

MODERN MAYA HOUSES
A STUDY OF THEIR ARCH/EOLOGICAL
SIGNIFICANCE

BY
ROBERT WAUCHOPE

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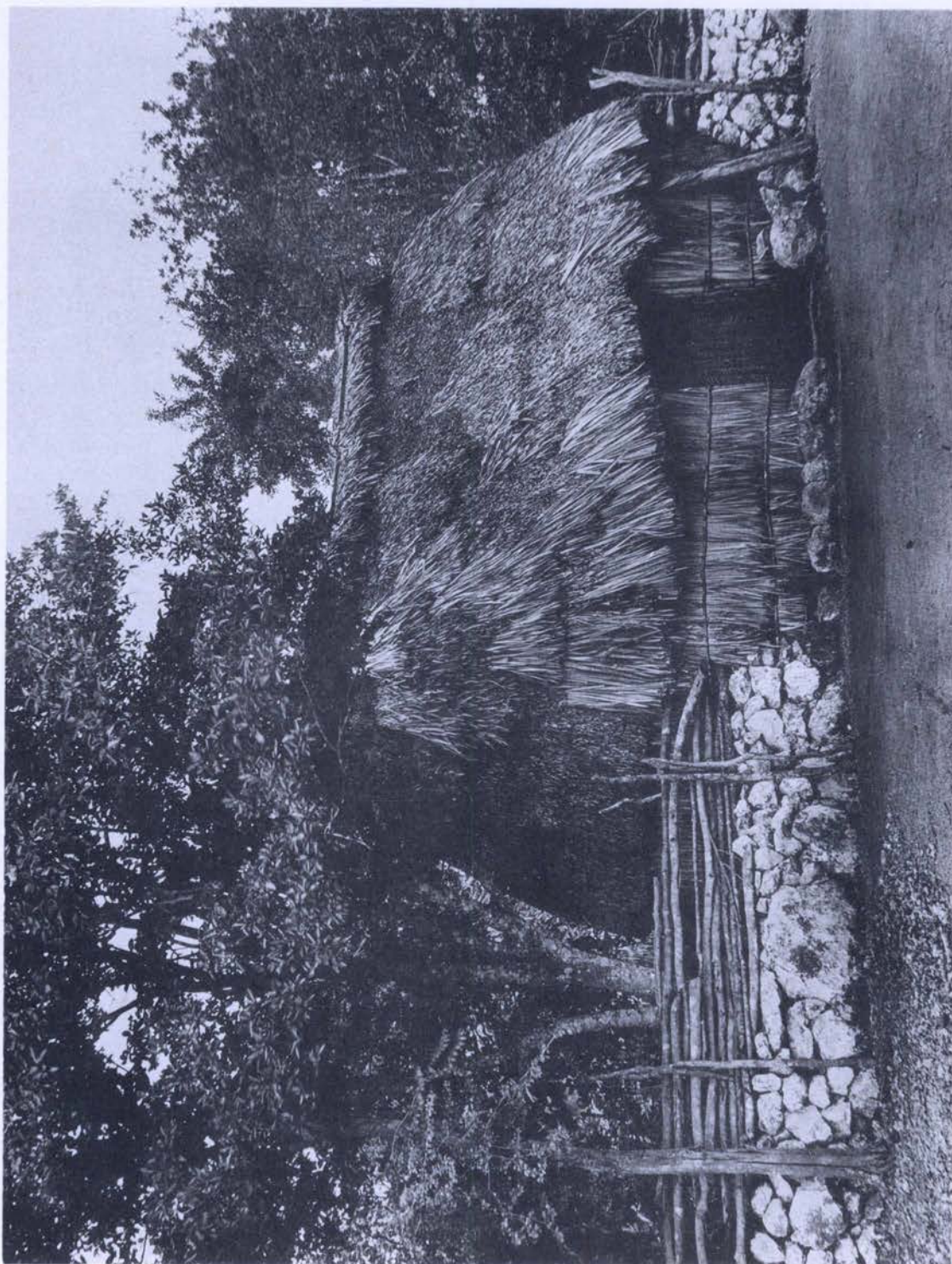
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A MAYA HOUSE, TIZIMIN, YUCATAN

INTRODUCTION

The study of modern Indian house types in the Maya area was undertaken in 1934 for the purpose of collecting data to facilitate interpretation of ancient dwelling sites. Excavation of house mounds at the ruins of Uaxactun, Guatemala, in 1932 made it clear that very little information, except upon certain features of the sub-structures, could be gleaned from excavation without some examination having first been made of modern houses and the way in which they fall to pieces.

The excavation of ancient house sites and that of temple or palace structures present two entirely different types of archæological problems. In the latter one must consider the order in which various units should be opened, the most expedient way of removing vast amounts of earth, the problems of chronology presented by many stages of superimposed and expanded construction, the necessity of keeping mapping abreast of excavation, and the many engineering situations that must be dealt with in the course of a large and complicated task of this kind.

In the case of a house site, on the other hand, the major problem is to find what is left of the house. Digging is relatively shallow. One deals with low mounds or no mounds at all, and architectural features with which trees, roots, and moisture have played havoc. Presumably occupied for much shorter periods than the larger buildings, the house remains are not so likely to be found protected by later stages of construction. Their floors, often of unplastered earth and marl tamped down to make a firm surface, disintegrate seriously and seldom retain the holes of the posts once embedded in them. Superstructures, consisting for the most part of perishable materials, have long since disappeared. Although potsherds and stone artifacts are, as usual, well preserved, other traces of house furniture, such as fireplaces and the leg holes of corn-mill tables, are most difficult to find without knowledge of their nature and probable location.

Many students in the Maya field have pointed out the resemblance between modern Maya houses and the ancient dwellings as we know them from prehistoric frescoes, architectural decorations, and occasional early accounts. It seemed logical, then, that the best approach to an improved interpretation of ancient domiciliary remains could be made by a study of present-day dwellings.

For this reason the ethnological work for the present study was done chiefly from an archæological point of view.

Special attention was directed to abandoned houses in an attempt to answer these questions: how did the dwellings fall to pieces; what means of identifying the house-framing could be developed from a study of imperishable remains, after the timbers themselves had disappeared; what distinguishing marks were left by various types of wall construction; how could the original ground plan of a house be determined after the house was gone; what effects of fire were revealed by the remains of burned houses? House furnishings were recorded in the hope

of finding traces of comparable material in ancient sites. Boundary walls and related property were noted, less because this information is significant in itself than because future excavation may reveal analogous pre-Columbian structures. Notes on sociological and religious topics related to the house were taken chiefly in the hope that we may some day apply them to interpretation of archæological finds. Indian word lists were collected as linguistic contributions only in the sense that they might, through comparison with sixteenth-century terms, tell something of the similarities and differences between modern and ancient dwellings.

The Indian terms listed in the tables were collected orally from Indians at the places indicated in the second column of the tables. Since I wanted the terms merely for comparison with early dictionaries their value is historical rather than linguistic. Certain errors, due to my untrained ear and ignorance of Indian language structure, will therefore appear. The words were recorded as I heard them and I have placed in parentheses certain phonemes spoken by the informants, but which I suspect were probably peculiarities of their own pronunciation or hesitant and introductory sounds. I know, for instance, that 'earth' should be **u'leu**, but if I heard **u'leu(x)** I recorded the additional phoneme, because in most cases I did not know what the word would be, correctly pronounced.

Once we have learned the ground plan of an ancient dwelling—its dimensions, and the arrangement and size of its mainposts—we have clues to much of the construction that once covered it. Modern superstructures were therefore recorded in detail.

Although this paper has no pretensions to being a contribution to ethnology, some historical problems became so apparent during the early stages of the field work, that I thought it worth while to seek, whenever feasible, any additional information that might help in their formulation or solution. Furthermore, there was always the possibility that such data might guide the choice of future sites to be excavated. Finally, since it was desirable to have a definite program and itinerary in the field, these ethnological and historical problems offered a basis on which systematic field procedure could be founded.

It so happened that each of these possibilities was fulfilled. Summarized at the end of this report are several truly ethnological problems thus presented. In some cases a tentative solution is offered, but the writer realizes fully that it is based on insufficient data and is justified to a large extent only by the chance that they will lead to further investigation based on actual excavations. That the formulation of these problems also furnished a plan for future excavations will be seen in the recommendations in the Discussion, page 149.

All Maya words not quoted from other sources are spelled phonetically according to the symbols adopted by the International Phonetic Association. Most of these symbols may be found in Jones' *Outline of English phonetics*. Quoted words are spelled as in the publications quoted. All Maya words are in **bold-face**, Spanish and other foreign words in *italics*, and English in roman letters. For other points of editing in regard to the linguistics, see extracts, in Appendix B, of a letter from Dr. Andrade, to whom the author is greatly indebted.

The writer has followed the spelling of place names in the Map of the Northern Part of the Peninsula of Yucatan¹ and in Urrutia's Mapa de Guatemala. There are a few exceptions: for instance, "Cuilapa" has been used instead of "Cuajinicuilapa" (Guatemala), "Palestina" instead of "Suj" (Guatemala), and "Uyamon" instead of "Huyamon" (Campeche).

The botanical reference abbreviations quoted from Roys may be found in his book, *The ethno-botany of the Maya*.²

The study of Maya house types was initiated at the suggestion of Dr. A. V. Kidder, Chairman of the Division of Historical Research, Carnegie Institution of Washington. Dr. Kidder's unfailing interest in the smallest details of my work and his continued support, advice, and encouragement have been my chief sources of help and inspiration. Dr. A. M. Tozzer of the Division of Anthropology at Harvard University has guided to a large extent the related research for this report as well as that for *House mounds of Uxactun, Guatemala*, which it supplements. I wish to thank also Mr. Donald Scott, Director of the Peabody Museum of Harvard University, and Professor Walter E. Rowe, Dean of the School of Engineering at the University of South Carolina, for extending to me at various times the use of workrooms and other facilities under their direction.

Dr. R. W. Chaney of the Department of Palæontology at the University of California, assisted by Mr. L. H. Daugherty, contributed some interesting information regarding specimens of wood that I sent him for identification. For other outstanding courtesies I wish to thank Sr. Pablo Castillo Cervera, Agente de Migracion in Merida, Yucatan; Mrs. R. W. Hempstead and her son, Mr. Alan Hempstead, of Coban, Guatemala; Dr. George F. Gaumer of Izamal, Yucatan; Mr. J. F. Avory at Quirigua, Guatemala; Sr. Jose Guillermo Mayorga, padre, and Sr. Jose Guillermo Mayorga, hijo, of Chiquimula, Guatemala; Dr. Ricardo Aguilar of the United Fruit Company Hospital at Quirigua; Sr. Alejandro Cordova of Guatemala; Sr. Christian Gantenbein of Huehuetenango, Guatemala; Sr. Victoriano Martinez of Motul, Yucatan; Sr. Luis Maldonado of Santa Rosa, Quintana Roo; Rev. H. Dudley Peck of San Pedro Sacatepequez in the Department of San Marcos; Dr. S. K. Lothrop of New York City; Mr. Frans Blom and Mr. Ernest Noyes of the Department of Middle American Research at Tulane University; and Dr. George McCutcheon and Mr. Herndon Fair of Columbia, South Carolina.

Modern village plans in Yucatan follow almost invariably a standardized pattern. The geographical, political, religious, social, and economic center of the town is the main plaza (pl. 1). The plaza itself may be only a bare field or the area surrounding a well; or it may be a carefully planned park with statues, fountains, a bandstand, and concrete seats (pl. 1, *b*).

Around the plaza and facing the streets that border it, are government buildings (town hall, police court, troops' barracks, and so on), a church (pl. 1), some-

¹ Shattuck, 1933, following p. 28.

² Roys, 1931.

times a schoolhouse, and, in larger towns, commercial houses, such as stores, hotels, and motion picture theaters.

The plaza, therefore, reflects to a large extent the civic life of the people. To it come petitions from citizens, complaints concerning quarrels, visiting guests of honor, arrested drunkards, devout worshippers, patriotic parades, sellers and buyers. At night the entire population congregates here to chat or to smoke, for refreshment or for entertainment. During fiesta days it is in a whirl of activity, crowded with visitors and townsmen, salesmen, orchestras; its fiesta nights are hideous with firecrackers, rockets, clanging bells, torchlight parades, and blaring bands.

The main plaza is the center of a great spider web of streets (figs. 1 and 2). Sometimes, as at Chichimila, the streets are haphazardly located and converge in the plaza as do spokes into the hub of a wheel, but usually the streets go out only at right angles to the sides of the plaza. The larger towns, therefore, can be divided into quarters and districts, and the houses are numbered accordingly.

We do not know much about the assemblage of dwellings in ancient towns. It seems probable that houses were scattered, singly or in small clusters, in the environs of the main temple and palace groups. This was the situation at Uaxactun, Guatemala,³ and the same can be said of Chichen Itza, Yucatan, if the sites examined there were those of ancient dwellings.⁴ It is possible, however, that house assemblage in ancient towns and cities varied just as their building assemblage did. At Sayil, Yucatan, for example, the population seems to have been concentrated more closely toward the civic and religious center. E. M. Shook, while surveying for a map of the city for Carnegie Institution, plotted over 200 small structures, presumably the substructures for thatch-roofed huts, in his lines of sight between the larger buildings. These house sites were associated for the most part in group units surrounding the chultuns or underground reservoirs that are characteristic of Sayil.

Presumably the poorer classes of the populations had cornfields to tend; but these were not necessarily situated as often found today, at some distance from the homes of the tillers. Both Kempton and Emerson have recently pointed out the influence that the introduction of cattle and horses has had upon the position of modern cornfields. Mules and horses facilitate transportation of harvested corn; the presence of cattle induces the Indian to cultivate remote cornfields in order to avoid the labor of erecting protective stone or wooden fences.⁵ At present we can only guess whether the ancient Maya worked distant fields and, if so, whether they lived near the cultivated fields or walked to them daily from a village. Lizana, who arrived in Yucatan in 1606, writes that when the Spaniards arrived, the Indians lived not in the temples but in thatched houses in the forests.⁶

The present-day orderly arrangement of the larger Indian towns is the result of continuance, by all Central American republics, of a governmental policy maintained by the Spaniards as early as the sixteenth century. "The better kind of villages," Bancroft writes of Guatemala in 1886, "have regular streets, a

³ Wauchope, 1934, p. 132.

⁴ See Appendix A, p. 163.

⁵ Kempton, 1935, p. 5; Emerson, 1935, p. 5.

⁶ Lizana, 1893, p. 3.

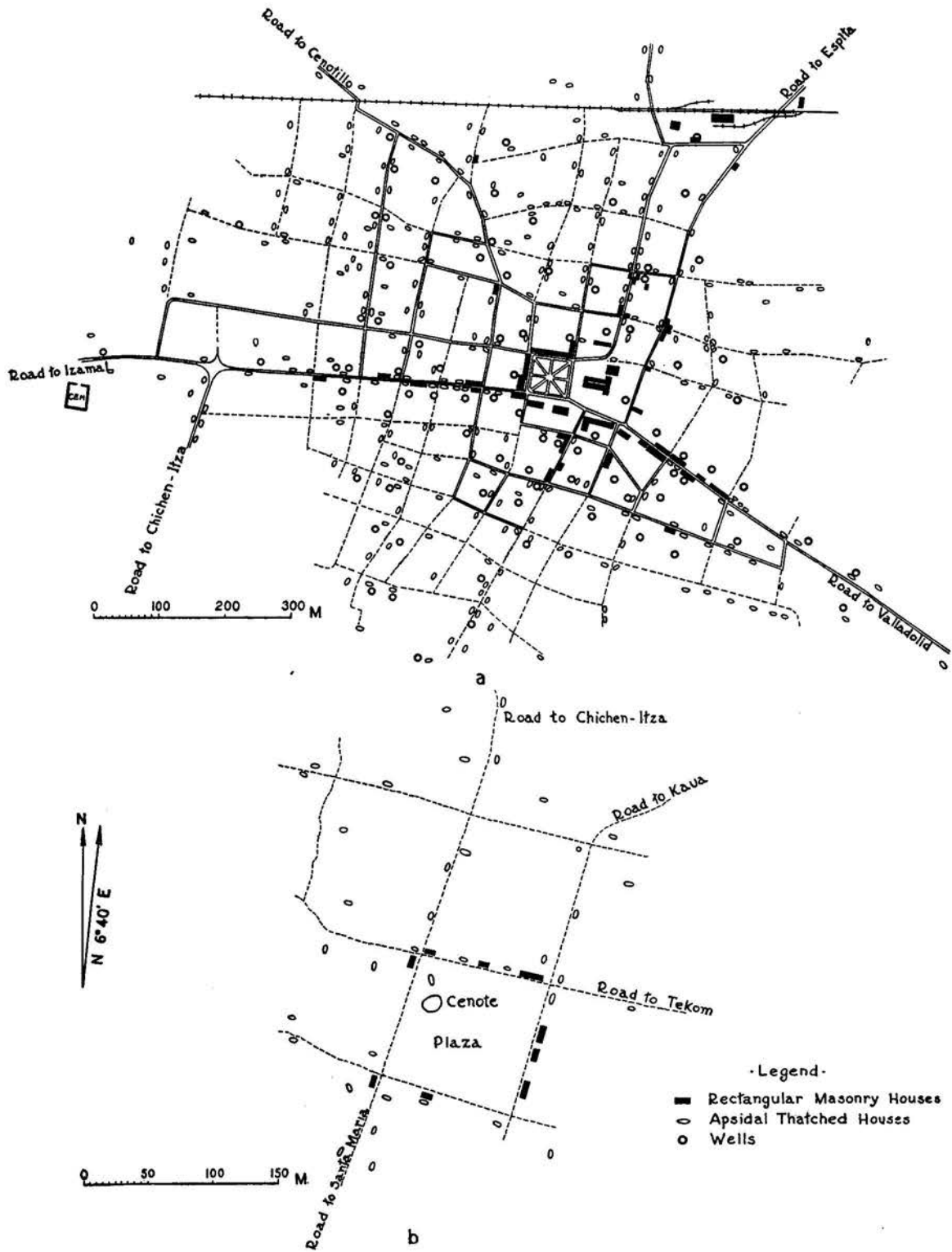


FIG. 1—DISTRIBUTION OF HOUSE TYPES IN TWO YUCATECAN TOWNS

(After Kilmartin in Shattuck, 1933, Figures 1 and 2)

a: Dzitاس (a relatively large town). *b*: Chan Kom (a relatively small town).

thing not to be seen in the ordinary hamlets.”⁷ Waldeck reports in 1838: “Sisal [Yucatan] is a small village a little larger than Frontera, Tabasco. Its streets are stretched out like a string, but, properly speaking, there is only one of them.”⁸

Bancroft cites Herrera as authority for his statement, “. . . the temples, palaces, and houses of the nobility were in the centre, with the dwellings of the common people grouped about them and . . . the streets were well kept.”⁹

In Charles V's instructions to Cortez concerning the treatment and conversion of the natives, in 1523, he writes that the house lots are to be assigned according to the rank of the persons who are to have them, and that this is to be done in an orderly way so that when the houses are built the town may be laid out by streets around the plaza and the church.¹⁰ The *Relacion del pueblo de Tepeaca*, written also in the sixteenth century, remarks, “. . . they do not [let] the doors of the houses show to the streets except at the most concealed parts, building turns [*vueltas*] and entries of fences of corn stalks lest there be enemies to see their houses.”¹¹

Bancroft quotes from Juarros' account of Utatlan, Guatemala: “The centre of the city was occupied by the royal palace, which was surrounded by the houses of the nobility; the extremities were inhabited by the plebeians. The streets were very narrow . . .”¹² Juarros writes of Patinamit, the Cakchiquel capital in Guatemala:

The streets were broad and straight, and crossed each other at right angles. The town was divided from north to south into two parts by a ditch nine feet deep, with a wall of masonry about three feet high on each side. This ditch served to divide the nobles from the commoners, the former class living in the eastern section, and the latter in the western.¹³

The frequency of “non-bush” house¹⁴ occurrence lies generally in direct ratio to its nearness to the main plaza. In some larger towns, such as Valladolid and Motul, Yucatan, there are no thatch-roofed structures on the plaza; this is not true of smaller towns like Xocenpich, Piste, and Chan Kom. In the smallest settlements, e.g., Nictiha and Ticimul, all houses, and even the schoolhouse at the latter place, are thatched.

Often one can identify the most important streets leading to the plaza by the types of house construction which border them. For example, the roads into Xocenpich from Dzitaz and Piste are bordered by more expensive houses than are the other streets which converge into the plaza. Dzitaz (fig. 1,*a*) and Chichimila (fig. 2) are other examples; the most important street in the latter town is that which leads to Valladolid. Even a “bush house,” if located on a plaza

⁷ Bancroft, 1886, p. 693.

⁸ Waldeck, 1838, p. 16.

⁹ Bancroft, 1886*b*, p. 787. Cf. Herrera, 1601, dec. 4, lib. 10, cap. 2, 3.

¹⁰ Colección de Documentos Inéditos, 1875, vol. 23, p. 364.

¹¹ Manuscript copy in Peabody Museum of Harvard University.

¹² Bancroft, 1886*b*, p. 788. Cf. Juarros, 1824, pp. 87-88.

¹³ Bancroft, 1886*b*, p. 790. Cf. Juarros, 1824, pp. 383-84.

¹⁴ “Bush house,” a house with thatched roof.

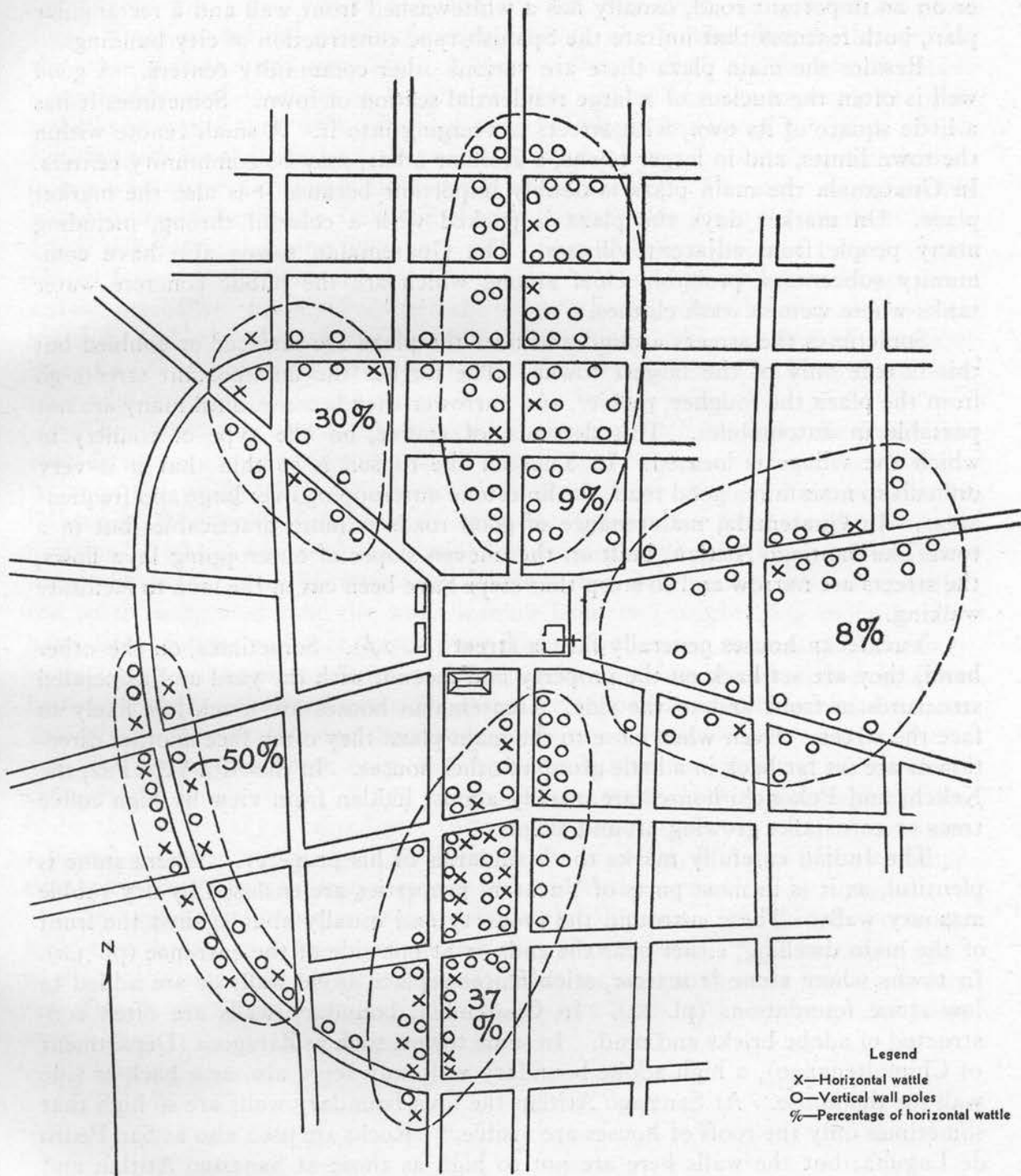


FIG. 2—SKETCH MAP OF CHICHIMILA, YUCATAN,
SHOWING DISTRIBUTION OF WALL TYPES

or on an important road, usually has a whitewashed front wall and a rectangular plan, both features that imitate the Spanish-type construction of city buildings.

Besides the main plaza there are various other community centers. A good well is often the nucleus of a large residential section of town. Sometimes it has a little square of its own, with streets converging into it. A small cenote within the town limits, and in larger towns, a store or a bar, may be community centers. In Guatemala the main plaza is doubly important because it is also the market place. On market days the plaza is packed with a colorful throng, including many people from adjacent villages. The Guatemalan towns also have community subcenters, probably chief among which are the public concrete water tanks where women wash clothes.

Sometimes the streets around and near the plaza are surfaced or cobbled but this is true only of the largest towns. The farther the unimportant streets go from the plaza the rougher, rockier, and narrower they become, until many are not passable in automobiles. This depends, of course, on the type of country in which the village is located. In Yucatan the topsoil is so thin that it is very difficult to maintain a good road, the limestone outcropping over large and frequent areas. In Guatemala, maintenance of good roads is more practicable; but in a town like Santiago Atitlan, built on the uneven slopes of outcropping lava flows, the streets are narrow and so steep that steps have been cut in the lava to facilitate walking.

Yucatecan houses generally face a street (pl. 2,*b*). Sometimes, on the other hand, they are set back on the property and face in, with the yard and associated structures in front and to the side. Guatemalan houses are much less likely to face the street. Even when close to the main plaza they often face another direction or are set far back in a little group of other houses. In the Alta Vera Paz, the Kekchi and Pokonchi houses are usually almost hidden from view by high coffee trees or cornstalks growing around them.

The Indian carefully marks the boundaries of his property. Where stone is plentiful, as it is in most parts of Yucatan, properties are enclosed by dry rubble masonry walls. These surround the property and usually abut against the front of the main dwelling, either near the ends or at one side of the entrance (pl. 3,*a*). In towns where stone is scarcer, stick fences replace stone walls or are added to low stone foundations (pl. 24). In Guatemala, boundary walls are often constructed of adobe bricks and mud. In some towns, such as Zaragosa (Department of Chimaltenango), a high adobe boundary wall may serve also as a back or side wall for the house. At Santiago Atitlan the lava boundary walls are so high that sometimes only the roofs of houses are visible.¹⁵ Rocks are used also at San Pedro de Laguna; but the walls here are not so high as those at Santiago Atitlan and consequently the town seems much more open and visible.

The social significance of boundary walls was most apparent at these lake towns in Guatemala. Yucatecan boundary walls enclose only one dwelling and its associated structures, such as kitchens, warehouses, and chicken houses. In

¹⁵ See also Lothrop, 1933, fig. 4, *b*.

Guatemala, and especially at Santiago Atitlan, San Pedro de Laguna, and San Lucas Toliman, several dwellings, each housing one family, may be located on the same wall-enclosed property. A man who can afford to, sometimes builds several additional dwellings on his plot of land. These he rents to people too poor to build houses of their own, receiving services in lieu of a money payment. S. K. Lothrop tells me that often a father will build such a house for his son and daughter-in-law who move into the father's house at his death.¹⁶ The same situation was found in San Sebastian, a Cakchiquel town farther west, near Retalhuleu. Here I had difficulty in gaining admission to a group of houses because I went to the rented houses first. The old widows, peering through the walls, would not even answer my hails. Finally I reached the owner's house, where his wife received me cordially and opened the other houses for inspection. She said that her husband owned all four houses on the property and that the widows who lived there were poor and ignorant and would not understand what I wanted.

This interesting social significance of boundary walls suggests the possibility that an analogous situation in ancient times could be deduced from excavations. In 1932 the writer excavated some house mounds at the Old Empire ruins of Uaxactun, Guatemala. Associated with the house sites were some walls, the function of which was doubtful since they did not retain any core of fill. They were followed for some distance and, although they were never traced completely, the writer suggested that the walls leading from two neighboring mounds may have been connected.¹⁷ It seems very likely that these were stone boundary walls. If excavations should reveal two or more dwellings placed within the same boundary walls, we would have a good case for supposing an ancient social custom analogous to the modern one described above.

The proper, and often only, way to enter Yucatecan property is, therefore, through the house itself. When the boundary walls do not abut against the house there is usually a barred gate through which one can pass to it. Sometimes a barred gate also affords back entrance to the premises, but this is not common even when the property is on a corner and bounded on two sides by streets.

One very rarely sees an isolated house in Yucatan. The people prefer to build their houses in towns, even though they may have to walk a league or more to their cornfields. In Guatemala isolated houses are much more common; they are often located several miles from the nearest town and sometimes far from even a road.

¹⁶ Cf. Landa, 1864, p. 60.

¹⁷ Wauchope, 1934, p. 143. See wall W, fig. 9; wall W, fig. 11; and pp. 137, 143.

I

FOUNDATION FEATURES

SITES

YUCATAN

The country is flat. There is little difficulty in selection or preparation of the site. Limestone outcrops are avoided, because post holes are harder to dig where outcrops occur.

GUATEMALA

The country is mountainous with the exception of certain districts such as the Peten and the West Coast. Many towns are situated on low, flat basins of volcanic ash, surrounded by mountain ranges. Examples: Chichicastenango, Quetzaltenango, Huehuetenango, San Marcos, Tecpam and Santa Apolonia, Santa Cruz, San Cristobal (Alta Vera Paz), and Salama (pl. 2,*d*). Steep outcrops and deep gullies are avoided in the selection of the site. The ancient Maya sometimes deliberately selected a limestone outcrop for the floor of the house. Example: House Mound II, Uaxactun.¹

SUBSTRUCTURES AND FLOORS

PLATFORMS

When the ground is already level, it is cleared, post holes are dug, and construction of the house begins immediately. Many Indians build a small platform substructure regardless of the flatness of the ground.

Construction.—The two methods are:

1. The top of the surrounding ground is cut away, leaving the original surface jutting up about 10 cm. The earth thus removed is sometimes daubed on the walls of the new house. Examples: House 1, Panajachel; House 3, San Sebastian; House 1, San Lucas Toliman, Guatemala; towns on the railroad between Tapachula and Islamapa, Chiapas, Mexico. The edges of the platform are not flush with the walls but extend about 15 cm. beyond the exterior base of the walls.² Sometimes the platform stops at the front wall of the house, but if there is a porch the platform usually extends beyond it.

2. Stone walls retain an earth-and-rubble fill,³ which is packed down and surfaced with marl. In some cases the larger wall poles⁴ of the house penetrate the retaining wall and enter the original ground beneath (fig. 3,*a,b*). Modern examples: Valladolid, Tizimin, and Quintana Roo, Yucatan; Cuilapa, Guatemala (pl. 26,*d*). Ancient example: House Mound I, Uaxactun.⁵

¹ Wauchope, 1934, fig. 11, and p. 140.

² In the Baja Vera Paz the platform edge is about 40 or 50 cm. from the base of the walls. Examples: Tablon, Zapote, and Morazan (pl. 16, *d*).

³ The platform of House 2, Cuilapa (Dept. of Santa Rosa), Guatemala, consisted not of earth and rubble but of large jagged rocks.

⁴ The Yucatecan *kulu'bo:b* or *mukt'ye'o:b*; see p. 69, *infra*.

⁵ Wauchope, 1934, "P. 2" in fig. 9, and p. 136.

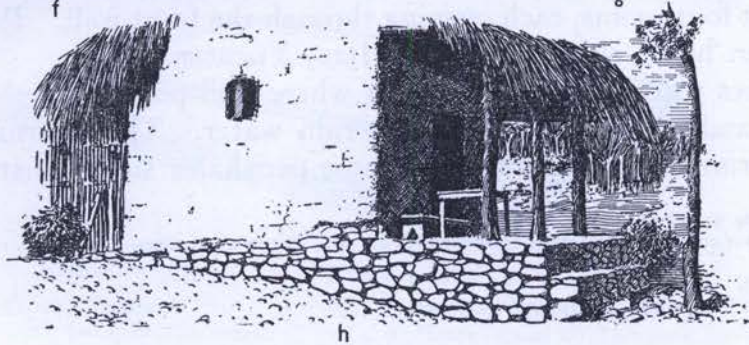
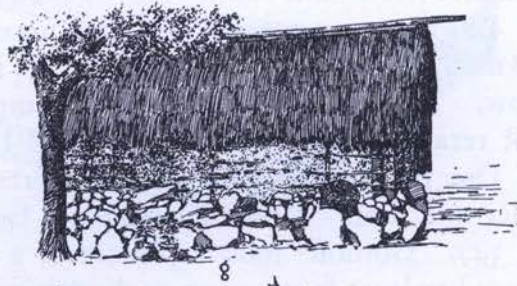
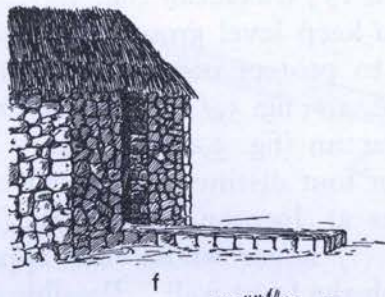
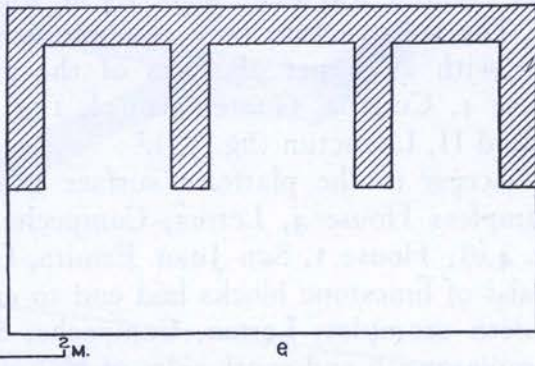
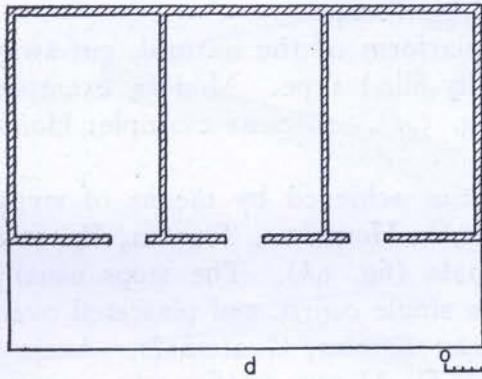
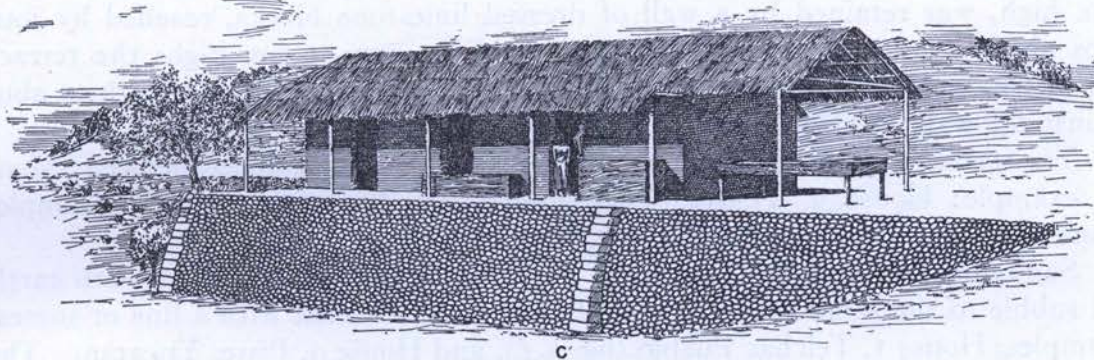
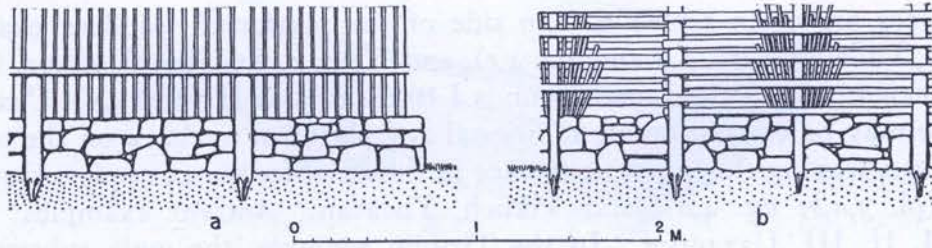


FIG. 3—MISCELLANEOUS SUBSTRUCTURES

a: House 4, Chan Kom, Yucatan.
b: House 5, Valladolid, Yucatan.
c: House 1, Jocotan, Guatemala.
d: Plan of the same.

e: Plan of House Site 8, Chichen Itza, Yucatan.
f: House 6, Telchac Pueblo, Yucatan.
g: House 2, Cuilapa, Guatemala.
h: House 1, San Juan Ermita, Guatemala.

Terraces are often added to one side of the platform. Modern examples: House 60, Valladolid (pl. 3,*d* and fig. 4,*e*), and Temax, Yucatan; Cuilapa, Guatemala. Ancient examples: House Mounds I (fig. 4,*b*) and III (fig. 4,*d*), Uaxactun. The house may be erected on an additional low platform set back on the original substructure, leaving the porch or terrace in front. Modern examples: House 11, Tizimin (pl. 3,*a,b*; fig. 4,*a*), and Tikuch, Yucatan. Ancient examples: House Mounds I, II, III, Uaxactun. In the Tizimin example, the main substructure, 1 m. high, was retained by a wall of dressed limestone blocks, reached by four steps about 1 m. wide. The additional platform was 15 cm. high; the terrace was 75 cm. wide. The usual dry rubble boundary wall was high enough to abut against the walls of the house in spite of the latter's raised position (pl. 3,*a*).

The terrace is sometimes cut short at one end to form an offset terrace. Modern example: House 9, Temax, Yucatan (pl. 3,*c*; fig. 4,*c*). Ancient example: House Mound I, Uaxactun (fig. 4,*b*).⁶

Sometimes a wide path leading to the door of the house is raised with earth and rubble to the same height as the platform and retained with a line of stones. Examples: House 1, Telchac Pueblo (fig. 3,*f*), and House 3, Piste, Yucatan. The Piste example was 9 cm. high, 1.5 m. wide, and 9 m. long.

The substructure may combine a lower platform of the natural, cut-away type with an upper platform of the artificially-filled type. Modern example: House 1, Cuilapa, Guatemala (pl. 15,*c* and fig. 5,*d*). Ancient example: House Mound II, Uaxactun (fig. 5,*c*).⁷

Access to the platform surface is sometimes achieved by means of steps. Examples: House 4, Lerma, Campeche (fig. 5,*b*); House 11, Tizimin, Yucatan (fig. 4,*a*); House 1, San Juan Ermita, Guatemala (fig. 3,*h*). The steps usually consist of limestone blocks laid end to end in a single course and plastered over. Modern examples: Lerma, Campeche; San Juan Ermita, Guatemala. Ancient example: north and south sides of House Mound IV, Uaxactun (fig. 5,*b*).

Lower terraces are sometimes necessary to keep level ground from washing downhill, away from houses built on it, and to protect other houses on roads below. Modern example: Lerma, Campeche (pl. 4,*b*; fig. 5,*f*). Ancient example: west retaining walls of House Mound III, Uaxactun (fig. 5,*e*).

