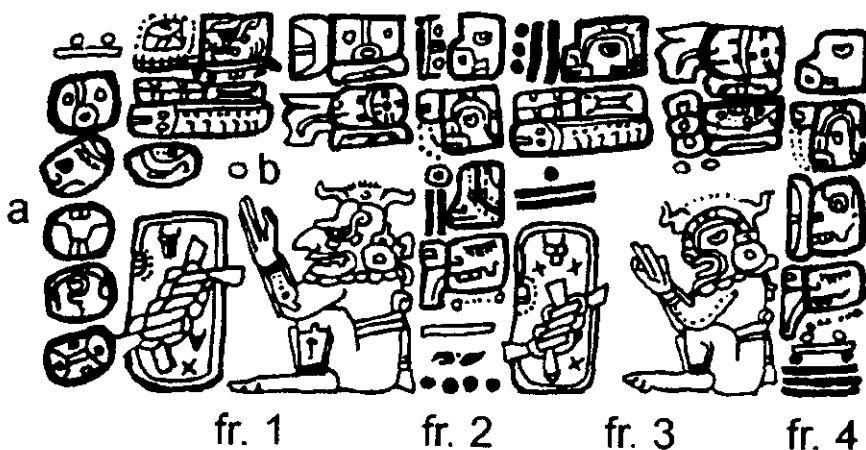


FIGURE 1.—Structure of almanac on Madrid 101c. Note the four vertical frames, two accompanied by pictures and two consisting only of text. The column of day glyphs at a determines the starting date of each of the five runs through the almanac (see Table 1). The numbers at b represent a distance number and coefficient pair. The distance number given here is the moon glyph, which represents «20.» Drawing after Villacorta and Villacorta (1976: 426).

TABLE 1
Calendrical Structure of Madrid 101c.

7 (+ 20)	1 (+ 4)	5 (+ 11)	3 (+ 17)
Ahau	Ahau	Kan	Men
Eb	Eb	Cib	Manik
Kan	Kan	Lamat	Cauac
Cib	Cib	Ahau	Chuen
Lamat	Lamat	Eb	Akbal

The *tzolkin* makes use of a base-13 system. Because of this, adding a distance number of 20 days to a coefficient of 7 produces a coefficient of 1 [$7 + 20 = 27 - 26 (13 \times 2) = 1$]. The coefficient associated with the fourth frame was incorrectly written as «2» in the almanac. It has been corrected to «3» in the table above (see column 4).

Bishop Diego de Landa discusses the annual round of festivals and ceremonies scheduled according to the *haab* calendar (summarized in Table 2).

The Madrid Codex represents a compilation of approximately 250 separate almanacs composed over a span of years during the Postclassic period of Maya history (c. 1250-1521 A. D.). Some of these almanacs were intended to be used in the fifteenth century (and perhaps later), whereas others represent copies of much older instruments (H. Bricker *et al.* 1997; V. Bricker 1997a, b). The style of the manuscript suggests an origin somewhere on the Yucatán peninsula (Thompson 1960: 26), although recent studies indicate that the glyphic texts contain a mixture of Yucatecan and Cholan vocabulary, raising questions about the ethnicity of the codical scribes (Lacadena 1997; Vail 1999a).

Only one Calendar Round date has been recognized in the Madrid Codex — 13 Ahau 13 Cumku, found on page 73b (V. Bricker 1997a: 169; Figure 2). Nevertheless, I believe that the primary function of the codex was to commensurate *haab* and tropical year activities with the *tzolkin* calendar. Evidence in support of this viewpoint includes the following:

1. The ceremonies on pages 34-37 of the manuscript are concerned with the celebration of the New Year (Thomas 1882; Taube 1988), which occurred at the beginning of Pop in the *haab* calendar. This provides evidence that *haab* rituals were important to the scribes who drafted the Madrid Codex.
2. Ethnohistoric sources (e. g., Landa in Tozzer 1941: 153-154) document the use of codices to determine the prognostics for the year.
3. A number of scenes depicted in the codex can be linked to Landa's description of the festivals associated with the 365-day year (see Table 2)⁴. Specific examples are presented below.

⁴ At several points in his discussion, Landa seems to confuse *haab* and *tzolkin* ceremonies. For example, the hunters» ritual he describes for the month Zac was actually a moveable feast: «On whatever day this 7 Ahau fell, they celebrated a very great festival...» (Tozzer 1941: 162). Likewise, the *tupp kak* ritual that took place in Mac represents part of the Burner ceremonies, a series of rites that took place at the quarter points of the *tzolkin* (see Tozzer 1941: n. 848). Nevertheless, it is clear that the majority of the festivals that Landa describes have *haab* associations, since they may be tied to seasonal activities such as planting and harvesting. This mirrors the situation in Central Mexico, where rituals associated with both the 260-day cycle and the 365-day calendar are pictured in the codices (Quiñones Keber 1995: Chapters 3-4).

Table 2
Haab Festivals Discussed in Landa's Relación.

