

I

Introduction

Together let us beat this ample field,
Try what the open, what the covert yield;
The latent tracts, the giddy heights, explore
Of all who blindly creep, or sightless soar;
Eye nature's walks, shoot folly as it flies,
And catch the manners living as they rise.

—ALEXANDER POPE, *An Essay on Man*

PURPOSE OF THIS STUDY

MAYA ARCHAEOLOGY is more than a dry catalogue of pots and pans, of studies of potters' methods and flint-knackers' strokes; it is more than a framework of history painfully erected from the timber of ceramic evolution; it is much more than a bare structure of material culture, for it has the animate beauty which the bricks and mortar of bygone ways of thought give it. In the New World only Maya culture extends to us the privilege of sharing its thoughts and its struggles, its triumphs and its failures, for in the glyphs the dead past has left a chart to guide the living present along the corridors of time to the treasures of its inspiration. That chart has permitted first one student and then another to take a few steps forward, but the half of it is yet ill-understood. The riches to which it leads may never be truly ours, for the accidents of centuries and differing mentality may prove a gulf too wide to bridge, denying us a true comprehension of the causes that channeled Maya thought into that strange, poetic absorption in the passage of time.

In this age when superlatives are used with a freedom that has made them all but meaningless, the commonplace or mediocre seldom lacks the label of remarkable. Yet the achievements of the Maya can be described only in words of grandeur, and no one who has studied Maya concepts of time can do aught but stand humbly in the presence of their records.

Down the centuries dominions have striven with scant success to deck the dull primers of Latin and Greek with a modicum of the beauty to which they are the key. It would be arrogance to think that where they have so often failed I could succeed, for the drudgery of Maya arithmetic, as of Latin paradigms, is the path to knowledge. Yet understanding is the overture to beauty, and if some student, advancing step by step to a comprehension of that symphony of time which is the Maya calendar, is inspired with a growing wonder at its magnificence and poetry, I shall not have written in vain.

The rhythm of time enchanted the Maya; the never-

ending flow of days from the eternity of the future into the eternity of the past filled them with wonder. Like a miser counting his hoard, the Maya priest summed the days that had gone and the days that were to come, stacking them in piles, juggling combinations to learn when the re-entering cycles of time would again pass abreast the turnstiles of the present.

There is a quiet nobility in this concept of time's orderly flow which had a compelling appeal to the Maya, whose life was guided by a desire for moderation and consistency in all things. Yet there was a strange mysticism, too, in the striving of the priest-astronomers to bring into harmonious patterns the circling planets, the changing seasons, the shifting sun, and the errant moon. Not only the planets, but the very days were divine, for the Maya held, and in some parts still hold, the days to be living gods. They bow down to them and worship them; they order their lives by their appearance. Truly it might have been written also of the Maya priests, "In the handywork of their craft is their prayer." It is because that attitude so clearly pervades the hieroglyphic texts, that I have scant patience with those whose sole objective is to assault the mysteries of that orchestrated symphony with slide rules, charts, and adding machines. Had those iconoclasts never heard of the Maya calendar they would have been equally content modernizing Hamlet or planning hydroelectric dams on the River Arno.

Scanning the centuries, our eyes rest on epochs, in which one group or another has produced individuals who, by their paintings or their poetry, their architecture or their prose, their music or their saintliness, have given the world spiritual comfort. Yet beauty, whether it be in the arts or in the lives of individuals or of communities, is all too rare.

In Maya civilization, culminating and finding its expression in the hieroglyphic writing, we have one such summit, perhaps not comparable to such towering ranges as Athens of the sixth and fifth centuries before Christ, Italy of the renaissance, or England of the fifteenth and sixteenth centuries, yet no mean peak. We can scale it

only with effort; we must first wander long in the foothills of glyphic decipherment, garnering beauty as we go. That is a pleasant and not unprofitable task, for Maya hieroglyphic writing embodies the religious concepts of its users, and in it is embedded a mythology of surpassing richness. In many, perhaps most, of the glyphs are to be found references to beliefs concerning the important gods, their activities, their powers, their kindlinesses, and their ill humors. These sagas are the expression of the Maya soul. Wherefore, in seeking decipherments we must rove in those green pastures of poetry, which we prosaically call mythology. In this study that poetical setting must always be in our thoughts, even when we are deep in minutiae as dreary as the dullest passage in Wordsworth, but for me it has not been easy to keep that beauty ever to the fore since argument and beauty are poor bedfellows. The quotation at the head of each section is my apology for not having succeeded better in the body of the chapter. Each is a signpost to the reader, whose way I have not clearly marked.

It is not unbridled enthusiasm which bids me describe the Maya calendar, too, as poetry. It is that, indeed, and of a form not unduly remote from that of the Hebrews, which, as preserved in the King James version of the Bible, has molded the culture of our race for three centuries. There are close parallels in Maya transcriptions of the colonial period, and, I am convinced, in the hieroglyphic texts themselves to the verses of the Psalms, and the poetry of Job. Those magnificent verses, which were sung antiphonally in the Gothic churches of England, studded with the effigies of recumbent knights of another faith, or recited in the spired and wooden churches of Puritan New England, rising with the leaven of Wren's inspiration, have much in common with Maya poetry. It is a subject to which I shall return, for on it depends the whole concept of the Maya calendar.

At first thought, the flow of time may seem hardly the material from which a national poetry could be fashioned, but a little reflection will show that it has all the needed qualities. Time past has the sadness of irrevocability, as Omar Khayyam, through the pen of Fitzgerald, reminds us in moving lines; time to come has the grandeur of the approaching dawn. Man can hardly fail to be moved in spirit as he gazes into the ever-receding past, or ponders the immeasurable future. He faces eternity whichever way he turns. Appreciation of this concept is the key to Maya thought, I truly believe.

In the beautifully carved blocks of Maya glyphic writing are embodied the accumulated knowledge of the centuries, the Maya ways of thought, and perchance the answers to other problems. Perhaps a full understanding of this glyphic literature may reveal the workings of that

strange mentality which led the Maya to chart the heavens, yet fail to grasp the principle of the wheel; to visualize eternity, as no other primitive people has ever done, yet ignore the short step from corbeled to true arch; to excel in the impractical, yet fail in the practical.

The study of the highest achievements of Maya culture has as its goal not merely the enrichment of the store of factual knowledge, although there should be no limits to the acquisition of beauty and knowledge, be they in nature, art, or way of life. There is a more distant end: the intellectual and spiritual progress of the Maya, as the most mature expression of New World civilization, is prime material for a comparative study of the growth of culture and for speeding the quest for those elusive laws of human conduct.

The civilizations of the Old World formed a loose unit of culture, the members of which benefited from the advances and discoveries of one another. A comparison of one civilization with another in the Old World will, therefore, not yield reliable criteria for the formulation of any laws that may govern human progress. For evidence of independent growth it is necessary to turn to the New World, where pre-Columbian civilizations developed without marked stimulation from the Old.

Naturally, the greater the progress, the greater the field for comparative study. One cannot weigh potsherds and flint points against the full range of Athenian civilization. One must seek the most advanced culture of the New World for that purpose. Maya temples and Maya sculpture can be compared with the products of Phidias or Praxiteles, but that is not the whole story. Only a complete elucidation of Maya hieroglyphic texts and early colonial transcriptions will reveal the breadth of Maya life. The intellectual progress, the poetry, the philosophy of life, and, indeed, the whole spiritual achievement of the Maya are contained therein, and these alone are worthy of comparison with the products of the minds of Pythagoras and Plato, Pindar and Aristotle.

To chart the diverging and converging paths that lead independently to the cultural peaks must be the final aim of students of history. That is a task far in the future, for in his most optimistic moment every student of the present generation must in truth echo the words of A. E. Housman:

I see the country far away
Where I shall never stand;
The heart goes where no footstep may
Into the promised land.

For the present, the nearer objective must engage us. Understanding and patience to continue the study of Maya hieroglyphic writing will be richly rewarded. In the jargon of journalists, archaeologists wrest secrets from the

past; I feel rather that our studies win us the privilege of sharing them with the past. In the drudgery of addition and subtraction, let us ever bear in mind the poetry of time. The road to that sublime concept of the expanding universe was thickly strewn with rocks of the most arid mathematics; in comparison Maya calculations are but grit.

In the next few pages I have attempted to sketch a geographical and cultural setting for the Maya hieroglyphic writing. Within such a short space it is impossible to give more than the barest summary. Unfortunately, the presentation must be somewhat of a cut-and-dried nature, which largely ignores alternative reconstructions and blurs the transitions from certainty to reasonable conjecture. Its purpose is solely to provide nonspecialists in Maya archaeology with a cultural background for the study of the hieroglyphic writing, for it is to be hoped that this subject will engage increasingly the attention of specialists in the fields of primitive astronomy and the development of writing.

GEOGRAPHY AND ENVIRONMENT

At the time of the Spanish conquest the Maya area covered all Guatemala except parts of the low coastal strip on the Pacific, sections of western El Salvador, the western fringe of Honduras, the whole of British Honduras, and, in Mexico, the entire states of Yucatan and Campeche, the Territory of Quintana Roo, the state of Tabasco except for a small area in the west, and the eastern half of the state of Chiapas. The area forms a rough quadrilateral with a north-south axis of nearly 900 km. The east-west extension is rather less than 550 km. toward the bottom of the rectangle; about 400 km. at the top of the Yucatan Peninsula. The whole area falls within the tropics, the southern boundary being about latitude $14^{\circ} 20'$ (fig. 1).

Like the early Victorian novel, the government of the United States, or, for those who like an old favorite, Gaul, the Maya area is divided into three parts. The southernmost, comprising the Guatemalan highlands and adjacent parts of El Salvador, is highly mountainous. Peaks, many of volcanic origin, tower to great heights. Towns nestle in mountain-girt valleys or sprawl on plateaus. Plants and animals of temperate climates flourish in this region, which only geographical co-ordinates place within the tropics. The temperature is never excessively hot nor unduly cold. A rainy season extends from May to October, nearly 30 cm. of rain usually falling in the peak month of June, but during the dry season there is often a distinct lack of water. The soil, largely of volcanic origin, is fertile.

The highlands had other advantages in addition to

good soil and good climate. Stone of volcanic origin formed a handy supply of building material, and from it excellent metates (rubbing stones on which maize was ground) were fashioned. Deposits of obsidian furnished the raw material for sharp knives and spearpoints, and volcanic tuff was a first-rate temper for potters. Iron pyrites served the highlanders for mirrors, and specular hematite was the basis of a much-used red paint. In later times gold was probably washed from streams and copper perhaps mined. All these products were exported to less favorable parts.

The commodity which contributed most to the wealth of the highland Maya was the very highly prized tail feathers of the quetzal, for this bird inhabits only restricted regions of considerable elevation. The feathers were traded far and wide. It is not improbable that jade, also highly esteemed in ancient Central America, was obtained from stream-beds, and perhaps even mined in the highland regions, although no deposits have yet been located. A jade boulder weighing some 200 pounds in a cache at Kaminaljuyu, near Guatemala City, is the largest known piece. It has the marks of stream-rolling. The highland area had every advantage in climate, fertility of soil, variety of flora and fauna, mineral wealth, and strategic position. Nevertheless, although Maya culture here was advanced in a material sense and in political organization and sculpture, it lagged far behind the other two, yet in aesthetic development, notably in architecture.

The Central Area, the second main territorial division, is that in which Maya culture reached its greatest height, and in this region hieroglyphic texts are most frequent. It is, for the most part, a low-lying limestone country, 30-180 m. above sea level, intersected by rivers and dotted with lakes and small ponds, although many of these are now swamps because of silting. However, much of the southern part is higher where it bounds the highland area. The large city of Copan in the southeast, for instance, has an elevation of some 600 m., and in the southwest, which is the central part of Chiapas, elevations of over 1500 m. occur. There are also smaller Maya sites at altitudes of around 600 m. in the Maya Mountains of British Honduras, but by and large the region is lowland and in marked contrast to the Guatemalan highlands. Although the southern boundary of the Central Area is pretty clearly defined, it is hard to draw a northern line since the Central Area merges imperceptibly with the Northern Area, geographically and culturally. The northern limits of the Central Area are drawn to include the region in which the Initial Series system of dating was used but where there is no evidence at present of an intensive occupation in later times.

Annual rainfall in the Central Area is very high. In the north it is 1.50–2 m.; in parts of the southern lowlands it averages as high as 2.5–3.1 m. There is a dry season from January to the end of May, but during the rest of the year rainfall is heavy except for a letup some years in September and October or in December. The country is densely covered with mixed tropical rain forest, up to 50 m. high, in which are many varieties of palms, mahogany, cedar, sapodilla (or zapote, from which chewing gum is bled), breadnut (not to be confused with breadfruit), occasional rubber trees and vanilla vines, and incredible quantities of aerial plants and lianas. It is not a friendly country, particularly to those with any tendency to claustrophobia. The fauna is tropical: jaguars, tapirs, deer, peccary, agouti, monkeys of the spider and howler varieties, turkeys, macaws, parrots, boa constrictors, small crocodiles, and, along the coast, alligators abound.

The great core of this region, embracing the Peten district and adjacent parts of British Honduras and Mexico, is now largely uninhabited. Groups of chewing-gum gatherers spend several months in the heart of the forest during the rainy season when the zapote sap flows, but their primitive camps are not permanent, and until a year or two ago one could travel north from Flores, the tiny capital of the Department of Peten, for a distance of about 250 km. through the heart of ancient Maya country without striking a single village. The lack of population at the present time is largely due to the prevalence of malaria and hookworm—both almost certainly introduced from the Old World since the Spanish conquest—lack of roads and resources, and difficulty in controlling the forest.

The numerous Maya ruins in this area are buried beneath the thick forest, and our knowledge of them is largely due to their chance discovery by natives cruising for zapote stands to bleed. Consequently these sites came to be known only long after the more accessible cities of Yucatan and of the southern edge of the Central Area had been visited by early travelers.

The more mountainous country to the southwest forms a subarea transitional to the Guatemalan highlands. Parts of it are covered with pine and savanna. Geographically, it is closer to the highlands, but for cultural and linguistic reasons it is best grouped with the Central Area. Unlike the Peten, it has a considerable Indian and mestizo (mixed Indian-Spanish) population.

The central core of the Peten is singularly deficient in natural resources, and the soil is scant except in the valleys. The ubiquitous limestone supplies first-rate stone for building and for sculpture, owing to its softness when first exposed, and it also contains deposits of flint, a good

substitute for the absent and more useful obsidian of the highlands. Minerals and metals are notably rare. The area is off the most important commercial routes of ancient Middle America, but it did produce in some quantity the highly valued cacao (chocolate) bean which served as currency throughout Central America and southern Mexico, and no doubt it exported to the highlands other tropical products such as macaw, trogon, and toucan feathers, jaguar pelts, cotton goods, logwood dye, vanilla, chile, copal incense, and rubber.

The Northern Area, the third division, comprises Yucatan and most of Campeche and Quintana Roo. As one travels northward from the Central Area the climate becomes drier until at the extreme northern tip the annual rainfall averages a scant 45 cm., about one-sixth of that registered for parts of the Southern Area. This, however, is rather exceptional, the rainfall over much of the region averaging 90–125 cm. annually. This greater aridity is reflected in the vegetation which becomes more scrublike as one goes northward. Much of the land is covered with thorny bushes, little resembling the lush rain forest of the Central Area, and many parts of Campeche are covered with savanna. Jaguars are found in Yucatan, but monkeys, tapirs, and macaws are unknown or extremely rare.

The limestone which covers the whole land is much more porous than that of the Central Area, and lets the rain seep through to an underground drainage system, with the result that surface rivers are nonexistent, and lakes occur only along certain fault lines. Much of the land would be quite waterless were it not that in places the surface crust of limestone has caved in, giving access to deposits of water beneath. These natural wells, known as *cenotes*, a corruption of the Maya word *tz'onot*, together with some artificial wells and catch pools, were, and still are, the sole sources of water throughout Yucatan. Yet the country had and now has a considerable population.

The Northern Area is extremely poor in natural resources. Limestone is everywhere, and flint beds are reported, but I suspect that the fine dark flint, used for the choicest work, is not local. Some products of the Central Area, such as rubber, vanilla, and cacao, do not do well in this more arid region. The last was grown to a certain extent in dry cenotes, but not in sufficient quantities to take care of the needs of the region. Cotton, however, grew well, and was widely exported in the form of woven and decorated mantles. There was also an active trade in salt in early colonial times and perhaps before the Spanish conquest. Yucatan is of prime importance because from there we have the fullest informa-

tion on how Maya culture functioned at the time of the arrival of the Spaniards.

OUTLINE OF MAYA CIVILIZATION AND HISTORY

ORIGINS OF MAYA PEOPLE

Of the origins of the Maya nothing is known. It may be assumed that the ancestors of the Maya reached America from the Old World via the Bering Strait, as supposedly did those of all other American Indians. Physical anthropologists now incline to the view that the round-headed Indians of the New World are the descendants of a strain that was one of the latest to reach America. Since the Maya are one of the most round-headed people in the world, this would tend to place the arrival of their ancestors in this hemisphere at a fairly recent date.

It is uncertain exactly how much culture was brought to the New World from Asia. Until a few years ago it was generally believed that extremely few cultural elements were thus introduced from the Old World, but there is now a tendency to credit more cultural traits of the American Indian to importation by later arrivals from northeastern Asia. Be that as it may, there can be little doubt that the component elements of Maya culture are overwhelmingly of American origin.

It can be supposed that in the millennium prior to the birth of Christ the various peoples of Mesoamerica (roughly definable as the area of high culture between a line drawn slightly north of Mexico City and another crossing Central America through Honduras) shared a fundamentally uniform culture. General similarities in techniques, economy, social organization, and patterns of religious observances presumably were much more striking than local variations found in pottery or in the skill with which stone implements were chipped. Agriculture (principally maize, beans, squash, and perhaps sweet manioc) was without much doubt shared at an early date by the Maya and their neighbors; monochrome pottery of the Formative Period, pleasing in form and burnished slip, reveals in the variety of its temper a lengthy pedigree. There were many seedlings in the cold frame of Middle American culture, and on the Maya plant, indistinguishable from all others, the first pair of leaves can have given no indication of the profuse and rare bloom which the summer of New World civilization would later bring forth.

The Maya area at that time may have been somewhat larger than it was in the sixteenth century, for the Maya-speaking Huastec, who now live in northern Veracruz, detached from the main body of the Maya, may then have

occupied parts of southern Veracruz or western Tabasco adjacent to the Maya area.

HISTORY

In *The Everlasting Mercy* John Masefield puts into the mouth of the parson some lines which well summarize the slow growth of culture.

The social states of human kinds
Are made by multitudes of minds,
And after multitudes of years
A little human growth appears.

and

States are not made, nor patched; they grow,
Grow slow through centuries of pain
And grow correctly in the main.

Maya history divides rather conveniently into four great periods: The Formative, The Initial Series, the Mexican, and the Mexican Absorption.