One platform in rare cases supports three or four distinct houses, which meet under one roof. Modern examples: two houses at Jocotan, Guatemala (pl. 4,*d*; fig. 3,*c*). Gordon⁸ took a picture of a Quiche (?) house whose roof apparently covered at least four rooms, each opening through the front wall. Possible ancient examples: seven house sites at Chichen Itza, Yucatan.⁹

Large stones placed outside the walls where wall poles meet the ground protect the floor and bases of poles against rain water. These furnish convenient means for determining plans of houses whose perishable superstructures have dis-

⁶ Wauchope, 1934, fig. 9, and pp. 135-36.

⁷ In this case the lower platform was a natural limestone ledge cut away sharply at the edges. (Wauchope, 1934, p. 140, and section *ab*, fig. 11.)

⁸ Gordon, 1896-1901.

⁹ House Sites 3, 4, 7, 8, 9, 11, 13. See Appendix A, p. 163.

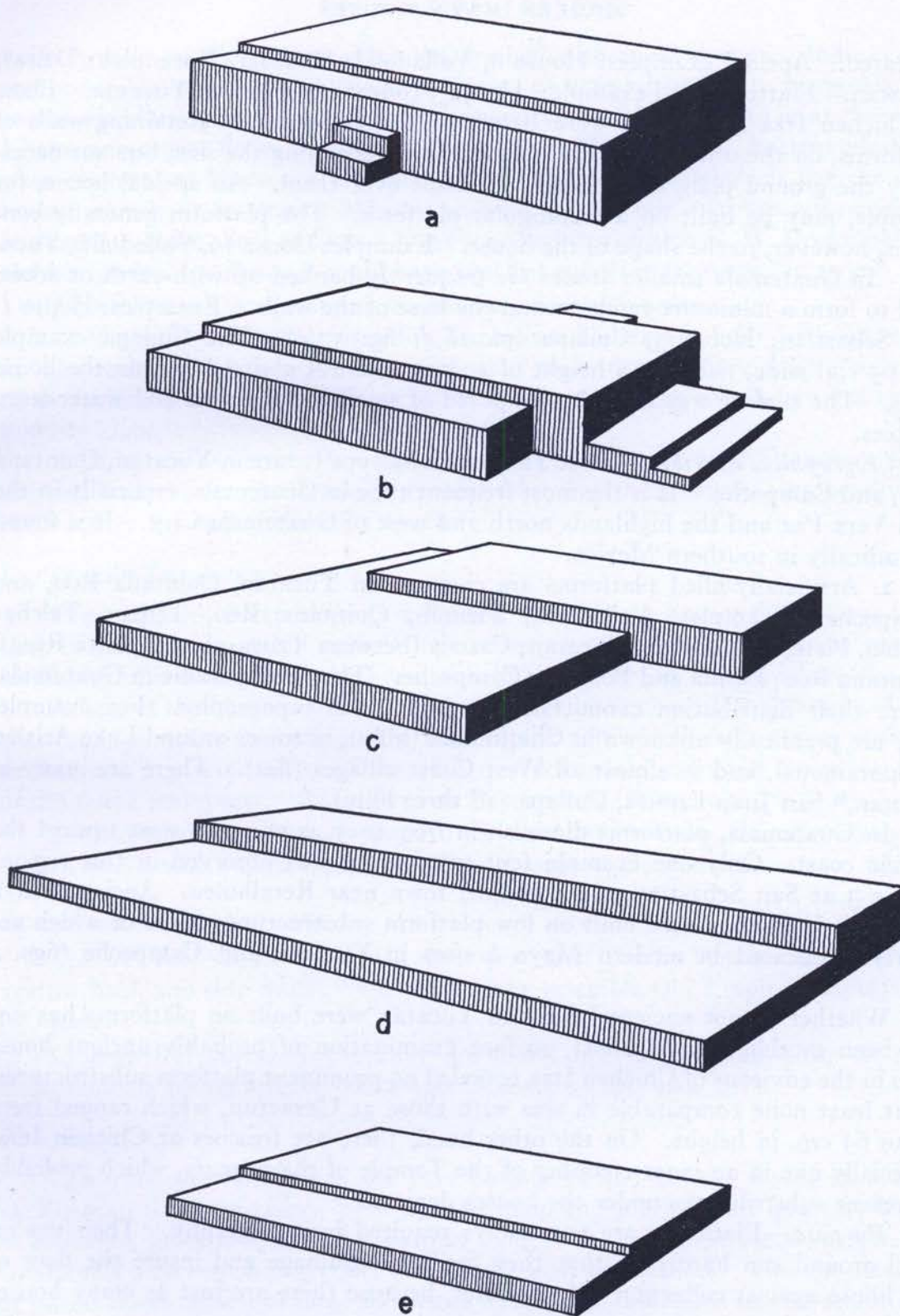


FIG. 4—ANCIENT AND MODERN SUBSTRUCTURES

a: House 11, Tizimin, Yucatan.

c: House 9, Temax, Yucatan.

b: House Mound I, Uaxactun, Guatemala.

d: House Mound III, Uaxactun, Guatemala.

e: House 6c, Valladolid, Yucatan.

appeared. Apsidal examples: House 8, Valladolid; House 1, Xocenpich; Dzitas, Yucatan. Flattened-end example: House 3 (burnt) at Tizimin, Yucatan. Plans of Chichen Itza house sites were based on similar stones.¹⁰ Retaining walls of platforms, on the other hand, are valuable in determining the size, but not necessarily the ground plan, of a house once built over them. An apsidal house, for example, may be built on a rectangular platform. The platform generally conforms, however, to the shape of the house. Example: House 19, Valladolid, Yucatan. In Guatemala smaller stones are frequently banked up with earth or adobe mud to form a miniature ramp around the base of the walls. Examples: House 1, San Sebastian; House 3, Cuilapa (pl. 26,*d*; fig. 37,*a*). The Cuilapa example was 65 cm. wide, rising to a height of 50 cm. where it abutted against the house walls. The surface was smooth, composed of small cobblestones and water-worn pebbles.

Geographical distribution.—1. The cut-away type is rare in Yucatan, Quintana Roo, and Campeche. It is the most frequent type in Guatemala, especially in the Alta Vera Paz and the highlands north and west of Guatemala City. It is found sporadically in southern Mexico.

2. Artificially-filled platforms are common in Yucatan, Quintana Roo, and Campeche. Examples: Valladolid, Tizimin, Quintana Roo, Temax, Telchac Pueblo, Piste, and Tikuch, Yucatan; Catmis (between Tzucacab and Santa Rosa), Quintana Roo; Lerma and Pomuch, Campeche. They are sporadic in Guatemala, where their distribution cannot be correlated with topography. For example, they are practically unknown in Chiquimula (hilly), in towns around Lake Atitlan (mountainous), and in almost all West Coast villages (flat). There are many in Jocotan,¹¹ San Juan Ermita, Cuilapa (all three hilly).

In Guatemala, platforms diminish in frequency as one goes west toward the Pacific coast. Only one example (cut-away type) was observed in this region: House 3 at San Sebastian, a Cakchiquel town near Retalhuleu. Ancient Maya houses at Uaxactun were built on low platform substructures, some of which are nearly duplicated in modern Maya houses in Yucatan and Campeche (figs. 4 and 5).

Whether or not ancient houses in Yucatan were built on platforms has not yet been established. A short, surface examination of probably ancient house sites in the environs of Chichen Itza revealed no prominent platform substructures, or at least none comparable in size with those at Uaxactun, which ranged from 20 to 63 cm. in height. On the other hand, there are frescoes at Chichen Itza, especially one in an inner chamber of the Temple of the Jaguars, which probably represent substructures under the houses depicted.¹²

Purpose.—Platforms are not always required by topography. Their use on level ground can hardly be that they facilitate drainage and insure the floor of the house against collection of rain water, because there are just as many houses

¹⁰ See Appendix A, p. 163.

¹¹ One of the few villages in eastern Guatemala where an Indian language (Chorti) still partially survives.

¹² Wauchope, 1934, p. 116, and fig. 2,*a*.

built directly on the ground which are drained with equal success. Indians deny the possibility of wet floors, since the bases of exterior walls are purposely protected with large stones, and doorsills prevent water from running in at the doors. I have never seen floors get wet or soggy during downpours. Ancient platforms were essential at Uaxactun, for although the district as a whole is flat the city's houses were built on sloping hillsides and uneven hilltops. It was not necessary, however, to build them so high. Not even the lakes, which C. W. Cooke believes once existed in the Peten,¹³ could have reached the sites excavated in 1932.

Discussion.—Two questions may be raised at this point.

1. If platform substructures for Yucatecan houses are built without regard for any real need of them, is it possible that such instances are merely survivals of an ancient custom, to which, as to many other customs, the Indian has unconsciously clung?

2. If it can be shown through excavation that the ancient Yucatecan Maya did not build house platforms, when and why was the practice temporarily discarded after the end of the stela epoch?

EXCAVATED TERRACES

Construction.—Steep slopes are leveled to receive a house, the process being that of cutting into a hill rather than terracing out from it. In some cases, a small platform is added to the lower end of the house; in others, where the cleft is insufficient, the house is built in two parts, the back on a little higher level than the front (pl. 5, *b*). Sometimes the level of the porch is slightly higher than the surface and it is retained by a long timber, which is laid along the ground in front of the porch mainposts. Example: Los Encuentros, Guatemala (pl. 25, *d*).

Geographical distribution.—Excavated terraces are most frequent along the road between Santa Cruz Quiche and San Francisco, Guatemala.

ELABORATE SUBSTRUCTURES

Construction.—Steps may lead to a plastered porch; benches may be built against back and side walls. Sometimes they resemble Old Empire temple rooms (pl. 5, *a*).

Geographical distribution.—They are found in Yucatan, especially on steep embankments facing streets. Example: Valladolid (pl. 5, *a*).

FLOORS

Construction.—Sometimes the bare surface of the ground serves as a floor. In Yucatan it is more often built up with lime and marl. This mixture, known as *embutido*, gives to the floor a harder, more even, and impervious surface. In Guatemala a corresponding effect is obtained with adobe mud. The few attempts at paved floors consist of large flat rocks irregularly embedded in *embutido*, their upper surfaces flush with the mixture around them. Ancient example: House

¹³ Cooke, 1933, p. 362.

Mound III, Uaxactun.¹⁴ True paving was found in porch construction at San Pedro de Laguna and elsewhere in the highlands of Guatemala.

The better Yucatecan houses have excellent mortar floors, which remain long after other construction has fallen. Post holes in such a floor are therefore much better preserved than elsewhere.

Linguistics.—An informant at Tizimin, Yucatan,¹⁵ called his embutido floor **but**. This Maya word may be derived from the Spanish; it is, however, an old form, listed in the Motul dictionary (**buth**). In Table I are other words for 'floor,' most of them meaning 'earth' also.

TABLE I

LANGUAGE	PLACE	FLOOR OR EARTH (<i>Suelo</i>)	LITERAL TRANSLATION AND REMARKS
Quiche	Chichicastenango Quetzaltenango	mis (u wutʃ) leu ¹⁶	Cf. Quetzaltenango and Santa Cruz Quiche oleuh (Barrera) uleu (Anonymous; Basseta)
	Santa Cruz Quiche	leu	
Cakchiquel	Santa Apolonia San Sebastian	u'leu(x) leu	uleu (Ximinez)
Zutuhil ¹⁷	Santiago Atitlan House 1 House 2 San Pedro de Laguna San Lucas Toliman	o:'lif u'lef u'le(x)u ku'leu	
Mam	San Pedro Sz. ¹⁸ and Concepcion	tʃ'otʃ'	chocx (Reynoso); ʃ, retroflex s
Jacalteco	Informant from Santa Eulalia	(sat) tʃ'otʃ'	
Kekchi	Coban and San Juan Chamelco	tʃ'otʃ'	
Pokonchi	San Cristobal	a'kal	

GROUND PLANS

APSIDAL

Characteristics.—The plan is a rectangle with rounded ends or apses (pl. 6, a; fig. 6, a). The mainposts always lie well inside the line of the walls. Exception: Oxkutzcab, Yucatan.¹⁹

Geographical distribution.—This type is absent in Guatemala. Throughout Yucatan it usually far outnumbers other plans. Its frequency in Yucatan and Campeche seems to be correlated with the presence of Maya blood and speech (fig. 7). Its occurrence diminishes toward the southwest and practically disappears south of the city of Campeche. Only about half of the bush houses of Campeche

¹⁴ Wauchope, 1934, p. 150, and fig. 20.

¹⁵ Ciriaco Acevedo, House 1, is of Mexican parentage but lives in a bush house with his Maya wife.

¹⁶ For explanation of use of parentheses in table word lists see Introduction, p. 2.

¹⁷ P. 174, n. 1, *infra*.

¹⁸ Sz., abbreviation of Sacatepequez. The San Pedro Sacatepequez mentioned throughout this book is that in the Department of San Marcos.

¹⁹ Mainposts were small and more numerous than usual.

are apsidal, and just a small minority (5 out of 43) was observed at China, a fairly large settlement about 10 km. to the southeast. The proportion increases, however, at a plantation between China and Uayamon. At Lerma, south of Campeche, the few apsidal houses there were built, according to indirect information,

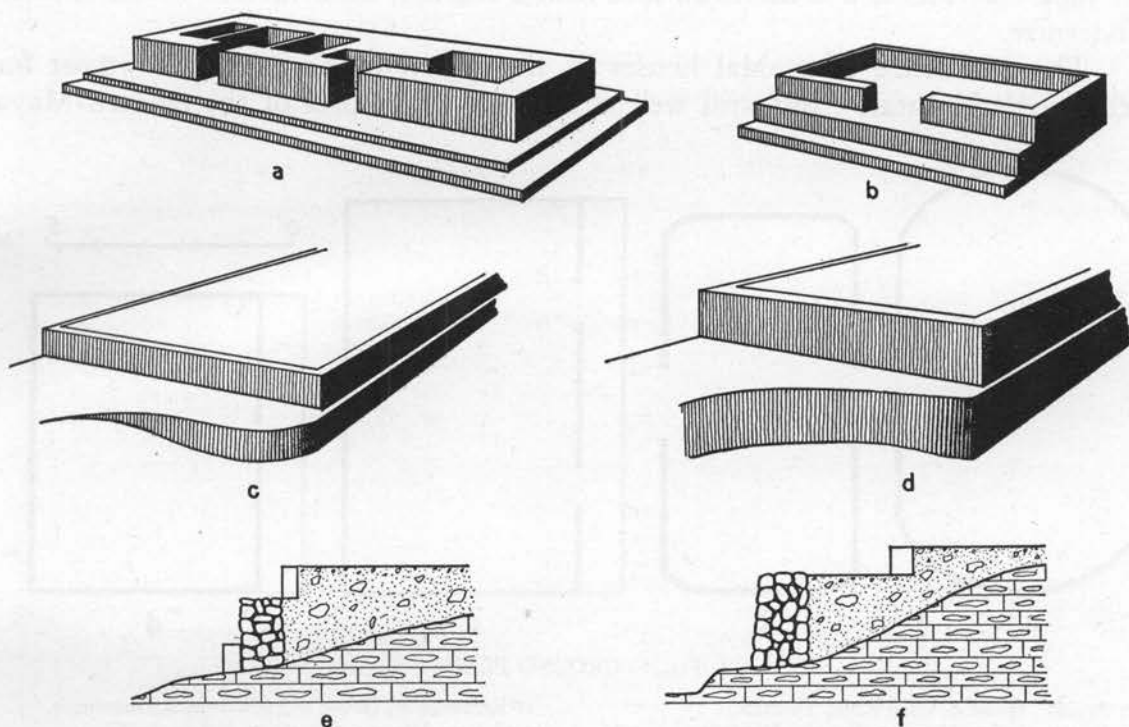


FIG. 5—ANCIENT AND MODERN SUBSTRUCTURES

a: House Mound IV, Uaxactun, Guatemala.

b: House 4, Lerma, Campeche.

c: House Mound II, Uaxactun, Guatemala.

d: House 1, Cuilapa, Guatemala.

e: House Mound III, Uaxactun, Guatemala (section).

f: House 3, Lerma, Campeche (section).

by people from Yucatan and northern Campeche. At Champoton, much farther south, there was none at all among the 100 houses observed. Coast towns of Campeche become increasingly un-Maya as one goes south from the capital; hence the incidence of Maya population is in direct proportion to this frequency of apsidal house types.

Apsidal houses are found in the southeastern Maya towns of Xyatil and Chan Santa Cruz,²⁰ but infrequently at Catmis, a town in the same general area but weak in Maya blood.²¹ There, just over the Quintana Roo boundary southeast of Tzucacab, only 17 of the 30 houses inspected had semi-circular rounded ends. Contacts here are more numerous with the south (Quintana Roo and the

²⁰ Shattuck, 1933, pl. 48, B, D.

²¹ Catmis is a chicle town although perhaps better known for its sugar refinery, and its population, necessarily made up largely of chicle gatherers, is very un-Maya.

Peten) where all bush houses are rectangular. Populations of seaport towns (Campeche, Lerma, and Champoton) are for the most part non-Maya; Maya speech is practically unknown there. It is not surprising, therefore, that a characteristically Maya house feature disappears in these two directions. Its disappearance in the direction of Chicxulub on the Gulf Coast may be explained by the fact that this is a coast town and near Progreso, both factors which tend to modernize.

The decadence of apsidal houses in the region of Tizimin, an outpost for "civilized" Yucatan²² but still well within the boundaries of the modern Maya

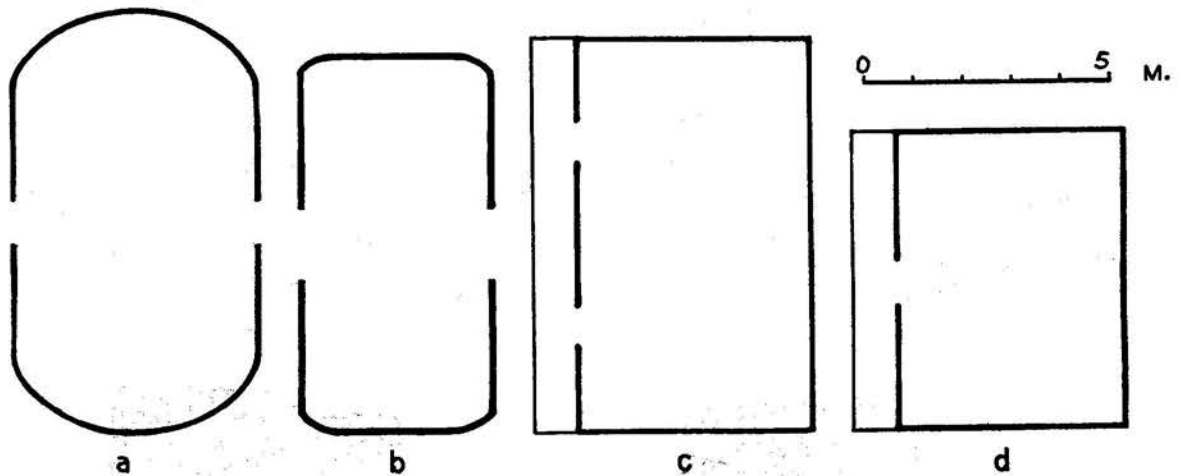


FIG. 6—GROUND PLANS

a: Apsidal, House 2, Chan Kom, Yucatan.
b: Flattened ends, House 1, Tizimin, Yucatan.

c: Rectangular, House 1, San Cristobal, Guatemala.
d: Square, House 1, San Pedro de Laguna, Guatemala.

area, is, on the other hand, unexpected. Here only 87 of the 214 houses observed (41 per cent) had fully rounded apses.

J. E. Thompson tells me that some houses at San Jose, British Honduras, were apsidal in plan (pl. 33, *d*). According to Thompson most of the Indians here came originally from Icaiche.

I observed no apsidal houses in Guatemala, but Sapper reports them at Lake Petha (one of the sides of a hut was semi-circular), and Lake Izan (*ermita* or gathering house of the Uhes).²³ E. M. Shook of Carnegie Institution tells me that he has seen apsidal houses at Yaxchilan and at Las Campañas (also called Salvamiento) on the right bank of the Usumacinta. At Las Campañas a rectangular house, used as a living room, shrine, and storehouse, was connected to the main apsidal house observed by Shook.

Sapper, and Blom and LaFarge write of houses with rounded ends among the Chontals.²⁴ Blom and LaFarge describe Chontal houses at Comalcalco,

²² I.e., those parts of Yucatan readily accessible by railroad, automobile, or flat car.

²³ Sapper, 1891, p. 893. A photograph of a large Quiche (?) settlement (Gordon, 1896-1901) shows several houses that may be apsidal in plan.

²⁴ Sapper, 1897, p. 384; Blom and LaFarge, 1926, p. 135.



GULF OF MEXICO

PACIFIC OCEAN

LEGEND

- Apical
- + Rounded corners
- ◻ 50% Apical
- ◻ 50% Rectangular
- ◻ Rectangular
- ◻ Square
- ◻ Round

• One or more apical houses reported;
no percentages available

Scale
0 50 100 200 Kil.

Fig. 7—GEOGRAPHICAL DISTRIBUTION OF GROUND PLANS IN MAYA AREA

Tabasco, as follows: "The corners of the houses are rounded and the thatching poles on the roof, which run parallel to the eaves, are carefully bent to carry this curve." Starr illustrates some apsidal Totonac houses at Pantepec, far up in the northern tip of Puebla near the Vera Cruz boundary, Mexico, and describes them in these terms: "The walls are of poles, heavily daubed with mud, which is neatly and smoothly laid on. The corners of this mud covering are rounded, instead of angular as elsewhere."²⁵

Antiquity.—The only old person who could give any information at Tizimin was a man of eighty, who said that when he was a boy there were no rectangular dwellings and that ends of houses were fully rounded and not flattened, as in so many Tizimin houses today. A survey of the newest parts of town (northwest, extreme south, and southeast) revealed that the proportions of apsidal houses in these three sections were considerably and consistently lower (30, 38.5, and 27 per cent, respectively) than that for the whole town (41 per cent). (See figs. 8 and 9.) Interpretation is hazardous, especially because these areas were grouped arbitrarily and chosen by general inspection, but the figures at least confirm the informant's statement that the apsidal house is the older type.

In 1843 Stephens said of a dwelling in Nohcacab, Yucatan: "The house, like most of those in the village, consisted of a single room rounded at each end."²⁶

In literature dating from Stephens and Waldeck (1838) back to the seventeenth century, we find a long lacuna in the subject of Indian houses. In the writings of travelers in the seventeenth and sixteenth centuries there is not one remark, so far as I know, that can be even freely interpreted as indicating the existence of apsidal houses at that time. This absence of any mention of rounded ends is so conspicuous as to be significant. It is most unlikely that not one of the Spanish authors of the fifty-two *Relaciones* examined for this paper, or of the other documents mentioning houses, should have considered the feature of sufficient interest to note. The improbability becomes even stronger when we consider that the Spaniards were accustomed to rectangular houses and, in addition, themselves presumably built rectangular houses in Yucatan. If apsidal houses existed there at that time, the Spaniards must have noticed, too, the difference between these and the rectangular houses in adjacent regions.

The only sources that approach even a mention of the 'end of the house' are the Motul and San Francisco dictionaries, both of which include this term in their vocabularies. The Indian equivalent which they give for *la culata de la casa* is **moy**, which we shall see later is the same word (**moi**) used by the modern Maya and given by them as the name also of one of the two pliant roof purlins of twisted vine which are necessary for carrying roof supports around the curved semi-circles of an apsidal house. The other pliant roof purlin is called **kop u moi** by the modern Maya. The Motul gives "**cop**, to take rope, cord, vine and similar things, twisting them, and things thus taken; hoop of iron or of wood."²⁷ But in neither dictionary

²⁵ Starr, 1908, p. 268; see also 1901, p. 186.

²⁶ Stephens, 1843, I: 358.

²⁷ Motul, 1929, p. 200; MS. (Maya-Spanish), sec. 82.

is there the necessary combination of these two words (which they would write **copumoy**) to prove to us the existence of apsidal houses at this early period.

Dictionaries were also searched in vain for the word **wul moi** (**vovol moy** as they would probably have it), which means 'rounded end of the house' at Tizimin, Yucatan. The Ticul gives "**uolol, redondes, pellaes, etc.**," 'roundness, pellets [or balls]'²⁸ and the Motul gives "**vovol, ovillo ó pella,**" 'ball or pellet,'²⁹ neither of which helps.

The Motul, however, gives "**vovoloc (ó vovoloc che), casa redonda, esférica,**" 'round [or] spherical house,'³⁰ which comes closer to what we are looking for than anything heretofore noted. But we must remember that true round houses were probably known in Yucatan after the influx of Nahuatl toward the end of the New Empire. These mud-covered huts are to be seen in fresco on the west wall of the Temple of the Jaguars at Chichen Itza, Yucatan, and have been identified by Tozzer as Nahuatl houses, "probably a Mexican prototype, and in contrast with the more typical Maya houses at the top of the painting."³¹ This type of Nahuatl hut, with its round plan and dome-shaped roof comes closer also to being a *casa esférica*, 'spherical house,' than anything else I can think of.

Although E. H. Thompson reports ancient apsidal house sites in Yucatan,³² the thirteen supposedly prehistoric dwellings examined at Chichen Itza were apparently rectangular.³³ House plans mapped by Shook at Sayil and Kabah were also rectangular. This, together with the negative documentary evidence already reported, leads one to believe that ancient Yucatecan houses were not so prevalingly apsidal as they are today.

A. Ledyard Smith recently discovered two perfectly preserved apsidal house substructures below the earliest phase of Palace Structure A-V at Uaxactun.³⁴ These houses antedate other Old Empire houses (rectangular) excavated at the same city in 1932, as well as some rectangular house sites uncovered in the highlands of Guatemala at Zacualpa, Department of Quiche,³⁵ and at San Agustin Acasaguastlan, Department of Progreso.³⁶

Shook tells me that some of the house sites at Chakantun (near La Libertad)³⁷ are apsidal and dumb-bell shaped in plan.

For further discussion of the antiquity of apsidal house plans, see Discussion, pages 147-49.

FLATTENED ENDS

Characteristics.—This type of plan is a long rectangle with rounded corners (pl. 6, *b*; fig. 6, *b*), similar in construction to the apsidal plan. It appears to be the result of an attempt to build a rectangular house around framework which retains the **moi** and **kop u moi** (bundle roof purlins) typical of the ends of apsidal

²⁸ Ticul, p. 84.

²⁹ Motul, 1929, p. 909; MS. (Maya-Spanish), sec. 451r.

³⁰ *Ibid.*, p. 909; MS. (Maya-Spanish), sec. 451r.

³¹ Tozzer, 1928, p. 156.

³² E. H. Thompson, 1892, p. 263.

³³ See Appendix A, p. 163.

³⁴ Smith, 1936, pp. 115-16.

³⁵ Wauchope, 1936, pp. 128-30.

³⁶ Kidder, 1935, pp. 117-19.

³⁷ See Lundell, 1934, p. 175.

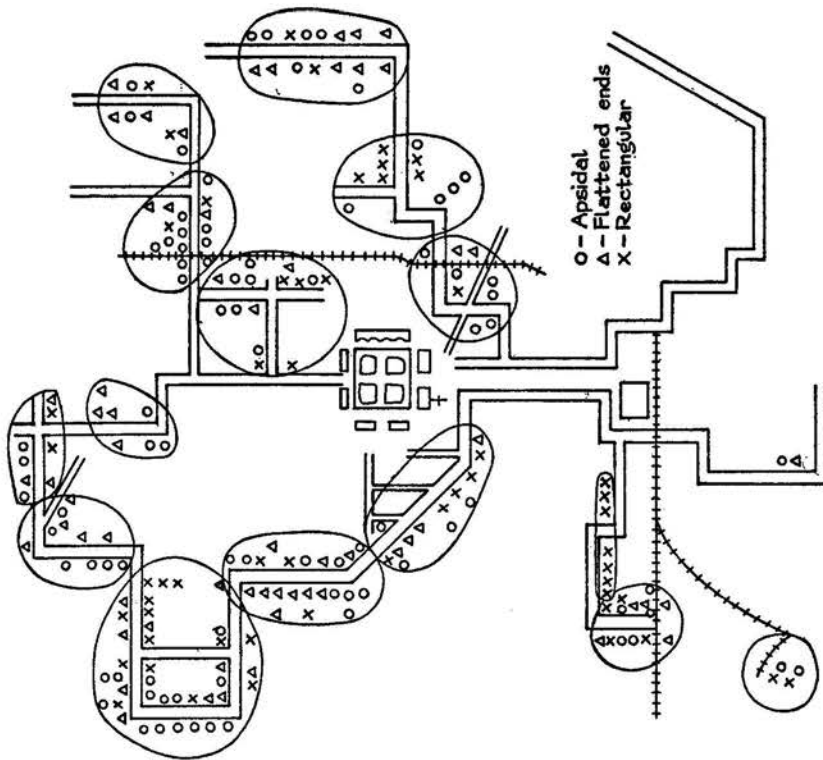


FIG. 8.—SKETCH MAP OF TIZIMIN, YUCATAN, SHOWING GEOGRAPHICAL DISTRIBUTION OF GROUND PLANS

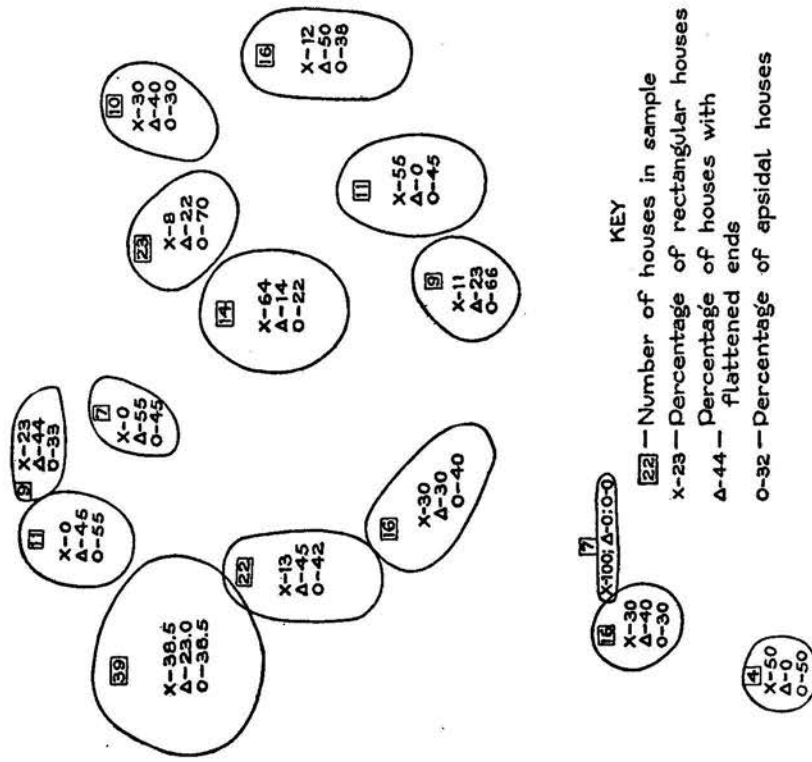


FIG. 9.—ANALYSIS OF MAP ON FIGURE 8

houses (see pp. 47-49). The rectangular house does not have these; they are replaced by cross-poles attached at right angles to the longitudinal poles. Since the wall poles follow the direction of the elastic *moi*, it is clear that an absolutely rectangular house is impossible when this member is retained. Generally the mainposts of a flattened-end house are not set so far in from the walls as they are in apsidal houses.

Geographical distribution.—This type occurs in Yucatan in those areas where rectangular houses are found. At Tizimin 65 of the 214 houses observed (30 per cent) had flattened ends. At Catmis, another town where the percentage of apsidal houses decreased, 4 out of the 30 observed (13 per cent) had them. They were observed but not counted at Campeche, the third area which has few apsidal houses.

Most Maya houses at San Antonio, British Honduras, are rectangular,³⁸ but a few have rounded corners.³⁹ J. E. Thompson showed me other photographs taken by him in British Honduras at Benque Viejo; some of the houses have either fully round or flattened ends.

About six or seven houses with rounded corners can be seen as one passes through the first two towns (on the railroad) east of Cordoba in northern Oaxaca, Mexico. I also recorded houses of this type at two settlements in the vicinity of Escobedo, in eastern Guanajuato near the Hidalgo border, Mexico.

Linton Satterthwaite of the University of Pennsylvania Museum sent me some photographs of houses under construction in the Usumacinta region. These are rectangular with rounded corners, split lianas connecting each side wall-plate and pole plate with the end plate. Earlier houses here are, according to Satterthwaite, rectangular. Shook recorded a shelter of similar construction at El Retiro, on the right bank of the river, between Piedras Negras and Tenosique.

Antiquity.—One informant (eighty years old) at Tizimin said that when he was a boy, houses were all apsidal; that is, they had semi-circular rather than flattened ends.

Linguistics.—Another Tizimin informant called his flattened-end house *wol moi* (*moi*, end of the house; Ticul gives *uolol*, round; Motul gives *vovoloc*, spherical or round house).

RECTANGULAR

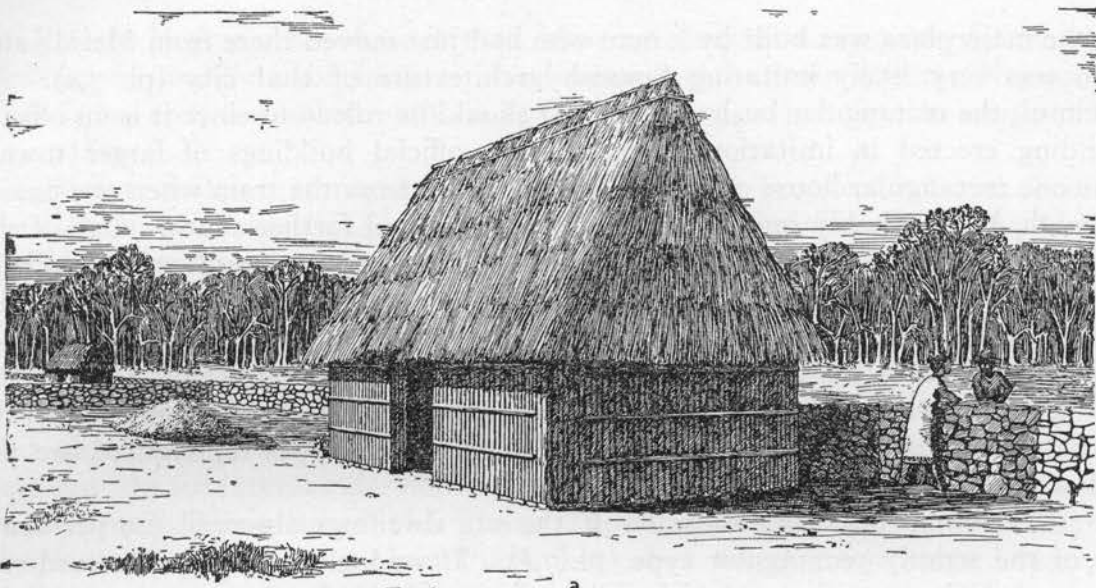
Characteristics.—Non-flexible transverse poles replace the pliant, intertwined roof purlins of the apsidal house framing. There are likely to be more and smaller mainposts, which generally stand in the line of the walls.

*Geographical distribution.*⁴⁰—Isolated occurrences should be overlooked in considering the significance of the geographical distribution of rectangular houses. Examples: At Xocenpich, Yucatan, the only rectangular bush house not located

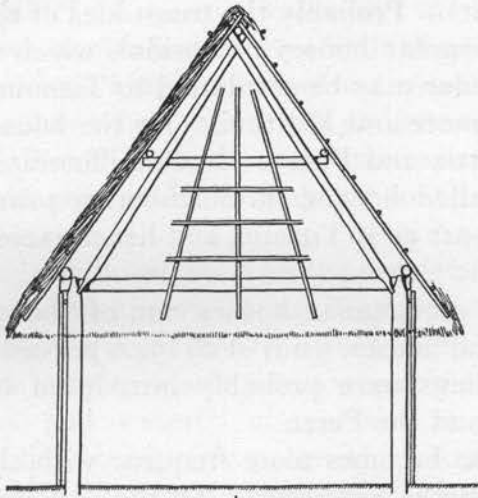
³⁸ J. E. Thompson, 1930, pp. 91-93.

³⁹ *Ibid.*, pls. I and XIII, 1.

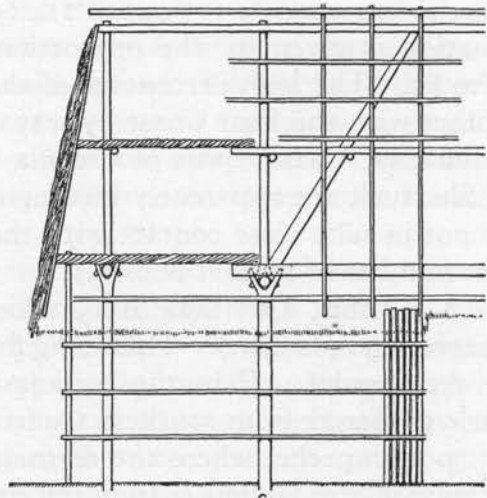
⁴⁰ Rectangular houses located on main plazas are not considered.



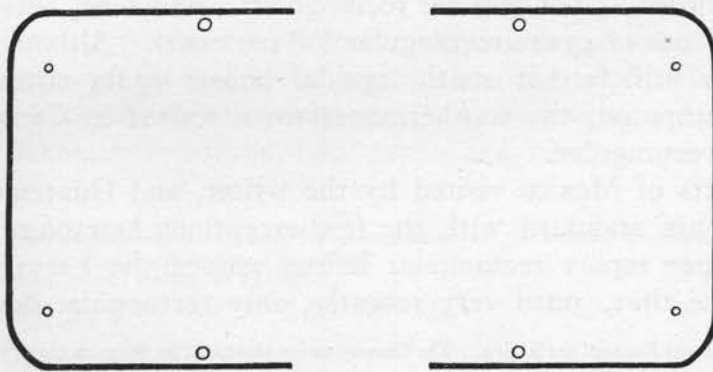
a



b



c



d

0 1 2 M.

FIG. 10—HOUSE 1, TIZIMIN, YUCATAN
 (Flattened ends, vertical wall poles, palm thatch, extra A-frames)

a: Perspective. b,c: Elevations. d: Plan.

on the main plaza was built by a man who had just moved there from Merida and who was very likely imitating Spanish architecture of that city (pl. 7,*a*). At Ticimul, the rectangular bush schoolhouse should be ruled out since it is an official building erected in imitation of rectangular official buildings of larger towns. The one rectangular house of the 33 dwellings seen from the train when one passes through Akil probably imitates houses at Catmis and farther south. One of the 32 houses recorded at Huhi is rectangular; it, too, must be considered an isolated case. Two bush structures at Valladolid are rectangular. One is a storehouse, the other a dwelling; the latter probably imitates better houses in the vicinity of the main plaza.

Districts where the percentage of rectangular houses is large enough to warrant consideration as an independent element in the house types represented are the following:

1. Tizimin, Yucatan, where 62 of the 214 dwellings observed (29 per cent) are of the strictly rectangular type (pl. 7,*b*). If we include the 65 flattened-end houses, which are attempts at building rectangular structures (see p. 20), the figure is increased to 127 out of 214 (59 per cent). Probably the truest idea of the situation is given by the proportion of rectangular houses to apsidal, which is 62 to 87. The high percentage of the rectangular may be attributed to Tizimin's contact with the East Coast by way of Chancnote and Kantunil,⁴¹ for the houses at the East Coast towns of Colonia Santa Maria and Puerto Morelos illustrated by Shattuck are apparently rectangular.⁴² (Valladolid and its neighboring towns are not in such close contact with the East Coast as is Tizimin, and hence exceed it in number of apsidal houses.)

2. Catmis, Quintana Roo, which has 9 rectangular houses out of the 30 observed (30 per cent). Excluding flattened-end houses, 9 out of 26 (34.6 per cent) are rectangular. Here the rectangular dwellings were probably introduced by chicle gatherers from southern Quintana Roo and the Peten.

3. Campeche, where the rectangular house becomes more frequent with the decrease of apsidal houses from the city of Campeche southward. Of the 45 houses with pole walls at Campeche, 26 are rectangular (58 per cent), and of the total number of houses recorded 45 per cent are rectangular. At China, between Campeche and Uayamon, 38 out of 43 are rectangular (88 per cent). Although at Mukuchakan, a plantation still farther south, apsidal houses again outnumber the rectangular, at Champoton, the southernmost town visited in Campeche, the 100 observed are all rectangular.

