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THE CALENDAR OF THE LOXICHA VILLAGES:
THE CULTURE HISTORY OF A PRESENT-DAY
MESOAMERICAN CEREMONIAL ALMANAC

by

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ABSTRACT

A Precolumbian ceremonial calendar recently discovered to be in use among the inhabitants of the Loxicha villages of southern Oaxaca differs in some important aspects from all previously known indigenous calendars of Mesoamerica and represents the survival of an early form of the calendar in general use in Mesoamerica before the conquest.

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Preface

In the spring of 1954 Professor Robert Weitlaner arrived in the southern Oaxaca village of San Agustín Loxicha. With the aid of his assistants, Donald Brockington and Gabriel De Cicco, he gathered information on a 260-day ceremonial calendar that had been reported by Moises de la Peña (1950) to have been in use in San Agustín and several surrounding hamlets of the Loxicha region (Weitlaner 1956). Once collected and analyzed, Weitlaner's data revealed a calendar with some similarities to the classic tonalpohualli, a ceremonial calendar in general use in Prehispanic times (see Appendix I), yet with some remarkable differences (Weitlaner 1956). For example, the mechanism of the tonalpohualli employs a repeating series of twenty god-names, whereas the Loxicha calendar utilizes a series of nine names of deities. Yet, in both calendars the 260-day ceremonial year is observed. There are other similarities and differences which will be discussed below.

I. Introduction

This paper undertakes to ascertain the origin of the calendar in use today in the Loxicha villages of Oaxaca by examining some of the more likely possibilities for the reconstruction of its historical development. Among the assumptions possible is that the calendar was either independently invented by the ancestors of the present-day inhabitants at some time or other before the conquest, or that it was modified from a tonalpohualli within that peasant community after the Spanish conquest. The former hypothesis may be immediately discarded as untenable when comparing the affinities of the Loxicha calendar with the Prehispanic tonalpohualli (see Appendix I). Since the Loxicha villagers do not exist in cultural isolation, nor are they culturally autonomous, it seems quite improbable that such a complex intellectual artifact as the calendar would have been invented independently of a widespread higher cultural tradition, either during Preconquest or Postconquest times. The latter assumption, that the Loxicha calendar is a modification of the tonalpohualli, will be discussed below and rejected.

If it can be hypothesized that the Loxicha calendar existed as a distinct local tradition in Classic times, this would then lead to the possible conclusion that the culture patterns emanating from the high civilizations of the urban

centers in Classic and Postclassic times did not extinguish all local traditions which continued to flourish on the peasant level. Such a conclusion would tend to confirm the existence of a Prehispanic "Great Tradition - Little Tradition" distinction such as Redfield propounds (1967).

Assuming that the Loxicha calendar is indeed of Prehispanic origin there are three possible lines of reasoning which may serve to explain when it originated. First, the ancestors of the Loxicha villagers may have acquired this calendar rather late, perhaps during the Postclassic (ca. A.D. 1000-1500), which is most unlikely considering that the Postclassic is not regarded as a time of widespread religious innovations, especially with regard to the calendar (Morley 1947; Thompson 1971). Nor could this particular cultural institution, the Loxicha calendar, have been imposed on a peasant society through conquest since the calendar of the conquering Aztecs and of all known Postclassic groups was the tonalpohualli. A second possibility is that the calendar was adopted in Classic times when the generally uniform culture patterns which characterize Mesoamerican civilization became widespread. But this too is unacceptable because, as has been pointed out above, the Loxicha calendar is radically different from the universal Mesoamerican calendar. Unfortunately, the Preconquest culture history of the ancestors of the present-day inhabitants of the Loxicha area cannot be documented. However, it does not appear likely that the ritual calendar was adopted in colonial times, or in Postclassic times or in the Classic period. The third and the

most reasonable alternative is that the highly individual Loxicha calendar was adopted in the remote past at a time when the Mesoamerican tonalpohualli had not yet crystallized into its known form and that the Loxicha calendar survived as part of a continuing local tradition.

The evidence in support of this hypothesis comes from ethnographic, archeological, and ethnohistorical sources. It should be borne in mind, however, that ethnographic observations are synchronic and by themselves give few answers to questions involving the past. There are no modern-day calendars comparable to the Loxicha calendar from which a proto-calendar may be reconstructed or from which the Loxicha calendar may have originated. The archeological material which relates to the Loxicha calendar is scant, and its interpretation is uncertain. Ethnohistorical material relating to the calendar is often of questionable reliability. In general, most descriptions of indigenous traditions and religious beliefs were seen as inspired by Satan and hence were usually reported subjectively (see Córdova). Yet, despite these shortcomings, evidence of this sort is all that is available to write the culture history of any given indigenous group.

ferred to as espíritus, "spirits," by the local informants, whereas the names of the periods and tiempos do not.

When a 260-day year has elapsed, it is immediately followed by another. And so the days continue to infinity in their neverending path. However, as is noted in figure 1, the first day of the year is made up of the day-names of the first two days, Mdi and Ndozin. In the first nine-day group, Mdi, is repeated, so that there are actually only eight different day names. The combining of two day names for the first day of the year is a device which prevents the position of the day names from shifting in position from year to year. Also, the combining of two day names is a mechanism which makes it possible for the 9-day groups, which have no particular name, to fall within the 260-day period with no days left over. Thus the scheme of the calendar may also be expressed by the formula $(9 \times 28) + 8 = 260$. A similar device is employed for bringing the cycle of the nine "Lords of the Nights and the thirteen "Lords of the Days" into phase with the 260-day period of Aztec tonalpohualli as found in the Codex Brobonicus and the Codex Aubin, which is a copy of the Codex Brobonicus (Codex Aubin 1893, Codex Borbonicus 1938). In these codices, however, the combining of the names occurs on the last day of the 260-day period rather than on the first as in the Loxicha calendar.

The "Lords of the Days" and the "Lords of the Nights" are known from Aztec and Maya sources (see Appendix II). Though their significance is somewhat enigmatic, it seems that they were calendrical deities augmenting the 13 numbers and

20 day names that intermeshed in the scheme of the 260-day tonalpohualli. The "Lords of the Nights" ruled a repeating series of nine days (Caso 1967:112-129). It is not certain if the periods over which the "Lords" reigned ran from sunrise to sunset and sunset to sunrise or from midday to midnight and midnight to midday.

III. A Comparison with the Tonalpohualli

The similarities and differences between the Loxicha calendar and the tonalpohualli used in the valley of Mexico outlined by Weitlaner are translated and paraphrased below as follows (1956:299):

Similarities

1) The nine days of the Loxichas have an apparent correspondence with the nine "Lords of the Nights" from the Maya and Nahuatl calendars. However, few specific similarities can be found between the nine gods of the classical pantheon and the Loxicha version.

2) The number 13 is instrumental in both the tonalpohualli and the Loxicha calendar.

3) The number 20, which in the Nahuatl calendar is the number of days, in the Loxicha calendar 20 is the number of tiempos.

4) The 260-day cycle appears in both the tonalpohualli and the Loxicha calendar.

Differences

1) In the Loxicha calendar the numbers 1 to 13 do not accompany the names of the days with the single exception of the day 7 Ndan which is considered an unfavorable day on which

to be born.

2) Prognostication is not of primary importance in the Loxicha calendar. Instead the numbers and names are used mostly for ritual purposes. Ceremonies are carried out according to the calendar.