<i>Maya Month</i>	<i>Western equivalent</i>	<i>Festival</i>	<i>Notes</i>
Pop	July 26-Aug. 14	New Year; general renewal	
Uo	Aug. 15-Sept. 3	For priests	
Zip	Sept. 4-23	Separate festivals for physicians, hunters, and fishermen	
Zodz	Sept. 24-Oct. 13	Preparation for Tzec festival	
Tzec	Oct. 14-Nov. 2	For beekeepers	
Xul	Nov. 3-22	In honor of Kukulcan	
Yaxkin	Nov. 23-Dec. 12	Initiation ceremony; general renewal	
Mol	Dec. 13-Jan. 1	For beekeepers; renewal of wooden idols	
Chen	Jan. 2-21	Renewal of wooden idols completed	
Yax	Jan. 22-Feb. 10	Renewal ceremonies (clay idols, temples, houses)	Could take place in Yax or Chen.
Zac	Feb. 11-Mar. 2	For hunters	Moveable ceremony; takes place on <i>tzolkin</i> day 7 Ahau.
Ceh	Mar. 3-22		Nothing listed.
Mac	Mar 23-Apr. 11	<i>Tupp kak</i> ceremony; festival in honor of Chacs and Itzamna	<i>Tupp kak</i> ceremony has <i>tzolkin</i> associations.
Kankin	Apr. 12-May 1		Nothing listed.
Muan	May 2-21	For cacao owners	
Pax	May 22-June 10	In honor of the <i>nacom</i> (war captain) and warriors	
Kayab	June 11-30	Fasting, preparations for New Year	
Cumku	July 1-20	Fasting, preparations for New Year	
Uayeb	July 21-25	Yearbearer rites	

Note: The dates appearing in column 2 have been modified to agree with the Gregorian calendar, rather than with the Julian calendar used by Landa.

13 Ahau 13 Cumku

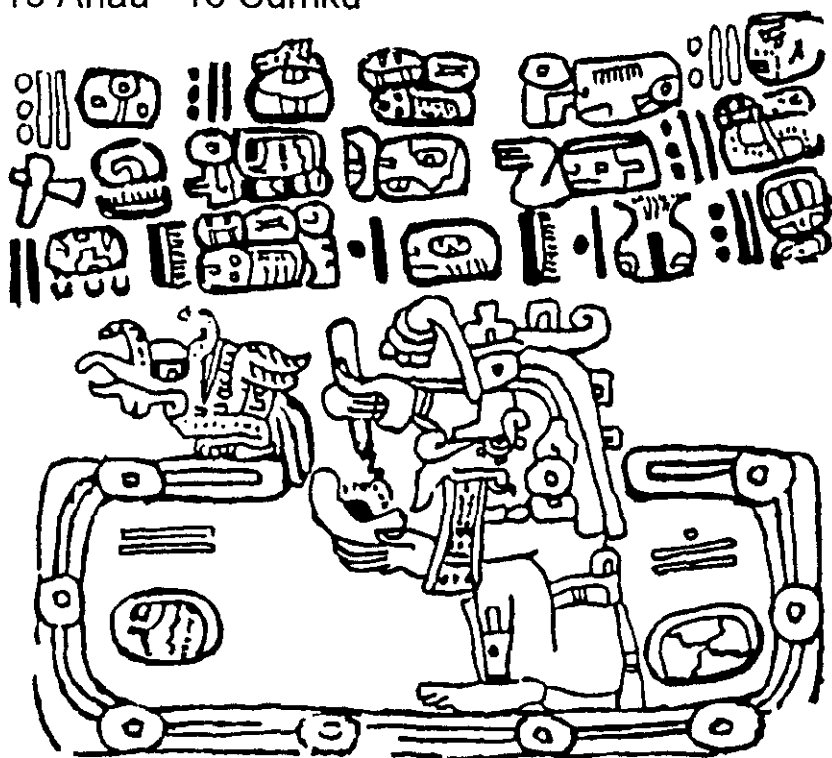


FIGURE 2.—Calendar Round date 13 Ahau 13 Cumku on Madrid 73b. Drawing after Villacorta and Villacorta (1976: 370).

4. Over half of the almanacs appearing in the Madrid Codex have seasonal referents. Examples include almanacs that picture rain-making ceremonies, planting crops, tending the bees, and carving masks or images to represent the gods. A review of the ethnographic literature illustrates that each of these activities can be placed within the yearly agricultural cycle (e. g., Davis 1978; Redfield and Villa Rojas 1934; Tozzer 1907).
5. Other almanacs appearing in the manuscript refer to the stations of the tropical year (i. e., the solstices and equinoxes). Like harvesting and

planting, these events recur according to the solar rather than the sacred calendar.

6. When *tzolkin* cycles are recorded in the Colonial manuscripts (such as the Codex Pérez), they do not represent perpetual 260-day calendars. Rather, the prognostication associated with a particular day may change from one cycle to the next. This suggests that the same almanac may not be valid in different *tzolkin* periods.

REFERENCES TO THE HAAB AND TROPICAL YEAR

Three types of almanacs have been identified in the Madrid Codex that may be correlated with the *haab* or the tropical year, including: (1) almanacs having seasonal associations; (2) almanacs referencing solar events (solstices and equinoxes); and (3) almanacs that may be related to specific months of the *haab*. Examples pertaining to the first two categories include, among others, the almanacs on Madrid 10b-11b and 10c-11c, which refer to the spring equinox, summer solstice, and midpoint of the *haab* (H. Bricker *et al.* 1997; V. Bricker and H. Bricker 1988); the series of almanacs on pages 24 through 28 that show planting and other activities related to the agricultural year (V. Bricker 1998); and the solar eclipse almanac on pages 12b-18b, which pictures seasonal phenomenon (rain) and what may be a New Year's celebration (H. Bricker *et al.* 1997; Wulfing 1994).

The third category remains the least well explored. Nevertheless, recent studies indicate that a number of the Madrid almanacs have *haab* associations (Bill 1997; Bill *et al.* 1999; V. Bricker 1997a; Paxton 1997; Vail n. d.). Here, I would like to draw further attention to this issue by reference to Landa's description of the annual round of *haab* activities. Coloration plays an important role in this discussion, since it may be used to help define parallels between the codical almanacs and Landa's *Relación*.

