

## Principles of Maya Glyphic Writing

And in the handywork of their craft is their prayer.  
—*Ecclesiasticus*, ch. 38

A SMALL PRIMER, entitled *French without tears*, enjoyed a large circulation in Victorian and Edwardian days. It was the precursor of a whole series of books, even systems of education, based on the optimistic assumption that any one can master a subject quickly and without effort by ignoring or hastily covering its more tedious and toilsome sections. In contrast, between the appearance of the present editions of *Codices Dresden and Madrid*, Geoffrey Chaucer had written: "Ther nys no werkman, whatsoever he be, That may bothe werke wel and hastily," and assuredly Chaucer has the best of the argument. A hasty review of the fundamentals of Maya hieroglyphic composition is a poor foundation for research in that subject; there can be no *Maya glyphs without tears*, or, at least, without a smothered yawn of tedium.

Surprisingly, no one has hitherto attempted to elucidate or even to list such rules of that peculiar form of writing as may exist. Naturally, with the greater part of the glyphs still undeciphered, a definitive study of the subject can not be made, but progress is hindered by the lack of any attempt to formulate such rules as can be accepted tentatively or affirmed with certainty. Hence the greater part of this chapter is a primer of Maya hieroglyphic writing, a hornbook one day to be replaced by the ample treatise of some grammarian. Its contents must be mastered by him who would essay glyphic decipherment. Withal, the subject is not without interest because of the effect of Maya temperament on the glyphic writing. The Maya had orderly minds, as their calendar, their philosophy, and the symmetrical groupings of their gods make clear; they were also poets and artists. Theoretically, rules closely prescribed the pattern of writing; in practice considerable deviation was conceded to the artistic and poetical temperament.

Hieroglyphic texts on the monuments consist of a number of blocks of varying size but usually rectangular with slightly rounded corners. The glyph blocks may be of the same height and width, or they may be wider than they are high, or, in rare cases, higher than they are wide; approximately equal height and width is the commonest practice. A height and width of about 15 cm. is average, but there is a wide range in dimension, de-

pending on the space available and the length of the text.

A text may have the glyph blocks arranged in one or more areas or masses. Where the whole surface is devoted to a hieroglyphic text there is usually only a single glyph-block area (fig. 51,2); where the glyph blocks occupy spaces not utilized by sculptured figures of gods or priests, they may occur in several masses.

Within a glyph-block area all glyph blocks are usually of the same size except that the one at the head of the inscription may occupy the space of two or four glyph blocks if it holds the IS introductory glyph (fig. 53,1-3); other glyph blocks in an area may be divided into two, three, or four sub-blocks (figs. 47,2; 54,1; 57,1), for the size of a glyph block bears no relation to the importance of the glyph or glyphs it contains. The subdivision, if it occurs, is in the lower part of an inscription and is purely a question of squeezing in more text without undue disturbance of the symmetry of the pattern (fig. 47,3). This is confirmed by the fact that the IS introductory glyph is not of outstanding importance as regards content, merely as regards position. The treatment is comparable to that of initials in an illuminated manuscript.

In those texts arranged in more than one glyph-block area, the glyph blocks within each area are of the same size, but the set size for the glyph block may vary from one mass to another. Again this is not a question of import but of space and balance. For ready reference vertical columns are lettered A, B, C, D, etc. from left to right, and the glyph blocks within a vertical column are numbered consecutively from top to bottom. Thus C<sub>4</sub> would be the fourth glyph block down in the third vertical column. In the case of a quartered glyph block the two left quarters are distinguished by the addition of *a*, u.h. and *a*, l.h. (u.h. and l.h. standing for upper half and lower half respectively); the two right quarters similarly are designated by the addition of *b*, u.h. and *b*, l.h. Thus D<sub>5a</sub>, l.h. is the lower left quarter of the fifth glyph block in the fourth vertical column from the left.

Morley has introduced the system of continuing the lettering of the vertical columns in sequence through various lintels of a single building. Thus at Yaxchilan Structure 10 contains Lintels 29, 30, and 31. There are four vertical columns of glyph blocks on Lintel 29,

lettered A–D. The left-hand column of Lintel 30 accordingly is given the letter E, and since there are also four columns in that lintel, the first column in Lintel 31 carries the letter I. The same sequence of lettering is used for the various sides of an inscription. The system has the drawback that later investigations have in more than one case shown that the order in which the sides are read is different to that originally supposed, thereby throwing the latter sequence into confusion. That, however, is a fairly unimportant detail. Morley's system is followed in this book.

With extremely few exceptions an inscription starts at the top left corner and passes to the glyph block in the adjacent column (B<sub>1</sub>); next to the second glyph block in the first column (A<sub>2</sub>), and then to that in the adjacent column (B<sub>2</sub>). The text continues in pairs of glyph blocks A<sub>3</sub>, B<sub>3</sub>, A<sub>4</sub>, B<sub>4</sub> etc. until the bottom of the second column is reached. The reader then passes to the top of the third and fourth columns C<sub>1</sub>, D<sub>1</sub>, and from the bottom of those to the next pair. Generally the columns reach an even number. If there is an extra column, the glyph blocks it contains are read from top to bottom after the last pair of columns is finished. In short texts of three columns this system may be used (fig. 59, 2–5), or the sequence may be across each line in turn from left to right (fig. 48). Single horizontal lines of glyphs are deciphered left to right. These rules have exceptions (e.g. a longer column at the left read by itself), but the context will usually resolve the point.

The quarters of a glyph block are generally read in the order *a*, u.h.; *b*, u.h.; *a*, l.h.; *b*, l.h. before passing to the next glyph block. Where a glyph block is halved the left half precedes the right half. Sometimes a single glyph may occupy the left half of a glyph block, whereas two glyphs one above the other occupy the right half.

In the codices the same general rules for reading apply, although, if, as is probable, multiplication tables are to be read in ascending order, the sequence on certain pages runs from right to left starting at the bottom right corner.

A glyph block or its half or quarter division may contain one or two glyphs, arranged so that the edge of one impinges on the edge of the second. I believe, although with our present knowledge of Maya writing the belief can not be substantiated, that this welding together of glyphs was practiced only when both formed part of the same clause.

## GLYPH FORMATION

### INFIXES

A glyph may consist of a single element, a main element to which have been added various infixes or affixes. An infix is a detail added to the interior of a glyphic ele-

ment; an affix is attached to its outer edge. Few glyphs lack affixes, and probably features in nearly every main element would qualify as infixes did we but know more of the history of the development of Maya writing. At the present stage of glyph decipherment it is best to treat as infixes only those details known to have been added to the main element of a glyph to change its meaning. For example, the carving inside the dot of the Imix glyph of a small face like that of Ahau changes the meaning of the glyph (fig. 2, 1, 2) and the addition of a small crosshatched area, the symbol for black, to the cauac element indicates that the month Ch'en is meant (fig. 2, 5). Both of these additions are therefore infixes. The number of infixes as defined above is not great, although there is little doubt that they will become more numerous as decipherment progresses. It will probably prove impossible to draw the line between fused glyphs (p. 41) and infixes, for many of the latter are probably the ultimate step in glyph mergence. There are also cases where a prefix is merged with the main element, thereby becoming an infix from the technical point of view. Examples of this process are found in representations of the month signs Uo and Zip (figs. 2, 7; 16, 13). Affixes, too, can have infixes added. Technically the head variants of numerical coefficients can be considered to be prefixes. The heads for the numbers 14–19 are formed by adding the diagnostic character of the head for 10, a jawbone, to the head of the second digit. The jawbone of 10 as an infix of the head for 4 converts the latter to the head for 14. It is, therefore, a prefix with an infix.

### AFFIXES

Certain elements may be added to the main element, to the left (prefix), above (superfix), to the right (postfix), or below (suffix). In the vast majority of cases an affix can be moved from the left to above the main element or vice versa without altering the meaning of the whole one iota. For example, the superfixes of certain months are sometimes moved to the left for purposes of symmetry without in any way affecting the meaning. Cases of such transpositions occur in the glyphs of the months Uo, Zip, Zec, Yaxkin, Ch'en, Yax, Zac, and Ceh (fig. 2, 4, 6). Contrarily the forward element of the posterior date indicator is usually placed to the left of the main element, but sometimes it occurs above (fig. 2, 8, 9), or it may appear as infix (fig. 2, 10).

Correspondingly, the affixes to the right and below are generally interchangeable without effect on the meaning of the symbol (figs. 11, 1–8; 33, 15–20). The postfix of the posterior date indicator is usually below the main element but it can occur to the right without altering the meaning (fig. 2, 43–45).

I think we can assume that prefix and superfix positions and postfix and suffix positions were always interchangeable and could shift in the same way. We can also assume that tradition alone led to the employment of only one position in those cases where an affix does not occur in both the positions open to it. For example, there is no known case of the affix of the katun glyph being placed to the left of the main (tun) element, but presumably the Maya priest would not have hesitated to put it there had consideration of space made it advisable. On the other hand, tradition dictated that the affix which served as a count indicator, a component element of a distance number, should be placed beneath the glyph (fig. 2,13), yet on Lintel 30 Yaxchilan it appears to the right of the katun sign. There the glyph block is somewhat elongated, and the use of both superfix and suffix would have produced a distorted glyph. Consequently the artist disregarding tradition moved the element from below to the right of the main sign (fig. 2,14). In this publication the terms *prefix* and *postfix* will be used in the more comprehensive sense: the former indicating that the affix stands above or to the left of the main element; the latter that it is below or to the right of the main element. The terms *superfix* and *suffix* will be used only when it is desired to record the actual positions of the affixes.

The same side of an affix, as Beyer (1934, 1934a) has pointed out in his admirable discussion of the subject, generally touches the main element whatever the position it occupies. Usually it merely pivots around the main element as the Plough swings around the north star. This is not a hard and fast rule, for certain affixes used above or below the main element may point either way. One example of this is the "u" element of the anterior and posterior indicators, which may have the "flame" element pointing to left or right (fig. 2,8-12). Another exception to the practice is supplied by the *te* (1) classificatory element. This, as a prefix, may occur to the left or above the main element. When placed to the left the circle may be at top or bottom and the curve against the main element; when placed above, the circle may be to left or right, and the curve against the main element or away from it (fig. 2,15-22). Perhaps such latitude was permitted only with affixes which were not likely to be misinterpreted.

A few affixes usually retain the same axis whether above or below, to right or to left of the main element. The most common example of this is the inverted Ahau, which almost always keeps its inverted position. This is almost certainly because the Ahau sign developed a new meaning when inverted (fig. 2,24-27). Were the rule of always attaching the same side of the affix to the main

element here followed, this particular affix would lose its characteristic, the inverted position, when used as a suffix, and could be confused with other symbols.

It is clear, then, that rules for attaching affixes were not rigid, but were modified as circumstances demanded.

#### INTERCHANGEABILITY OF AFFIXES AND MAIN ELEMENTS

Affixes and main elements do not form two separate groups, rigidly restricted as to function, for affixes could be used as main elements, and many main elements were also used as affixes. Figure 2,29 shows a main element with the "comb" variant of the count sign as postfix to right and an inverted Ahau postfix below; in figure 2,30 the main element has become a prefix, the "comb" variant of the count sign has been replaced by the personified or head variant of the same symbol which serves as the main element. The same inverted Ahau postfix is still below, but now attached to the new main element. The positions of these glyphs in almost identical clauses make it virtually certain that the essential meaning they convey is the same, although there may be small grammatical variations involved in the change, just as we convey the same information by saying either "that book is mine" or "that book belongs to me."

Similarly, in glyphs for the month Mac the "count" element may be the "comb" symbol used as a postfix (fig. 18,1,2,10-13), or it may be the corresponding head form (the head of the *xoc* fish, highly conventionalized) used as the main element (fig. 18,3-6,14,15). Another example is supplied by the month sign *Zec*. The normal form of this glyph consists of a geometrical main element with a "comb" prefix (fig. 16,45-49,51), but in one case the comb is replaced by its corresponding head variant, the *xoc* fish, recognizable by the upsweeping barbels in front of the forehead, and the "chuen" symbol, which is normally the main element, becomes an infix (fig. 16,50).

Another case of an affix becoming a main element is supplied by Glyph F of the lunar series. This sign usually has a postfix which I have termed *te* (2) (fig. 34,58-62,64-66), but occasionally the corresponding head form, which is almost certainly that of the maize god (p. 283), replaces it, becoming the main element, and the knot, which is normally the main element, becomes a prefix (fig. 34,21,63,68). The same happens when the "u" postfix is replaced by its personified form, a vulture head, in rare examples of the anterior date indicator (cf. fig. 2,43-45, with fig. 4,29,30).

The rule seems to be that when the head or personified form of an affix, replaces the geometric or symbolic form, the affix becomes the main element. There are, however, exceptions to this rule, for where the *xoc* head replaces the comb as a prefix (fig. 5,26,42), and where the death

head is substituted for the "death eyes" as a prefix (fig. 32,27) these head forms remain prefixes. This is probably because they do not normally form part of the glyph but are attached to modify its meaning. In one case the prefix becomes a separate glyph on changing from its symbolic, or normal, form to its personified form (fig. 33,26).

Theoretically any affix could become a main element, but in practice many do not, or a more elaborate variant is used, as in the case just cited. It is also impossible to draw a hard and fast rule as to whether a certain combination is a single main element with an affix or two main elements joined together. One can be reasonably sure that the Maya themselves did not always make such a distinction, but were guided primarily by questions of spacing and appearance.

Were the text long for the area to be occupied, the glyphs were compressed and affixes used; were there plenty of space the reverse could happen. At Chichen, particularly, affixes are frequently detached, and stand alone in separate glyph blocks or are attached to an adjacent glyph. In fact, Maya glyphic writing has a flexible quality, and could be easily expanded or compressed without loss in the essential meaning. Figure 35,16 shows a text of nine glyphs from the hieroglyphic stairway at Copan. Four glyphs could be eliminated, and one prefix added to produce a shorter version which would convey all the information now embodied in the text, although, as we shall see, melodic qualities might be lost by abbreviations.

#### TRANSFERENCE OF AFFIXES TO ADJACENT GLYPHS

There is evidence that some affixes could be shifted to an adjacent glyph without substantially altering the meaning of the passage. In the divinatory almanacs of Dresden the same glyph or pair of glyphs frequently occurs with each division of the almanac. In the divinatory almanac on pages 13b-14b the same pair of glyphs opens the text in each division, but in the last three sections the postfix of the second glyph is transferred to the first glyph, and one of the prefixes of the first glyph disappears, but a postfix of the same meaning as that prefix (p. 40) is attached, in its place, to the second glyph (fig. 2,58-61). That is to say, this is a change roughly the equivalent of that of *ab,cd* to *bd,ca'* (*a'* denoting that it is a synonym for *a*). This mutation is surely about the same as changing an expression such as "he gave him hearty thanks" to "he heartily thanked him." I make no doubt that the flexibility of such affixes corresponds to the flexibility of spoken Maya. Naturally, affixes such as those possessed by most month signs could not be transferred to another glyph, because they qualified the elements to which they

were attached, and served to identify the glyph. At Chichen the *tu* prefix is sometimes attached to the previous glyph as a postfix, but the sequence, of course, is unchanged (fig. 39,3-6). This shift is comparable to wrong punctuation. Similarly, the tail of the kin is incorrectly attached to the adjacent sky sign in figure 3,14.

#### INTERCHANGEABILITY OF PREFIXES AND POSTFIXES

Generally speaking, an affix attached to a given element always occupies either the prefixal or postfixal position, and in the case of most glyphs of known meaning the positions either could not be, or in practice never were, interchanged, but there are cases in which an affix may appear in either position with the same main element, or may be used as prefix to one main element, but as postfix to another. Unfortunately, it is not yet known what effect a shift from one position to the other had on the meaning of the whole glyph. This is, naturally, a matter of very great consequence in the interpretation of the glyphic writing.

There is, however, one clear instance of a change in position of the affix having no effect on the meaning of the whole glyph: all examples of the month sign *Zec* in the inscriptions have the "comb" element as a prefix, but in all examples of *Zec* in Dresden the "comb" element is a postfix (fig. 16,45-52). Another possible example of this shift in position producing no change in meaning may be supplied by the hand glyph with infixes (fig. 42,58-61). This sign, followed by a sun glyph with dotted outline, occurs in the three divisions of the divinatory almanac of Dresden 12c and in the two divisions of the almanac on Dresden 15c (figs. 62,5; 63,1). In the divisions of Dresden 12c its only affix is the "*ak*" postfix (fig. 42,59), but on page 15c it appears in the first compartment with "*ak*" postfix to right and "down-balls" postfix below, whereas in the second compartment it has a saw-bracket prefix to left and the "down-balls" element now a prefix above (fig. 42,61). The same main element is found also on Dresden 2d, but there it has the *u* bracket to left and the "down-balls" as postfix. In all six cases this is the initial or action glyph of its compartment, and it is, therefore, highly probable that the shift of the "down-balls" element from prefix to postfix makes no important alteration in the meaning of the whole element, but is probably a result of the addition of other affixes.