The Formative Period or Middle Culture Horizon. During the second half of the millennium before the birth of Christ the Maya began to develop in the lowlands the distinctive traits which characterize their culture. The intricate Maya calendar, which bursts upon us full grown, like Pallas Athena springing from Zeus' head, can hardly have evolved in a few years. It seems to have the marks of slow growth. The evolution of medicine men into a caste of priests, capable of guiding or forcing the people to such stupendous feats of construction to the glory of their gods, must have been a matter not of years but of generations.

Differentiation was taking place in those elements which were to develop into what I have termed the hierarchic cult, but in the material culture of everyday life a general uniformity appears to have continued. There are no Maya hieroglyphic texts attributable to the Formative Period, although it is to be supposed that certain of the simpler elements of the calendar, such as the 260-day almanac and, possibly, the 365-day year, were shared by the Maya, Zapotec, Olmec, and other peoples of the region. By the close of the period hieroglyphic writing had made enough growth to permit of the development of different glyphic writings for the main centers of culture. The end of this period is marked by the earliest known Maya carving dated in terms of the Maya calendar. This corresponds to A.D. 320 in the Goodman-Martinez-Thompson correlation, followed in this publication. This first Initial Series, together with the appearance of corbeled vaulting and polychrome pottery, marks the change from the Formative Period to the fully developed Maya culture of the Initial Series Period.

The Initial Series or Classical Period. This, the second

stage of Maya history, takes its name from the use of the Initial Series method of dating (p. 154), which was current throughout its length. It spans the six centuries (A.D. 320-909) during which the lowland Maya were erecting stelae with Initial Series inscriptions or related forms of dating. The earliest inscription now known, which is coeval with its carving, is the Leiden plaque, which carries the date 8.14.3.1.12 1 Eb 0 Yaxkin (A.D. 320); the latest is 10.4.0.0.0 12 Ahau 3 Uo (A.D. 909), incised on a jade bead from Tzibanche, Quintana Roo, and probably recorded on the Caracol at Chichen Itza and on the Monjas at Uxmal, both in Yucatan. The Initial Series Period is the classical age of Maya history, to which belong the great architectural developments of the Central Area and the pre-Mexican buildings of the Northern Area and which is marked by the peaks in sculpture and ceramics. To it belong all the great "cities" of the Central Area. It was the period during which the hierarchic cult was at its highest. Interchange of ideas and products, the absence of fortifications, and the tremendous surge of building activity presuppose a period of relative peace. The hierarchic culture is composed of sundry traits, all of which conform to a rather uniform standard. The most important are: hieroglyphic writing; advanced arithmetic and astronomy; calendrical calculations of a nature more complex than those connected with the 260-day almanac; stone architecture, embodying the erection of temples and "palaces," the building of pyramids, and the use of the corbeled vault; typical Maya art, especially in sculpture; and the development of a series of deities not directly of the soil or the elements. To these undoubtedly should be added a theocratic government or one that was deeply influenced by the priesthood, although there is no direct evidence for such an organization.

These elements are in contrast to the traits composing the lay culture. The latter consists of the sum of such activities as agriculture, hunting, pottery making, weaving, and other home industries, together with a social and family organization of a simple form (in the primitive sense, but probably complex as among many less advanced peoples), and a simple religion, built around the personification of the powers of nature, which was served by a nonprofessional priesthood.

The hierarchic culture overspread divergent local cultures, and produced a false appearance of unity, just as Islam, with its Arabic script, mosque architecture, and art style evolved from the prohibition against representing the human figure, gives a superficial uniformity to the various cultures which have embraced its tenets. The various elements of the Maya hierarchic culture did not spread uniformly, with the result that one Maya city

may have erected buildings with corbeled vaulting but set up no stelae, and vice versa. However, from the viewpoint of our study, the important fact is that the stela cult never penetrated to the Maya of the Guatemalan highlands.

Certain influences from central Mexico made themselves felt during the Initial Series Period. They are discernible in representation of the Mexican rain god Tlaloc on sundry Maya stelae (some of relatively early date) and are more manifest in certain ceramic forms which appear in the earlier of the two main horizons into which the Initial Series Period is divided. A Maya baroque, bright-hued as autumn leaves, appears toward the close. As the period drew to its end, the leaves began to fall.

In all Maya cities there was a collapse of the stela cult and of intensive building activities at or shortly before the close of the Initial Series Period. At one time it was thought that the whole Central Area was then abandoned, but it now appears more probable that the people continued to occupy the region, although the great cities or ceremonial centers, to use a more fitting term, were deserted. In fact, many, perhaps most, great religious centers throughout the Maya area, both in the Guatemalan highlands and in the Northern Area, were deserted at about that time. It is not impossible that this was owing to the overthrow of the hierarchic government. Perhaps this was the work of the common people in revolt against the oppressive demands on their time in the name of a religion which meant little to them; perhaps it was the result of pressure from non-Maya groups, for the tenth century seems to have been a period of unrest and tribal movement in Mexico.

Following the close of the Initial Series Period there is an interlude of about 80 years. During this transitional phase, or at the close of the Initial Series Period, metal first makes its appearance in the Maya area. The exact date of its arrival probably varied from city to city, those nearest the great gold-working regions to the east (Panama and Costa Rica) apparently receiving trade pieces first; but the intensive excavation of Uaxactun, which erected its last stela at 10.3.0.0.0 (A.D. 889), failed to produce a trace of metal.

The Mexican Period. About 10.8.0.0.0 (A.D. 987), according to Maya chronicles of the colonial period, the Itza, a group from the region of Tabasco who may have been Chontal Maya or even Mexicans, conquered and settled several of the large cities of Yucatan. Their culture was profoundly affected by influences from central Mexico, particularly from Tula. During their domination of Chichen Itza, the great religious center of Yucatan, they introduced many Mexican elements and religious concepts, notably new ideas in architecture, the cult of

Quetzalcoatl the feathered-serpent god, and a militaristic organization, the fighting orders of Jaguars and Eagles. There is some evidence of a shift at this time or somewhat later to fortified sites; the adoption of Mexican terms for sundry elements of warfare serves to substantiate this change to a warlike society. Native sources record that at that time several city states in alliance dominated Yucatan.

At or about the same time very similar influences from Tula were modifying Maya culture in the Southern Area. Accordingly, this part of Maya history is known as the Mexican Period. It terminates at 10.19.0.0.0 (A.D. 1204) when, again according to the same sources, the Itza at Chichen Itza were overthrown.

The Mexican Period witnessed a profound change from the apparent theocracy of the Initial Series Period to the aggressive militarism of the new rulers. The old religion in its simple lay-culture form continued to be the prime factor in the lives of the common people, but among the new rulers the new religion, evolved from an uncohesive amalgamation of elements of the old Maya theocratic cult and of Mexican rituals and beliefs, lost ground to political and militaristic institutions. Warfare, once a means to an end—that of obtaining victims for sacrifice to the gods—became more important than the end. The culture changed from one of moderation in all things to one in which excess was the standard; an essentially extrovert pattern replaced one which was, I believe, profoundly introvert. The Mexican Period was to its predecessor as the pretentious formalism of Pope is to the simplicity of the Elizabethan poets.

Few traces of the Mexican Period have been found in the Central Area, which at that time was in cultural eclipse. No hieroglyphic stone monuments are assignable to this horizon, although a few non-Maya glyphs were carved on walls of buildings in the style of the Mexican Period at Chichen Itza; the stela cult had fallen into complete desuetude, but it is probable that two of the three known Maya hieroglyphic codices date from this time.

The Period of Mexican Absorption. This final division of Maya history lasted from 10.19.0.0.0 to 11.16.0.0.0 (A.D. 1204–1539), when it was terminated by the Spanish conquest. During its span Mexican influences gradually became attenuated in both the Northern and Southern Areas. Maya attitudes reasserted themselves, Mexican concepts and deities were discarded or nationalized, and the ruling families became Maya in speech and outlook. By the time of the Spanish conquest there remained little Mexican save a claim by all ruling families to descent from chiefs of Mexican Tula, a dying cult of Quetzalcoatl, and some architectural features.

At the start of the period there was strong centralized government. The Cocom family dominated Yucatan with their seat at the fortified city of Mayapan; in the south at approximately the same time the Quiche Maya, from their fortified capital, ruled the neighboring tribes. Yet there was a very marked retrogression in the arts and in architecture. Taking into consideration also the total lack of hieroglyphic inscriptions and the limited subjects covered in the one codex attributable to this horizon, one can not hesitate to class this as a decadent period.

Mayapan was overthrown about 60 years before the Spanish conquest, and the Northern Area dissolved into many petty chiefdoms, constantly at war with one another. In the Southern Area Quiche rule was also replaced by a process of Balkanization. Of the history of the Central Area during this period we know little, but at the time of the Spanish conquest it, too, was divided into small chiefdoms which fought among themselves. It was the Maya Götterdämmerung.

The parallel developments in the various parts of the Maya area may some day supply material for the students of cultural evolution.

POLITICAL AND SOCIAL ORGANIZATION DURING THE INITIAL SERIES PERIOD

There is no direct information on how the Maya were organized during the Initial Series Period in the Central and Northern areas, but the tremendous amount of religious building, the wholesale manner in which religious structures were altered and enlarged, the effort which went into the erection of dated monuments, the overwhelming dominance of religion in all works of art, the lack of reference to lay activities, and the evidence for a pacific culture all point to theocracy or a government over which the priests had complete control. War was not unknown, but probably was waged primarily to obtain sacrificial victims.

Lack of fortifications, evidence for the rapid spread of new discoveries in the intellectual field, the essential uniformity of the elements of the hierarchic culture from one end of the lowlands to the other, apparent scenes of conferences on astronomy by delegate priests from various groups, and much trading in commodities suggest a general unity. Perhaps one would not be far in error in postulating a loose federation of states each ruled by a small group of sacerdotal aristocrats. Perhaps the Jesuit organization of the Guarani in seventeenth-century Paraguay supplies the closest parallel.

During the Initial Series Period the whole Central Area and the greater part of the Northern Area were dotted with the great religious centers usually termed cities. However, it is virtually certain that these were not

cities in our sense of the word, but rather ceremonial centers to which the people repaired for religious exercises and such lay activities as markets and courts of justice. The buildings are little suited to permanent habitation and in fact show no evidence of prolonged occupation. It is, however, probable that priests and novices took up residence in the temples and "palaces" for the long periods of fasting which preceded important ceremonies. Such temporary residence would account for the rather slight traces of occupation sometimes visible in Maya buildings. The general population undoubtedly lived in small scattered groups in the surrounding country. They must have been forced to work for long periods on the erection of the innumerable courts, platforms, pyramids, and temples of their sacred cities.

INDUSTRIES

Maya civilization was based primarily on maize, but many other plants were cultivated. The importance of maize and the deep religious feeling of the Maya toward it are alike illustrated by the fact that in many parts the Maya do not refer to maize directly by its name but in a reverent manner address it as "Your Grace." Land was held by the community and allotted to the heads of families for as long as they were able to work it. Perhaps over 90 per cent of the Maya were farmers, for many of those that had other occupations also cultivated their lands. We can presume that only the small ruling class and a restricted group, comprising such trades as masons and merchants, did not farm.

Not a few masons must have been permanently employed in construction of the religious centers, for the amounts of mortar alone that were used were enormous. Presumably the rank and file were made to work so many days a year hauling supplies and doing unskilled work on the buildings. The Maya had no domesticated animals, except dogs and fowl, and therefore no beasts of burden; they never learned to apply the principle of the wheel (except, perhaps, to use on toys, such as were constructed in Veracruz); and, to make life still more onerous, they had no tools except those of stone to clear the forest from their lands (copper axes appeared only shortly before the Spanish conquest, and even then were not too common).

SCULPTURE

Maya sculpture is one of the great glories of pre-Columbian America, but the newcomer to this field may at first have difficulty in appreciating it because its conventions are very different from those of western art. The primary interests of the artist lay in exactly reproducing the attributes of each god and in conforming to

the traditional style of presentation. The necessity of introducing so much symbolism led to over-elaboration of certain aspects and to consequent distortion of proportions and failure to allow the design to stand forth by leaving the background plain. Thus, in many sculptures the head, with its elaborate headdress, may occupy over a third of the total height of the portrait because these were the vehicles principally employed to convey full information on the deity portrayed. At first this disproportion strikes our western eyes as uncouth, and seems to indicate lack of aesthetic development, but as one grows accustomed to Maya conventions, one takes them as much for granted as the lack of western conventions in oriental art, or many of the standards of our own art.

That tradition dictated the somewhat awkward positions of gods or their impersonators is demonstrated by the fact that subsidiary figures are quite frequently delineated with much greater skill, and with a vitality lacking in the static postures of the principal personages. In such details, the artist, unstified by religious convention, showed his real worth. A true appreciation of the great heights to which Maya sculpture rose can be attained only through the study of such minor details.

The problem of perspective was sometimes tackled in a pleasing way by combining high with low relief, so that the principal figure in high relief stands against a background of low relief or even incised work. Size of figure was used not to convey perspective but to designate the relative importance of the participants in a scene. Thus captives and attendants are usually shown as about one quarter the size of the principal figure. On occasion, deities, other than the one occupying the central position, are on a small scale because their rôles were subsidiary to that of the principal god.

The employment of blocks of glyphs to counter disharmonic groupings, the treatment of feathers, particularly in the way the long sweeps were broken by carving one or two feathers with a forward swirl, as though ruffled by a breeze, the not infrequent use of a diagonal and secondary axis, and the way in which a three-dimensional effect was achieved in low-relief sculpture by allowing details of the design to overflow the frame, are a few among the many ways in which Maya sculpture attains true greatness.

Maya sculptural portraiture is distinctly static. It conveys a message of calm self-assurance and obviously reflects the temperament of a group that had chosen a philosophy of life in which moderation and dignity were dominant.

In contrast to sculptural portraiture, Maya murals of the Classical Period have remarkable animation. The artist, unshackled by the conventions of the stela cult,

reveals his mastery of problems of grouping and of techniques, such as foreshortening. All stiffness disappears; the figures are quickened; the chatter and movement of real life are reproduced with amazing charm and vivacity. The same is true, although to a lesser degree, of portraiture on polychrome pottery. Even when tackling that refractory substance, jade, the artist reveals great powers of composition.

ARCHITECTURE

The large ceremonial centers or cities of the Maya were sometimes of considerable size. Tikal, the largest, occupies an area about 1150 m. long by 750 m. wide. A ceremonial center consists of many courts flanked by platforms and pyramids in astonishing numbers. On the platforms often stood large buildings of many rooms, to which the convenient but slipshod term "palace" is applied; the pyramids were usually crowned with small temples containing only one or two or three rooms. From the doorways of the highest of these one now looks across the tops of the trees growing in the courts beneath, the range of green hues not unlike the contrasting shades in shoal water, with perhaps the white walls of one or two temples rising like coral islands above the sea of foliage. In ancient times one would have had an uninterrupted view across the city with its clusters of smaller pyramids topped by temples, its multichambered buildings facing courts at different levels, and its endless surfaces of cream-white stucco relieved only by shadow and an occasional building finished in red.

There is a bewildering amount of local variation in minor details which serves to counteract the lack of deviation in major aspects from the pattern tradition had imposed on the builders. Tikal, in its crowded buildings and soaring pyramids, and even in its sculptural art, has the restless quality of a Tschaiakowsky symphony, whereas at Palenque the rhythm of architecture and art beats more peacefully. The restful lines of its bas-reliefs in stone and stucco, and the less pretentious elegance of its smaller and fewer buildings, with their traceried roof-crests, are indicative of a greater cultural self-assurance. They are best translated in terms of an eighteenth-century minuet.

In the great court and in various smaller courts stood the stelae, like sentinels, before the approaches to platforms and pyramids. One can visualize the priest-astronomer, anxious to check his theories on the length of the solar year or the lunar month, threading his way from stela to stela to see what calculations his predecessors recorded in the then dim past, or one can conjure up the acrid, sooty smoke of copal incense which rose on special occasions from braziers placed before each stela. Just as

one now forces one's way through the tangled vegetation that crowds the courts and surges up mound and across terrace, so, in ancient times, a late arrival at some ceremony must have shouldered his way through the congregation, which, packed in the court, intently witnessed some ceremony held on the platform top of a pyramid before the temple door. I once espied a troop of monkeys sporting in the ceremonial court of Tikal, converting it into a New World court of Jamshyd.

The Maya employed the corbeled vault familiar to students of Old World archaeology, the stone courses of the vault overlapping each other like inverted staircases, until the two sides were sufficiently close to be bridged by a line of capstones. Because Maya architects usually adhered to this type of vaulting, rooms were narrow, never exceeding about 4 m. in width. To balance each half of the vault thick walls were necessary, and as the overlap of each course was small, vaults were high. The Maya, accordingly, carried the façade up to or somewhat above the level of the roof, and thereby produced a large area which could be, and often was, used as a field for decoration.

Some buildings had flat roofs of stone and mortar laid on beams, others were of perishable materials, and still others had walls of stone and roofs of thatch.

As already noted, there is no evidence that Maya cities of the Initial Series Period were fortified in any way. Small mounds on the outskirts of the ceremonial centers supported huts which were probably the dwelling places of the priests and other members of the ruling class; the huts of the rank and file were probably scattered through the surrounding country. They, too, were of perishable materials.

A perusal of Miss Proskouriakoff's album of architectural renderings will bring to life the Maya cities to a degree which no description can hope to rival.

RELIGION

A review of Maya religion within the compass that can be allotted to it in this introduction can hardly claim to satisfy the general reader; it certainly fails to pleasure the writer. It is, in truth, regrettable that there exists no comprehensive publication on the subject because the religious concepts of the Maya are extremely complex, and that complexity throws light on their history and on their mental and spiritual outlook. Moreover, the matter is of outstanding importance to this study owing to the close relationship between Maya hieroglyphic writing and religion, for there is no doubt that many of the forms and perhaps the names of hieroglyphs have religious connotations. A knowledge of Maya theology and myth is essential to the student of Maya epigraphy.

Information on the subject preserved by Spanish writers of the sixteenth and seventeenth centuries is scant; it must be supplemented by data gathered from modern ethnological sources and from the related fields of Mexican religion. The religious concepts of the Maya and of the peoples of central and southeastern Mexico were fundamentally the same at the time of Spanish conquest, but we have no good means of knowing how much foreign intrusions during the Mexican Period altered those of the Maya, or what effects the still earlier Mexican influences of the first half of the Initial Series Period had on them. In the brief outline given below certainty and theoretical reconstruction are cheek by jowl, for space does not permit distinguishing them.

Cosmology. The Maya appear to have believed that the sky was divided into 13 compartments, in each of which certain gods resided. These may have been arranged as 13 horizontal layers or as six steps ascending on the east to the seventh and then six more descending on the west, so that compartments 1 and 13, 2 and 12, etc. were on the same level. In the latter case there were 13 heavens but seven layers. The sky was sustained by four gods, the Bacabs, who were placed one at each side of the world. An association of supreme importance in Maya religion is that of colors with directions. Red is the color of the east, white of the north, black of the west, and yellow of the south; there may have been a fifth color, green, for the center. Almost every element in Maya religion and not a few parts of the Maya calendar are connected with one world direction and its corresponding color. Thus the red Bacab stood at the east, the white Bacab at the north, the black Bacab at the west, and the yellow Bacab at the south.