Landa notes that body paint was used in various contexts. The three colors that receive the most frequent mention include red, black, and blue. Red is associated with everyday use and was worn by both men and women (Tozzer 1941: 126). It was also occasionally worn by warriors, although black is more commonly associated with warfare. Black was also used by young, unmarried men and by those who were fasting (Tozzer 1941: n. 378). Blue seems to have been the most sacred color. During renewal ceremonies, blue coloring was applied to a variety of objects; additionally,

sacrificial victims were anointed with a blue paste before being executed (Tozzer 1941: n. 537).

During the yearly round of festivals (associated with the eighteen months of the *haab* plus Uayeb), coloration played a vital role in defining the status of a person or an object. For example, black soot was worn during the months leading up to the celebration of the New Year's renewal ceremonies in Pop, to signify a period of fasting and abstinence (Tozzer 1941: 152). It is also explicitly mentioned in connection with the month-long act of carving new «idols», which commenced during the month of Mol (Tozzer 1941: 160-161; see Table 2). Blue coloring was used at various times throughout the year, including the priests' ceremony in Uo, the physicians', hunters', and fishermen's ceremonies in Zip, the renewal ceremony in Yaxkin, and the festival dedicated to the Chacs and Itzamna in Mac (Tozzer 1941: 153, 154-156, 159, 164).

Red pigment is only mentioned explicitly in terms of the Pop renewal ceremony, although Landa points out elsewhere that it was commonly used. Before the Pop celebration, those who had been fasting cleansed themselves of the black soot worn during the previous month(s) and applied a red ointment over their skin. Next, they gathered around the temple courtyard, which the priest purified, seating himself in the middle «clothed like a pontiff.» Four Chacs, situated at the four corners, then stretched a rope around the perimeter of the area in order to drive out the evil spirit (Tozzer 1941: 152-153).

A number of parallels exist between Landa's discussion of *haab* rituals and the almanacs in the Madrid Codex. Here, I will consider only a small subset of the relevant almanacs, focusing on the series found on pages 14a through 23 of the manuscript. These almanacs form part of a larger set related to planting (see Madrid 24-29) and rain-making activities (see Madrid 30-33).

The almanac on page 19b brings to mind the rope ceremony that Landa describes as a means of purifying the temple courtyard during the month of Pop (Figure 3). This scene has also been interpreted as showing a rite of penis perforation (Joralemon 1974: 61). While bloodletting is undoubtedly pictured, I do not believe that this invalidates the link to the ceremony that Landa describes. Instead, what we are witnessing is the conflation of two ceremonial acts, both of which are associated with purification.

During the month of Yaxkin, the temple was again the focus of the monthly festival. Landa (in Tozzer 1941: 159) notes that the celebrants «collected in the temple and performed the ceremonies and burning of incense, which they had done in the past (festivals)». Whether or not this included the rope ceremony remains unclear. Tozzer (1941: n. 811) suggests that Yax-

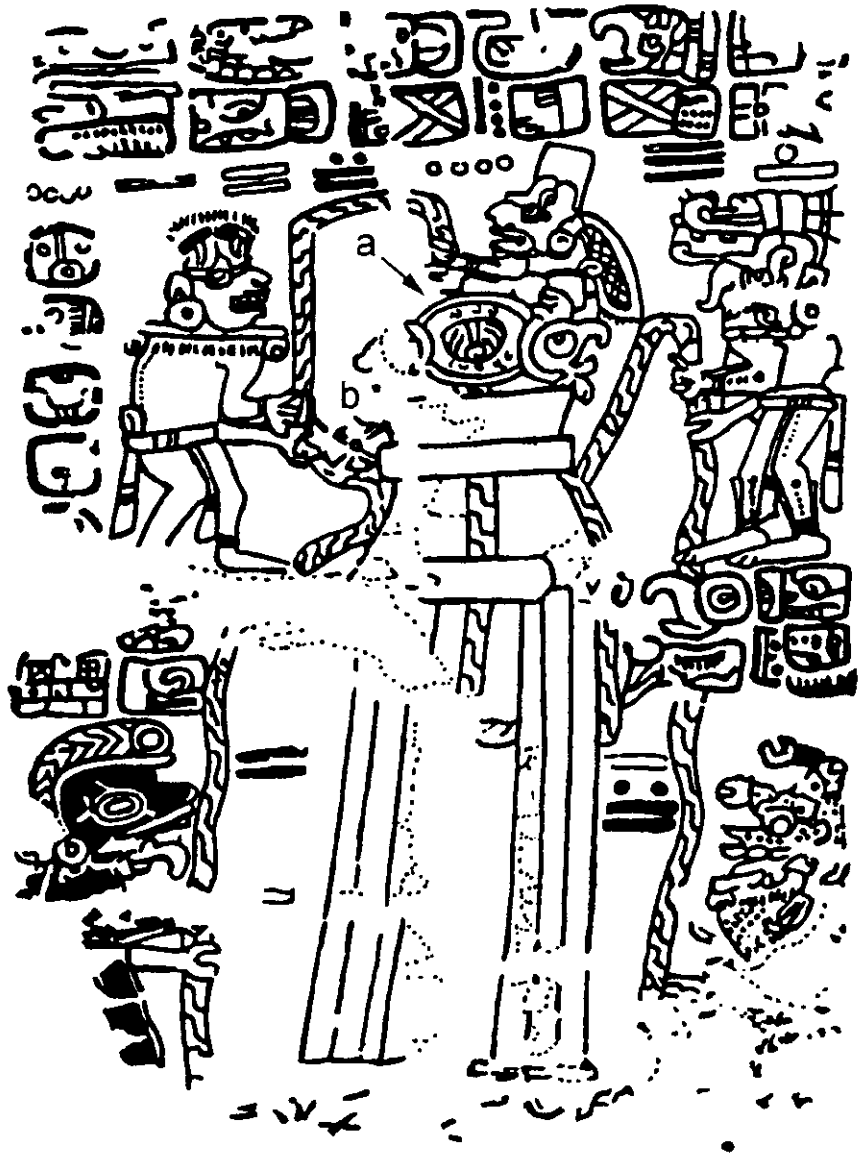


FIGURE 3.—Ceremony in temple courtyard on Madrid 19b. Note yax glyph at a and kin glyph at b. Drawing after Villacorta and Villacorta (1976: 262).

kin may once have been the start of the new agricultural year (*yax* means «first» or «green» and *kin* refers to «sun» or «day»). For this reason, it had many of the same associations as Pop, being a period of renewal. By the early Colonial period, however, Yaxkin occurred in late November/early December, and marked the time when the fields were cleared in preparation for planting the next year's milpa⁵.