3) The custom of giving the newborn child the name of the day on which he was born has been abandoned.

4) The gods of the southern Zapotecs do not correspond with those of the Nahuas and the Maya (see Appendix II), nor with those of the Zapotec pantheon as given by Fray Juan de Córdova (1886).

5) There is little correspondence between the day names in the two systems. (See Appendix I, Table 1 and Appendix II).

6) Among the Loxicha villagers little importance is given to the cult of the sun, the moon, hell, and the fate of the soul after death.

7) On the other hand, there is a strong emphasis on the cult of the ancestors, the sea, the earth, lightning, rain, wind, the snake of the water, and the seasons of the year.

Adding to what Weitlaner has said, it may be noted that 7 Ndan, which is considered a bad day on which to be born, is the 33rd day of the year (Fig. 1). The qualifying of the number 33 as bad may be of Christian origin, since 33 was the age at which Christ died. Among Catholics in Southern Mexico, Guatemala, and Central America 33 is considered of special significance (personal observation).

From Weitlaner's comparison it seems that the Loxicha calendar is quite different in its structure and use from the commonly known tonalpohualli. The calendar described by Weitlaner is also markedly different from the surviving versions of the Calendar Round which Susana Miles analyzes (1952). She classifies these calendars used by communities in Guatemala and Chiapas according to their "conservation of structural features" and divides them into three types. Type A includes those which retain 20 day-names, 13 numbers, and a 365-day year divided into 18 cycles of day names plus a 5 day terminal period. Type B refers to calendars which continue to observe a 260-day cycle which is constructed of 20 day-names and 13 numbers. Finally, Type C calendars consist of a 365-day year with 18 uinals (20-day periods), a 5-day terminal period, yet do not retain the 20 day-names and 13 numbers. She lists several Mam towns as having calendars which are exceptions to this classification scheme. They maintain the 365-day year, year bearers, 20 day-names, yet the 13 numbers have apparently disappeared from use. All the calendars which Miles describes are apparently based on the same arithmetic combinations which make up the Calendar Round. The Loxicha calendar does operate on more or less the same arithmetic principle, except that it uses different multiples, that is, 9×13 to the exclusion of the number 20 normally employed with the tonalpohualli. The Miles calendars appear to be simplifications of the Calendar Round, the Loxicha calendar, however, is more involved. There seems to be no reason why the people of the Loxichas would turn

from the smoothly operating mechanism of the tonalpohualli to a system in which the cycles of 9 and 13 are arbitrarily forced into a 260-day year. Furthermore, the calendar used in the Loxicha area shows no evidence of having been used in conjunction with the 365-day cycle or any traces of the 20 day names common to both the 260 and 365-day cycles, indicating, therefore, that it probably did not originate from the commonly known Mesoamerican calendar.

IV. A Comparison with Maya Sacred Almanacs

However, the calendar of the Loxichas bears a great resemblance to the 260-day sacred almanacs of the Maya as recorded in the Codex Madrid and the Codex Dresden. According to J. Eric Thompson (1961:26), the Codex Dresden probably dates from the twelfth century (Early Postclassic in my terms) but reflects a tradition extending from the Classic Maya period, while the Codex Madrid can be placed as late as the middle of the fifteenth century or Late Postclassic. Frequently, the almanacs in these codices are divided into five sections of fifty-two days each. In rare instances the subdivisions consist of sixty-five days. The almanacs probably served as tools for divination: namely, enumerating which days are propitious for different activities (Thompson 1961: 101). The subdivisions of fifty-two days are in turn divided into irregular intervals in the Madrid and Dresden codices. However, in the Codex Dresden on pages 14a-15a, the fifty-two day periods are partitioned into four equal subdivisions, each of thirteen days, exactly as the Loxicha calendar.

Just how the Loxicha calendar and these Maya almanacs relate to each other is not clear. It is possible that the ancestors of the present-day inhabitants of the Loxichas, living on the periphery of the Maya culture area were influenced by the calendrics of the "Great Traditions". It is

also quite possible that the reverse was true. That is, the influence of the declining Classic cultures was diminished and local traditions prevailed and developed. Thus it may be that these almanacs represent "peasant" contributions to "urban" civilization. In fact, during Postclassic times from which all the codices mentioned actually date, including the Borbonicus and Aubin, the era has often been viewed as a time of decline and of the emergence of folk religion and culture (Borhegyi 1956:35; Morley 1947:212; Thompson 1970:163). Thompson points out that the Codex Madrid reflects this decline since it is almost totally concerned with mechanical divination and contains no real signs of learning such as astronomical tables or the katun counting of earlier works (1961:26).

V. A Comparison with the Zapotec Piye

Alfonso Caso has suggested that the Loxicha calendar may in fact predate the tonalpohualli and may be a source from which the tonalpohualli derives some of its combinations (1965:946; 1967:33). He feels that this "relationship of origin" is most clearly evident between the Loxicha calendar and the Zapotec version of the tonalpohualli (1965:946).

The Zapotec calendar Caso refers to was described by Córdova in the sixteenth century (1886). Basically it was a tonalpohualli, consisting of twenty day names and thirteen numbers. There also existed the custom of giving a child the name of the day on which he was born. Yet, the piye, as the Zapotec calendar was called, had several characteristics not found in the Mexican version of the tonalpohualli, characteristics which Caso perceives as exhibiting great antiquity (1965:945). It is noteworthy that some of these characteristics seem to be comparable to elements found in the calendar used today in the Loxicha region.

First, the piye was divided into periods, but into four periods rather than five as found in the Loxicha calendar. These periods of sixty-five days each were also called piye or pije, meaning "time" or "time duration." (Apparently this is the same Zapotec term which now designates the thirteen-day tiempo of the Loxicha period though the term was not disclosed by the local informants.) The sixty-five-day period

was further divided into five parts of thirteen days each, called cocij or tobocij. Thus the calendar is formulated as $(5 \times 13) \times 4 = 260$. These thirteen-day subdivisions form a clear parallel to the *tiempos* or thirteen days each in the Loxicha calendar. Each thirteen-day cocij in the Zapotec calendar had its name. Also each piye or sixty-five day period bore the name of the first day of the thirteen-day subdivision, just as the first *tiempo* of a Loxicha period is called by the same name as the whole period.

Another feature which Caso feels is possibly quite old (1965:945) and thus possibly indicative of the existence of a relationship between these two calendars has to do with the series of thirteen particles which accompany the day-name and number in the piye. These accompanying particles in the sixteenth century Zapotec calendar and the thirteen numbers of the Loxicha calendar possibly correspond to the thirteen "Lords of the Days" in some way. Furthermore, since these "Lords of the Days" were associated with nine "Lords of the Nights," it is not unreasonable to speculate that the nine gods and thirteen numbers of the Loxichas share some common origin with the thirteen Zapotec particles. This speculation is supported by the fact that both the "Lords of the Days" and the "Lords of the Nights" were calendrical deities.