At each of the four sides of the world (or perhaps at each side of one of the heavens) stood a sacred ceiba (the wild cotton tree), known as the Imix ceiba, and these, too, were associated with the world colors. They appear to have been the trees of abundance, from which food for mankind first came; their counterparts in Aztec mythology helped to sustain the heavens. There is a group of 13 gods which appear to symbolize the sky and daylight; they fought with the group of nine gods who represent the underworld and night.

Of the Maya's ideas on the form of the earth we know little. The Aztec thought the crust of the earth was the top of a huge saurian monster, a kind of crocodile, which was the object of a certain cult. It is probable that the Maya had a similar belief, but it is not impossible that at the same time they considered the world to consist of seven compartments, perhaps stepped as four layers.

There seems no reason to doubt that the Maya, like the Aztec, believed that there were nine underworlds,

one below the other or again stepped with the fifth the bottom-most. At any rate, the nine lords of the nights, who have an evil aspect, are as prominent in the Maya calendar as in the Aztec. In Aztec belief these ruled the nine underworlds; Mictlantecutli, one of the nine lords and chief god of the underworld, and his wife ruled the fifth. The numbers 13, 9, 7, and 4 have great ritualistic and divinatory importance in both Maya and Aztec cultures.

The Aztec believed the world had been created five times and had been destroyed four times, the present age being the fifth. Each age had been brought to a violent end, the agents being respectively ferocious jaguars, a hurricane, volcanic eruptions, and a flood. The traditions that have survived among the Maya on the number of creations and destructions of the world are somewhat at variance. That we are now in the fourth age is the view expressed in two sources. Nevertheless, it is probable that Maya belief was in agreement with the Aztec in assigning the number 5 to the present age.

Mexican sources allot varying lengths to these ages. The total as given in the *Historia de Colhuacan y de Mexico* is 2028 years; that of *Codex Vaticanus A* is 18,028 years. There seems little doubt that each age was believed to have been a multiple of 52 years (after which the cycle of year names starts to repeat), to which in some cases were added a few years to mark the interregna. There is no information on the periods the Maya assigned to their past ages. The theoretical start of the Maya calendar was over 5,000,000 years in the past according to Long (1919). As will be demonstrated (App. IV), there are good grounds for believing that the Maya reckoned backwards not five, but hundreds of millions of years, and one can, perhaps, assume that the Maya grasped the concept of a calendar, and therefore a world, without beginning. This idea would have existed alongside a belief in various creations and destructions of the world.

General Characteristics of Maya Deities. Most Maya gods were in groups of four, each associated with a world direction and world color, but at the same time, as in the Christian doctrine of the Trinity, the four were regarded as one. Thus there were four Chacs (rain gods) but at the same time one could speak of the four as a single personality. In this, as in very many respects, Maya and Mexican concepts and even deities are remarkably alike.

Gods could have both good and bad aspects. The Chacs sent the rain, but they also sent hail and long periods of damp which produced rust on the ears of corn. The Chac might therefore be shown as a beneficial deity or as a death-dealing power. In the latter case he could be presented with a skull replacing his head, and with other

insignia of death. Gods could change their localities and resultant associations. The sun god was, naturally, a sky god, but at sunset he passed to the underworld to become one of the lords of nights, and emerged at dawn with the insignia of death. To depict him during his journey through the underworld it was necessary to add attributes, such as those of the jaguar or black, the color of the underworld, or maize foliage, which also connoted the surface of the world and the underworld. In a similar manner celestial dragons could become terrestrial monsters. These varying aspects of deities make the elucidation of Maya religion more difficult. Many, perhaps we can say most, Maya gods blend the features of animals or plants with a human aspect. The Maya may have made their gods in their own mental image, but hardly in their physical image.

Sky Gods. Of the sky gods perhaps most important from the epigraphical viewpoint were the sun and moon (figs. 14, 18, 23, 24; 15, 15, 16). Around them was built a veritable cycle of legends. Sun and moon, prior to their translation to the skies, were the first inhabitants of the world. Sun is patron of music and poetry and was a famed hunter; moon was the goddess of weaving and of childbirth. Sun and moon were the first to cohabit, but moon, who was unfaithful to her husband, earned an unenviable reputation for looseness, and her name became synonymous with sexual license. As the flowers of the *plumeria* tree (frangipani) were the symbol of sexual intercourse, they came to be associated with both sun and moon. The monkey had the same symbolic qualities. We find both these traditions reflected in the hieroglyphic writing. From parallel beliefs in central Mexico we can add to the functions of the moon that of being goddess of maize and of the earth and probably all its crops. Sun and moon were finally translated to the sky. Moon's light is less bright than that of sun because one of her eyes was pulled out by sun. A widespread belief, still prevalent in Middle America, but clearly not shared by the Maya priest-astronomers, is that eclipses are due to fights between sun and moon. In Yucatec the sun is *Kin*, and in most Maya languages or dialects the word is similar or a slight variant thereof. The moon is *U* or *Uh* in Yucatec and other lowland dialects; *Po* or *Ikh* in several highland languages or dialects. Honorific titles such as "lord" and "lady," "our father" and "our mother," or "our grandfather" and "our grandmother" were bestowed on sun and moon almost throughout the Maya area.

Itzamna was perhaps the most important deity in the Maya pantheon. Again there were actually four Itzamas, one assigned to each world direction and color. There can be little doubt that the Itzamas are the four celestial monsters (often represented as two-headed alligators or

lizards; sometimes shown as serpents with one or two heads) which are so prevalent in Maya art of all periods. To evidence on this point gathered some years ago (Thompson, 1939, pp. 152-62) may be added the important facts that *itzam* is translated in the Vienna dictionary as "lizard" and Izamal is said to have meant the place of the lizard. Anthropomorphic forms of Itzamna existed. Among the Chorti Maya of the eastern fringes of the Central Area sky monsters, known as Chicchan, are thought to be half human, half snake, and they are associated with world directions and colors. There are also terrestrial manifestations of the Chicchan. These celestial monsters are deities of the rain and, by extension, of the crops and food.

Other dwellers in the skies were the deities who were the planets and the Chacs. Of the former the Venus god was of supreme importance in the Maya hieroglyphic records; the Chacs, like the Itzamas, are rain gods, and have ophidian attributes. It is possible that they merely represent a different manifestation of the Itzamas, but it is, perhaps, a shade more probable that they are elements of the simpler and older religion which survived particularly among the peasants in rivalry with the more occult deities, such as the Itzamas, favored by the hierarchy.

Kukulcan, as Quetzalcoatl was called in Yucatan, appears to have been but a flash in the Maya pan. Of supreme importance in the art of the Mexican Period, he appears to have been regarded as alien by the great body of the Maya. His ephemeral character is well illustrated by the fact that his name is quite unknown among the present-day Maya, although the Chacs and other gods of the soil are still worshipped. His portraits are very rare or unknown in the codices and during the Initial Series Period.

Earth Gods. Of the gods of the soil those who have charge of the crops are most important. A deity of vegetation in general and of maize in particular, a youthful personage who incorporates features of the young corn, is frequently represented in Maya art (fig. 13, 1, 2). His head is used as a symbol for the number 8 (fig. 24, 42-49). In the more rugged parts of the Maya area gods of the soil are associated with prominent mountains, springs, the confluences of rivers, and other outstanding manifestations of nature. There is a little evidence suggesting that there may have been a group of seven deities associated with the surface of the earth, just as there were 13 sky gods and nine gods of the underworld.

It is almost certain that the Maya, like the Mexicans, believed that the world rested on the back of a huge alligator or crocodile, which, in turn, floated in a vast pond. I am inclined to think that there may have been

four of these terrestrial monsters, each assigned to a world direction and each with its distinguishing features (fig. 12,1-4), although at the present time there is some doubt as to whether the sundry attributes of these saurian monsters are interchangeable or whether they serve to distinguish the various reptiles from one another.

The jaguar god, corresponding to the Mexican Tepeyollotl, god of the interior of the earth, is an important Maya deity of the surface of the earth or its interior, for the two regions overlap (fig. 12,12-15). Of importance, too, is the old god, the Mam, who carries the symbol of the year, and generally has a conch shell on his back, and is believed to cause earthquakes when he moves in his residence beneath the earth (fig. 21,1-7). The earth deities share a number of attributes, of which the water lily, shells, and other aquatic symbols, the Imix sign, and attributes of death are the most prominent.

Gods of the Underworld. The Aztec believed that there were three abodes of the dead. Warriors who had died in battle or on the sacrificial stone and women who had succumbed in childbirth went to a celestial paradise. The former escorted the sun from the eastern horizon to the zenith; the latter from the zenith to the western horizon. Persons who had died of sundry diseases, such as dropsy and epilepsy, and those who were drowned or had been struck by lightning (the axes hurled by the rain gods) went to Tlalocan, the home of the Mexican rain gods, called Tlalocs. This was a paradise in which all edible plants grew in great profusion, and, according to one source, formed the lowest celestial compartment. The third abode of the dead was Mictlan, apparently the lowest compartment of the underworld, whither departed those who had not qualified for either of the other two lands of the dead. The god and goddess of death ruled this realm.

How closely these concepts were paralleled in Maya belief is not certain. There is no evidence for a celestial abode for warriors, which may have been an outgrowth of Mexican warrior cults, but there was definitely a Maya equivalent of Tlalocan, and, at least in later times, an underground abode of the dead, ruled perhaps by Kisin, whose name implies the stench of the charnel house, and who is probably the death god so frequently represented in Maya codices (fig. 13,11,19).

In the pantheons of the peoples of Mexico and of the Maya there was a group of nine deities, called in Yucatec Bolon-ti-Ku, "nine gods," who were the lords of nights, and gods of the underworld. They ruled in succession over the nights in contrast to the 13 sky gods who apparently ruled the days in sequence. The glyphs of the Maya nine lords of nights and underworlds are known (fig. 34), but not all of them can be identified, although the first of the

series, the night sun or the sun god in Hades, is easily recognized.

Deification of Periods of Time and Numbers. The 20 days, which formed the Maya "week," were regarded as gods, and were the recipients of prayers. The days were in a way embodiments of gods, such as the sun and moon, the maize deity, the death god, and the jaguar god, which were drawn from their various categories to be re-assembled in this series. The numbers which accompany the days were also gods and perhaps correspond to the 13 sky gods, although they are also in the same sequence as 13 of the day gods. The fact that in this series of 13 occur gods of the underworld or the surface of the earth does not seriously militate against their identification as the original 13 gods of the heavens, for Maya deities pass elusively from one region to the other. Similarly, all periods of time appear to have been regarded as gods, and Maya divinities form and reform in bewildering aggroupments, thereby supplying the priest-astrologer with means to hedge on his prophecies but sorely perplexing the modern student.

Sundry Gods. In addition to the deities assigned to sky, earth, and underworld, there were various gods not so easily placed, albeit temporarily, in those categories. At the time of the conquest, the Maya had various gods who were the patrons of trades, such as the patron deities of merchants, beekeepers, and tattooers. It is not improbable that several of these were merely manifestations of specialized aspects of gods, whose main functions were of a more general nature. Various deified heroes reported for sixteenth-century Yucatan probably reflect Mexican influences, but deities of animal origin, such as the dog and the Moan bird, surely were worshipped during the Initial Series Period, as was the god of the flint or obsidian blade. On the other hand, we have no information on a Maya god of fire, although among the Mexicans that deity was of considerable importance. The Maya recognized a supreme being, the creator god, but, like the Mexicans, appear to have accorded him little worship, presumably because he was regarded as remote from human affairs.

Several of the Maya gods have various names reflecting their functions and their calendar days; their glyphs will be discussed as occasion arises.

I believe the outstanding characteristics of Maya religion to be: (1) Reptilian origin of deities of the rain and of the earth; features of snakes and crocodiles, merged and fantastically elaborated, alone or blended with human characteristics, distinguish those gods. Deities with purely human form are not common in Maya art. (2) Quadruplicity of various gods together with association with world directions and colors, yet a mystic merging of the four in one, a process somewhat comparable to the Chris-

tian mystery of the Trinity. (3) Duality of aspect, for deities could be both benevolent and malevolent, and in some cases, seemingly, could change sex. This duality also extends to age, for in the case of several deities, functions are shared between a youthful and an aged god. Malevolence is expressed in art by the addition of insignia of death. (4) Indiscriminate marshaling of gods in large categories so that a god might belong to two diametrically opposed bodies, becoming, for instance, a member of a sky group as well as of an underworld group. (5) Great importance of the groups of gods connected with time periods. (6) Inconsistencies and duplication of functions arising from the imposition of concepts originating among the hierarchy on the simpler structure of gods of nature worshipped by the early Maya.

Sacrifices. In Maya eyes the gods were not benevolent dispensers of indiscriminate charity; they did not grant favors but traded them for offerings of incense, food, and blood. It is a rather pleasant concept, revealing somewhat of a desire on the part of the Maya not to be over-beholden to anyone and disclosing also an absence of abasement.

Human sacrifice almost certainly was practiced by the Maya in all periods of their history, but never on a scale approximating that reached by the Aztec. At one time it was thought that mactation was introduced during the Mexican Period, but evidence has now been uncovered which shows that the rite was observed during the Initial Series Period. Devotees customarily drew blood from various parts of their bodies to offer to the gods. The drawing of blood from the tongue and the offering of the sacrifice to a snake god are depicted on lintels from Yaxchilan. Sundry animals, such as dogs, deer, and turkeys, and large quantities of foodstuffs, particularly those made of maize, were also offered to the gods. Pictographic glyphs representing these offerings are prominent in Dresden. Copal and rubber were burned in sacrifice; the smoke represented the rain-filled clouds, an example of sympathetic magic. Jades, most cherished possession of the Maya, were also offered.

CHARACTER AND MENTAL OUTLOOK OF THE MAYA

Some years ago Dr. Morris Steggerda persuaded a small group of American ethnologists, archaeologists, and missionaries who had been in rather close contact with Yucatec Maya to rate them on certain psychological traits. The majority opinion was: The average Yucatec Maya is socially inclined and likes to work in groups. He has strong family ties but shows little outward affection. He is not quarrelsome. Though good-natured and sympathetic toward those in distress, he is fond of practical jokes. He is a keen observer and has a very good

memory. He is fairly intelligent, but not particularly inventive or imaginative or inclined to wander. He is very fatalistic and superstitious, and not particularly afraid of death. His sexual life is not over-emphasized, but he has a strong tendency to alcoholism. He is thrifty and unusually honest and exceptionally clean in his person. His wife is a neat housekeeper. Individuals vary in their desire to excel, in their religious enthusiasm, and in their attitude toward change. Murderers and beggars are exceptional in a Maya community.

My own answers agreed fairly closely with those of the majority replying to the questionnaire except that my observation in remote Maya villages of British Honduras leads me to believe that as individuals and groups the Maya like to move from one place to another. I would also list corporal modesty as a very marked trait, and give them a high rating for industry. I have noticed that a Maya, unless strongly influenced by Spanish contacts, is little inclined to sing and is even less given to whistling a tune. I would deem the Maya deeply religious, and would say that in his dealings he is formal. I have noticed in trials for small offenses that the presiding judge (the "mayor" of the village) seeks a verdict that will satisfy both parties rather than a strict application of the law. He will discuss the decision with each side, put himself in turn in the position of plaintiff and defendant, try to see both points of view, sympathize with both sides, and coax them to a reconciliation. I think this attitude epitomizes the Maya attitude of "live and let live."

On the whole this description applies pretty well to all Maya groups of the present time, although in some regions the Maya are not so clean and pacific as in Yucatan. It probably would have fitted the mass of Maya in pre-Spanish days except in two regards: intelligence and artistic attainments. The Maya of today is fairly intelligent but not exceptionally so, and he shows little artistic inclination at the present time except in such minor arts as the brocading of textiles and the shaping of pottery. This retrogression is largely attributable to the submergence of the ruling class in colonial times, although there were clear signs of a decline in the centuries immediately prior to the Spanish conquest.

The Maya outlook on life has a direct bearing on the content of the hieroglyphic texts and therefore merits a brief review. It is a subject which, despite its obvious importance, has never been discussed in any book dealing with the Maya.

The Maya philosophy is best summarized in the motto "Nothing in excess" which was inscribed over the temple of Delphi. Harmonious living, moderation, and a full comprehension of that spirit of toleration for the foibles of one's neighbors contained in the expression "live and

let live" characterize Maya civilization. The development of a somewhat similar philosophy has been generally considered one of the greatest achievements of Athenian civilization, and rightly has been put before material progress.

The various books of Chilam Balam (p. 34) which have survived reveal unconsciously that the preceding paragraph correctly summarizes the Maya philosophy of life. This is particularly apparent in the descriptions of the two occasions when the Maya felt the impact of alien ideas and ways of living: first when they were conquered by the militaristically minded Mexicans, second when the imposition of Spanish rule required tremendous mental and physical adjustments. Both conquests were accompanied by great bloodshed and cruelty, but it is highly significant that it was the disappearance of harmonious living, not the temporary slaughter and cruelty, which impressed itself on the Maya mentality. This is reflected in the following passage in the Chilam Balam of Chumayel (Roys, 1933) contrasting life before and after the Itza conquest:

In due measure did they recite the good prayers; in due measure they sought the lucky days, until they saw the good stars enter into their reign. Then they kept watch while the reign of the good stars began. Then everything was good. Then they adhered to the dictates of their reason; in the holy faith their lives were passed. There was then no sickness. . . . At that time the course of humanity was orderly. The foreigners [the Itza] made it otherwise when they arrived here. They brought shameful things when they came. They lost their innocence in carnal sin; they lost their innocence in the carnal sin of Nacxit Xuchit, in the carnal sin of his companions. . . . This was the cause of our sickness also. There were no more lucky days for us; we had no sound judgment. At the end of our loss of vision and of our shame everything shall be revealed. There was no great teacher, no great speaker, no supreme priest when the change of rulers occurred at their arrival. Lewd were the priests. . . .

The mention of carnal sin and lewdness refers to certain erotic practices introduced by the Itza, which were not at all in accordance with the Maya concept of purificatory rites before interceding with the gods. The Maya clearly attributed the subsequent outbreaks of sickness and general disaster to these erotic practices. In another passage referring to the immodesty of the Itza we read:

They twist their necks, they twist their mouths, they wink the eye, they slaver at the mouth, at men, women, chiefs, justices, presiding officers . . . everybody, both great and small. There is no great teaching. Heaven and earth are truly lost to them; they have lost all shame. . . . Understanding is lost; wisdom is lost. . . . Dissolute is the speech, dissolute the face of the rogue to the rulers, to the head chiefs.

Of the change resulting from the Spanish conquest the Maya scribe writes:

Before the coming of the mighty men and Spaniards there was no robbery by violence, there was no greed and striking down one's fellow man in his blood, at the cost of the poor man, at the expense of the food of each and everyone. [And elsewhere:] It was the beginning of tribute, the beginning of church dues, the beginning of strife with purse snatching, the beginning of strife with guns, the beginning of strife by trampling of people, the beginning of robbery with violence, the beginning of debts enforced by false testimony, the beginning of individual strife, a beginning of vexation. . . .