Several iconographic clues suggest the possibility of a Yaxkin, rather than a Pop, date for the almanac on page 19b. The most compelling, perhaps, is the fact that the word Yaxkin is incorporated into the picture (note the *yax* glyph on the turtle's shell [a] and the *kin* glyph to the left below the turtle [b])⁶. The form of the *yax* glyph is almost identical to the one that Landa illustrates when he spells the word Yaxkin glyphically (Tozzer 1941: 158; Figure 4). Also relevant to this discussion is the blue coloration seen to adorn the temple as well as two of the deity figures, Chac (in the upper right) and Itzamna, who here assumes the role of priest (see Anders [1967] for a high-quality color reproduction of the Madrid Codex). Landa notes that, in Yaxkin, «their purpose was to anoint with the blue bitumen, which they made, all the appliances of all their pursuits, from the priest to the spindles of the women, and the wooden columns of their houses» (Tozzer 1941: 159). An adjacent



FIGURE 4.—Landa's drawing of the Yaxkin glyph. Redrawn after Tozzer (1941: 158).

⁵ This discrepancy may be explained in terms of the recession of the 365-day *haab* against the tropical year, which is 365. 2422 days in length. This results in a recession of 24. 22 days per century.

⁶ Alternately, the Yaxkin glyph may refer to a period of renewal more generally, since it also occurs as part of the upper picture on the page concerned with the Muluc New Year's ceremonies (Madrid 36).

almanac, the one that begins on page 20b, shows what may be wooden columns painted blue (Figure 5). The figures in the second, fourth, and sixth frames (including Itzamna, God H, and God C) are also blue in color.

This blue coloration is repeated in a number of almanacs in this section, including one that seems to picture the repainting of a temple (Madrid 23c; Figure 6), three that may show the renovation of temples or altars (pages 14a-16a; Figure 7), and another which pictures a turtle (Madrid 17a; Figure 8). In these almanacs, the color blue is associated with the structures (temples and altars), the turtle, and each of the deities pictured with the exception of the death god (God A). Specifically, it occurs with Chac, Itzamna, the maize god (God E), and the god of flowers (God H)⁷. I have argued elsewhere that these figures form a complex of agricultural deities (Vail 1996, 1999b). Their presence here is in line with the fact that so many of the almanacs in this section focus on rain-making and planting activities.

Two other monthly festivals are relevant to the discussion. The first, known as *Oc Na*, takes place in either *Chen* or *Yax* and involves the renovation of the temple in honor of the *Chacs* and the gods of the cornfield (see Table 2). Deity images made from clay (referred to as «idols») and their braziers were also renewed (Tozzer 1941: 161). Evidence found on page 16a (see Figure 7) suggests that this series of almanacs may relate to the *Oc Na* ceremony, as indicated by the fact that each clause begins with the statement *oc* (or *och*) *na* (literally «enter the temple»). In light of these correspondences, it is curious that Landa does not mention the use of blue paint during this festival, although this may simply be an oversight.

Blue paint is used in *Mac*, however, and there are a number of parallels between the almanacs under discussion and the events associated with the *Mac* celebration, which was dedicated to the *Chacs* and *Itzamna*. For example, Landa mentions a purification ceremony similar to that described for the *Pop* festival, noting that the celebrants gathered «in the court of the temple in which the *Chacs* and the priest took their places seated in the corners, as they were wont to do, in order to drive away the evil spirit...» (Tozzer 1941: 163). Later, they built an altar, which they anointed with mud from the well (on the bottom step) and a blue paste (on the remaining steps). This may very well

⁷ Blue coloration occurs with God C as well, but previous studies have made it clear that this figure is not a distinct deity but rather an embodiment of godliness (Ringle 1988). As such, he can substitute for any of the other Maya deities. In this section of the Madrid Codex, God C most commonly fills in for the rain god *Chac* (V. Bricker 1997b; Vail 1996: Chapter 5).

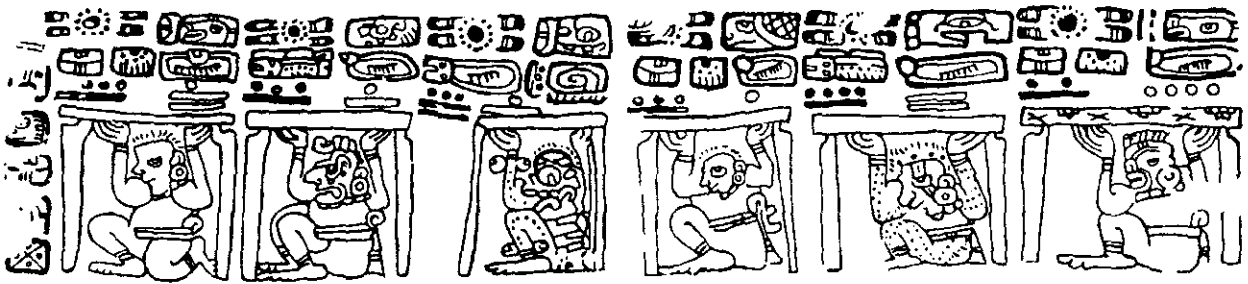


FIGURE 5.—Almanac on Madrid 20b-21b. Drawing after Villacorta and Villacorta (1976: 264, 266).