4. Other parts of Mexico visited by the writer, and Guatemala, where rectangular houses are standard with the few exceptions heretofore noted.⁴³ Both Tozzer and Sapper report rectangular houses among the Lacandonnes.⁴⁴ Satterthwaite writes me that, until very recently, only rectangular houses were built

⁴¹ Data from Chancnote and Kantunil are lacking. The Chancnote inn illustrated by Shattuck (1933, pl. 43,*A*) seems, however, to be apsidal in plan.

⁴² Shattuck, 1933, pls. 44 and 45.

⁴³ See pp. 19, 22. As we shall see later, some of the shorter rectangular houses in certain limited areas are approximately square (p. 26, *infra*).

⁴⁴ Tozzer, 1907, p. 64; Sapper, 1891, p. 893.

at Piedras Negras. Shook says that he remembers a rectangular shelter at El Desempeño on the right bank of the Usumacinta between Piedras Negras and Tenosique, and, associated with an apsidal dwelling, a rectangular house at Las Campañas.

Sapper writes that rectangular houses are built by the Chol and Chorti,⁴⁶ the Kekchi and Pokonchi, Mam, Quiche, Pokom, Tzental, "and the other Indians of Chiapas and the Isthmus of Tehuantepec, of southern Guatemala, Salvador, Honduras, and western Nicaragua. . . ." ⁴⁶

Antiquity.—Verbal information given by old Yucatecan Indians was conflicting and unsatisfactory. Jose Exaltacion May, an old man of Valladolid, said that as far back as he could remember houses had been apsidal in plan. He said that about ten years ago "Don Luis" (a liquor distiller now living in Merida) had built the first rectangular house in Valladolid in imitation of rectangular houses he had seen in Belize, British Honduras. I assumed he was referring to rectangular structures on or near the Main Plaza, but when asked about stone houses, he replied that there were both rectangular and apsidal *stone* houses when he was a child.⁴⁷ A second Valladolid informant stated definitely that the first wooden rectangular houses were built about twelve years ago, an estimate that apparently confirms May's information. An eighty-year-old Maya at Tikuch⁴⁸ said that when he was a boy there were no rectangular houses. Gregorio Camal, seventy-six, of Yalkom⁴⁹ made the same statement. But two other old informants at Valladolid⁵⁰ said that so far as they knew there had always been some rectangular houses in the town.

An interview with the owner of the only rectangular house at Muna, Yucatan, revealed an interesting Maya word usage which indicates that the rectangular house is a relatively recent introduction or invention. As pointed out before, the supple, intertwined roof purlins (the upper one called *moi*,⁵¹ the lower and larger one *kop u moi*⁵²) of apsidal houses are replaced in rectangular houses by non-flexible transverse poles which are usually lashed to the ends of corresponding longitudinal roof members. These transverse purlins are generally called by the same names as the longitudinal ones, the upper being *u beil tš'o?*, 'road of the rat,' and the lower, *patš'na*, back of the house.⁵³ In an apsidal house the lower flexible *kop u moi* is often supported by several vertical poles, each called *o'kom moi*.⁵⁴ Likewise, there are certain wall poles higher than the others and lashed to lower supple end purlins; these are called *kutš moi*.⁵⁵ In this rectangular house at Muna, the non-pliant transverse purlins had taken the new names, *u beil tš'o?* and

⁴⁶ Sapper, 1897, p. 384.

⁴⁶ Sapper, 1905, p. 28.

⁴⁷ The old man's deafness, the continued prompting of his grown children, and the necessity of using an interpreter to translate his Maya into Spanish combined to prevent clarification of these data.

⁴⁸ An Indian town between 4 and 5 km. east of Valladolid.

⁴⁹ Another native town between 3 and 4 km. southeast of Valladolid.

⁵⁰ Houses 46 and 55, Valladolid.

⁵¹ *moi*, end of the house.

⁵² *kop*, twisted vine, rope, etc.

⁵³ These names vary by locality. The upper is sometimes called *patš'na*. I have heard the word *tantš'e?*, 'central wooden piece,' used for both members.

⁵⁴ *o'kom*, forked post.

⁵⁵ *kutš*, carry.

patʃ'na, but the posts on which they rested and the wall poles to which they were lashed retained the old names, **o'kom moi** and **kutʃ moi**, respectively. This is a good example of a name's clinging to an object even after the name is no longer appropriate. The **moi** member had changed, not so much in function as in form and in name, but the vertical members, not being changed either in function or in form, retained their old inappropriate names, as if they still supported the same **moi** members.

SQUARE

Characteristics.—All the walls are of the same length. There is no single ridge-piece, because the sides of the roof, being equal in width, meet at a point over the center of the house. Square houses can generally be identified from a distance by the inverted bowl of pottery capping the tuft of thatch that juts upward from the peak of this pyramidal roof (pl. 7,c).

Geographical distribution.—This type is absent in Yucatan. It occurs in Guatemala in only a few places, being most frequent around Lake Atitlan, especially at Santiago Atitlan, San Pedro de Laguna, and San Lucas Toliman. Square houses are also found at Santa Apolonia and Patzicia (both in the Department of Chimaltenango) and at Mauricio (Department of Escuintla). At Rio Bajo (Department of Chimaltenango) and at Cuilapa some of the shorter rectangular houses are approximately square in plan but they lack perfect pyramidal roof form. Sapper describes a square Maya house in Honduras.⁵⁶ Blom and LaFarge report square houses among the Tzeltals of Tenango, Chiapas, and (in great numbers) at Cancuc, Chiapas.⁵⁷

Antiquity.—The square house may be older than the rectangular. An informant at San Lucas Toliman said that the square house and the rectangular house with its ridgepole supported by a single king-rod at each end (pl. 7,d) are both older forms than the rectangular house with its ridge-piece carried by A-frames or rafters. He said that the last-named type came in about thirty years ago, in imitation of rectangular houses on plantations of the West Coast. If this is true, the occurrence of the square house could be used as a measure of the relative primitiveness of towns in Guatemala. Thus, villages around Lake Atitlan would rank high as towns retaining indigenous culture, with Santiago Atitlan the best example. Santa Apolonia, near Tecpam, would also rank above the average highland village in this respect. This one person's testimony, although inconclusive in itself, is interesting because Atitlan towns and Santa Apolonia are comparatively isolated from the modern influences to which towns like Chichicastenango, Solola, and Tecpam are exposed.

ROUND

Characteristics.—Circular plan, conical roof.

Geographical distribution.—No round dwellings were observed in any of the places visited by the writer. There are two round structures at Catmis, Quintana

⁵⁶ Sapper, 1898, p. 83.

⁵⁷ Blom and LaFarge, 1927, pp. 380, 389.

Roo; one is a soft drink store, the other a barber shop! Although they are built on the same principle of construction and with the same materials as the usual bush houses throughout this region, their shape was undoubtedly selected for commercial purposes. True round houses with conical roofs are found at San Andres Chicahuastla, a Triqui village in western Oaxaca. Starr attributes them to the influence of negro towns on the Pacific coast of the neighboring state of Guerrero.⁵⁸ Seler writes of circular Totonacan dwellings in Vera Cruz, particularly in the vicinity of Orizaba and Cordoba.⁵⁹ Most interesting of all is Schuller's report that the typical Huastec house of San Luis Potosi, Mexico, is round with a conical roof.⁶⁰

Antiquity.—If the Nahuatl introduced round houses into Yucatan, it seems possible that these Triqui round houses in Oaxaca may be survivals from an early period in Mexico, rather than diffused architectural features from negroes of Guerrero. Both Seler⁶¹ and Pollock⁶² state that it is possible that the circular house type of the Atlantic slope may have been a factor in determining the form of temples erected to Quetzalcoatl.

⁵⁸ Starr, 1908, pp. 132, 134, 138; see also 1901, p. 143.

⁵⁹ Seler, 1923, p. 414.

⁶⁰ Schuller, 1924, p. 143.

⁶¹ Seler, 1916, pp. 5-7.

⁶² Pollock, 1936, p. 161. He adds that the process would have taken place not through a series of revolutionary architectural advances, but through association of the idea of the round dwelling with the East, the home of Quetzalcoatl, the builder constructing the temple in circular form, "at the same time rationalizing his conception of the wind god. It was actually a religious concept that determined the shape of the structure, but the material manifestation of this idea may have been based partially upon the house type."

II

HOUSE FRAMING

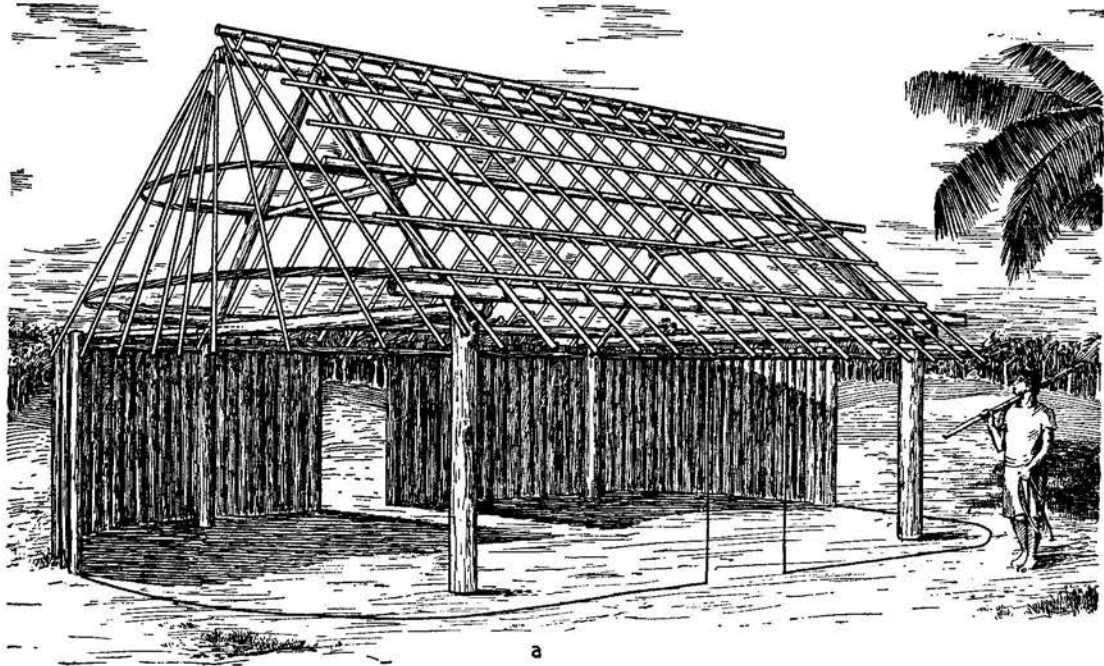
PRINCIPLES OF CONSTRUCTION

1. Forked or notched mainposts are implanted in post holes, which have been dug in the ground or substructure (fig. 11).
2. Mainposts support transverse beams (crossbeams), which in turn carry longitudinal beams (wall plates), or vice versa. This simple basic frame supports the roof.
3. Horizontal longitudinal poles (pole plates) are sometimes lashed across the ends of the crossbeams, a little outside the line of the posts.
4. Additional transverse poles (tie beams) sometimes rest across the ends of the pole plates. If the mainposts carry wall plates instead of crossbeams, the positions of the pole plates and tie beams are reversed.
5. Two or more transverse A-frames, with the bases of their arms either forked and resting on crossbeams or lashed to the backs of wall plates, carry a ridgepole where the arms cross above the center of the house.
6. Rafters, resting at their upper ends on this ridgepole and at their lower ends on the pole plate, plus longitudinal poles (roof rods) bound to their backs, form a frame on which the roof covering, usually some form of thatch, is fastened.
7. The entire roof framing is strengthened on the interior by roof purlins, by additional crossbeams, and sometimes by roof bows, which are poles lashed diagonally across the inner slopes of the roof.
8. Sometimes the ridgepole is not carried by A-frames, but by roof posts (king-rods), the bases of which either are implanted in the floor or rest on tie beams. Or the rafters themselves may carry the ridge-piece in crotches formed where they cross each other at the top.
9. Normally an upper ridge-piece ("false" ridge-piece) lies in these crotches between rafters. It is bound to the crest of the thatch.
10. Walls enclose the house interior.

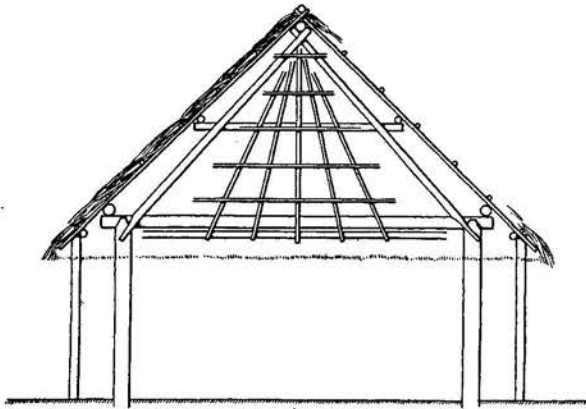
MEMBERS OF CONSTRUCTION

MAINPOSTS

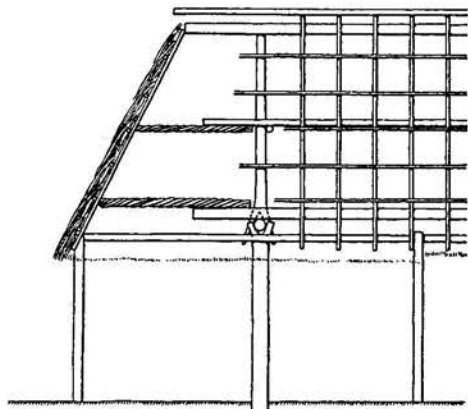
Number and position.—Typical Yucatecan apsidal houses have 4 mainposts. At Tizimin, most flattened-end houses have extra A-frames at each end; these are usually carried by smaller forked mainposts, giving the house 8 posts instead of 4. An old informant at House 7, Tizimin, said there had always been 8 *horcones* (mainposts) to a house. In some cases the walls themselves support the house frame, thereby making mainposts unnecessary (p. 75). Rectangular houses throughout the Maya area may have only 4 mainposts, but the number is often increased, especially in Campeche and Guatemala. Examples: House 1, Lerma, Campeche, had 18 mainposts (4 in each side and 3 in each end, plus 4 corner posts);



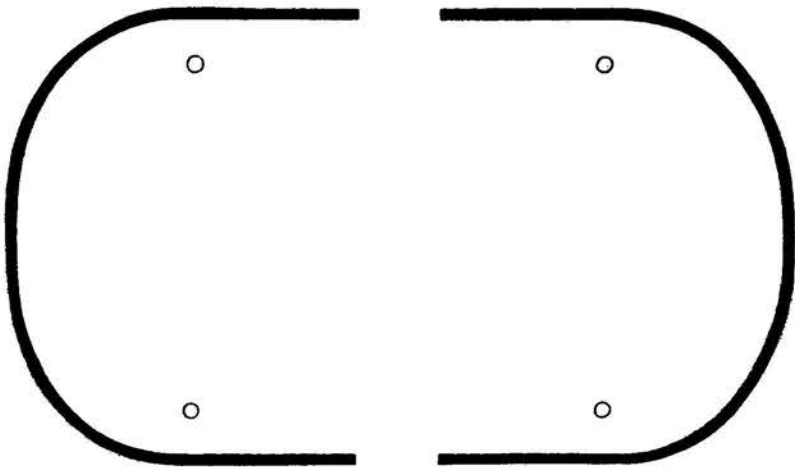
a



b



c



d

0 1 2 M.

FIG. 11—HOUSE 2, CHAN KOM, YUCATAN
(Apsidal plan, vertical wall poles)

a: Perspective, showing details of framing. Some members omitted for sake of clarity.
b,c: Elevations. d: Plan.

House 2, Lerma, had 16 (4 in each side, 2 in each end, plus 4 corner posts); House 1, Chiquimula, Guatemala, had 8 (1 in each side, 1 in each end, plus 4 corner posts); House 1, Panajachel, Guatemala, had 8 (1 in each side, 1 in each end, plus 4 corner posts); House 4 at San Lucas Toliman and House 1, Santiago Atitlan, Guatemala, each had 6 (3 in each of 2 sides). When the number of mainposts is increased, the posts are much smaller. Example: House 1, San Lucas Toliman, Guatemala, where the 33 mainposts of the 3 closed sides served as wall poles also, while the 4 posts supporting the longitudinal purlin on the open (porch) side were larger. A large number of mainposts is characteristic of Alta Vera Paz dwellings, especially in the vicinity of Coban. Examples: House 1, San Cristobal, had 28 mainposts (8 in each side, 4 in each end, plus 4 corner posts); House 6, Coban, had 38 (11 in each side, 6 in each end, plus 4 corner posts); House 4, Coban, had 56 (17 in each side, 9 in each end, plus 4 corner posts).

Regardless of the ultimate plan of the house (apsidal, rectangular, or square), mainposts are set up in the ground in such a position that if lines were drawn between adjacent posts the space thus enclosed would be rectangular. The position of mainposts relative to walls, however, differs according to the ground plan. In Yucatecan apsidal and flattened-end houses, the mainposts stand well inside the lines of the walls; that is, side walls are built anywhere from 12 to 75 cm. away from the mainposts. Exception: an apsidal house at Oxkutzcab had small mainposts in the line of the walls all around the house. Mainposts of rectangular and square houses generally stand directly in the line of the walls, thereby becoming part of the walls (pl. 8,*a,b*). House 4, San Lucas Toliman, combined the two principles: mainposts on one side stood in the line of the walls, but on two other sides they had been erected 90 and 60 cm. inside the walls (fig. 13).

Size and description.—The Yucatecan mainpost is one of the three or four heaviest timbers in the house frame. Its size depends upon the weight of the timbers it must support and upon the type of wood available. Mainposts range from 12 to 18 cm. in diameter, and from 1.45 to 2.39 m. in height above the ground. (Add 50 cm. to 1 m. for the entire length of the post.) The consistently thickest mainposts were found at San Sebastian near Retalhuleu, Guatemala. The post is preferably straight, but diameter, material, length, and usually the fork at the top, govern the builder's selection. If the trunk is slightly crooked, the position of the post hole is adjusted to bring the top of the post to its correct position.

In Yucatan, mainposts are cut off at the top above a natural fork, in the crotch of which a transverse beam will rest (pl. 9,*b*; fig. 12,*b*). Since the fork is generally V-shaped, the timber it supports cannot settle all the way into it. Small pieces of wood are stuffed between the lower surface of the supported timber and the base of the fork, to lessen outward pressure on the prongs and afford a flat surface over which the downward weight of the timber can be distributed. The base of the fork is sometimes chopped out to make it more U-shaped, but this is generally avoided since it weakens the lateral strength of the prongs.

In Guatemala, mainposts do not always have this natural fork at the top. Instead, a shoulder is cut in the top of the post (fig. 12,*d*) by undercutting at the desired level and then splitting off from the top. A man building a small kitchen

at Panajachel, near the Atitlan lake shore, determined the level for the base of the cut as follows: having set the post in a post hole, he stood behind it and held his arm upward and past it at the angle of imaginary rafters, sighting along it to an imaginary ridge-piece (fig. 46,*a*). When the angle of the rafters was thus deter-

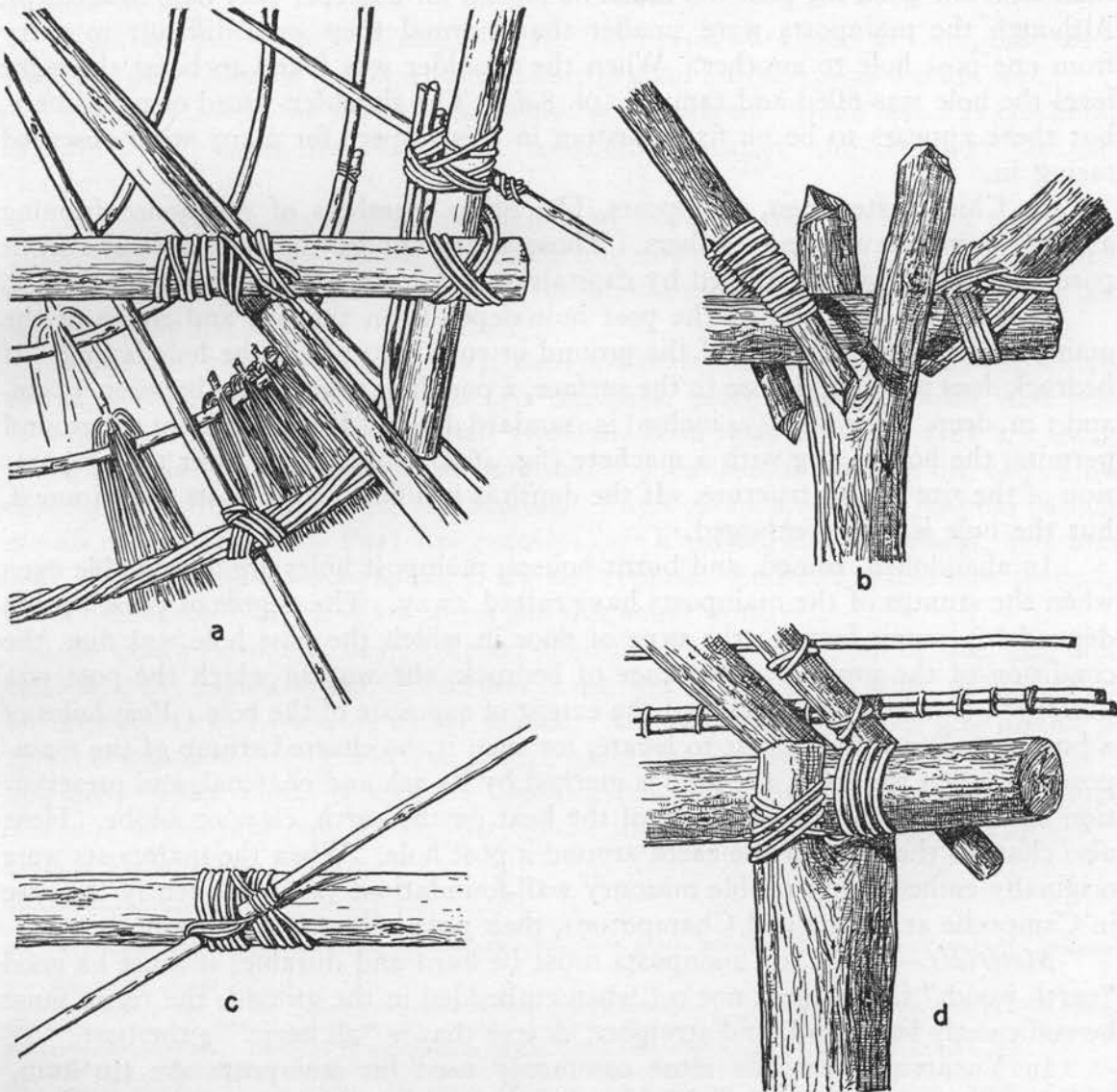


FIG. 12—DETAILS OF HOUSE FRAMING

- a*: A-frame, roof purlins, common rafters and roof rods, House 1, Chichen Itza, Yucatan.
b: Mainpost, crossbeam, pole plate, and A-frame arm, House 1, Chichen Itza, Yucatan.
c: Roof bow and pole plate, House 1, Chichen Itza, Yucatan.
d: Mainpost, plate, principal rafter, common rafter, and roof rods, House 1, Panajachel, Guatemala.

mined from the assumed height of the house, he noted the place where his arm passed the mainpost and marked it as the correct level at which the wall plate should rest. The size of the cut depends on the diameter of the wall plate. The other mainposts were then notched to match the height of the first. The man set the first mainpost in its hole, then the others one by one in their holes, a cord or

rope being tied from the shoulder of the first to a corresponding level on the new ones (pl. 8,*c*). When a shoulder had been marked and cut accordingly, the post was set up again and the rope test checked, the builder standing off to judge whether or not the rope between the two shoulders was perfectly level (fig. 46,*b*). Rather than trim one good big post too much he looked for a deeper post hole to set it in. Although the mainposts were smaller than normal they were difficult to carry from one post hole to another. When the shoulder was found to be at the right level the hole was filled and tamped (pl. 8,*d*). The shoulders faced outward here, but there appears to be no fixed custom in this respect for many were observed facing in.

In Chichicastenango, mainposts, like other members of the house framing at this town, are saw-cut timbers. Those that support the roof over the front porch are called pillars, topped by capitals and resting on stone bases (pl. 9,*a*).

Post holes.—The size of the post hole depends on the size and shape of the mainpost and the condition of the ground or rock into which the hole is dug. If bedrock does not lie too close to the surface, a post hole is generally between 75 cm. and 1 m. deep. One vara (34 inches) is standard depth. If the nature of the ground permits, the hole is dug with a machete (fig. 46,*a*) immediately after the preparation of the site or substructure. If the depth is insufficient the posts are trimmed, but the hole is rarely enlarged.

In abandoned, ruined, and burnt houses, mainpost holes are identifiable even when the stumps of the mainposts have rotted away. The degree of preservation depends on many factors: the type of floor in which the post hole was dug, the condition of the ground or presence of bedrock, the way in which the post was destroyed (rotting, fire, etc.), and the extent of exposure of the hole. Post holes of a burnt house are the easiest to locate, for even if the charred stump of the mainpost has fallen to pieces, the hole is marked by its ash and charcoal, and preservation is aided by the baking effect of the heat on the earth, clay, or adobe. Heat also changes the color of the earth around a post hole. When the mainposts were originally embedded in rubble masonry wall-foundations (as is frequently the case in Campeche at Lerma and Champoton), their post holes are easy to locate.

Materials.—Wood for mainposts must be hard and durable; it must be good "earth wood," i.e., it must not rot when embedded in the ground; the trunk must be sufficiently large, tall, and straight. A tree that is "all heart" is the best.

In Yucatan the woods most commonly used for mainposts are tʃu'kum,¹ tʃak'te?,² tʃoptʃe?, k'ik'tʃe?,³ kitʃe?,⁴ tʃu'lul,⁵ and ha:'bin.⁶ Of these tʃak'te?

¹ Roys, 1931, p. 239: "chucum. *Pithecolobium albicans*, (Kunth.) Benth. (Standl. 1920-26, p. 397). Described as a high forest tree. The fruit is said to yield a black dye."

² *Ibid.*, p. 231: "chacté. *Casalpinia platyoba*, S. Wats. (Standl. 1920-26, p. 424). *C. bijuga*, L. Brazil. (Gaumer.) The former is described as a shrub or small tree 6 to 20 feet high, bearing yellow flowers. The reports of the 16th century settlers in Yucatan mention the chacté as a deep red wood, or *palo colorado*. (Rel. de Yuc. I, 84 & II, 34). "There are other trees for which the Indian name is chigte (chacté); it is a red wood and is very good for house-beams, as it is a strong wood. Cut up fine and thrown into water, it turns to blood, and the Indians make use of it for dyeing their garments." (*Ibid.*, I, 108). Landa is evidently referring to the same tree when he tells of "another that is a dark orange color, of which they make staffs; it is very strong, and I believe it is said to be *brasil*." (Landa, 1900, p. 389)."

Dr. Ralph W. Chaney, of the Department of Palaeontology at the University of California, also writes that a specimen of tʃak'te?, which I sent him for identification, is a member of the genus *Casalpinia*.

³ *kiik*, rubber; *kiik*, blood. Perez, 1866-1877, p. 175, gives *kiikche*, *el árbol que produce la goma elástica y ostra especie de árbol*, the

(tʃak, red; teʔ, ending for names of plants and trees) is used probably more than any other. A Hunucma informant, who was building a new house and using tʃu'kum for posts, said that tʃoptʃeʔ was better, but more difficult to obtain in that region. K'ik'tʃeʔ and ha:'bin, according to a man at Piste, are also very hard and durable woods.

Tʃak'teʔ and tʃoptʃeʔ (called tʃoʔtʃeʔ⁷ at Lerma) are used in Campeche also. The only other kind of wood mentioned here as good for mainposts was tʃa'kek.

Redfield⁸ mentions yaxek, oxcitinche, and dzudzuc. Gann⁹ records chichem, sapodilla, and other hardwoods in southern Yucatan and northern British Honduras.

In Guatemala many different names of mainpost materials were gathered. Since they come from various languages and since I was unable to get Spanish equivalents or samples in every case, the actual number of types may really be less than the list appears to indicate.¹⁰

Llaje was mentioned as a wood used for mainposts at the Spanish-speaking towns of Zacapa and Chiquimula. At the latter place jiroble,¹¹ arapin, and orotoguaje¹² are also used. At Coban (Kekchi) both tasis'kob and tʃut are used, though the latter, according to an informant, is dangerous because fire can climb through it to the inflammable roof thatch. The Pokonchi at San Cristobal (which is also in the Alta Vera Paz) use guachipilin,¹³ k'antʃeʔ, kus (tasiskab), and tux, oak. A Santa Eulalia man spoke of k'i'sis, cypress. Andrade writes that he finds ts':sis mentioned in his Mam notes for this same word.

At Santa Apolonia, near Tecpam, one uses iʃinatʃeʔ, la'ma or dila'ma, and tʃe(u)x, pine. Guachipilin in Pedrano is um'kui (a very hard wood according to an informant) and ilamo is called ni'ma. At San Lucas Toliman guachipilin is called u'kui, ilamo is called la'ma, pine is called tʃax, and atarai is called kiniʃintʃeʔ. Saq tʃax, 'white pine,' is used at Chichicastenango. Basseta gives chah, pine. Andrade writes that pine in the four Quiche dialects is tʃax. Chapulin, capulin,¹⁴ is used at Santiago Atitlan.

tree that produces the elastic gum and another species of tree. Roys, 1931, p. 255: "kik-che. *Castilla elastica*, Cerv. Hule. (Standley Gaumer.)"

⁴ Possibly the same as k'ik'tʃeʔ.

⁵ Roys, 1931, p. 239: "chulul. *Apoplanesia paniculata*, Presl. (Standl. & Gaumer.) Tree sometimes 30 feet high; its small flowers form in slender racemes. (Standl. 1920-26, p. 441). 'chulul. A very strong tree of this land, from which they make bows. Its heart is the strongest of any tree.' (Motul.)" A vocabulary in the *Col. de Doc. Ind.*, 1898, p. 436, gives *chulul*, tree hard as bone.

⁶ Roys, 1931, p. 242: "habin. *Ichthyomethia communis*, Blake. (Standl. 1920-26, p. 511). *Piscidia erythrina*, L. (Mills. I, 368; Seler, 1902-28, III, 569). Madera de fierro. Described as a large tree 50 to 80 feet high, abundant in the forests. 'habim. A tree of this land, strong like the live-oak.' (Motul.)"

⁷ Perez, 1866-1877, p. 75, gives *choch, un árbol y su fruta así llamada*, a tree and its fruit of this name.

⁸ Redfield, 1934, p. 35.

⁹ Gann, 1918, p. 26.

¹⁰ The Indian names are given in the language spoken at the town mentioned.

¹¹ Possibly the same as *roble*, oak tree.

¹² *Guaje*, object made of calabash and used for learning to swim.

¹³ Dr. Ralph W. Chaney of the University of California, to whom I sent a specimen of *guachipilin* for identification, writes: "Your No. 11, um'kui or *guachipilin*, is probably a leguminous plant. The word *chipilin* or *chipele* is Guatemalan for legume. *Guachipilin* appears to be a general word for any hard-wood species."

¹⁴ Dr. Chaney, to whom I sent a specimen of *capulin* for identification, writes: "My assistant, L. H. Daugherty, has determined that your No. 12, *Capulin*, is *Vitex*, of the family Verbenaceae. It is a common tropical tree with a cherry-like fruit which accounts for the name. True cherry, of course, falls in the genus *Prunus* and is totally unrelated."

The Ximinez dictionary gives: "*Capulin*. Is Mexican introduced into these languages and here it is called *guxbaquel lazereza* and *capulin* is another tree and these are [found] in the hot country and are called thus because of their similarity to the fruit."

Linguistics.—The following words for 'mainpost' (*horcon*) were collected. The term usually means leg (or foot) of the house.

TABLE 2

LANGUAGE	PLACE	MAINPOST	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan and Campeche	o'kom	Cf. Motul, Ticul, and San Francisco dictionaries ok, foot or leg
Chorti	Jocotan	oi	Cf. Suarez; cf. Tzeltal (below)
Quiche	Chichicastenango Quetzaltenango Santa Cruz Quiche	r a'qan xa ri §qan xa r a'qan xa	Leg of the house xacanha (Basseta)
Cakchiquel	Panajachel and Santa Apolonia San Sebastian	§a'tat r a'kan xa	Cf. Quiche (above)
Zutuhil ¹⁵	Santiago Atitlan San Pedro de Laguna San Lucas Toliman	a§'kal ax§a'kal	
Mam	San Pedro Sz. Concepcion	t qan xa	Leg of the house
Jacalteco	Informant from Santa Eulalia	(te) oi	Cf. Chorti and Tzeltal
Kekchi	Coban and San Juan Chamelco	oket§	ok, foot Cf. Sapper ¹⁶
Pokonchi	San Cristobal	r ok	Foot
Tzeltal	Chiapas	oix ¹⁷	oi§ in IPA symbols ¹⁸

The fork at the top of the Yucatecan mainposts is called **ko o'kom**, tooth of the mainpost. The Kekchi term, according to Sapper,¹⁹ is **xnaj xsi re**, the place which receives the plate. A post hole in Yucatecan Maya is **hol o'kom**.

CROSSBEAMS

Number and position.—There are almost always two main crossbeams, which, in Yucatan, support the two main A-frames; in houses with no A-frames the bases of main gable rafters are often lashed to them. Main crossbeams are supported in one of three ways: (1) In Yucatan they rest in the forks of mainposts (fig. 12, *b*). (2) In rectangular and square houses of Campeche and Guatemala they are lashed across the ends of wall plates. Exceptions: House 1, Puerto Barrios, Guatemala (non-Indian); House 1, Chichicastenango, Guatemala (plank construction). (3) When walls are of stone or adobe brick, they carry the main crossbeams. Examples: House 1, Motul, Yucatan (dry rubble walls); Dzitas, Yucatan (dry rubble walls); House 1, San Pedro de Laguna, Guatemala (adobe brick walls).

Besides the two main crossbeams there are sometimes outer crossbeams (tie beams) and inner or intermediate crossbeams (pl. 9, *c*), both of which usually

¹⁵ P. 174, n. 1, *infra*.

¹⁶ Sapper, 1905, p. 25.

¹⁷ Blom and LaFarge, 1926, p. 341.

¹⁸ IPA, abbreviation of International Phonetic Association.

¹⁹ Sapper, 1905, p. 25.

rest across the wall plates, though there may be extra mainposts to carry them. Tie beams are found only in rectangular houses; intermediate crossbeams are common in all types. The number of intermediate crossbeams does not depend on the

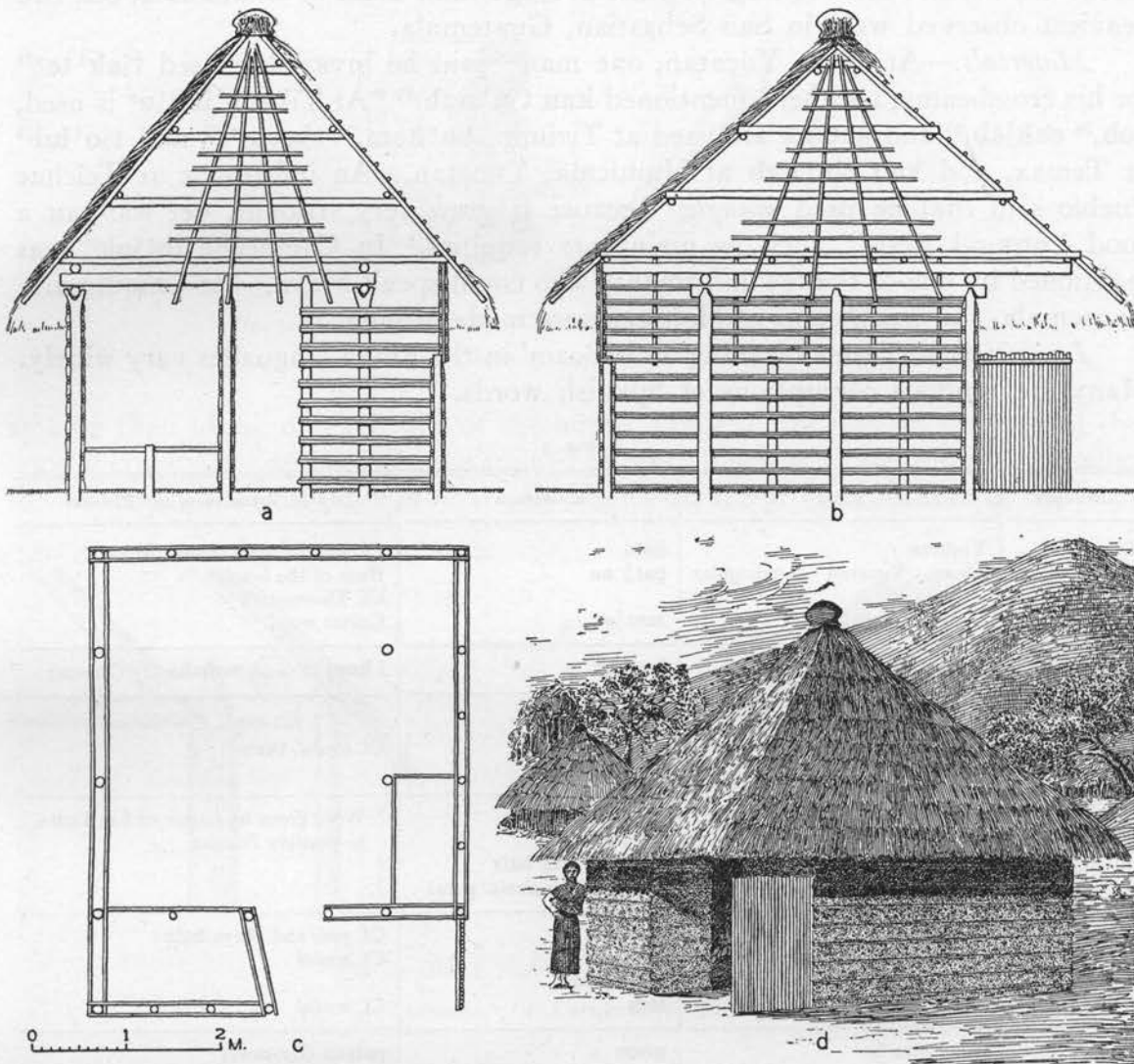


FIG. 13—HOUSE 4, SAN LUCAS TOLIMAN, GUATEMALA

(Square plan, pyramidal roof, walls of mass adobe over cane framing, grass thatch)
a, b: Elevations. *c:* Plan. *d:* Perspective.

length of the house, as one would expect; sometimes one finds several in square houses and none in longer houses. House 1, San Lucas Toliman, Guatemala, had seven; House 4, Coban, Guatemala, eight; House 1, San Cristobal, Guatemala, seven.

Some houses have no crossbeams. Examples: House 3, San Lucas Toliman; House 1, Los Encuentros, Guatemala; and a house between Totonicapan and San Francisco, Guatemala. In such cases the ridgepoles are carried by full-length king-rods.

Size and description.—The crossbeam is usually one of the largest timbers in a house framework, especially in Yucatan, where it supports a heavy A-frame. Its length depends on the width of the house; it ranges from 9 to 13 cm. in diameter. Yucatecan crossbeams are larger on the average than those of Guatemala, but the heaviest observed were in San Sebastian, Guatemala.

Materials.—At Piste, Yucatan, one man²⁰ said he invariably used *tšak'te*²¹ for his crossbeams; another²² mentioned *kan tšu'nub*.²³ At Tikuch *ikitše* is used, *bob*,²⁴ *sakjab*,²⁵ and *sutsuk* are used at Tizimin, *bo'hom*,²⁶ *tšakte*,²⁷ and *tšo'lul*²⁸ at Temax, and *kan tšu'nub* at Hunucma, Yucatan. An informant at Telchac Pueblo said that he used *mangle*²⁹ because it grew very straight, yet was not a good "ground wood" such as mainposts required. In Campeche *to'šok*³⁰ was mentioned by one of the few informants who could speak Maya. At Chiquimula, Guatemala, the crossbeams of House 3 were made of pine.