There had been tribute before the Spanish came, but it had not been onerous; and doubtlessly violence was not entirely unknown, but what an indictment of our civilization! All through these quotations and similar passages the Maya spirit of moderation is revealed. Wisdom, restraint, orderliness, honesty, respect for one's fellow men, reasonableness and nonresort to violence are the elements stressed. The flouting of them by the new rulers is deplored. These writings are not nostalgic recollections of an idealized past. The same attitude is revealed in the customary prayers of hunters, wherein it is promised that only what is needed will be killed. The Maya believes that it is wrong to slaughter wild life indiscriminately, and that he must show consideration for the animals themselves, and for others who also depend on hunting to augment their food supplies. The desire to see both points of view survives in the simple judicial proceedings to which I have referred.

There are historical instances of this Maya spirit of toleration. After the overthrow of Mayapan, the Mexican mercenaries were not massacred or even expelled from the country, despite the fact that they had been instrumental in keeping a tyranny in existence. Instead, they were given territory in which to settle.

Early in the seventeenth century two friars visited the still independent Itza of Tayasal. On being taken on a tour of the city, one of them on a sudden impulse smashed the chief idol in its temple, and, with his face alight with fanatical joy, exhorted the enraged Itza to become Christians. After resting in the guest house, the friars visited the chief ruler and told him what they had done. He, of course, already knew of the incident but showed no outward sign of anger, and in the subsequent conversation did not once refer to the matter. Far from suffering the death which in Maya eyes they must have merited for this sacrilege, the two friars were permitted to continue their stay on the island and to say their daily masses in public. The only outward manifestations of anger were a refusal to supply the friars with men to accompany

them when they finally departed and a shower of stones and some jeering as they set out. How many other peoples would have displayed equal moderation?

The art of the Initial Series Period reflects cultural tranquility as clearly as the restless art of the Mexican Period mirrors the turbulent, extrovert influences of that epoch; but it is the superb compromise which the Maya made between their own religion and Christianity, amalgamating elements of both in a harmonious and living whole, which most clearly illustrates this philosophy of life. A people that could adjust itself and its culture so well, and eschew excess so uncompromisingly, had achieved an intellectual advance which we may well envy.

BEARING OF MAYA MENTALITY ON GLYPHIC WRITING

The mental characteristics of the Maya have, I think, affected their glyphic writing and its subject matter to a considerable degree. So far as the glyphs themselves are concerned, the marked artistic sensibilities of the Maya must be partly responsible for the extreme diversity permissible in their delineation, although without the Maya concept of the personification of glyphs, this variation would have been less extreme. In theory, every glyph could seemingly have at least two distinct outlines: a symbolic (or normal) form and a head (or personified) form. In addition, there were many elements which could be substituted for one another, and many of these must have had their origins in the poetical and artistic concepts which enriched the figurative speech and, in turn, expanded the range of glyphs.

In the content of the glyphic texts Maya mentality and character are more evident. Without infinite patience, the methodical recording of all pertinent data, and a willingness to correct previous errors, progress in astronomy would have been scant, and the bulk of the material on the stelae would never have been recorded. The motto *per ardua ad astra* would have served Maya astronomers as well as modern aviators. I am persuaded that inscriptions were longest around 9.13.0.0.0 (A.D. 692) because the Maya scientists were then deep in argument on two problems: the length of the solar year and how best to record lunar data. A century later, after these matters had been solved to the satisfaction of the priest-astronomers, the inscriptions on stelae were much abbreviated.

The poetical endowment of the Maya also, I believe, affected the form of the inscriptions, and glyphs were added, like enough, not in a spirit of witless tautology, but because they corresponded to the antiphonal character of the spoken word (p. 62).

One wonders, too, whether the not infrequent mistakes in texts may not in some cases reflect Maya mentality. Some errors may have arisen from hasty transference

to stone of the drawings on the work sheets of the priest-astronomer in charge, or, if the glyphs were outlined in charcoal on the smooth stone, smudging of the design might have caused mistakes, such as the carving of a crescent instead of a dot or the omission of a numerical bar; but some errors, such as the carving of a wrong glyph, can not be blamed on the sculptor. Naranjo 18 has the Initial Series introductory glyph corresponding to Yax, whereas it should be Zac; Pusilha H has Glyph G9 instead of G1. These mistakes are so obvious that a tyro could hardly have made them. Did they result from plain carelessness in calculation or is there some other reason for them? The erection of a stela must have been an event of great importance, and it seems incredible that no one proofread the inscription before it was carved. Perhaps, therefore, G. B. Gordon was on the right track many years ago, when he suggested that the Maya may have deliberately made mistakes, holding the oriental view that no human undertaking should be perfect, as perfection belonged to the gods. This theory, if acceptable, gives a fresh insight into Maya mentality.

Finally, because of the deprecatory attitude toward individual assertiveness which characterizes Maya culture, glyphic inscriptions on the monuments, unlike those of almost every other civilization in the history of mankind, almost certainly do not record the deeds of individuals; instead, they are utterly impersonal records of calendrical and astronomical data and of religious matters.

LANGUAGE

At the present time there are 15 Maya languages or major dialects spoken or recently extinct, and several of these are further divided into minor dialects, so that altogether there are about 23 Maya languages or dialects; it is impossible to be more definite because some have not yet been well studied, and many of them hardly differ sufficiently from one another to deserve separate ranking (fig. 1). The Maya stock may be compared to the Romance group of languages: some Maya languages are closer than Spanish is to Portuguese, others stand in approximately the same relation as French to Italian. Quite possibly we should speak of only two Maya languages, a highland and a lowland, and classify the rest as dialects.

Authorities on linguistics are noncommittal as to what wider affiliations Maya may have. There is a tendency to consider that it may be related to the Mixe-Zoque-Huave group of languages spoken in central Chiapas and southern Veracruz, just west of the Maya area. Should that be so, it is possible that Maya fits into a yet larger category. This embraces the Aztec group of languages and some spoken in the western United States and northern Mexico, such as Shoshonean, Piman, Kiowan, Tanoan. Others of

California and Oregon belong to the same group. However, one would have to go back very far to reach their mutually ancestral tongue.

The various Maya languages and dialects fall readily into two groups, highland and lowland. In the Northern Area only Yucatec (often called Maya) is spoken; in the north of the Central Area Yucatec is also dominant. Southeast of this is Mopan, and across the base of the Central Area are spread from west to east Chontal, Chol, and Chorti. In the transitional area in the southwest (eastern Chiapas) are found Tzeltal, Tzotzil, Chaneabal, and Chuh, the last extending into the Guatemalan highlands. Except for Chuh all are quite closely related, and as one travels southwestward there appears to be a slow and uniform transition from Yucatec to Tzotzil. Mopan differs little from Yucatec. Chontal, Chol, and Chorti are all very close to one another, and nearer to Mopan than to Yucatec. Tzeltal and Tzotzil form another fairly closely related group. Halpern (1942) thinks the Chiapan languages diverged from the Maya stock at an early date, but there are grounds for questioning this (p. 283).

Thus for the Northern and Central Areas this gradual transition in language is strong evidence that no large movements of peoples have taken place in recent centuries, and that therefore Maya classical art and architecture and the considerable achievements in astronomy and arithmetic must be credited to lowland Maya groups.

Jacalteca, the first highland language in the geographical sense, is closest to Chuh, the last of the languages of this transitional area, and is in turn closely related to its southern neighbor, Motozintlec. All three have been classified by some authorities as lowland, by others as highland. The same dependence of language change on distance is true of the highland languages. The late Dr. Manuel J. Andrade, the foremost authority on Maya languages, has remarked that in the central highlands the transition from one language or dialect to another is so gradual that it is impossible to say where Quiche stops and Cakchiquel or Tzutuhil starts. As he put it, one would have to make the language map in blending pastel colors, not harsh reds and greens and yellows. The Indians themselves do not visualize definite boundaries. This correlation of distance and change applies also to the other highland tongues—Kekchi, Pokoman, and Pokomchi, and Ixil and Mam—a good indication that the same static conditions have persisted for many centuries. This does not imply that no changes have taken place. There is evidence that the Quiche expanded at the cost of their Zutuhil neighbors, and the Kekchi have absorbed Chol areas, but these were minor matters.

Entirely cut off from the Maya area is Huastec, a Maya language spoken by the Indians around Tampico, Vera-

cruz, and contiguous territories in San Luis Potosi and Tamaulipas. It is now fairly definite that Huastec is closer to the lowland group of languages than these are to the highland group. This is a matter of considerable historical importance, since it means that the Huastec were separated from the lowland Maya after they had diverged from the highland group, and linguistic evidence suggests that this may not have taken place much over a couple of thousand years ago.

All these languages and dialects, listed at such dreary length, are still spoken by large numbers of Indians, and in the remoter villages the number of Maya who speak Spanish is often very small, particularly in the case of women, who have fewer contacts beyond their village or with the local schools. Yucatec is so virile that many whites in Yucatan are bilingual, and not a few mestizos speak no Spanish.

The inventors of the Maya hieroglyphs almost surely spoke a lowland language, because Maya hieroglyphic texts occur only in the area covered by peoples of the lowland group, and because the hieroglyphic writing presumably developed after the lowland and highland groups began to diverge.

I am convinced that the inventors of the hieroglyphic writing spoke a language which was very close to modern Yucatec and to Chol-Chorti-Mopan. Unless there have been unsuspected shifts in population, a view which is contradicted by the gradual transitions from one contiguous group to another, the glyphs probably originated among the ancestors of the people who spoke Yucatec, Chol, or Chorti at the time of the Spanish conquest. To judge by the dated monuments, Maya hieroglyphic writing spread later to the territories in which Tzeltal, Tzotzil, and Chaneabal now live, and never reached the highland peoples. In fact, the Cakchiquel used the 400-day year until after the Spanish conquest. This is complete proof of the inability of the Maya long count to spread across the highlands. Two or three thousand years ago the differences between the various lowland dialects were presumably even less than they are today.

Accordingly I believe that we shall not err greatly in supposing that the language of the glyphs would have been understandable by present-day Yucatec or Chol. Phonetic elements in the glyphic script, particularly examples of rebus writing, suggest that the inventors of the glyphic writing spoke a language closest to sixteenth-century Yucatec (p. 285).

There is a great deal on Yucatec in the form of vocabularies, grammars, and religious manuals, but available material on Chol and Chorti is scant. Chorti is merely a dialect of Chol, chiefly differentiated by the substitution of *r* for the *l* of Chol. Unfortunately, Chol word lists,

published or photostated, are in no way commensurate with the historical importance of the language. There exist only the short vocabularies of Moran, Fernandez and Fernandez, and Starr, and the longer one compiled by Becerra. Western (or Palencano) Chol is somewhat different from eastern (or Manche) Chol, which is quite close to Yucatec. A vocabulary of western Chol has been compiled by Mr. and Mrs. Wilbur Aulie, and it is to be hoped that this will be published.

There is a fair amount of material on Tzeltal and Tzotzil but less on Chaneabal. This can be used in comparative work. For example the occurrence of a word in the same or slightly changed form in both Yucatec and Tzotzil is evidence that it is an old lowland root. There are certain phonetic changes. For example the *ch* (as in *chai*, "fish") of many words in Tzeltal, Tzotzil, Chol, and Chaneabal is the equivalent of hard *c* in Yucatec (*cai*, "fish"), and the *t* (as in *te*, "wood") of the same dialects is often the equivalent of *ch* in Yucatec (*che*, "wood").

Perhaps it would be well to warn the reader at this point that I am not a trained linguist.

The highland languages and dialects can also be used for comparative purposes. If, for example, a word runs through several highland languages or dialects but is not found in dictionaries of the lowland group, there is a reasonable expectation either that chance has decreed the absence of the word from available lowland dictionaries or that the word has become extinct in Yucatec (the dialect with the largest vocabularies available) but survives although unrecorded in the incomplete dictionaries of other lowland tongues. An example of this is supplied by the Kekchi word *hix* which means "jaguar." The Yucatec day name *Ix* or *Hix* is the equivalent of the Aztec *Ocelotl*, "jaguar," and the glyph clearly shows the markings of the jaguar, yet *hix* or *ix* does not connote jaguars in any lowland tongue so far as is known. In Kekchi alone the connection remains. Perhaps *hix* was a ceremonial name for the jaguar which has disappeared elsewhere. Whatever the explanation may be, we are fully justified in going to the highland group of languages for such interpretations when the lowland group fails us. Outstanding vocabularies are listed under the respective lowland language or dialect in the bibliography.

Language will play an ever-growing part in the decipherment of the Maya hieroglyphs, and the day may not be far distant when texts will have first to be rendered in Maya to conserve their full richness. A start in that direction will be made in this publication.

PHYSICAL APPEARANCE

The Maya are fairly homogeneous in their physical appearance despite the language differences. Generally

speaking, the Maya is stocky with strong muscular development in his legs. He is broad-faced and has prominent cheekbones. The features are soft, and one can describe both sexes as handsome. The Yucatec are among the most broad-headed of the world, for the average cephalic index for males is 85, with isolated cases reaching 93. Among the Tzotzil and Tzeltal there seems to be a strain which has produced a group with narrow heads. Other Maya groups are very definitely in the brachycephalic column. Maya of pure blood have straight (sometimes slightly wavy) black hair and dark brown eyes, but the eyelids often show a rather pronounced Mongolian fold, which makes the eyes appear almond-shaped. Many Maya have a fleshy, hooked, or rather aquiline nose, and somewhat drooping lower lip. These are features which combined with the deformed forehead to produce the type of classical beauty found everywhere in the art of the Central Area during the Initial Series Period.

ESTIMATES OF POPULATION

The descendants of the Maya still exist in large numbers in many parts of the area they formerly ruled, but in some areas they have been absorbed culturally and, to a certain extent, physically into the mestizo population. Sapper estimated in 1904 that there was then a Mayaspeaking population of approximately 1,250,000, three-fifths of whom belonged to the highland linguistic group.

Estimates on the preconquest population vary from the one of 1,250,000 by Kroeber (1934) to that of over 13,000,000 for the Peninsula of Yucatan alone by Morley. Taking as a basis the tribute list of 1549 for Yucatan and Campeche and Sapper's figures for the present population, and allowing for areas now depopulated or occupied by mestizos, I reach a figure of about 3,000,000 for the Maya population at A.D. 800. Estimates that the Central Area toward the close of the Initial Series Period was one of the most densely peopled in the world, and that its population may have surpassed the 50,000,000 mark are surely fantastic.

SOURCES OF HIEROGLYPHIC TEXTS

STELAE

The great bulk of Maya hieroglyphic texts occurs on stelae and altars, as adjuncts to buildings, or in hieroglyphic codices.

The stelae and altars vary considerably in material. Throughout the greater part of the Peten and Yucatan they were made of limestone, which differs greatly in quality from one region to another. For example, the limestone used for stelae in several sites of northern British Honduras, northern Peten, and southern Quintana Roo is

so poor that I have made perceptible scratches on the under side of a fallen stela with my thumbnail, and have been unable to scrub surfaces with a hard-bristled brush without seriously injuring the carving. Consequently, very few hieroglyphic texts have survived in that region; at the most, there remain vague outlines of glyphs which can be identified only because of their positions in a text. However, at some sites, notably Lubaantun in southern British Honduras, a fine crystalline limestone of marblelike consistency was used. The stone in many Peten sites ranges in quality between these two extremes. Naturally, when a stela has fallen, the design on the under side is likely to be better preserved than that on the sides still exposed to the weather.

The best-preserved inscriptions come from the southern part of the Maya lowlands. At Palenque and at some sites of the Usumacinta Valley dolomite was used for the carving of some hieroglyphic inscriptions, and this is superior to most limestones. At Quirigua the stelae and altars are cut from sandstone which has withstood the ravages of time remarkably well; at Copan, on the extreme eastern fringe of the Maya area, a beautiful greenish trachyte was employed for buildings, stelae, and altars. This has proved the most enduring of all materials. Unfortunately, time and climate have destroyed or rendered illegible a high proportion of glyphic texts, but we can take some consolation in the thought that, generally speaking, the most interesting inscriptions occur at cities which had the most enduring stone. The texts of the northern part of the Central Area are the poorest preserved, but, by and large, they are short and in subject matter of meager interest; the inscriptions of the belt covering the Usumacinta basin and extending eastward to Copan are in fairly good shape, are longer, and in their content demonstrate greater scholarship.

Stelae are usually about 3–3.50 m. high, about 1 m. wide, and about 30 cm. thick; the height includes an undecorated butt, set in the ground, which may be as much as 75 cm. long. There is, however, considerable variation in the size of stelae. At Quirigua, in the Motagua Valley, some tall graceful shafts were erected, the tallest of which, Stela E, has a height of 10.50 m. (including a butt 2.50 m. long) and a width of 1.50 m. The weight of this stela has been estimated at 65 tons. On the other hand, stelae may be less than 3 m. high.

Stelae at Quirigua throw some light on the method of quarrying the stone. Quarry stumps remaining on one narrow side of the butts of both Stelae A and E indicate that the profile of the shaft was outlined in the ledge of rock by a ditch which was cut to a depth slightly greater than the desired width. The mass was then undermined from back and front and cut through at intervals until the

shaft stood detached except for slender stumps left in the process of undercutting. With levers those stumps could be snapped and the shaft moved for trimming, transportation, and carving.

The wheel was unknown in Middle America except as a relatively late development in Mexico, where its use appears to have been confined to toys (small pottery animals have been found with four wheels). It is therefore probable that stelae were hauled to the points of erection with the aid of rollers. Peter Martyr has an account of transportation in ancient Mexico which is doubtlessly applicable also to the Maya area:

They have also certain hearbes, with the which, in steed of broome, and hemepe, they make ropes, cordes and cables: and boaring a hole in one of the edges of the beame, they fasten the rope, then sette their slaves unto it, like yoakes of oxen, and lastly in steede of wheels, putting round blocks under the lumber, whether it be to be drawn steepe up, or directly downe the hill, the matter is performed by the neckes of the slaves, the Carpenters onely directing the carriage. After the same manner also, they get all kind of matter fitte for building, and other things apt for the use of manne.

There is evidence that some, but not all, decorative elements for buildings were carved at or near the quarries, feathered serpents and parts of decorated friezes having been found in open country; the stones composing the panels of Copan Temple 11 clearly were carved before assembly (fig. 54.4, G1 B1, B5, C3). If stelae were carved at the quarry, great care would have been necessary to avoid damage in transit. Moreover, the shaft would presumably have to be upended to facilitate carving on all four sides, particularly when the design was carried round to another face. For those two reasons it was probably advantageous to erect the stela in its final position before starting to carve it, despite a possible hardening of the limestone which the delay might entail. Strömsvik (1941, p. 92) has discussed the methods by which the Maya probably raised stelae into position. He deems it most likely that a temporary ramp or incline of earth was built, up which the stela would have been pulled on skids until its butt could be tipped into a prepared socket. Alternatively he suggests prying up one end with levers and blocking under until leverage could be had for a final pull with ropes. The ropes might have passed over a stout A-frame. Possibly both methods were employed: the first for the huge shafts at Quirigua, the second for the stelae of more normal size.