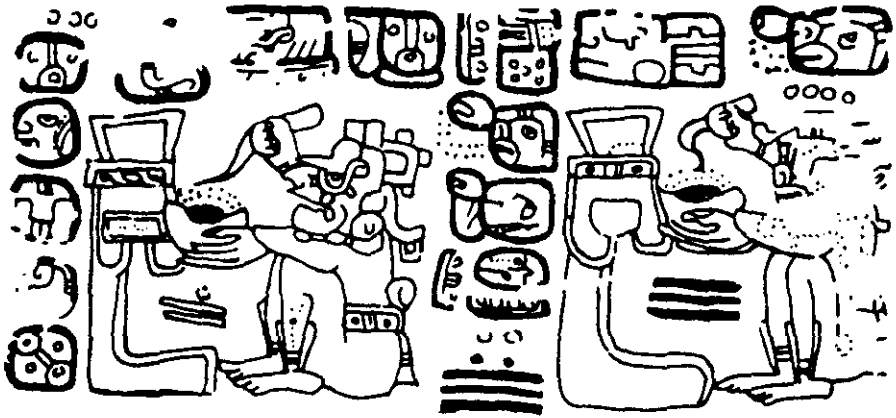


FIGURE 6.—Almanac on Madrid 23c. Drawing after Villacorta and Villacorta (1976: 270).

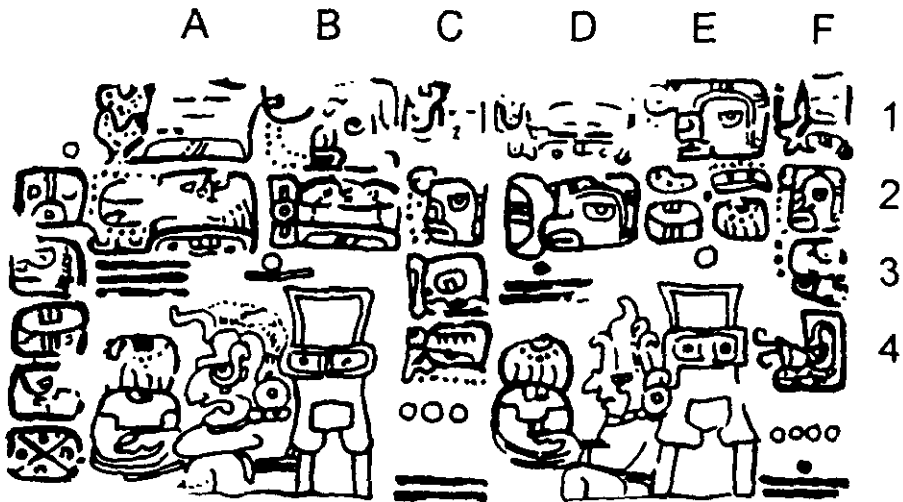


FIGURE 7.—Almanac on Madrid 16a. Reference to an oc (or och) na event (enter the temple) is made at A1, C1, D1, and F1. Drawing after Villacorta and Villacorta (1976: 256).

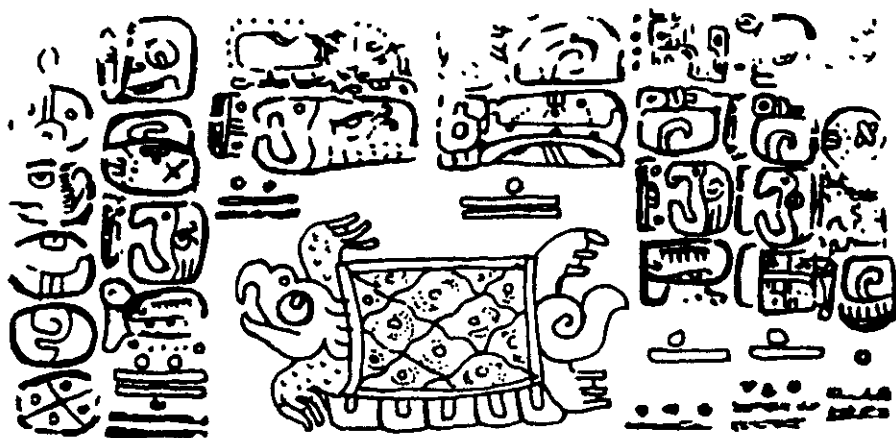


FIGURE 8.—*Almanac on Madrid 17a. Drawing after Villacorta and Villacorta (1976: 258).*

account for the scene on page 19b (see Figure 3), as well as those on pages 14a-16a and 23c (see Figures 6-7). Moreover, the month of Mac correlates well with the seasonality of the almanacs in this section, since it occurs in the early spring (in late March/early April according to Landa's calendar; see Table 2), just prior to the start of the rainy season and the planting cycle. Other iconographic parallels include the emphasis on Chac, Itzamna, and the gods of the cornfields. Finally, Colonial sources describe Mac as the month «when the turtles lay their eggs» (Roys 1933: 85). Turtles are pictured in several of the almanacs in this section, including pages 17a and 19b (see Figures 3 and 8), and are referenced in the text of both almanacs⁸.