VI. The Origin of the 260-Day Cycle

J. Eric Thompson, renowned for his work in Maya calendars, states that the antiquity of the cycle of thirteen gods is supported by the fact that the days from Caban to Muluc in the Maya calendar probably represent gods whose heads stand for the numbers 1 to 13. Thus, if Thompson's assumption is correct, it would appear that a series of thirteen gods preceded the development of the twenty day signs (1961:99). He further hypothesizes that a cycle of thirteen days, each day ruled by its own god, was ultimately increased to twenty, in accordance with the vigesimal system, by the addition of seven gods (1961:99). A base-twenty numbering system was common among the known cultures of Mesoamerica and in fact had been employed since Preclassic times (Thompson 1961:99)

Thompson's hypothesis of the origin of the cycle of twenty day names is lent evidence from various sources. First, it seems that the Maya hieroglyphic head variants of the numbers demonstrate a continued association with the old gods. Thompson also points out that the association of thirteen numbers with the gods still survives among the Ixil Maya (1961:99).

Secondly, a statement in the Chilam Balam of Chaymel suggests the expansion of the series of thirteen days to

twenty. Roys translates Oxlahun tuuc, uuc, tuc hun as "Thirteen entities, seven entities, one" suggesting that this statement refers to the fact that the twenty day period comprised a series of thirteen days and an additional seven (1933:118).

Thompson goes on to suggest that the 260-day cycle possibly had its origin as a consequence of the expansion of the 13 days to 20 (1931:349-53; 1961:99). That is, when the series of 20 was created, the old series of 13 was not dropped but continued to function as a separate series. "From there it would not have been a great step to replace the gods of the original cycle of 13 with the numerical positions they held in the sequence" (Thompson 1961:99). Later it would be noted that the two counts would coincide and repeat every 260 days (13 x 20).

There are several alternative hypotheses of the origin of the 260-day cycle which Thompson reviews (1961:98-99). One hypothesis suggests that 260 days was chosen as a sacred period because it approximates the period of human pregnancy. This explanation offers no logical reason why the period of gestation should be used in a sacred almanac. Thompson points out that it is more likely that sophistication in counting days would precede knowledge of the exact length of human pregnancy. Furthermore, he continues, once the biological facts of pregnancy were known, it should have been quite easy to get a more accurate estimate than 260 days (1961:98).

Another speculation about the origin of this time period of 260 days has been that it represents nine lunar months of twenty-nine days each as referred to by Thompson (1961:98). However, this would not only necessitate the reckoning of a lunar month as twenty-nine days, but also the reducing of one of the lunations to twenty-eight days.

An explanation put forth by Zelia Nuttall (1928) and later supported by R. H. Merrill (1945) rests on somewhat firmer ground. According to this thesis, the 260-day-period represents the interval each year between the passage of the sun across the zenith in the approximate latitude of $14^{\circ}30'$. This is a line which runs a little south of Copán. In this area the midday sun lies north of the zenith for 105 days between April 30 and August 13. But this thesis has serious shortcomings. Within the geographical area to which it supposedly applicable the length of the interval between zenith passages of the sun varies between 260 days at Copán, on the southernmost boundary and 311 days in the northernmost among the Otomí. If the interval is 260 days on the southern periphery of the area in which the 260-day calendar was current, this would imply that the calendar spread northward and westward and was adopted by people to whom it had no solar significance (Thompson 1961:98). Thompson indicates that there is no evidence as to where the 260-day almanac originated, save that some of the fauna which give their names to days (see Appendix I) in some of the almanacs are inhabitants of the tierra caliente, as noted by Hans Gadow (Thompson 1961:98). Thompson speculates that the first de-

velopment did not take place near Copán or anywhere along the latitude of $14^{\circ}30'$, but somewhere in an area extending slightly west of the Isthmus of Tehuantepec to the Golfo Dulce, a region which would include the Maya, Zapotec, and the Olmec builders of the La Venta culture.

The validity of the Nuttall-Merrill theory can be further questioned because in the 260-day calendars the 260-day years are marked in succession, that is, they follow one another in a continuous round of time. The lack of a complimentary 105-day interval between the 260-day periods or counts is an argument against any connection between the 260-day calendar and solar phenomena. Thus, though Thompson's theory of the origin of the 260-day calendar from this expansion of a cycle of thirteen gods to twenty is merely speculative, it seems more convincing than the various other theories which have been put forth.

From the available data it is impossible to conclude in what order the different aspects of the Loxicha calendar evolved. It may not be too far-fetched to suggest that the local cycles of 9 and 13 preceded the development of the cycles of 13 and 20 and the 260 cycle which resulted from these two cycles ($13 \times 20 = 260$), and that the older cycles of 9 and 13 were preserved and made to mesh with the 260-day cycle which ultimately became the universal one in Mesoamerica.

VII. The Archeological Record

The earliest evidence of a complete functioning calendar comes from Monte Albán from perhaps as early as Monte Albán I, 600-200 B.C. (Caso 1965:932). The interpretation of the glyphic materials seems to indicate that at Monte Albán I all the elements of the later Mesoamerican calendars are already present at the very latest in the Late Preclassic, including the 260-day cycle, the year, the four year bearers, and probably the division of the solar year of 365 days into units of 20 days (Caso 1965:932). Though quite early, this stage of calendrical reckoning must surely represent the results of a long development.

If Thompson's hypothesis concerning the origin of the 260-day calendar is correct, it could be assumed that a pre-existing calendar like the present-day Loxicha calendar, would be divided into thirteen day units rather than into units of twenty days. Unfortunately, archeological evidence in support of this notion is lacking so far. Perhaps further investigation will turn up supporting evidence such as some Preclassic cache offerings in groups of thirteen. On the other hand, the sacred tally of nine, another basic element in the structure of the Loxicha calendar, has an archeological record of great antiquity. And it is possible that the association of nine and thirteen extends back with this

record for, as was mentioned above, the association of nine "Lords of the Nights" and thirteen "Lords of the Days" was widespread. A most interesting cache of nine miniature mushroom stones and nine miniature manos and metates from the Verbena cemetery at Kaminaljuyu, on the outskirts of Guatemala City, dates from the Verbena subphase of the Miraflores phase of the Preclassic and may possibly represent a Loxicha-type nine-day cycle as early as 1000 B.C. (Borhegyi 1961).

Several of the nine miniature mushroom stones bear figures on the stems carved in relief which may possibly represent dieties. Four of the stones lack figures. However, three are decorated with zoomorphic forms and the remaining two with humans. One of the anthropomorphic representations is that of an aged individual sitting cross-legged, and the other a youthful one also sitting cross-legged or squatting. Distinguishing characteristics or religious attributes which might make possible iconographical identification are unclear. Nonetheless, Borhegyi states that there is a possible association of the mushroom stone effigies and the nine "Lords of the Nights" and even suggests that the mushroom effigies may be representations of the same (1961:503). However, to identify these figures, both animal and human, with the calendrical deities of the Loxichas results, at best, in a tenuous correspondence. (In Appendix II an attempt is made to demonstrate a relationship between the nine Loxicha deities and the nine "Lords of the Nights," as well as a relationship between the nine "Lords of the Nights" and the nine Ka-

minaljuyu mushroom stones. The difficulties in relating these different groups of nine deities are made apparent.) Such a correspondence would have to be based on characteristics which are not clearly depicted on the figurines, as well as on an aspect of the Loxicha calendar subject to much change; namely, the attributes and functions of the gods. Weitlaner and De Cicco (1961:695) note that the arithmetic of the calendar does not vary from town to town in the Loxichas, yet there is great variation in the nine calendrical deities and their attributes. Thus, comparing deities on the basis of attributes and physical appearances of individual deities may appear quite futile. But nonetheless, at least some convincing external evidence may be brought to bear to confirm the identity of the group figures represented. The tradition of grouping deities into series of nine seems to have had widespread significance in Classic times; the practice it would seem extended back into Preclassic times, judging from the fact that offerings were discovered at La Venta each containing nine jade celts. These had been laid out and buried in construction phase IV. The celts are believed to date from around 300 B.C. (Drucker, Heizer, and Squire 1959:265). Classic period cache offerings in groupings of nine have frequently been found in the Maya Lowlands (Kidder 1947:21-4,59, Figs. 69-71). These caches date from Early and Late Classic (mostly Tepeu 2, A.D. 700-800) periods. The oldest evidence of the nine "Lords of the Nights" is the appearance of a variant of the G₅ glyph carved on a slab

marked with a long count date equivalent to A.D. 320 using the Thompson correlation (Caso 1967:120).