Usually the butt of a stela was placed in a hole dug in the earth or through the artificial fill of a platform, and then wedged with rubble or dirt and stones. At Copan a number of stelae were erected over cruciform vaults,

which frequently contained dedicatory caches. The butt of the stela was held in position by a close-fitting crib of long stone blocks. At Quirigua stelae were typically supported by large slabs, and held in position by rubble packed between the butt and the stone-lined walls of a pit especially prepared for it.

There is evidence that stelae were sometimes moved from their original positions and re-erected elsewhere. There is therefore some danger in dating buildings by the stelae with which they are associated, and similarly caution must be observed in associating cache material beneath stelae with the dates recorded thereon.

Stelae may be carved on one, two, three, or four sides or they may be plain. It has been supposed that plain stelae were covered with stucco, on which hieroglyphs were painted. Usually the front of a stela is carved with the figure of a deity or of a priest impersonating a deity. I believe, although proof escapes me, that the choice of subject for portrayal was directly governed by the dedicatory date of the monument. The designs are usually complex.

The principal figures on stelae are almost always presented full face with feet turned out so that they are almost in a straight line, heel to heel, or the head is in profile and the body full face, or the whole figure may be in profile. The stiffness of these awkward postures must not be considered a symptom of immaturity. There is little reason to doubt that they were demanded by tradition, and probably represent a rigid adherence to a style evolved at a time when Maya sculptors had not yet mastered the art of foreshortening. This is not surprising, for religious art throughout the ages has tended to adhere to the canons of past usage. Foreshortening can often be detected in the portraits of captives or minor figures, or in the complex vignettes which served as full-figure glyphs. Tremendous vivacity is to be seen in little figures of gods who clamber around lianlike motifs, or peer like startled fawns from behind a cornstalk. Sometimes a scene was enclosed within a frame, but more often the border was omitted or reduced to a very low and hardly noticeable line.

Maya sculptors seldom failed to achieve good balance in their compositions. Sometimes the symmetry was a little too patent, as in the tablets at Palenque, where a central motif is flanked by individuals of almost equal size, and they, in turn, by columns of glyphs of the same length and breadth. Generally, however, the columns of glyphs are used to counter disharmonic groupings. Where a smaller figure faced a larger one, a mass of glyph blocks above the former restores the balance. Too obvious balance is often avoided by subsidiary glyphs in the diagonally opposed corner. In fact, many sculptures have

a subsidiary quality of diagonalism which results from the two-headed dragon element, usually called the ceremonial bar, which many personages carry at a cant across their breasts. These introduce a secondary axis: the headdress with its sweeping feathers and massed masks at the top right corner and a kneeling captive in the bottom left corner countering it.

Because religious considerations dictated a narrow field within which to work, Maya sculptural portraiture of Late Classical times, which is that we have been discussing, is distinctly static. Yet, as we have seen, subsidiary figures were often vibrant with life. The maize god, in particular, was treated with gay abandon, for he was loved and regarded almost as a comrade by the Maya. This combination of static portraiture of the main figure and vivacious treatment of subsidiary figures reminds one of mediaeval Christian art. Reposeful statues of saints dominate, but in odd nooks and corners or on the under sides of choir stalls are carefree little scenes which reveal how alive that sculpture, too, could be when freed of ecclesiastical formality.

This restrained portraiture of the Initial Series Period contrasts strongly with the restless art of the Mexican Period, as exemplified by Itza sculptures at Chichen Itza. Never-ending lines of warriors, as awkwardly grouped as figures on an old-style fashion plate, face in toward an altar or sun disk. There is an incredible stiffness in their poses, and a depressing monotony in their dress and weapons. Since this was primarily a secular art, these defective qualities can not be attributed to the restraining influences of religious conservatism.

Maya sculpture was not, like mediaeval Christian art, a form of pictorial education for the masses. It was executed for the edification of the gods and a small sacerdotal group, the members of which were thoroughly acquainted with all the intricacies of its symbolism. Also, the confused polytheism of the Maya, in which gods blended into one another and overlapped in their functions, naturally required a more complicated representation than would be necessary in the art of a monotheistic culture.

Frequently small areas not utilized in the presentation of the main personage or for details subsidiary to his portraiture were filled with short panels of glyphs. This was invariably the case when only the front of the stela was carved. Generally, however, the bulk of the hieroglyphic text is presented on the sides and sometimes on the back of the stela. The back, nevertheless, is more often plain or devoted to the portrait of some other divine personage. Very rarely figures are found on the sides. All four sides of a very few stelae are carved with glyphs, but there is no known case of a stela with figures in relief but lacking glyphs. From this it may, I think, be inferred

that the primary purpose of these stelae was to record hieroglyphic texts.

Sylvanus G. Morley evolved an elaborate system for classifying the stelae in 10 groups according to whether the various surfaces of the stelae are plain or carved with glyphs or personages. Although such a system has some value, the group to which a stela belongs must have been largely a matter of how many subjects were to be discussed in the hieroglyphic texts, just as the length of a letter depends on how much the writer wishes to say. At one period lively discussions concerning lunar and solar computations were going on between the various cities, and calculations far into the past were recorded as evidence for the varying viewpoints. Finally, these matters were settled, and as a consequence, I believe, inscriptions became much shorter. Thus, an increase in the space devoted to hieroglyphs is indicative that the text dates from 9.12.0.0.0 to 9.17.0.0.0 in the Maya calendar, and even that applies only to cities which were intellectual leaders. Other cities, having no controversial views to air, recorded only abbreviated inscriptions.

On those stelae carved on three or more sides, the hieroglyph inscription usually starts on the (observer's) left side, and then passes to the back or to the right side, but at Copan it commences on the back. The final date is not infrequently given or repeated on the front of the stela. There is no fixed rule in this matter.

Stelae were usually erected in the courts of Maya cities, at the foot of some pyramid or mound so that their fronts faced toward the center of the court. Sometimes they were placed on the terraces or on the summit of a pyramid, or they could be set in the stairway of a structure. Quite commonly several stelae stand in a row before a single building. An example of this method is to be found at Piedras Negras where no less than eight stelae were in line before Structure J-4, six or seven of these occupying a single low platform. Indeed, low platforms were frequently built to carry one or more stelae. Sometimes stelae were housed in small shrines, which may be vaulted with corbeled arching, and very occasionally they were placed in temple rooms.

Some stelae still retain traces of stucco in sheltered nooks of their surface, and sometimes traces of paint (red of more than one tone commonest; also green, and light and dark blue). The reprehensible Maya custom of painting the lily has, however, been beneficial to epigraphists; the stucco, which is often of considerable hardness, has done much to save the texts from weathering,

Frequently fragments of incense burners are found in the ground immediately in front of stelae, indicating that they were the object of a cult. Present-day Maya of Yucatan and Quintana Roo still burn copal and candles

before certain stelae of Coba which are regarded as guardians of the forest. A. M. Tozzer (1907, p. 82) reports finding five incense burners in a line before a stela at Tzendales. They were of the type ordinarily made by the present-day Lacandon. At the ruins of Benque Viejo in western British Honduras an altar with a small cross on it has been erected on top of a fallen stela, and passing Indians place flowers or stones on it, and say an Ave Maria or Pater Noster.

Among the Maya of eastern Yucatan and Quintana Roo special stones, either stelae or rocks of odd shapes, are known as *tzimin tun*, a term which originally meant "stone tapir," but which now signifies "stone horse," or can be translated "stone ridge" or "stone trestle." These are believed to be alive. By day they are motionless; at night they wander around. They will protect one's milpa (cornfield), aid one while hunting, and keep one in health, if placated with offerings of food, copal, or candles; but they will punish with sickness anyone who fails to make them offerings. It is believed that they can be brought to life by a *h-men* (priest-sorcerer). The ritual, which consists of sprinkling the stone with water and offering it copal, posol (maize gruel), and tortillas (maize cakes), is preceded by a nine-day vigil.

These simple rituals are presumably the last surviving elements of a stela cult, for we know that the image of each katun (period of 20 approximate years), which must have been very closely associated with the stelae, was worshipped during its "reign."

ALTARS AND ZOOMORPHS

Altar is a convenient term under which are grouped many Maya monuments which cannot be called stelae because of their shapes. They comprise two main categories: squat rectangular blocks and drum-shaped stones. The former usually rest directly on the floor of a court; the latter sometimes stand on three oblong supports also of stone. They vary considerably in size. Altar T, Copan, one of the largest, is 70 cm. high, 1.80 m. wide, and 1.30 m. thick. Altar 1, Piedras Negras, which is drum-shaped, has a diameter of 2.16 m. and is supported by three feet of solid stone, each 1.39 m. high.

Many of these altars are placed before stelae; others are in no way associated with stelae or even with structures, but stand entirely by themselves. Those that are carved frequently carry glyphs on their sides or perimeters, and sometimes on their tops; they may be all glyphic or may be carved with designs but no glyphs. The supports also may be inscribed with hieroglyphic texts. Altars have been designated by separate numbers or letters or have been referred to by the stela in front of

which they stand (e.g. Altar of Stela 1, Copan). The system followed in this publication is explained in the preface.

The unmelodious term "zoomorph" has been applied to certain large sculptured boulders at Quirigua which are indistinguishable, except for size, from the more elaborate altars. In recent years other sculptures which are in the same category, have been discovered in front of two of these zoomorphs, and they have been called respectively "Altar of Zoomorph O" and "Altar of Zoomorph P." Naturally such nomenclature makes no pretense to being functional. Zoomorph P, at Quirigua, in the intricacy of its carving and in its massive presentation (girth 10 m., height 2.20 m., estimated weight approximately 20 tons) is an amazing testimonial to Maya sculpture. The late W. H. Holmes, former director of the National Art Gallery, presently Collection of Fine Arts, considered it the finest example of ancient American sculpture extant. The subject, a favorite one in Maya art, is a two-headed celestial dragon. The hieroglyphic text is grouped around the two heads in a felicitous blending with the intricacies of the monstrous deity.

There is no definite evidence that altars ever functioned as such. Possibly those that are directly associated with stelae served as tables for sacrifices of various kinds. Occasionally (e.g. at Piedras Negras and Calakmul) outcroppings of rock in or near ceremonial centers were carved.

TEXTS IN BUILDINGS

Lintels. In most Maya cities the lintels of doorways were of wood, but along the Usumacinta Valley, particularly at Yaxchilan, and at Chichen Itza (during the Initial Series Period) and at a few other scattered sites, notably Xcalumkin and other Puuc cities, they were often hewn from a single stone. Many of those of stone are carved with hieroglyphic texts and representations of deities or ceremonies performed in their honor.

Usually the under side and the front of the lintel are carved, and if there are several doorways thus treated, the inscription is continued from one lintel to another. Stone lintels are usually about 2 m. wide, 85 cm. deep, and 30 cm. thick, the width includes plain borders at each end which rest on the jambs, and, naturally, are hidden from view. The length of the sculptural panel is usually around 1.25 m. The design on many lintels can be viewed by looking upward as one enters the doorway, but in other cases the design or hieroglyphic text follows the long axis of the lintel.

Presumably, many wooden lintels were once sculptured, but none with hieroglyphic texts has escaped the ravages of time, except a handful at the large site of Tikal. The

material in some cases is sapodilla wood (*Achras zapota* L.), the tree which yields chewing gum.

There are grounds for believing that nearly all the stone "lintels" from Piedras Negras were actually wall tablets. As they are so well known under their classification as lintels, much confusion would arise if they were renamed now.

Jambs. Hieroglyphic texts in stone on the jambs of doorways are rare. They are confined to Copan, and parts of Yucatan and adjacent Campeche.

Columns. A few stone columns, round and square, which supported lintels or roof beams, carry hieroglyphic texts. They are rare and confined to a few sites in Yucatan and adjacent Campeche.

Wall Panels or Tablets. These were usually set in the rear walls of temples. All that have survived are of stone. Most famous are those of the Temples of the Cross, the Foliated Cross, the Sun, and the Inscriptions at Palenque. The last of these consists of three panels. Two are set in the back wall of the outer room; the third is in the back wall of the rear room, the sanctuary. The three together have a total of 620 glyph blocks, the longest inscriptions still intact in the Maya area. As already noted, some texts labeled as lintels, are almost certainly panels. A variant form of panel, a long narrow text on a vertical band which starts close to the capstone of a building and continues to near floor level is found at the Campeche site of Xcalumkin.

Another form of panel sometimes decorates the surfaces of short walls on each side of a doorway. In most cases the hieroglyphic texts are subsidiary to the portraits of deities or their impersonators, but at Copan the panels are purely textual.

Moldings. In the Red House, Chichen Itza, a stone molding with a line of glyphs in low relief runs the length of the rear wall of the front room at the level of the vault spring. At Xcocha a similar band apparently ran around the whole room, and was carried around three sides of the capitals of the columns in the doorways. Temple 26, Copan, once was decorated in a similar manner with full-figure glyphs. At Halal a painted band of glyphs extends on either side of a carved glyphic lintel, along the inner wall of a room, as though forming a single text.

Thrones. This term has been applied to some immovable tables of solid masonry or of stone partially supported by stone legs. These are rectangular, and set against the rear wall of a building, sometimes occupying a specially designed alcove. There is evidence that on occasions a throne served as a sort of dais, on which an important personage sat while others stood or sat in front. The sides, the screen at the back, and the supports may

carry hieroglyphic texts, which may be carved or incised (Piedras Negras) or worked in stucco (San Jose).

Ceilings. The only example I know of hieroglyphic texts on ceilings occurs at Tzibanche, in southeastern Quintana Roo. There it seems to have been customary to lay flooring across the vault a few feet below the level of the capstones so as to form a small attic running the length of the room. In profile the vault and ceiling take the form of an A with blunted apex. These floors are of wood and in one case the under side, which forms the ceiling of the room, was carved with hieroglyphs.

Capstones. A few stucco-covered capstones were painted with designs, which include short hieroglyphic texts. The known examples are confined to Uxmal, Chichen Itza, Xkichmook, and Dzibilnocac. At Kiuic there is a carved capstone with glyphs.

Murals. Hieroglyphic texts painted on the stuccoed walls of rooms, alone or accompanying religious scenes, are scarce. The most important are the sequence of 72 day signs on a wall of Structure B-XIII at Uaxactun, certain texts from the palace at Palenque, and various lots of glyphs, including an Initial Series (hereinafter contracted to IS; p. 154), on the magnificent murals recently found at Bonampak. Vertical or L-shaped panels of two or three glyphs placed near individuals are common on the Bonampak and Uaxactun murals, and should some day prove a fruitful field for investigation.

Naturally, inscriptions which were inside buildings have been less exposed to weathering, and therefore supply prime study material.

TEXTS CONNECTED WITH THE EXTERIORS OF BUILDINGS

Hieroglyphic Stairways. Flights of stone steps, one or all of which are inscribed with hieroglyphs, are fairly common. As a rule, only the riser is carved, but both treads and risers of the hieroglyphic stairway at Palenque carry glyphs. The most magnificent hieroglyphic stairway is that of Structure 26, Copan. It has been estimated that this originally consisted of 62 steps, each 8 m. wide. At intervals were seated five heroic figures of gods or priests, as though guarding the ascent to the temple which once crowned the summit. Unfortunately the stairway is partially destroyed, much of it having slid down to the base of the mound, with the result that only two sections, comprising approximately one-half of the text, are still intact. Most of the remainder of the inscription has been recovered, but the stones are hopelessly jumbled; the inscription originally consisted of about 1000 glyph blocks.

Sills and Single Steps. Each of the three doorways of Structure 44, Yaxchilan, has a carved sill, and a second carved step giving access to it. The surfaces are decorated with hieroglyphic texts and personages in low relief.

Some of the riser faces of these stones are also carved. The text of the so-called Reviewing Stand at Copan falls in this category.

Retaining Walls. Rarely, short hieroglyphic texts are carved on the stone retaining walls of the platforms of structures. The best known examples are at the Palace, Palenque.

Façade Decoration. Glyphic texts on façades are rare. The outstanding examples are the hieroglyphic molding of Structure 1, Quirigua, and that of the south building, Xcalumkin, and the various elements from the exterior of the Caracol, Chichen Itza. There is some doubt as to how these last were arranged except that they were inscribed on the bodies of two-headed snakes. The fronts of piers between the exterior doorways of Palenque buildings were generally ornamented with representations of personages and hieroglyphic texts in stucco.

Occasional short texts are scattered in odd places. At Labna a few glyphs are incised on the long snout of the mask of a celestial monster, and the medial molding of one structure at Palenque has glyphs cut in the under surface of the lower element. The exterior walls of a small temple at Santa Rita, British Honduras, were largely covered with murals. Figures of gods, probably the patrons of a succession of approximate years (tuns), predominate, but a few hieroglyphs also occur.

TEXTS CONNECTED WITH BALL COURTS

The Maya, like several other peoples of Mesoamerica, erected courts for the playing of a certain game which involved the use of a large solid rubber ball. The rules forbade propelling the ball with hands or feet, and shots were usually taken on the upper thigh immediately below the hip. The game had a strongly ritualistic connotation and occupied an important place in Maya culture. The court consists of a playing alley which varies considerably in size but in most instances is about 17-22 m. long and 3.5-6.5 m. wide. On the long axis the sides of the playing alley are bounded by solid masonry masses with low faces toward the alley. Typically, the upper surface of each masonry mass slopes upward and outward for a distance of about 4 m. and then becomes vertical, or more sharply sloped, to form the faces of a flat-topped section, on which a temple is often situated. Transverse playing areas may exist at each end of the playing alley, converting the ground plan into two T's placed base to base. Sometimes a stone ring projects from the center of the vertical face of each flanking mass. The main scoring point in the game, at least in the form of the game played in the sixteenth century, was achieved when the ball was driven through the ring.

Hieroglyphic texts may occur in various parts of the

ball court. Frequently stone markers are set in the floor of the playing alley along its long axis, with their surfaces flush with the floor. There are usually three, set at equidistant intervals, and round, with diameter about 65 cm., or sometimes rectangular. The surfaces of these markers may carry hieroglyphic texts or may be carved to represent players in the game with or without the addition of hieroglyphs. Alley markers with hieroglyphs have been reported from Yaxchilan, Copan, Chinkultic, Cancuen, Laguna Perdida, Lubaantun, and Hatzcab Ceel. In the last case the inscription is worn nearly smooth, presumably by Maya feet.

Panels are sometimes set in the surfaces of the sides flanking the playing alley. These panels may be rectangular or circular or long vertical bands. Rectangular panels with figures and glyphs have been encountered on the slopes of ball courts at Coba and Tonina; circular panels with glyphs occur at Yaxchilan; and long bands with glyphs are reported from ball courts at Copan and Piedras Negras.

Short hieroglyphic inscriptions cover both faces of each ring of the ball court at Uxmal.