Although it has not been possible to determine unique associations for the set of almanacs under consideration, I believe that I have demonstrated that the events represented take place within the context of the *haab*. Possible parallels have been noted with Landa's description of the Pop, Yaxkin, Chen

⁸ Elsewhere in this section (e. g., on pages 13a and 17b), turtles seemingly have zodiacal associations (Wulfing 1994). The turtle corresponds to the European constellation Orion at the time of heliacal rise, or first appearance in the eastern sky at dawn following its period of invisibility. This occurred during the first two weeks of June in the Postclassic period (H. Bricker and V. Bricker 1992; V. Bricker 1997a: 169). With respect to the almanacs under discussion, however, a June date does not correlate particularly well with the use of blue coloration.

or Yax, and Mac festivals. In a related study, I suggest that a spring (or Mac) date provides the best fit for these almanacs in light of their relationship to renewal activities pictured elsewhere in the manuscript, although I have not ruled out the possibility of a Yaxkin (or late fall) association (Vail n. d.).

Almanacs found later in the codex may likewise be linked to the *haab* ceremonies discussed in Landa's *Relación*. Examples include two that show a dance performed by hunters in the month of Zip, involving a deer skull and an arrow (Figure 9), and a series of almanacs that show the manufacture of deity images carved from wood (Figures 10-11), an event which Landa describes for the months of Mol and Chen (see Vail n. d. for a more detailed discussion of these almanacs).

DISCUSSION

The fact that so many of the Madrid almanacs make reference to the 365-day year suggests several things about their use. I have demonstrated, for



FIGURE 9.—Zip ceremony on Madrid 50b. Drawing after Villacorta and Villacorta (1976: 324).



FIGURE 10.—*Almanac on Madrid 99d, showing manufacture of wooden deity images beginning on day 1 Ahau (#40). Drawing after Villacorta and Villacorta (1976: 422).*

example, that each of these almanacs can be linked to a particular month in the *haab*. Although not specified textually in the codex, *haab* associations would have been obvious to the viewer, who was attuned to the rhythms of the seasonal and ritual calendar. Almanacs could have been recycled for a period of years to schedule *haab* activities, as I discuss below, but they would have required frequent updating or replacement. Given this understanding of their function, it is clear that almanacs of this type could not have been used as perpetual 260-day instruments.

Reference to the *tzolkin* cycles preserved in the Books of Chilam Balam provides additional evidence that these instruments were not intended as perpetual calendars. Rather than repeating in an endless pattern, the same day name and number may occur with different associations from one 260-day cycle to the next. For example, in an almanac from the Archives at Maní, the day 4 Muluc occurs twice (Craine and Reindorp 1979: 41, 48). The first occurrence, associated with a March 1 date, is listed as «a good day», whereas the second, on November 17, has the following annotation: «A bad day. The roads are closed.» These associations seem to have depended to some extent on the larger context of the date in question, including perhaps its position within the 365-day year.

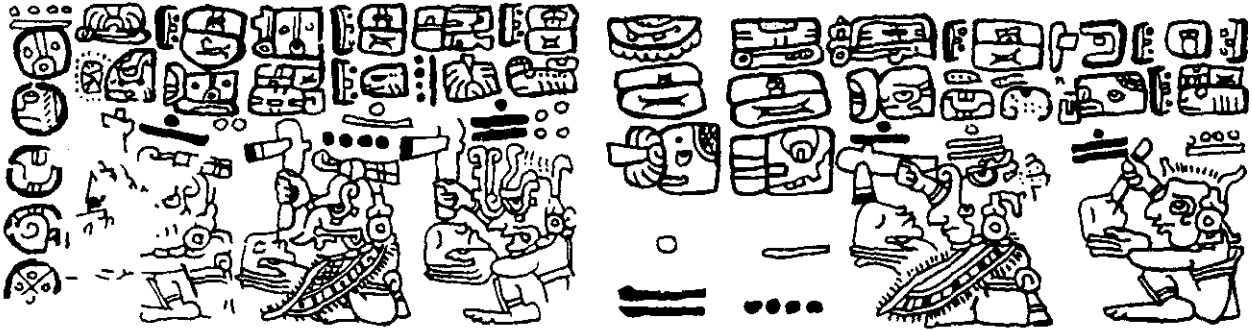


FIGURE 11.—Almanac on Madrid 95d-96d, showing manufacture of wooden deity images beginning on day 9 Ahau (#100). Drawing after Villacorta and Villacorta (1976: 414, 416).

Returning to the Madrid Codex, I would like to consider the idea that almanacs having seasonal referents could not have functioned as perpetual 260-day instruments more closely. Why this is so may be seen by examining the planting almanac on pages 26b-27b (Figure 12). Planting is an activity that would have been tied to the seasons. It may be roughly correlated with the month of Muan (May 2-21) in Landa's calendar (see Table 2). If planting in a particular year was scheduled to begin on 9 Kan (see Figure 12a), then one would expect planting the following year to begin on or near 10 Muluc, which is 365 days later. Using this almanac as a perpetual calendar, however, involves a return to 9 Kan after 260 days. This would fall in the month of Chen, which correlates with January in the Western calendar. Clearly, this would be an inappropriate time to begin planting.

Victoria Bricker (1997b: 16-17) has demonstrated that almanacs that are structured in terms of five rows of 52-day intervals may be recycled in accordance with the *haab* or tropical year. The almanac on pages 26b-27b meets these criteria. As we have seen, planting is set to begin on 9 Kan (corresponding to year 1 of our model). One year, or 365 days later, planting would commence on 10 Muluc. An approximation of this date, 9 Lamat (falling one day earlier in the year), is represented in the third position of the initial *tzolkin* column (see Figure 12c). The following year, planting would take place on or near 11 Ix. This date is approximated by the 9 Eb date (falling two days earlier in the year) represented in the fifth position of the *tzolkin* column (see Figure 12e). This method of recycling, based on the 364-day «computing year» defined by Thompson (1941), could continue for several more years, until the discrepancy between the actual and targeted dates was too great (see Table 3). At that point, a new almanac would have to be introduced to bring the event back into synchrony with the *haab* or the tropical year.