Linguistics.—Terms meaning 'crossbeam' in the Maya languages vary widely. Many are obvious corruptions of Spanish words.

TABLE 3

LANGUAGE	PLACE	CROSSBEAM	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan	<i>balo</i>	Cf. <i>palo</i> [timber], <i>balol</i> (Motul)
	Muna, Yucatan (rectangular house) Lerma, Campeche	<i>patš'na</i> <i>tantše?</i>	Back of the house ³¹ Cf. Thompson ³² Center wood
Chorti	Jocotan	<i>ku'kur</i>	<i>i huoj</i> (?) and <i>wojtaha</i> (?) (Suarez)
Quiche	Chichicastenango	<i>tem</i> <i>baten'ta</i>	Cf. <i>tendal</i> , beam
	Quetzaltenango Santa Cruz Quiche		
Cakchiquel	Panajachel	<i>ru? e'lem</i>	? Word given by native of San Pedro, so possibly Zutuhil
	Santa Apolonia San Sebastian	<i>ten pani'kax haix</i> <i>ko'lom (tok abala'pam)</i>	? ?
Zutuhil ³³	Santiago Atitlan	<i>bo'lox</i>	Cf. <i>palo</i> and Maya <i>balo</i>
	San Pedro de Laguna	<i>tem</i>	Cf. <i>tendal</i>
	San Pedro de Laguna	<i>ru? e'lem</i>	
	San Lucas Toliman	<i>tem</i>	Cf. <i>tendal</i>
Mam	San Pedro Sz.	<i>ptson</i>	<i>potzon</i> (Reynoso)
Jacalteco	Informant from Santa Eulalia	<i>te patsap</i>	
Kekchi	Coban	<i>ram'kab</i> <i>tsam'ba</i> <i>tsam'ba</i>	Heart of the house? Cf. Sapper's <i>tzamba</i> ³⁴
	House 1 Houses 4 and 5 San Juan Chamelco		
Pokonchi	San Cristobal	<i>i'wox</i>	

²⁰ At House 1, Piste.

²¹ P. 32, n. 2, *supra*.

²² At House 2, Piste.

²³ Roys, 1931, p. 251: "*kan-chunup*. *Thouinia paucidentata*, Radlk. (Gaumer & Standley.) *Sebastiana adenophora*, Pax. & Hoffm. (Standl. 1920-26, p. 648). Described as a tree or shrub 10 to 20 feet high abundant on the north coast."

²⁴ *Ibid.*, p. 217: "*bob*, or *bob-che*. *Cocoloba Schiedeana*, Lindau. (Standl.) 'A tree, with large leaves, of this land, in which they gather dry chile.' (Motul.)"

POLE PLATES AND WALL PLATES

Number and position.—A home usually has two pole plates. Exception: House I, San Pedro de Laguna, Guatemala, where there was a pair of pole plates,

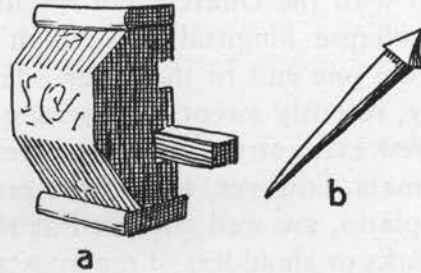


FIG. 14—LOCK AND NAIL, CHICHICASTENANGO, GUATEMALA

a: Lock. b: Nail.

smaller than usual, on each side of the house. Pole plates rest on the tops of the ends of crossbeams and receive the ends of rafters. Their position differs regionally: in Guatemala the pole plate is relatively higher off the ground because of the large

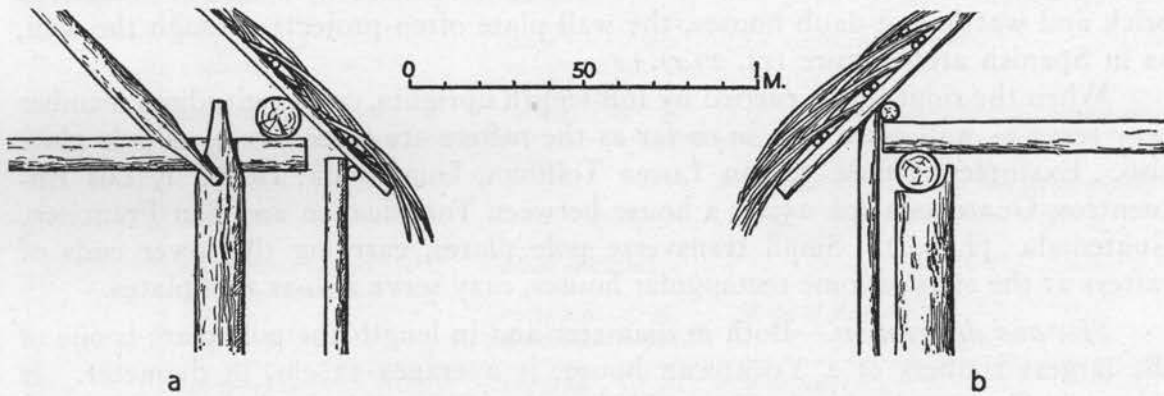


FIG. 15—POLE PLATES AND WALL PLATES

a: Yucatan. b: Campeche and Guatemala.

wall plate which carries its supporting crossbeam (pl. 9,c; fig. 15,b); in Yucatan the crossbeam is the only large horizontal member below the pole plate (pl. 9,b; fig. 15,a). The Yucatecan wall plate is a much smaller pole lying well outside the line

²⁶ *Ibid.*, p. 307: "zac-yab. *Gliricidia maculata*, H. B. K. (Standl. 1920-26, p. 482; Millsp. I, 300; Gaumer; Standl. 1928, Pl. 36). Tree 30 feet high, with a short crooked trunk and pink flowers in racemes. The wood of zac-yab is heavy and said to be of a dark greenish color."

²⁷ *Ibid.*, p. 217: "bohom. *Cordia gerascanthus*, L. Baria. (Standl. 1920-26, p. 1220). The wood is used for construction."

²⁸ P. 32, n. 2, *supra*.

²⁹ Roys, 1931, p. 238: "cholul. See chulul." P. 33, n. 5, *supra*.

³⁰ Mangle, mangrove tree.

³¹ Roys, 1931, p. 287, describes toxob as "*Casalpinia vesicaria*, L. . . . Shrub or small tree, 10 to 15 feet high, with a yellow flower and a thick hard fruit two and a half to three inches long and half an inch wide." This tree could scarcely be the same as my to'ok, for the latter supplies a large crossbeam for the house.

³² See also pp. 38-39, *infra*.

³³ J. E. Thompson, 1930, p. 91.

³⁴ P. 174, n. 1, *infra*.

³⁵ Sapper, 1905, p. 25.

of the mainposts and is distinct, structurally, from the rest of the house framing. In Guatemala, on the other hand, it is a large timber carried in the forks or on the shoulders of mainposts.

This difference explains the remarkable longitudinal weakness of the Yucatecan framing as contrasted with the Guatemalan framing. Practically all abandoned Yucatecan houses collapse longitudinally; high windstorms often cause even a new house to sag from one end to the other. Examples: many houses of Chan Kom and the vicinity, recently swept by a strong "norther" (pl. 9,*d*). No longitudinal A-frames and few extra struts or braces strengthen Yucatecan houses from end to end; in Guatemala, however, two of the main longitudinal members of house framing, the wall plates, are well anchored at short intervals throughout their length in the grip of forks or shoulders of mainposts.

Wall plates sometimes lie directly on the tops of walls and carry tie beams at their extremities. Examples: House 1, Motul, Yucatan (dry rubble walls); Hunucma, Yucatan (dry rubble walls); House 1, Santa Apolonia, Guatemala (adobe brick walls); House 1, San Pedro de Laguna, Guatemala (adobe brick walls). Marks where wall plates were thus imbedded in the tops of rubble masonry walls are identifiable after the wood has rotted away. Examples: many abandoned houses at Santa Ana, between Tabi and the ruins of Kabah, Yucatan. In adobe brick and wattle-and-daub houses, the wall plate often projects through the wall, as in Spanish architecture (pl. 27,*e*).

When the ridgepole is carried by full-length uprights, one longitudinal member may serve as wall plate and, in so far as the rafters are footed to it, as pole plate also. Examples: House 3, San Lucas Toliman, Guatemala; House 1, Los Encuentros, Guatemala (pl. 25,*d*); a house between Totonicapan and San Francisco, Guatemala (pl. 7,*d*). Small transverse pole plates, carrying the lower ends of rafters at the ends of some rectangular houses, may serve also as wall plates.

Size and description.—Both in diameter and in length the pole plate is one of the largest timbers of a Yucatecan house; it averages 12 cm. in diameter. It is large in Guatemala also, but is not likely to be as big as the wall plate or tie beam supporting it; here and in Campeche it ranges from 8 to 12 cm. in diameter. Wall plates are of a comparable size in Guatemala, but much smaller in Yucatan.

Materials.—The large pole plates of House 1, Piste, Yucatan, were made of *sak wi' tsil tʃeʔ*; those of House 2 were of *tʃak' teʔ*.³⁵

Linguistics.—As will be seen from the table, there is some confusion in Yucatan as to the correct term for 'pole plate,' the names for this member and for the longitudinal roof purlin being exchanged in various towns. I am inclined to rule out *u beil tʃ'oʔ* as misinformation on the part of the informants who gave this term, because of the fact that a word meaning 'road of the rat' almost invariably refers, in most Guatemalan languages, to the roof purlin. Both *patʃ'na* and *tantʃeʔ* may be correct; if only one is correct, I favor *patʃ'na*, because: (1) it was given more often; (2) the informants who did so, gave *u beil tʃ'oʔ* as the name for

³⁵ P. 32, n. 2, *supra*.

roof purlin; (3) most of the informants who gave **tantʃeʔ** as the name, translated **patʃ'na** as a literal phrase rather than as a part of the house; (4) **patʃ'na** was men-

TABLE 4

LANGUAGE	PLACE	POLE PLATE	LITERAL TRANSLATION AND REMARKS
Maya	Piste, House 1 Izamal, House 1 Sotuta, House 1 Muna, House 1 Piste, House 2 (informant from Valladolid)	patʃ'na	Back of the house
	Valladolid, House 7 Tikuch, House 1 (near Valladolid)	tantʃeʔ	Center wood
	Tizimin, House 1 Motul, House 1	u beil tʃ'oʔ	Road of the rat
Chorti	Jocotan	oxas oti'tot	Cf. <i>hojas</i> , leaves; o'tot , house
Quiche	Chichicastenango	tem ʃi ʃut	tem , beam; ʃi , edge; ʃut , tile
	Quetzaltenango	sa'pat	xot , tile (Anonymous; Barrera)
Cakchiquel	Panajachel Santa Apolonia longitudinal transverse	tem kutʃu tʃu tʃi xaix ex kaix ratʃuk tʃu kin xaix tʃi ebal u tʃi	Informant from San Pedro tʃi , mouth; xaix , house ? tʃi , mouth; cf. <i>bocateja</i> (literally 'mouth tile')
	San Sebastian		
Zutuhil ³⁶	Santiago Atitlan	bolox	Cf. crossbeam (Table 3, p. 36) boloh , <i>lomo . . . y surco</i> , loin (of an animal) or ridge . . . and rut, furrow, groove (Ximinez)
	San Pedro de Laguna San Lucas Toliman House 1 House 3	balox and bolox ru be tʃoi tem ri ʃin r o'poʃ	Road of the rat
Mam	San Pedro Sz.	tʃu(l) xa	ʃ , retroflex s
Jacalteco	Informant from Santa Eulalia	xo'lom moi	
Kekchi	Coban Houses 1 and 5	sa re'bol	re'bol , mother; cf. <i>madre viga</i> (literally, 'mother beam' or 'foundation beam')
	House 4	(ʃ) nabal li tsamba	Cf. Sapper: ³⁷ x natval li tzamba , which press on the tie beams
	San Juan Chamelco	sa re'bol	
Pokonchi	San Cristobal	kulwal tʃisik	tʃisik , edge

tioned from scattered parts of Yucatan, while **tantʃeʔ** seems to be localized in Valladolid and its vicinity; and (5) both E. H. Thompson³⁸ and Redfield³⁹ give **patʃ'na**.

³⁶ P. 174, n. 1, *infra*.

³⁷ Sapper, 1905, p. 25.

³⁸ E. H. Thompson, 1911, p. 505.

³⁹ Redfield, 1934, p. 34.

TABLE 5

LANGUAGE	PLACE	WALL PLATE	LITERAL TRANSLATION AND REMARKS
Chorti	Jocotan	oti o'tot	o'tot, house
Quiche	Chichicastenango	batent(e)	Cf. crossbeam, Santa Cruz Quiche (Table 3, p. 36) <i>Tirante</i> , beam or truss-rod
	Quetzaltenango	sapat	
Cakchiquel	Panajachel	tem	Cf. <i>tendal</i>
	Santa Apolonia San Sebastian	ten kolom	
Zutuhil ⁴⁰	Santiago Atitlan	sak tʃe? bolox	White wood See remarks on Zutuhil term in Table 4 (p. 39) Cf. above Main rafter timber
	San Pedro de Laguna San Lucas Toliman	balox tem <i>de tijeras</i>	
Mam	San Pedro Sz.	t (kul) xa	
Jacalteco	Informant from Santa Eulalia	xo'lom moi	
Kekchi	San Juan Chamelco Coban Houses 1 and 5 House 4	sa re'bol	re'bol, mother; cf. <i>madre viga</i>
		sa re'bol	xsi re (Sapper) ⁴¹
		re'bol	
Pokonchi	San Cristobal	pan tʃi r ok	Cf. pan in 'ridgepole' (Table 8, p. 47) tʃi, mouth; r ok, the mainpost
Tzeltal	Chiapas	tsan-te ⁴²	

ROOF TYPES

Characteristics.—The two types are:

1. Hip roof, which is pitched back from all four sides. It varies according to area and pitch of end slopes relative to side slopes, from the rectangular houses with long ridgepoles and the flattened-end houses of Yucatan, in which the end slopes are almost vertical, through the apsidal Yucatecan houses, to the pyramidal roofs of square houses, in which all four roof slopes have the same area and the same pitch. The longer slopes of hip roofs sometimes overlap the end slopes so far that the latter are almost hidden. Examples: Buena Vista, Coyolate, Guatalon, Rio Bravo, three settlements between El Transito and Nahualate, Nahualate, and Las Cruces (west of Retalhuleu), Guatemala.

2. Gable roof, in which the pitch falls in two directions from the center of the building. When the house walls are of mass adobe over a cane or wooden framing, the gable ends of the walls are generally closed almost all the way to the peak. Examples: most houses in eastern Guatemala, especially in the vicinity of Jocotan and Chiquimula.

There is also a single-pitch or shed roof, but its use is limited to temporary lean-to shelters and penthouses attached to the main house.

⁴⁰ P. 174, n. 1, *infra*.

⁴¹ Sapper, 1905, p. 25.

⁴² Blom and LaFarge, 1926, p. 341.

Geographical distribution.—The hip roof is standard in almost all parts of the Maya area. The gable roof is the most common form in only one Indian region, the Alta Vera Paz of Guatemala; it is found also in non-Indian towns of eastern Guatemala. One occasionally sees examples of this saddle roof from Lake Amatitlan west to the Pacific Coast. Examples: Lake Amatitlan, the town of Amatitlan, La Compañia, San Nicolas, Mixtan, El Transito, Nahualate, and three settlements between the last two villages.

ROOF PITCH

Characteristics.—The pitch of the roof (its rate of slope) may be expressed as (1) the ratio of the rise of the roof to its span, (2) the relation of the rise to the run ("rise per foot of run"), or (3) an angle of inclination in degrees.⁴³ Although the first is the most common method of expressing pitch, I shall use the last (the angle of inclination in degrees), since practically all Indian roofs fall within the same general class of "quarter pitch." The pitch of Indian roofs throughout Central America is very uniform, varying between 42 and 60 degrees.⁴⁴ Newer non-Indian houses (*ranchitos*) in the Zacapa-Chiquimula district, in the Baja Vera Paz, and sometimes in the Alta Vera Paz, have a pitch much less steep. Example: roof angle of a house at Zacapa was only 11 degrees.

Geographical distribution.—The steepest roofs were recorded at Lerma, Campeche (50 and 60 degrees), at Tizimin, Yucatan (55 degrees), at Muna, Yucatan (60 degrees), at Telchac Pueblo, Yucatan (51 degrees), at San Sebastian and San Lucas Toliman, Guatemala (both 50 degrees). The smallest angles of inclination were at San Pedro de Laguna and Coban, Guatemala (both 42 degrees). There is apparently little correlation between roof pitch and amount of rainfall. Sapper states that local conditions occasion roof modifications, heavy rainfall and unfavorable materials leading to a steeper inclination of the roof.⁴⁵ He had probably seen Indians correct a leaking roof by driving the mainposts deeper and thus increasing the pitch, as recorded by Blom and LaFarge at a Tzeltal house in Chiapas.⁴⁶

Discussion.—From an engineering point of view, the quarter-pitch roof is the most economical, for less roof material is required and sufficient roof void is available for a truss if the latter is structurally necessary.⁴⁷ One-third pitch gives a better slope but results in a greater wind load and more roofing material. In northern Yucatan, a region swept by occasional northers of hurricane violence, the factor of wind load should be an important one. The resultant stresses in a truss covering a third-pitch are greater than those in a quarter-pitch roof. In the latter, the lengths of the compression members are comparatively short and thus there is an actual saving of material. For a pitch of one fifth, stresses in the truss are greatly increased.⁴⁷

⁴³ Voss and Varney, 1926, p. 121.

⁴⁴ End slopes are not included in this discussion.

⁴⁵ Sapper, 1905, p. 28.

⁴⁶ Blom and LaFarge, 1926, p. 342.

⁴⁷ Voss and Varney, 1926, p. 121.

Data on the actual weights of materials used in roof framings were not collected, for this would have required more time and equipment than was warranted. The Indian of course does not actually calculate dead load to arrive at the type of truss, the depth of the truss, or the pitch of the roof that he builds. The house dimensions are determined more by the lengths of main roof timbers available. To know how closely the Indian approximates modern engineering specifications for the most economical depth of the truss, for the roof pitch best adapted to the dead and live loads of a bush house, and for the type of truss best designed for their support, one would need only the weights of materials used; the number and dimensions of the various frame members are shown in the figures of this report.

A-FRAME ARMS

Characteristics.—The ridgepoles of almost all Maya houses are carried by A-frame trusses, which consist of two arms and one or more bars. In Yucatan, the arms are forked at the base and rest on crossbeams at a point just inside the prongs of the mainposts (pls. 9, *b*, 10, *a, b*). Guatemalan arms are rarely forked and do not always rest directly on tie beams. They are usually lashed in the outside corners formed by the junction of pole plates and tie beams or of wall plates and tie beams. In a few cases they are pointed at the base and footed, without lashing, to the tops of adobe brick walls. Example: House 1, Santa Apollonia, Guatemala. The inclination of the roof depends entirely on the inclinations at which the A-frame arms are erected, for the rest of the roof framing is built upon these trusses. The ridgepole lies in the V's formed where the arms cross each other near their upper ends. Arms range from 7 to 14 cm. in diameter.

Materials.—For arms of the A-frames *ikitse'* is used in Piste, Yucatan; *kan tʃu'nub*⁴⁸ was mentioned at Tikuch, Yucatan, and *hol*⁴⁹ at Tizimin, Yucatan. An informant at Temax said that the same woods used for mainposts, *tʃak'te*⁵⁰ and *tʃo'lul*,⁵¹ were used for A-frame arms also. At Lerma, Campeche, *sabaktse'*⁵² is used.

Sak wi'tsil tʃe' was given by one Piste informant as the best wood for the arms of A-frames. Another informant at Piste and also one in Tikuch mentioned *ikitse'*. At Tizimin, *u beil sinik*⁵³ and *pitʃitʃe'*⁵⁴ are used.

Linguistics.—The Maya name for an arm of an A-frame presented one of the most puzzling linguistic problems encountered during the season, for the universal word used throughout Yucatan, even by Maya who speak no Spanish, is *ti'sera*, a corruption of the Spanish *tijera*, scissors. At Tizimin the arms of the extra A-frame were called *sintse'* (*sin*, slope; *tʃe'*, wood), but nowhere else was this

⁴⁸ P. 36, n. 23, *supra*.

⁴⁹ Roys, 1931, p. 245: "hol. *Hibiscus tubiflorus*, DC. (Standl. 1920-26, p. 779; Millsp. I, 30). *H. clypeatus*, L. (Standl.)" "hol-che. *Mariscus jamaicensis* (Crantz) Britt. (Standl.)"

⁵⁰ P. 32, n. 2, *supra*.

⁵¹ P. 37, n. 28, *supra*.

⁵² Roys, 1931, p. 301: "zabac-che. *Exostema caribaeum* (Jacq.) Roem. & Schult. *Falsa quina*, Princewood. (Standl. 1920-26, p. 1366; Millsp. I, 392; Gaumer.) *E. Mexicana*, Gray. (Standl.) A shrub or tree, sometimes 25 feet high, with white flowers."

⁵³ *Ibid.*, p. 217: "bezinic or bezinic-che. *Avaradoa amorphoides*, Liebm. *Palo de ormigas*. (Standl. 1920-26, p. 540; Millsp. I, 33 & 301; Seler 1902-08, III, 569) . . . be-zinic means ant-path."

⁵⁴ *Ibid.*, p. 276: "pichi-che. *Psidium sartorianum* (Berg.) Niedenzu. (Standl. 1920-26, p. 1035). *Calycorectes mexicanum*, Berg. (Millsp. I, 312; Gaumer.) (?) Described as a tree 50 feet high with creamy white flowers, common in brush and forest lands about Izamal. (Millsp.)"

name given and I am somewhat dubious about its authenticity here, since it was given by a Mexican who spoke Maya and referred doubtful words to his Maya wife. At Campeche the usual Maya suffix *tʃeʔ*, 'wood,' was added to the Spanish *tijera*.

Since scissors were unknown before the arrival of Spaniards⁵⁵ there must have been a different native word for this member of the house framing. It is impossible to suppose that there was no comparable timber in the pre-Conquest dwellings. The San Francisco dictionary (dating from about the middle of the seventeenth century)⁵⁶ and the Motul⁵⁷ dictionary (late sixteenth century)⁵⁸ give the word **much**, which may be the original Maya word for A-frame arm. **Mutʃeʔ** today refers to another member of the house framing. The Moran vocabulary (Chorti), written about 1685, gives **chuuc**.

TABLE 6

LANGUAGE	PLACE	ARM OF A-FRAME, PRINCIPAL RAFTER	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan Tizimin, Yucatan Campeche	ti'sera sintʃeʔ tijera-tʃeʔ	Cf. <i>tijera</i> , scissor sin, slope; tʃeʔ, wood mutʃ (San Francisco)
Quiche	Chichicastenango Quetzaltenango Santa Cruz Quiche	tʃiʃereʃ iʃteriʃ ri xa tuʃiriʃ	Cf. <i>tijera</i> Cf. <i>tijera</i> ; ri xa, the house Cf. <i>tijera</i> ; tuxeras (Barrera)
Cakchiquel	Santa Apolonia San Sebastian	taʃeriʃ tiʃ	Cf. <i>tijera</i>
Zutuhil ⁵⁹	Santiago Atitlan San Pedro de Laguna San Lucas Toliman	ʃrup teseras and mokon <i>tijera</i>	Cf. <i>tijera</i>
Mam	San Pedro Sz. Concepcion	t qan (tʃers)	Leg of the <i>tijera</i> No Mam word not coming from Spanish has r (Andrade)
Jacalteco	Informant from Santa Eulalia	(te) kutʃup	
Kekchi	Coban House 4 House 5 San Juan Chamelco	terer teʃe(r)s ox(m) bilikam	Cf. <i>tijera</i> Cf. <i>tijera</i> ?
Pokonchi	San Cristobal	teʃeriʃ	Cf. <i>tijera</i>

Whatever the original name was, it was completely displaced by the new Spanish word and its Maya version. That the Spanish-derived word is an old form is shown by the presence of **tuxeras** in the Barrera (Quiche) dictionary.

The word for 'scissors' is often given to something that has a fork at the end. For instance, there is a small beetle-like insect which has a long, forked anterior appendage. This bug is called *tijerilla*. The idea of scissors, in the case of the

⁵⁵ The Maya word for real 'scissors' in the Motul (1929, p. 667) is **nathab mazcab** (nath, seize with the teeth; ab, instrumental suffix; mazcab, metal).

⁵⁶ Tozzer, 1921, p. 172.

⁵⁷ Motul, 1929, p. 638; MS. (Maya-Spanish), leaf 310, (Spanish-Maya), leaf 222.

⁵⁸ Tozzer, 1921, p. 170.

⁵⁹ P. 174, n. 1, *infra*.

house timber, is probably due to the fork at the base. I have seen unforked A-frame arms called by the same name,⁶⁰ and the idea occurred to me that perhaps the name 'scissors' was inspired by the crossed arrangement of the arms. However, other timbers are sometimes used to brace the regular framing, and when these are forked at the end they are generally called **ti'sera** also, regardless of whether or not they cross anything.

A-FRAME BARS

Number and position.—The main bar of an A-frame is generally located a little over half way up the rise. If single, it may be lashed to either side of the frame, but out of fourteen cases recorded only one⁶¹ was fastened to the outside (pl. 10,c). Occasionally one sees an A-frame with double bars, one lashed to each side of the frame and directly opposite each other. Examples: House 3, Chan Kom, Yucatan; an abandoned house at Xocenpich, Yucatan (pl. 10,b); House 10, Valladolid, Yucatan; House 3, Dzilam Gonzalez, Yucatan; and one at Dzitaz, Yucatan; House 1, San Pedro de Laguna, Guatemala. Sometimes there is an additional upper bar near the ridgepole. Examples: House 1, Muna, Yucatan; House 1, Puerto Barrios (non-Indian), House 1, San Pedro de Laguna, House 1, San Lucas Toliman, and House 1, Santa Apolonia, Guatemala. The non-Indian house at Puerto Barrios had also a double-barred A-frame, but the bars were lashed to the same side of the frame, one just above the other.

Size.—A-frame bars range from 7 to 12 cm. in diameter.

Purpose.—Besides forming an integral part of the A-frame itself, the bar usually carries the ends of longitudinal roof purlins (pl. 10,a,b; fig. 12,a). When an additional upper bar occurs in square houses it usually supports a corresponding upper longitudinal roof purlin.

Linguistics.—

TABLE 7

LANGUAGE	PLACE	BAR OF THE A-FRAME	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan	k'abak	kab , branch of wood (Motul) kab , arm or hand (Perez) ⁶² kabac (Perez) ⁶³ cap-aac (Thompson) ⁶⁴ capac (Redfield) ⁶⁵
	Muna, Yucatan	puruŷ	
Cakchiquel	Santa Apolonia	See roof purlin (Table 9, p. 49)	
Zutuhil	San Pedro de Laguna	ruk'etal	
Kekchi	San Juan Chamelco	be levali tŷ'o?	be , road; tŷ'o? , rat x cut sa (Sapper) ⁶⁶
Pokonchi	San Cristobal	See roof purlin (Table 9, p. 49)	

⁶⁰ E.g. House 1, Santa Apolonia, Guatemala.

⁶¹ House 1, San Lucas Toliman, Guatemala.

⁶² Perez, 1866-1877, p. 163; 1898, p. 39.

⁶³ Perez, 1866-1877, p. 163.

⁶⁴ E. H. Thompson (1911, p. 505) gives **cap-aac**, turtle's arm.

⁶⁵ Redfield, 1934, p. 34.

⁶⁶ Sapper, 1905, p. 26.

In Guatemala the bar of the A-frame is often a purlin for the end roof-framing. For this reason its name is usually the same as that of the longitudinal roof purlin, and will be discussed later (p. 49) as the name of the latter member. At Muna, Yucatan, the additional little bar near the top of the A-frame was called by a Spanish name, *crucera*, cross.

EXTRA A-FRAMES

Number and position.—Sometimes one or more extra A-frames further strengthen the house framing both transversely and longitudinally. They are characteristic of houses with flattened ends. Examples: almost all the houses of this ground plan at Tizimin, Yucatan. At each end of the house a smaller set of mainposts and a tie beam support an A-frame identical to the inner A-frame in everything but the size of its members. Many flattened-end houses have still another A-frame in each end. It is footed to the principal (inner) crossbeam just inside the forks of the main A-frame arms and leans inward and upward, crossing under or lashed to the sides of the ridge-piece at a point just short of the center of the room. Houses of this type, with six A-frame bars bracing the longitudinal purlins, are more stable than the average Yucatecan house. Examples: Dzitas, Yucatan; House 1, Tizimin, Yucatan (fig. 10,c).⁶⁷ The extra A-frame may be centrally located, footed to the pole plates and joined to the ridgepole over the center of the room. Example: House 1, Hunucma, Yucatan. Pyramidal arrangement of four A-frames was noted in a practically square house (5.6 × 6 m.) at San Pedro de Laguna, Guatemala. Four principal rafters served as arms for the A-frames; they were footed to the outside corners formed by the crossing of pole plates. The frames leaned upward and inward, converging at a point above the approximate center of the house.

PRINCIPAL RAFTERS

Characteristics.—Principal rafters are those which contribute to the upward support of the ridgepole.⁶⁸ They usually cross under this member; common rafters, on the other hand, rest on it. The former may be footed directly to the pole plates; more often, immediately above the mainpost they are lashed to the outside of the intersection of transverse and longitudinal pole plates. Forked principal rafters, rarely seen in Guatemala, are hooked over the wall plates. Example: House 1, San Sebastian, Guatemala.

Guatemalan principal rafters are generally smaller than Yucatecan A-frame arms; they range from 5 to 9 cm. in diameter.

Linguistics.—See Table 6, page 43.

⁶⁷ This house was over 20 years old, yet there was no perceptible sag in it.

⁶⁸ The arms of A-frames are principal rafters, but since they are connected by bars they have been described here under an A-frame classification (p. 42, *supra*).

RIDGEPOLE

Position.—(1) The ridgepole⁶⁹ usually rests in the V's formed where the upper ends of A-frame arms or other principal rafters cross at the top. (2) It is sometimes carried by uprights.

Size and description.—The ridgepole is usually one of the largest and longest timbers in the house framing. In Yucatecan apsidal and flat-ended houses it projects beyond the tops of the A-frames. In Guatemalan rectangular houses its length varies according to the type of roof. A square house has no ridgepole. In hipped roofs that cover houses almost square in plan the ridge-piece is very short. In larger rectangular houses it may be long enough to project beyond the end walls of the house, and roof framings at the ends must be vertical or even battered slightly negatively to connect with it. When the side slopes of the roof are built all the way out to the ends of long ridgepoles, the end roof-slopes are inclined inward and are thus overlapped by the side slopes. Examples: several towns east of Nahualate, Guatemala, including Rio Bravo, Guatalon, Coyolate (Department of Solola), and Buena Vista (Department of Escuintla).⁷⁰

Geographical distribution.—All Maya houses in Yucatan and Campeche have long ridgepoles. In Guatemalan rectangular houses the ridge-piece, as mentioned before, varies in length. In the vicinity of Coban, Alta Vera Paz, it is consistently long, projecting, as described above, beyond the end walls. The short type seems to be standard at Mauricio (Department of Escuintla), but at San Nicolas, only a few kilometers to the west, and at Coyolate, still farther west, all ridgepoles were long. Indeed, both types may be seen in the same town. Examples: Santiago Atitlan, San Pedro de Laguna, and Amatitlan.

Materials.—For Yucatecan ridgepoles *sak wi'tsil tʃeʔ* was used at Piste, 'paasak⁷¹ (an all-heart wood), *el'bob*⁷² or *pitʃitʃeʔ*⁷³ in Tizimin, and *k'utʃeʔ*⁷⁴ in Temax.

Linguistics.—

TABLE 8

LANGUAGE	PLACE	RIDGEPOLE	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan	ho(o)lnatʃeʔ	l is sometimes dropped or indistinct, e.g., in Piste, Chan Kom, ⁷⁵ and Muna <i>hool</i> , head; <i>na</i> , house; <i>tʃeʔ</i> , wood <i>hol na</i> , <i>el cavallette de la casa pajiza por la fuera, y toda la cubierta de la casa de piedra</i> , 'the ridge of the straw house, from the exterior, and the entire roof of the stone house' (Motul) <i>holna che</i> , <i>unos maderos que ponen en las casas pajizas sobre las tijeras a la larga</i> , 'some timbers which they place lengthwise on top of the main rafters in the straw houses' (Motul)

⁶⁹ False ridgepoles will be described under the subject of thatch (p. 111, *infra*).

⁷⁰ This feature, less accentuated, is typical also of Kekchi and Pokonchi houses in the Alta Vera Paz.

⁷¹ Roys, 1931, p. 274: "pa-zak, or x-pa-zakil. *Simaruba glauca*, DC. (Standl. 1920-26, p. 540; Millsp. I, 370; Gaumer.) zac means locust. The tree is 100 feet high and common in forests about Izamal, producing light green flowers in February."

⁷² Probably the same as bob (see p. 36, n. 24, *supra*).

⁷³ See p. 42, n. 54, *supra*.

⁷⁴ Roys, 1931, p. 258: "kuche, or kulche. *Cedrela mexicana*, Roem. *Cedro*, *Cedro colorado*, Spanish-cedar. (Standl.) *C. odorata*, L. (Millsp. I, 26 & Gaumer.)"

⁷⁵ Cf. Redfield, 1934, p. 34.

TABLE 8—(Continued)

LANGUAGE	PLACE	RIDGEPOLE	LITERAL TRANSLATION AND REMARKS
Chorti	Jocotan	<i>viga cumbreira</i> or <i>caballete</i>	Uppermost beam or ridgepole (<i>viga cumbreira</i> also means ridgepole) No Chorti terms for ridgepole known by informants
Quiche	Chichicastenango	ri wal xa	
Cakchiquel	Santa Apolonia	<i>viga cumbreira</i> or <i>caballete</i>	Cf. above No Cakchiquel terms for ridgepole known by informant
Zutuhil ⁷⁶	Santiago Atitlan House 1 House 2 San Pedro de Laguna San Lucas Toliman	lokox makom r utum xai tem de xulup	Possibly comment in Spanish regarding writer's mentality
Mam	San Pedro Sz. Concepcion	t wi(l) xa tox t wi xa	Head of the house
Jacalteco	Informant from Santa Eulalia	kut ubal	Cf. kut ^{sup} , rafter (Table 6, p. 43)
Kekchi	Coban House 1 House 4 House 5	§ alarekab § elarit § alarit kab	Back of the house Back xsi ruj (Sapper) ⁷⁷
Pokonchi	San Cristobal	repant § elrix	<i>Lo que es más encima</i> (?), that which is uppermost
Tzeltal	Chiapas	kabaiye-te ⁷⁸	Cf. <i>caballete</i> , ridge

ROOF PURLINS

Number and position.—The two main longitudinal roof purlins are usually about midway between the pole plates and the ridgepole. As a rule they are carried by the ends of the A-frame bars (pl. 10, *a, b*) and, in turn, support the ends of any horizontal, transverse braces at this level. In a few cases of rectangular and square houses that had no true A-frame, the longitudinal purlins carry the transverse purlins. Sometimes the transverse roof purlin is double. Examples: Houses 1 and 5, San Pedro de Laguna, Guatemala. Occasionally one sees upper roof purlins, especially in pyramidal roofs which have no ridgepole. At Coban, Guatemala, one house was so long that the roof purlins had to be pieced together of several poles. In small houses the purlin may be absent (pl. 7, *d*).

There are generally two bundle roof purlins (described below) in each end of Yucatecan apsidal and flat-ended houses. The lower is lashed at each end to the tops of the pole plates; ⁷⁹ the upper is similarly fastened to the longitudinal roof purlins.⁸⁰ They are then bent in a flattened or true semi-circle (pl. 10, *d*), the shape in which they are bent determining the form of the house. Small posts situated

⁷⁶ P. 174, n. 1, *infra*.⁷⁷ Sapper, 1905, p. 26.⁷⁸ Blom and LaFarge, 1926, p. 341.⁷⁹ At Tizimin, Yucatan, it is lashed to the under surfaces.⁸⁰ The bundle end-roof purlin of House 4, Chan Kom, Yucatan, reached all around the house.

directly under the curving line of the wall plates usually support the bundles further.

Size and description.—The main longitudinal roof purlin is midway between the pole plate and the ridgepole not only in position but also in size. It ranges from 8 to 13 cm. in diameter.

The end roof purlins of Yucatecan apsidal and flat-ended houses are cable-like bundles of from five to ten supple withes laid together with a twist, like cordage (pl. 10, *e*). Sometimes one of the withes is not twisted with the others, but runs around the end of the house several centimeters below its mates, to which it is bound at the ends. Example: House 3, Valladolid, Yucatan. The crumbling rubble masonry walls of some abandoned houses bear imprints of the lower bundles of pliant purlins that rested on them. Examples: many abandoned houses at Santa Ana, between Tabi and the ruins of Kabah, Yucatan. Given a sufficiently large chunk of mortar from the walls of an ancient house, one might be able to identify imprints of this kind, thus proving the existence of apsidal or flat-ended houses in prehistoric times.

Materials.—Longitudinal roof purlins at Piste, Yucatan, are made of **sak wi' tsil tʃeʔ**. The supple twisted bundles that serve as roof purlins in the ends of the houses are made of various kinds of wood. **Su' tup**⁸¹ is used at Piste, Chan Kom, and Tizimin. **Elemui**⁸² is another favorite, being used in Piste, Chan Kom, Tikuch, and Tizimin. In Chan Kom and Tizimin **ʃul**⁸³ was mentioned. Other materials were **sabi(ʃ)tʃeʔ** at Campeche and **sabatʃeʔ**⁸⁴ at Hunucma.

Linguistics.—The widespread use of a word meaning 'road of the rat' for the roof purlin in so many languages throughout Yucatan and Central America is very interesting. It was this word that Ernest Noyes of the Department of Middle American Research at Tulane University mentioned having heard in several languages, information that prompted the collection of these house word lists.

Informants generally give this term with much giggling and nudging among themselves. Many try in vain to think of a more dignified term before they will give it at all, but if asked about a member of the framing called 'road of the rat,' they invariably point to the roof purlin.

The name is a good one. Anyone who has spent much time under Maya roofs has seen large rats running along this roof purlin.

⁸¹ Roys, 1931, p. 313: "zutup. *Ipomoea bona-nox*, L. *Nicua*. (Gaumer.) Reported as *zutub*. This is the moon-flower vine; its large showy white flowers open late in the evening. (Standl. 1920-26, p. 1201.)"

⁸² Dr. Chaney, to whom I sent a specimen of *elemui* for identification, writes: "Your No. 7, *elemui*, is correctly referred to *Guatteria*. You may be interested to know that another of my graduate students independently identified this as *Guatteria* on the basis of its resemblance to one of our fossil leaves from the Eocene. Of great interest to me, and I think of general scientific interest, is the fact that all of the genera which have been determined are included in the Eocene forest of California and Oregon. This forest, once widespread to the north, is now restricted to low latitudes in this hemisphere."

Roys, 1931, p. 241: "*ele-muy*. *Guatteria Gaumeri*, Greenm. (Standl. 1920-26, p. 278; Gaumer.) *Conejo quemado*. A tree 30 to 50 feet high with gray bark. The leaves have an aromatic odor when crushed. The name may be a corruption of *ek-lemuy*."

⁸³ Roys, 1931, p. 297: "xul. 'A tree from which they obtain certain poles for the thatched houses.' (Motul.)"

⁸⁴ Probably the same as *sabaktʃeʔ*; see p. 42, n. 52, *supra*.