HIEROGLYPHIC CODICES

Form and Material. Only three Maya hieroglyphic codices have survived; many were destroyed by order of the church because they were considered, quite rightly, to be an integral part of the old Maya paganism. Some were probably destroyed by the Maya themselves because their existence endangered the souls of their owners if these were Christians; their bodies, if at heart they remained heathens. Others must have fallen victims to neglect and to the ravages of time. From sixteenth-century Spanish writers we learn that sometimes codices were buried with Maya priests. This information has been confirmed by the discovery of heaps of thin flakes of lime with painting on them in tombs at Uaxactun and San Agustin Acasaguastlan. These surely represent the sizing of pages after the vegetal backings had disintegrated. A tomb at Nebaj yielded a codex in a slightly better stage of preservation.

Spanish (and hispanicized Maya) writers state that the subjects noted in their codices were: historical records, lives of outstanding people, prophecies, information on the planets, songs in meter, ceremonies, the order of sacrifices to their gods, and their calendars. We can be reasonably sure that, like the peoples of central Mexico, the Maya had also hieroglyphic documents covering distribution and ownership of land, tribute lists, dynasties, and mythology.

The contents of the three surviving Maya codices deal with the passage of time, rituals and perhaps prophecies

for sequences of katuns and tuns, arrangements of the 260-day sacred almanac for the purposes of divination with special sections dealing with particular professions, tables covering the movements of the planet Venus, eclipses, and perhaps for correcting the vague year to solar time, various "multiplication" tables, pictures of certain ceremonies, and numerous vignettes representing the deities and rituals connected with all these activities (figs. 61-64). Short glyphic passages give the luck of the day, the pictures illustrating and supplementing the texts.

No historical records have survived so far as is known, although it is possible that historical and prophetic data are concealed in the unelucidated texts of Paris. Moreover, certain passages in books written since the Spanish conquest in European script but employing the Maya language give the appearance of deriving from hieroglyphic predecessors.

Maya books consist of a single sheet of paper, of varying length (the longest, that of Madrid, is approximately 6.70 m.) and height between 29.5 and 22.5 cm. The long sheet of paper was folded like a screen to produce pages 8.5-13 cm. wide. The pages were made of a paper, really a refined bark-cloth, made by soaking and then pounding the inner bark of certain trees until a thin sheet was obtained. The tree generally used was a wild fig (*Ficus*). The tree, the paper, and the books were called *amatl* (hispanicized form *amate*) in ancient Mexico. Some Spanish colonial writers apply the variants *analte* or *analteh*, *anares*, or *amales* to the books or the glyphs of the Maya. It is probable that all are corruptions of *amatl* or its hispanicized form, *amate*. The Yucatec word for a book or paper is *huun*, and to read, *xochun*, literally "to count a book."

The sheets of paper were covered with a fine lime sizing which formed a smooth white surface on which the glyphs and pictures were painted on both sides of the sheet. Texts run from left to right the whole width of the obverse, and then from left to right on the reverse side. The pagination is a modern addition for convenience of reference. Each fold of the obverse is numbered consecutively from left to right, and those of the reverse continue the sequence from right to left. Thus a codex of 10 leaves (folds) would have page 20 as the verso of page 1. The covers of Maya codices have not survived, but among the few Mexican codices of pre-Columbian date is one with covers of wood with jade inlay.

Codex Dresden. This, the finest of the Maya codices in draughtmanship and the most interesting in content, takes its name from the city of Dresden, for it was and presumably still is in the former Royal Library of Saxony but suffered some damage from water in World War II. Nothing is known of its history prior to its purchase in

1739 from an unknown vendor in Vienna by the director of the Dresden library, but its appearance in Vienna suggests that it may have been sent to the Emperor Charles V.

It is 3.5 m. long and 8.5 cm. high, and is folded into 39 leaves, of which all except four are painted on both sides. Like other codices both Maya and Mexican, it consists of various sections—chapters we might almost call them—which deal with different subjects. There are, however, usually no lines or other obvious indications of a change of subject, such as the start of a new divinatory almanac, when that occurs in the middle of a page; many pages, on the other hand, are divided into two, three and, in one case, four horizontal sections which are independent or semi-independent of one another. For example, the eclipse table starts in the upper half of page 53 and passes across the tops of pages 54–57, as far as the middle of page 58, where a vertical line divides the page in half, indicating a change of subject. At that point the table passes to the lower half of page 51 and then continues across the lower halves of pages 52–57 to terminate on page 58 immediately below the conclusion of the upper half of the table.

The contents of the codex, so far as is known, are as follows:

- p. 1: Badly damaged.
- pp. 2–23: Divinatory almanacs in all sections except for a scene of human sacrifice on p. 3. Pp. 16–23 presumably devoted to affairs of women, since a goddess, probably the moon goddess, patroness of childbirth, weaving, etc., dominates the scene (figs. 62,5,6; 63).
- p. 24: Multiplication table for synodical revolutions of Venus together with adjustments. Glyphs of various deities connected with the revolution of the planet.
- pp. 25–28: Pictorial representations with explanatory texts of ceremonies leading up to new-year celebrations (fig. 64,1).
- pp. 29–45: Divinatory almanacs, interrupted only by multiples of 91 and 364, occupying top sections of pp. 31, 32 and 45, and IS probably associated therewith on top section of p. 31 (fig. 46,10). Sacrificial scene at top of p. 34, 260-day almanac and lords of night in a combined cycle occupy the lower parts of pp. 30–33. IS and multiples of 78 are on middle of pp. 43, 44 (figs. 61,1–4; 62,1–4; 64,2–4).
- pp. 46–50: Tables of movements of planet Venus.
- pp. 51–58 (left): Eclipse tables.
- pp. 58 (right)–59: Multiples of 78 and 780 days. By some these are thought to be tables for calculating the synodical revolutions of Mars; more probably, they are divinatory almanacs with accompanying tables. IS lead to them.
- p. 60: Pictures and glyphs of unknown meaning, but reference to Katun 11 Ahau. Last page of obverse.
- pp. 61–62 (left): Long distance numbers reckoned from far in the past set in folds of serpents.
- pp. 62 (right)–64: Multiples of 91 and 364 days up to 145,600 days and IS leading thereto.
- pp. 65–69 (left): Subdivisions of the periods of 91 days in the preceding section, each into 13 unequal parts. Almost surely prognostications of the weather, and its effects on the crops.
- pp. 69 (right)–70 (left): Long distance numbers, reckoned from far in the past, set in the folds of a serpent, and accompanying IS. These preface the following pages.
- pp. 70 (right)–73 (left): Multiples of 65 and 1820 days and of 54 and 702 days. The tables are carried to 109,200 days in the first table, and probably to 168,480 days in the second table. Periods of rain, cloudy weather, and drought; and their effects on the crops (fig. 46,1–9).
- p. 74: Scene showing water descending from celestial monster, the god Itzamna. Probably representing the destruction of the world by flood.

It should be noted that the pagination is irregular. Ernst Förstemann, the great commentator and interpreter of Dresden, at first thought he was dealing with two separate codices. Accordingly he numbered the first part pages 1–24 obverse and 25–45 reverse (the four blank pages were left unnumbered). The second section carried the pagination 46–60 on the obverse; 61–74 on the reverse. The order should be 1–24, 46–60, 61–74, 25–45. Förstemann's arbitrary arrangement, based on very weak evidence, divided the Venus chapter in two, for pages 46–50 belong with page 24, which they follow in the original. Raynaud (1893) rectified the arrangement, but Förstemann's pagination is retained to avoid confusion.

The portraits of deities and the glyphs are delineated with extreme neatness. Presumably a thin brush was employed. Many of the pages are merely in red and black, but in some sections details or backgrounds are in bluish green, light and dark yellow, brown, or red.

The codex is without much doubt a copy, or rather a new edition, of an earlier and now lost original, for certain tables are included which were out of date when the present copy was made, but additions bring them up to date. Certain Mexican influences are discernible. To cite a particular example, the Mexican blindfold god Ixquemilli is portrayed, whereas this deity is nowhere represented in Maya art of the Initial Series Period. Furthermore, a few of the pottery vessels depicted in the codex appear to be of forms typical of the Mexican Period in Yucatan, which at Chichen Itza started about A.D. 1000 or very shortly prior thereto.

The latest date in the codex written in the notation generally used for transcribing Maya dates is 10.17.13.12.12. This corresponds to A.D. 1178 in the correlation followed in this publication. The starting and ending dates of the eclipse tables are apparently 10.12.16.14.8 and 10.14.10.0.8, respectively A.D. 1083 and A.D. 1116. Probably, therefore, we are not far in error in dating Dresden as twelfth century. To guess as to the area in which the codex was composed would be hazardous; as it does not

conform to Yucatecan methods of writing, it almost certainly did not originate in that area.

Dates in the Long Count (Chapter 6) consist of various (usually five) units of time in the vigesimal system arranged in descending order; in transcriptions these are given in arabic numbers separated by periods. The transcription 10.17.13.12.12 corresponds to 10 baktuns (units of 400 tuns), 17 katuns (units of 20 tuns), 13 tuns (approximate years of 360 days), 12 uinals (periods of 20 days), and 12 kins (days). These total 4353 approximate years and 252 days, and the reckoning is made from the usual point of departure for the Maya calendar, corresponding in function to the A. U. C. of ancient Rome.

Codex Paris. This codex is commonly known as Codex Perez or Codex Peresianus, but as certain manuscripts dealing with the Maya calendar are also known as the Codex Perez (they were collected and annotated by the Maya scholar Juan Pio Perez), it seems best to follow the lead of W. E. Gates in calling this hieroglyphic manuscript after the city in which it now lies. It was found by Leon de Rosny in 1859 in a basket amid a mass of old papers, deep in dust, which lay forgotten in a chimney corner of the National Library in Paris. It was wrapped in a piece of paper which bore the name Perez, in a writing claimed to be of the seventeenth century, and from this circumstance derives the name by which the codex is generally known.

The codex in its present state is approximately 1.45 m. long and 22 cm. high and is folded into 11 leaves, all with writing on both sides. One may assume that this is merely a fragment of the original codex. Actually there is internal evidence that at least two pages are missing at the end or perhaps one at the start and one at the end, as W. E. Gates (1910) supposed.

The obverse is a record of 11 successive ends of katuns (20 approximate years, 7200 days), one to each page, such as were used in Yucatan at the time of the Spanish conquest (and almost certainly for several centuries before) as a framework for recording historical events and prophecies, and for noting the deities that ruled over each katun and, probably, the ceremonies appropriate thereto.

Since these katuns were arranged in sequences of 13, after which the series started to repeat itself, it is clear that two pages are lacking to complete the series. These probably followed the present sequence to make the important Katun 4 Ahau the last of the series; Gates thought that the series could best be completed by adding a page at each end, and so he numbered the obverse pages 2-12, and the reverse 15-25, leaving the numbers 1, 13, 14, and 26 for the missing pages. A pagination of 1-11 for the obverse and 16-26 for the reverse, with 12-15 for the two lost leaves at the end, would be better, but such a

change at this date would merely add to the confusion. Accordingly, I shall adhere to the Gates pagination, which is well established in the literature of the subject.

The center of each page is occupied by figures which undoubtedly depict the deities ruling over the katun recorded on that page. Each picture is framed with a fairly lengthy hieroglyphic text. Little progress has been made in elucidating their content, but it is a fair assumption that ritual, prophecies, and perhaps historical events are discussed. The upper third of each page lists two or perhaps three days Ahau spaced to show that the whole formed sequences of tuns.

The reverse of the codex is in poor condition. Remains of some divinatory almanacs, new-year ceremonies (pp. 19, 20), what is probably a kind of Maya zodiac with divisions of the 364-day year associated with it (pp. 23, 24), and miscellaneous scenes can be recognized. The material on pages 12 and 25 is almost completely obliterated.

Deities and glyphs are painted with care, but the general standard is somewhat lower than that of Dresden. Colors are brown, black, red, pink, blue, and bluish green. There are several intermediate tones.

There is little stylistic evidence to date the codex. The glyphs show a certain intermingling of styles, as in Dresden. I think that, as in the case of Dresden, this may be due to the fact that the present codex was copied from an earlier one painted during the Initial Series Period, and that the scribe sometimes copied glyphs in their original forms and sometimes changed them to conform with the style then current. Paris can hardly be earlier than Dresden, and is probably of slightly later date.

Writing in Spanish, apparently a commentary, is visible on several pages, but cannot be read.

Codex Madrid. This codex, also called Codex Tro-Cortes, is in Madrid. It became divided, and the two parts fell into separate hands. The first part, the Tro manuscript, was brought to the attention of the scientific world by the famous Americanist the Abbé Brasseur de Bourbourg, who, during the course of a visit to Madrid in 1866, found it in the possession of Juan de Tro y Ortolano, professor of palaeography. By one of those twists of fate which readers enjoy in histories but deprecate in works of fiction, the owner of the fragment was himself a descendant of Hernando Cortes. There is no information as to how long Sr. de Tro y Ortolano, or perhaps his family, had been in possession of these pages, but it is not improbable that the professor acquired them as a result of his researches in palaeography.

The second part, discovered in Spain in 1875, was bought by the Spanish government and named Codex Cortes. It was soon recognized by Leon de Rosny as

forming with the Tro part a single codex, which is now known as Tro-Cortes or as Codex Madrid.

The codex is approximately 6.55 m. long by 22.6 cm. high and is folded into 56 leaves, painted on both sides. The pagination starts at the left of the obverse of the Cortes (pp. 1-21) and then continues with the obverse of the Tro (pp. 22-56); the codex is then reversed, the pages of the Cortes part following those of the Tro.

The codex contains no astronomy, no multiplication tables, no prophecies, and no reckoning in the "long count." It appears to have served purely as a book of divination. Divinatory almanacs cover many subjects including hunting, beekeeping, weaving, rain-making, sowing, and crops. One must assume that all these almanacs had as their purpose the enumeration of days propitious for each activity. As in the other two codices, there are pages devoted to the ceremonies which ended the old year and began the new. These, too, were of a divinatory nature.

Much attention is paid to world directions and world colors, the various glyphs for which appear with monotonous regularity. An almost complete 260-day period crosses the centers of pages 13-18, arranged in four horizontal lines, each of 52 sequent days. Apparently the scribe miscalculated the length of this table, and did not have room to complete it, as the addition of the 13 missing columns would have required another page. The right half of the last page (18) was left incomplete, and the scribe arranged the day signs on the left half of that page so that there were only five vertical columns. Consequently, after coming to the end of one horizontal line, one could pass to the left of the horizontal line immediately below on page 18 and count off 13 days in the usual left-to-right and top-to-bottom sequence, and then pass to the start of the next horizontal line on page 13. It was an ingenious solution of the problem raised by a misjudgment of space available. A 260-day cycle with fuller commentary occurs on pages 65-73b.

The delineation of the codex is hasty, and is far inferior to that of the other two codices. Gods are portrayed in a grotesque and crude manner, and little attention is paid to shaping the glyphs; lines are too heavy and spacing is often irregular. Colors include reddish brown, light brown, light blue, dark blue (very rare), and black.

On stylistic grounds (glyph styles and portraits of gods) the codex can be dated as quite late, perhaps as late as the middle of the fifteenth century. The pottery vessels depicted on several pages appear to be of late types. Among these should particularly be noted storage jars on tripod supports. Absence of real learning, as exemplified by the astronomical sections of Dresden and the katun pages of Paris, may be accidental, but it is suggestive of

a period of cultural decline when the primary interests of the priesthood had sunk to mechanical divination. Such a period of decline marks the close of Maya history, the Period of Mexican Absorption, immediately prior to the Spanish conquest.

The treatment of the deities finds its closest parallel in frescoes from late temples at Tulum, on the east coast of Quintana Roo. This serves to confirm the lateness of the codex, and at the same time to suggest a provenience. This would not necessarily be the east coast of Quintana Roo, since the art and architecture of that region clearly reflect influences from northwestern Yucatan. It is not impossible that the codex was obtained at Tayasal by one of the participants in the overthrow of that last Maya stronghold in 1697, for the people or, at least, the rulers of Tayasal had migrated thither from Yucatan during the Period of Mexican Absorption.

Reproductions of Codices. There have been many editions of these three codices during the past century; the best facsimile reproductions are listed in the bibliography. All are very rare, and in default of them, the reader is advised to use the accessible edition published by Villacorta and Villacorta (1930). The various editions published by Gates should be avoided because of the casting of the glyphs in type, a treatment which greatly reduces their value for students. Gates also restores glyphs, usually without any indication of the fact. The Kingsborough version of Dresden has some value for checking damaged glyphs, because it was copied half a century before the first Förstemann edition.

OTHER SOURCES OF GLYPHIC MATERIAL

Short hieroglyphic texts were also incised on jade, hard stones, bone, and shell; embossed on metal; and painted, carved, or molded on pottery.

Jade and Hard Stone. The most famous jade from an epigraphic viewpoint is the Leiden plaque, which records the earliest Maya IS which was current time when the glyphs were incised. This is 8.14.3.1.12 1 Eb 0 Yaxkin (A.D. 320). Actually this plaque was found in apparent association with copper bells which were not manufactured in Mesoamerica until five or six centuries later. However, because of the style of the glyphs, there can be no question of the antiquity of the date (Morley and Morley, 1938).

The Tuxtla statuette, a large figure of jade found at San Andres Tuxtla, Veracruz, was at one time thought to bear the earliest inscribed date in the Maya calendar (Holmes, 1907), but more complete information on Middle American cultures now makes it virtually certain that this piece is of Olmec (La Venta) workmanship, and it has also been suggested that the calendrical system

employed may not be that of the Maya (Thompson, 1941a).

Several jade pieces, both pectorals and beads, carry short inscriptions of calendrical import. In two cases the cities where the glyphs were incised can be traced from the inscriptions they carry, for two of the jades recovered from the Sacred Cenote at Chichen Itza repeat or refer to dates which were of great importance at Piedras Negras and Palenque. Other pieces, both jewels and celts, of jade, diorite, and other hard stones carry glyphs, but their meanings are unknown. In a few cases the glyphs are apparently Olmec, although the pieces were found in the Maya area. Rarely, glyphs were incised on obsidian.

Bone and Shell. Texts incised on bone and shell ornaments are short and for the most part undecipherable. One on a peccary skull, found at Copan, is of importance because of the early style of the glyphs.

Metal. The only objects of metal with glyphs are some disks dredged from the Sacred Cenote at Chichen Itza.

Painted Pottery. Hieroglyphs painted on pottery vessels appear to have been largely decorative. On a few vessels from the Alta Verapaz, Guatemala, short sequences of day signs, without coefficients, are painted (fig. 6, 12, 28, 62, 63, etc.), but these can bear no relation to the deities depicted, and appear to have functioned as ornamental divisions between scenes. A few vessels carried Calendar Round (hereinafter contracted to CR) dates but as some of these contain obvious errors (e.g. Imix followed by 13 Zip), one may presume that their function is purely decorative.

Senseless mistakes of a rather singular nature occur in the only IS so far found on a vessel, the famous IS vase at Uaxactun. There is internal evidence that the artist who painted the details was ignorant of hieroglyphic writing. The blunders must have worried the priest who owned this vase and, indeed, may not have ceased to do so after his death, for the vase was buried with him, and its "soul" accompanied him to the next world. Many vessels carry repetitions of the same glyph, and in these cases obviously the glyphs had only a decorative function. In the Uloa Valley and southward to El Salvador these decorative glyphs degenerate into semigeometric patterns hardly recognizable as glyphs.