A very common glyph at the end of texts is composed of two Imix signs, the second of which has the comb prefix (figs. 5,15; 40,13,15), but in one text this prefix becomes a postfix without seemingly any change in general meaning (fig. 40,14). Conspicuous among the glyphs which accompany the 260-day almanac occupying Ma-

drid 65-72 is the tun sign with a variable coefficient and usually with the *il* postfix and a second affix, apparently a numerical classifier, perhaps *piʒ* or *p'el* (p. 197). In 10 cases this latter is a postfix; four times it is absent; thrice (including one haab substitution) it is a prefix (fig. 12,23,24). Here again the transposition from postfix to prefix clearly does not affect the meaning. The clenched hand and crossed-bands glyph at Chichen Itza (Beyer, 1937, figs. 450-56) supplies another instance of transposition of postfix to prefix (cf. fig. 51,4, Gl C1,C2). The conclusion is inescapable that under certain circumstances prefixes and postfixes could be interchanged without major modification in meaning.

In the case of one of the tun signs with the Madrid almanac just discussed, the numerical classifying affix is missing, but appears as prefix of the next glyph, the cross-bands sign. As nowhere else does that common sign have this affix, it is extremely likely that it really belongs with the tun sign, and, accordingly, supplies another instance of an affix transferred to an adjacent glyph.

#### SUBSTITUTION OF PREFIX FOR POSTFIX OF SAME VALUE

Most IS at Quirigua are followed by a distinctive glyph with a crosshatched area and usually with a lunar postfix, but in two cases the lunar postfix is absent, and is replaced by the *u* bracket prefix (fig. 11,37-41). This is a situation rather similar to that of the interchange of affixes on Dresden 13b and 14b, where the *u* bracket prefix replaces the lunar postfix, but with a shift from the second to the first glyph of the clause (p. 39; fig. 61,5,6). In these Quirigua texts the lunar glyph is probably used rebus fashion to indicate the possessive *u* (p. 47), and Landa informs us that the bracket prefix corresponds to the sound *u*. The two affixes therefore have the same sonal value, and we can be reasonably sure that both stand for the possessive *u*.

Tradition or need for clarity has resulted in certain affixes, among which is the *u* bracket, nearly always occupying a prefixal position, whereas others, including this lunar sign, are generally found as postfixes. If, then, this prefix and this postfix have precisely the same meaning, it follows that the order of reading does not necessarily correspond to the order in which the parts of a glyph are carved or written. This case, therefore, presents evidence that in translating glyphs into spoken Maya, the word corresponding to a postfix may come before the main element, and, reciprocally, a prefix may follow the main element in the spoken word. This confirms the evidence of transfer of the affixes of Zec and Imix, to which attention has already been called. There are other glyphs which can take either the *u* bracket prefix or the lunar postfix, but, unfortunately, they are of unknown meaning.

#### CHARACTERISTICS OF AFFIXES

There is fairly good evidence that affixes could be suppressed, when the meaning of the main element was not clouded by their suppression; the postfix of the month signs Uo and Zip (fig. 16,13,14,16,17,26,28-31) was often suppressed, presumably because the meaning of the glyph was perfectly clear without it. In Madrid 43b and 43c are two divinatory almanacs, the first divided into eight compartments, the second, into seven, with the result that the glyphs are crowded. The same glyph (Gates' Glyph 141) appears in all 15 compartments, but only the first and last compartments of each almanac show this glyph with the *u* prefix attached. These examples without prefix are the only known cases of this main element standing alone, and, accordingly, I think it very probable that the affixes were suppressed because of crowding. Affixes could be fused with one another, as noted in the discussion of that subject. They could also be duplicated without affecting the meaning, as pointed out under the heading "Duplication of Details."

In brief, the following characteristics of affixes should be remembered: They can become infixes and they can change places with the main element of the glyph. Like main elements, they can be personified as head forms, and they can be duplicated without change of meaning. They can, in some cases, be suppressed, and they can be fused with one another, and they can have their own infixes. Under certain conditions an affix can be transferred to an adjacent glyph in a clause without serious modification of meaning, and, also, under certain conditions a postfix can become a prefix without altering the meaning of the whole glyph, although there is, as yet, no evidence that such interchanges never affected the meaning of the whole passage.

The meanings of most affixes are still unknown; those which have been identified, definitely or tentatively, include adjectives (color symbols), numerical classifiers (*te*), prepositions (*ti*, *tu*, and signs for backwards and forwards), relationship terms (*u*, *il*), attributive elements which confirm the identity of the main element ("*ak*," "*te*," and the "death eye" prefix), elements which indicate a restricted usage of the main element (postfixes of time periods to indicate that period glyphs record a distance number or mark the lapse of time, the "Ben-Ich" prefix with katun signs and Ahau), and nouns directly joined to the word corresponding to the glyph to which they are affixed (hand, count, and demise prefixes). Affixes may be found in more than one category; for instance, the symbol for black may be used as an adjective or, as a symbol of the underworld, it may denote a connection with that region, as in the glyph of the night sun. A main element may be

an adjective, and the affix, the noun it qualifies, if the emphasis is on the adjective. The glyphs for the world directional trees supply examples of this (p. 56). Finally, it should be observed that there are groups of synonymous or nearly synonymous affixes, the members of which were under certain conditions interchangeable.

Affixes, then, are of tremendous importance, and I heartily disagree with the view that some of them are meaningless, and were merely added for decorative reasons. Attributive affixes and affixes indicating a specialized use of the main element could be, and not infrequently were, suppressed because they were not essential, but served to permit more speedy identification of the function of the whole glyph; affixes in other categories were, for the most part, essential and could not be suppressed. If the main elements can be regarded as the skeleton of Maya glyphic writing, the affixes and infixes are the flesh, without which the dead bones can not take life. In subsequent chapters much will be said concerning them, but I fully apprehend that these are but quick forays against a subject of outstanding importance. Until most of the affixes can be deciphered, the purport of Maya texts will not be within our ken.

#### COMPOUND GLYPHS

In some glyphs there is more than one main element: the symbolic form of the baktun glyph has the main element doubled, and usually a postfix is added (fig. 26,15-23); the sunrise glyph has three main elements (fig. 2,32). Glyphs of this nature may be termed compound glyphs. A compound glyph may also have affixes (fig. 2,33), and it may be expanded into two or more glyph blocks, as occurs once with the drought glyph (p. 271; fig. 46,6).

#### OVERLAPPING GLYPHS

Frequently two glyphs are joined together so that one slightly overlaps the other, leading to the suppression of some of the details of the latter as though they were hidden from view (fig. 40,13,44,52). In such cases it is the glyph on the right or below (rarely above) which is given in full, hiding details of the glyph to the left or above. It does not necessarily follow that glyphs which are paired in this way are intimately related to one another, although that is often the case.

#### FUSION OF GLYPHIC ELEMENTS

Sometimes glyphs are fused together. This process not infrequently happens in the case of Glyphs G and F of the lunar series. Glyph G can stand by itself, but Glyph F apparently was never used without Glyph G. In a

number of cases the essential variable element of Glyph G was placed in the center of Glyph F (fig. 2,35-37). As already noted, this is a transition to the use of an infix. Examples of the symbol which Beyer has termed the o-tun glyph (although I am inclined to translate it as the seating of the haab; p. 119) carries the process a step farther. The fusion is complete so that a new glyph emerges, the tun sign with a special infix (fig. 19,37-39). The first glyph of the clause used in discussing the 819-day cycle supplies an interesting case of fusing two elements, the second of which might be treated either as a postfix or a separate element subsequently fused or infixed (fig. 2, 38,39). Morley (1945) cites examples of the fusing of Glyphs C and A of the lunar series. The general custom of fusing the two glyphs which together denote the half-period is another example of this practice (fig. 32,46-53) but sometimes the second glyph becomes a postfix of the first illustrating the fluidity of the rules of Maya glyphic writing (fig. 32,50).

Affixes, too, could be fused when questions of space or aesthetic treatment were involved. The month Kayab normally has two postfixes, which are usually placed to the right and below the main element, or both may be suffixes, placed one below the other. Occasionally the two are arranged alongside one another as suffixes. There was little room for such an arrangement, and consequently the two postfixes were sometimes merged, an unessential element being omitted from one of them (fig. 2,40-42). There is also an example from Copan of the two postfixes of the anterior date indicator being fused (fig. 2, 43-45), and the postfixes of Glyph D of the lunar series are sometimes fused (fig. 37,7).

#### DUPLICATION OF DETAILS

Beyer has shown that the duplication of details does not alter the meaning of a glyph, and produces and illustrates a number of cases to prove his point. He shows that the doubling of an affix was merely a matter of appearance and of space. Where a single affix might appear distorted in the space assigned it, the artist doubled or tripled it. Presumably tradition dictated what elements might be duplicated.

Examples of duplication of affixes without alteration of meaning are to be seen in representations of the months Zec and Mac (figs. 16,49,51; 18,1,2,11,12), and in the inverted Ahau element of that variant of the kin sign (fig. 2,24,27). An example of Yax at Chichen Itza supplies another good case of duplication of the main element without change in meaning (fig. 17,44). The duplication of the cauc element to form the baktun sign is discussed on page 147. It may be noted that the element can be tripled without, apparently, affecting the meaning.

Naturally, if an element which is usually single can be doubled, an element which is usually in duplicate can also appear only once. The prefix of the katun sign usually consists of a cauc element flanked by two small combs, thereby producing a good balance. However, sometimes when the katun sign overlaps another glyph or for some reason space is limited, the left comb was omitted (fig. 2,46). Similarly one of the "legs" in the superfix of a glyph common at Quirigua could be suppressed (fig. 2,47-49).

#### SIZE OF ELEMENTS

The size of one of the elements composing a glyph bears no relation to its importance, just as the size of the glyph block similarly fails to reflect the significance of its content. Again artistic considerations were paramount. Generally speaking, affixes are smaller than the main element, but they may be larger. A good example of this is supplied by the Yax sign on the Caracol at Chichen Itza just cited. The prefix becomes the largest element, although normally it is about half the size of the latter, and the main element is doubled (fig. 17,44). Were there not other forms known, we would consider the yax prefix to be the main sign, and the doubled cauc to be postfixes. Variation in size and duplication are well illustrated by the compound variant of the kin (fig. 31,12-20).

The four months signs, Ch'en, Yax, Zac and Ceh, are distinguishable only by their prefixes, and their names partially correspond to their prefixes. Were the value of the meaning of an element to guide its size, these four prefixes should be larger than the main element which they share. The fact that normally that is not the case confirms the conclusion that size and import are not related. Moreover, in the numerous texts which have the date which they commemorate recorded as a period-ending (hereinafter contracted to PE) date at or near the close of the inscription, the glyphs which carry that information are in no way differentiated by size, spacing, or arrangement from their neighbors.

#### ELIMINATION OF DETAILS

Most Maya glyphs could be elaborate or simple, the complexity of the design depending on the date when the glyph was carved (the early inscriptions are the most elaborate), the space available, the skill of the artist, the standard of glyph writing in each city, and the rarity of the glyph. Because many a glyph contains certain details which are not essential to its meaning or its identification, there was usually opportunity to simplify by eliminating the unessential, a process comparable to the kind of writing evolved for sending telegrams.

Morley (1915, p. 23) has illustrated the range of elimi-

nation in Glyph B of the lunar series, an excellent example of the process. The series can be amplified.

The glyph generally consists of four elements: (1) the head of a rodent; (2) an oval element, identified by Beyer as a conventionalized bone; (3) one of three prefixes: the possessive *u* bracket (fig. 2,51), the head of the *xoc* fish with the meaning of "count," (fig. 2,55), or the death eyes and hair, with the meaning of "expiration" (fig. 5,33); and (4) a doubled "sky" element which forms an elbow, the two arms flanking the top and right edge of the rodent's head (fig. 2,50).

This glyph could undergo the following changes without any loss of essential meaning: the oval element could lose its independence, and become an infix of the rodent's head (fig. 2,51); the head of God C could replace the rodent and oval, although that is very rare (fig. 2,52); the symbolic form of the "count" prefix could be used in place of the *xoc* head (figs. 2,53; 5,31), or it could replace the rodent and oval (fig. 2,56); the symbolic form of the rodent's head could be used (fig. 2,55); problems of space or symmetry could cause the elimination of either arm of the sky elbow (fig. 2,53-54); or the prefix could be entirely eliminated. Finally, it should be noted that the entire glyph could be dropped from its position in the lunar series without any essential loss of meaning to the whole clause.

The sky glyph, which forms the elbow, is a very common sign, the St. Andrew's cross being one of several infixes it can take (figs. 2,57; 31,52-72). It is a frequent element in the sunrise compound, where it occupies a space across the right top corner of the glyph, roughly corresponding to the elbow shape it assumes with Glyph B (fig. 31,41-51).

Another example of elimination of detail is supplied by the cauc element in the katun sign (fig. 26,24-32). The glyph was such a common and distinctive one that there was no danger of its being confused with any other if a detail was dropped from the cauc part of the prefix, consequently the "bunch of grapes" element was often omitted, or the side infixes could be left out. Such omissions could be compared to contractions, such as "Mr." or "Inc." in our writing.

#### ADDITION OF DETAILS

For reasons of balance or at the whim of the sculptor certain details could be added to most glyphs. The numerical classifier *te* was unessential; it was never used with day signs because it was not so used in speech, but was sometimes employed with month signs and period glyphs, corresponding to its oral use in Yucatec (*tu hunte Pop*, "on first of Pop"). Since only about 5 per cent of the month signs and an even smaller percentage of period

glyphs have the *te* prefix, it is clear that it was not essential. The reasons for adding it must have been aesthetic; that is to say, to avoid distortion of the glyph (fig. 2,15-23).

Similarly, there are a few cases where both the tripedestal and distance number postfixes occur with a period glyph (fig. 3,1). Normally, the second replaced the first when a distance number was recorded (fig. 2,34).

Examples of elimination or elaboration of detail are particularly evident in head variants. The presence of the normal kin element as an infix plus position in the clause were sufficient to identify the head variant of the kin sign, yet other details were often added which were not essential for the identification (fig. 27,53-66). Again, the long-nosed snake, one of the head variants of the tun sign, is unmistakable when it occurs in an IS or in a distance number. Nevertheless, the normal tun element is almost always present as a headdress, a quite unnecessary elaboration (figs. 27,28,30-33,35; 28,16,17; 30,6). The occasional presence of the katun prefix with head variants of the katun is another instance.

The sporadic use of only half the normal Venus symbol to represent the day Lamat is an example of simplification (fig. 7,57); extreme conventionalization of the Ahau face, in which the features are reduced to three circles representing the eyes and mouth is another (fig. 11,13). Generally speaking, elimination of unnecessary detail is commoner in the codices than in the carved texts. This, of course, is to be expected in view of the great rapidity with which glyphs could be reproduced on paper.

#### PREFATORY GLYPHS

There are some cases in which a separate glyph qualifies the glyph it precedes. The term "prefatory" will be applied to glyphs of that type. Sometimes the prefatory glyph can be substituted for a prefix. The commonest prefatory glyph is the completion sign which has as its main element an outstretched or partially outstretched hand. Sometimes the hand alone or with only the tassel as an addition serves as a prefix; sometimes it stands alone with its own affixes (fig. 33,25,26). The hand in that position has the meaning of completion and is followed by the glyph of the period which is completed. Few glyphs now fall in this category but, with greater knowledge, more should be classified as such. The prefatory glyph and that which it qualifies really form a short clause, but a prefatory glyph is differentiated by the fact that it can be replaced by an affix.

#### CLAUSES

The word clause is used to denote a combination of glyphs which is repeated elsewhere in the same or some

other text, and which appears to represent a single sentence. A clause need not always consist of the same number of glyphs or be in precisely the same order. There should, however, be certain obvious repetitions of glyphs in a clause. Naturally, the IS, distance numbers, and lunar series are clauses, but scattered through the text there are many more combinations which are clearly clauses, although often their meanings are still unknown.

As early as 1897 Goodman isolated clauses of unknown meaning; Beyer, in his studies of the inscriptions of Chichen Itza, identified a considerable number of what he called glyph pairs and glyph series. These are also clauses.

An example of a clause on the stelae of the Central Area is supplied by the six glyphs which discuss the 819-day cycle. The first and last are the same in four cases, and the intervening glyphs show certain relationships between the various texts (fig. 35,1-5). Examples of another clause which is of the expandable type occur on two stelae at Naranjo. There are usually four glyphs in the same order, but the first in the series may be dropped, and extraneous ones may be added (fig. 3,3-9). This sentence of unknown meaning appears four times on Stela 24, Naranjo, and four times on Stela 29 at the same site.

World-direction signs form a two-glyph clause, in which the first glyph (that of the world direction) is variable but the second remains the same. The first sign theoretically could be of four, or perhaps five, forms corresponding to the four world directions and perhaps to the center. Among surviving texts all directions are reasonably sure. The second glyph has two main elements, the *cauac* and *muluc* signs. The "down-balls" prefix of Mac stretches above both (fig. 4,1-4). A clause of six or seven glyphs occurs at Palenque (fig. 3,10-12), and one with coefficients appears at three cities (fig. 3,13-15). A long clause may contain one or more subordinate clauses. Glyphs G and F form one within the lunar series, which is a long sentence dealing with nocturnal matters.

Possibly the overlapping of glyphs within a clause is indicative of subclauses. Glyph B of the lunar series is sometimes omitted, but it is never present if Glyph X is absent. However, on Quirigua B Glyph B (reproduced as a full-figure variant) carries Glyph X on its shoulder, just as day signs and their coefficients are similarly linked together when produced as full-figure variants (fig. 29, 14). It is a good assumption, although nothing more, that Glyphs X and B form a subclause within the lunar series and should be read together.