The mathematics of this model are not without precedent in the Maya codices. On Dresden 32a (Figure 13), for example, the twenty Maya day glyphs, each associated with a coefficient of 13, are grouped in such a way that they are separated from each other by 364 days (one computing year) vertically and by 91 days (one-quarter year) horizontally (Thompson 1941: 44-45, 1972: 94-95). In other words, as Merideth Paxton (1997: 74, 77) notes, this almanac provides an explicit means of calculating the relationship between the *haab* and *tzolkin* calendars. She argues that the *trecena* almanac on Madrid 75-76 had a similar function.

I believe that this model may account for the type and distribution of almanacs in the Madrid Codex. One of the things that has always puzzled

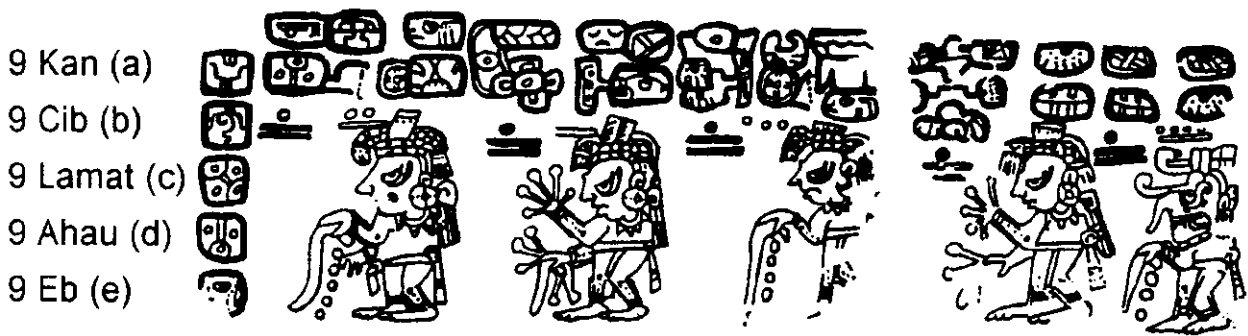


FIGURE 12.—Planting on Madrid 26b-27b. This almanac can be recycled for a period of years using the day glyphs in the introductory column, as shown in Table 3. Drawing after Villacorta and Villacorta (1976: 276-278).

TABLE 3.
Recycling Model for Madrid 26b-27b

Year	Date (at 365 day intervals)	Date represented in almanac	Where recorded	Discrepancy
1	9 Kan	9 Kan	Position a	0 days
2	10 Muluc	9 Lamat	Position c	1 day
3	11 Ix	9 Eb	Position e	2 days
4	12 Cauac	9 Cib	Position b	3 days
5	13 Kan	9 Ahau	Position d	4 days

Note: This pattern can be continued until the discrepancy between the actual date and the date represented in the almanac interferes with accurate scheduling of the activity in question (in this case planting).

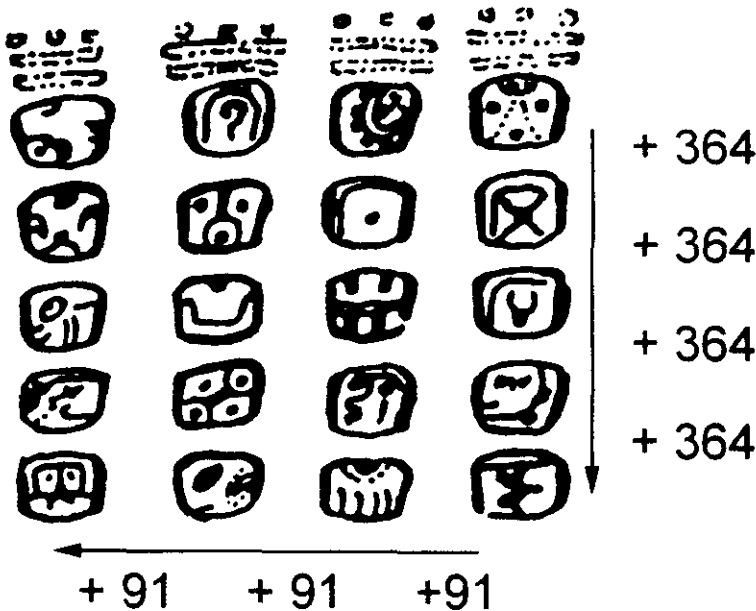


FIGURE 13.—Relationship between the twenty tzolkin dates represented on Dresden 32a. Drawing after Villacorta and Villacorta (1976: 74).

scholars is the redundancy seen in terms of events and activities pictured, which seems at odds with the premium placed on space in the manuscript. For example, there are five almanacs that show deity images being carved, and fifteen that show deer being trapped. If almanacs were being recycled for a period of years and then replaced by newer copies, this would explain the patterning seen in the codex.

It has not been possible to test this model extensively to date, although recent studies demonstrate its validity for several sections of the manuscript (see, for example, V. Bricker 1998; Vail 1997). Here, I will focus on the almanacs that depict the manufacture of wooden figures representing the gods (see Figures 10-11). The five almanacs that picture this activity in the Madrid Codex begin on the following days in the *tzolkin* cycle: day 40 (Madrid 99d), 63 (Madrid 98c-99c), 100 (Madrid 95d-96d), 113 (Madrid 101b), and 201 (Madrid 97b-98b). Clearly, these almanacs were not used to schedule multiple carving events within the same month (with the possible exception of those that begin on days 100 and 113), given the length of the intervals that separate them. Instead, it is possible to show that they portray activities or ceremonies that occurred in different years. For example, the first and third of these almanacs (e. g., Madrid 99d and 95d-96d) are separated by an eight-year interval ($\text{day } 40 + [365 \times 8] = \text{day } 100$). Presumably, the almanac on page 99d (see Figure 10) would have been recycled for a period of eight years using the model described above before being replaced with the almanac on pages 95d-96d (see Figure 11); the mathematics of this model are presented in Table 4. In this connection, it may be significant that both almanacs picture the same deity (Itzamna) in their initial frames.