A few vases from the Alta Verapaz have short vertical or L-shaped glyphic panels which do not add to the composition and give the appearance of being explanatory. They resemble those found on murals. In the study of these lies the best hope of progress in the field of ceramic texts. A cylindrical tripod vase from Uaxactun with fresco decoration is in the same category, although of earlier date, and there are scattered examples from elsewhere.

Carved and Molded Pottery. Generally speaking, glyphs carved and molded are more conventionalized and tend more to the purely decorative than those that are painted. A short text incised on a vessel from Uaxactun has been used for helping to date pottery sequences, but the sign identified as Ahau is, as a matter of fact, an entirely different but well-known glyph. The reading must be rejected.

Two or three small figurines from Lubaantun, British Honduras, are molded to represent stelae with hieroglyphic texts. The glyphs are hard to make out, and doubtlessly are not supposed to convey any meaning.

AREA AND EPOCHS OF HIEROGLYPHIC WRITING

The area in which Maya hieroglyphic writing was employed does not correspond to that of Maya speech in the sixteenth century, for we have no evidence that hieroglyphs used in the Guatemalan highlands were Maya, and the stela cult never penetrated to that area. Furthermore, the Cakchiquel reckoned their years in the Long Count (hereinafter contracted to LC) by periods of 400 days, not the 360-day turns of the hieroglyphic texts. We have no information on the LC practices of other highland peoples, but because of their close cultural ties with the Cakchiquel, it is probable that the Quiche and Zutuhil had the same 400-day count. There is actually some evidence suggesting that some of the ruling families of the Guatemalan highlands used Mexican hieroglyphs.

The evidence of rebus writing and the forms of the head variants for the numbers 11 and 12 (p. 51) tend to confirm the supposition that Maya hieroglyphic writing originated in the lowlands.

The area of Maya hieroglyphic writing corresponds pretty closely with that occupied by Maya of the lowland group of languages and dialects. In defining the area of hieroglyphic writing the distribution of polychrome vases or jewelry with glyphs is not considered, for in both cases trade might, and in fact did, carry pieces far afield, and in the case of polychrome pottery the use of conventionalized glyphs as a decorative design (as in the Uloa-western El Salvador region) is hardly evidence on which alone to postulate a knowledge of Maya hieroglyphic writing in the area.

The various sites in which hieroglyphic inscriptions have been found are superimposed on a linguistic map in figure 1. It should be remembered that the linguistic boundaries are based on colonial and modern data.

The Zapotec, Olmec, and perhaps other peoples of Middle America used hieroglyphs at an early date, but their writings never passed the rudimentary stage, and little progress has been made in their decipherment. The

general homogeneity of day names and, perhaps, certain glyphs in those areas points to a single center of origin, but present evidence does not suggest which, if any, of these three peoples invented glyphs. As Zapotec and La Venta (Olmec) influences on Maya writing were probably very slight once the formative stage had passed, I shall not discuss their glyphs. Readers are referred to Caso (1928, 1947) for Zapotec writing; to Holmes (1907), Stirling (1940, 1945), and Thompson (1941a) for Olmec writing.

Maya hieroglyphic inscriptions on stone, with a few dubious exceptions, are confined to the Initial Series, or Classical, Period, and no text inscribed on stone can be surely assigned to the Mexican Period, although there are a few non-Maya glyphs in buildings of that period at Chichen Itza. It is evident that the stela cult ceased at the close of the Initial Series Period, perhaps because of foreign influences or a revolt against the hierarchy. There are, however, mural texts which date from the Mexican Period or Period of Mexican Absorption, and to those epochs must be assigned the three surviving codices, as well as a scattering of glyphs on copper disks.

SEARCH AND RESEARCH

Maya hieroglyphic writing was first brought to the attention of the modern world by Abbé Brasseur de Bourbourg, the French antiquary and historian, whose enthusiastic delving into the past of Middle America uncovered a great mass of material and saved many manuscripts from the dangers of ignorant neglect. It is a sad commentary on our supposed progress that more manuscript treatises on every aspect of Indian life were destroyed through negligence, bigotry, and ignorance during the second half of the nineteenth century than were lost during the three preceding centuries. The abbé had the good fortune to be in Chiapas at the time the convents were suppressed in Mexico, and was thus able to save many manuscripts from destruction. His interest in the Maya was aroused by his contact with the Quiche when he served as priest of the Quiche town of Rabinal. Above all things we are indebted to the abbé for bringing to light and publishing the copy, or rather abstract, of Bishop Diego de Landa's *Historia de las cosas de Yucatan*.

This book, by the third bishop of Yucatan, was written somewhere about 1566. It gives a history of Yucatan from native informants, an account of the Spanish conquest, a good deal of straight Maya ethnography, and a rather full description of the Maya calendar together with some of the ceremonies connected therewith. The description was illustrated with drawings of the glyphs for the days and the 20-day months. There was also a "key" to

the hieroglyphic writing which was to prove a source of much contention. When efforts to decipher the Maya codices with its aid were fruitless it was declared a Spanish fabrication; it was probably neither a key nor a hoax. Landa appears to have asked the Maya glyphs for the letters of the Spanish alphabet, and the informant drew a glyphic element resembling the sound. Thus, when Landa said *b* (pronounced bay in Spanish) the informant drew a foot, the symbol for travel because the Maya word *be* (pronounced bay) means road, journey, etc. I have found the Landa alphabet of some assistance.

Landa's description of the calendar and his illustrations of day and month signs supplied a firm foundation on which to reconstruct Maya hieroglyphic writing; it is as close to a Rosetta Stone as we are ever likely to get.

Brasseur de Bourbourg (he discarded his title with the fall of Napoleon III) published Landa's book, omitting, however, the final and least important part, in 1864, the year following its rediscovery. He had immediately recognized as Maya the Dresden and Paris codices on the strength of the identity of glyphs they contained with those illustrated by Landa, and he had realized that the inscriptions at Palenque and Copan belonged to the same class.

Dresden had already been published in Lord Kingsborough's monumental work *Antiquities of Mexico*, and the inscriptions of Palenque and Copan were known through the descriptions or drawings of Del Rio, Dupaix, Castañeda, Stephens, and Catherwood. A photographic reproduction of Paris appeared in the same year as Landa's *Relación*. Probably the enthusiastic support of the abbé hastened its publication. Two years later Brasseur de Bourbourg collaborated with Count Waldeck in a work on Palenque which reproduced in 40 lithographed plates many of the drawings made by Waldeck during the three years he spent at Palenque. It is interesting to note that despite his long residence in the tropics, the count lived to the age of 109.

In that same year of 1866, or very shortly after, the indefatigable Brasseur de Bourbourg had discovered the Tro part of Madrid; this he published with a lengthy introduction and a Yucatec grammar and vocabulary in 1869-70. The introduction has little value because the abbé followed that will-o'-the-wisp, the Landa alphabet, and failed disastrously in the attempt to decipher the glyphs. He did, however, recognize the day signs.

Some idea of the stupendous activity of this French priest can be gained by noting that between 1857 and 1859 he published his *Histoire des nations civilisées du Mexique et de l'Amérique centrale*; he translated the Popol Vuh and published it in 1861, and in the same year he produced a charming travel book *Voyage sur*

Isthme de Tehuantepec. In 1862 he followed this with a grammar and vocabulary of Quiche. Landa appeared in 1864; the Palenque report and studies of the ruins of Merida, Izamal, and Mayapan in 1866. In 1868 his *Quatre lettres sur le Mexique* were printed; during the next two years he was engaged in his studies of the Tro part of Madrid and in travel in Central America, and in 1871 his *Bibliothèque Mexico-Guatémaliennne* saw the light.

Various smaller studies and articles appeared during this fruitful decade despite the fact that he also gave courses on New World archaeology at the Sorbonne. Before residing in Guatemala (1855-57) the abbé had written extensively on the history of the Roman Catholic Church in Canada. His acquisitions of many manuscripts, including the indispensable Motul dictionary of Yucatec, the Rodaz material on Tzotzil, and the Aguilar dictionary of Tzeltal, rescued so many priceless works from destruction that we are forever indebted to the learned antiquary.

It is well to cite the record of this remarkable man, for with the recent progress in Maya archaeology the great contributions of the pioneers in the field are easily forgotten.

An earlier student in the field, but one whose work could not be fully utilized until after the publication of Landa, was the Yucatecan Juan Pio Perez, one-time *Jefe Politico* of Peto in Yucatan. Pio Perez did very valuable service in preserving, copying, and collating the various books of Chilam Balam and land titles in Maya, and in copying Yucatec-Spanish dictionaries. His published works start with *Cronología antigua de Yucatan* which he presented to J. L. Stephens in 1842, and which the latter published as an appendix to his *Incidents of Travel in Yucatan*. A much fuller version was published in 1846 in the *Registro Yucateco* and was also printed by Brasseur de Bourbourg in his edition of Landa. The Pio Perez dictionary of Yucatec-Spanish is largely derived from the older San Francisco and Ticul dictionaries and Beltran's *arte*, but contained many additions by Pio Perez. It was completed after Pio Perez's death (1859) by Dr. Berendt, and published in 1866-77.

The manuscript compilation by Pio Perez of material in the Maya language is of great importance; it is known as the Codex Perez, and among its contents are lengthy abstracts from the Book of Chilam Balam of Mani, the original of which is lost. Tozzer (1921) lists the contents; Barrera Vasquez (1939) gives a more detailed description. A full summary is given by Roys (1949a), and a translation by Ermilo Solis Alcala is in press.

Brasseur de Bourbourg had failed in his attempts to interpret the Tro fragment with the Landa key, but he had recognized the day signs and the kin signs and had learned the meaning of the bars and dots. Leon de Rosny

(1876) identified at least one month sign and correctly deciphered the world direction glyphs; A. Pousse (1884) found how the red and black numbers in the codices were used, and the glyph for twenty; Cyrus Thomas (1882) identified the ceremonies for the departure of the old year and the start of the new in the Tro fragment, and wrote extensively on the subject of Maya numeration (1901) and the calendar (1901 and 1904) without, however, making any fundamental contribution to the subject.

It was in 1880 that the most important figure in Maya hieroglyphic research entered the field: Ernst Förstemann, head librarian of the Royal Public Library at Dresden. In that year he published a reproduction of Dresden (a somewhat inaccurate edition had been published by Lord Kingsborough nearly 50 years before).

Dr. Förstemann was 58 years old when he took up his Maya studies; six years later the first results of his investigations were published, and thereafter scarcely a year passed without a significant contribution from his pen. Even in 1906, the year of his death, at 84, two papers of his appeared, following the publication of no less than five during 1905. The whole framework of the Maya calendar was elucidated by him. At first his studies were largely confined to Dresden, but subsequently he extended his interest to the other codices and to the stelae.

In papers published in 1880, 1886, and 1887 Förstemann identified the month signs in Dresden, recognized that the shell and moon symbols had the respective values of 0 and 20, and demonstrated the abbreviated system of the almanac of 260 days. In addition, he showed that the Maya employed a vigesimal system (except for the uinals), and used this to the sixth degree (the pictun of 2,880,000 days) by means of superposition. He also recognized and deciphered the complex Venus tables, and seems to have grasped the lunar significance of the eclipse tables in Dresden. He had also worked out the numerous "multiplication" tables.

In 1887 he was able to announce that the Maya LC was reckoned from the base 4 Ahau 8 Cumku, and he was able to give the correct explanation of the ring numbers. In 1891 he identified the glyphs for the uinal, tun, and katun in Dresden. To these he added in 1893 the definite recognition of the lunar series in that codex. In the following year he identified the baktun glyph on the monuments (it does not occur in Dresden) and the hand and normal symbols for zero used with period glyphs on the monuments. Actually he calls them symbols for 20, but he recognized their functional value. As a result of these identifications he was able to decipher the head variants of kin, uinal, tun, katun, and baktun used on the monuments. In that same paper, written in 1894, he

read correctly the IS on seven monuments at Copan.

In 14 years this brilliant man had wrested the secret of the Maya calendar from codex and stela; he stands shoulders above any other student of Maya hieroglyphs. Furthermore, one must bear in mind that these studies had to be pursued in the time he could spare from his duties as chief librarian of the Royal Library at Dresden. The title of Privy Councillor bestowed on him was a just recognition of his remarkable achievements. In the remaining 12 years of his life Förstemann added much to our knowledge of the glyphs. For example, he was probably the first to recognize distance numbers on the monuments, for in his study on the Temple of the Cross (1897) he uses them as though they were no novelty to him. However, Goodman's work, which also includes distance numbers, was published as early as February of the same year. In a discussion of Piedras Negras 3, published in 1902, Förstemann recognized the lunar character of the lunar or supplementary series, and came near a solution, but was misled by giving the lunar glyph a value of 28 instead of 20, thereby reaching a value of 37 instead of 29 for Glyph A of that series. A dozen years later, Förstemann's discovery overlooked, the lunar character of this series was hailed as a new and great discovery.

J. Thompson Goodman's important work *The archaic Maya inscriptions* appeared in February 1897, as an appendix to Maudslay's great work, the archaeological part of *Biologia Centrali-americana*. As Goodman made no acknowledgments in his text to the work of any other student of the glyphs, it is difficult to know what he thought were his own discoveries, and what he assumed his readers would know were those of others. It has often been claimed that Goodman produced his results quite unaware of Förstemann's and others' work, and it has been suggested that the credit for the various decipherments should be divided between them, to Förstemann being attributed those in Dresden, to Goodman those on the stelae.

I find some details in Goodman's study which convince me that Goodman had knowledge of Förstemann's discoveries. Strong evidence is to be found in a casual reference by Goodman to the lunar tables in Dresden. Had he discovered these himself he would hardly have been content with a passing remark, for that was an achievement of very considerable importance. I can only conclude that Goodman had read Förstemann's paper of 1893 in which the interpretation was set forth. Förstemann called the 20-day period the Chuen, because of the resemblance of its glyph to that day sign; Goodman, who relied largely on the writings of Landa where that period is clearly named uinal, also calls the 20-day period the Chuen. Förstemann thought the zero or completion symbol at-

tached to period glyphs on the monuments should be read as 20; Goodman also renders it as 20, although it is more logical to translate it as zero. It would be strange had both these students hit upon this same rather artificial rendering independently.

Irrefutable evidence, however, that Goodman had read Förstemann comes from his own pen. In discussing the chronological calendar, Goodman writes, "It has been known that the Mayas reckoned time by ahaus (i.e. tuns), katuns, cycles (i.e. baktuns), and great cycles (i.e. pictuns)." That information is in none of the early sources, but was brought to light only through the studies of Förstemann. Furthermore, Brinton (1895) gives many details of Förstemann's researches, including the reading of IS, and such matters as the glyphs for the katun and tun, in his *Primer of Maya hieroglyphics*, which surely must have come into Goodman's hands.

In view of the above facts, it is amazing to find in Goodman's work such statements as: "I had discovered the secret of the ahau and katun count," "I determined the character of the chuen and great cycle periods. . . . I ascertained the first cycle was composed of twenty katuns. . . . I finally deduced a chronological calendar . . . and, by reversing the process, succeeded in reconstructing the outline of the entire Archaic chronological scheme. I expect my calendar to be challenged," and, of the results of other students of the glyphs, "A deal of learned and pompous kowtowing to each other, but not a single substantial gain toward bottoming the inscriptions." Every one of these discoveries had been made previously by Förstemann, who, of course, had for his own use tables like Goodman's "archaic chronological calendar," for without such tables or their equivalent in some other form, he could not have checked his reckonings from 4 Ahau 8 Cumku. One wonders what Maudslay, whose modesty was his outstanding characteristic, felt about such vainglorying.

Withal, Goodman has to his credit the identification of the head variants 0-19 (except 2, 7, 11), a discovery of prime importance. This Förstemann himself had just failed to make when he successfully read the IS of Copan I (for the coefficient of Ahau on that stela is the head variant for 5). Goodman also recognized the half-period glyph (the misnamed lahuntun sign) and the 5-tun glyph (the so-called hotun glyph). His very full tables of Maya dates have been of great aid to scholars, and are still in constant use. Some of his ideas on numerical values have been rejected by subsequent students, but I myself am often amazed at how many correct leads he gave us. Except on the subject of numbers Goodman displayed sound judgment, and *The archaic Maya inscriptions* remains a reference book of the highest importance.

In 1905 Goodman published a short paper in the *American Anthropologist* in which he advocated a correlation of the Maya and European calendars which involved the addition of 584,283 to a Maya date to reach the equivalent Julian day. For over 20 years his ideas on the subject were rejected by other workers in the field, but in 1926 the Yucatecan scholar Juan Martinez Hernandez reaffirmed the correlation, producing new evidence from the times of the conquest. This synchronization is now known as the Goodman-Martinez correlation. In 1927 I applied the tests of the lunar data and the Venus calendar to the various correlations, and offered an amended version of the Goodman correlation, using an addition of 584,285 to the Maya day to reach the Julian day. This correlation bears the name Goodman-Thompson, and has received rather wide acceptance. I have now amended this to the equation 584,283 (App. II).

Goodman's renown does not rest only on his achievements in the field of Maya hieroglyphs. As owner and editor of "The Territorial Enterprise" of Virginia, Nevada, he gave Mark Twain his start as a journalist; the two were lifelong friends. Subsequently Goodman founded "The San Franciscan," a literary publication of some importance.

Goodman's studies and, indeed, those of all his contemporaries would have been impossible had it not been for the great contribution of Maudslay. Alfred Percival Maudslay, after some years in the British colonial service, visited Guatemala in 1881 with the primary purpose of passing the winter in a warm climate. Visits to the nearby ruins of Copan and Quirigua interested him so greatly in the Maya that he returned the following year with more suitable equipment for recording the inscriptions. Altogether Maudslay made seven expeditions to Central America, spending considerable periods at the ruins of Copan, Quirigua, Palenque, Yaxchilan, Tikal, and Chichen Itza. The results, in the form of casts, magnificent photographs of the ruins and particularly of the hieroglyphic texts, maps and plans, and the extremely good drawings of the glyphs, made by Miss Annie Hunter under Maudslay's supervision, were published between 1889 and 1902. They formed four volumes of plates and one of text and included Goodman's study on the inscriptions as an appendix. They set a new standard of accuracy, and are a fitting monument to the tireless enthusiasm which enabled this pioneer to overcome the obstacles with which those remote and fever-ridden jungles strove to daunt him.

Maudslay's work was acclaimed by all those interested in the subject. With characteristic generosity he placed his results at the disposal of the leading scholars in the field, content to have provided them with the material for

their studies in usable form. Goodman pays a well-merited tribute to the value of Maudslay's work which every student of Maya hieroglyphs will echo.

No prophet is without honor save in his own country. Maudslay's magnificent collection of casts was ignominiously consigned to the basement of the South Kensington Museum. It was not until 1923 that they were removed from obscurity and placed, together with some original sculptures, in the Maudslay room of the British Museum. In 1925 Cambridge University tardily recognized her son by conferring on him an honorary degree. I count it among my privileges to have been present at that ceremony. The words John Drinkwater wrote of another Cotswold man—"a life complete is a great nobility"—well encompass the achievements of this lovable scholar and gentleman.