A most suggestive fact in support of the type of religious belief represented by the Preclassic Kaminaljuyu mushroom stones and Loxicha calendrics is that they both seem to be associated with the use of "sacred mushroom" (teonana-catl). Borhegyi suggests that the miniature manos and metates found with the mushrooms may symbolize full size implements used in a Preclassic version of the type of mushroom grinding ceremony observed by Wasson and Ravicj among the Mixtecs of present-day Oaxaca (Borhegyi 1961:502).

VIII. The Ethnographic Record

The calendar of the Loxichas is closely connected with a mushroom cult. The zahor, soothsayer, uses the calendar in conjunction with hallucinogenic mushrooms for divination. The deity, Mdi, the great lightning bolt, creates the mushrooms and is the source from which the mushrooms derive their powers according to local belief (Wasson and Wasson 1957:315). The cult and the calendar share a common term as well. The word mbeydo is a collective term meaning a barch or lot of mushrooms, or it may refer to a dose of divinatory seeds which may be substituted for the mushrooms. Mbeydo also is the name of the calendrical deity of all crops and of the wind.

The connection between calendrical belief and the use of sacred mushrooms is further supported by the fact that in Santa María Nativitas, a Mixe town of Oaxaca, mushrooms are ceremonially consumed in dosages of six, nine, thirteen, or eighteen pairs and the groups of nine and thirteen pairs of mushrooms are believed to represent "Nine Lesser Servants and Thirteen Major Servants" (Wasson and Wasson 1957:272). It is highly suggestive that these "Servants" correspond to the thirteen "Lords of the Days" and the nine "Lords of the Nights."

The evidence from the Loxichas, and from the Mixe town

of Santa María, together with the evidence from Kaminlajuyu is hardly fortuitous or an accidental correspondence. It suggests that there exists a direct continuity between the ancient mushroom cult of southwestern Mexico and highland Guatemala, which in antiquity was related to calendrical religious belief, and with the "calendar-mushroom complex" found today in the Loxichas of Oaxaca.

IX. Summary and Conclusion

Colonial documents show that the ancestors of the inhabitants of the Loxichas were originally settled in their present area at the beginning of the seventeenth century arriving from the Coatlán area which lies to the west two days away by foot (Brockington, personal communication). Furthermore, Gabriel De Cicco recently found a version of the Loxicha calendar to be in use in the Coatlanes (Weitlaner 1961:695). Thus the calendar may probably be traced back at least to the beginning of the seventeenth century. Its existence before the early seventeenth century, at best, can be extrapolated or inferred from a comparison with calendrical evidence from early Post-Conquest and Pre-Conquest chronicles and from archeological data.

On the basis of the known relocation of the Loxicha people from the Coatlanes where a Loxicha type calendar is still extant, it is admissible to conclude, tentatively at least, that their calendar is of remote origin and has been preserved as a local tradition. Furthermore, their calendar is doubtlessly of Prehispanic origin since it has definite affinities with a variety of Prehispanic calendric beliefs, with the possible exception of the concept that the thirty-third day of the year is of ill omen.

The calendar does not appear to be a modified version

of the tonalpohualli. The Loxicha cycles of 9 and 13 do not form a multiple which will fit evenly into the 260-day year as do the tonapohualli cycles of 13 and 20. Thus, it may very well be that the Loxicha cycles of 9 and 13 were in use before the 260-day year originated from the new cycles of 13 and 20. The evidence from Monte Albán I, Middle Preclassic demonstrates that all the features of the sophisticated tonalpohualli had already developed by the Late Preclassic suggesting a long prior development in the area of calendrics. Thus, if the Loxicha-type cycles of 9 and 13 developed before the 260-day year, their origin would have to be placed sometime before the late Preclassic.

Another line of reasoning is the evidence of the association of the Loxicha calendar with a mushroom cult, implying that the Loxicha calendar is quite old. The Preclassic cache of nine miniature mushroom stones, with nine miniature manos and metates from Kaminaljuyu seems to represent the essence of the "calendar-mushroom complex" found in the religious practices of the present day Loxicha villagers. For a more satisfactory assessment of the origin and development of the Loxicha calendar, future archeological investigation must be carried out with special attention to groupings of artifacts. The significance of nine and thirteen and the possible calendric association of these numbers in Preclassic times needs to be further demonstrated. Future ethnographic and ethnohistorical research would also be pertinent in giving a more complete assessment of the Loxicha calendar. If

comparable calendars were to be discovered perhaps a universal as well as a Loxicha protocalendar could be reconstructed.

Whether the Loxicha calendar has survived because it existed as part of a tradition of an isolated peasant society, or whether it survived as part of the culture at the peasant level of a complex society cannot be fully answered with the evidence available. The latter possibility is more likely, but must await more direct evidence to be conclusive. If the ancestors of the Loxicha villagers had lived in the Coatlán area in the remote past, further verification is needed to ascertain if they were not actually by-passed by the major influences of Mesoamerican culture history. Archeological investigation in the Coatlanes might possibly supply answers to this problem.

The association of the Loxicha calendar with a mushroom cult implies not only that the Loxicha calendar is quite old but also that it represents part of a broader tradition. The mushroom cult is known to have been both ancient and widespread in southwestern Mexico and in highland Guatemala (Borhegyi 1963).

Other evidence also suggests that the calendar may represent the peasant component of a complex culture. There is archeological evidence which supports the coexistence of distinct elite and subordinate cultures, at least in Post-classic times in Oaxaca. A study of ceramics revealed that at the site of Miahuatlán there are distinct subordinate and elite styles (Brockington 1971). Furthermore, the elite

styles have affinities with other widespread elite styles of Oaxaca while the subordinate styles have affinities with other local subordinate styles (1971:128-129), implying the contemporaneous existence of both "Great" and "Little" traditions in the same area.

While the Loxicha calendar preserves elements which are quite distinct from those of the major calendars, yet, at the same time, the Loxicha calendar shares elements with the calendars of the cosmopolitan, high civilizations of Mesoamerica, such as the 260-day year. The evidence points to a long-lived coexistence of folk and complex cultures, and seems to be in contradiction to Redfield who states (1941:343), "When folk societies undergo contact with urbanized society, they tend to change in the direction of these characteristics (i.e., the cluster of elements characteristic of folk societies)."

It would seem that in the course of Mesoamerican culture history the "Great-Traditions" and "Small-Traditions" were different components of one society. As pointed out by Borhegyi, the perpetuation of folk tradition does not necessarily depend on physical isolation, but may just as well be the result of mental isolation or be derived from a "folk ideology" (1956:355).