Other almanacs in the codex picture activities that are related thematically but are not identical. They presumably represent part of a sequence of events that took place within the same *haab* cycle. Such a sequence may be illustrated, for example, by reference to several other almanacs that co-occur with those discussed in the previous paragraph (see Table 5). Four almanacs from this section correlate particularly clearly with events described in the ethnohistoric and ethnographic literature pertaining to renewal ceremonies (Tozzer 1907: 105-150; Tozzer 1941: 159-161). The first, on pages 99a-100a (Figure 14), shows the presentation of ritual bread and incense offerings. Such offerings were commonly made throughout the month-long process of carving deity images. Fifteen days later, we see the completed images in pots, covered with a cloth (Madrid 96c; Figure 15). This correlates well with Landa's description: «[H]aving burned the blessed incense, they placed the new

TABLE 4.
Relationship between the Almanacs on Madrid 99d and 95d-96d

Year	Date (at 365 day intervals)	Date represented in almanac	Where recorded (almanac + row)	Discrepancy
1	1 Ahau	1 Ahau	M. 99d-1	0 days
2	2 Chicchan	1 Kan	M. 99d-3	1 day
3	3 Oc	1 Lamat	M. 99d-5	2 days
4	4 Men	1 Eb	M. 99d-2	3 days
5	5 Ahau	1 Cib	M. 99d-4	4 days
6	6 Chicchan	1 Ahau	M. 99d-1	5 days
7	7 Oc	1 Kan	M. 99d-3	6 days
8	8 Men	1 Lamat	M. 99d-5	7 days
9	9 Ahau	9 Ahau	M. 95d-96d-1	0 days

images in a little hamper, wrapped up in a cloth, and handed them over to their owner...» (Tozzer 1941: 161). On the following day, three figures are pictured smoking cigars, an activity to celebrate the harvest, or first fruits» ritual (Madrid 79b; Figure 16). The final almanac in the sequence, Madrid 99b-110b (Figure 17), seemingly shows the ceremonial deposition of the images carved the previous year, which have been replaced by new copies. This occurs on the day following the tobacco ritual (Table 5). This sequence of events provides a nice parallel with that discussed by Tozzer (1907) for the Lacandon renewal ceremony at the turn of the century.

Using this methodology, what remains to be accomplished is to map out how each of the almanacs in the codex is interrelated, either as a replacement for an iconographically similar almanac, or as part of a sequence of events within the same *haab* cycle. Only by delineating the calendrical structure of the manuscript in such minute detail can we hope to understand how the codex was used by Maya priests and daykeepers in Postclassic times to structure ritual activities and regulate the ebb and flow of daily life.



FIGURE 14.—*Almanac on Madrid 99a-100a, beginning on day 12 Imix (#181). Drawing after Villacorta and Villacorta (1976: 422, 424).*

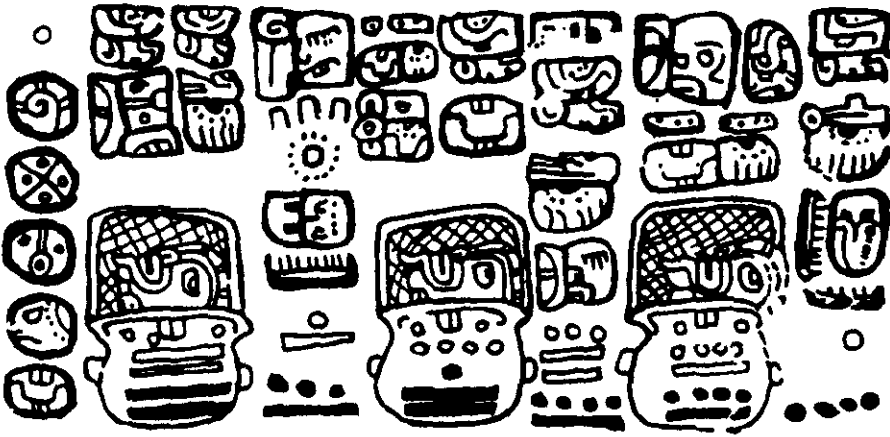


FIGURE 15.—Almanac on Madrid 96c, beginning on day 1 Cib (#196). Drawing after Villacorta and Villacorta (1976: 416).



FIGURE 16.—Almanac on Madrid 79b, beginning on day 2 Caban (#197). Drawing after Villacorta and Villacorta (1976: 382).



FIGURE 17.—Almanac on Madrid 99b-100b, beginning on day 3 Edznab (#198). Drawing after Villacorta and Villacorta (1976: 422, 424).

TABLE 5
Relationships among Almanacs Pertaining to Renewal Ceremonies.

<i>Almanac</i>	<i>Activity</i>	<i>Starting date</i>	<i>Tzolkin #</i>	<i>Interval to next date</i>
M. 99a-100a	Incense and ritual bread offerings	12 Imix	181	+ 15 days
M. 96c	Finished images placed in pots	1 Cib	196	+ 1 day
M. 79b	Smoking cigars (first fruits' ritual)	2 Caban	197	+ 1 day
M. 99b-100b	Ceremonial deposition of deity images from previous year	3 Edznab	198	

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