Needless to say, the various glyphs which compose a clause often stand alone or they can reappear in other sentences. Cities appear to have shown a certain in-



dependence in the development of clauses, for a number occur only at a single ceremonial center. A clause, which usually contains the "Ben-Ich" katun, is common at Yaxchilan, but does not seem to have been used elsewhere. Its composition varies greatly (figs. 46,10-16; 49,1 Gl G1-G2; 2 Gl G1-H1; 50,2 Gl C7-C8; 51,2 Gl B3-B4; 56,4 Gl G2-G3, 6 Gl Q3-R4). Clauses are of great importance to the epigrapher because they supply examples of synonyms and near synonyms.

Because of fusion a clause may at times consist of only one glyph: the world-direction sentence normally comprises two glyphs, one of which is a compound, but there is at least one case of the two being fused to form a one-glyph clause (fig. 41,22). The fusion of Glyphs G and F of the lunar series supplies several examples of a sub-clause reduced to one glyph.

#### SEQUENCE OF GLYPHS

Generally speaking, sequences of glyphs conform to established patterns, particularly when matters of the calendar or arithmetic were under discussion, but certain variations in the order were permitted, and these probably reflect the flexibility of the spoken word. For example, at Yaxchilan the sign of the "Ben-Ich" katun is sometimes combined with a lunar glyph which has certain established affixes, but the moon sign may either precede or follow the "Ben-Ich" katun (fig. 33,36-38). The same is true of the pictun glyph and "one moon" on the Tablet of the Inscriptions, Palenque (fig. 3,10-12). In the illustrations the pictun glyph comes first, but elsewhere in the text the order is reversed. A reversal of the order of glyphs in clauses also occurs at Chichen Itza (Beyer, 1937, figs. 101, 102). There is even a case, on Copan 16, of the day sign following the month sign, and occasionally distance numbers are arranged in descending order instead of the usual ascending order (p. 158). This occasional variation in the order of reading applies also to some compound glyphs. For example, in the "count of the year" compound, either the haab or the count element may come first (figs. 4,1-4; 41,6,8,20,22).

#### GLYPH VARIANTS: SYMBOLIC AND PERSONIFIED FORMS

A peculiar quality of Maya hieroglyphic writing is the very extensive use of variant forms of the same glyph or of quite different forms to express the same idea. Of those glyphs that have been identified there are very few which have not at least two shapes. These are a symbolic or geometric form and a human form, and they are usually known respectively as the normal form and head variant, but the first term is not very felicitous since it carries the implication that the symbolic is the regular and most common shape, whereas in many cases the personified

form is far commoner. For example, the so-called normal form of the baktun glyph is somewhat rare, the head variant being far more frequent. The latter is true of certain days signs, as, for example, the glyphs for the days Chicchan and Cimi (fig. 7,1-34).

In some cases, as, for instance, with the tun sign (figs. 26,33-40; 27,28-39) the head variants (for there is more than one) are totally distinct from the symbolic form; in other cases (fig. 5,14,24,44) the personified variant is formed by converting the outline of the symbolic form into a profile head, or infixing the symbolic form in a head (fig. 30,52-54). The "normal" form may consist of some symbol which is in some way connected with the head variant or is one of the attributes of the deity involved. For example, the symbolic form of Cimi is the percentage sign (fig. 7,26,29,31), one of the attributes of death; but Cimi means death, and the head variant is a skull (fig. 7,18-25). Similarly the personified form of Lamat is the head of the god of the planet Venus, who is often shown with the Venus symbol in his headdress or on his cheek; the geometric form of Lamat is that sign in its single or double form (fig. 7,51-68).

Sometimes there is no obvious connection between the head and geometric forms, but we can be reasonably sure that a relationship would be apparent had we a greater knowledge of Maya mythology and symbolism. The symbolic form of the count element is identical with the day sign Muluc (fig. 30,37-40,42-44); the personified form is the highly conventionalized head of a mythological fish (fig. 30,41,45-47). The connection would not be apparent were it not known that Muluc corresponds to the Aztec day Atl, "water," and the symbol itself probably represents a jade bead. In the ritualistic speech of the Aztec, jade is used as a honorific term for water. With these various connections known, it is obvious that the two forms of the "count" glyph are linked, the connection between fish and water being very obvious.

In a few cases (e.g. the main element of the IS introductory glyph) no head variant has yet been found; in others the head variant is very rare. I know certainly of only two head variants of the distance number introductory glyph. The symbolic form of this has as its main element what looks like an unfinished swastika; in the personified variant that element is replaced by a youthful head with what seems to be the swastika on his temple (fig. 30,9-16), but there are a few examples of possible head variants of this glyph at Palenque (fig. 30,17-19).

In the case of a few affixes there are also head forms which replace symbolic affixes. The comb form of the "count" affix can be replaced by the head of the mythological *xoc* fish. The comb affix may be the conventionalized dorsal fin of a fish, although it is also possible that

it is the stylized picture of the flower of a water lily (fig. 5,29-31; p. 72). The head of the Chicchan god, god of number nine (fig. 24,50-55), is the personification of the yax affix and of the synonymous kan cross (figs. 3,7, penultimate glyph; 31,49-51).

Another prefix partly interchangeable with the count prefix has the meaning of "expiration of," "demise of," and hence "end," and takes the form of a small skull (fig. 5,22,36,43). The symbolic form corresponding to this has two circles with an intervening element. Each circle usually has a small circular or oval infix attached to its left edge, the interior of which is frequently crosshatched (fig. 5,21,27,33,45,52). This decorated circle is one of the attributes of the death god, who frequently has this identical circle immediately before his forehead (fig. 24,56-62); several may be set in his hair or in his headdress or attached to the edge of his ruff, or one may be at the end of the rod of each earplug. They may even be painted on the mantle, or attached to the ankles (fig. 13,11,19). Schellhas (1904, p. 11) identifies them as rattles or bells; Beyer (1937, p. 151) as death eyes. For our purpose the identification is not important. However, it is worth noting that representations of the death god in central Mexico often have rather similar circles set in their hair; these have been recognized as symbols of darkness, the eyes of night, that is, the stars. The death god lived in the underworld, the land of darkness, therefore this was a natural attribute, and one can be reasonably sure Beyer is correct. Note how, for lack of space, the death eye may be placed below the affix (fig. 5,22).

It is clear that the attribute of the deity serves as the symbolic form of this prefix; the skull of the deity as the head form. The skull may also stand alone as a prefatory glyph (fig. 5,26). The lines between the two eyes may well represent the hair of the death god as Beyer has suggested. Doubtlessly, a greater knowledge of Maya mythology and symbolism would reveal connections between many symbolic forms and their equivalent head forms.

#### FULL-FIGURE FORMS

In a few texts complete bodies are attached to the head variants of a number of glyphs. The full-figure glyphs are largely confined to the elements which form the IS, although the complete texts of Quirigua B and Copan D are of this type. Full-figure variants are extremely useful in identifying the animals or beings which the head forms represent. For example, the various full-figure representations of frogs as uinal signs make the identification of the corresponding heads certain (figs. 28; 29; 60).

Full-figure glyphs are among the finest examples of Maya carving extant. The artists, unrestricted by the rigid traditions which prescribed certain styles of presenta-

tion for religious art, were able to show their mastery of the technique of foreshortening. The static poses of the gods and their impersonators, which Maya religious portraiture demanded, yield to the utmost vivacity in treatment. These full-figure variants appear "a sort of bustle or hubbub in stone," as G. K. Chesterton says of mediaeval carving in *Tremendous Trifles*, but they are merely elaborations of the regular signs.

#### GLYPH SUBSTITUTION

In many cases one glyph may be substituted for another in a clause or one affix may replace another with the same glyph. Substitution of one element for another may or may not change the meaning of the whole. Naturally there is no way of telling in the cases of glyphs of unknown meaning whether substitution involves change in meaning. Even in the cases of glyphs of known meaning, further research has shown that changes in affixes vary the meaning of the whole. For example, it is now known that a number of the 26 affixes that Beyer (1937, pp. 150-58) groups together as ending signs mean something quite different. Every case of substitution must be examined on its own merits, and a decision as to whether a change of meaning is involved can be reached only after all examples of the use of the element in question have been tested. For example, the tun and katun signs can take three different postfixes. The tripod type appears to be purely ornamental (fig. 26,25,26,28,40). The type formed by two crescents flanking two or three circlets (and variations thereof) occurs only in distance numbers, and clearly serves to express the fact that a distance number is to be counted forwards or backwards (fig. 26,27, 30,36-38). The third type, the so-called bundle postfix, is used only to record that the accompanying date is a definite distance of so many tuns or katuns from some other CR date (hereafter called an anniversary count) but is not used to record distances counted from the conventional starting point of Maya chronology (fig. 33,21-23).

In order to preserve the full savor of Maya hieroglyphic writing, it is essential that our translations render, as far as is possible, those minor glyphic variations, which, in turn, surely reflect alternative phrases in the spoken word. Were a translator or paraphraser to encounter such expressions as "the day is ended," "the day draws to its close," "the day is no more," "the light has waned," "darkness has fallen," "night is here," and were he to render them uniformly as "at the end of the day," he would convey the general sense, but his work would show an impoverishment not in the original. In the case of the decipherment of Maya texts such treatment in the past has obscured many clues to the translation of glyphs of unknown meaning.

The various affixes and prefatory glyphs found with PE supply a case in point. There are five main signs: the hand, the bracket, the fish head, the comb, and the eye of death. All five have been given indiscriminately the meaning of "end of," although only the first and last carry, and indirectly at that, the meaning of "ending." The fish head and comb correspond to the word *xoc*, "count" or "sum"; the bracket, which is listed in Landa's alphabet with the value *u* is the possessive "of" but also converts cardinals to ordinals; the death eye and its sundry variant forms is without much doubt the symbol for *hitz'*, "death throes of," "demise of," and, by extension, "end of"; the hand symbol can be accepted with some assurance as the equivalent of *tz'oc*, "end of" or "completion of." Sometimes the hand appears as a prefatory glyph, and one of the affixes, usually the bracket, is attached to the period glyph. The whole then reads "completion of *n*th katun" (fig. 32,8). Thus by careful attention to variations we can enrich the translation, and pave the way for fresh decipherments; to translate all such expressions as "end of *n* katuns" is a sorry performance.

#### CONVERGENCE IN GLYPH DELINEATION

Elaboration of glyphs and the latitude allowed the sculptors occasionally cause some confusion, producing fortuitous resemblances between two distinct glyphs. There are cases where only the context serves to differentiate between the day signs Ben and Kan (figs. 6,53-58; 9,3-12). In the case of some head forms there is also a certain difficulty in distinguishing between different glyphic elements. Weathering, of course, is a much more serious cause of misidentification, but that can hardly be blamed on the Maya.

### MAYA GRAPHOLOGY

#### LANDA'S ALPHABET

For three-quarters of a century scholars have discussed whether Maya hieroglyphs represent a true writing or an embryo writing, and have argued as to whether the glyphs are ideographic or phonetic or are based on the rebus system or are a combination of all. The discovery of Landa's supposed alphabet raised high hopes of a rapid decipherment of the glyphic texts, but those hopes were soon dashed to the ground. All attempts to apply Landa's alphabet met with failure and the alphabet was pronounced a fraud.

There seems little doubt, as Valentini surmised (1880), that Landa pronounced the letters of the alphabet to an educated Maya, and the latter drew a glyphic element which resembled the sound. Not all the symbols are clear, but there is little doubt that that was how the famous

alphabet was composed. There is also no doubt at all that Landa was wrong in trying to extract a Maya alphabet from his informant. Maya symbols appear usually to have represented words, occasionally perhaps syllables of compounded words, but never, so far as is known, letters of the alphabet. Elements in the Landa list identifiable with varying degrees of probability are: a, *ac* (turtle); b, *be* (road); c, *Zec* (month sign); e, *elcl* (burn, cf. fig. 43, 53-55); h, *ach'* (apply pressure when tying something); ca, *cai* (fish; p. 146); k, *kab* (hand, deed, cf. fig. 42,58-61); p, *pek* (dog); pp, Xipe (a Mexican god); cu, element in *cuch*, "burden," glyph (cf. fig. 43,37,49,61); ti, *ti*, locative preposition used as an affix; u, *u*, affix meaning "of"; u, *u* (moon), conventionalized lock of hair, the main attribute of the moon goddess.

I myself have found the Landa alphabet of some value and confidently expect that it will be of aid in deciphering other elements, although in a manner very different from that which Landa supposed.

#### REBUS WRITING

The use of homophones (words with similar sounds but different meanings) seems to have been fairly general among the Maya. It also appears in Aztec writing, although, as Long (1935, pp. 25-26) has shown, it is far more prevalent in postconquest glyphic writing than in that of the pre-Columbian period. It survives among us as a children's pastime. For example, pictures of an eye, a tin can, waves, an ant, and a rose are decipherable as "I can see Aunt Rose."

The Maya language with its wealth of monosyllabic words and verbal roots was particularly well supplied with homophones. A few examples of rebus writing among the Maya will be given.

The word *xoc* or *xooc* in Yucatec is the name for a mythological fish. The word *xoc* also means a count, or the root of the verb to count. The head of a fish is the main element of a glyph which can only mean "count forward to" or "count back to" or something very similar, the direction varying with changes in affixes (figs. 2,43-45; 30,45-47). The evidence is too lengthy to be presented here, but there is little reason to doubt that *xoc* fish stands for *xoc* count (Thompson, 1944).

The general lowland Maya word for the moon is *u* perhaps *uh* in some dialects). *U* also is used before consonants as the possessive of the third person in Yucatec, eastern Chol, Tzeltal, and probably other dialects (*u col Juan*, "Juan's milpa," literally "his milpa Juan"). In Maya texts the moon sign usually refers to the moon itself, and in combination with numbers can give the age of the moon (figs. 36; 37). In one form it can also have the meaning of 20, and with numbers affixed can serve as a

short distance number (fig. 4,16-18). Occasionally, however, a moon sign appears with a hand before a period glyph (figs. 4,15; 32,2-5,7,11). There is no doubt that the hand is a symbol for completion, the whole signifying the completion of so many katuns or tuns; the moon sign, as here used, can not possibly have a lunar connotation, but must be read as a rebus for the possessive *u*. This may be used here to convert the following number from a cardinal to an ordinal, "the completion of the *n*th katun," or it may correspond to the possessive, "their completion, *n* katuns." In neither case would the moon sign have a lunar significance. There are other cases in which the moon glyph is used as the possessive (p. 40; figs. 2,59; 11,37-41).

The glyph for Bolon-Yocte (p. 56) presumably supplies another instance of rebus writing. The name probably means "Nine Strides," but *oc*, "stride," is represented by the head of the dog used for the day *Oc* (fig. 12,1-3).

The symbolic form of the tun is among the commonest glyphs of known meaning. As used in IS, distance numbers, and PE, it always represents the period of 360 days, called in Yucatec *tun*. Occasionally, this sign becomes a prefatory glyph or a prefix attached to a month sign (fig. 19,21-26). Elsewhere I have shown (Thompson, 1935, pp. 101-03) that when thus used, this *tun* affix (sometimes with the addition of its own affix) must mean completion of the month in question. I am indebted to Ralph L. Roys for suggesting to me the reason for this use: the word *tun* means in Yucatec not only "stone" (jade) and the 360-day period, but also carries the connotation of finality. Thus we find in the Motul dictionary "*tun*: *postpuesta a la primera dccion, ya o finalmente. Cimen tun, muerto ya, zame hoppoc in xachetic, ca tun chictahi ten, rato ha que començé á buscarlo y finalmente lo hallé.*" The San Francisco dictionary gives "*Finalmente. tz'ocbali tun, tu tz'oc tun.*" The Vienna dictionary has "*Ya no mas, u lahi tun, u nak, u xuli tun.*"

Mr. Roys, on supplying the above citations, comments, "Its most frequent meaning in my texts seems to be 'then, after that.' It can mean 'finally,' as per the dictionaries; often it seems to me to emphasize and put the seal on an immediately preceding word which has already expressed the idea of completion or something done. This, of course, is merely my personal view. Certainly *tz'oc tun* is a familiar term to me, but the most frequent expression is *ca tun* or *caa tun.*"

The *tun* sign used as a prefix with a month sign can be substituted for the so-called zero sign with the following month. The combination *tun Yaxkin* has the same apparent meaning as *o Mol*. Therefore it must mean *Yaxkin* ended, which is the same as *Mol* not yet started. The interpretation made independently of the glyph

agrees with one of the meanings of the affix. *Tun*, "360-day year," is, therefore, used in the sense of "end," another example of rebus writing.

The use of the frog or toad as a symbol for 20 is probably another case of homophonic substitution. In a number of Maya dialects, highland and lowland, the generic name for the frog or toad is *po*. In Yucatec a special variety of frog (*Rhynophrynus dorsalis*) is called *uo* and this same word denotes frog in Chaneabal. Yet there is a variety of toad called *ampo* in Yucatec, listed in the Vienna dictionary as Mr. Roys informs me. There seems little doubt that both *po* and *uo* are onomatopoeic words corresponding to the croaking noise emitted.