For a more satisfactory answer to the problem of the social organization of the tradition which the calendar represents, further evidence is needed. So far, little archeological research has been carried out to solve the problem.

A step in this direction has been taken by Brockington (1971) who devotes attention to the distinctions between elite and subordinate styles using modal and attribute analysis. Borhegyi (1956:354) suggests that our picture of Mesoamerican culture history might be considerably different if more outlying and smaller house mounds or village units were excavated. He states that the Classic period gives the appearance of uniformity, not because every individual member of each community understood or contributed to its cultural complexities, but because research has been almost exclusively devoted to the ceremonial centers which represent the cosmopolitan and very broad culture patterns of the elite governing classes.

APPENDIX I

The calendar system of all the major civilizations of Mesoamerica was quite uniform mechanistically. The literature concerning this calendar goes back more than a century and is very extensive. Alfonso Caso's Los Calendarios Prehispanicos (1967) represents an authoritative synthesis which centers mainly on calendrics from the Valley of Mexico. J. Eric Thompson gives the subject of Maya calendrics an impressively thorough treatment in his Maya Hieroglyphic Writing (1961).

Two separate time counts interlock to form the two fundamental Prehispanic calendars of Mesoamerica, one of 365 days and the other, 260 days. Both are still found to be in use in some areas (Miles 1952). The 260 day cycle was called the tonalpohualli (count of days) by the Aztecs and the Tzolkin (Wheel of days) by the Maya.

The 260-day cycle of the tonalpohualli was produced by combining 20 day names with the numbers 1 to 13. A complete day name consisted of a day-name prefixed by a number, for example, 5 Serpent or 13 Alligator. Combining each of the 13 numbers with each of the 20 names gives 260 combinations or day names. The numbers 1 through 13 run in a sequence and then repeat after 13 days as the 20 day-names likewise run consecutively and then repeat after 20 days (see Table 1).

Thus the first day of the year would be 1 Alligator, the second, 2 Wind, the third, 3 House and so forth.

It was widespread practice to give an individual the name of the day on which he was born. All personal characteristics and fate were thought to be determined by the characteristics of the day, the combination of a number and god name. The 365-day calendar and the 260-day calendar shared the day names and numbers, and thus, the two calendars meshed together like cogwheels to form a single calendrical system referred to as the Calendar Round. The twenty calendar names which were essentially the same for all previously known Mesoamerican calendars were: Alligator, Wind, House, Lizard, Serpent, Death, Deer, Rabbit, Water, Dog, Monkey, Grass, Reed, Jaguar, Eagle, Buzzard, Movement, Flint Knife, Rain, and Flower. The days of the 365-day calendar were divided into 18 "months" or cycles of these 20 day-names plus a period of 5 "useless days" at the end of the 360-day cycle.

TABLE 1

ALLIGATOR	1	8	2	9	3	10	4	11	5	12	6	13	7
WIND	2	9	3	10	4	11	5	12	6	13	7	1	8
HOUSE	3	10	4	11	5	12	6	13	7	1	8	2	9
LIZARD	4	11	5	12	6	13	7	1	8	2	9	3	10
SERPENT	5	12	6	13	7	1	8	2	9	3	10	4	11
DEATH	6	13	7	1	8	2	9	3	10	4	11	5	12
DEER	7	1	8	2	9	3	10	4	11	5	12	6	13
RABBIT	8	2	9	3	10	4	11	5	12	6	13	7	1
WATER	9	3	10	4	11	5	12	6	13	7	1	8	2
DOG	10	4	11	5	12	6	13	7	1	8	2	9	3
MONKEY	11	5	12	6	13	7	1	8	2	9	3	10	4
GRASS	12	6	13	7	1	8	2	9	3	10	4	11	5
REED	13	7	1	8	2	9	3	10	4	11	5	12	6
JAGUAR	1	8	2	9	3	10	4	11	5	12	6	13	7
EAGLE	2	9	3	10	4	11	5	12	6	13	7	1	8
BUZZARD	3	10	4	11	5	12	6	13	7	1	8	2	9
MOVEMENT	4	11	5	12	6	13	7	1	8	2	9	3	10
FLINT KNIFE	5	12	6	13	7	1	8	2	9	3	10	4	11
RAIN	6	13	7	1	8	2	9	3	10	4	11	5	12
FLOWER	7	1	8	2	9	3	10	4	11	5	12	6	13

(from Sahagun 1957, Fig. 102)

APPENDIX II

Comparing the attributes of the deities from different systems of nine deities through the course of Mesoamerican culture history reveals some very general correspondences, but it is almost never possible to demonstrate that a specific god appears in any two systems. One gets a picture that the pantheons and mythologies were constantly changing with deities taking on new attributes, exchanging attributes, and losing attributes according to the whim of the mythmaker. The process seems to be revealed most clearly by the variations among the different accounts of the Loxicha pantheon as collected by Weitlaner et. al. in each of four villages, San Agustín Loxicha, Sta. Magdalena Loxicha, San Bartolo Loxicha, and Sta. Lucia Tamasulapa (1961). Interestingly, although variations were rare in the arithmetic of the calendar, there was great variation in the functions and attributes assigned the gods which ruled the nine basic days of the system.

The Loxicha Deities

A study of the many versions of the pantheon obtained in the four towns reveals a multitude of discrepancies and contradictions which makes it quite difficult to produce a synthesis. The extent of the variation is revealed in the many different phonetic versions of the god names that were

collected in the different towns (Weitlaner and De Cicco
1961:495-96):

	San Agustín	Sta. Magdalena	San Bartolo	Sta. Lucía
1	mdi, mdi? mdido?	ndi ndigol(?)	ndi	wndi?, mdi? (mdido) ndidu?
2	ndodzin, ndozin mdo?dzin	dozin mdozin	wlizin	ndizin, dozin wlidzin
3	mdoyet, ndoyet mdò?yèt	doyet mdoyet	doyet	ndiyet doyet
4	bey, mbey mbèydb?	mbeydo	beydo	kiloo, kilo (meydo)
5	dùbdò? dubdo	ndubdo	ndubdo	dibdu
6	kedo kèdò?	kedo	kedo	justis (kedo)
7	mdan, ndòotàn ndo?tan	ndando mdan	ndan	mdan, ndan mdandu, ndandu
8	mše mpše	mše	mše	mše
9	baz mbàz	mbwaz	bas	baz, mbaz mbazdu?

The following represents an attempt to synthesize the attributes and functions of the Loxicha deities:

1. Mdi Lightning gods. Creator of rain, maize, and other crops. Has male and female aspects. Gives strength to the sacred mushroom. Said to have the form of the iguana, as the back of the iguana looks like a crooked lightning bolt.
2. Ndozin Associated with death and the souls of the dead. A god of justice. Associated with the number 13. Ndo is translated as "spirit" or "image" and zin means

- means "thirteen." An evil spirit.
3. Ndo'yet God of souls. Ndo is translated as "spirit" and yet "nine."
4. Beydo God of all crops except corn. God of wind. Brother of Dubdo, son of Mdi and Mbaz, the two earth gods. Associated with the sacred mushroom.
5. Dubdo God of corn. Has male and female aspects. Daughter of Mbaz.
6. Kedo God of justice. His name translates, ke, "crime" and do, "great."
7. Ndan Head of the hierarchy of deities. Creator of all, heaven and earth. Has male and female aspects. King of the earth.
8. Mse Servant of all the other gods. Punishes those who do not carry out their duties to the gods. Spirit of bad air. There seem to be many Mse.
9. Mbaz Creator of the earth. Has male and female aspects. Guardian of the animals. Mother of Dubdo and Beydo.