TABLE 9

LANGUAGE	PLACE	ROOF PURLIN	LITERAL TRANSLATION AND REMARKS
Maya	Temax, Dzilam Gonzalez, Motul, Izamal, Sotuta, Cat- mis, Muna, Campeche Piste, Motul, Chan Kom Tizimin	u beil tʃ'oʔ	Road of the rat ⁸⁵
		patʃ'na tantʃeʔ	Back of the house Center wood ⁸⁶
Quiche	Chichicastenango Quetzaltenango	ʃi'qol xa or ʃqol xa be ri tʃ'o	ʃqol, mud; xa, house Road of the rat
Cakchiquel	Santa Apolonia	tʃu ri xaix	Informant said this meant 'road around the house,' but Fray Thomas gives <i>bey</i> , road ⁸⁷
Zutuhil	Santiago Atitlan	r ʃqolovil and warabal tʃ'oi	ʃqol, mud Sleeping place of the rat <i>uarabal</i> , <i>dormitorio</i> (Ximinez)
	San Lucas Toliman	pa r xa	
Mam	San Pedro Sz.	t be itʃ' or t q' ux xa	Road of the rat Stomach (middle) of the house; <i>titzi nuquh</i> , <i>estómago</i> (Reynoso)
	Concepcion	t be itʃ'	Road of the rat
Jacalteco	Informant from Santa Eulalia	pe t qu bal	?
Kekchi	Coban House 4 House 5 San Juan Chamelco	be tʃ'oʔ baqsot (x be le) be tʃ'oʔ	Road of the rat ? Here <i>be tʃ'oʔ</i> , roof bow Road of the rat; <i>x keoc</i> (Sapper) ⁸⁸
Pokonchi	San Cristobal	we wal tʃ'oʔ	wal in all words collected; tʃ'oʔ, rat

When there are distinct posts to support the bundles of twisted end-roof purlins, each post is called *o' kom moi*, post (leg) of the end of the house.

TABLE 10

LANGUAGE	PLACE	BUNDLE END PURLIN		LITERAL TRANSLATION AND REMARKS
		Lower	Upper	
Maya	Piste Tizimin Campeche	kop u moi	kop u moi	kop, twisted <i>bejuco</i> , rope, etc.; moi, end of the house
		moi	tʃa moi	tʃan, little; moi, end of the house
	Piste Tizimin		moi	End of the house

COMMON RAFTERS

Number and position.—The number of common rafters varies according to the length of the house and the type of thatch that covers it. The rafters of a

⁸⁵ Cf. E. H. Thompson, 1911, p. 506.⁸⁶ Cf. Redfield, 1934, p. 34.⁸⁷ Thomas, 1693.⁸⁸ Sapper, 1905, p. 26.

roof thatched with straw are usually closer together than those of a palm-thatched roof. Instead of crossing under the ridgepole they rest on it and cross over it at their upper ends (pl. 11, *b*). When there is a false ridgepole it lies in the V's formed where these common rafters cross. Their lower ends are lashed to the pole plate and about half-way up the roof slope they are again fastened to the roof purlins. To the backs of the common rafters are lashed the light horizontal rods to which thatch is attached. In the ends of houses short "floating" common rafters, which are not full length, fill in empty spaces at the bottom of the roof framing where the other common rafters spread far apart due to their fan-shaped arrangement (pls. 10, *c* and 11, *c*). In addition to these, especially in Yucatecan apsidal houses, there are generally three poles which run from the upper to the lower bundles of roof purlins at the ends of the roof.

Size and description.—Common rafters are smaller members of the roof framing. The three poles that lie between the upper and lower bundle roof purlins are usually heavier. Common rafters are not cut to length until after they have been lashed to the roof framing. The long, thin poles project far down toward the ground; when all are in place they are cut to whatever height is desired for the eaves (pl. 11, *d*).

Materials.—The same sort of wood that is twisted into the bundle roof purlins of Yucatan is usually good for common rafters also, except in cases where the latter are larger than usual. **Elemui**⁸⁹ seems to be the favorite; it is used at Chan Kom, Piste, and Tizimin. Mangrove⁹⁰ is used at Telchac Pueblo, Yucatan, and Champoton, Campeche. **Sabatŷe**⁹¹ is used at Chan Kom and Hunucma. Other kinds of wood mentioned for the common rafters are **ŷul**⁹² at Chan Kom, **tŷakni** at Piste, and **hol**⁹³ at Tizimin.

In Guatemala the common rafters are of *llaje* at Zacapa and of pine at Chiquimula.

Linguistics.—In several Guatemalan languages the native term for common rafter is white wood.

TABLE II

LANGUAGE	PLACE	COMMON RAFTER	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan and Campeche	winkitŷe?	winkil, servant or slave; tŷe?, wood uincil che (Motul) ⁹⁴
Chorti	Jocotan	calsonte	Common rafter No Chorti term known by informant
Quiche	Chichicastenango Santa Cruz Quiche	qutŷ	Support cuch (Ximinez)
	Quetzaltenango	ri tŷe? ri ŷot	tŷe?, wood; ŷot, tile

⁸⁹ P. 48, n. 82, *supra*.

⁹⁰ See remarks on *mangle*, p. 36, *supra*.

⁹¹ P. 48, n. 84, *supra*.

⁹² P. 48, n. 83, *supra*.

⁹³ P. 42, n. 49, *supra*.

⁹⁴ E. H. Thompson (1911, p. 506), gives *uinkin-che*, deriving it from *uinic* [*winik*], man.

TABLE II—(Continued)

LANGUAGE	PLACE	COMMON RAFTER	LITERAL TRANSLATION AND REMARKS
Cakchiquel	Santa Apolonia San Sebastian	qutʃu tiʃ	
Zutuhil ⁹⁶	Santiago Atitlan San Pedro de Laguna House A House 1 San Lucas Toliman	qutʃup tʃup qutʃup	qutʃ, support
Mam	San Pedro Sz. Concepcion	saq tse	White wood
Jacalteco	Informant from Santa Eulalia	sax te	White wood
Kekchi	Coban House 1 House 4 House 5 and San Juan Chamelco	pitʃq qab pitʃ pitʃq	qab, house sacche (Sapper) ⁹⁸ Cf. Pokonchi (below)
Pokonchi	San Cristobal	saq tʃe?	White wood
Tzeltal	Chiapas	sak-te ⁹⁷	White wood (gable rafters)

The three heavier poles that connect the upper and lower bundle purlins are called **kutʃ moi**⁹⁸ in Temax, Yucatan.

ROOF RODS

Number and position.—The rods are laid, either singly or in pairs, across the backs of the common rafters. Like the latter, they are closer together when the roof is thatched with grass or sugar cane instead of palm. At the ends of the roof framing the rods are bent sharply around the roof corners (pl. 12, *d*). I saw them being lashed on apsidal houses at Piste and Chichen Itza, Yucatan, and on a rectangular house at Champoton, Campeche; the procedure in each case was the same. A rod often split where it was bent around a sharp corner, but when this occurred it was left in place with a little more lashing added to strengthen it.⁹⁹ The lowermost rod, at the eaves of the roof, is often widely separated from its companion members. Sometimes the longer wall poles (**kulu' bo:b**) are bound to it.

Size and description.—The rods are the smallest members of the house framing. The load they carry is not great and the common rafters that support them are small; the rods, therefore, are thin and light, and preferably somewhat pliant.

Materials.—The same kinds of wood that are used for common rafters and for bundle roof purlins are good for rods also. **Elemui**¹⁰⁰ is again preferred, being

⁹⁶ P. 174, n. 1, *infra*.

⁹⁷ Sapper, 1905, p. 26.

⁹⁸ Blom and LaFarge, 1926, p. 341.

⁹⁹ Cf. (above) name for common rafter in Quiche (Chichicastenango), Cakchiquel (Santa Apolonia), and Zutuhil. Also cf. **kutʃ moi** for pole supporting **moi** at Muna, Yucatan.

¹⁰⁰ I thought at first that this practice of bending rods around the sharp corners of rectangular houses in Campeche might indicate that the apsidal house was older than the rectangular; but since the operation strengthens a rectangular house, in spite of the splitting of the rods, my idea of survival was not necessarily correct.

¹⁰⁰ P. 48, n. 82, *supra*.

mentioned at Piste, Chan Kom, Tikuch, and Tizimin. At Chan Kom and Piste \int ul¹⁰¹ is also used. **Su'tup**¹⁰² at Chan Kom, **hol**¹⁰³ at Tizimin, mangrove¹⁰⁴ and **spet ki'tan**¹⁰⁵ at Telchac Pueblo are other kinds of wood suitable for roof rods. Redfield¹⁰⁶ mentions also **dzudzuc**. In Guatemala the rods are often stalks of sugar cane.

Linguistics.—Nowhere in Yucatan could I find a Maya word for roof rod. The Spanish word, *jil* (slender pole), is used throughout the state and also in Campeche. This word was used as early as the sixteenth century, for it is found in the Motul dictionary as an Indian term.

TABLE 12

LANGUAGE	PLACE	ROOF ROD	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan and Campeche	<i>jil</i>	hil and hil che (Motul); <i>jil</i> and hil (Perez) ¹⁰⁷
Chorti	Jocotan	xarer	
Quiche	Chichicastenango Quetzaltenango Santa Cruz Quiche	qi \int ub le t \int e? ri \int ot saq t \int e?	t \int e?, wood; \int ot, tile White wood
Cakchiquel	Santa Apolonia San Sebastian	saq t \int e? baijel	White wood ?
Zutuhil ¹⁰⁸	Santiago Atitlan San Pedro de Laguna San Lucas Toliman	saq t \int e? ax	White wood Cane
Mam	San Pedro Sz. Concepcion	lam bi(x)l q'ux xa	qambil , <i>a los pies</i> , at the feet of (Reynoso)
Jacalteco	Informant from Santa Eulalia	\int u \int ul	Cf. Sapper's Kekchi term (below)
Kekchi	Coban and San Juan Chamelco	saq t \int e?	White wood; xuxul (Sapper) ¹⁰⁹
Pokonchi	San Cristobal	saq t \int e?	White wood

ATTIC STAGINGS OR ROOF FLOORS

Size and description.—Roof floors range in size from large stagings covering a large proportion of the house interior to makeshift floors consisting of one or more poles.

Large stagings are built of long thin poles, laid longitudinally across the upper surface of the tie beams (examples: Kekchi houses at San Juan Chamelco in the Alta Vera Paz), or transversely across the wall plates (examples: Pokonchi houses at San Cristobal, Alta Vera Paz, Guatemala). The poles lie so close together that they hide the roof framing above.

¹⁰¹ P. 48, n. 83, *supra*.

¹⁰² P. 48, n. 81, *supra*.

¹⁰³ P. 42, n. 49, *supra*.

¹⁰⁴ See remarks on *mangle*, p. 36, *supra*.

¹⁰⁵ This wood was not identified.

¹⁰⁶ Redfield, 1934, p. 35; cf. p. 33, *supra*, and also my *sutsuk*, p. 36, *supra*.

¹⁰⁷ Perez, 1866-1877, p. 33; 1898, p. 31.

¹⁰⁸ P. 174, n. 1, *infra*.

¹⁰⁹ Sapper, 1905, p. 26.

Makeshift roof floors are laid longitudinally across the upper surfaces of crossbeams over one end or one corner of the house. The floor is constructed not only of poles but also of other objects, as illustrated in the following examples: three long inverted benches, House 1, Chan Kom, Yucatan; three long poles, House 3, Chan Kom; two poles resting across the crossbeams on the west side and two more across the bundle roof purlins on the north side, House 2, Piste, Yucatan; a log, flattened on top, resting on crosspieces which ran from wall to mainpost and to the adjacent main wall pole, House 9, Valladolid, Yucatan; poles lashed from a mainpost to an inner post,¹¹⁰ Tikuch, Yucatan.

Geographical distribution.—The only area where large roof floors are a standard part of the house is the Alta Vera Paz in the vicinity of Coban, particularly at San Juan Chamelco (Kekchi) and San Cristobal (Pokonchi), Guatemala. A small but permanent roof floor was recorded at San Lucas Toliman, Guatemala. Makeshift attic stagings are frequently found in Yucatan.

Purpose.—Foodstuffs, loose or in baskets and sacks, gourds, tools, household furniture, and other objects are stored on these stagings. Sometimes hammocks, trays of basketry, and gourds are suspended from them. The larger roof floors of Guatemala also prevent water leakage and insects from falling into the house from the thatch above.

Antiquity.—The *Relacion del pueblo de Tepeaca*,¹¹¹ written in the sixteenth century, includes a statement that the houses of this province are very small and low, without any attic (*soberador*).

Linguistics.—

TABLE 13

LANGUAGE	PLACE	ROOF FLOOR OR ATTIC STAGING	LITERAL TRANSLATION AND REMARKS
Maya	Chan Kom	bantʃeʔ	kaan, ceiling; cheʔ, wood canche or caanche (Perez) ¹¹² kat chean, <i>cosa assi atravesada con palos</i> , something with poles laid across it (Motul)
	Tikuch	kantʃeʔ	
Zutuhil ¹¹³	San Lucas Toliman	laxbal	
Kekchi	Coban San Juan Chamelco	bentʃeʔ qaq	chiben i cheh (Sapper) ¹¹⁴
Pokonchi	San Cristobal	mux pat	

Roof Bows

Number and position.—There may be as many as four roof bows in one house. When small, the bow is lashed at its lower end to the pole plate; from there it passes diagonally and longitudinally upward, its upper end being fastened either to the ridgepole or to a point high up on an arm of the A-frame. If it touches a longitu-

¹¹⁰ The *ku'lub* (p. 69, *infra*).

¹¹¹ MS. copy in Peabody Mus. of Harvard Univ.

¹¹² Perez, 1866-1877, p. 42.

¹¹³ P. 174, n. 1, *infra*.

¹¹⁴ Sapper, 1905, p. 28.

dinal purlin it is lashed to that also. When there are two roof bows under each side slope, they generally cross each other directly over the center of the door, and are lashed at their upper ends to a point a little beyond the midpoint of the ridgepole. There are many variations: the bases of roof bows may be attached to bundle pole plates in the ends of the house, proceeding thence to the longitudinal roof purlins and finally to the ridgepole. Example: House 4, Chan Kom, Yucatan. Some roof bows are footed to the crossbeams. Examples: some houses at Izamal, Yucatan, and the city of Campeche. Sometimes the forked lower end of the large heavy type of roof bow is hooked over a crossbeam, as in the case of a forked A-frame arm. Examples: Chan Kom, Valladolid, Lerma, and other towns in Yucatan and Campeche.

Size and description.—Roof bows, which are diagonal braces to the roof framing, range in size from long thin poles to heavy forked timbers resembling arms of A-frames.

Geographical distribution.—Most roof bows were recorded at Chan Kom and Temax, Yucatan. At the latter town they were a standard feature of every house. In Guatemala they were most frequently observed in the Alta Vera Paz in the vicinity of Coban.

Linguistics.—When the roof bow is forked and large, it is called by the same name as the arm of an A-frame, which it resembles. This use of *tijera*, or its Indian equivalent, shows that the idea of 'scissors' comes from the forked end rather than from the fact that rafters cross each other (pp. 43-44).

TABLE 14

LANGUAGE	PLACE	ROOF BOW	LITERAL TRANSLATION AND REMARKS
Maya	Chan Kom Tikuch Izamal	sinantʃe? sintʃe? ʃikmas	Sloping wood; cf. principal rafter, Tizimin (Table 6, p. 43) Sloping wood x-nezinaan (Redfield) ¹¹⁵
Kekchi	Coban	be tʃ'o?	Road (of the) rat; cf. roof purlins (Table 9, p. 49) kaksotz (Sapper) ¹¹⁶
Pokonchi	San Cristobal	qiwalpan	

KING-RODS

Number and position.—Ridgepoles may be supported at each end by a king-rod instead of principal rafters. Houses of this type are likely to be smaller than average, but in some places, especially in Guatemala, the king-rod is used for all sizes of dwellings. When it is full length its base is embedded in the ground; when it is half length it rests on a tie beam or on a longitudinal member resting on the tie beams high up in the house framing. In rare cases one finds smaller uprights, located farther down in the truss; these correspond to the upright supports in queen-rod construction. Example: Coban, Guatemala (pl. 8, a).

¹¹⁵ Redfield, 1934, p. 34. For 'forked brace,' Redfield (*ibid.*) and E. H. Thompson (1911, p. 506) give ʃol much, toad's crutch (cf. p. 55, *infra*).

¹¹⁶ Sapper, 1905, p. 26.

Size and description.—Full-length king-rods are usually forked at the upper ends; the ridge-piece lies in the base of these forks. In many cases a shoulder cut into the ends takes the place of forks, or the timber may simply be cut off square and lashed to the ridgepole. Half-length king-rods are generally of the last-named type.

Geographical distribution.—A great number of chicken houses and small shelters in Yucatan and Campeche employ king-rods instead of A-frames. Houses with full-length king-rods were recorded also in Guatemala at Chiquimula, Molina la Sierra, Santiago Atitlan, San Lucas Toliman, Los Encuentros (pl. 25,*d*), a settlement between Los Encuentros and Tecpam, another between Sija and Huehuetenango, a third between Totonicapan and San Francisco (pl. 7,*d*), Coban, Cuilapa, and in the Baja Vera Paz at Tablon, Zapote, and Morazan (pl. 16,*d*). In the last-named region and at Chiquimula king-rods are almost a standard feature of house construction. Half-length rods were seen in Guatemala at Zacapa (non-Indian, pl. 12,*a,b*), Jocotan (pl. 9,*c*), Chiquimula (pl. 27,*e*), and Coban (pls. 8,*a*, 11,*c*).

Antiquity.—An informant at San Lucas Toliman, Guatemala, said that houses with king-rods, together with square houses (see p. 26), are older than long rectangular houses with rafter-supported ridgepoles.

Linguistics.—According to Sapper the Kekchi term for this member is **xchapoc xsi ruj**, the support of the ridgepole.¹¹⁷

MISCELLANEOUS

Vertical struts.—In Yucatan one often sees short supports in the roof framing at the ends of houses. Their forked bases rest on the bundle pole plates; their tops are lashed above to the bundle roof purlins. At Izamal, Yucatan, a member of this type was called **sol mut**, toad's crutch. At House 4, Tizimin, Yucatan, an extra forked post was embedded in the floor at each end of the house. It carried one end of a longitudinal member, which, in turn, supported a diagonal brace to the ridgepole (fig. 16,*b*). The A-frame bars at both ends of House 1, San Pedro de Laguna, Guatemala, were braced by three upright struts, which were forked at the base and rested on intermediate crossbeams. A-frame bars of the sides were similarly braced, the single upright supports here being forked over two short longitudinal pieces laid across the two central tie beams (fig. 16,*d*).

Diagonal braces.—Many forked braces heretofore described as single roof bows should be classified under the present heading; because they usually function as roof bows I preferred to discuss them as such. House 1, Muna, Yucatan, had a tijera-like diagonal brace at each end. Their forked bases were hooked over tie beams. They sloped upward and inward to rest at their notched upper ends on the cruceras, small upper bars of the nearest A-frames (fig. 16,*a*). In the same house there were three short braces to each transverse roof purlin. The base of each was forked and rested on outer tie beams. Like other forked members of the framing they were called tijeras.¹¹⁸ At House 4, Coban, Guatemala, a diagonal support

¹¹⁷ Sapper, 1905, p. 26.

¹¹⁸ Redfield (1934, p. 34) and E. H. Thompson (1911, p. 506) give **xol-much**, toad's crutch. Cf. 'vertical struts' above.

lent considerable additional strength to the long axis of the framing. Its base was lashed to the intersection of an intermediate crossbeam and a long longitudinal pole, which it carried over the center of the house. The upper end was attached to the point where king-rod, end rafters, and ridgepole met (pl. 8,*a*; fig. 16,*c*).

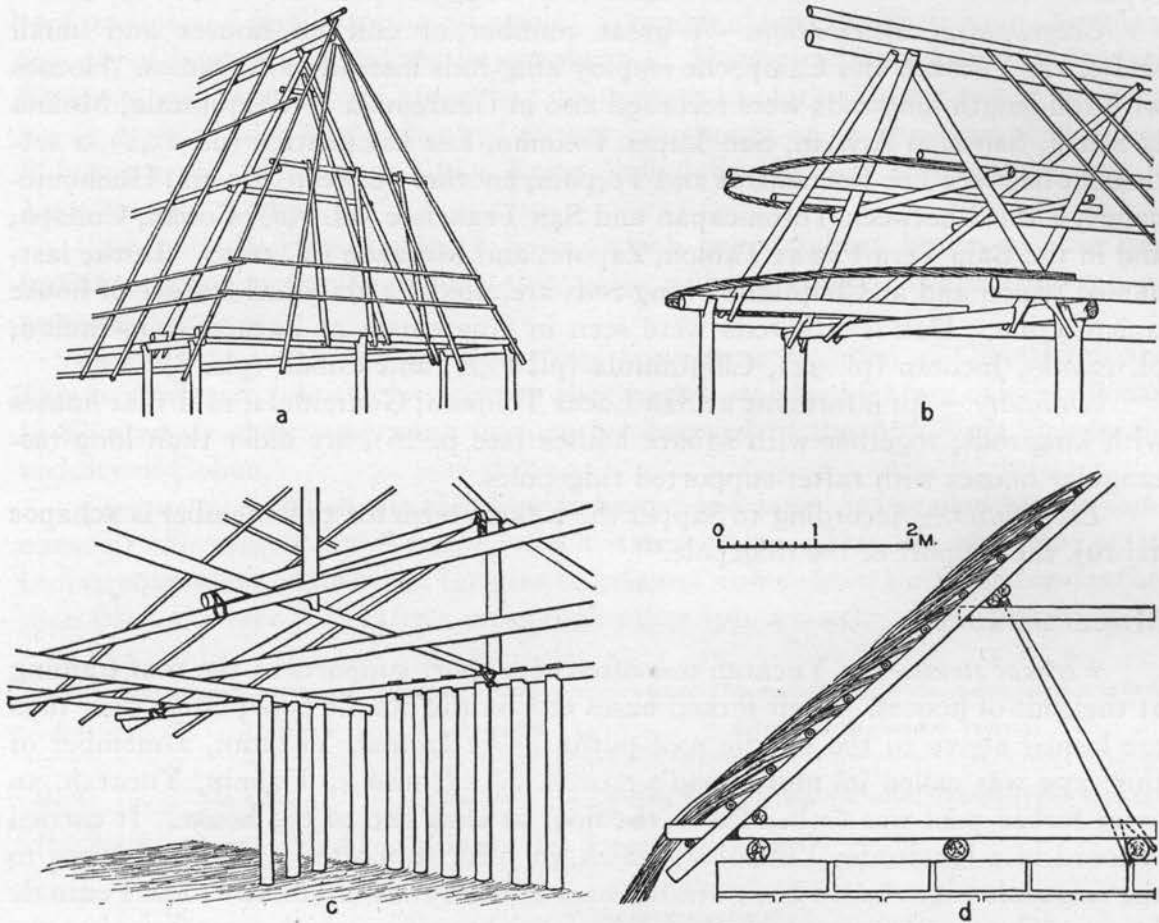


FIG. 16—MISCELLANEOUS MEMBERS

a: House 1, Muna, Yucatan.
b: House 4, Tizimin, Yucatan.

c: House 4, Coban, Guatemala.
d: House 1, San Pedro de Laguna, Guatemala.

Horizontal members.—There are two main types of extra horizontal braces in addition to those heretofore described. One of these is the transverse brace which bridges at intervals the space between longitudinal roof purlins. They are very common, especially in Yucatecan houses, and remind one of the crossbeams that bridge the vaults of many ancient Maya structures. They are generally called by the same name as that of an A-frame bar (in Yucatan, *k'abak*), to which they correspond in level and, to a certain extent, in function. Less frequently these braces are found in the ends of a house, where they bridge the gap between the pliant bundle roof purlins. Sometimes, instead of lying on the purlins, they are forked at each end and are prized into a self-sustaining position. Example: Telchac Pueblo, Yucatan.

The other horizontal brace is limited to Tizimin, Yucatan. Here, where it is a characteristic feature of houses, it is called the **lat moi**, because it helps to hold up (*lat, sosténir*) the **moi**, or bundle roof purlin. The brace runs longitudinally, usually resting on the two A-frame bars (or on the crossbeams if it is to support the **kop u moi**), with its end pushed under and lashed to the purlin. A brace of this type at House 4 was further supported by a forked post (fig. 16,*b*). A third variation was seen at House 6, where the **lat moi** was lashed to the top of the **moi**, then passed over the two outer A-frame bars, and continued to the leaning A-frame, where its notched end passed under the bar.

In addition to these members, which serve primarily as braces, there are horizontal pieces of supporting function: longitudinal timbers that sometimes carry king-rods (fig. 16,*c*) and the various members, already described, which support vertical struts and horizontal braces.

LASHINGS

Discussion.—Acting on the suggestion of the late Roland B. Dixon of the Division of Anthropology at Harvard University, I recorded some of the ways in which members of the house framing are lashed together.¹¹⁹ Dixon pointed out that the patterns of lashing created by certain Oceanic house builders are not only distinctive artistically but are also significant anthropologically, since variations can sometimes be correlated with the geographical, linguistic, or racial groups into which these people fall.

I watched Maya builders at work, had informants lash models together, and examined the completed lashings on many houses. Almost invariably they are done in the same way, almost to the number of turns that are taken. I was unable, however, to find any significant correlation such as exists in Oceania.

It is always interesting to the layman to learn that no nails are used in the construction of a native bush house in the Maya area. The following are typical examples of methods employed to hold a house framing together:

Patterns.—The patterns are as follows:

1. Reinforcing the fork of an A-frame arm (pls. 9,*b*, 10,*a,b*; figs. 12,*b*, 17,*a,b*). This strengthens the prongs against spreading and splitting off under the heavy downward pressure of the roof framing. The length of the vine depends on the diameter of the timber to be reinforced. Usually about 5 m. is necessary. The worker lays the vine, at a point about one hand span (*una quarta*) from its end, through the crotch of the timber. He then passes the vine around one branch of the fork, through the crotch, and around the other branch. This is repeated several times until the end of the vine is nearly reached. He then tucks the free end through the crossed layers of vine in the crotch, at a level about two layers from the top. The other free end (with which the work was started) he tucks in at the base of the crotch between the second and third layers of vine.

2. Fastening the bar to an A-frame arm (pl. 10,*a,b*; figs. 12,*a*, 17,*c,d,e*). About 4 m. (two *brazos*) of vine are used in this operation. The bar is held against the

¹¹⁹ Lashings involved in thatching will be described under that heading (pp. 107-09, *infra*).

A-frame arm. The worker usually stands on the crossbeam and works from the inside of the house. He lays one end of the vine in a vertical position, end pointing downward, against the near surface of the rafter. Then he passes the long free end of the vine around and back of the rafter, bringing it next around and in front of the arm and over the original end of the vine. This is repeated three times (four in all), each strand passing below the one just before it. When the end is almost reached it is passed under the four layers of turns at the upper right corner of the intersection of the two timbers. It then passes over the front of the bar and is tucked under all turns at the lower left corner. If the vine is very long and if, after the above process is completed, there is still much left over, lashing is continued as illustrated in figure 17,*e*.

3. Lashing crossed A-frame arms (pl. 10,*a*; fig. 17,*f,g*). The worker always stands on the outside, his feet resting on the bar of the A-frame or on any member of convenient height (fig. 46,*c*). He holds the end of the vine in a vertical position, pointing downward, against the surface of the nearer A-frame arm. He then passes the long free end upward and around behind the upper end of the farther timber, thence in front of the nearer timber and over the original end of the vine there. Then the vine passes back of the left corner of the intersection of the two timbers, behind the farther timber, and across to the right intersection corner. It next takes six or eight consecutive horizontal loops around the middle two A-frame arms. After passing behind the farther timber on the last loop, it is brought from behind to the lower corner of the intersection, then up over the near surface through the upper corner of the intersection. Then it passes around behind the right end of the farther timber to the right intersection corner, where, finally, it is tucked in as far down among the turns as possible. The worker then anchors a second vine among the strands of the first vine in the upper corner of the intersection (fig. 17,*g*). He passes the long free end behind the upper end of the nearer timber, over the lower part of the farther, then under the corresponding part of the nearer, and over the upper end of the farther. This is repeated about six times, care being taken to pack down each new turn tightly over the one before it, in order to hold the lashing firmly. After the last turn, when the end of this second vine reaches the right intersection corner, it is tucked in as far down among the strands as is possible.

4. Fastening a common rafter to a pole plate (pl. 14,*b*; fig. 17,*i,j*). The end of the vine is laid, point diagonally downward, against the near surface of the pole plate. The worker passes the long free end upward through the upper right intersection of the two members, then around behind the rafter, and through the upper left intersection to the front of the pole plate. From here the vine passes diagonally downward across the plate to the lower right intersection corner, whence it goes upward behind the right arm of the plate and then behind the rafter again. The process is repeated twice (three times in all). On the third turn, when the vine reaches the lower right intersection, it passes around back of the rafter (fig. 17,*j*), comes out from the lower left intersection, and goes diagonally upward across the nearer surface of the plate and back around again behind the rafter to the lower

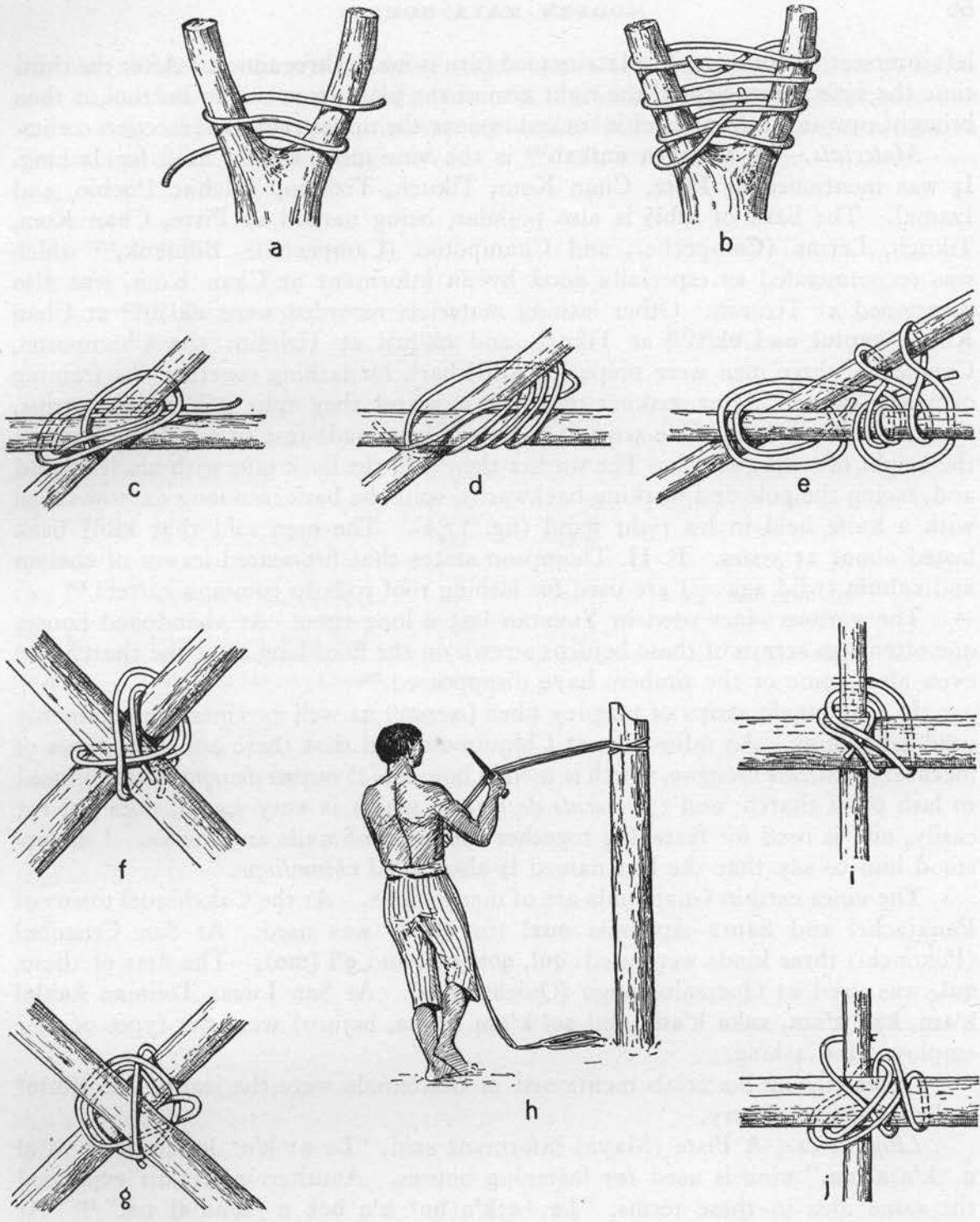


FIG. 17—PATTERNS OF LASHINGS

a, b: To reinforce "teeth" of mainpost fork. *f, g:* Crossing of A-frame arms.
c, d, e: Bar and arm of A-frame. *h:* Splitting kibiş bark for lashing, Champoton, Sampeche.
i, j: Common rafter and pole plate.

left intersection corner. The last-named turn is made three times. After the third time the vine passes behind the right arm of the plate from top to bottom, is then brought upward in front, and is tucked in near the upper right intersection corner.

Materials.—In Yucatan **anikab**¹²⁰ is the vine most widely used for lashing. It was mentioned at Piste, Chan Kom, Tikuch, Tizimin, Telchac Pueblo, and Izamal. The bark of **kibiš** is also popular, being named at Piste, Chan Kom, Tikuch, Lerma (Campeche), and Champoton (Campeche). **Bilinkok**,¹²¹ which was recommended as especially good by an informant at Chan Kom, was also mentioned at Tizimin. Other lashing materials recorded were **ekišil**¹²² at Chan Kom, **škantul** and **ek'iš**¹²³ at Tikuch, and **ak'inš**i at Tizimin. At Champoton, Campeche, three men were preparing **kibiš** bark for lashing together the framing of a new house. After soaking the bark in water they split it into long strips. One end of each long, wide strip of bark was first made fast to a pole or hook at the height of a man's neck. The worker then held the bark taut with his left hand and, facing the pole and working backwards, split the bark into long narrow strips with a knife held in his right hand (fig. 17, *h*). The men said that **kibiš** bark lasted about 25 years. E. H. Thompson states that fire-seared leaves of **chelem** and **cahum** (wild agaves) are used for lashing roof rods to common rafters.¹²⁴

The various vines used in Yucatan last a long time. At abandoned houses one often sees scraps of these bejucos strewn on the floor long after the thatch and even after some of the timbers have disappeared.¹²⁵

In Guatemala strips of maguey fiber (*mecate*) as well as vines are commonly used for lashing. An informant at Chiquimula said that there are three types of *mecate*: (1) *mecate del agua*, which is used in houses; (2) *mecate de sepa*, which is used to lash palm thatch; and (3) *mecate de bejuco*, which is very tough, does not rot easily, and is used for fastening together the parts of walls and fences. I understood him to say that the last named is also called *chimaliope*.

The vines used in Guatemala are of many kinds. At the Cakchiquel towns of Panajachel and Santa Apolonia **quxl** (or **qutxl**) was used. At San Cristobal (Pokonchi) three kinds were used: **qul**, **qoxqom**, and **q'i (mo)**. The first of these, **qul**, was used at Quetzaltenango (Quiche) also. At San Lucas Toliman **kaklol k'am**, **kak k'am**, **xoka k'am**, and **sel k'am (k'am)**, bejuco) were the types of vine employed for lashing.

Other lashing materials mentioned in Guatemala were the leaf of the **tšinte** and the *capulin*, cherry.

Linguistics.—A Piste (Maya) informant said, "Le a:k'e? ku servir u 'ti?al u 'k'ašal na," vine is used for fastening houses. Another informant expressed the same idea in these terms, "Le 'a:k'o'bo? k'a'bet u 'k'aašal na."¹²⁶ At

¹²⁰ Roys, 1931, p. 215: "**anicab**. *Cydista æquinoctialis* (L.) Miers. (Standl.) This probably the same as the *chac-anicab* described as 'a bijuco common in the forests about Izamal, producing its gamboge-yellow flowers in April and May.' (Mills. I, 390)."

¹²¹ *Ibid.*, p. 217 (*bilim-coc*).

¹²² *Ibid.*, p. 241: "**x-ek-kixil**, or **ek-kixil-ak**. *Bignonia unguis-cati*, L. (Standl. & Gaumer.) Lit. black thorns, or black-thorn-vine. Described as a black trailing vine with small dark-green leaves."

¹²³ Probably the same as **ekišil**.

¹²⁴ E. H. Thompson, 1911, pp. 506-07.

¹²⁵ This may be due, however, to the removal of timbers for firewood or other purposes by neighbors, rather than to any remarkable lasting qualities of the vine.

¹²⁶ Dr. Andrade writes that he does not think the Maya ever use **k'a'bet** in such constructions without **u 'ti?al**.

Tizimin, Yucatan, the vine lashing which reinforces the "teeth" of an A-frame was called **toi**. *Chiute*, a lashing material at Chichicastenango (Quiche), was called **kim**. The hand-span measure by which lengths of vine are measured in Yucatan is called **naab** in Maya.

TABLE 15

LANGUAGE	PLACE	BEJUCO	MAGUEY (MECATE)	REMARKS
Maya	Yucatan	ak'		ak (Motul; Perez ¹²⁷)
Chorti	Jocotan		tʃan	
Quiche	Quetzaltenango Santa Cruz Quiche	kul	ri kim k'am	k'am tʃe?, <i>bejuco</i> (Andrade)
Cakchiquel	Santa Apolonia	qu(x)l		
Zutuhil ¹²⁸	Santiago Atitlan San Pedro de Laguna San Lucas Toliman	k'am quxl k'am	sax ki sax ki	
Mam	San Pedro Sz. and Concepcion	ak'	tʃ'etʃ	k'xax, <i>mecate</i> (Andrade)
Jacalteco	Informant from Santa Eulalia	tʃan	tʃ'etʃ	
Kekchi	Coban and San Juan Chamelco	k'am		

¹²⁷ Perez, 1866-1877, p. 8; 1898, p. 3.

¹²⁸ P. 174, n. 1, *infra*.

III
WALLS
TYPES

VERTICAL POLES

Construction.—Fairly stout poles (4 to 8 cm. in diameter) are set side by side in an upright position, lashed together, and usually braced by means of stringers. The resulting stockade may then be daubed with mud but this is not always done. The erection of a stockade wall is one of the last operations in house construction; even the thatching of the roof usually precedes it. This type of wall is structurally independent of the rest of the house framing. If omitted entirely, as it often is in the case of many overnight shelters (*champas*) and storehouses (*bodegas*), the house framing remains unchanged.

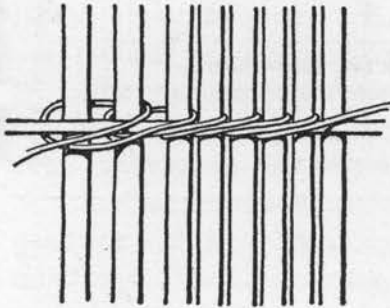


FIG. 18—LASHING OF WALL
POLES TO STRINGER

The bases of the poles generally rest directly on the ground, but sometimes they are embedded in the earth or set on a foundation of rocks. The latter practice helps prevent the bases from rotting from contact with earth and moisture. At Valladolid, Yucatan, I watched poles being lashed into position. Two men worked together, one on each side of the new wall. All the poles had been assembled beforehand; they lay on the ground under the roof (pl. 14, *b*). The man on the inside took a pole from this supply and held it up next to the pole last erected and against the central stringer,

which was held in position until there were enough poles to keep it from falling. Vine was passed through the wall from one man to the other, the outside workman inserting it each time between the second and third poles, counting back (fig. 18).

At intervals of about every sixth to twelfth pole, one upright is longer and thicker than the others. This is lashed at its upper end to the wall plate or its equivalent.¹ Wall poles are sometimes split lengthwise before erection. Examples: Lerma, Campeche; Jocotan (Department of Chiquimula), Mauricio and Miriam (Department of Escuintla), Guatalon (Department of Solola), and high in the mountains between Los Encuentros and Tecpam, Guatemala. At most of these places the timbers available for wall poles are unusually large.

Wall poles at the gable ends of saddle-roofed houses are usually graduated in length from eaves to ridgepole. Sometimes, however, gable ends above the level of the wall plates are closed with poles laid horizontally and graduated in length to fit the pitch of the roof. Examples: Lake Amatitlan (fig. 19) west to La Compañía, Guatemala.

¹ In the Valladolid house already mentioned, the lower bundle pole plate extended from the ends around the sides of the house and served as wall plate (pl. 14, *b*).

There are generally three exterior wall stringers, one high up near the eaves, a low one down near the base of the poles, and a third midway between these two. The number may be increased. Examples: Tinum, Yucatan (six or eight), school-house at Ticimul, Yucatan (seven), Dzitas, Yucatan (six). Stringers are not absolutely necessary, especially when the wall poles are large and heavy. Example: San Sebastian, Guatemala.