In Kekchi, Pokomchi, and Pokoman, Maya dialects of the Guatemalan highlands but occupying an area bordering on the lowlands, the moon goddess, who is also the goddess of weaving, is called *Po*. In Pokoman the month also bears the name *po*, and it is probable that this word was originally applied to the 20-day period known in Yucatec as the *uinal*. Mr. Aulie informs me that the Palencano-Chol word for full moon is *pomol*. The Yucatec name for the wife of the sun, who was also the goddess of weaving, was *Ix Azal-Uoh*, according to Lopez de Cogolludo. However, as the sun's wife was considered to be the moon in most parts of the Maya area, we can be reasonably certain that *Ix Azal-Uoh* was the moon. Thus we have *po*, "frog," and *po*, "moon" in one area (but except for the Palencano term for full moon, not that in which the glyphs presumably originated); *uo* and *po*, "frog," *po*, "toad," *uoh*, last name of a goddess who was almost certainly the moon in Yucatan. The word *po* seems to be connected with weaving, *Pot*, "huipil," in Chol, Kekchi, and Pokomchi; *poh*, "to sew something," and *potal*, "something connected with the huipil or dress of the natives," are Pokomchi words.

The Maya moon goddess, like other Middle American deities, seems to have had three names, an honorific title, a functional title, and a real name. Honorific titles are "The Lady" or "Our Mother" (Chaneabal, *hanantic ixau*, "our mother, the lady"; Chorti, *ca tu*, "our mother," a term used also to denote queen; Jacalteca and Mam, *xau*, "the lady"; Chuh, *ix cu chich*, "our lady [grand?] mother"; San Miguel Acatan, "our mother"; Lacandon *na*, "mother," and *ekna*, "star mother" (?); and Pokomchi, *atit*, "old lady").

Functional titles are less common. *Po*, as already noted, appears to refer to the moon as the lady who introduced weaving. *Ix Azal-Uoh* may also be a functional title. In the Ritual of the Bacabs *Ixchel*, who is almost certainly the moon goddess, is addressed as the virgin of the jade needle and reference is also made to her 13 balls of dyed thread. The real name for the moon appears to be *U* or

Uh. The highland name *ik* may be honorific since *ixik* means in Yucatec a woman of rank and in western Chol and Chontal a woman. *Ix* is the feminine prefix.

With three names available, one might become common in one dialect; another in some other dialect. Thus in present-day Yucatec the real name, *u*, remains. The functional title may have been *Ix Azal-Uoh*, as given by Lopez de Cogolludo, but the honorific title had disappeared. Another of her names, *Ixchel*, which perhaps means the stretched-out woman, may refer to an incident in the moon's life on earth. On the other hand, in Kekchi territory the functional title came into general use and appears to have supplanted the honorific title and real name. In Pokomchi both the functional and the honorific title were used in counting time, for we find both *hinah po* and *hinah r atit* given as the equivalents of one month; in Palencano *uh* is the usual name for the moon, but *po* appears to survive in the term *pomol*, "full moon."

Thus the absence of a title such as *Po* or *Uo* from the vocabularies of lowland Maya dialects is not a serious argument. These vocabularies were largely collected by Roman Catholic missionaries who were constantly on the watch for signs of heathenism. The less the informant said about titles of important deities, the better for everyone save his auditor.

In the hieroglyphic texts 20 days can be expressed by a moon glyph (p. 167; fig. 4,16-18), the head of a frog or toad (figs. 27,40-52; 29,1-4), or a geometric sign. In the lunar series the moon glyph can be replaced by an up-ended head which without much doubt also represents a toad or frog (fig. 37,11,36). The employment of the moon sign to represent 20 days is of very ancient usage since it thus appears in a distance number on the very early Balakbal 5. The Yucatec species *ampo* also suggests a connection between frog or toad and moon. The name would be translatable as "spider toad," but the moon goddess is also connected with the spider (Thompson, 1939, pp. 147-49). In short, moon sign and frog are interchangeable in the glyphic texts presumably because their names were once phonemes in the lowlands, as they still are in the northern highlands. Thus *po*, "frog" or "toad," is a rebus for *po*, "moon."

Other examples of rebus writing will be discussed in following chapters. There are excellent grounds for affirming that the Maya made much use of this kind of writing.

#### PICTORIAL GLYPHS

In the codices there are a considerable number of pictographic glyphs, for when we find glyphs shaped as fish or haunches of animals above scenes which show offerings

of fish or deer haunches we can hardly err in classifying these glyphs as pictographic (fig. 5,54-56,58-60).

A fairly common glyph shows the symbols for earth and sky arranged so that their contiguous edges touch at the right edge of the glyph, but diverge from one another to the left, forming an angular opening like the open jaws of a crocodile. In this wedge is set the sun glyph (fig. 31,41-51). This compound glyph has been variously interpreted as observation of sun at the horizon, daybreak, sun in the day sky, and sunset (p. 168). A Yucatec word for daybreak is *hatszab*. The Chol equivalent is given in the Moran vocabulary as *pazcab*, "de mañana," but again the Moran vocabulary often fails to distinguish between *z* and *tz* (there is an occasional shift from *p* to *h*). The Yucatec word *hatsz* means "to divide"; *cab* means "earth." There can be little doubt that in the Maya mind sunrise marked the cleaving of the earth, perhaps the division into sky and earth. The hieroglyph under discussion represents this action; the sun is in the cleft betwixt sky and earth.

A number of glyphs may be pictographic, although there is a possibility that they may eventually prove to be examples of rebus writing. The Yucatec name for the fourth month is *Zotz'*, and the corresponding glyph is the head of the leaf-nosed vampire bat, called *zotz'* in Yucatec and in most lowland dialects (fig. 16,35-44). This month may have been called the month of bats, or it may have had a name with some quite different meaning, but resembling the word *zotz'*. For instance, *zutzil* is given as the equivalent of winter in Moran's vocabulary of eastern Chol. Should that have been the meaning of the month, the bat head would be in rebus writing.

*Pop*, the name of the first month, means "mat" in Yucatec and in most lowland Maya dialects, and the glyph shows as its main element plaited rushes (fig. 16, 1-9). It thereby qualifies as a pictographic symbol, but there is also an ideographic element, since "mat" is a symbol of authority or overlordship in Maya because the chiefs sat on special mats or mat-covered cushions (corresponding to the West African use of the sunshade as a symbol of authority). Indeed, the word means chief in Pokomchi. Thus the first month of the series might well be named *Pop* because of the idea of elevated rank contained therein.

#### IDEOGRAPHIC GLYPHS AND GESTURE SIGNS

Some Maya glyphs can clearly be classed as ideographic. The hieroglyph for west is the back of a partly opened hand over the sun symbol. The hand in that position symbolizes completion or perhaps ending. "End of sun" is an ideographic sign for west. The Yucatec expression for west is *chik'in*, and sunset is *ocol kin*, "the entering

of the sun." West in Manche Chol is given in the Moran manuscript as *u yochib cin* (should be *kin*), "the entrance of the sun." Thus the glyph does not correspond to the spoken word but expresses a parallel idea.

The winged cauc glyph (figs. 5,40-46; 32,24-31,35-45) is used in the inscriptions to denote the passage of a certain number of 'tuns, but never in IS and never in combination with uinals and kins. It is probably the hieroglyph of the word *haab* or *hab*, which is used in a somewhat similar manner in the books of Chilam Balam. The cauc symbol which forms the main element of this glyph represents water, and is almost certainly a section of the body of one of the celestial dragons which send the rain; the tail part is one of the distinguishing marks of the sun glyph. Thus the glyph appears to symbolize rain and sun, that is to say the rainy and dry seasons, in other words the year.

The western and eastern Chol, the Chontal, the Kekchi, and the Pokomchi also call the year *hab*; the Tzotzil, Tzeltal, Chaneabal, and Jacalteca use the word *habil*. Tzotzil also uses *abil*; the Ixil word is *yab*. The general word for water or rain throughout the Maya group of languages is *ha* (rarely *a*). *Hab* means rain in Kekchi and shower in Cakchiquel, and the same word is given as water in Pokomchi. It is therefore probable that the word for year carries the idea of rain and the rainy season, just as the glyph does.

The glyph in its more usual form, as already noted, seems to combine symbols for the rainy and dry seasons, but the addition of the latter appears to be an afterthought, perhaps for the purpose of avoiding confusion with other glyphs. The evidence for this assertion lies in the existence of another cauc glyph without the wing (but with a prefix), which also means year (fig. 33,27-32).

Glyphs for the tun (year of 360 days) supply interesting examples of ideographic writing. The commonest head form for the tun is the profile of the Moan bird (fig. 27,29,34,36-39). These creatures, the Yucatecan screech owl or horned owl, were believed to be set in the sky above the celestial dragons, and to participate with the latter in the task of sending rain to earth. In fact, the Yucatec word *moan* means shower. As the year carried the idea of rain or rainy season, it was perfectly logical to use the head of the Moan bird to represent it (p. 145). Another head form of the tun is that of a snake, which, because of its association with water, carries the same connotation (figs. 27,28,30-33,35; 28,12,16,17).

The symbolic form of the tun sign is also in part ideographic. One of its elements is the sign for jade. Jade was "the precious thing," and among the Mexicans,

and doubtlessly, too, among the Maya, a ritualistic name for rain or water because rain was so essential for the crops. Thus the use of this jade symbol in the tun sign once more demonstrates the association of the year with the rainy season. In full confirmation of this identification, it may be remarked that *tun* means jade (p. 144).

The jade symbol, as a sign for rain, "the precious thing," is also used to form the day sign Muluc, which corresponds to the Aztec day Atl, "water." Again, the day Muluc has as its guardian the *xoc* fish. This *xoc* fish, as already noted, is used as a rebus for *xoc*, "to count." The symbolic form corresponding to it is again the jade sign because water and the *xoc* fish were already closely connected through their identification with the day Muluc, and perhaps because the *xoc* deity also sent water to mankind. With growing knowledge as our guide, we shall tread such trails with surer foot.

Religious symbolism is the basis of many ideographic glyphs. For example, shells, particularly the conch and other univalves, symbolize the earth, the underworld, and the realm of the dead situated therein. Shells added as a prefix to the glyph of the sun convert that deity to his nocturnal form, as lord of the night, because during the night the sun was believed to travel through the underworld from west to east to reach again his point of rising in the east. Similarly, a conventionalized univalve shell, inverted and flanked with additional elements (fig. 41,28,31,34,36), is the glyph for south on the monuments (but not in the codices), because that direction is under the guardianship of the death god, the lord of the underworld. Again, the glyph for day commonly used in lunar calculations and in distance numbers is a conventionalized shell because the count appears to have been by nights or sunrises (fig. 31,1-9; p. 174).

The glyph for Caban, "earth," is the glyph of the moon goddess, with a lock of hair as its most prominent feature (fig. 10,1-15), because in Maya (and also Mexican) mythology the moon goddess was also an earth goddess (fig. 14,18,23,24). Many other examples of ideographic glyphs will be noted in succeeding chapters, and I feel that were our knowledge of Maya mythology more extensive, a great number of other ideographic glyphs based on legendary incidents or associations would be identifiable.

Some elements may have either a direct or an ideographic meaning, depending on their use. Thus, the symbol for black may represent black as opposed to some color, or it may be found on glyphs connected with denizens of the underworld, not to denote that they are black, but to show that they are connected with the world of darkness. Similarly, vegetation may represent actual growth or it may be a symbol of the earth and the underworld. As the latter it sometimes replaces the shells

as a prefix to the glyph of the sun god to indicate that it is the night sun, the lord of the night, who is under discussion. As the former, it may, for example, be shown emerging from the kan glyph, the symbol of ripe maize and of maize seed. Likewise, the jade symbol may denote the actual jade in addition to its secondary meaning of rain, and its tertiary meaning of year. Thus, a straightforward division of glyphs into ideographic and pictorial is not possible.

There are a few signs which derive from gestures. The back of the outspread hand in a horizontal position or at an angle of 45 degrees signifies completion. A thumb or single finger stands for one. Possibly the open hand pointing downwards signifies completed, a past participle form. I suspect, but cannot prove, that the hand in a vertical position has a different meaning. It occurs in this position with Manik, which so far as is known has no connection with completion. The hand is also the main element of various glyphs of the action group (p. 265), which may derive from gestures.

#### PLACE NAMES AND PERSONAL NAMES

No glyphs representing the names of persons (other than gods) and places have been identified. That glyphs of personal names existed is shown by a statement by Oviedo y Valdes (1851-55, 3:246), which has been cited by Genet (1934b, p. 41) to the effect that beehives were identified by the marks of the individuals who owned them. This can hardly mean other than the glyphs of the owners' names. There is inconclusive evidence that persons of importance had their name glyphs tattooed or painted on their arms or hands. Landa (Tozzer ed., p. 40) states that Ah Kin Chel "wrote on the fleshy part of his left arm certain letters which were of great importance and such as to be respected." Similarly in Chumayel we read of a certain Uooh-puc, "There was a glyph written on the palm of his hand. Then a glyph was written below his throat, was also written on the sole of his foot and written within the ball of the thumb." Here attention is probably drawn to the glyphs because the man's name contained the word for glyph (*uoooh*). On the Bonampak murals one warrior has glyphs painted on his arm; another has them on his thigh.

One of the very few place names concerning which there is any glyphic information is Campeche, called in Maya Campech. The author of the *relacion de Chunchu y Taby* (*Relaciones de Yucatan*, 11:146) writes that Campeche is the name of an idol which had on its head as insigne a curled-up snake with a tick on its head. This precisely corresponds to the name, for *can* is

snake and *pech* is tick (*n* not infrequently becomes *m* before a labial). It is possible, but not probable, that the god was an anthropomorphized blending of a snake and a tick, although such a deity would hardly reflect much dignity. It is therefore likely that *campech*, "snake tick," is a rebus glyph worn in the headdress of the god and later adopted as the glyph of the town.

It is possible that titles of rank, individual names, and names of groups, perhaps even of totemic clans, eventually will be recognized. They may occur in the short panels of glyphs accompanying figures on murals and polychrome pottery or the minor glyphs, often incised, on some stelae and lintels, notably at Piedras Negras.

The glyphs for various gods found in the codices will be discussed in the following chapters. Several of the better-known deities have two glyphs, one a pictorial representation, the other a symbolic form, perhaps corresponding to a ritualistic name or an attribute. Thus the symbolic form of the glyph of God B has as an infix part of a hand, reminding one of the title of Kabul, "he of the working hand," applied to Itzmna and perhaps other deities.

#### SENTENCES

In deciding what is a sentence, one must remember that the distinction between noun and verb is vague in many of the Maya stems, many verbs are really nouns used with the possessive pronoun as subject (Tozzer, 1921, p. 9). Gender is absent except for particles attached to some nouns. In the opinion of Ralph L. Roys, tense is of much less importance to the Maya than to us. This blending of verb and noun may well be reflected in the hieroglyphic writing. The posterior date indicator is associated with distance numbers. The prefix is the adverb forward; the main element expresses the idea of count; the postfix is the preposition *ti*, "to, at or from" (fig. 30,42-47). The whole, therefore, reads "count forward to" and shows the direction in which the distance number is to be reckoned. The elimination of the prefix and the addition of a second postfix changes the meaning to "count backward to" or something very similar (fig. 30,37-41). The central element pretty clearly corresponds to the word *xoc* which can be a noun, or the root of a verb derived therefrom. We can not say which it is, and I do not suppose that the Maya would have attempted to do so. On the other hand, I doubt that the Maya could or did add other affixes to take care of pronouns or to express tenses. In other words, they could give a number of tuns, uinals, and kins, followed by the glyph meaning "count forward to," but I suspect that they had not evolved elements to record "you counted forward to," or "we shall count forward to," although,

having a glyph for the pronoun of the third person, they could have written "his count forward to."

The interchangeability under certain circumstances of the positions of affixes shows, I think, that the arrangement of glyphs and the elements which compose them does not always correspond to the order of the spoken word. There are two identified (and other suspected) affixes representing the possessive pronoun *u*. One of these, the bracket, is nearly always a prefix; the other, the lunar glyph, is usually a postfix. However, in spoken Yucatec the possessive pronoun *u* precedes the object possessed, and the possessor comes last, e.g. *u pek uinic*, literally "his dog man" (the man's dog). When therefore, as in the case of the shift of prefixes on Dresden 13b-14b (p. 40), we find that the *u* prefix, probably used as a nominal pronoun with a verbal stem, is moved in the last three clauses of the almanac to the second glyph, and changed from the prefixal bracket form to the postfixal lunar form, we can feel reasonably sure that in the second case the sequence does not correspond to that of the spoken word. Similarly, the attributive *il* in the speech of Yucatan is always a suffix, whereas in glyphic writing it can be either a prefix or a postfix (p. 285).

The short clauses on the monuments which record the world direction to which the haab (year of 360 days) belonged, usually consists of two glyphs. The first records the point of the compass; the second is a compound comprising the cauac (haab) glyph, the "down-balls" prefix of unknown meaning, and the symbolic form of the count glyph (fig. 41, 5-8, 19, 20, 28, 29). The whole clearly means "the east (or north, west, or south) the count of the year," and corresponds to *u xocol haab ti lak'in*, "the count of the year to the east," as given in Mani. However, in the texts, the order of the haab and xoc glyphs can be reversed, so one can perhaps conclude that the order of the glyphs is not supposed to correspond without deviation to the spoken sentence, but that all the essential parts are given so that the reader could arrange them and supplement them with speech particles (e.g. the possessive *u* in this clause) not represented in the text, to correspond to the spoken word, whether the reader was a Yucatec, Chol, Tzeltal, or Chontal priest.