The Lords of the Nights

The most obvious Prehispanic concept which may relate to the nine Loxicha deities is that of the nine "Lords of the Nights."

The Aztec "Lords of the Nights" and their attributes

according to Serna (1892) and as modified by Caso (1967:20) and Thompson (1961:208) are as follows:

1. Xiuhtecutli "Lord of the year." God of grass or fire. Also called Huehuetotl "the old god," and Ixcozauhqui "yellow face," "Lord of grass," "the Lord of turquoise."
2. Itli, Tecpatl, God of flint. The flint knife is the
or fetish of Tezcatlipoca. Also god of sin,
Itzapaltotec justice, and misery. Presided over the homes of young warriors and bachelors. A young deity. Wears a smoking mirror in place of the foot torn off by the earth monster.
3. Piltzintecuhtli Lord of youth or youthfulness. Also Ometecuhtli or tonactecuhtli. Symbol of fertility. Adorned with corn. Double lord, both male and female, master and mistress of food. Creator of all.
4. Centeotl God of corn, ears of maize. Son of Tlazolteotl, the earth goddess.
5. Mictlantecuhtli God of the dead, the infernal regions, the underworld. Decorated with human bones. Associated with the bat, spider, and owl, a bird of ill omen.
6. Chalchiutecuhtli Lady with the skirt of jade. Goddess of water. Either wife or sister of

Tlaloc. Goddess of all bodies of water. Responsible for all deaths by drowning. Has the calendrical name of 8 Malinalli or 8 Grass.

7. Tlazolteotl "The goddess of filthy things." An earth goddess. Mother of Centeotl. Consumes the sins of men and thereby cleanses them. Goddess of love. Also known as Cihuacoatl, patron of women who had died in childbirth and Coatlicue, mother of the sun, moon, and the star, Huitzilopochtli. Also known as the mother of the gods and of mankind.
8. Tepeyollotl Jaguar, heart of the mountains. Associated with the number 7. A disguise of Tezcallipoca.
9. Tlaloc Lord of rain and celestial fire.

A comparison between the Aztec "Lords of the Nights" and the descriptions of the Loxicha deities and their attributes yields a broad but tenuous correspondence. However, a connection between the two is suggested by various facts. First, both are found to run in conjunction with a 260-day cycle. And secondly, the mechanism by which the series of nine are fit into the 260-day-period is similar. On the other hand, the Maya "Lords of the Nights" follow a continuous sequence, without regard for the cycle of the tonal-pohualli.

The Maya "Lords of the Nights," known from their glyphs, the G-glyphs, were discovered by J. Eric Thompson. He observed that a certain deity, which was later designated as G_9 or the last of the G-glyphs, was represented on almost every initial series with lunar series representing a katun (360 days) or half-katun (180 days) or quarter-katun (90 days). The G_9 glyph also appeared on a number of dates that did not end periods. Later observations revealed that these dates were all on days removed from the period endings by multiples of nine and the G_9 glyph reoccurred every nine days. It only remained to be discovered that eight other G-glyphs occurred in the positions between the G_9 deity and each reoccurred after an interval of nine day positions: these were designated as G_1 through G_8 .

Thus, The Maya "Lords of the Nights" were discovered because the 360 day katun, the half-katun, and the quarter-katun mark intervals which occur after the passage of a number of days that is a multiple of 9. If the Maya "Lords of the Nights" were altered by combining two day names to fit the 260-day tonalpohualli, as the Loxicha deities and the "Lords of the Nights" of the Bourbon and Aubin Reckonings, they would not reoccur with regularity in accordance with the katun endings. The Long Count and the Maya "Lords of the Nights" both follow a continuous sequence, independent of the tonalpohualli.

The Maya and Mexican "Lords of the Nights" have a remote yet far from satisfactory correspondence. In several cases

the same deity occurs in both the Aztec and Maya lists though the uncertain identification of some Maya gods weakens the possibility of establishing a correspondence. Nowhere in the Chilam Balam or any other writings have a list of Maya "Lords of the Nights" been found with the type of information Serna gives for Mexico. They are only known from their glyphs, the G-Glyphs, which accompany Long Count dates.

The representational attributes of the variants of these may be summarized as follows (Thompson 1961:208):

- G₁ A hand, head of God C, monkey features, fish, water symbols (circlets, Kan cross), coefficient of 9.
- G₂ Small circles (water symbols), head variant that of a youthful deity, jade symbol, scrolls (vegetal motif).
- G₃ Moan bird, bird of the rain interior, pluvial deity.
- G₄ Roman nosed deity, number 7 possibly associates it with maize.
- G₅ No outstanding characteristics, coefficient of 5 is associated with the earth, the conch man.
- G₆ Head of a youngish deity.
- G₇ Jaguar paw, jaguar, coefficient of 7 makes it a very likely counterpart of the Aztec Tepeyollotl, a deity of the interior of the earth.
- G₈ Conch shell (symbol of that primeval body of water in which floated the saurian monster whose back was the earth).
- G₉ Head of the aged sun god, the nocturnal sun, Kan glyph, vegetal motif, and black death eyes (symbol of the earth

or its interior).

Alfonso Caso has attempted to correlate the calendrical deities of the Loxichas and the nine "Lords of the Nights" in the following manner (1965:946):

Mdi	___	Tlaloc (Lightning, rain, water)
Ndozin	___	Mictlantecutli (Death
Ndoyet	___	Mictlantecutli (Death)
Dubdo	___	Centeotl (Maize)
Kedo	___	Itzapaltotec (Sin, Justice)
Mdan	___	Tonacatecuhtli (Supreme god) (Piltzintecutli)
Baz	___	Tlazolteotl (The Earth)

Adding to what Caso proposes, Ndoyet could possibly be associated with the G_1 glyph as both are associated with the number 9.

The Kaminaljuyu Mushroom Stones

Borhegyi gives an analysis of the various representations on mushroom stones found in the highlands of Guatemala and suggests the following identifications (1961:501):

<u>Mushroom effigy</u>	<u>Mexican deity</u>	<u>Maya glyph</u>
1. Aged individual seated cross-legged or squatting.	Xuitecutli, aged sun god, night sun.	G_9
2. Youth seated cross-legged or squatting.	Piltzintecutli	G_6
3. Bird, possibly a moan bird.		G_3
4. Monkey, may be the spider monkey		G_1 , God C
5. Jaguar or puma	Tepcyollotl	G_7

An identification of the mushroom stones with the "Lords of the Nights" would logically relate the mushroom stones with the Loxicha deities if it can be assumed, as Caso suggests, that the Loxicha deities do in fact relate to the "Lords of the Nights." However, the only gods that could possibly be thus identified to be represented on the mushroom stones and as part of the Loxicha pantheon would be:

<u>Loxicha deity</u>	<u>Lord of the Night</u>	<u>Mushroom stone</u>
Mdan	Pitzintecuhtli	youth seated cross legged
Mdoyet	G ₁	monkey

Considering the recent and rapid changes in the Loxicha pantheon made evident by the great variation in the different accounts of the pantheon, it seems unlikely that deities separated by over two millenia would be the same. Also, the fact that Caso is able to associate two different Loxicha gods with Mictlantecuhtli suggests that the gods cannot be considered to be part of a fossilized system, but subject to changes. Nonetheless, it is evident that the Loxicha gods and the "Lords of the Nights" are of generally related mythological traditions. For instance, both have the conception of a water god and earth god giving birth to a corn god and to a god of crops.