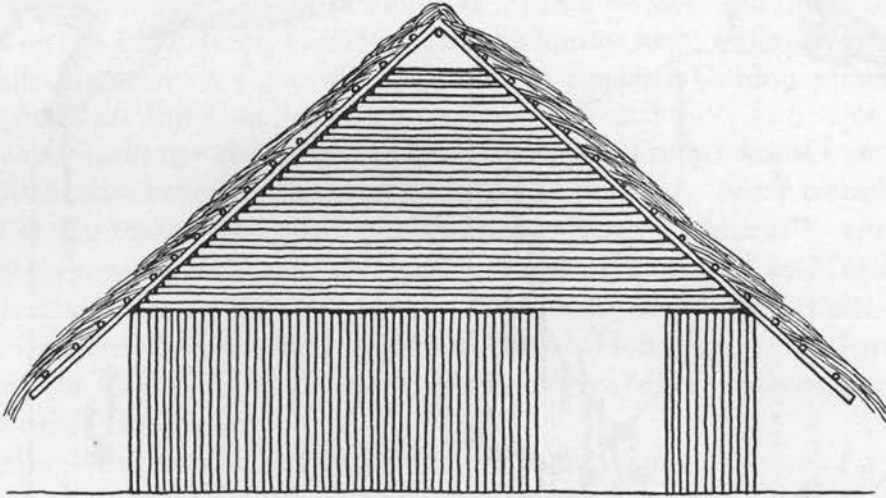


FIG. 19—HOUSE WITH CANE WALL CONSTRUCTION, LAKE AMATITLAN, GUATEMALA

Geographical distribution.—Walls of vertical poles are more common than any other type in the peninsula of Yucatan. In the state of Yucatan itself they outnumber other types everywhere except in the south and in the following towns farther north: Sotuta, Acanceh, Motul, Telchac Pueblo, Dzilam Gonzalez (fig. 20). They are found in large numbers at only one place in the southern area: Ticul, where they form 62 per cent of the total number of houses observed. In the state of Campeche, on the other hand, they extend much farther south. With the exception of Potoc in the north and Mukuchakan in the south, they far outnumber all other types of walls from Becal south to Champoton. The only towns I visited in Quintana Roo (Catmis, Santa Rosa, and Dziuche near Lake Chichankanab) have no walls of vertical poles, the houses of this section apparently belonging with those in the great triangle that forms the southern part of the state of Yucatan. Three of the seven huts illustrated by Shattuck at Xyatil (farther east in this same general area) have stockade walls.²

In Guatemala, especially in the highlands, walls of vertical poles are not so common. They are found in considerable numbers only in the Peten and in some places on or near the West Coast. Vertical wall poles of cane, however, are common in several regions (see p. 68); they are standard at Santiago Atitlan. Bancroft makes the general statement that Guatemalan thatch-roofed huts have sides stockaded with cane, bamboo, or rush.³ LaFarge and Byers report vertical wall poles

² Shattuck, 1933, pl. 47, C.

³ Bancroft, 1886, p. 692.

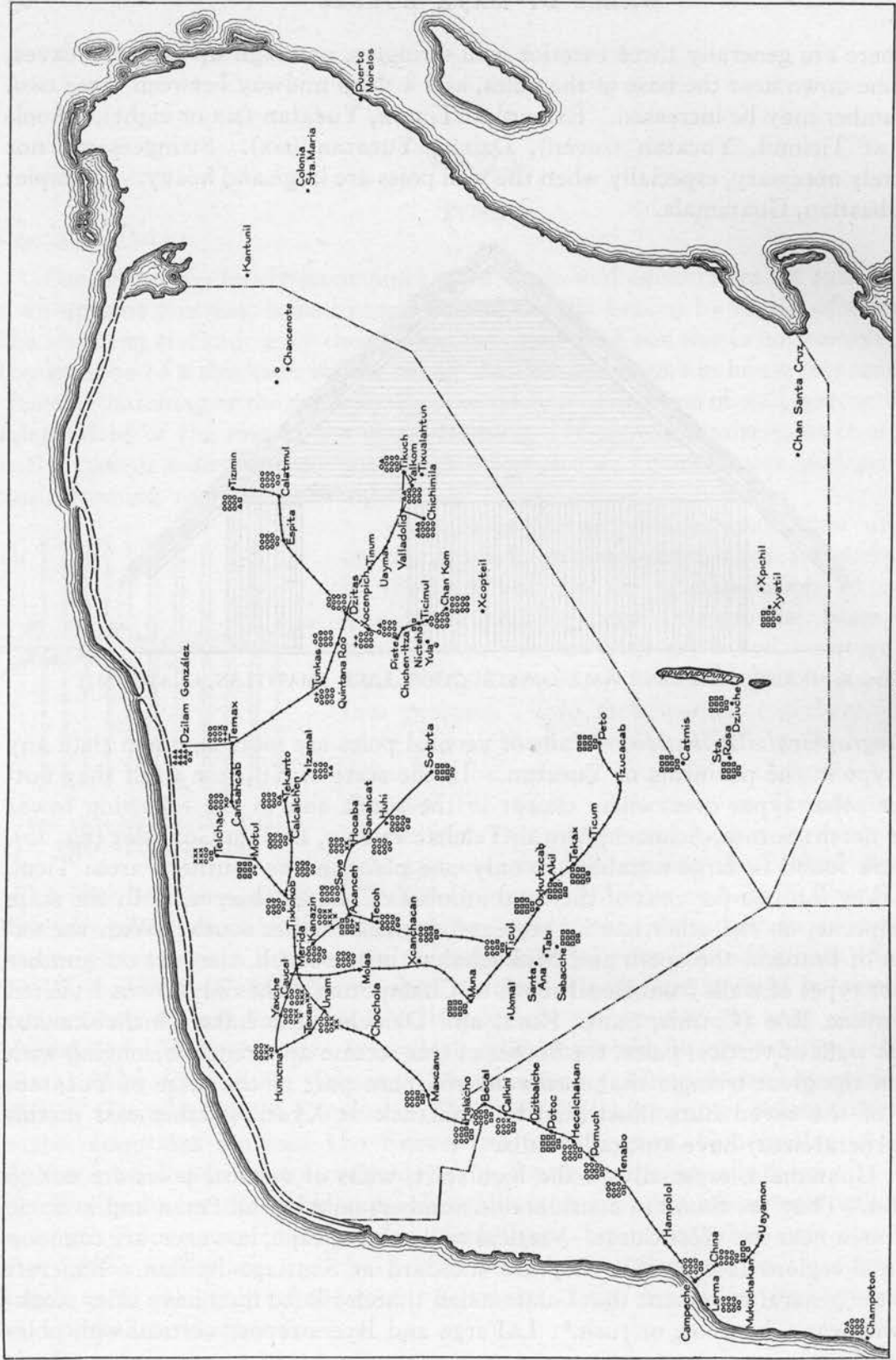


FIG. 20—GEOGRAPHICAL DISTRIBUTION OF TYPES OF WALL CONSTRUCTION IN YUCATAN

on Jacalteca houses in the "Hot Country" of Guatemala,⁴ and Sapper found them (split) on Kekchi dwellings in cooler regions.⁵ Stephens speaks of "houses made of upright poles" at several places in Guatemala and Honduras. In one case the reference is clearly to members of the house framing; in another (a house at San Jacinto) he alludes obviously to wall poles.⁶ His use of the word "poles" is doubtful when he describes houses at Iztapa on the West Coast of Guatemala, Copan, and a plantation near Esquipulas, Honduras.⁷ In a photograph made by Gordon at Santana on the Uloa River, Honduras, all the houses have walls of vertical poles. Similar walls are seen on some of the houses in another Gordon photograph of Travacillo, also on the Uloa.⁸

Blom and LaFarge describe stockade walls on Tzeltal houses in Chiapas; at Tenango the stockades consisted of broad, split planks.⁹ Starr records vertical wall poles at Pantepec (Totonac) and Tantima (Aztec), Mexico.¹⁰ One of Barbour's photographs of an Aztec (Nahuatl) house at Xochimilco, Mexico, shows walls of vertical canes or slender poles.¹¹ Gann tells of stockade walls on Maya houses in southern Yucatan and northern British Honduras;¹² Stephens reports them among the Caribs,¹³ and J. Eric Thompson reports them among the Maya of southern British Honduras.¹⁴

Antiquity.—In parts of Yucatan there is some dubious evidence of a relatively recent trend away from the use of horizontal wattle for walls, vertical poles now being employed more frequently than before. The evidence will be discussed later under the subject of horizontal wattle (pp. 71-72). If this change in wall structure has taken place it marks in some degree a return to a former type, for we can trace walls of vertical poles back through literature as far as the sixteenth century:

1844. Catherwood says of Yucatan, ". . . the original style of house (in use, no doubt, from the earliest period, and still found exclusively in Indian villages,—the walls constructed of bamboo canes, or trunks of trees, placed upright, and bound together by withes . . .)"¹⁵

1843. Norman and Stephens: both writers, in describing houses, use the word "poles" in a vague sense (see above). Only one¹⁶ out of seven passages¹⁷ by Stephens clearly refers to stockade walls, but this one is sufficient to establish their existence almost a century ago. Norman's reference is doubtful.¹⁸ It is also difficult to distinguish wall types in the illustrations of these books. In a poor drawing of an Indian house in Norman's *Rambles in Yucatan* the walls apparently consist of widely spaced uprights with mud between.¹⁹ The houses in Catherwood's drawings of Yalahao on the east coast of Yucatan and of San Miguel on

⁴ LaFarge and Byers, 1931, p. 38.

⁵ Sapper, 1905, p. 27.

⁶ Stephens, 1841, 1: 233, 174.

⁷ *Ibid.*, 1: 287, 288; 107; 165.

⁸ Gordon, 1896-1901.

⁹ Blom and LaFarge, 1926, pp. 335, 336; p. 380.

¹⁰ Starr, 1908, pp. 268, 283.

¹¹ Barbour, 1910.

¹² Gann, 1918, p. 26.

¹³ Stephens, 1841, 1: 28.

¹⁴ J. E. Thompson, 1930, p. 92.

¹⁵ Catherwood, 1844, pp. 9-10.

¹⁶ Stephens, 1841, 1: 174.

¹⁷ *Ibid.*, pp. 107, 165, 174, 287, 288; 1843, 2: 126, 362.

¹⁸ Norman, 1843, p. 132.

¹⁹ *Ibid.*, p. 72.

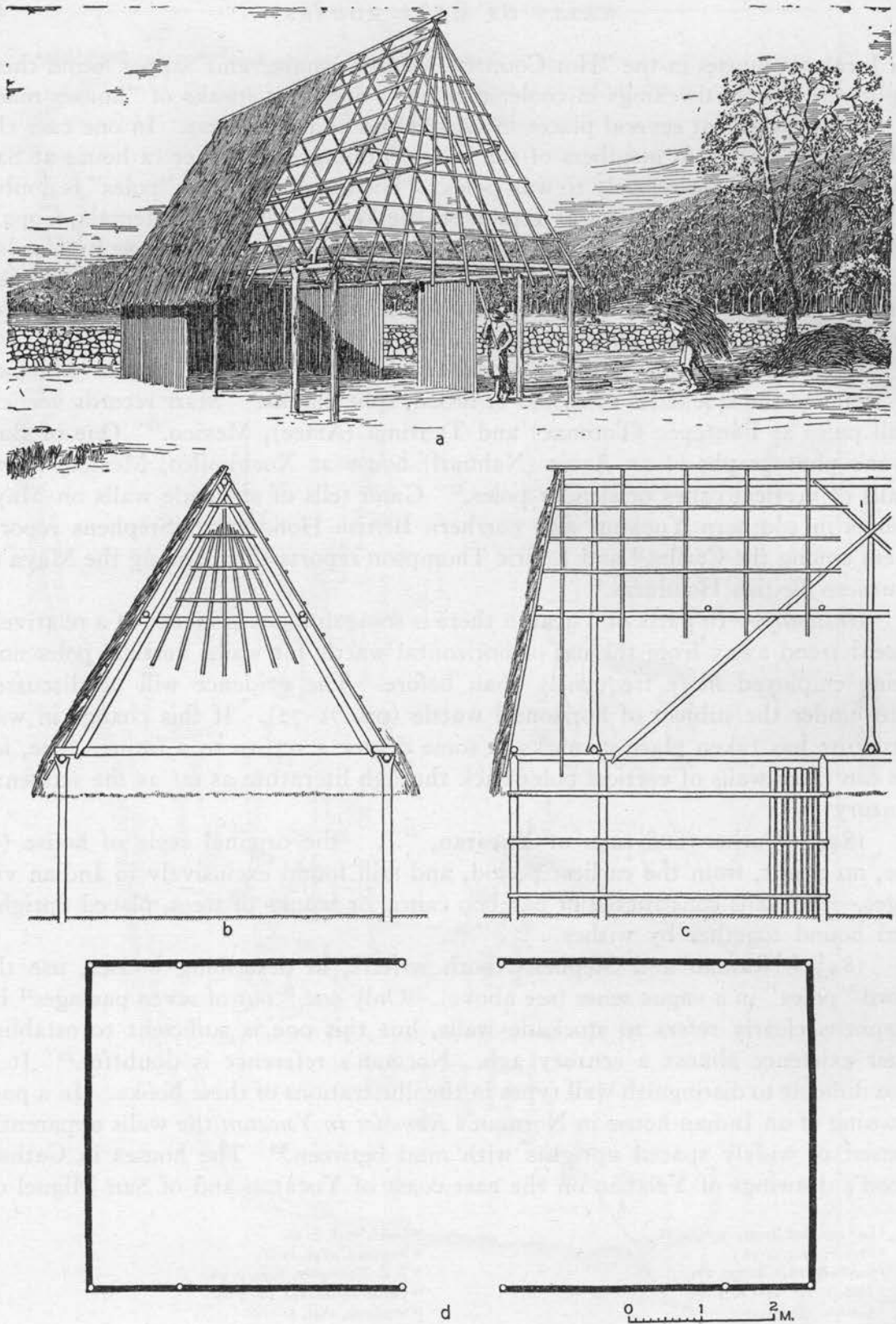


FIG. 21—HOUSE 2, LERMA, CAMPECHE

(Rectangular plan, vertical wall poles, palm thatch. Note steeply pitched roof)

a: Perspective. b,c: Elevations. d: Plan.

Cozumel Island seem to have vertical wall poles.²⁰ Walls of houses he illustrates at Nohcacab may be of either vertical poles or vertical wattle.²¹

Ca. 1577. Answering a questionnaire issued by Philip II of Spain an official of Yucatan writes that in Izamal and Santa Maria they bind the houses together

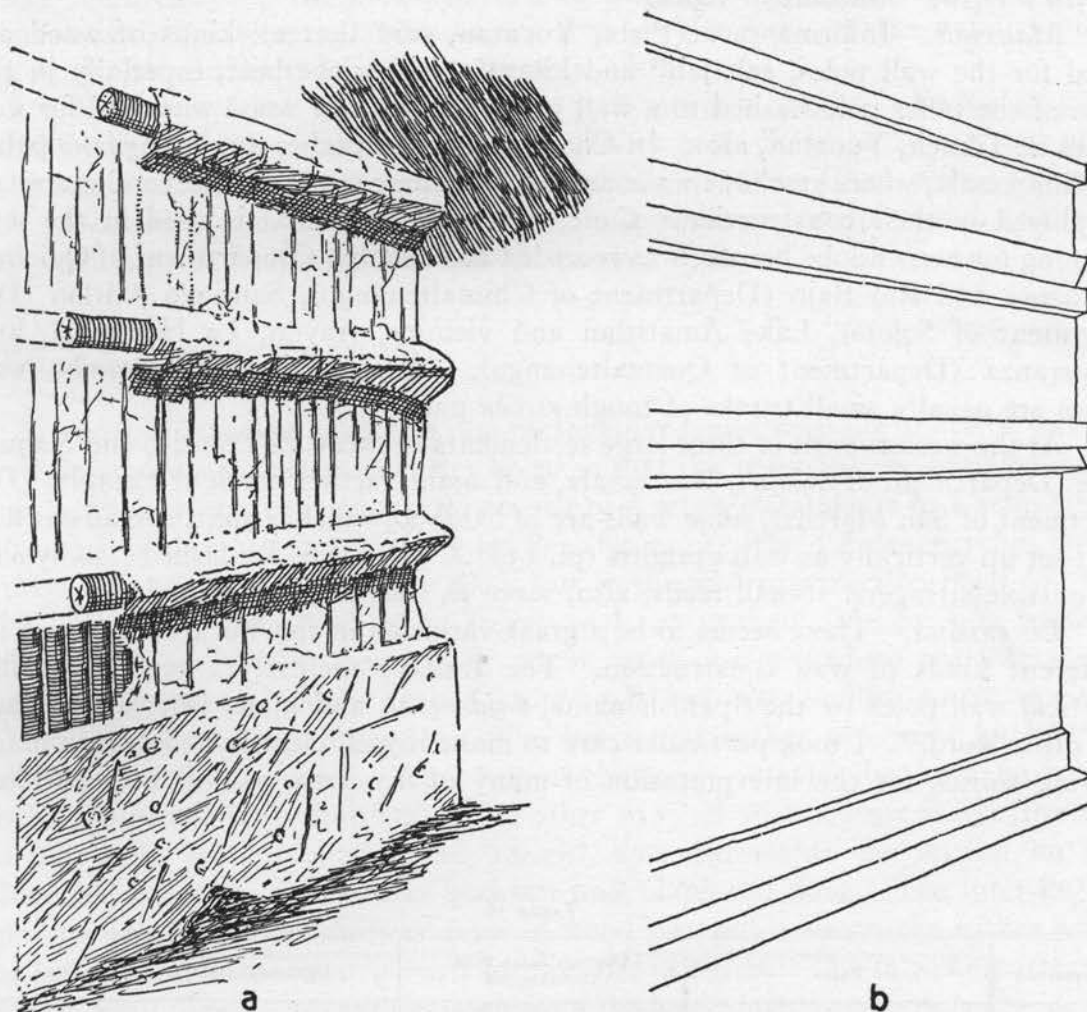


FIG. 22—HOUSE AND TEMPLE PROFILES

a: House 6, Champoton, Campeche.

b: The Cemetery, Uxmal, Yucatan (after Selser, 1917, fig. 130).

and “surround the whole thing with poles.”²² Another official writes that the houses of Villa de Santa are of wood and “fenced with heavy reeds, like short lances bound together with some runners or vines . . .”²³

Ca. 1575 and ca. 1650. A final suggestion that house walls of vertical poles were built in ancient times is found in the Motul and San Francisco dictionaries, the former written probably in the last quarter of the sixteenth century and the

²⁰ Stephens, 1843, 2: 347.

²¹ Stephens, 1843, 1: 369.

²² *Col. de Doc. Inéd.*, 1898, 11: 92.

²³ *Ibid.*, p. 370.

latter about the middle of the seventeenth.²⁴ The modern Maya word meaning 'wall of vertical poles' is *kološtʃeʔ* (see Table 16, below).²⁵ In the Motul we find "*colol che, seto o palizada, o de corral hecho de palos o maderos,*" fence or palisade, or corral made of poles or timbers. The San Francisco gives "*cololche, paliza ó cerca,*" stockade or fence.

Materials.—Informants at Piste, Yucatan, said that all kinds of wood are used for the wall poles, *sak jab*²⁶ and *kitantʃeʔ* being the best, especially in the case of the taller poles lashed to a wall plate. The latter wood was used for wall poles at Tikuch, Yucatan, also. In Champoton, Campeche, they use *guano* palm. In Guatemala, where stockade walls are not so common, one finds several materials employed in their construction. Cane, the same kind that is used in the wall framing for mass adobe houses, was recorded at Zacualpa (Department of Quiche), Zaragosa and Rio Bajo (Department of Chimaltenango), Santiago Atitlan (Department of Solola), Lake Amatitlan and vicinity, Anyon, La Hortensia, and Esperanza (Department of Quetzaltenango). In the Peten, Guatemala, wall poles are usually small trunks of tough *escoba* palm.

At the westernmost of three large settlements between El Transito and Nahualate (Department of Solola), Guatemala, and again, farther north at Pajapita (Department of San Marcos), some walls are of bamboo, which is split, spread out flat, and set up vertically as wall uprights (pl. 13,c). The strips are lashed side by side to outside stringers. Small reeds, also, serve as wall poles at Pajapita.

Linguistics.—There seems to be a great variation in the Yucatecan names for different kinds of wall construction. The Indians themselves generally called vertical wall poles by the Spanish name, *bajareques*, and many informants knew no other word.²⁷ I took particular care to make myself clear in collecting the following words, for the interpretation of many of my data, as will be seen later,

TABLE 16

LANGUAGE	PLACE	VERTICAL WALL POLE CONSTRUCTION	LITERAL TRANSLATION AND REMARKS
Maya	Piste, Yucatan	<i>kološtʃeʔ</i>	<i>colol che</i> (Motul) <i>cololche</i> (San Francisco)
	Chan Kom, Yucatan	<i>kološtʃeʔ</i>	<i>kološtʃeob jo tu'nitʃob</i> , the <i>bajareques</i> rest on stones
	Valladolid, Yucatan	<i>tswitʃeʔ</i>	<i>chuyche</i> (Redfield) ²⁸
	Tizimin, Yucatan	<i>kološtʃeʔ</i> or <i>tswitʃeʔ</i>	Informant said <i>tswitʃeʔ</i> refers to lashing of wall poles together
	Muna, Yucatan	<i>xit bi kološtʃeʔ</i>	<i>xit</i> from the Spanish <i>tejido</i> , woven?
	Campeche	<i>kološtʃeʔ</i>	
	Dzilam Gonzalez, Yucatan	<i>kološtʃeʔ</i>	

(For footnotes see opposite page.)

hinged on the particular meaning implied in the term used in the various regions studied. In towns where only one type of wall construction was used it was difficult to be sure that I was not getting just a general name for 'wall' or even for the type of wood used in the wall. I had to make a return trip to Valladolid and spend a day there checking the meanings of two words, for the names given in other parts of the state were so contradictory that they endangered the validity of all my work done in Valladolid on a previous visit.

A Piste informant called an exterior wall stringer **koptʃeʔ**. Redfield²⁹ gives **bahche** or **copoche** for this member. The taller poles fastened to the wall plate were called **ku'lub** at Piste, and **muktʃeʔ** (strong wood) at Chan Kom, Yucatan. The Motul dictionary gives **culub**, *colmo de la medida*; I suppose this might be best translated as 'full measure,' but this is only a guess.

HORIZONTAL WATTLE

Construction.—The plan of a non-rectangular house with horizontally wattled walls differs from that of an ordinary house in that the apses, instead of following an even semi-circular curve, appear to consist of a series of tangents to a semi-circle, joined in a broken but roughly rounded line (fig. 24,c). The difference is due, not to a preconceived desire for another plan, but to the wall construction itself (pl. 16). The wall poles, instead of being heavy and set upright side by side between **kulu'bo:b**,³⁰ are thin withes (about 2 cm. in diameter), which are interwoven horizontally among widely spaced **kulu'bo:b** and the smaller single uprights with which these are interspaced. The horizontal withes run from **ku'lub**³¹ to **ku'lub**, passing alternately (from top to bottom) outside the **kulu'bo:b** and inside the interspaced uprights. The other rows of withes start inside the first **ku'lub**, bend around outside the upright, and end inside the second **ku'lub**. There are about 60 or 70 withes between wall plate and floor. The inter-**ku'lub** uprights are flanked by short sections of wood inserted between the withes where the latter bend outward or inward to pass the uprights. The fan-like pattern of four layers of these smaller sticks, seen from the house interior and thus silhouetted against the light, gives an impression of shrubbery planted on the other side of the wall (pl. 16,b; fig. 24,b,d). The sticks, however, are not purposely decorative; their real function is that of filling in empty gaps, so that mud daubed on later will have something to hold to before it dries. Since horizontal withes, pliant though

²⁴ Tozzer, 1921, pp. 170, 172.

²⁵ This is the translation in most widespread use; in some places it refers to horizontal wattle or vertical wattle. The Perez dictionary gives *colohche* or *cololche*.

²⁶ P. 36, n. 25, *supra*.

²⁷ *Bajareque* in Guatemala refers to the wooden wall framing for adobe construction.

²⁸ Redfield, 1934, p. 34.

²⁹ *Ibid.*, p. 34.

³⁰ Plural of **ku'lub**.

³¹ See text following Table 16 above.

they be, cannot follow a curve as gradually as can vertical poles, the slight difference in house plan is a functional one.

Informants' opinions differed concerning the advantages and disadvantages of horizontal-wattle construction. All agreed that it is much easier and cheaper to build; the small withes are easier to cut and to carry, and no lashing is required to

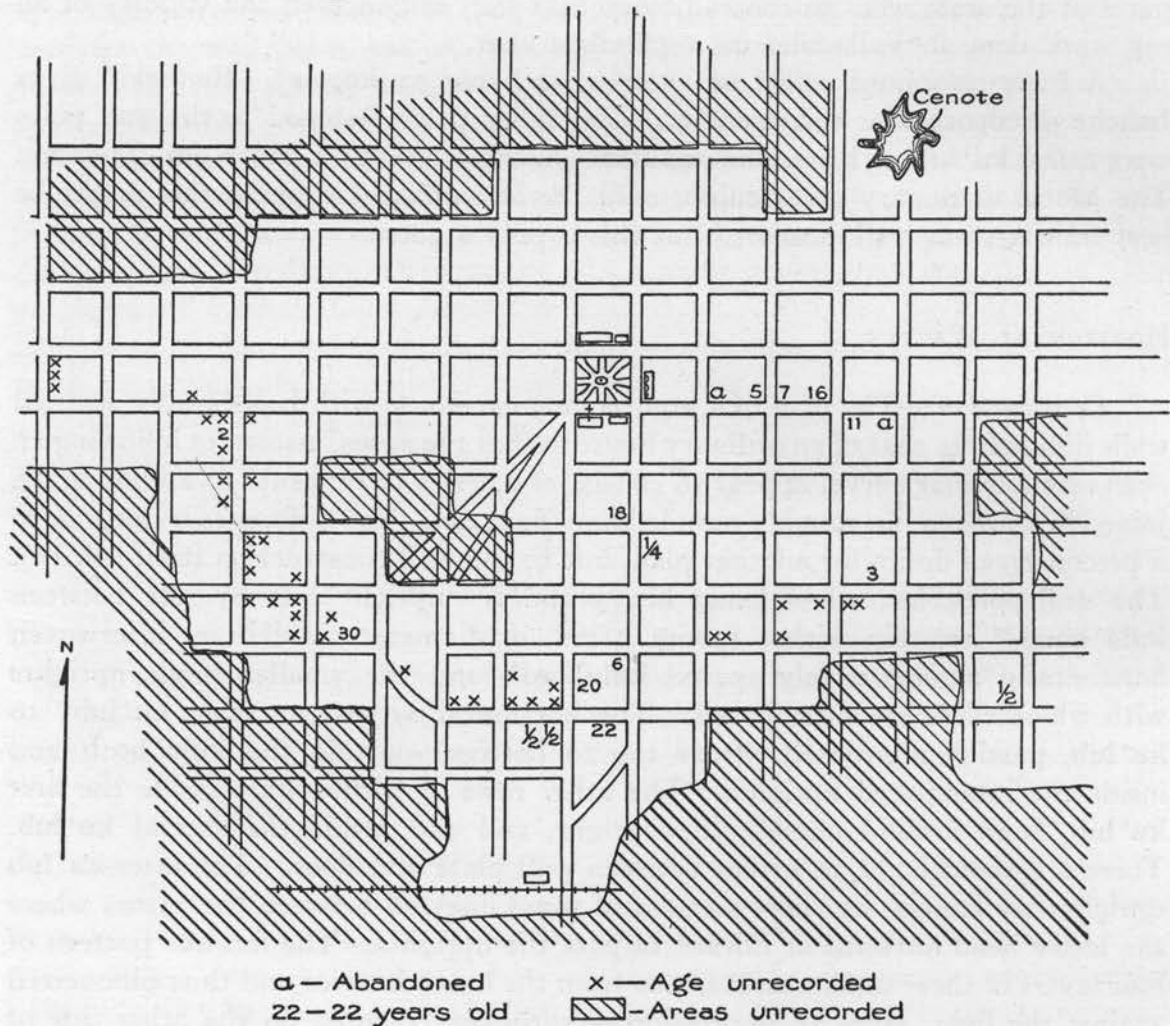


FIG. 23—SKETCH MAP OF VALLADOLID, SHOWING DISTRIBUTION OF HOUSES WITH HORIZONTAL WATTLE

About 25 per cent of total number of houses in the recorded area are represented.

hold them in place. Horizontal wattle holds mud better than vertical poles do. I was also told, to my surprise, that the tightly interwoven withes provide sturdier resistance to wind and weather than do the heavier stockades. In abandoned houses, the former collapse outward and inward rather than longitudinally; since the longitudinal axis of the Yucatecan house is the weaker axis, the house is considerably strengthened when its walls are fortified from end to end. In addition, as a Chichimila informant pointed out, horizontally wattled walls do not have

so many upright poles to rot away where their bases come in contact with the ground. Against these opinions were those of six Valladolid informants who preferred vertical wall poles. In most cases they maintained that uprights are heavier and stronger and therefore last longer than withes.

Geographical distribution.—The occurrence of horizontally wattled walls (fig. 20) is puzzling; it cannot be correlated with environmental or economic factors. The town which has the highest percentage of houses with this type of wall construction, Dzilam Gonzalez, Yucatan (92 per cent), is isolated in this respect. The other Yucatecan focal area for walls of horizontal wattle is Valladolid and vicinity, far to the southeast. Among three towns visited in this region, the percentage of houses with horizontal wattle increases from northeast to southwest: Tikuch 6 per cent, Yalkom 16 per cent, and Chichimila 20 per cent. Although I kept no record of the total number of houses visited in Valladolid, I think that the 55 houses with horizontal wattle observed there represent very close to 25 per cent of the total. Izamal holds fifth rank in Yucatan with 10 per cent (15 out of the 150 houses recorded). In no other part of Yucatan visited is the percentage significantly large. Temax (5 per cent) ranks near Tikuch, but the 11 houses that have horizontal wattle walls are all in the outskirts of town, concentrated along the narrow-gauge flat-car track that leads to Dzilam Gonzalez. The two houses with walls of horizontal wattle at Piste were built by men who came originally from the vicinity of Valladolid.³² There are two houses with walls of this type at Tizimin, and one each at Tekanto, Dzitas, and Merida. I saw a few, also, at Chicxulub on the Gulf Coast, but had no opportunity to count the percentage. One example was recorded at Champoton, Campeche.

In Guatemala horizontal wattle walls were recorded at Tablon, Zapote, Morazan, and other towns in the Baja Vera Paz (pl. 16, *d*). Coming up the Motagua Valley on the train one sees along the railroad tracks shacks built in the same fashion but made with laths of modern manufacture rather than with supple withes.

Antiquity.—The following are the results of sixteen interviews with old men at Valladolid, Chichimila, Tikuch, and Yalkom, Yucatan: ten men, ranging from seventy to eighty years old,³³ said that almost all Maya house walls were of horizontal wattle when they were children. One of the ten stated that there were more horizontally wattled walls only six years ago, but other estimates ranged from thirty to fifty years ago. Several said that vertical wall poles were introduced by Mexicans. At Tizimin, Yucatan, an eighty-year-old man said that when he was a boy all houses had walls of horizontal wattle and that vertical poles did not appear until about fifty years ago. These data were collected from six different towns with a new interpreter for each of them except one.

³² Morris Steggerda of Carnegie Institution of Washington writes in a personal letter this interesting news concerning a third house at Piste: "This last year, 1935, there was a similar house built on the Chichen road by people also from the east. I learned in Chichimila last year that those people built the horizontal type of house walls because of the scarcity of thicker poles. Am I right on this? I think it is interesting that when eastern people come to a town like Piste they still build their own type of house."

³³ They wore the old-fashioned loin cloth.

Against this evidence are the statements of four Valladolid informants, one of whom was eighty years old, that the number of wattle and stockade walls has always been equal. There are today, however, many more stockade walls than wattle walls in Valladolid. Hence, if the informants meant exactly what they said, wattle walls have decreased; if they meant that houses were then as they are now, their accuracy must be doubted. A fifth informant, a Tizimin woman who gave her age as seventy but was probably under sixty, said that when she was a girl there were no walls of horizontal wattle; she excepted Valladolid from this statement. A seventy-year-old man at Temax said that there had always been both types of wall construction.

Data from Dzilam Gonzalez, where wattle walls are standard, are equally confusing. Two informants said that when they were children all house walls were of vertical poles; one of these said that wattle construction was learned from the east "in the direction of Tizimin." A third stated that all houses formerly had the horizontally interwoven withes, and a fourth said that when he was a boy there were many more houses of this type than there are today. None of these informants was over fifty-five years old. At Izamal most of the people interviewed said that there had always been both types of wall construction.

The ages of the houses themselves are of no value as evidence, for dwellings of both types ranged from three weeks to thirty years in age. When associated with another type of wall construction (for example, a wattle-walled dwelling on the same property with a stockade kitchen), five houses of the latter type were older and six were newer. I was told in Valladolid, Yucatan, that the southern and especially the southwestern parts of that town (near the Sisal convent) are the oldest sections; horizontally wattled walls are most numerous there (see sketch map, fig. 23). One should hesitate to attach significance to this distribution because there are too many factors that could have been influential. For instance, neighbors may have imitated other house construction in their community. Wattle houses, being cheaper, may reflect poverty in these sections. Or the older house types may be marginal in location rather than typical of the older and more conservative communities. The distribution of percentages cannot be checked with that of Chichimila (fig. 2), for no one could tell me which was the oldest section of that town.

Early literature mentioning house walls is scarce. At least one sixteenth-century document provides evidence that either horizontal or vertical wattle existed at that time. This is the *Relacion de Quinacama ó Moxopipe*, which, in answer to Philip II's questionnaire, reports "They arm the house with light interwoven poles and fasten it with . . . vines."³⁴ One edition of this *Colección de Documentos Inéditos* illustrates the type of house at Tetzal and Temax. The walls shown in the picture appear to be of horizontal wattle construction, but one cannot be sure that the original drawing has been faithfully reproduced.³⁵ Some

³⁴ *Col. de Doc. Inéd.*, 1898, 11: 262.

³⁵ *Ibid.*, p. 263.

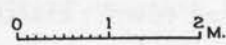
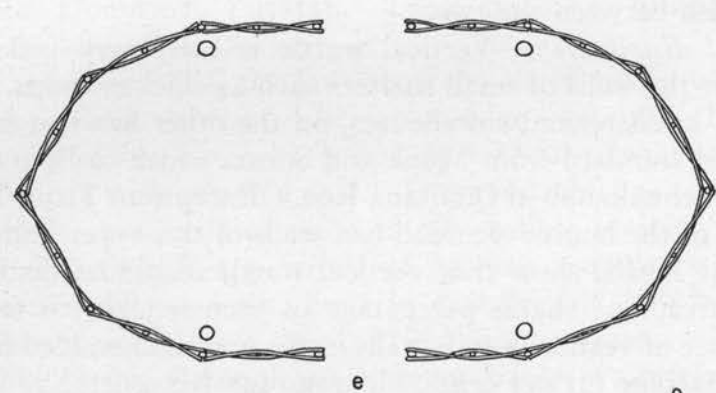
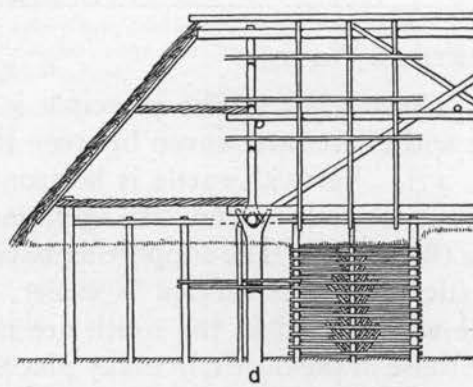
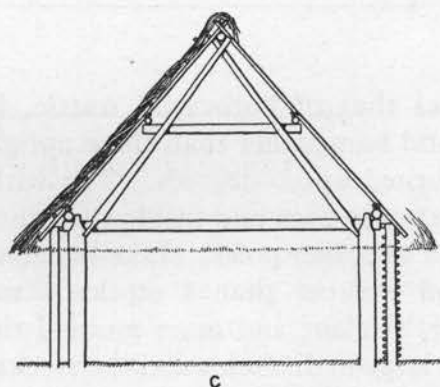
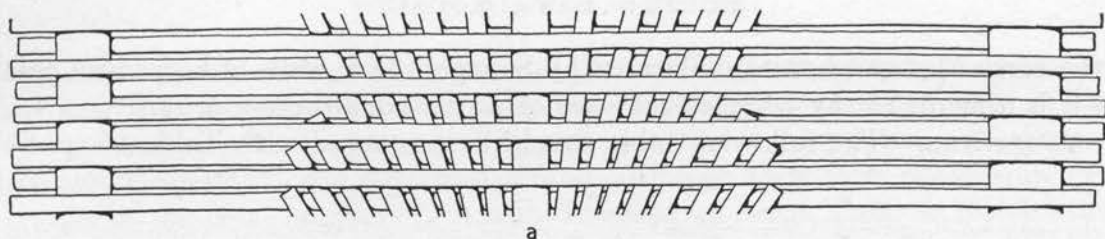


FIG. 24—HOUSE 2, PISTE, YUCATAN
 (Apsidal plan, horizontal wattle walls, palm thatch)
a: Detail of wall construction. *b*: Perspective. *c,d*: Elevations. *e*: Plan.

of the early Mexican houses illustrated by Sahagun have walls of horizontal poles, but it is difficult to say whether they are of wattle construction or not.³⁶

Linguistics.—The following table should be compared with Table 16 (p. 68).

TABLE 17

LANGUAGE	PLACE	HORIZONTAL WATTLE CONSTRUCTION OF WALLS	LITERAL TRANSLATION AND REMARKS
Maya	Valladolid, Chichimila, Tikuch, and Yalkom, Yucatan	koloʃtʃeʔ	
	Tizimin, Yucatan	siptʃeʔ	
	Telchac Pueblo House 2	hit tʃeʔ	From <i>tejido</i> and <i>tʃeʔ</i> , wood <i>hiithil</i> , <i>ser tejido ó trenzado</i> , to be woven or braided (Perez) ³⁷ <i>hiith</i> , <i>hacer con entretejidas como trenza ó petate</i> , interwoven as in a braid or mat (San Francisco)
	House 3	sikitʃeʔ	
	Izamal	siptʃeʔ or hit tʃeʔ	See above
	Champton, Campeche	hit tʃeʔ	See above

VERTICAL WATTLE

Construction.—The principle is the same as that of horizontal wattle, but the withes are interwoven between three horizontal bars rather than three uprights (pl. 17). Vertical wattle is horizontal wattle turned up 90 degrees. The withes pass alternately outside the uppermost and lowermost bars and inside the central one (fig. 49,a). The supporting bars are fastened to corner poles. Like horizontal wattle, this construction is easier, quicker, and cheaper than a stockade wall. The withes used in the south are much heavier, thicker, and more gnarled than are those in the north; in many places they are so large in diameter and the stockade poles are so much more slender than usual that it is difficult, without close inspection, to distinguish between the two.

Geographical distribution.—Vertical wattle is used very widely in Yucatan for fences and for the walls of small shelters such as chicken coops. For the walls of dwellings and kitchens and storehouses, on the other hand, it is typical of the south only. It is standard from Muna and Sotuta south to Peto and from there south to Lake Chichankanab in Quintana Roo. Exception: Ticul, Yucatan, where only 33 per cent of the houses recorded had walls of this type. Shattuck's photographs of huts at Xyatil show that vertical wattle continues farther east in this same southern area, but shares percentage of occurrence with stockade walls.³⁸ The preponderance of vertical wattle walls in the south is heralded first in centrally located towns: Halacho (21 per cent), Maxcanu (38 per cent), Xcanhacan (23 per

³⁶ Sahagun, 1880, lam. 133, libro II, no. 896-910. See also Wauchope, 1934, fig. 6.

³⁷ Perez, 1866-1877, p. 127.