#### MAYA COUNTING

All Maya dialects and languages made use of a vigesimal system for general purposes of counting. Twenty units of the first order made one of the second order. Twenty units of the second order made one of the third order, and so on.

There is no specific name for the first order, for the Maya use a large number of numerical classifiers to indicate the nature of the object that is being counted just

as we speak of three head of cattle, two lengths of cloth, etc. The numerical classifier is a suffix attached to the numeral. Tozzer (1921, p. 290) lists some 80 examples in Yucatec, and other Maya languages and dialects are equally rich in these suffixes. These numerical classifiers are reduced to a very few in the second order and disappear with the third order.

The general unity in Maya numeration is illustrated in Table 1. The representation of Maya dialects or languages could be increased, but without revealing any different arrangements or tendencies. I have taken the liberty of standardizing the spelling in some cases and of not giving every unimportant variant.

It is noteworthy that the names for numbers 1-10 are approximately the same in all languages, but that the numbers 11 and 12 are distinctive names in the lowlands, whereas in highland languages and dialects they are formed by combining the words for 10 and 1 and 10 and 2 respectively. Exceptions in the lowland groups to this system are in eastern and southern Yucatan and some western Chol vocabularies. Starr (1902) and Tozzer (1921) report that the words for 11 and 12 in the Valladolid and Tekax regions of Yucatan are *hunlahum* or *unlahun* and *calahun* respectively, that is to say they follow the highland style of combining the two digits. The same is true of western Chol (Palencano) vocabularies collected by Stoll (1938) and Marcos Becerra (1935), but not of vocabularies from the same group made by de la Fuente Albores (1789, reproduced by Fernandez and Fernandez, 1892), by Sapper (1897), and by Starr (1902). As Huastec conforms to the highland system in that respect, it is not improbable that the lowland groups (including the Maya peoples of Chiapas) coined these separate terms for 11 and 12 after they had separated from the Huastec and from the highland groups. That the personified glyphs for those numbers do not combine with that for 10 (p. 135) is evidence that the glyphs are of lowland origin.

All Maya languages, so far as is known, parallel English in compounding the two orders to form the numbers 13-19, inclusive. All Maya languages start the second order with 20. In Yucatec, Chol, Chuh, and Jacalteca the word for 20 is *hun kal*, "one score," but several dialects, both highland and lowland, call 20 *hun uinic* or such variations of it as *hun uinac*, literally "one man." Nevertheless, in some highland languages where *kal* does not occur with 20 it reappears as *ox kal*, "60" (Mam, Ixil, Aguacatec, Quiche, Uspantec, Kekchi, Pokomchi, and Cakchiquel), and again, in most cases as *ho kal* or *o kal*, "100." At first thought *kal* and *unic* (together with the rarer *mai*, *tab*, and *tom*) would appear to be no more than different numerical classifiers. Nevertheless, the



TABLE 1—NUMBERS IN VARIOUS MAYA LANGUAGES

	YUCATEC (BELTRAN, KAUA)	CHOL (MORAN; SAPPER, 1897; BECERRA, 1935; AULIE)	TZELTAL (V. PINEDA, 1888; SAPPER, 1897; BLOM AND LA FARGE, 1926-27)	TZOTZIL (RODAZ, 1688; SELER, 1901)	CHANEABAL (BERENDT, 1870; SELER, 1901; STOLL, 1884)	KEKCHI (THOMAS, 1901; BURKITT, 1902; WIRSIING, 1930)	POKOMCHI (SAN CRISTOBAL CAHCOH VOCABU- LARY; THOMAS, 1901)	QUICHE (STOLL, 1938; SAPPER, 1891; THOMAS, 1901)	MAM (STOLL, 1938; THOMAS, 1901)
1	hun	hun	hun	hun	hun	hun	henah, hun	hun	hun
2	ca	cha	che(eb)	chi(m)	cha	ca	ci, ca	ci	ca
3	ox	ux	ox	ox	ox	ox	ux, ix, ox	vuox	ox
4	can	chuum, chan	chan	chan	chan	ca, cah	cih	cah	ciah
5	ho	hoo, o, oo	hoo	ho	ho	o, ho	ho	ho	ho
6	uac	uöc	uac	uac	uac	uac	uac	uac	uac
7	uuc	huc	uuc, huc	huc	huc	uuc	uuc	uuc	uc
8	uaxac	uaxöc	uaxac	uaxac	uaxac	uaxac, uahxac	uaxac	uaxac	uaxac, uahxac
9	bolon	bolon	balun	balun	balun	bel(eb), belo	beleh	beleh	belehuh, belhuh
10	lahun	luhum	lahun	lahun	lahun	lah(eb)	lah	lahuh	lahuh
11	buluc	buhluch, hun e luhum	buluch, muluch	buluch, baluch	buluch, bulu, huluch	hun lahu	hun lah	hu lahu	hum lahu
12	lahca	lahchöm, cha e luhum	lahche, laschai	lahcha	lahcha, lahchan	cab lahu	cab lah	cab lahu	cab lahu
13	ox lahun	ux e luhum	ox lahun, ux lahun	ox lahun	ox lahun	ox lahu	ox lah	ox lahu	ox lahu
14	can lahun	chum e luhum	chan lahun	chan lahun	chan lahun	ca lahu	cah lah	cab lahu	ciah lahu
15	höl hun	ho lum	ho lahun	ho lahun	ho lahun	vo lahu ho lahu	ho llahuh	o lahu	ho lahu oo lahu
20	hun kal	hun kal	tab, tap	hun uinic, tom, tob	hun tab, lahun- tabh	hu mai, hun mai	hun inac, hu uinac	hu vinac	huing, vuincim
30	lahu ca kal	luhun cha kal	lahunes- cha uinic	lahun- cha uinic	lahunes- cha uinic	lah x- ca kal	lah(eb) ni- ca uinac	hu vinac- lahuh	lahuh cauinac
40	ca kal	cha kal	cha uinic	cha uinic	cha uinic	ca kal	ca uinac	cavinac	ox kal
60	ox kal	ux kal	ox uinic	ox uinic	ox uinic	ox kal	ox kal	ox kal	ox kal
80	can kal	chun kal	chan uinic	chan uinic	chan uinic	caa kal	ca uinac	hu much	hum mucx, hu much
100	ho kal	ho kal, o kal	hol uinic, hoo uinic	ho uinic	ho uinic	ho kal	ho kal	o kal	o kal, ho kal
200	lahun kal	luhun kal	lahun uinic	lahun uinic	lah uinic	lah kal ho tuc, hun lah	ho tuc	o tuc	o chuc
400	hun bak	hun bakh hun bak	bak	bok, hbok	hun xan	hun okob ca(ib) lah	hun icom	o much	o mucx, o much
800	ca bak	cha bakh	cha bak	cha bok	cha xan	ca(ib) okob	ca icom	ca go, ca ko	lahuh much
8000	hun pic	hun pik, hun kal ti bak	pic tabuc bak	hpic, pic	hun hiquipil	hun chin, hun mai	hun chui okob	hu chuy	.....
160,000	hun calab	.....	bak baketic	.....	.....	hun calab	un cilab	.....	.....

regularity of the use of *kal* compounded with *ox* and *ho* or *o* to represent 60 and 100 suggests something more than chance. I can offer no explanation.

Typical of Maya speech is that numbers beyond two-score are counted as so many on the next score. Fifty for example is called "ten on (or to, or lacking to) three-score"; 41 is "one on (or to, or lacking to) threescore." Similarly two and a half is called "half on (or to, or lacking to) three." We shall find this system reflected in the use in hieroglyphic texts of the glyph for a half period, which is not infrequently followed by the next highest number (p. 192).

There are traces in several highland languages or dialects of a count by 40's and 80's. Thus in Quiche, Cakchiquel, Pokomchi, Kekchi and Mam 200 is called *ho* (or *o*) *tuc* or *chuc*, i.e. five *tuc*. Brasseur de Bourbourg (1862) says that *tuc* appears to signify a certain herb, and has also the meaning of 40; Beltran (1859) notes that *tuc* has in Yucatec the meaning of "to count heaps" or "to count by heaps"; the Motul dictionary has for *tuc*, "heap of small things brought together such as salt, earth, stones, fire-wood, etc." The author of the Pokomchi dictionary of Cahcoh (pp. 443v, 490v) notes that this term for 40 is used only for counting cacao, wild cacao

(*pataxtle*), chile, and ears of corn, but with the number five prefixed (i.e. as 200) "*este se dice ad omnia generaliter.*"

For 80 we find in Quiche, Cakchiquel and Mam *humuch*, *humuch*, and *hum mucx* or *humuch* (one *much*) and for 400 in the same three languages *o much*, *o much*, and *o mucx* (five *much*); the Motul dictionary defines *much'* as "in composition many together" and "pile of grains and small things. *Hun much' ixim.*" The last means one pile of maize.

There is no way of judging whether the Yucatec used *tuc* and *much'* in a vague way or defined them as heaps of 40 and 80 small objects. The word *tuc* occurs once in connection with a time count in Chumayel, for in a rather obscure passage with reference to a Katun 3 Ahau there appears the expression *oxtuc ti hab*, "three heaps of years." However, there is no way of telling whether this means three years, three heaps of years, or 120 (3×40) years. At any rate this counting by 40's and 80's undoubtedly was much more highly evolved in the highlands, and may have been a local development which never reached the lowlands.

The third order (400) is called *bak* or *bök* (the western lowland shift from *a* to a sound between *o* and *u*) in all recorded examples from lowland languages except Chaneabal, which unaccountably has *xan*. One can, therefore, be fairly certain that *bak* was the word in use in the place and at the time Maya hieroglyphic writing was produced. Kekchi and Pokomchi have respectively *okob* or *ocob* and *icom*; the Quiche word is *go*, not reported as 400, for that is given as 5 *much*, but appearing as *ca go*, "800," *oxo go*, "1200."

For the fourth order (8000) we have *pic* in Yucatec and Tzotzil: *pic* or *tabuc bak* (20 *bak*) for Tzeltal; and *chui* in various highland languages. The Chaneabal *hiquipil* is a direct borrowing from Nahuatl.

The fifth order (160,000) is termed *calab* in Yucatec and Kekchi; *cilab* in Pokomchi, and *bak baketic* (400 *bak*) in Tzeltal. It is interesting to note that the first syllables of *calab* and *cilab* mean "two" in the respective languages in which the words occur. This, however, may well be coincidence, since the number two could scarcely be involved. The Cahcoh vocabulary also gives *ca quilab* as 320,000.

Vicente Pineda (1888, pp. 155-72) gives the terms *tab sbak baketic*, *mam*, *mechum*, and *muculmam* for the Tzeltal equivalents of 3,200,000, 64,000,000, 25,600,000,000, and 10,240,000,000,000.

Yet another unit, 200, occurs in Kekchi according to the Wirsing dictionary, where the words *hun lah*, *caib lah*, *oxib lah*, *cahib lah*, *hoob lah*, and *laheb lah* are listed for 200, 400, 600, 800, 1000, and 2000 respectively, but

there are alternatives for expressing these numbers. The number 200, for instance, can be translated as *laheb kaal* (10 *kaal*), *ho* or *hoob tuc* (5 *tuc*), or *hun lah* (1 *lah*). Similarly for 400 one can say *laheb tuc* (10 *tuc*), *caib lah* (2 *lah*) or *hun ocob* (1 *ocob*). The term *lah*, as used for 200 and its multiples, presumably is a contraction of *laheb kaal* (tenscore). Again, the possibility must be borne in mind that these terms *tuc*, *much*, and *lah* were originally restricted to the count of certain articles, but have attained a wider use owing to the breakdown of the old systems of counting. It is worth noting that all three are multiples of 20, and therefore were probably developed within the framework of the vigesimal system.

This brief summary of names for higher numbers in several Maya languages and dialects suggests that counting in scores of millions may not have been restricted to the sacerdotal class, but may have been employed also in commercial transactions, perhaps in reckonings of cacao beans. That, in turn, implies the use of standard measures of weight or volume, with a sack or load of given weight or content representing a higher unit in the arithmetical count. One is amazed at the mastery over tremendous numbers implied in the various terms for higher units which have survived. Surely no other people on a comparable level of material culture have had such a concept of vast numbers, and a vocabulary of terms for handling them.

It has been suggested that as *lah* means completion and *hun* one, *lahun*, the word for 10 in most Maya languages and dialects means one completed. From this it has been deduced that the Maya system once had a decimal basis. It has further been suggested that the one completed refers to the 10 fingers. The proponents of this theory fail to note that if *lahun* means one completed, the word for 12, *lahca*, must similarly mean two completed. If 10 marks one completion, 12 can scarcely be two completions. Furthermore, one completion would normally be written *hun lah* not *lah hun*.

It would appear more likely that *lahun* means not one completion, but a completion plus one, and *lahca* a completion plus two. As a rule added digits are prefixed in Maya (e.g. *ox lahun*, "three and ten"), but in Huastec we find the reverse (e.g. *lahu ox*), suggesting that in the developmental stages of the language the added digit could equally well appear as a suffix.

On the above assumption the first completion is not 10, but nine; the second is not (twice) six, but 10. Nine is a number of the greatest ritualistic importance in Maya. There are nine lords of the underworld, and almost certainly nine underworlds. Nine is commonly used in magic and medicine as a lucky number, and caches frequently contain nine offerings. Various Maya deities have the

number nine in their names: Bolon-Mayel, Bolon-Tz'acab, Bolon-Hacmatz, Ah Bolon-Yocte, Ah Bolon-Caan-Chaac, Bolon-Hobon, and Cit-Bolon-Tun in Yucatan; and Bolomac among the eastern Chol. The deified days 9 Imix and 9 Kana are regarded as tribal ancestors by the Jacalteca, and the day 9 Toh was an important god of the Cakchiquel. Among the Ixil one picks a day with a coefficient of 9 or 13 to send one's nagual into another person. Also in the interrogation of the chiefs in Chumayel the novice replies to the question as to when he prays: "On the ninth day and on the thirteenth day: it is to Bolon-ti-Ku [nine lords of the underworld] and Oxlahun-ti-Citbil [thirteen sky gods] that I count my beads."

Redfield and Villa note that *bolon* also has the meaning of uncontaminated, something which is apart or with which man has not been in contact. *Bolon* also implies, I think, the idea of the superlative. For example, *pixan* means lucky, fortunate or happy; *ah bolon pixan* is a man who is lucky or fortunate. *Hobon* combined with the words *pucziqal* or *ol* ("heart," "soul") means clever, wise or inventive; *ah bolon hobon* is one who knows many trades and one who is very clever in one trade; *ah bolon maqap*, "great hunter." *Tz'acab* means lineage, but *Bolon-Tz'acab*, the name of an important god, is translated in the Motul dictionary as a thing without end.

The use of the lucky nine in inscriptions is well illustrated by the IS of Altar 1, Uxul, which reads 9.9.9.18 9 Etz'nab 16 Zac. I feel that this date must have been chosen because of its lucky or divinatory aspect.

I think, therefore, that it is not impossible there was once a count of nine, and 10 was one over the completion of that count. Later, 10 may have become important as a count of fingers, and 12 was then called one completion (of the finger count) and two. Twenty was one man presumably because fingers and toes reach 20. After all, languages grow in a somewhat illogical manner; they are not composed in any ordered arrangement. In English we have traces of counting by 7's, 10's, 12's, and 60's, and historical evidence of importations of these sundry conflicting systems. There is no reason to believe that Maya counting was an orderly and autochthonous growth. Reckoning by 9's, 10's, 13's, and 20's may have arisen among a number of neighboring groups and as a result of mutual influences a tally by 10's replaced one by 9's, and at the same time or later a count by 20's may have come into vogue. The decimal system seems to have been transitory in all Maya languages and dialects and there are no traces of a decimal count in the hieroglyphic texts. Huastec, it is true, enumerates 100's by the decimal system, but as lower numbers are counted in the vigesimal system, and the term for 100 means five 20's, we can be

reasonably certain that the old vigesimal system has been modified in the higher, and therefore less frequently used, numbers as a result of European contacts.

I see no evidence that the Maya count ever had a quinary basis; there is no linguistic evidence for a system of that type. In the hieroglyphic texts there is much emphasis on the 5-tun and 5-katun intervals, but I am convinced that this emphasis is because these are quarter periods, and are stressed just as the 15-minute interval is of importance in our own civilization merely because it is a quarter of an hour. There is no emphasis on the 5th, 10th, and 15th uninal because these are not quarters of a tun. Had the number five had importance in its own right as a unit in a quinary system, one would presumably find the 5, 10, and 15 uninals stressed.

The hieroglyphic texts reveal evidence of counts by 7's, 9's, 13's, and 20's, but all, save the last, appear to have a ritualistic origin. There are also special glyphs used when recording five or seven days, and a corresponding linguistic term in many Maya languages or dialects. It is not improbable that this term refers to the interval between markets (p. 170; fig. 31,33-36).