Other figures were crowding the stage of Maya research in the last two decades of the nineteenth century. Their contributions were of great importance, but Maya hieroglyphs were but one of the many subjects that engaged their attention. The great Eduard Selser, Nestor of Middle American studies, turned from his primary interest in the field of Mexican religion and codices to put his shoulder to the wheel. In addition to his studies on the inscriptions of Copan and Quirigua and his commentaries on the codices, he wrote extensively on the ruins of Palenque, Chichen Itza, Uxmal, and the Chenes country. Perhaps his greatest single contribution was his demonstration of the essential unity of the advanced cultures of Middle America.

The early explorer Waldeck had been a soldier of Napoleon in Egypt, and perhaps had stood in the shadow of the pyramids to hear Bonaparte's historic address to his troops; Daniel Garrison Brinton was a surgeon of the Union at the battle of Gettysburg, and may have heard Lincoln's still more memorable speech on that battlefield. In the years following the Civil War Brinton devoted such time as he could spare from his medical duties to the study of linguistics and ethnology, particularly those of the Maya field. His translations of the chronological passages in the various books of Chilam Balam (1882) and his researches into the Maya calendar (1893, 1895) and Maya mythology (1881) are of particular importance to the student of the hieroglyphs.

Count Hyacinthe Charency was another scholar primarily interested in the linguistic field. Among his publications are two Tzotzil-Spanish vocabularies and the names of the Tzotzil months, the latter from a Spanish manuscript. He made special studies of Maya terms for numbers and the cardinal points.

The turn of the century saw a notable recruit to the study of Maya hieroglyphs, Charles Pickering Bowditch,

also a veteran of the Civil War. He contributed generously to the various expeditions of the Peabody Museum, Harvard University, to the Maya area, and by his own example and tireless efforts persuaded others to support this work. He was largely instrumental in creating the magnificent library for Maya research at the same museum, donating most generously from his own pocket for rare items and paying the cost of large numbers of photographic copies of inaccessible works. As an adjunct to this work, he supervised the translation into English of the leading papers on Middle America written by Förstemann, Selser, and other German scholars. In his book *The numeration, calendar systems and astronomical knowledge of the Mayas* he set forth in a concise manner the progress to date in that field, subjecting the take-it-or-leave-it statements of Goodman to arithmetical tests, and proving or discarding them one by one. In various short papers he offered many new readings of inscriptions at Yaxchilan and Piedras Negras and drew together many of the loose ends left by previous workers in the field.

Teobert Maler, born in Bonn in 1842 but subsequently naturalized as an Austrian, came to Mexico in the train of that most pathetic figure in Mexican history, the Emperor Maximilian. Subsequently, he explored many Maya sites for Peabody Museum, Harvard University, as well as a considerable number in Yucatan and Campeche without outside backing. He had had some training as an architect and engineer, to which he brought a determination and patience to overcome difficulties, many, alas, of his own making. He was a first-rate photographer and paid special attention to making as complete a record as possible of the texts and sculptures he found; his photographs of Tizimin are of great value, for subsequently the manuscript deteriorated. His excellently illustrated reports supplement Maudslay's work.

Students of Maya linguistics and hieroglyphs owe a deep debt to William E. Gates for his unflagging zeal in gathering or photographing every available manuscript or rare book on Maya linguistics in particular and Middle American culture in general. Gates' death in 1940, at the age of 76, left unfinished the tremendous task he had set himself of collating the vocabularies and grammars of all the Maya languages. His principal publications in the hieroglyphic field were a study of Codex Paris (1910) and his dictionary of Maya hieroglyphs (1931), but many other papers from his pen, particularly in the short-lived *Maya Society Quarterly*, are of very considerable importance to that discipline. Gates was a descendant of General Horatio Gates who took a prominent part in the French and Indian wars and later in the Revolutionary War.

Early in 1907 Morley, then a young student at Harvard, stepped ashore in Yucatan on his first visit to the Maya

area. Until his death, in 1948, there passed only one year which did not find him in Central America. Of this first journey Morley says, "My great-aunt Virginia offered me a trip anywhere in the world I might choose. When I said Yucatan, she replied 'And where, pray, is Yucatan?' She was horrified no end at my choice when she found out where it was."

Sylvanus Griswold Morley in the past four decades visited almost every known site in the Maya field in his unflinching quest for hieroglyphic texts. A man of indifferent physique, he endured the discomforts and the monotony of travel at the slow pace of a mule train for months at a time in his search for new sites and new stelae. His first long trip through the forests of the Peten was made in 1914. This, with characteristic enthusiasm, he financed with the proceeds of a bequest of a thousand dollars from a relative, although that sum would have measurably relieved the strain on his personal finances. It was his persuasive advocacy that induced Carnegie Institution of Washington to enter the Maya field. Morley's faculty, almost uncanny at times, for wresting dates and distance numbers from crumbling stelae enabled him to produce a huge number of decipherments. These have been presented in his two monumental works, *The inscriptions at Copan* and *The inscriptions of Peten*. The later earned for him the Loubat Prize and the Guatemalan Order of the Quetzal. With the amassing of so much raw material, Morley had little time for the decipherment of glyphs of unknown meaning. However, he proved the identifications of the so-called hotun and lahuntun glyphs first made by Goodman, and, with the aid of R. K. Morley and Professor Robert W. Willson, established the general lunar significance of the supplementary series. He was the first to solve the meaning of the end of a tun glyph.

Morley's unshakable enthusiasm has been an inspiration to me since my first meeting with him on the trail from the hacienda of Chichen Itza to "old Chichen" on a January afternoon in 1926 and his unfailing friendship I have ever cherished. His death in 1948 was a grievous blow to Maya research.

Herbert Joseph Spinden entered the Maya field at approximately the same time as did Morley. His greatest contribution has been in the field of art (1913). In 1909 Morley had proposed a correlation of the Maya and European calendars which placed the Katun 13 Ahau of the Spanish conquest in the LC position 12.9.0.0.0 13 Ahau 8 Kankin. Ten years later Spinden announced a day-for-day correlation of the calendars which equated 12.9.0.0.0. 13 Ahau 8 Kankin with April 22, 1536 (Gregorian) and called for an addition of 489384 to a Maya date to reach its Julian day equivalent. Spinden's

writings on Maya hieroglyphs (1924, 1928, 1930) have been entirely confined to the advocacy of that correlation. At one time the Spinden correlation had a large following, but in recent years opinion has turned against it. Nevertheless, the cogency with which he has advocated his ideas has enormously stimulated interest in the glyphs. His outstanding successes in many branches of Maya study place him in the very forefront of Middle American research.

Richard C. E. Long, an Irish solicitor who had for many years studied ethnology, interested himself in Maya hieroglyphs toward the close of the second decade of this century. In the numerous short papers he has written there are many important discoveries, notably arithmetical proof for the identification of the pictun glyph, data on the "burner" period, identification of the haab as a period of 360 days, the elucidation of dates in the *Annals of the Cakchiquels*, and the identification of the frescoes at Santa Rita as a count of tuns. Through many years of his friendship I have derived much pleasurable benefit. As I write, Maya calendar names subtly changed by his soft brogue echo in my ears.

John Edgar Teeple, a chemical engineer of outstanding merit, took up the subject of Maya hieroglyphs to while away time on the long train journeys his professional work entailed. In articles published in the *American Anthropologist* from 1925 to 1928 he proved that Glyphs D and E of the lunar (or supplementary) series recorded the age of the moon, and Glyph C of the same series indicated the number of the moon in a group of six with which Glyphs D and E were to be associated. He also showed that a uniform system of moon numbering spread to all Maya centers, and that this eventually gave way to something else. He also solved the problem of the various entries in the Venus tables in Dresden, showing that the different sets of dates represented corrections to bring the calculations into agreement with actual revolutions of the planet.

In 1930 his brilliant study *Maya astronomy* was published by Carnegie Institution. This was in part an expansion of ideas he had previously published, but it gave to the public for the first time his determinant theory, the elucidation of a system by which the Maya kept track of the difference between solar time and their vague year of 365 days. I had the pleasure of hearing this revolutionary idea from Teeple's own lips at a lunch in New York in the summer of 1929. Death cut short the career of this brilliant and productive student early in 1931 when he was just getting into his stride.

Hermann Beyer began his long series of publications on Mexican archaeology as early as 1908, but it was not until 1921 that he published anything on Maya hier-

oglyphs, and not until 1926 that he began to devote the greater part of his attention to the subject. During the next 15 years he wrote on a great number of topics connected with the study. Beyer's greatest contribution to the field was, undoubtedly, *Studies on the inscriptions of Chichen Itza*, not because of the actual result (conclusions were insignificant and his chronological scheme was quite unacceptable) but because of his approach. The glyphs were systematically classified, variants in affixes noted, and clauses isolated with a methodical thoroughness hitherto unknown in the Maya field. The same systematic classification characterized all his numerous studies on Maya glyphs. Of his discoveries the most important are: the function of the variable element in the IS introductory glyph (1931), Glyph G8 (1936d), the use of the moon sign in distance numbers in the inscriptions (1938a), and rules for affixes and infixes (1934). An unbending opponent in the field of archaeology, Beyer had a kindness of heart and a queer pawky humor, more Scottish than German, which endeared him to his colleagues. Apart from the direct results of his studies, he has an outstanding monument in his great pupil, Alfonso Caso. Beyer was the plodder, but folklore tells us and Beyer's work confirms it, that the tortoise may get first to the tape. Beyer died in 1942, leaving much manuscript material, which, one fervently hopes will eventually be published. In this book I have made much use of the Beyer approach.

Four astronomers of distinction in their own field have studied Maya inscriptions from the astronomical point of view, and have added their important contributions to the subject, although not directly contributing to the decipherments. They are Robert W. Willson, Hans Ludendorff, Arnost Dittrich, and Maud W. Makemson. Their publications are listed in the bibliography. The high hopes entertained for decisive results from a strictly astronomical approach have not been fulfilled. I think that is because the Maya priests did not use astronomy, as an exact science. Instead, they fashioned it to their mystical and poetical approach. Associations of celestial phenomena with lucky or unlucky days, or connections deep in mythology were, I am sure, of more importance than an exact record of when they occurred. Since these are the methods of the astrologer rather than of the astronomer, the precise technique of the latter is often of little value in augmenting knowledge of the meaning of the inscriptions. Among the astronomers who have taken up this study only Mrs. Makemson has realized this fundamental difference in approach.

Interest in Maya epigraphy in Mexico has not been great. With so many ancient cultures in the center of Mexico to be investigated, it is not surprising that the

Maya area, remote from Mexico City, has received little attention. However, the Mexican archaeologist Enrique Juan Palacios, whose primary interests lie in Veracruz, has made important contributions, of which the most outstanding are the identification of the head form for the number two, and various discoveries in Chiapas and Campeche. Another Mexican who has made valuable researches in Maya epigraphy is the journalist Cesar Lizardi Ramos. A star on the horizon is Raul Pavon Abreu, now director of the museum at Campeche. Heinrich Berlin is a notable student of the Mexican school which stems from Palacios.

Attention should also be called to the writings of E. Wyllys Andrews, Samuel K. Lothrop, Thomas A. Joyce, Lawrence Roys, and Linton Satterthwaite on the inscriptions, and of Oliver La Farge, Robert Burkitt, Sol Tax, Antonio Goubaud, and J. Steward Lincoln on modern survivals of the Maya calendar.

Indirect contributions of outstanding importance to the study of Maya hieroglyphic writing have been made by Ralph L. Roys through his published translations of Chilam Balam of Chumayel (1933), the titles of Ebtun (1939), the prophecies for the Maya tuns (1949), and his many unpublished translations. Roys combines a wide knowledge of the Yucatec language with a deep understanding of Maya culture. My personal debt to him is great, for he has vouchsafed me of the full stores of his wisdom and advice on a hundred occasions, invariably answering my queries with a conscientious thoroughness rarely found in this age. Most vivid of my impressions of Roys harks back to an evening on the deck of *The Ulua*, when we settled, to our fleeting satisfaction, the problems of the Maya, as the sun's afterglow suffused with soft violet the tree-clad hills of Tela. To him I could repeat the lines from *Henry IV*: "My voice shall sound as you do prompt my ear, and I will stoop and humble my intents to your well-practised wise directions."

The translations from the various books of Chilam Balam by the Yucatecan scholars Juan Martinez Hernandez, Alfredo Barrera Vasquez, and Ermilo Solis Alcala and his son are also of prime importance. Until all this source material is accessible in translations, hieroglyphic research must suffer.

Outstanding figures in Maya research, such as A. V. Kidder, A. M. Tozzer, and G. C. Vaillant, are omitted from this brief survey because their work bears only indirectly on glyphic problems, although of enormous importance in the reconstruction of Maya civilization. Were they and their many colleagues in the fields of dirt archaeology, architecture, and ethnology to be included, this section would have to be expanded to a considerable extent.

BOOKS OF CHILAM BALAM

The books of Chilam Balam are manuscripts written in Yucatec with European characters; their compilers were Maya of the colonial period interested in preserving a knowledge of the old culture. The books take their name from a Maya called Chilam Balam who reputedly prophesied the coming of the white man; with that is coupled the name of the town in which each was preserved. The most important contain chronicles of native history set in the frame of the Maya calendar; fragments of historical narrative; prophecies for years and for katuns (of 20 approximate years), in which are embodied much history, mythology, and ritual; almanacs of lucky and unlucky days (App. I); medical lore, European and Maya; and astrology, mainly European. Roys (1933, 1946) details their contents.

Some of the material, particularly in the prophecies for years and katuns, may well have been transcribed from glyphic sources comparable to the pages of Paris giving the katun round and to the pages of year prophecies in all three codices. Indeed, we have the statement of one transcriber of a framework of Maya dates (Chronicle of Oxkutzcab, p. 66) that he compiled it from a glyphic source. Many of the expressions and set phrases are paralleled in glyphs or pictures (p. 270) in the codices, but it is highly probable that the glyphic and pictorial frame was strengthened with material culled from ancient chants and traditions. When the surviving editions were written, much of the old lore had been lost, and there is considerable garbling of rituals and phrases. The historical frameworks were probably made in colonial times by drawing historical material from the prophecies, but often events seem to have been assigned to wrong rounds of the katun count (p. 181). Moreover, these eighteenth-century antiquaries deliberately tampered with their sources, inventing a 24-year katun and then rewriting dates to fit the new scheme. Withal, the ritual and wording of the prophecies are rich veins of glyphic ore.

The most important books are those of Chumayel, Tizimin, and Mani. The last, incorporated in Codex Perez, closely parallels Tizimin, but the text is somewhat corrupt. Kaua also contains katun prophecies. Principal translations are by Martinez Hernandez (1927), Roys (1922, 1933, 1949), Barrera Vasquez (1943, 1949), Solis Alcala (1949), and Gates (1931a).

APPROACH USED IN THIS STUDY

In this volume I have tackled the problem of decipherment in what I deem to be a new way, although one which has in it elements which have been tried before. It is my conviction that we shall interpret the glyphs

only by relying heavily on the beliefs, the religious symbolism, the mythology, and, to a lesser extent, the everyday activities of the Maya, because such concepts surely are imbedded in the structure of each glyph, but at the same time we must follow Beyer's lead in paying careful attention to affixes and infixes, particularly with regard to their assignment to groupings of synonyms and near synonyms.

The same glyphic elements, such as yax and water signs (pp. 274-79), appear over and over again in different combinations. Sometimes these signs are not readily recognizable, as they may appear in a horizontal position in one glyph, in a vertical position in another, as happens, for instance, with the jade symbol (cf. figs. 8,4-7; 17,14-22; 43,30,31). It is essential, therefore, to learn to recognize such elements, and then to seek to identify their meanings by turning to the mythology of the Maya and their neighbors. If a dog glyph appears sometimes in a context which suggests fire, but at other times in one indicative of death and the underworld, we must pore over the vast body of Maya and Mexican religion to seek a link connecting these different concepts. Sometimes, as in the case of the dog, it is apparent; at other times direct evidence is not forthcoming. There may be a hint of what the context of the glyph leads us to surmise, or we may not be able to recover the connection.

Argument must be from the known to the unknown, and for that reason many pages are given to elucidating the meanings of the day names and glyphs and other signs, the names and functions of which are known. I believe I have had some success in that task; of those who are not convinced by my views I would fain echo, although, I trust, with less complacency, that passage in *Sense and sensibility*, in which the pompous Mr. Dashwood remarks, "Well may you wonder, Marianne, at the obstinacy which could resist such arguments as these."

From the study of the known glyphs a fair vocabulary, or, rather, list of ideographs and symbolic concepts, can be garnered, and this can be tested on glyphs of unknown meaning. The study of the affixes will yield some idea of the structure of the glyphic writing, and a due appreciation of the poetical inspirations of Maya thought and writings (for mythology is poetry) will teach us that a Maya, when dealing with sacred matters, never calls a spade a spade.

I am not unmindful of the pitfalls in the path of one who would stray in the tangled woods of Maya mythol-

ogy. There is too much danger of finding what one seeks, for many opposed ideas exist in the religious concepts of the peoples of Middle America, and one is free to pick and choose. To take an extreme instance, I have built a structure, the walls of which are assumptions with a light bonding of fact, to explain the religious significance of the day Cib (pp. 84-86). Is this a well-reasoned reconstruction of the Maya ideas behind that day, or have I built on sand? I take confidence from the realization of how the same religious ideas pervade the Maya area in particular and Middle America in general. Agricultural prayers practically throughout the Maya area are cast in the same mold. Snakes are not really a great danger to milperos, yet a petition for protection from the bites of snakes occurs in these prayers almost throughout the region; elements of the creation legend are equally widespread, as, for instance, the story of the origin of monkeys, which is repeated in substantially the same form from the Maya Dan to the Maya Beersheba. Similarly, the Tlalocs of Mexico, the mountain gods of Guatemala, and the Chacs of Yucatan merge their identities, and the same story of the discovery of maize by ants is spread from central Mexico across Guatemala to British Honduras. The extension is not only geographical; it is temporal. The incident of a captive deceiving his enemy by substituting a firefly for the glow of his cigar occurs in the preconquest traditions of the Popol Vuh, and reappears in a twentieth-century story of the imprisonment of our Lord before the Crucifixion. Such continuity in time and space encourages me to feel that although there may be some misses in identification, there are plenty of hits.

The excursions into mythology are time-consuming, but it is meet and right to make them; they represent the unromantic staff work which must be done before the attack can be launched. They take up much space, and it is only as the book draws to a close that we can take the offensive into new territory. In truth, this new approach to the glyphic problem holds great promise; it has enabled me to grasp, at least to my own gratification, the general purport of the glyphic texts in Dresden. Old friends argued over in discussing day glyphs and names are later ready to help interpret the unknown, and the identification of synonymous affixes in glyphs of ascertained meaning greatens the possibility of deciphering glyphs of unknown significance. Those are the two principal methods which will be used in subsequent chapters.