³⁸ Shattuck, 1933, pls. 47,A,B, 48,C,D.

cent), Huhi (7 per cent), and Sotuta (98 per cent). That latitude does not limit their distribution entirely is shown by the reappearance of these walls in large numbers at Acanceh, Yucatan, and by their scarcity in Campeche. In this state they are standard at only one town, Potoc, although they form considerable percentages of the total numbers of houses observed at Becal, Calkini, Hecelchakan, Pomuch, Tenabo, Campeche, and Mukuchakan. Returning to Yucatan, we find occasional examples of this type of wall at Hunucma in the northwest, Telchac Pueblo and Temax in the north, Tizimin in the northeast, and Nictcha and Chan Kom in the east. Shattuck illustrates samples from Yula and Dzitas.³⁹

Linguistics.—At Sotuta the horizontal members of the wall were called *xalatse?*. The table below should be compared with Tables 16 and 17 (pp. 68 and 74).

TABLE 18

LANGUAGE	PLACE	VERTICAL WATTLE CONSTRUCTION FOR WALLS	LITERAL TRANSLATION AND REMARKS
Maya	Valladolid, Sotuta, and Muna, Yucatan	kološtse?	coloche (Redfield) ⁴⁰
	Tizimin, Yucatan	baltse?	<i>balche</i> , un cordel con que atan la tela, a cord with which they fasten the cloth (San Francisco; Motul) <i>bal</i> , to twist cords, double, and twine them (Motul) <i>baltse?</i> is also a tree from which the Indians made an intoxicating drink

DRY RUBBLE MASONRY

Construction.—The house framework is exactly like that of other houses, except that the mainposts and taller poles (Yucatecan *kulu'bo:b*) supporting bundle end plates may be removed when walls are built to their full height. One often sees pole plates lying on top of dry rubble walls, while the crossbeams rest either across the plates or, more often, on the walls, also. Sometimes the poles supporting the wall plates are left in position and the stone walls are built up to them. Example: Hunucma, Yucatan. These poles are generally visible from the exterior of the house (pl. 18,*d*).

As for the masonry itself, the lowermost course of stones usually consists of larger rocks, often thick enough to be set on edge (fig. 25). The remainder of the wall, consisting of smaller rocks, is laid up without mortar to the level of the plate.⁴¹ This is done with amazing skill. Everyone who has traveled in Yucatan is familiar with the hundreds of miles of dry rubble masonry boundary walls (*albarradas*), which, though apparently of careless construction, are in reality remarkably sturdy. House walls, built in exactly the same way as boundary walls, are sometimes as high as 2.5 m. (pl. 18,*b*) and support a heavy roof framing in addition. The latter, although a steadying factor in ordinary weather, adds

³⁹ *Ibid.*, pl. 17, A, B.

⁴⁰ Redfield, 1934, p. 34.

⁴¹ At Santiago Atitlan, Guatemala, it is built to within 15 cm. of the plate.

considerably to the wind load during a storm. Walls are usually built to their full height at first only in the four places which are to support the crossbeams (pl. 18,c). Then the remainder of the wall is constructed. In rare cases mud is daubed on the outside to a width of about 75 cm. at each side of the door. Example: Telchac Pueblo, Yucatan (fig. 3,f).

Geographical distribution.—Motul and Telchac Pueblo are the only two towns visited in Yucatan where dry rubble masonry is the most common type of wall construction. Motul, with 86 per cent of recorded houses having walls of this type, leads; Telchac (59 per cent) is second. Dry rubble walls appear again in large numbers farther west at Hunucma (38 per cent), Yaxche (40 per cent), Caucel (46 per cent), and Unam (36 per cent). Except for two isolated examples at Calkini, Campeche, they were not seen south of Unam, Acanceh (20 per cent), and Hocaba (14 per cent), or east of Dzilam Gonzalez (4 per cent), Temax (4 per cent), and Izamal (4 per cent). With such a limited extent, they may be considered almost as typical of northwest Yucatan as vertical wattle is typical of southern Yucatan. The fact that stockade walls outnumber them in the northwest does not alter the situation; if we remove all stockade-wall symbols from our distribution map (fig. 20), only two consistently localized wall types remain: vertical wattle in the south and dry rubble in the northwest. Santiago Atitlan is the only town in Guatemala where dry rubble walls were recorded. Generally walls here are part masonry and part cane stockade (p. 85), but in some cases the canes are omitted and masonry is continued almost to the eaves.⁴²

Antiquity.—Three informants at Telchac Pueblo, Yucatan, said that when they were boys there were few, if any, house walls of dry rubble masonry. Because these are sturdier they have replaced stockade walls in relatively recent years, according to the men. Thatch-roofed houses with rubble masonry walls were in use as early as the sixteenth century in Yucatan (pp. 79–80). Most of the early references are to “*cal y canto*” (masonry in which a mortar is employed) and do not mention dry rubble masonry specifically. The Motul dictionary, however, defines *cot* or *ticin cot* as a “*pared ó cerca de piedra sin barro*,” ‘wall or fence of dry rubble,’—clear proof that this type of masonry was, as seems logical, used in ancient times just as it is today. The Telchac verbal data, if they are valid at all, should therefore be interpreted as meaning that the use of dry rubble masonry house walls has increased within recent years.

Materials.—Yucatecan building stone is always limestone. In areas where dry rubble masonry walls are common, there is an abundance of limestone rocks on the surface. Throughout Yucatan limestone either outcrops or lies only a few centimeters below the surface; when not loose on the ground it can therefore always be quarried within a few meters of the house site. Pointed iron poles are driven into the limestone bed, to a depth of about 60 cm. or to whatever depth the desired size of the stone requires. When a series of these holes has been sunk, the stone is pried loose. When it falls it brings with it many smaller fragments which are used as fillers or chinking. Extensive quarrying for a large house may reduce

⁴² Rubble masonry here is not always dry, however.

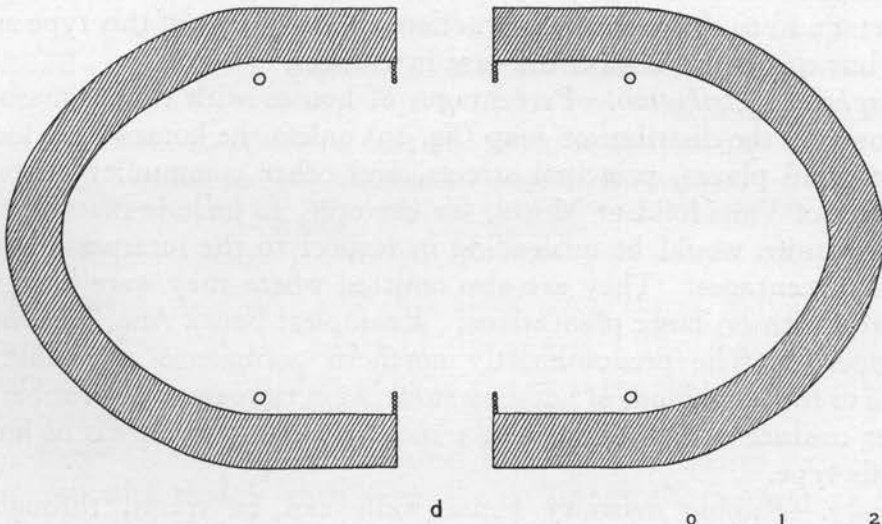
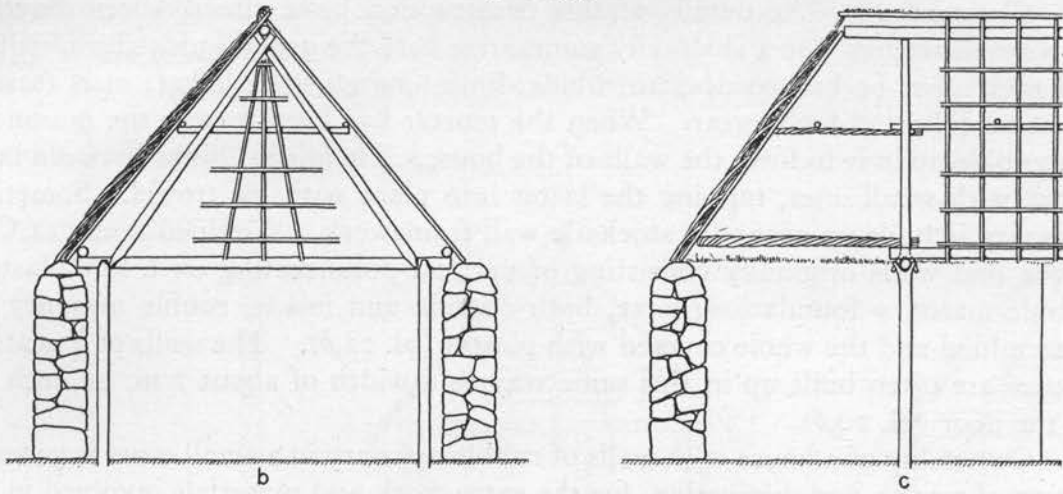
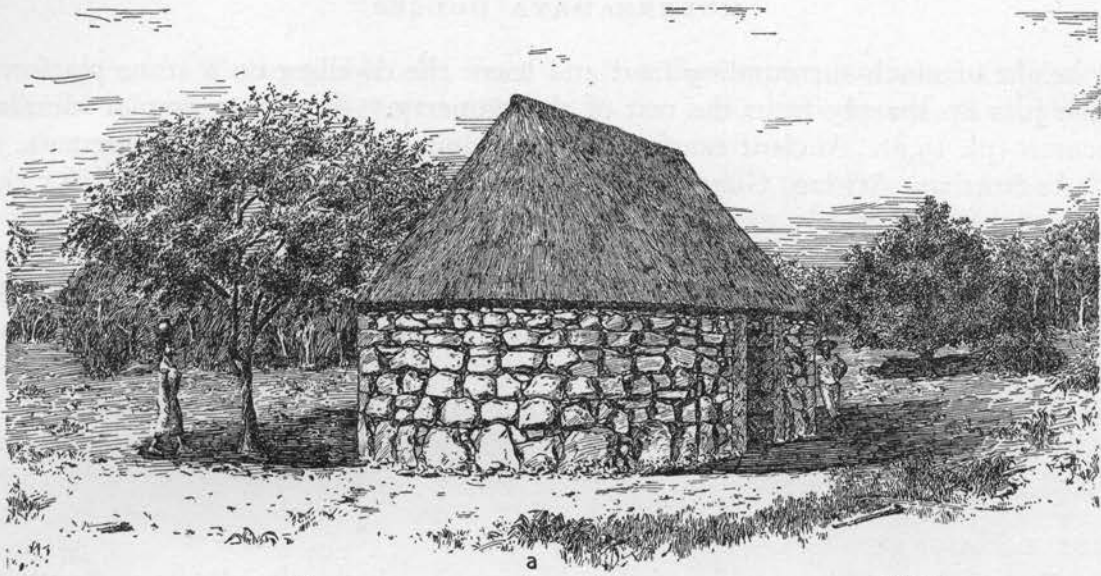


FIG. 25—HOUSE 5, TELCHAC PUEBLO, YUCATAN
 (Apsidal plan, dry rubble masonry walls, grass thatch)
a: Perspective. *b,c*: Elevations. *d*: Plan.

the height of much surrounding land and leave the dwelling on a stone platform which juts up sharply from the rest of the property. Modern example: Merida, Yucatan (pl. 19, *b*). Ancient example: House Mound II, Uaxactun, Guatemala.

At Santiago Atitlan, Guatemala, large chunks of lava rock are used for the walls.

Linguistics.—The Yucatecan Maya usually calls a dry rubble wall by the Spanish name, albarrada. At Hunucma one informant called it *tš'in luk* (*luk*, mud). Another man at the same town called it *kot'bil na*; *kot* was given at Piste. The Motul dictionary gives *cot* or *ticin cot*, wall or fence of dry rubble. The first term, *tš'in luk*, may refer to something else, for properly no mud is used in dry rubble construction. A quarry is called *tš'ak'bil tu'nitš* (*tš'ak*, cut; *tu'nitš*, stone).

RUBBLE MASONRY

Construction.—The details of this construction have already been described by various writers,⁴³ so I shall only summarize here the general procedure. Building rock must be broken up into rubble; limestone must be burnt; marl (*sascab*) must be collected for mortar. When the mortar has been mixed, the mason sets the rubble up in it to form the walls of the house. He fills in chinks between larger rocks with small ones, tapping the latter into place with his trowel. Sometimes masonry is built up around a stockade wall framework. A ruined house at Campeche had walls originally consisting of vertical poles resting on a low plastered rubble masonry foundation; later, both outside and inside, rubble masonry had been added and the whole covered with plaster (pl. 22, *b*). The walls of Yucatecan houses are often built up in this same way to a width of about 1 m. on each side of the door (pl. 20, *b*).

Ownership of a house with walls of rubble masonry in a small town is generally a sign of wealth and distinction, for the extra work and materials involved in preparing mortar add to the cost of construction. City houses of this type are usually plastered, but this is not always the case in villages.

Geographical distribution.—Percentages of houses with rubble masonry walls are not shown on the distribution map (fig. 20) unless the houses were located well away from main plazas, principal streets, and other community centers. In a town the size of Valladolid or Motul, for example, to include masonry houses in the center of town would be misleading in respect to the interpretation of other house-type percentages. They are also omitted where they were built obviously to house workmen on large plantations. Examples: Santa Ana, Yucatan; Uayamon, Campeche. The predominantly northern occurrence of rubble masonry may be due to the abundance of building stone, as in the case of dry rubble masonry, or to closer contact with Merida, where there are many hundreds of houses with walls of this type.

Antiquity.—Rubble masonry house walls can be traced through literary sources to the sixteenth century.

⁴³ Morris, 1931, 1: 220; Redfield, 1934, pp. 54-55.

1834-36. Waldeck (Merida, Yucatan): an illustration featuring a woman in costume includes a thatch-roofed dwelling in the right background; the walls are of plastered rubble masonry.⁴⁴

1577. Most of the Yucatecan replies to Philip II's questionnaire report that some chiefs, lords (*señores*), and leading men had houses of rubble masonry (*cal y*

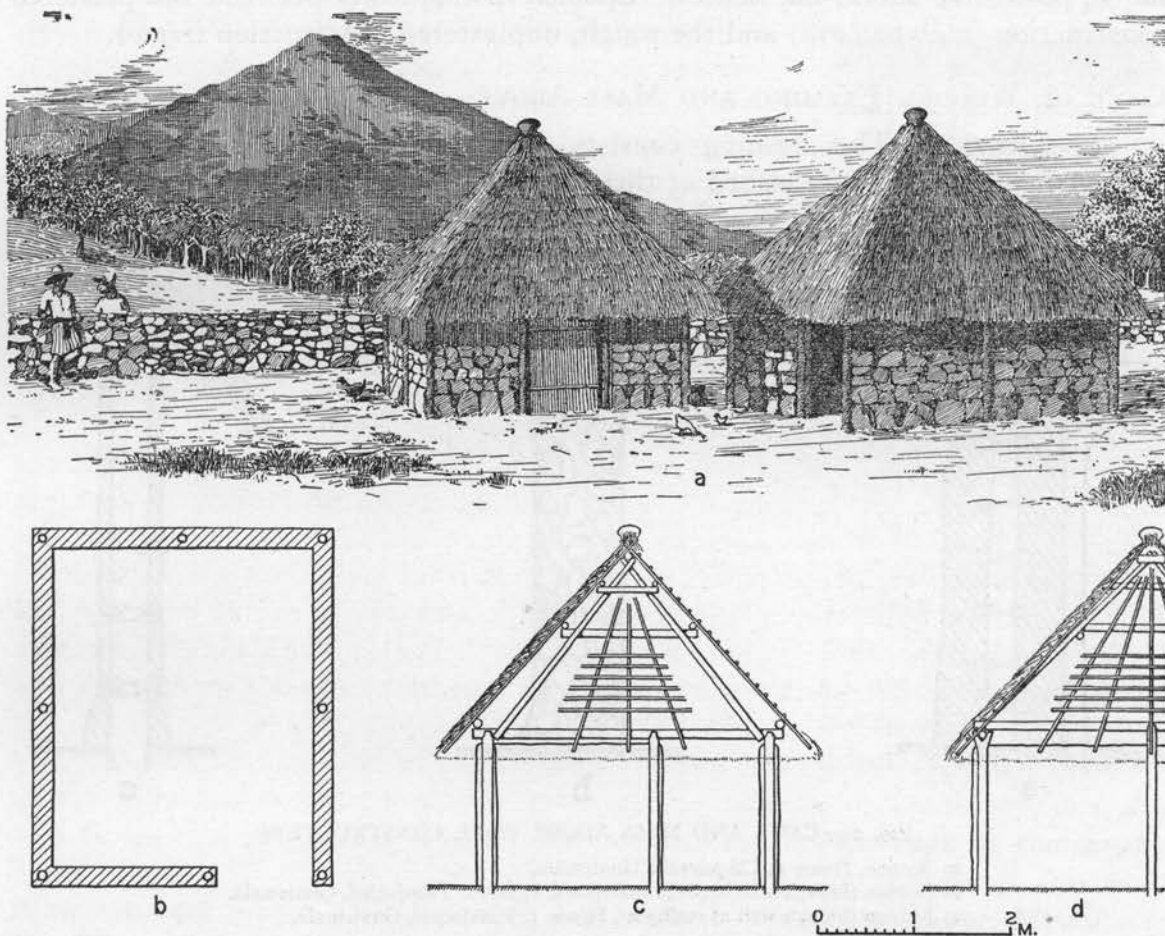


FIG. 26—HOUSE 1A, SANTIAGO ATITLAN, GUATEMALA

(Square plan, walls of dry rubble lava masonry, pyramidal roof)

a: Perspective. House 2 at left, with walls of rubble masonry foundations supplemented by vertical canes.

b: Plan. c,d: Elevations.

canto).⁴⁵ In several cases they add that these walls are so well constructed that mortar scarcely shows at the joints of the stones. The *Relacion del pueblo de Tepeaca* includes a statement that some of the chief people imitated the Spaniards by building plastered houses of stone and mud.⁴⁶

1516. Peter Martyr says of Cozumel Island, "The houses are built of brick or stone, roofed with thatch when there are no stones, but with stone flags when there are quarries in the neighborhood."⁴⁷

⁴⁴ Waldeck, 1838, pl. IV (facing p. 92).

⁴⁵ *Col. de Doc. Inéd.*, 1898, II: 141.

⁴⁶ MS. copy in Peabody Mus. of Harvard Univ.

⁴⁷ MacNutt, 1912, 2: 13.

16th century. Grijalva,⁴⁸ Cordova, Bernal Diaz, and Purchas⁴⁹ all speak of thatch-roofed houses of stone or brick, held together with mortar. Geronimo de Aguilar writes that thatched houses near the Tabasco River were of stone covered with plaster.⁵⁰

Linguistics.—In Yucatecan Maya, rubble masonry is called **pak** or **pa'k'il na** (**il**, possessive suffix; **na**, house). Spanish distinguishes between the plastered construction (*mamposteria*) and the rough, unplastered construction (*ripio*).

CANE OR WOODEN FRAMING AND MASS ADOBE

Construction.—The framing consists of upright and horizontal members (fig. 27). The former are lashed at their upper ends to the exterior surface of the

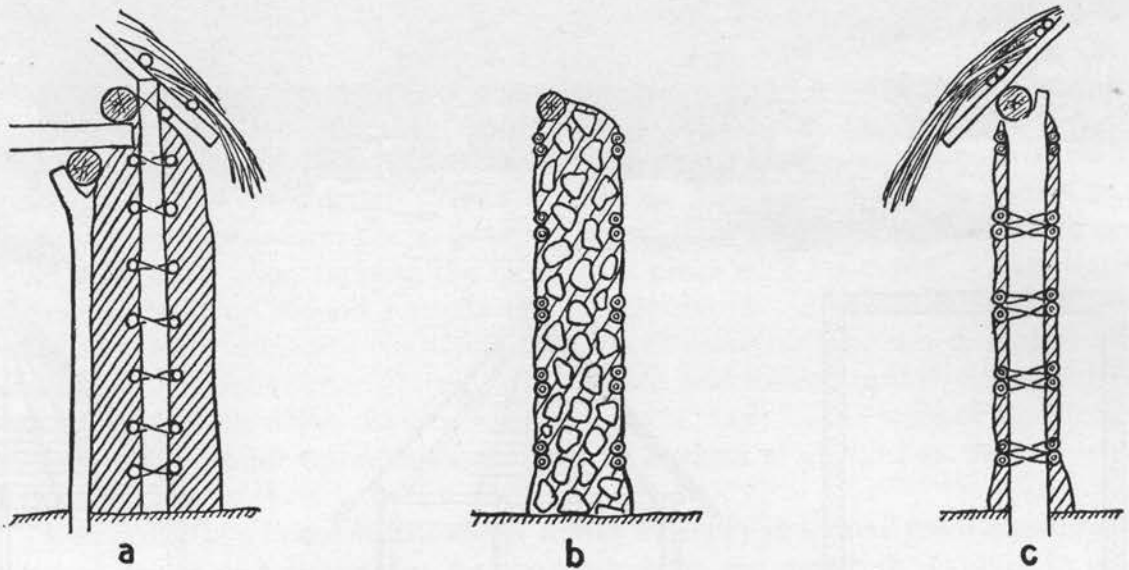


FIG. 27—CANE AND MASS ADOBE WALL CONSTRUCTION

a: Section, House 1, Chiquimula, Guatemala.

b: Section through wall between mainposts, House 1, Panajachel, Guatemala.

c: Section through wall at mainpost, House 1, Panajachel, Guatemala.

plates. At the gable ends of saddle-roofed houses the uprights are graduated in length and lashed at their upper ends to the main rafters. Horizontal members, usually long stalks of cane, are lashed to both exterior and interior surfaces of the uprights. In most places these canes are put on in pairs. Sometimes uprights and horizontal members are larger wooden poles hewn square in cross section; they are of equal size and cross each other, giving a checker pattern to the framing. Examples: between San Juan Ostuncalco and Quetzaltenango, notably at Palestina, Guatemala (pl. 21, a). The members are lashed together with strips from a henequen stalk (*mecate*). Exception: vine was used at San Lucas Toliman, Guatemala.

⁴⁸ MacNutt, 1912, 1: 7.

⁴⁹ Bancroft, 1886b, 2: 783-84.

⁵⁰ MacNutt, 1912, 2: 33-34.

Adobe mud mixed with straw is then built up around both sides of this framing (pl. 21,c). The worker starts at the ground and works upward, one arm thrust through the framing so he can pack mud between the poles from both sides of the wall. The mud usually reaches the eaves of the roof, where the wall uprights are fastened to the plate, but sometimes a horizontal zone about 35 cm. wide, just below the eaves, is left open for ventilation (fig. 28). The amount of adobe varies; generally only enough is put on to make it flush with the horizontal canes or to cover them thinly. Small rubble is sometimes mixed with the mud. Examples: Los Encuentros (pl. 21,d) and Panajachel, Guatemala (fig. 27,b). Mud for House 1 at Panajachel was dug from the ground immediately surrounding the house. According to the builder of this house, the mud would require ten or fifteen days to dry, for it was shaded by several large trees. At Cuilapa (Department of Santa Rosa), Guatemala, the wall framing of one house was packed with small rubble instead of mud.

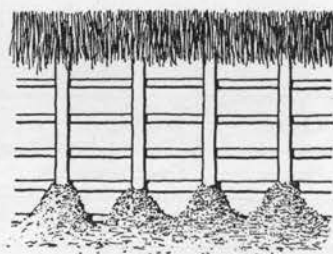


FIG. 28—METHOD OF VENTILATION, JOCOTAN, GUATEMALA

Geographical distribution.—Walls of mass adobe over a cane or wooden framing (pl. 19,c) are found, probably more frequently than any other type, throughout Guatemala with the exception of Santiago Atitlan in the highlands, and the Department of Peten in the lowlands. This statement does not apply to the larger and less isolated towns, especially those exposed to much modern and non-Indian influence, for adobe brick houses are probably predominant there. Examples: Chichicastenango, Huehuetenango, Quetzaltenango, Santa Cruz Quiche, Tecpam, and Solola. Houses with walls of the type with which this section deals were not observed in Yucatan, Campeche, or Quintana Roo. Waldeck reported them at Sisal, Yucatan, in 1838.⁵¹

Antiquity.—References in literature can be found as far back as the seventeenth century.

1896. Gordon's photograph of Travacillo on the Uloa River, Honduras, shows many houses with walls of this type.⁵²

1886. Bancroft, describing the "wild tribes" of Central America, writes that their houses are often of adobe bricks or of cane plastered over.⁵³

1877. Boddam-Whetham (describing San Juan Ermita, Guatemala) said, "This was a miserable little village of cane and mud-plastered huts."⁵⁴

1841. Stephens refers to houses built of poles and plastered with mud at Mico, San Antonio (between Comotan and Copan, Honduras), and San Jacinto. Of Esquipulas he writes, "There was one street nearly a mile long, with mud houses on each side . . ."⁵⁵

1644. Reynoso's dictionary gives the Mam term, *biitz*, for *pared de baha-*

⁵¹ Waldeck, 1838, p. 16.

⁵² Gordon, 1896-1901.

⁵³ Bancroft, 1886, p. 693.

⁵⁴ Boddam-Whetham, 1877, p. 191.

⁵⁵ Stephens, 1841, I: 49, 88, 174, 169.

reque, mass adobe wall. *Bajareque* in Guatemala refers to cane or wooden framing and mass adobe construction.⁵⁶

Materials.—A Chiquimula informant stated that the woods called *guaje* and *llaje* are used for wall framings. At most other towns in Guatemala cane is used for the horizontal members.

Linguistics.—

TABLE 19

LANGUAGE	PLACE	FRAMING AND MASS ADOBE	CANE	MUD	LITERAL TRANSLATION AND REMARKS
Chorti	Jocotan	sa(a)rum		irum	
Quiche	Quetzaltenango	xa ri šqol	a šxix	šqol	
Cakchiquel	Santa Apolonia			tš'abuk	
Zutuhil ⁵⁷	Santiago Atitlan San Pedro de Laguna San Lucas Toliman	tsaxin <i>bajareque de</i> tš'abak	pa(a)tsam or po(o)tsom ax ax		Cf. Cakchiquel (above)
Mam	San Pedro Sz. Concepcion	lam 'bi(x)l lam 'bil	ax lax p tsal	šq' l	š, retroflex s
Jacalteco	Informant from Santa Eulalia	bitsab	wale		
Kekchi	San Juan Chamelco Coban	qut		q'ut	Cf. mud, Coban
Pokonchi	San Cristobal			tš'uwu	Wet mud

ADOBE BRICK

Construction.—The adobe bricks made in Guatemala are long, wide, and low. They are usually laid flat in courses with broken joints (pl. 9, *a*; fig. 29, *a*); at Motan (Department of Amatitlan), Guatemala, they are laid on edge. McBryde describes the manufacture of adobe bricks at Solola, Guatemala, as follows:

As to building-materials, adobe blocks, about 25"×15"×5" for wall construction are made as a rule on the site where the house is to be erected, and apparently no special skill is required in the process. It was a common occurrence to see men excavating a site and wheeling the black dirt, softened with water, to an open, level plot where they molded it by means of a simple square frame of wood, and left the bricks to harden in the sunlight . . . These are universally used in this section for wall-building, the adobe, in the case of better finished houses, being coated with white or tinted plaster.⁵⁸

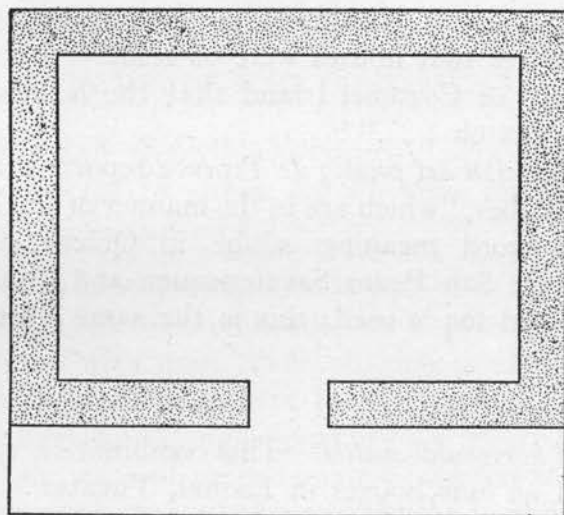
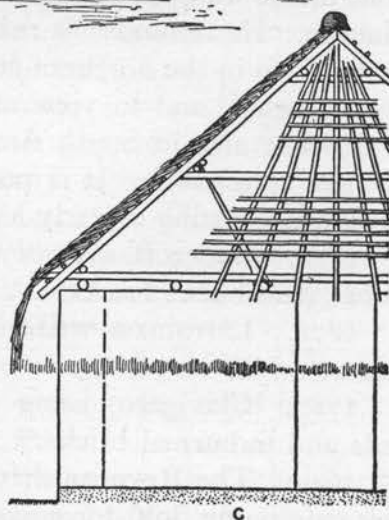
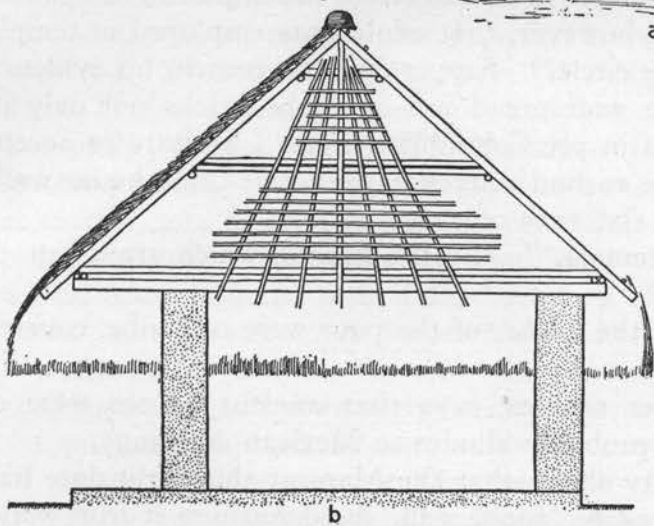
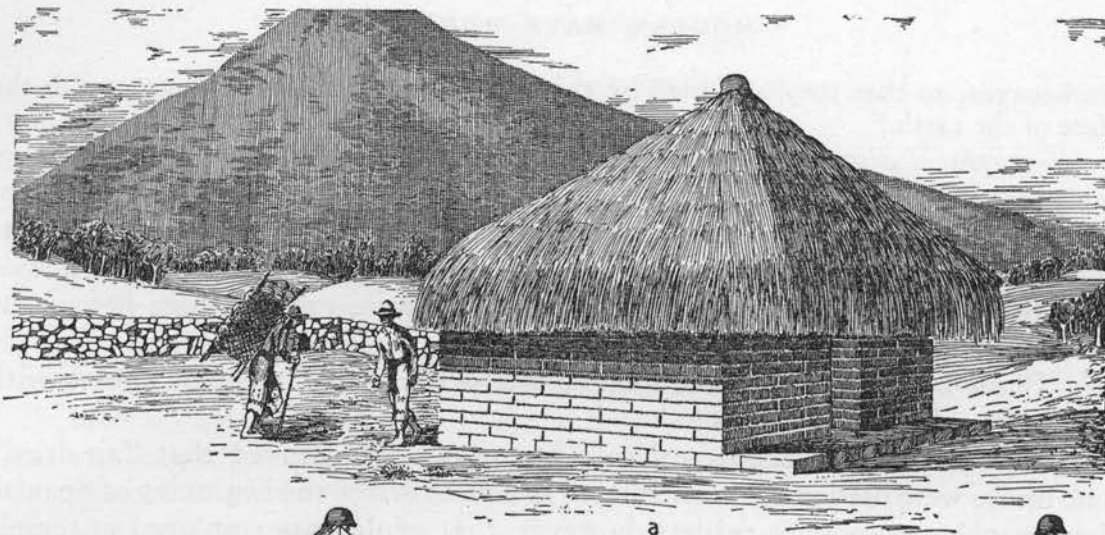
Stephens points out the advantage of adobe-brick wall construction in areas frequently shaken by earthquakes:

The houses in Costa Rica are the best in the country for resisting these shocks, being, like the others, long and low, and built of adobes, or undried bricks, two feet long and one broad, made of clay mixed with straw to give adhesion, and laid when soft, with upright

⁵⁶ In Yucatan *bajareques* are vertical wall poles.

⁵⁷ P. 174, n.1 *infra*.

⁵⁸ McBryde, 1933, p. 104.



0 1 2 M.

FIG. 29—HOUSE 1, SAN PEDRO DE LAGUNA, GUATEMALA
 (Square plan, pyramidal roof, adobe-brick masonry walls, porch, walls supporting roof framing)
a: Perspective. *b,c*: Elevations. *d*: Plan.

poles between, so that they are dried by the sun into one mass, which moves with the surface of the earth.⁵⁹

Geographical distribution.—Walls of adobe brick are found in large numbers in all parts of Guatemala except Santiago Atitlan, the Alta Vera Paz, the Peten, and parts of the West Coast. They are especially common in the larger, more modern cities, some of which were mentioned on page 26. No adobe brick houses were recorded in Yucatan; Sapper says that they were present there before the revolution, and that one can see traces of them in the foundations and cellars of Santa Clara Icaiche.⁶⁰ At Champoton, Campeche, there are five houses with walls of "beach adobe" bricks.

Antiquity.—Sapper believes that it has never been proved that "air-dried" adobe bricks were used in the construction of houses before the beginning of Spanish influence. He reminds his readers, however, that adobe was employed in temple construction in the northern culture circle.⁶¹ Sapper does not present his evidence for this belief, and in view of the widespread use of adobe bricks not only in Mexico but also in South America in pre-Columbian times, I hesitate to accept his view as tenable. It is possible to find references to adobe-brick house walls in literature dating as early as the sixteenth century.

1886. Bancroft says of Guatemala, ". . . the houses, which are often of adobes (sun-burnt bricks) . . ." ⁶²

1878. Larrainzar writes that the houses of the poor were of adobe, covered with straw.⁶³

1780. Clavigero, using earlier sources, says that ancient houses were of reeds and unburned bricks.⁶⁴ He probably alludes to Mexican dwellings.

1644. The Reynoso dictionary shows that the Mam at this early date had their own name (**lok**) for *pared de adobe*, 'adobe wall,' distinguishing it from *pared de bahareque*, 'mass adobe wall' ⁶⁵ (**biitz**).

1626. Purchas writes that houses were of stone or brick, and lime.⁶⁶

1516. Martyr says of Cozumel Island that the houses "are built of brick or stone, roofed with thatch . . ." ⁶⁷

Ca. 1577. The *Relacion del pueblo de Tepeaca* reports that the houses of that province are made of adobes, "which are in the manner of small mud walls . . ." ⁶⁸

Linguistics.—The word meaning adobe in Quiche, Cakchiquel, Zutuhil, and Jacaltec is **san**. At San Pedro Sacatepequez and Concepcion, both Mam-speaking towns, the word **loq** is used; this is the same word (**lok**) given by the Reynoso dictionary.

COMBINATIONS OF ABOVE TYPES

Vertical poles and horizontal wattle.—This combination was recorded at Valladolid (House 54) and at four houses in Izamal, Yucatan. The walls had been started in one technique and finished in the other.

⁵⁹ Stephens, 1841, 1:383-84.

⁶⁰ Sapper, 1897, p. 251.

⁶¹ Sapper, 1905, p. 28.

⁶² Bancroft, 1886, p. 692.

⁶³ Larrainzar, 1878, 5: 72.

⁶⁴ Clavigero, 1780, p. 199.

⁶⁵ P. 82, *supra*.

⁶⁶ Purchas, 1626, p. 885.

⁶⁷ MacNutt, 1912, 2: 13.

⁶⁸ MS. copy in Peabody Mus. of Harvard Univ.

Vertical poles and vertical wattle.—Only one example, in Maxcanu, Yucatan, was recorded.

Horizontal wattle and vertical wattle.—The walls of House 5, Tizimin, Yucatan (pl. 31,*a*), had been started in the former technique; when only about one-eighth completed, they were changed to vertical wattle.

Masonry and horizontal wattle.—Three examples were recorded in Yucatan: one at Temax, the other two at Dzilam Gonzalez (pl. 20,*b,c*). The walls were built up to part of their height in rubble masonry, in two cases dry laid. The remaining distance to the eaves was then filled with walls of horizontal wattle.

Masonry and vertical wattle.—Several cases were recorded at Maxcanu, Hunucma, and Sotuta (pl. 20,*d*), Yucatan. Possible ancient example: House Mound IV, Uaxactun, Guatemala.⁶⁹

Masonry and vertical wall poles.—This was the most common combination observed. Modern examples: Seye, Hocaba (ten houses), Xocenpich (pl. 20,*a*), Ticul, Dzitas, Temozon, Hunucma, and Izamal, Yucatan; Campeche and Lerma,⁷⁰ Campeche; Santiago Atitlan, Guatemala. In the last-named town many walls are built to half their height in rubble (lava) masonry, either dry chinked or set in mortar, and finished in vertical canes (pl. 24,*c*; fig. 26). This construction is called *ruji xai* in Zutuhil. Starr publishes a photograph of a Chocho (Coixtlahuaca, Mexico) house with walls combining masonry and stockade construction.⁷¹ Probable ancient example: House Mound IV, Uaxactun.

Antiquity.—Besides the archæological evidence offered by House Mound IV at Uaxactun, we have an early literary reference to support our belief in the great antiquity of combined masonry and wood constructions:

1518. Grijalva says of Yucatan, "All along [the streets] the inhabitants of that place have many houses, made of cement and mud up to half [the height] of the walls, and then covered with straw."⁷²

IDENTIFICATION OF WALL CONSTRUCTION IN RUINS

NOTE

Many abandoned and destroyed house sites were examined for data on how different types of walls fall to pieces and for clues on their identification when perishable materials had disappeared.

VERTICAL WALL POLES, HORIZONTAL WATTLE

When wall poles have been embedded in a good hard floor, especially one that has been surfaced with marl, their position is easily identifiable in ruined houses by their pole holes, if these have been preserved. Usually, however, pole holes are exposed to weather so long before they are covered by accumulating earth and rubbish that little trace of them remains. Again, the earth in which bases of wall poles are embedded generally lies outside the boundaries of the house floor; as a result the pole holes are in softer ground and are more exposed to weather.

⁶⁹ Vertical poles may have been used there instead of vertical wattle.

⁷⁰ Houses here, being rectangular (pls. 4,*a*, 8,*b*), are particularly reminiscent of House Mound IV, Uaxactun.

⁷¹ Starr, 1908, p. 226.

⁷² Grijalva, 1858, tom. 1, p. 286.

And thirdly, as we have already seen, most wall poles are not embedded in the ground; it is only the larger ones (the **ku'bo:b**) that are so footed. As the **ku'lub** is found in both vertical-pole walls and horizontal-wattle walls, identification would be limited to these two types of construction. At the abandoned house site examined in Xocenpich, Yucatan (pl. 22,*a*), the task of identification was easy, for the site had not been abandoned very long and some of the rotted remains of **ku'lub** bases were still recognizable in well-preserved pole holes (pl. 23,*a*). The same is true of the burnt house remains inspected at Tizimin, Yucatan, and Champoton, Campeche. In addition to the dark outline of ash left by burnt walls, there were pole holes filled and preserved by the charred bases of the poles which had been emplantated in them.

Supposing that we could narrow our identification to a choice between two types of wall construction, vertical wall poles and horizontal wattle, how could we further distinguish between these two? Our best chance would lie in the probability that the walls had once been generously daubed with mud and in the possibility that sufficient mud was left in the ruins to make a further decision possible. Fallen mud gives a clue to the nature of the walls, on which it was daubed, in two ways:

The first and most obvious of these is provided by imprints left by members of the wall. When partly wet, mud is forcefully thrown by hand against the wall. It sticks against and in between the poles or other sticks and dries there, later becoming very hard. When a house gets fairly old most of the mud has already fallen to the floor inside or the ground outside. When a house burns down the mud is often fired to a brick-like hardness. On chunks of mud examined at many abandoned and burnt houses almost invariably the impressions, left by the walls against which they had been packed, were clearly traceable. In the best-preserved examples even marks of vine lashings and details of markings on the woods were distinguishable. Plate 22,*c* shows a Tizimin house the wall poles of which had fallen away from a very durable, cement-like mixture of mud and lime with which they had been in contact. Given large and well-preserved chunks of mud in a ruined house, and preferably a house that had been burned, one might be able to tell what kind of walls had once stood there and, possibly, how they had been lashed together and what the nature of the wood itself had been.