#### NUMERICAL CLASSIFIERS

The books of Chilam Balam supply many examples of the uses of numerical classifiers in time counts, illustrating entries in various dictionaries and grammars. It must be remembered, however, that these were for the most part written or copied in late colonial times when the old usages were losing their value. Below are listed the principal numerical classifiers.

**Te.** The Motul dictionary says this was used for counts of years, days of the months, leagues, cacao, calabashes, and eggs. Examples show that when used with *tu* (contraction of *ti u*) the number changes from an ordinal to a cardinal. Examples in the various books of Chilam Balam and the Chronicle of Oxkutzcab: *oxlahunte ti katuns*, "13 katuns [they reigned]"; *oxlahunte katun u cuch*, "13 katuns was the burden," but *oxlahunte katun catac uacppel haabi*, "13 katuns and six years [it took to build the mounds]"; *buluc Hix tu hunte Pop*, "11 IX on first of Pop"; *tu bulucte xul*, "on eleventh of Xul"; *uucte hab qintunyabil*, "seven years of drought"; *tu holhunte (tun)*, "in the fifteenth [tun]."

**Pix.** The Motul dictionary says of *piz*, "count for days and years and reales." It also has the meaning of ordinary, common, simple, without malice. It is used with katuns, tuns, haabs, and European months. Examples are: *cankal haab catac lahunpiz haab*, "fourscore years and ten years"; *lahunpiz katun*, "in katun 10 [was established]"; *tu uucpiz tun uaxac Ahau u katunil*, "in the seventh tun [or tun 7?] of Katun 8 Ahau"; *bulucpiz Junio*, "eleventh

of June." The substitution of *tu* for *ti* probably converts *piz* into an ordinal.

**Ppel** is a general classifier for numbers. The Motul dictionary says "general count for everything there is" and also gives the meaning "only," "not more than." Perhaps it corresponds to our "no more no less." It is used with the kin, tun, haab, katun, and Spanish time periods: *hun ppeł katun*, "one katun"; *uacppel hab u binel*, "six haab shall pass until"; *uucppel kin ichil hunppel semana*, "seven days in one week." It is very likely that the use of *ppel* with periods of time arose in colonial times, and is part of the general decay in the use of numerical classifiers which has continued to this day.

**Tz'it.** The Motul dictionary lists this as used for counting candles, thin rods, or spindles, and cotton or silk threaded on a needle. To this list the Pio Perez adds, "particle for counting long things such as candles, sticks, sections of cane, ears of young corn, etc., and also persons." Beltran (1859) adds to the list mamey apples, bananas, and alligator pears, although the mamey apple and alligator pears hardly qualify as long. The books of Chilam Balam use the particle occasionally with katun and tun: *u bolontz'it katun*, "the ninth katun [of the count]"; *huntz'it tunil*, "in the first tun." I have the impression that *tz'it* may be used as a numerical classifier only when reference is made to the position of a katun, tun, or other period within the round of 13, that is to say in the rotation of Katun 11 Ahau, 9 Ahau, 7 Ahau, etc., or the equivalent rotation of the tuns. On page 17 of Chumayel there occurs the phrase *huntz'it katun yanobi*, which Roys (1933, p. 81) translates, "They were there one katun." The incident refers to the Spanish occupation of Campeche which started in 1531 (the text has 1513). Twenty tuns counted from 1531 would fall largely in Katun 11 Ahau, which, if the suggested explanation is correct, would be the *huntz'it katun* of the new round of the katuns which started in 1539.

On page 13 of Tizimin is the expression *tu tz'oc katunob u uutz' huntz'it katun* which is translated as "at the completion of the katuns, the fold of one katun." The whole passage ostensibly treats of a Katun 5 Ahau, but there is fair evidence that the seventeenth-century scribe transferred a prophecy from a Katun 11 Ahau to a Katun 5 Ahau. Katun 11 Ahau would be the first of the cycle of 13 katuns. The passage may, therefore, well mean "from the completion of the katuns, the fold of the first katun [of the new series]."

In the katun prophecies *tz'it* is used with the number giving the position in the sequence of 13, thereby greatening the possibility that the suggested interpretation of *tz'it* may be correct.

**Tic.** The Motul dictionary defines *tic* as something

which is untied, such as bundle or a load. It occurs in the story of the birth of maize in Chumayel: *ix huntic, catic, oxhuntic*, which Roys (1933, p. 108) translates "the first, the second, the thirteenth unfolding." Later in the text we are told that the only son of God, God the Father, and Expleo-u-caan were born in the *huntic, catic, oxtic* katuns. This might mean the first, second, and third katuns, but it is also possible that it refers to three different creations of the world, since there appears to be a reference to the final creation at the bottom of the same page. This affix, therefore, in all probability has a purely mystica sense, and can be ignored so far as the calendar is concerned.

**Tuc.** This occurs once in Chumayel. It may mean 40. *Oxtuc ti hab* would then be "120 haab" (p. 53).

From the above it would appear that *te* and *piz* were more or less interchangeable as numerical classifiers with the counts. When *tu* (*ti u*) precedes them they are, it would seem, converted into ordinals. This interchangeability may, however, be due to decline in the strict use of numerical classifiers in colonial times. A copyist may sometimes have retained the original classifier and at other times may have changed it to conform with the usage then current. In pre-Spanish times there may well have been a definite distinction. *Tz'it* may refer to the position within a re-entering cycle, and would be used as an ordinal. The use of *p'el* with dates may, one suspects, be a colonial innovation. *Tic* and *tuc* probably have a significance not at present apparent. Finally mention should be made of *tzuc* which appears to indicate a fraction. In the Chronicle of Chicxulub (1882, p. 216) there occurs the expression *u hotzuc ca culhi ah buluc Ahau lai katun*. This has been translated as "the fifth division of Katun 11 Ahau had been placed." It has, furthermore, been assumed that the said division is a tun. This last, however, is open to question, although probably correct.

The affix *il*, sometimes attached to the coefficients of day names, is the possessive or rather the relationship termination, showing that the word to which it is attached belongs to or is related to the word that follows. That is to say, it affirms the close connection between the coefficient and the day name. The glyphic affix corresponding to *il* has now been identified with considerable certainty (p. 285).

Numerical classifiers have not hitherto been recognized in the glyphic texts. Nevertheless, it is reasonably certain that the sign which Beyer calls "greenstone disk and teeth element" is a classificatory affix with the meaning of *te*. I designate it *te* (1) since there are two other elements, termed *te* (2) and *te* (3), apparently with the same phonic value. *Te* (1) occurs not infrequently in the inscriptions with period glyphs and with month signs,

but never with day signs. Thereby, it conforms to the use of *te* in the books of Chilam Balam. Its position is almost invariably between coefficient and glyph (fig. 2,15-23). It is found with 9 baktuns (Copan 6, 19; Tila B); with 2 tuns (Copan T 11); with 1 tun (Yaxchilan 11; fig. 56,6); with 8 uinals (Copan Z); with 4 uinals (Xcalumkin IS); with 3 uinals (Copan HS, Date 1); with month signs (Copan 1, 7, C, G, J, M, N [pedestal], HS, Dates 21, 34; Yaxchilan 11, 19, L 3, Str 44; Quirigua G, P; Palenque Olvidado; Calakmul 9; Yula 1; Halakal 1; Naranjo 10; and La Amelia HS). I make no doubt there are other examples. There seems to be no rule governing the presence or absence of this element; it may have been inserted to obviate possible distortion of the glyph when a low coefficient would have left a somewhat elongated space for the glyph, for it usually appears with bar and dot coefficients of 5 or less. However, there are rare cases in which it accompanies 8 and 13. It does not occur with period glyphs or month signs in the Dresden, where space was always at a premium, but *te* (3) is present once in Madrid (66a) with 13 tuns.

*Te* (1) appears five times in the codices as a postfix to the head form of Oc, and in each case there is a coefficient of 9 (fig. 12,16,17). I think we can safely read this glyph as that of a rather obscure deity, Bolon-Yocte, whose name may mean "9 strides," the *y* before *oc* probably being the possessive. Bolon-Yocte is mentioned in Chumayel, Perez, and Kaua as patron of Katun 11 Ahau and in connection with the second year of the Tizimin prophecies. On Dresden 60 his glyph appears in a short text dealing with a Katun 11 Ahau (the affixes of 11 Ahau indicate a katun count; p. 200) confirming the identification of the glyph. However, his glyph is also recognizable on Paris 7 and 8, which treat of Katuns 5 Ahau and 3 Ahau. This does not weaken the identification, for the patrons of the katuns in Paris are not in agreement with our information from Yucatec sources. There is a variant form of this glyph on Madrid 70b.

The fact that *te* (1) is placed not between numeral and glyph, but as postfix to the Oc head is interesting, because the order thereby agrees with that of the syllables of the god's name, 9, Oc, *te*; as a numerical classifier with periods and months, its position between numeral and sign similarly reflects the spoken word, 3, *te*, Pop. Its presence with period glyphs and month signs taken in conjunction with its absence from day signs is strong evidence that we are dealing with a numerical classifier; its uses in other contexts strengthen the case for identifying it as a symbol for *te*.

*Te* (1), like the other *te* affixes, occurs with glyphs which do not have a numerical coefficient. This is understandable, for *te* is a word with sundry meanings (p. 283),

and the affix is often used in an attributive sense to indicate a connection with vegetation. Indeed, the sign appears to have developed from the vegetal motif which forms the headdress of God E, god of vegetation in general and of maize in particular.

Among other things *te* signifies tree, and the affix *te* (1) is used in that sense. On Dresden 30c-31c (fig. 62,1,2) are pictures of God B seated on a tree, and the corresponding text in each compartment contains the glyphs of God B and of one of the four world directions. Accordingly, we can feel confident that the section deals with God B and the trees set up at the four sides of the world, to which were assigned the colors red, white, black, and yellow. The glyphs for these in that order precede the corresponding world directions in each of the four compartments, and postfixed to those for red, black, and yellow is the *te* (1) affix. These combinations must read "red tree," "black tree," and "at [*ti* prefix] the yellow tree." The passages fully confirm the identification of the *te* (1) affix. The white affix is joined to the tun sign which replaces *te* (1). The heart of the habin tree is called *tun cuy*, "stonelike hardening," presumably because of the hardness of the wood of that tree. *Zac tun* could mean "substitute for stone" or "not quite the same as stone," both of which would be applicable to a very hard wood (cf. *quiebra hacha*, "axe breaker," a name for *Krugiodendron ferreum*). The element containing three dots placed between red and *te* (1) may be the sign for *le*, "leaf" (note its use on Madrid 42c with snaring [*le*] of animals). *Te* (1) is also affixed to the yax element (Dresden 67b; Paris 16b, 18a; Madrid 95d) to form a glyph which, I think, we are justified in reading as that of the *yaxche*, the ceiba tree (with *te* (2), fig. 62,4).

These glyphs make it clear that *te* (1) was used not only as a numerical classifier and as the termination *te* in Bolon-Yocte, but also for *te*, "tree."

A second and very common affix, which for other reasons (p. 282) appears also to have the value *te*, can be used, as well, as a postfix of numerical coefficients (figs. 24,62; 25,20,36). On Copan 19 it is postfixed to all the numerical heads of the IS except that of the baktun, which has instead the regular *te* (1) postfix. The reason for this unusual display of postfixes is that the numerical heads occupy separate glyphs blocks on this monument. On two or three other Copan stelae, where this same situation obtains, postfixes do not occur, but enlarged ear-plugs fill the spaces. The fact that these two postfixes are reciprocals on Copan 19 and with *yaxche* strengthens the case for identifying the second form as also a *te* symbol. This element I call *te* (2). There is a third affix, *te* (3), seemingly with the same value (p. 283).

Another affix occurs with the tun and haab glyphs

when used as declarants of anniversaries, but never when they are used in IS or PE. This may correspond to either *piz* or *p'el*, both numerical classifiers used with years (pp. 54-55).

An element which resembles, but is not identical with, this last is found with month signs and the winged cauc in Yucatecan texts, but it stands outside the coefficient, sometimes even being placed beneath the previous glyph. Because of that placement and because the *te* affix may also be present, we can feel reasonably sure that we are not dealing with a numerical classifier. It appears to correspond to the Yucatec *tu*, a contraction of *ti* and *u*, which commonly precedes the number of the month or the year in the books of Chilam Balam. The *u* converts the number from a cardinal to an ordinal; *ti* is the locative (figs. 38; 39; p. 163).

#### GLYPH STYLES

There are certain variations in glyph presentation which represent differences in material, space, and time.

Glyphs painted in the codices are much more cursively treated than those carved in stone. The variations are not entirely due to the lateness of the codices, because they also exist, although to a lesser degree, on murals and pottery vessels of the Initial Series Period. They are to be expected because glyphs could be painted with rapidity; they could be carved only with painstaking slowness. The ranges of difference can be seen in the series of day signs and month glyphs (figs. 6-11; 16-19), and in individual glyphs, as, for instance, the glyph for south (fig. 41,23-31,34,36).

There is little variation in glyphic styles between one city and another of the Central Area during most of the Initial Series Period, but well-preserved texts from the early stages of that period are not sufficiently numerous to indicate whether the same uniformity holds good for the first two centuries of the inscriptions.

Hieroglyphic texts from Chichen Itza and northwest Yucatan are somewhat different from those of the Central Area. As this was a peripheral region during the Initial Series Period, the local style never conformed entirely to that of the area to the south. There are traces of archaism which appear to have survived there long after their disappearance in the south (Thompson, 1937, pp. 191-92). The "centipede" affix of day signs and the occasional absence of a true cartouche from day signs are examples (figs. 38,5,6; 39,4,5).

Late inscriptions at Sacchana, Chiapas, are of a style not found elsewhere, but it is possible that those deviations from standard practice are due to the lateness of the dates, and do not have a geographical explanation (Seler, 1901, figs. 5,6; this work, fig. 27,14,39,52,65).

Some sites in Campeche, notably Xcalumkin, have a local style of writing which is quite marked (fig. 53,3). The style is dissimilar to that of Chichen Itza, although in both regions the same peculiar method of recording dates existed.

Despite these differences there is a marked homogeneity in glyphic delineation throughout the Maya area, and a Maya priest from Copan would have had no difficulty in reading contemporaneous inscriptions at Piedras Negras or Palenque, at Macanxoc or Naranjo. He would have had a little trouble at Xcalumkin or Chichen Itza, but more because of the content of the texts than because of stylistic differences.

Temporal variations are fairly evident. In some texts from the early part of Baktun 9 (ca. A.D. 500) there are certain features which later disappear. The most characteristic of these are complex elaboration of detail of glyphs, decoration in some detail of numerical dots, rarity of filler crescents on each side of numerical dots, a certain irregularity in the outline of glyphs, the centipede infix or prefix of day signs (fig. 47,4), the use of a monkey face in full view for the day Ahau (fig. 10,50,51; Morley's notched day sign), the circular outline of the right infix of the cauc glyph (fig. 26,15,17), a peculiar headdress (fig. 27,31,32,42), and a tendency to shallow relief. With two or more of these stylistic features present, Maya texts can be dated as early with as much certainty as the writings of Oscar Wilde can be placed by style and content in the Yellow Book period.

Yet earlier texts, from Baktun 8, display a number of these early features, but the carving is more crude, and lacks the complexity of the sequent style (figs. 10,48; 26,24,33,41,49). The outline of the glyphs is even more irregular and relief tends to be quite shallow (fig. 7,37). In the earliest known text, that of the Leiden plaque, some of the period glyphs lack their identifying characteristics (fig. 27,3,15).

By the close of the first half of Baktun 9 (A.D. 633) the classical style is well established. This endured for approximately two centuries, but toward the close of Baktun 9 and in the first katuns of Baktun 10 changes appear. Glyphs are carved with less care. For example, in the interiors of the tun and katun signs straight horizontal lines replace the more elegant design of the previous period (fig. 26,31,39). The numerical filler may take the form of a St. Andrew's cross instead of the more usual crescent, and the same element appears between the double "eye" of death as a prefix (fig. 5,27). The "grape" infix of the cauc glyphs becomes angular (fig. 17,61); hands lose their beauty and become pudgy (fig. 32,22).

Beyer (1932, 1937) has discussed the stylistic sequence of glyphs at some length, but in my opinion all his classi-

fiction of the glyphs at Chichen Itza is incorrect, for I believe the various texts to which he assigns a span of over 500 years actually were carved within a very few decades of one another, and that the stylistic differences result from a mingling of styles in a period of uncertainty and do not correspond to great differences in time (p. 197). A similar mingling of styles is to be seen on the pages of Dresden. Glyphs of types which Beyer on stylistic grounds would separate by hundreds of years occur almost cheek by jowl in that codex.

The lunar series supplies a good example of the addition of new glyphs as needed. In inscriptions of Baktun 8, Glyphs X, B, and A are absent, but Glyphs X and A appear at the start of Baktun 9; the first occurrence of Glyph B is not until 9.8.15.0.0 (Piedras Negras 25).

#### REGIONAL GLYPHS

Certain glyphs are common at one site or in one region but unknown elsewhere. These are clearly local developments which for some reason were not widely accepted.