A more conclusive solution to the problem of tracing the Loxicha pantheon may be arrived at through further research, especially ethnohistorical research in colonial writings. Future ethnographic research may also be useful to reconstruct a prototypical pantheon and indicate a possible

reconstruction of the southern Zapotec pantheon.

REFERENCES

Brockington, D. L.

- 1971 New Evidence Concerning the Origins of the Mixtec Ceramic Tradition. Research Laboratories of Anthropology, University of North Carolina. typescript.

Caso, A.

- 1965 Zapotec Writing and Calendar. In Handbook of Middle American Indians, Part II, Vol. 3, edited by R. Wauchope and G. Willey, pp. 931-45. University of Texas Press, Austin.
- 1967 Los calendarios prehispánicos. Universidad Nacional Autónoma de México. Instituto de Investigaciones Históricas Serie de Cultura Nahuatl Monografías, 6. México

Codex Aubin

- 1893 Códice tonalámatl de Aubin. Edited by E. Leroux. Paris.

Codex Borbonicus

- 1938 Códice Borbónico. Edited by G. M. Echániz. Mexico.

Codex Dresden

- 1892 Die Maya-handschrift der Koniglichen Bibliothek Zu Dresden. Dresden. (Also, Berlin, 1962).

Codex Madrid

- 1967 Codex Tro-cortesianus. Akademische Druck- und Verlagsanstalt. Graz.

Córdova, J. de

- 1886 Arte del idioma zapoteco. Morelia. (First printing 1578 by Pedro Balli, México.)

De Borhegyi, S. F.

- 1956 The Development of Folk and Complex Cultures in the Southern Maya area. American Antiquity, Vol. 21, No. 4, pp. 343-356. Salt Lake City.
- 1961 Miniature Mushroom Stones from Guatemala. American Antiquity, Vol. 26, No. 4, pp. 498-504. Salt Lake City.
- 1963 Pre-Columbian Pottery Mushrooms from Mesoamerica. American Antiquity, Vol. 28, No. 3, pp. 328-38. Salt Lake City.

Drucker, P., R. F. Heizer, and R. J. Squire

- 1959 Excavations at La Venta, Tabasco, 1955. Bulletin, Bureau of American Ethnology, No. 170. Washington.

Merrill, R. H.

- 1945 Maya Sun Calendar Dictum Disproved. American Antiquity, Vol. 10, No. 3, pp. 307-11. Salt Lake City.

Miles, S. W.

- 1952 An Analysis of Modern Middle American Calendars. In Selected Papers of the XXIXth International Congress of Americanists (New York, 1949), Vol. 2, Acculturation in the Americas, edited by Sol Tax, pp. 273-84. University of Chicago Press, Chicago.

Morley, S. G.

- 1947 The Ancient Maya. Stanford University Press, Stanford.

Nuttall, Z.

- 1928 Nouvelles lumières sur les civilisations américaines et le système du calendrier. Proceedings of the Twenty-second International Congress of Americanists (Rome, 1926), pp. 119-48. Riccardo Garroni, Rome.

Peña, M. T. de la

- 1950 Oaxaca económico. Biblioteca del Gobierno del Estado de Oaxaca. typescript.

Roys, R. L.

- 1933 The Book of Chilam Balam of Chayumel. Carnegie Institution of Washington, Publication 438.
Washington.

Sahagun, B. de

- 1957 General History of the Things of New Spain,
Book 5, Part 5. School of American Research,
Santa Fe, N. M.

Serna, J. de la

- 1892 Manual de ministros de indios. Anales del Museo Nacional de México, Epoca I, Vol. 6, pp. 263-475.
México.

Thompson, J. E. S.

- 1931 Archeological Investigations in the Southern Cayo District of British Honduras. Field Museum of Natural History, Anthropological Series, Vol. 17, No. 3. Chicago.
- 1961 Maya Hieroglyphic Writing: An Introduction. University of Oklahoma Press, Norman.
- 1971 Maya History and Religion. University of Oklahoma Press, Norman.

Wasson, V. P. and R. G. Wasson

1957 Mushrooms, Russia, and History. Pantheon Books,
New York.

Weitlaner, R. J.

1958 Calendario de los zapotecos del Sur. Proceedings
of the Thirty-second International Congress of
Americanists (Copenhagen, 1956), pp. 296-99.
Munksgaard, Copenhagen.

Weitlaner, R. J. and G. de Cicco

1961 La jerarquía de los dioses zapotecos del sur.
Proceedings of the Thirty-fourth International
Congress of Americanists (Vienna, 1960), pp. 695-
710. Vienna.

Figure 1

THE LOXICHA CALENDAR
(after Weitlaner 1956)

The calendar was reported to Weitlaner and his assistants by an informant with 260 grains of corn and several slips of paper. The grains were laid out as shown below on the next five pages. The informant described the calendar as being like a snake or a circle (Brockington, personal communication).

Ze gon			Sgababil		
1 * mdi ndozin	12 * mse	13 * mbaz widzin	1 * mdi	12 * ndan	13 * mse widzin
2 * ndo'yet	11 * ndan		2 * ndozin	11 * kedo	
3 * beydo	10 * kedo		3 * ndo'yet	10 * dubdo	
4 * dubdo	9 * dubdo		4 * beydo	9 * beydo	
5 * kedo	8 * beydo		5 * dubdo	8 * ndo'yet	
6 * ndan	7 * ndo'yet		6 * kedo	7 * ndozin	
7 * mse	6 * ndozin		7 * <u>ndan</u>	6 * mdi	
8 * mbaz	5 * mdi		8 * mse	5 * mbaz	
9 * mdi	4 * mbaz		9 * mbaz	4 * mse	
10 * ndozin	3 * mse		10 * mdi	3 * ndan	
11 * ndo'yet	2 * ndan		11 * ndozin	2 * kedo	
12 * beydo	13 * dubdo widzin	1 * kedo	12 * ndo'yet	13 * beydo widzin	1 * dubdo
		Sgablodios			Sgablyu
			<u>Ze gon</u>		

Figure 1 (cont.)

Ze blazgac		Sgabgabil	
1 * mbaz	12 * kedo	13 * ndan widzin	1 * mse
2 * mdi	11 * dubdo		2 * mbaz
3 * ndozin	10 * beydo		3 * mdi
4 * ndo' yet	9 * ndo' yet		4 * ndozin
5 * beydo	8 * ndozin		5 * ndo' yet
6 * dubdo	7 * mdi		6 * beydo
7 * kedo	6 * mbaz		7 * dubdo
8 * ndan	5 * mse		8 * kedo
9 * mse	4 * ndan		9 * ndan
10 * mbaz	3 * kedo		10 * mse
11 * mdi	2 * dubdo		11 * mbaz
12 * ndozin	13 * ndo' yet widzin	1 * beydo	12 * mdi
			13 * ndozin widzin
		Sgablodios	
			Sgablyu
			<u>Ze blazgac</u>

Figure 1 (cont.)