At Palenque a small prefix in the form of a snake or an eel is sometimes placed over day signs to indicate that that is the starting point of a count forward (figs. 4,24,25; 30,48-51); the glyph really serves as a short substitute for the anterior date indicator. The element occurs with that meaning nine times at Palenque; never, so far as is known, at any other site except once at Xcalumkin (fig. 4,26). Beyer (1943a) has called attention to the composite glyph which he names "ending day," but which actually must have a meaning such as "forward to sunrise" (or sunset?; p. 166). This occurs 19 times at Piedras Negras and once at the nearby site of El Cayo, but nowhere else in the Maya area, although the elements composing the glyph are frequent in other combinations or alone. On some inscriptions at Copan the IS introductory glyph is not followed by an IS. This practice is not observed elsewhere.

A peculiar composite glyph consists of a sky sign below a small cauc flanked by flippers or legs and with the addition of a double flame element which, being a prefix, may be to the left or above (fig. 2,47-49). This glyph is quite common in certain clauses at Quirigua but is unknown elsewhere.

Quirigua also has a peculiar head form of the winged cauc with a very beaked nose and larger square eye of a type not reported from other sites. Together with the corresponding symbolic form it is used as a substitute for the more general "end count of tun" glyphs (fig. 4,27). At Palenque, but not elsewhere, the Moan bird can replace this glyph (fig. 4,28).

The substitution of the eagle or a vulture for the *ti* or torch element in anterior date indicators occurs only at

Quirigua and Copan (fig. 4,29,30). The reason for this substitution is that the *ti* element is the characteristic frontal ornament of the vulture.

In Yucatan and Campeche alone is the kin sign placed immediately after the day sign (fig. 4,31-35). This corresponds to a Yucatecan method of writing dates, as, for instance, *ti hoo ahau tu kin*, "on 5 Ahau on its day," on page 2 of Tizimin. Also, in Yucatan and Campeche alone are month signs supplied with a prefix which almost certainly means *tu* as in expressions such as *tu hunté Pop*, "on first of Pop" (figs. 38; 39).

Examples of these local glyphs are very numerous. There are also small local variations in the delineation of common glyphs, particularly noticeable in the case of Ahau, with its regional and temporal variations. The Ahau sign with death-eyes prefix and bundle postfix is very frequent at Yaxchilan, but unknown or rare at other sites.

Many clauses, also, are local. One expandable clause is of common occurrence at Yaxchilan, but unknown elsewhere (fig. 46,10-16), and the same is true of a clause which appears several times at Naranjo (fig. 3,3-9).

#### REGIONAL METHODS OF FIXING DATES

In Yucatan a special system of recording dates was employed. The CR date is followed by a winged cauc glyph with its coefficient and a day Ahau also with coefficient, and almost invariably with the "Ben-Ich" prefix and the "ak" postfix. There is good evidence that this arrangement means that the given date fell in the declared tun of a katun ending on the day Ahau recorded (pp. 197-99). Even though the interpretation may be challenged, the local character of the arrangement is beyond doubt.

In the Jatate drainage of Chiapas there appears to be special emphasis on a system of counting not from the last date recorded, as is the general Maya practice, but directly from the IS (p. 158). At Palenque there is a system of reckoning from suppressed dates which is still not entirely understood. However, certain glyphs appear to indicate whether the count is to the "seating" of a tun or to a date which does not mark the end of a tun (p. 120).

Beyer's glyph for 0 tuns, which I read as "the seating of the tun" (p. 119), appears to be confined to Palenque, and to Chinikiha, which lies a short distance to the east; it has not been reported from elsewhere, and presumably was a local development. The special postfix to indicate an anniversary is also a localism, being confined to the Usumacinta Valley (p. 195; fig. 4,13,14).

Perhaps with more thorough investigation, other regional variations in methods of date recordings will be discovered.

## THE BURDEN OF TIME

Time has been the subject of many similes in the history of man. In our own civilization the most familiar symbol is that of aged Father Time with his scythe. He reminds us of the brevity of our span of life but fails to convey the idea of the eternity of time. A far better picture is that of the poet which compares time to an ever-flowing stream, but the concept is narrowed to the experience of the individual when Isaac Watts conceives of this stream as bearing its sons away. These and other similes reflect the attitude toward time in our own culture; time is regarded not as an abstract, but rather as to its effect on us as individuals. It is as though we were surprised and a trifle offended that we, the self-styled lords of creation, should have to bow to the passing years.

The Maya concept of time was something which in its broad outlines is not unfamiliar to us, but which in its philosophical aspect reflects a very different mentality. The Maya conceived of the divisions of time as burdens which were carried through all eternity by relays of bearers. During the Initial Series Period these bearers were the numbers by which the different periods were distinguished; each number carried the period with which he was associated over his allotted course. This imagery differs strikingly from any picture of time our civilization has produced, for time was not portrayed as the journey of one bearer and his load, but of many bearers, each with his own division of time on his back.

The concept is well illustrated in the full-figure glyphs, particularly those of Copan D. The date of that monument is 9.15.5.0.0 10 Ahau 8 Ch'en, an important subdivision of Maya time (fig. 60). The numbers are the bearers; the periods, the burdens. The glyphs depict the moment when the period comes to an end, symbolized by the arrival of the procession at the *lub*. That Yucatec term customarily signified the place where porters set down their burdens, and also the distance between one resting place and another. The word undoubtedly is a noun formed from the root *lub* with the meaning of falling (*lubul*, "to fall"; *lubzah*, "to upset something," literally, cause to fall). The Motul dictionary gives *lubay* as "the great resting places, or the destination at the end of a journey." In Kekchi, according to the Wirsing dictionary, *lub* means "weary," "tired."

The glyphs of the IS of this Copan stela depict the weary bearers starting their rest. For the gods of the numbers 9 and 15 this is a momentary respite; for the others it is the end of the journey. The 9 and 15 must carry their burdens more stages on the journey, for the current baktun and katun have still considerable distances to travel before the *lubay* is reached. The god of number

5 will be immediately replaced by the god of number 6 as bearer of the tun; the deity of number 1 will assume the loads of the uinal and kin now fallen from the backs of the impersonators of the god who personifies completion. A charming picture of these bearers and their loads in a living group, from the pen of the famed artist, Jean Charlot, forms the frontispiece to this volume.

In the hieroglyphic pictures the resting gods hold the periods or support them in their laps. The god of number 9, the bearer of the baktun, still has his load on his back, held there by the tumpline (the *mecapal*) which passes across his forehead. His hand is raised as though to slip off the load; the pad between tumpline and forehead is clearly delineated. Beside the god of number 10, with his arm linked in the cartouche of Ahau, is the lord of the night who is clearly in the act of rising from the ground; the tumpline and the load (Glyph F) it supports are in position. With his left hand the nocturnal god eases the weight on the tumpline; with his right hand on the ground he steadies himself as he starts to rise. Furthermore, the artist has subtly conveyed in the strain reflected in the god's features the physical effort of rising from the ground with his heavy load. It is the typical attitude of an Indian carrier as he resumes his journey, which anyone familiar with present-day Maya of the highlands of Guatemala must have seen a score of times.

The lord of the night takes up his burden as the day comes to rest. The combination pictures feelingly the never-ceasing journey of time. True, there was not in the Maya concept of time a measurable period of repose with the burdens fallen to the ground, for it was a relay race; as soon as one bearer set down his burden, his successor hoisted it on his back, but the glyphs had to conform to the general presentation of the IS. It is the very moment that the period ends and there was, accordingly, no need to show the new bearers waiting to assume their loads. Such an enlargement of the picture would not have been in conformity with use and wont so far as the IS was concerned, and would have caused an undesirable confusion in the hieroglyphic text.

Other inscriptions also show the dropping of the burdens. On Copan D' what is apparently the month coefficient bears the month by means of a tumpline, still in position across his forehead; on Quirigua B and D most of the period glyphs rest on the legs of the gods that represent the numbers. The latter for the most part are seated or reclining in positions suggestive of exhaustion after their journey (figs. 28; 29). On the other hand, the god of the night has his burden on his back, although he does not appear to be rising from the ground. The picture of the completed moons portrays the goddess of number 1 with the moon held with both her hands on



her left shoulder. Glyph B of the lunar series carries Glyph X of the same series on his back, the tumpline being very clear (fig. 29,14). This last picture is of importance since it clearly shows that Glyph B should be read with Glyph X, not with Glyph A, as has been rather widely supposed. The artist who carved the full-figure glyphs of Quirigua D depicts the bearers in attitudes of exhaustion on completing the stages of their journey.

This interpretation of the Maya concept of time does not rest only on a diagnosis of the attitudes of these full-figure glyphs, for there are many passages in the books of Chilam Balam which reveal the same pattern of thought.

In the Chronicle of Mani the phrase *lai año cu ximbal*, followed by a note on some historical event, occurs eight times. Brinton (1882, p. 104) translates this "as this year was passing"; Martínez Hernández (1927) as "*en el transcurso de este año.*" *Ximbal*, however, means "to walk, to journey," and the whole clearly expresses the concept of the year traveling. Elsewhere the phrase recurs with the Maya *haab* or *hab* substituted for *año*, for in the eight passages where *año* is employed the associated events fall after the Spanish conquest, and the European year is given.

In the series of year prophecies at the start of Tizimin, which appear also in Mani (which supplies two words lacking in Tizimin), we read "*lai u lukul u cuch . . . hooote u cuch ca ti luk'i ti yahaulil.*" This Roys translates: "This is the removal of his burden . . . five is his burden, and then he departs from his reign." The reference is to a Katun 5 Ahau. Again, on page 9 of the same manuscript occurs the phrase "*u kax cuch katun ti ho ahau katun u lubul uale tu hunte uil katun,*" translated by Roys as "the binding of the burden [of] the katun in Katun 5 Ahau. It would fall in the first katun." On page 10 of the same manuscript we read: "*ti ah oxil kan tu hunte pop u kax cuch katun,*" "On Lord 3 Kan on 1st of Pop the binding of the burden [of] the katun." On page 11 of Tizimin there occurs the expression "*tu kin u kaxal u cuch ah ho ahau,*" "On the day of the binding of the burden of Lord 5 Ahau." Furthermore, in connection with the end of the katun we are told in Roys' words: "He [Katun 5 Ahau] gives up his mat, his throne. There comes another cup, another mat, another throne, another reign. The burden of Lord 5 Ahau falls (*u lubul u cuch ah ho ahau.*)" Again we find in this same passage *tu tz'oc u cuch katun*, "at the completion of the burden of the katun," and in Chumayel *u cuch u ximbal katun*, "the burden of the journey of the katun."

Again, in Tizimin, page 10, we find "*u ximbalte kin, u ximbalte akab,*" "the march of the day, the march of the night," and in Chumayel, page 90, in connection with

the prophecy for the evils of Katun 7 Ahau, "*ti u hoppol u tzintzin loc katun,*" "the katun begins to limp."

In the account of the Manche Chol calendar in the manuscript by Tovilla, recently brought to light by Scholes, it is stated that, "According to what [the Indians] say, [these four first days] are those which take the road and bear the load of the month (*cargan el mes*), changing in turn." It is, therefore, clear that this concept of the periods of time traveling with their loads was not confined to Yucatan at the time of the conquest. The "first four days" are, of course, the year bearers. Indeed, the expression year bearer is a direct translation of the Yucatecan compound *cuch haab*, and similar expressions occur in other Maya languages and dialects, notably Jacalteca and Chuh (La Farge and Byers, 1931, p. 180).

In a passage of Chumayel (p. 45) there is a sentence which Roys translates as: "Then the charge of the katun was sought; nine was its charge when it descended from heaven. Kan was the day when his burden was bound to him." Actually, the mention of nine has nothing to do with the coefficient of the day Ahau in this particular case, for the katun ended on 11 Ahau. The reference is probably to the association of nine with the katun because Ah Bolon-Tz'acab was regent, his name meaning "Lord Nine Generations." Here *cuch* might rather have the meaning of misfortune, for, by extension, *cuch* can mean the burden of office and the burden of life's misfortunes, for holding office was a burden. The same meaning can be attached to the katun's burden.

The above quotations are somewhat contradictory. The first implies that the coefficient was the burden, as Roys has pointed out; the others suggest that both the day and his coefficient were the bearers. It is tolerably certain that the day and his coefficient were the bearers of the katun in Yucatan, at least in the sixteenth century, but in the somewhat different system of the Initial Series Period the number of the katun was the bearer. These distinctions appear to reflect somewhat different usages, for in Yucatan the custom of numbering katuns in sequence according to the position of each within the baktun seems to have been on the verge of extinction, having given place to the numeration of katuns by the day on which each ended. It is, therefore, not illogical that in the south, during the Initial Series Period, the bearer should have been the number of the period; in Yucatan, at the time of the Spanish conquest, the day name and number on which the katun ended.

Possibly there was a shift, spatial or temporal, or the old idea may have persisted in Yucatan until the Spanish conquest, but its details were reversed by the eighteenth-century chroniclers who may have misunderstood the concept. More probably, we are insisting on too sharp a

definition of what was really a flight from realism, for the outlines of such poetic imagery are by their very nature blurred.

That the Maya were not too precise in defining this concept is perhaps indicated by the full-figure kin of Yaxchilan L 48, which holds the head for six in his outstretched hand and supports the head for 10 on his feet (fig. 47,2). This, taken in conjunction with the reversed treatment at Quirigua and Copan might indicate that the Maya of the Initial Series Period had not made up their minds as to which was the bearer and which the borne. Nevertheless, the conclusion is not beyond criticism, for the numbers on this Yaxchilan lintel are represented as heads, not as full figures, and a head could scarcely carry a full figure. Yet there was nothing in Maya artistic canons to prevent the artist from depicting the kin as a head and the number 16 as a full-figure glyph, had the burden concept been sufficiently defined as to demand that arrangement.

That, however, is a minor detail not seriously affecting the Maya imagery of time on its journey.

In the katun prophecies given in the various books of Chilam Balam the names of towns are generally accompanied by the designation of the katun and the words *u hetz' katun*. For example on page 97 of Chumayel there is the sentence: "*Lahun Ahau katun. Chable u hetz' katun.*" This has generally been rendered as "Katun 10 Ahau, the katun is established at Chable." In the Perez dictionary *hetz'* is translated as "*apoyar, sellar, asentar con firmeza, elegir lugar, fundar, establecer usos,*" and the intransitive *hetz'el* is given the meanings *asentarse, apoyarse con firmeza algo que pesa, establecerse, fundarse, cimentarse.*" It is just possible that *hetz'* refers not to the act of setting up a stela (for none appear to have been erected at so late a date, Landa notwithstanding), but to the symbolic adjustment of the burden of the katun to the bearer's back. It is possible that important towns took turns in celebrating the advent of a new katun by religious pageantry, and in such celebrations impersonators of the time periods may have performed the ceremonies involved in the transference of burdens from the backs of one set of divine bearers to those of the new group of carriers.

Another method of expressing this association may involve the word *ch'a*. For example, in Chumayel, page 80, we read: "*Lahca Ahau te ch'abi Otzmal u tunile.*" This has been customarily rendered as "12 Ahau, the stone was taken at Otzmal." The Motul dictionary translates *ch'a* as "*tomar, llevar, traer*"; the Perez dictionary gives *tomar, apropiarse*. It has been widely assumed that the word refers to the act of setting up a stela, although movement is definitely implied in the Motul dictionary.

It is possible, therefore, that the sentence means "12 Ahau, his stone was carried at Otzmal," supposing that the day 12 Ahau was regarded as starting from Otzmal on his burdened pilgrimage of 20 tuns, or, perhaps, the sentence implies that the pageant which acted this poetic fantasy was held at Otzmal. The suggested interpretations of *hetz'* and *ch'a* may not hold water, for *ch'abi* could also come from *ch'ab*, "create something from nothing, which power belongs to God," although this is not a very probable derivation. In any case, the evidence for the general concept of the burdens of time being borne by relays of divine carriers is beyond dispute.

It has been necessary to interlard this poetical imagery with dull discussions of Maya etymology. It is as though one discussed the geology of Mount Helicon in an introduction to a brief essay on Clio. Nonetheless, deviations along arid paths are necessary in assessing such an unknown quantity as the mental outlook of the Maya. We are, accordingly, fortunate in having the aid of Jean Charlot in bringing to life this vivid concept. He has captured its qualities of mysticism and striking beauty in the frontispiece of this volume.

#### MAYA POETRY

In many hieroglyphic texts there are glyphs which, so far as the general meaning is concerned, are redundant. In some texts these glyphs are inserted; in others they are omitted; and I had thought that their presence was evidence of an inherent love of tautology (Thompson, 1932b, p. 386; 1944, p. 14). There are also some grounds for believing that unnecessary glyphs were sometimes introduced to fill a space so that an important glyph might occupy a prominent position. Now, however, I am convinced that these extra glyphs were interpolated to improve the cadence of a passage.

In the introductory paragraph of this book I have referred lightly to Maya poetry, comparing it to the poetry of the Psalms and other parts of the Old Testament. Both have an antiphonal arrangement in which the second line of a verse answers or repeats a variant from the first. In addition, Maya poetry plays on the sounds of words, bringing together words which have approximately the same sound. Compare:

"The sea is his, and he made it; and his hands prepared the dry land."—*Psalms*, 95:5.

"Surely against me is he turned: he turneth his hand against me all the day."—*Lamentations*, 3:3.

"They shall roar together like lions: they shall yell as lions' whelps."—*Jeremiah*, 51:38.

"Katun 11 Ahau is set upon the mat; is set upon the throne, When their ruler is set up: Yaxal Chac its face to their ruler.

The fan of heaven shall descend; the wreath of heaven, the bouquet of heaven, shall descend.  
 The drum of the Lord 11 Ahau shall resound: his rattle shall resound,  
 When knives of flint are set in his mantle.  
 On that day there shall be the green turkey: on that day there shall be Zulim Chan: on that day there shall be Chakanputun. They shall find their harvest among the trees: they shall find their harvest among the rocks, those who have lost their harvest in the katun of Lord 11 Ahau."—Chumayel, p. 13 (Roys translation with slight emendations).

"Accept in person my offering of meat.  
 I have given you, my father, the offering of meat, the heated sacrifice, for many days, for many years:  
 Ground meat, fine ground maize, cooked meat, ground meat, fine ground maize.  
 This will be the offering of meat, this will be the offering of meat for many days, for many years, for many days to come, for many years to come."—Lacandon prayer (Tozzer, 1907, Chant 36).

"They moved among the four lights: among the four layers of the stars.  
 The world was not lighted. There was no day: there was no night, there was no moon.  
 Then they perceived that the [first] dawn was coming: Then dawn came.  
 Until [during] the dawn thirteen eight thousand *tz'ac* to seven was the count of the [first] dawn. Then the world was theirs."  
 —Chumayel, p. 44 (Roys translation with slight emendations).

There is a fine cadence in the original Maya, as for example some of the lines in the first quotation:

"*Buluc Ahau katun*  
*Cumaan ti pop: cumaan ti tz'am*  
*Ti ualaac yahaulili: Yaxal Chac u uich ti yahaulili.*  
*Emom caanil ual: emom caanil tz'ulub, caanil utz'ub*  
*Pecnom u pax: Pecnom u zoot Ah Buluc Ahau,*  
*Ti yokte tok yubte.*  
*Tu kin yan yax cutz: tu kin yan Zulim Chan, tu kin yan*  
*Chakanputun*  
*Uuilnom che: uuilnom tunich, ah zatal uuil ichil*  
*Ah buluc Ahau katun"*

Single sentences often possess a vibrating melody, as for example:

"*Ca tz'oci u lohol balcah: ca tz'oci u caput cuxtal*" (Chumayel, p. 42).  
 "*Ca yalah u chich; ca yalah u tz'e naa,*  
 "*Ca yalah u mim; ca yalah u muu*" (Chumayel, p. 60).  
 "*Yan xin mac xin ahan, uale*" (Chumayel, p. 59).

Tizimin presents many similar passages. For example on page 6:

"*Yalab u t'an yetel u caan*" and  
 "*Hol can be, hol can lub,*" and, as a variation  
 "*U tz'oc tzotz, u tz'oc sitz'il*

Note the rhythm of the lines, the free use of iambs, and the antiphonal character of every line. This is blank verse of high quality. The same poetry is in the Lacandon prayer and in other prayers from Yucatan and British Honduras, but Maya poetry has little imagery. It depends for its effect on simplicity of language and cadence.

The playing on the sounds of words is well illustrated by the following passages:

"*U uacunic u luch: yetz'cunic u pop*" (Tizimin, p. 6).  
 "*Bal bin c'alab ca bin c'ilab uinic ti be?*" (Chumayel, p. 60).  
 "*Ba la hex u kabatahob ca patlahobe*" (Chumayel, p. 58).  
 "*Hex u zilic u pice: u tz'ilic u pach*" (Chumayel, p. 40).  
 "*U chun tz'alpach p'ax; u chun pakpach p'ax*" (Chumayel, p. 14).

This, however, is a quite minor and infrequent feature of Maya poetry.

With such a melodious cadence in the Maya of the books of Chilam Balam and in that of modern prayers, it is logical to expect a similar setting for the hieroglyphic texts, and, accordingly, we may believe that the redundant glyphs were inserted to better the flowing harmony.

In many cases a katun completion not only chronicles the number of katuns elapsed, but notes, furthermore, that the date is also the completion of the tun count. Since a katun consists of 20 tuns, obviously a date ending a katun must also end a tun. It is as though we wrote "December 31, 1900, end of nineteen centuries, end of a year."

On Tikal 16 the first five glyph blocks (fig. 4,36) record: "6 Ahau 13 Muan, completion of the count of 14 katuns, the completion of the tun." There is a certain reverberant measure in the English translation, which echoes the majesty of the glyphs. In Yucatec the text may have run: *Uacil Ahau tu oxlahunte Muan, tz'ococ u xocol canlahunte katunob, u tz'ocol haab*. This, too, is not lacking in antiphonal melody.

Seven glyph blocks of Palenque Inscriptions Tablet (east) read: "Completion of a haab, 1 Ahau 8 Kayab, the seating of the tun, tenth katun, expiration of a half baktun" (fig. 4,37). The Yucatec equivalent may have been: *u tz'ococ haab, Hunil Ahau tu uaxacte Kayab, u cutal tun, u lahunte katunob, u hitz' xel baktun*. Here three glyphs would have conveyed all the information: "1 Ahau 8 Kayab, tenth katun."

Similarly the secondary series was often expanded to a length unnecessary for clarity, but perhaps contributing to euphony. The IS itself could in many cases have been replaced by the much shorter PE without raising any doubt as to the date recorded. That its numerous glyphs were patiently carved is, I think, good evidence that the Maya strove for a euphonious grandeur in their texts. The passage of time had for them a mystical beauty which called for beauty in recording it.

I often wish that I could summon some Maya priests from the shades to listen to the grandeur of our music. Their hearts would be uplifted by it. In the third movement of Beethoven's Fifth Symphony, to cite a single instance, they would hardly fail to recognize their own antiphonal poetry transmuted into melody beyond their mortal ken. A Maya, were he of the majestic period of the stelae or of the sixteenth-century eclipse, could have repeated with sincerity the words of Elihu, "For the ear trieth words, as the mouth tasteth meat." My belief is strong that the glyphic texts are words tried by the ear, and deemed worthy of perpetuity graven in stone.

#### SUBJECT MATTER OF HIEROGLYPHIC TEXTS

The subjects covered in Maya writings depend on the media in which they are contained. The inscribed monuments carry texts dealing with one group of subjects; the codices, for the most part, record information on different matters. Single sheets, none of which has survived, were probably used for recording data in yet other categories. For that reason it is advisable to discuss separately the two main groups, texts inscribed on monuments of the Initial Series Period, and writings on paper.

#### INSCRIBED TEXTS

In this book the words *inscribed* and *inscriptions* apply only to texts which were carved in low relief or incised in stone and wood, and serve to differentiate them from texts written in the codices.

With very rare exceptions the inscriptions deal with the passage of time, with particular reference to the end of the period which was approaching when each inscription was carved. As we have seen, the unending journey of time was of transcendental importance to the Maya; it was the main theme of their philosophy of life, but, because of its effect on human life, it was much more than the focal point of a cult of mysticism. The powers wielded by the succeeding rulers of the divisions of time affected life to its very roots: the ruler of one day was a beneficent deity who brought happiness and prosperity with him; the lord of another day was a malevolent power, whose passage was fraught with misery and evil.

The same subjection of man to the caprice of each god extended to that of each god of a year and each god of a katun. Years which were the burdens of Kan and Muluc (i.e. began with those days, and were under their influence) were favorable; those borne by Ix and Cauac were calamitous. A few katuns were ruled by benign day gods; one or two were affected by influences which were neither good nor bad; most were under the sway of malign powers. Naturally, the longer the period, the more important were its aspects.

Few prophets are over-positive in forecasting the future or in charting the path of divine action for many years to come; they generally provide some loophole of escape, some way of substituting gray for uncompromising black and white. From Landa's account of the ceremonies held in Yucatan for the incoming years we learn that the gods who bore the burdens of the years could be influenced for the better by appropriate ceremonies; it was possible to ease the woes of Ix and apply balm to the ills of Cauac. Maya philosophy was not a simple form of predestination, for many indirect influences allowed man some latitude. Evils could be ameliorated by some forms of propitiation, and doubtlessly the fate of each katun could also be bettered by appropriate action.

In the sixteenth century Maya culture was both mature and decadent. Formulae had been established for achieving certain results: so many offerings of food, so many grains of copal incense, would produce the desired result. In the earlier and more vigorous period of the inscriptions the priest-astronomers, I believe, dedicated much of their effort to an investigation of the complex influences that decided the aspect of the katun. Were it merely a question of the temperament of the ruling god, the problem would have been relatively simple, but it is a fair assumption that other factors, the positions of sun and moon and the wanderings of the planets, influenced the periods. Some of these may have been known; others were unknown equations. The investigation of these problems, I think, occupied the priest-astronomers, and the computations involved presumably form the subject matter of most inscriptions.

As an illustration, let us assume that we are Maya priests living at 9.15.10.0.0 (A.D. 741). In another ten tuns Katun 13 Ahau (9.17.0.0.0 13 Ahau 18 Cumku) will enter. It is necessary to prepare our calculations for the new katun. The god 13 Ahau is somewhat ill-disposed toward man. Are there factors which might alleviate the expected evils, or, alas, augment them? Calculations show that the day on which the katun will end will also be the occasion of a solar eclipse, but we do not know whether that eclipse will be visible or not. Our only recourse is to turn to our records to see whether a visible eclipse has ever occurred before, on a day 13 Ahau.

When the katun ends Venus will be at, or very close to, superior conjunction, and therefore invisible. The sun will rise on that day (13 Ahau 18 Cumku) at a point 20 risings north of the winter solstice, but so far as the true solar year is concerned, the situation is very different. Our most modern calculations show that at that date the sun will be 940 days behind our calendar, a loss accumulated by our failure to use leap days in the 3960 tuns that have elapsed since the last creation of the world at

13.0.0.0.0 4 Ahau 8 Cumku. Subtracting two years (730 days) from the sun's lag, we have a correction of 210 days to apply. Therefore, in weighing the various aspects of the katun ending, we must take into account that the day in the year of the last creation on which the sun was 20 risings north of the winter solstice was 8 Mol (210 days before 18 Cumku), and, contrariwise, the sun will now rise on 3 Zac at the same point at which it rose on 18 Cumku at 13.0.0.0.0 (3 Zac is 210 days after 18 Cumku).

These various possibilities give us material with which to gauge the factors which will have a bearing on the aspect of the coming katun. If we can find dates in the past which unite celestial and divine influences comparable to those which will occur at the end of the coming katun, and note what were their fortunes, we shall have data to check the effects of the various influences for good and evil which will shape the destiny of Katun 13 Ahau.

Such motives, I would hazard, governed the Maya priests. I further believe that the calculations they made to find precedents for the various combinations which would influence the end of a katun occupy the bulk of the inscriptions. That is to say they were using astronomy to develop laws of astrology, and combining the results with what they knew of the direct influences of the days themselves. It was a scientific approach, but the original premises were false. The CR dates in the inscriptions (p. 123) are, I think, for the most part those which reproduced conditions duplicating or related to those expected to obtain at the end of the katun. All the data which would throw light on the problem were examined, and the most pertinent incorporated in the texts.

I do not believe that historical events are recorded on the monuments. The almost complete absence of dates, other than period endings, common to two cities (there are only three such dates known) is, I believe, due to the almost limitless choice of dates in gathering information on the katun endings. A priest in one city, gauging the aspects of a katun ending, might put more emphasis on lunar influences, and be governed accordingly in his choice of dates; priests in other cities may have regarded solar influences as paramount, and chosen dates with that in mind. In that matter, too, there was room for divergences, for calculations as to the amount the Maya year was ahead of solar time varied from city to city. Furthermore, the correction might be applied in various ways, and at any time during the journey of the katun. Thus, in solar corrections alone there were perhaps a hundred dates which might have been used in connection with every katun ending. The choice would have been more restricted had there been complete agreement as to the aspects of every day, but that, in all probability, was one

of the variables, as it certainly is among the present-day Maya. There must have been rather general agreement that such and such a day was lucky, and such and such a number lucky or unlucky, but the appraisal of the combination of the two may have varied from city to city, and perhaps from one individual to another within a city. Such divergences of opinion, although they may not have been great, would have affected the choice of pertinent dates.

A few texts deal with new formulae for reckoning the length of a lunation and for grouping moons, but I feel rather certain that celestial phenomena, such as eclipses, heliacal risings of Venus, sun at zenith, or equinoxes, were not recorded unless they had some bearing on the end of the current period (p. 217).

A number of the undeciphered glyphs record doubtlessly the names of gods whose influences affected the calculations, and probably the ceremonies and offerings necessary to ameliorate those influences. Many glyphs, I think, will be found to correspond to set phrases, paralleling those in the katun prophecies of the books of Chilam Balam. Others, I believe, will prove alternative forms or variants reflecting choice of expression in the spoken word, just as we can choose among such words as "count," "reckon," "sum," and "calculate." I do not, therefore, look to the emergence of much directly factual material in the untranslated portions of the texts.

I have stressed what I believe to be the impersonal nature of the stela records. It might be objected that some lintels and stela may portray scenes of conquest and glorify the individual. For instance, Piedras Negras 12 carries a design representing a richly attired individual on the top of what is probably a small structure or conceivably a throne; two attendants and nine captives are grouped on the steps below. This has been identified as the commemoration of a conquest, but can we be sure that it is not a scene preceding some important ceremony, in which the captives are to play their dire parts as sacrificial victims? The number of the captives leads to the suspicion that they are being groomed to impersonate the nine lords of the underworld, and the fact that each one has been delineated with such care points to a rôle greater than that of the conquered in a triumphal procession. The attitude of the main personage is not that of an arrogant conqueror, but of a person intent on the scene being enacted beneath him.

One captive alone is regally dressed. Is it not as logical to suppose that he has been attired in the costume he is to wear in the ceremony (cf. the attirement scene on the Bonampak murals) as to assume that he is a captive of rank who has not been deprived of his jewelry. Soldiers the world over are much alike, and it is not, therefore,

rash to argue that had he been a captive thus attired in battle, his beautiful necklace, earplugs, and headdress would have been stripped from him long before he got to his captors' base camp. On this thesis the other victims are waiting to be attired for their tragic rôles in the ceremony. There are, I submit, as good grounds for identifying this scene as ceremonial as for regarding it as one of conquest.

Again, Piedras Negras L 2 shows a richly clad individual behind whom stands an official, and before whom kneel six persons, also sumptuously dressed. All eight carry spears. This scene, too, has been identified as a representation of an historical event, but Morley (1937-38, 3:96-98) makes out a good case for the scene's having an astronomical connotation. He also shows that the somewhat similar scene on Piedras Negras L 4 may treat of astronomical or calendrical matters. It is, perhaps, not beside the point to note that two of these monuments, and perhaps the third, were dedicated to commemorate periods ending on the highly important 4 Ahau. As I have remarked, I am inclined to think that the choice of deity or subject to be sculptured on a monument was governed by the dates recorded. This is not the place to enter into a lengthy discussion of the matter, but as good a case may be made for such scenes' being ritualistic as for their being historical. It is noteworthy that there are no scenes of actual battle, such as one finds in the Mexican Period of Chichen Itza; it is the aftermath of battle with its ritualistic connotations which is presented.

#### WRITTEN CODICES

The subject matter of the three surviving codices has already been discussed (pp. 23-26). Madrid is a book of divination, crowded with information which would aid a priest in choosing days suitable for the sundry activities of everyday life; it is essentially the book of a priest catering to the requirements of the rank and file. Dresden is a mixture of simple divination and a compilation of astronomical data, doubtlessly used in the more important branches of that work—for matters of church and state—in contrast to the simple almanacs for everyday life. Paris

appears to deal with the divinatory aspects of katuns and tuns, with the new-year ceremonies, and to a limited extent with manipulations of the 260-day almanac.

Codices recording history are said to have existed, but none has survived, unless there is some historical matter in those pages of Paris dealing with the sequences of tuns and katuns. The missing codices, one would expect, would have followed the general pattern of the historical codices of central Mexico, either of the type of Codex Nuttall or of the type of Codex Xolotl or the Codex of 1576. Much historical matter was, of course, the warp into which the prophecies were woven, and such books of prophecy undoubtedly existed in addition to the purely divinatory sections of Dresden.

Roys writes me that he seriously doubts that chronicles in the Mexican or European sense of the word existed in pre-Spanish Yucatan. He calls attention to the remarks of Fuensalida and Avendaño to the effect that at Tayasal prophecies and histories were the same thing, and that knowledge came from their Yucatecan experiences. He also notes the lack of postconquest chronicles in sixteenth-century Yucatan (the only exception being the short Xiu Chronicle, the historical elements of which are perhaps the result of European influence) in contrast to the comparative frequency of chronicles in Mexico and probably in the highlands of Guatemala. This comment refers, of course, to records other than those incorporated in the prophecies.

We can be reasonably sure that such matters as land maps and titles, and genealogical records were also written on paper, perhaps single large sheets rather than books, but none of these has survived. Probably a good deal of the information in these last categories, as well as that in the historical outlines and prophecies, was presented as pictures supplemented with glyphs or, perhaps, as in the divinatory almanacs, as glyphs supplemented with pictures. An attempt to decipher in broad outlines the general tenor of the divinatory almanacs in Dresden will be found in Chapters 11 and 12.

With the conclusion of this brief review of the general principles of Maya glyphic writing, let us pass to the details of the complex Maya calendar.