Ze yatetan			Sgababil				
1 * ndan			12 * beydo	13 * dubdo	1 * kedo	12 * ndo ^e yet	13 * beydo
2 * mse			11 * ndo ^e yet		widzin		widzin
3 * mbaz			10 * ndozin		2 * ndan	11 * ndozin	
4 * mdi			9 * mdi		3 * mse	10 * mdi	
5 * ndozin			8 * mbaz		4 * mbaz	9 * mbaz	
6 * ndo ^e yet			7 * mse		5 * mdi	8 * mse	
7 * beydo			6 * ndan		6 * ndozin	7 * ndan	
8 * dubdo			5 * kedo		7 * ndo ^e yet	6 * kedo	
9 * kedo			4 * dubdo		8 * beydo	5 * dubdo	
10 * ndan			3 * beydo		9 * dubdo	4 * beydo	
11 * mse			2 * ndo ^e yet		10 * kedo	3 * ndo ^e yet	
12 * mbaz	13 * mdi	1 * ndozin			11 * ndan	2 * ndozin	
	widzin				12 * mse	13 * mbaz	1 * mdi
						widzin	
		Sgablodios					Sgablyu

Ze yatetan

Figure 1 (cont.)

Ze we		Sgabgabil			
1 * dubdo	12 * ndozin	13 * ndo'yet widzin	1 * beydo	12 * mdi	13 * ndozin widzin
2 * kedo	11 * mdi		2 * dubdo	11 * mbaz	
3 * ndan	10 * mbaz		3 * kedo	10 * mse	
4 * mse	9 * mse		4 * ndan	9 * ndan	
5 * mbaz	8 * ndan		5 * mse	8 * kedo	
6 * mdi	7 * kedo		6 * mbaz	7 * dubdo	
7 * ndozin	6 * dubdo		7 * mdi	6 * beydo	
8 * ndo'yet	5 * beydo		8 * ndozin	5 * ndo'yet	
9 * beydo	4 * ndo'yet		9 * ndo'yet	4 * ndozin	
10 * dubdo	3 * ndozin		10 * beydo	3 * mdi	
11 * kedo	2 * mdi		11 * dubdo	2 * mbaz	
12 * ndan	13 * mse widzin	1 * mbaz	12 * kedo	13 * ndan widzin	1 * mse
	Sgablodios			Sgablyu	

Ze we

Figure 1 (cont.)

13 * mbaz
widzin
260th day

(proceed with
the first day)

Ze blagay		Sgabgabil	
1 * ndo' yet	12 * mbaz	13 * mdi widzin	1 * ndozin
2 * beydo	11 * mse		2 * ndo' yet
3 * dubdo	10 * ndan		3 * beydo
4 * kedo	9 * kedo		4 * dubdo
5 * ndan	8 * dubdo		5 * kedo
6 * mse	7 * beydo		6 * ndan
7 * mbaz	6 * ndo' yet		7 * mse
8 * mdi	5 * ndozin		8 * mbaz
9 * ndozin	4 * mdi		9 * mdi
10 * ndo' yet	3 * mbaz		10 * ndozin
11 * beydo	2 * mse		11 * ndo' yet
12 * dubdo	13 * kedo widzin	1 * ndan	12 * beydo
		Sgablocios	13 * dubdo widzin
			Sgablyu

Ze blagay

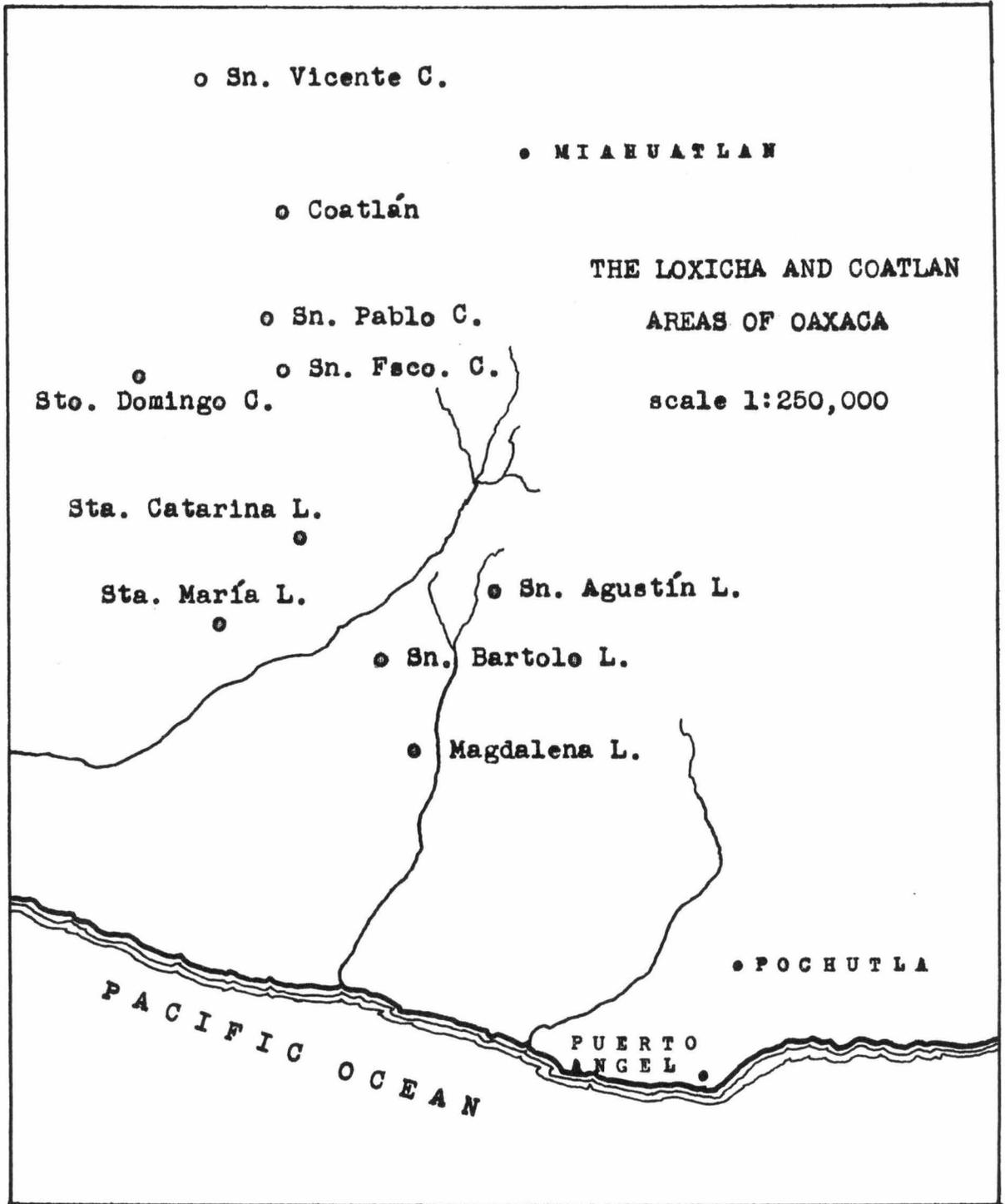


Fig. 2