The second way in which mud can give the archæologist a clue to the construction of the walls on which it was daubed is afforded by the position in which it has fallen to the ground (pl. 22,*d*). As we have seen before, walls of vertical poles almost invariably fall with the house, that is, longitudinally. Even if this does not happen to be the case, the wall at least falls in only one direction, whether it be outward, inward, or longitudinal. The mud which falls with it therefore generally lies in a continuous heap, not absolutely straight perhaps, but in an almost unbroken straight or slightly meandering line. Walls of horizontal wattle, on the other hand, always⁷³ fall outward and inward. As the wall weakens, one

⁷³ Of dozens of cases examined there was only one exception to this rule.

section, or possibly two (i.e., from **ku' lub** to **ku' lub**), sags outward, the next sags inward, the next outward, and so on. The sections finally collapse in these positions, carrying their mud with them. It is not inconceivable, therefore, that careful excavation under the most favorable circumstances could reveal the hardened mud from a wall of this type and by its consistent out-and-in line of fall identify the horizontal-wattle construction of the wall from which it had collapsed.

VERTICAL WATTLE

I did not record any characteristic manner in which walls of vertical wattle collapse. But this type of construction, like the two just discussed, would leave an unmistakable imprint in mud daubed on it. If enough well-preserved mud remained in the ruin of a house of this type the original construction of the walls could probably be determined.

COMBINATIONS OF MASONRY AND WOODEN CONSTRUCTION

When we come to identifying remains of walls that combined masonry with wooden construction we are confronted with approximately the same problems discussed above, plus an added difficulty caused by the absence of post holes. Rubble masonry wall foundations are usually well surfaced and do not show any mark of wooden parts which are super-erected upon them. House Mound IV at Uaxactun, Guatemala, is a good illustration of this fact; we believe that its walls were supplemented by wood construction, probably like that which is shown in plates 4,*a*, 8,*b*, or 20,*d*, but as to the details of that construction we know nothing. In some cases where the masonry foundation decomposes earlier than usual, the weight of the house superstructure tends to embed the sharper poles in the masonry (pl. 4,*a*), but this is not usual.

RUBBLE MASONRY

Walls of rubble masonry alone need no study for identification (pl. 23,*b*). In excavating dwellings, however, the archæologist should watch for evidences of an original wooden framework in the core of the masonry (pl. 22,*b*).

CANE OR WOODEN FRAMING AND MASS ADOBE

I examined some Guatemalan burnt houses which once had walls of mass adobe built up around a wall framework. One of the best examples was between Los Encuentros and Tecpam. Charred stumps of the mainposts were still standing, but the walls had disappeared. Their outline, however, was clearly marked by a bright red, low mound of burnt adobe all around the house. Terrific heat from the blazing thatch and the wooden house framing, together with actual contact with the flames, had burnt the adobe mud of the walls bright red. With the burning of the exposed cane framework core the mud had collapsed into this even red mound, sharply contrasted with the black earth floor which it surrounded.

House 1 at Los Encuentros had walls of mass adobe on a framing, both of which were falling to pieces. Rubble, which had been packed in with the mud,

was falling (especially the heavier stones) both inside and outside the house, chiefly outside (pl. 21,*b*). At Santa Cruz (Alta Vera Paz) another house of this type was falling to pieces. No rubble was mixed with the mud, which had fallen both inside and outside the house.

ADOBE BRICK

At Tecpam, Guatemala, I inspected several abandoned houses with walls of adobe brick. Once the roof has collapsed, leaving the tops of the walls exposed to weather, the brick begins to disintegrate fairly rapidly. The chief wear is at the sharp edges of the walls, which soon become broken or rounded off. As in masonry walls from which the protective plaster has worn off, weathering takes place lower down on the face of adobe walls. Thus the entire wall is sometimes undermined, hastening the final collapse.

Walls of most long-ruined adobe houses stand at only a fraction of their former height, depending on how long and to what extent they have been exposed. When a wall is worn down to a certain height, say about 1 m., it remains in fairly good condition, rounded off to be sure, but basically solid and strong. Along the sides of the roads on the outskirts of Tecpam there are many old remains of adobe walls. These are so weathered that it is difficult to distinguish them from the natural red mud of which they were originally made and with which they are fast merging.

POSITION OF WALLS

OUTSIDE THE LINE OF THE MAINPOSTS

When walls are in this position they are structurally independent of the house framing. The pole plates rest on the ends of crossbeams rather than on the tops of the mainposts. This arrangement is typical of Yucatecan houses. Blom and LaFarge report it among the Tzeltals⁷⁴ and Sapper writes that it is found among the Chols, the Cajaboneros (who belong to the Chol group ethnologically, but speak Kekchi), the Pipiles of Guatemala and Chiapas, the Tapachultecs, some of the northern Zoques ("who may have borrowed this peculiarity from neighboring Chontales"),⁷⁵ and the Payas of Honduras.⁷⁶

Sapper is also inclined to derive walls thus located from a wind-screen prototype, although he says that its original purpose is no longer clear.⁷⁷

ALIGNED WITH THE MAINPOSTS

Walls aligned with the mainposts are not technically independent of the house framing, for they contribute somewhat to its support. In most cases, however, the roof could stand without their aid. The pole plates, instead of resting on the ends of crossbeams, are carried by the mainposts and, to a lesser degree, by the wall itself. This arrangement is typical of most of the houses

⁷⁴ Blom and LaFarge, 1926, p. 335.

⁷⁵ Sapper, 1905, pp. 28-29.

⁷⁶ Sapper, 1898, p. 83.

⁷⁷ Sapper, 1905, pp. 28-29.

observed in Guatemala. Sapper found it among the Chaneabals.⁷⁸ It is interesting to note that J. Eric Thompson reports it among the Maya in southern British Honduras;⁷⁹ this shows that the difference is regional rather than a linguistic group difference, for the Yucatecan Maya employ the other system. Gann does not include information on the position of house walls among the Maya of northern British Honduras and Yucatan;⁸⁰ it would be interesting to know which plan is in use there.

FINISH

MUD DAUBING

Method.—Mud is often applied to either the interior or the exterior surfaces of wooden walls; in some cases it is daubed on both. The mud is mixed with a binding of shredded *guano* palm leaf, grass, or cornhusks. While wet it is scooped up by hand and thrown against the wall with such force that it penetrates empty spaces between the members and sticks there until it dries. Long slender stringers, fastened to the interior wall surface, help to hold the mud in place. An informant at Piste, Yucatan, said that mud will fall from the walls within three or four years unless it is covered with plaster. A house at Tinum, Yucatan, had an unusual type of exterior wall decoration, consisting of red mud studded with many small white stones (pl. 23,c).

According to information received by A. L. Smith of Carnegie Institution of Washington, the Maya of Santa Cruz de Bravo and Bacalar, Quintana Roo, surface wooden house walls with a mixture of powdered marl, water, and savanna grass. The grass has first been gathered, dried for two or three months, and then cut in fourteen-inch lengths. The mixture is allowed to ferment for eight days, after which it is applied to the walls in the manner already described.

Materials.—Different kinds of mud in Yucatan are classified by color. Red mud is most frequently used, but brown and yellow muds are found in some places. The last-named is best, according to a Piste informant. In Champoton, Campeche, the mud is the same gray, shell-sand-and-mud mixture that is used for bricks.

Geographical distribution.—Mud daubing is most frequently found in Yucatan and northern Campeche. South of the city of Campeche it is not so common, but was recorded at several places. Example: Champoton. Mass adobe applied to cane or wooden framings of Guatemalan walls is technically a form of mud daubing, but deserves classification in this report as a main type of wall construction.

Antiquity.—Many large chunks of adobe-and-clay mud bearing imprints of wooden poles were found during the excavation of ancient house sites at Zacualpa, Department of Quiche, Guatemala.⁸¹

Linguistics.—The Yucatecan Maya term for mud daubing is **pak luum**⁸² (**pak**, wall; **luum**, earth). The Motul gives also **pak luk**. Red mud is **tʂak luum**,⁸³

⁷⁸ *Ibid.*, p. 29.

⁷⁹ J. E. Thompson, 1930, p. 92.

⁸⁰ Gann, 1918, pp. 26-27.

⁸¹ Wauchope, 1936, p. 128.

⁸² Sometimes **k** not pronounced: **pa'luum**.

⁸³ E. H. Thompson, 1911, p. 509, gives **kankab**. Redfield, 1934, p. 35, gives **chac kancab**.

yellow mud, **k'an luum**. Cornhusks mixed with the mud are called **ho'lot**; grass is **'suuk**. The stringers that keep mud from falling from the interior wall surface are called **sakamtse**.⁸⁴

WHITEWASH

Method.—Mud-daubed and masonry walls are often covered on the exterior with a lime whitewash, which may be renewed every few years if the owner wishes. I watched a man at Santa Rita Chamas (Department of San Marcos), Guatemala, whitewashing his house with a long pole that had a cornhusk tied to its lighter end (pl. 21, *d*). The cornhusk was shredded and served as a brush or mop. The man would dip it into a bucket of whitewash, then lift the pole and paint the walls with it.

Geographical distribution.—Mud-daubed wooden walls in Yucatan, Campeche, and Guatemala, masonry walls in Yucatan and Campeche, and adobe brick walls in Guatemala are often whitewashed.

Linguistics.—In Yucatecan Maya, whitewash is called **joko (le lumo)**. Plaster is **jul (bi pak)**.

⁸⁴ Redfield, 1934, p. 34, gives **chacanche**.

IV

EXTRANEEOUS FEATURES

PART OF IMMEDIATE CONSTRUCTION

WINDOWS

Construction.—Each of the two Yucatecan windows observed outside Merida consisted merely of a space formed by the removal of short sections from the vertical wall poles, the height of the window depending on the length of the sections cut out, and the width depending on the number of poles thus altered. One window was only one “wall pole wide” (about 8 cm.). A short cross-piece, or stringer, was bound across the top of each window near the lower ends of the poles from which sections had been removed. Glass inserted from the interior was held in position by a fine lime mortar. A small exterior sill was made of the same mortar (fig. 30).

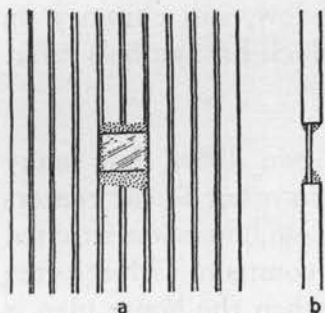


FIG. 30—WINDOW, HOUSE 4,
CHAN KOM, YUCATAN

a: Elevation. b: Section.

Windows in Guatemalan houses with walls of mass adobe over a cane framing are small, approximately rectangular openings left in the wall. More adobe is applied around the borders. The windows may generally be closed by means of a removable interior plank shutter or small curtain.

Geographical distribution.—In all Yucatan, Merida excepted, I saw only one bush house supplied with windows. This house, which had the two windows mentioned above, was at Chan Kom. In Guatemala I recorded windows at five places. At Patal, a small Pokonchi settlement just over the south side of the political boundary line between Alta and Baja Vera Paz, several newer houses had boarded-up windows. At Santa Cruz (Alta Vera Paz) there was a very ugly house consisting of a strange conglomeration of boards, mass adobe on cane framing, plank doors, thatched roof, and windows. The last-named were of modern type, but dirty and warped in frame (pl. 23, *d*). The remaining three places were in the Department of Chiquimula: San Juan Ermita, Jocotan, and Chiquimula. LaFarge and Byers write that Jacalteca houses sometimes have small windows in the end walls, but rarely at the front or back.¹ Chontal houses of Comalcalco, Tabasco, usually have no windows, according to Blom and LaFarge;² the same report is made of Kekchi houses by Sapper³ and of dwellings at Flores on Lake Peten Itza by Morelet.⁴

Antiquity.—There were probably no windows in the ancient bush houses of the Maya. Larrainzar⁵ and Catherwood⁶ assume, without citing authority,

¹ LaFarge and Byers, 1931, p. 44.

² Blom and LaFarge, 1926, p. 135.

³ Sapper, 1905, p. 27.

⁴ Morelet, 1871, p. 207.

⁵ Larrainzar, 1878, 5: 80.

⁶ Catherwood, 1844, p. 10.

that there were. In 1838, six years before Catherwood, Waldeck, describing the same building that later prompted Catherwood's remarks and discussing the similarity of modern huts to the stone ones decorating the Uxmal Monjas façades, writes that one sees, just to the side of the door, a little window, "which did not exist on the cabins of the ancient Yucatecos."⁷

Houses with windows are depicted on many old maps of towns and districts in Central America. These were, however, probably symbolic of "house" in the minds of the Spanish cartographers, accustomed as they were to windows, and one should hesitate to accept them as attempts at true representation. Tell almost anyone today to draw a sketch map, indicating dwellings by appropriate symbols, and he will draw little match-box houses with a door, window, and chimney on each, regardless of the actual appearance of the house to which his symbols refer.

DOORS

Number and position.—Most Yucatecan houses have two doors, but many have only one. The doors are usually situated opposite each other at the centers of the long sides of the house. The main door of one Chan Kom house was situated in the end. In Guatemala, houses with only one door are common. More often than in Yucatan, the door is located in an end, especially when the house plan is almost square and when a porch with closed sides makes the house longer one way than the other. Fairly long houses often have two doors opening on the same side (pl. 25, *a, b*). Single doors are not so frequently located in the exact center of the length of the wall in Guatemala as they are in Yucatan. In houses of Campeche doors are located in various places. Rectangular House 1, Champoton, located on a corner, had three doors. A house at Huhi had a single door in each end.

Size and description.—The height of a door is that of the wall plate; its width varies from 80 cm. to 1.5 m. Most doors are of modern plank construction, with thresholds, jambs, and lintels also built of timbers trimmed by modern machinery. Occasionally one sees a typically Indian door, the kind evidently used by ancestors of the Maya before European influence had made itself felt.

Aboriginal types.—An old-style Yucatecan door completes the rustic beauty of a truly native hut (pl. 24, *a*). Its Maya name, (**x**)**mak ak'** (**mak**, close, door; **ak'**, vine) comes from its twined, basket-like construction of uprights and vine. Pairs of upright sticks set fairly close together are bound to each other by a double weft of vine, each strand of which passes alternately out and in from one pair of stick warps to the next. The last upright on each side of the door is a single larger stick. (Fig. 31, *a, b*.) When the vine reaches this it passes around it and starts back again.

Two other types of door were seen in Yucatan. One, on a kitchen⁸ at Chan Kom, consisted of two uprights with many cross-pieces lashed between them. Fronds of *guano* palm hung over the uppermost cross-piece in the usual

⁷ Waldeck, 1838, p. 98.

⁸ House 4, belonging to Asuncion Tec.

manner of palm thatch (p. 104). The other type, recorded at Valladolid, was built of upright poles lashed side by side to four stringers (pl. 24,*b*). Gann describes doors of these three types on Maya houses in southern Yucatan and northern British Honduras; split cabbage palm is used for the third type in this region.⁹

At Mukuchakan, between China and Uayamon, Campeche, there was a door of interesting native construction. It consisted of small *guano* palm uprights set side by side and, I suppose, lashed to stringers on the other surface (pl. 6,*c*). The

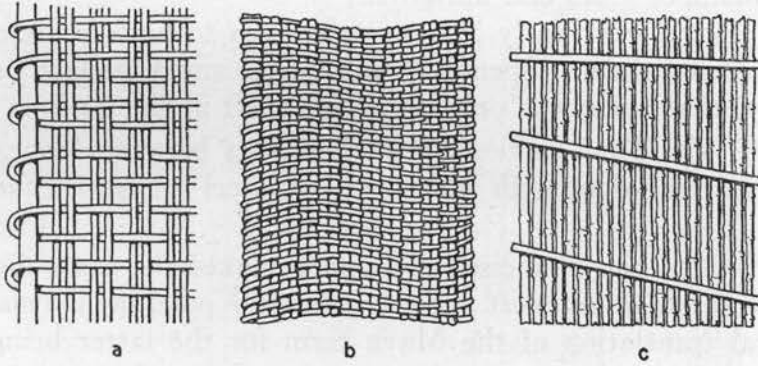


FIG. 31—ABORIGINAL TYPES OF DOOR

a: Twined-vine door (pattern), Yucatan.

b: The same, closed.

c: Cane door of Lake Atitlan villages, Guatemala.

same type of door, built of cane (fig. 31,*c*) instead of palm, is found in villages around Lake Atitlan (pl. 24,*c,d*) and farther west at San Sebastian, Guatemala (fig. 32). These doors are usually lashed to the adjacent jamb at only one place near the top. As a result they do not swing freely, sagging over on one edge when open. In some cases an ingenious though scarcely aboriginal device facilitates smoother operation: a glass bottle is buried in the ground in such a position that it acts as a socket for the base of the innermost upright in the door framing. A similar door of vertical poles or canes appears in one of Gordon's photographs of Quiche (?) settlements.¹⁰ Doors closely resembling this type are also reported by LaFarge and Byers among the Jacalteca,¹¹ and by J. Eric Thompson among the Maya of southern British Honduras.¹²

The mud-walled Jacalteca house has, according to LaFarge and Byers, a door consisting of a single slab of wood.¹³

Leather hinges are employed at Tzeltal houses of Cancuc, Chiapas.¹⁴ Closed doors are made secure by means of stick bars¹⁵ or by passing a cord around a door upright and a wall pole.¹⁶ Sapper writes that Kekchi houses, having no door but only an open entrance, are protected by means of boards inserted in the opening.¹⁷

⁹ Gann, 1918, p. 26.

¹⁰ Gordon, 1896-1901.

¹¹ LaFarge and Byers, 1931, p. 44.

¹² J. E. Thompson, 1930, p. 92.

¹³ LaFarge and Byers, 1931, pp. 47, 48.

¹⁴ Blom and LaFarge, 1927, p. 389.

¹⁵ LaFarge and Byers, 1931, p. 44.

¹⁶ J. E. Thompson, 1930, p. 92.

¹⁷ Sapper, 1905, p. 27.

When planks are not used in Yucatan, the door sill is constructed of two poles laid in the floor parallel to each other and about 15 cm. apart, the space between them being filled with earth and packed. The threshold of Jacalteca doors "is often raised about 30 cm. above the ground, with the same construction as that of the walls, or with boards set on edge."¹⁸

Antiquity.—Twined-vine doors in Yucatan have been largely replaced by modern plank doors only within the last generation. Five old informants (from Valladolid, Chichimila, Tikuch, and Tizimin) said that when they were children all doors were made of vines and uprights.

There are several very early literary references to both house entrances and the doors that closed them. Spencer,¹⁹ and Genet and Chelbatz²⁰ assume, probably incorrectly, that there was only an opening left in the wall.

*Ca. 1690.*²¹ The Ticul dictionary distinguishes between 'door, the opening' (*puerta el agujero*) and 'door with which [an entrance] is closed' (*puerta con que se cierra*).

*Ca. 1650.*²² The San Francisco dictionary makes the same distinction: 'the house door' (*la puerta de la casa*) and 'the stick [or pole] door' (*puerta la [sic] de palo*), the literal translation of the Maya term for the latter being 'that which closes the house opening [or entrance].'

*Ca. 1565.*²³ Landa speaks of doors "left in the wall" between the front and back parts of the Yucatecan house; he does not say whether there was any way of closing them or not.²⁴

1577. In answer to Philip II's questionnaire, the *Relacion del Pueblo de Dohot, y Cabecera de Tetzimin* reports that doors of houses there always face the west (*donde sale el sol*) and are higher here although one still has to stoop a little to enter the house.²⁵

Evidence from Guatemala is lacking. Almost all the old dictionaries from that country give a term meaning 'door by which one enters or leaves'; in most cases the term can be translated literally as 'mouth of the house,' referring most probably to the entrance itself.²⁶

Archæological evidence points to the use of temple doorway coverings, probably curtains, screens, or doors similar to those described under aboriginal types. Tie-holes, which are small depressions (at each side of a doorway) with a stick crossing them, have been found by Tozzer at Nakum²⁷ and Tikal,²⁸ Guatemala, and by A. Ledyard Smith at Uaxactun,²⁹ Guatemala.

¹⁸ LaFarge and Byers, 1931, p. 44.

¹⁹ Spencer, 1898, chart at back of book.

²⁰ Genet and Chelbatz, 1927, p. 192.

²¹ Tozzer, 1921, p. 173, gives this date.

²² *Ibid.*, p. 172, assigns the San Francisco dictionary to the middle of the seventeenth century.

²³ See Morley, 1915, p. 7, n. 1.

²⁴ Landa, 1864, p. 324.

²⁵ *Col. de Doc. Inéd.*, 1900, 13: 213.

²⁶ P. 96, *infra*.

²⁷ Tozzer, 1911, p. 100.

²⁸ Tozzer, 1913, p. 158.

²⁹ A. I. Smith, 1937, pl. 11, *b*, and references to other structures at Uaxactun, 1931-1936.

Identification in ruins.—Abandoned house sites were examined for the purpose of developing a method of identifying the position of doors in ancient house ruins. If the walls had any sort of masonry base, as in House Mound IV at Uaxactun, identification of the door is simple. It is more difficult in the case of houses with perishable walls. An abandoned house at Xocenpich, Yucatan (p. 86), was surrounded by a line of rocks. This line was interrupted and turned in at right angles

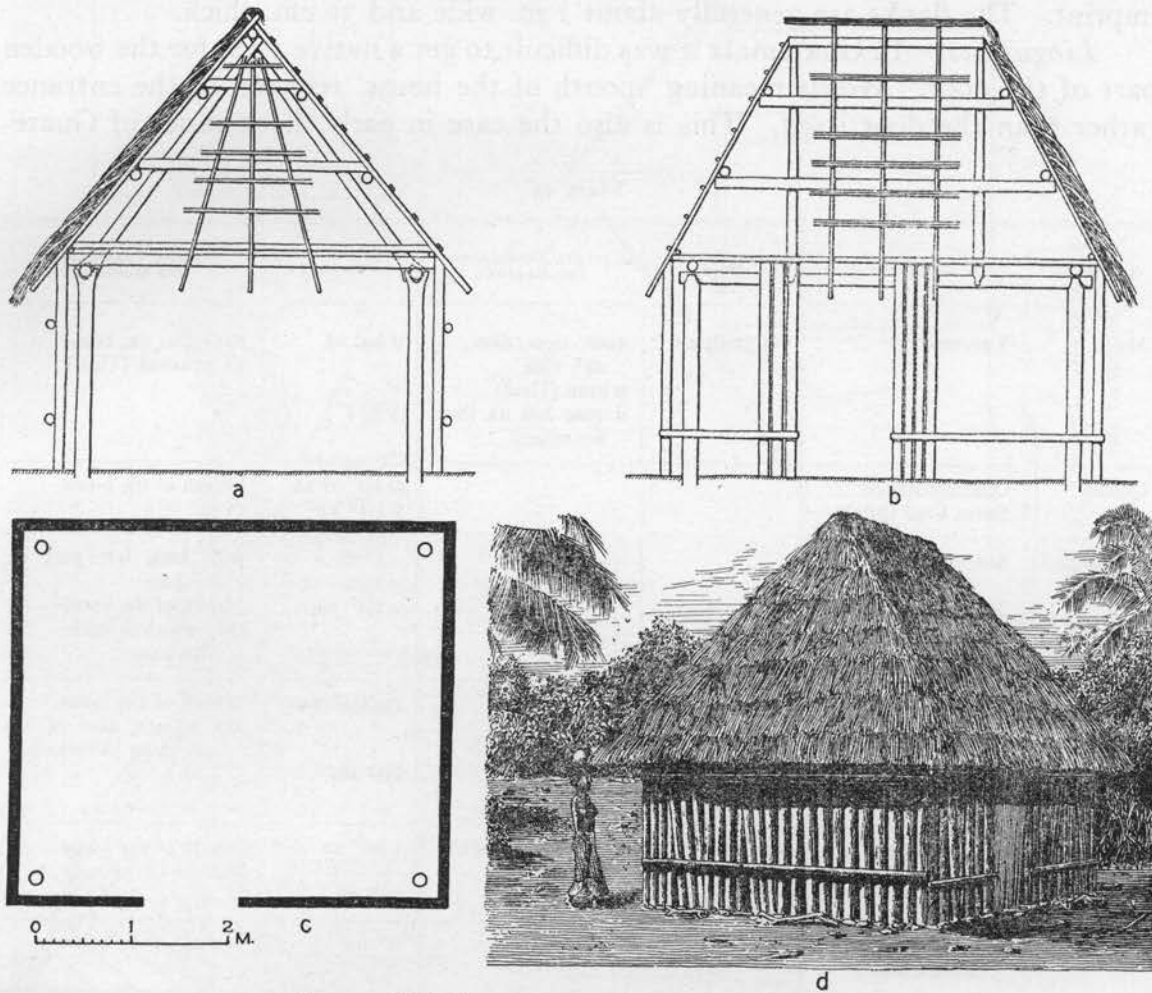


FIG. 32—HOUSE 1, SAN SEBASTIAN, GUATEMALA

(Rectangular plan, hip roof, short ridgepole, heavy timbers, palm thatch)
a, b: Elevations. *c:* Plan. *d:* Perspective.

toward the house interior at places probably occupied by bases of the door jambs. Even if the rocks serve to retain a small platform as well as to support the wall poles, they do not always continue across the front of the doorsill, for in most cases a ramp leading to the door makes them unnecessary. This was the case at Xocenpich. The ancient house sites at Chichen Itza, on the other hand, are completely surrounded by stones. The location of the doors at a burnt house site, Tizimin, Yucatan, was identified by means of similar gaps (1 m. wide) in the line of burnt stones surrounding the site. The outline of the walls at this same site was clearly indicated by a deep layer of ashes where the wall poles had burned; this line of

ash was also interrupted, but not so clearly, at places where the doors had been. The same was true of the red mound of burnt adobe at the house site between Los Encuentros and Tecpam, Guatemala (p. 87).

Masonry door flanks (pl. 20, *a*) sometimes carry the imprint of a mainpost with which they may come in contact. Example: Tizimin, Yucatan. Remains of door flanks in ancient sites might be more easily identifiable by means of such an imprint. The flanks are generally about 1 m. wide and 30 cm. thick.

Linguistics.—In Guatemala it was difficult to get a native term for the wooden part of the door. Words meaning 'mouth of the house' referred to the entrance rather than the door itself. This is also the case in early dictionaries of Guate-

TABLE 20

LANGUAGE	PLACE	DOOR	LITERAL TRANSLATION AND REMARKS	ENTRANCE	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan	(ʃ)mak ak'	mak, close, door; ak', vine u mac (Ticul) u mac hol na (San Francisco)	u hol na	hol, hole; na, house Cf. u uolna (Ticul)
Quiche	Quetzaltenango Santa Cruz Quiche			ri tʃiʔ ri xa u tʃiʔ xa ³⁰	Mouth of the house
Cakchiquel	Santa Apolonia San Sebastian			u tʃiʔ xa	paʃo'kun, left part of the door Mouth of the house chi, mouth or door (Thomas)
Zutuhil	Santiago Atitlan San Pedro de Laguna	tsax'pin		r u tʃiʔ xai tʃiʔ xai	Mouth of the house chi, mouth, door of something (Ximinez)
Mam	San Pedro Sz. Concepcion	t x(e)bel xa	Closing thing of the house	t tsiʔ xa tsiʔ xa	Mouth of the house titsi ha (Reynoso)
Jacalteco	Informant from Santa Eulalia			tiʔ na	Mouth of the house
Kekchi	Coban		xtzapval li capl, material for closing the house (Sapper) ³¹	re li kab	Mouth of the house re li capl (Sapper) ³¹
Pokonchi	San Cristobal			t'sap	

malan languages. A situation like this sometimes implies that the unnamed object did not originally exist. It seems scarcely possible, however, that there were originally no doors to close the entrances to dwellings in the cold highlands of this country.

³⁰ Cf. Anonymous, Barrera, and Basseta.

³¹ Sapper, 1905, p. 27.

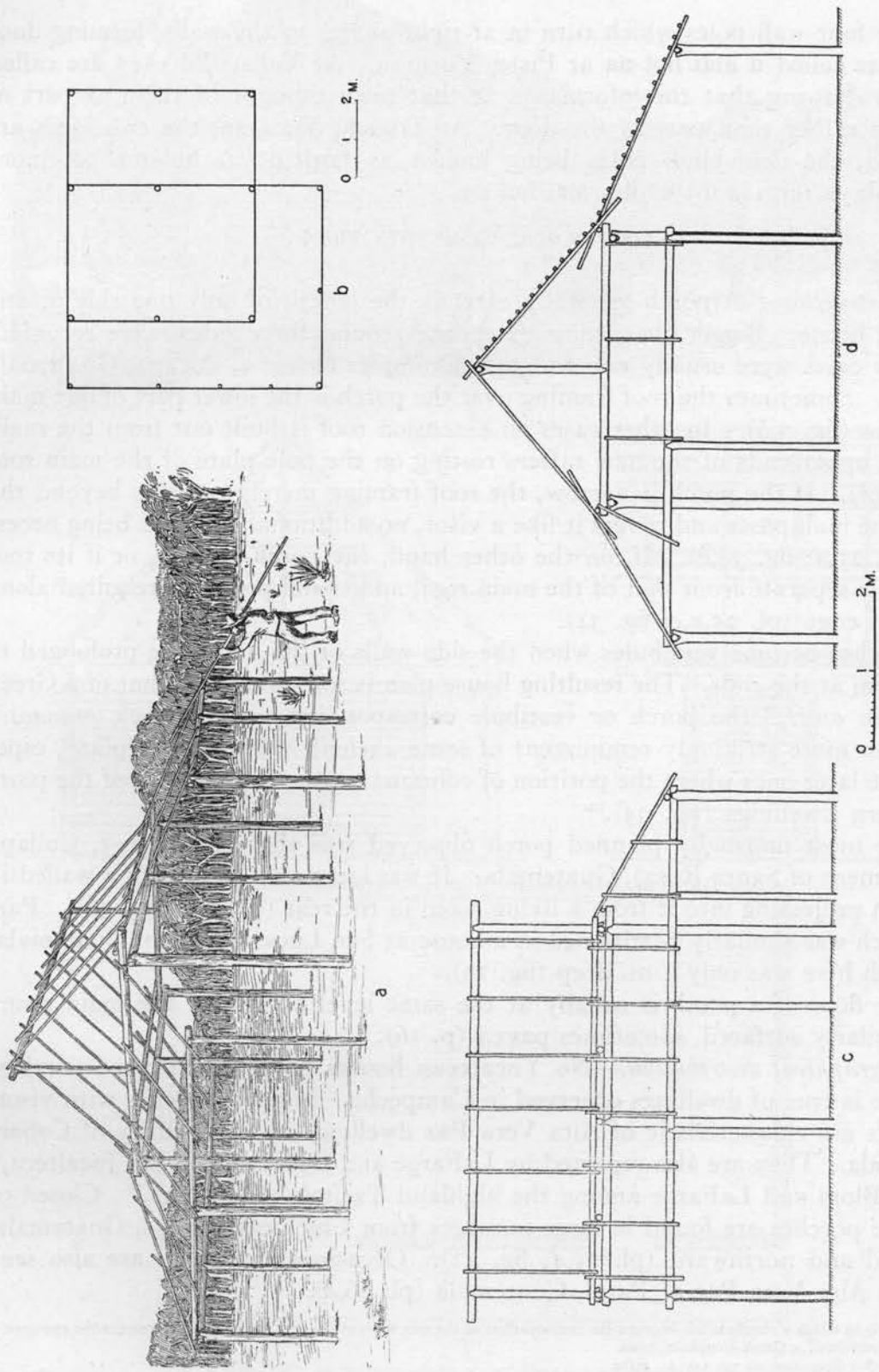


FIG. 33—HOUSE 1 (NON-INDIAN), ZACAPA, GUATEMALA
a: Perspective. *b*: Plan. *c,d*: Elevations.

The four wall poles which turn in at right angles to the walls, forming door jambs, are called **u alai hol na** at Piste, Yucatan. At Valladolid they are called **tswitʃeʔ**, showing that the informants at that town thought of them as part of the walls rather than part of the door. At Tikuch, Yucatan, the two ideas are combined, the door-jamb poles being known as **tswitʃeʔ de hol na**. A more purely Maya term is **u tʃeʔ il u alai hol na**.

ADDITIONAL CONSTRUCTION

PORCHES

Construction.—A porch generally extends the length of only one side or one end of a house. Bigger ones, some extending around three sides, were recorded, but such cases were usually non-Indian. Example: House 1, Zacapa, Guatemala (fig. 33). Sometimes the roof framing over the porch is the lower part of one main roof slope (fig. 3, *h*). In other cases an extension roof is built out from the main one, the upper ends of the new rafters resting on the pole plate of the main roof (pl. 12, *a, b*). If the porch is narrow, the roof framing merely projects beyond the line of the mainposts and covers it like a visor, no additional supports being necessary (pl. 25, *a*; fig. 38, *b*). If, on the other hand, the porch is wide, or if its roof framing is separate from that of the main roof, additional posts are required along the front edge (pl. 25, *a, c*; fig. 34).

Porches become vestibules when the side walls of the house are prolonged to close them at the ends. The resulting house plan is somewhat like that of a Greek temple *in antis*,³² the porch or vestibule corresponding to the Greek *pronaos*.³³ It is even more strikingly reminiscent of some ancient Maya temple plans, especially the later ones where the position of columns corresponds to that of the posts in modern dwellings (fig. 35).³⁴

The most unusually planned porch observed was that of House 5, Cuilapa (Department of Santa Rosa), Guatemala. It was large and deep, with a walled-in partition projecting into it from a living-room in the rear (pl. 26, *b*; fig. 36). Part of a porch was similarly partitioned in a house at San Lucas Toliman, Guatemala; the porch here was only 1 m. deep (fig. 12).

The floor of a porch is usually at the same level as that of the main room. It is similarly surfaced, sometimes paved (p. 16).

Geographical distribution.—No Yucatecan houses have roof-covered porches; the same is true of dwellings observed in Campeche. Narrow porches with visor-like roofs are characteristic of Alta Vera Paz dwellings in the vicinity of Coban, Guatemala. They are also reported by LaFarge and Byers among the Jacalteca,³⁵ and by Blom and LaFarge among the highland Tzeltals of Chiapas.³⁶ Closed or vestibule porches are found in large numbers from Chichicastenango, Guatemala, westward and northward (pl. 25, *d*; fig. 42). Occasional examples are also seen near the Alta Vera Paz at Patal, Guatemala (pl. 26, *a*).

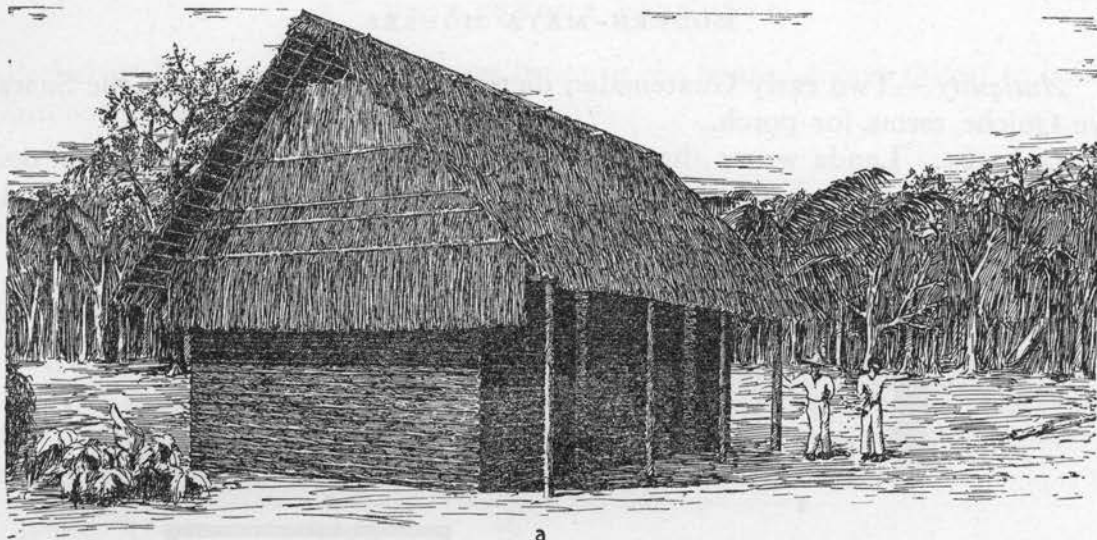
³² A temple in which a vestibule lies between the prolongations of the side walls of the *cella*, or main room opposite the entrance.

³³ The vestibule of a Greek temple in *antis*.

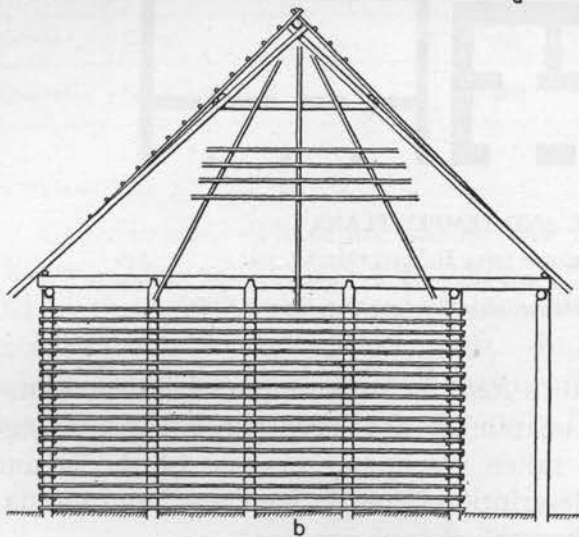
³⁴ For further discussion see pp. 149-51, *infra*.

³⁵ LaFarge and Byers, 1931, p. 44.

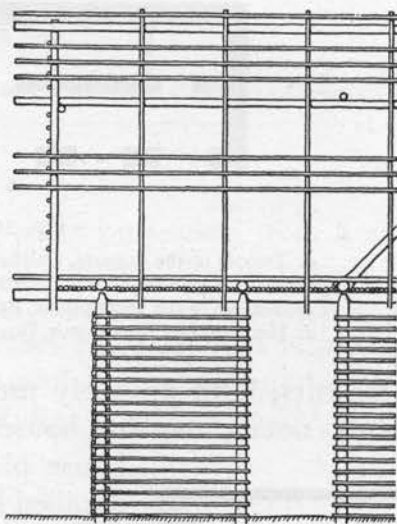
³⁶ Blom and LaFarge, 1926, p. 335.



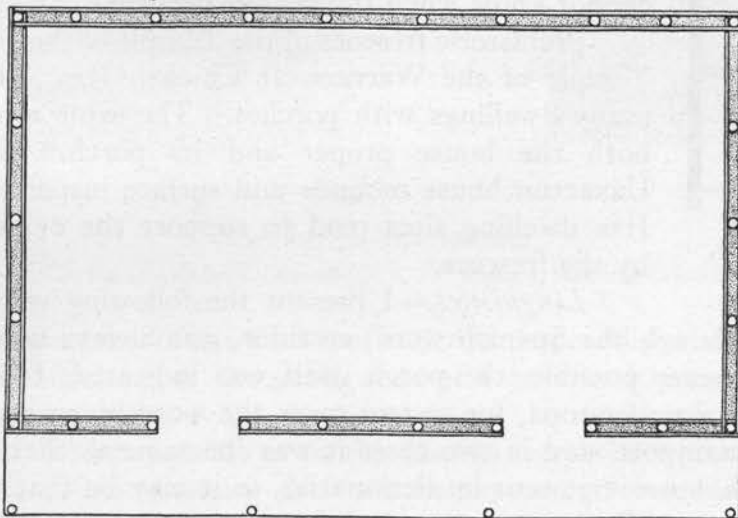
a



b



c



d

0 1 2 M.

FIG. 34—HOUSE 1, SAN CRISTOBAL, GUATEMALA

(Rectangular plan, roof slopes overlapping gable ends, walls of mass adobe over cane framing, porch, two doors)

a: Perspective. b,c: Elevations. d: Plan.

Antiquity.—Two early Guatemalan dictionaries, the Basseta and the Suarez, give Quiche terms for porch.

Ca. 1565. Landa writes that Yucatecan houses have a reception room open the entire length of the house in front.³⁷ Molina Solis³⁸ and Spencer³⁹ make similar

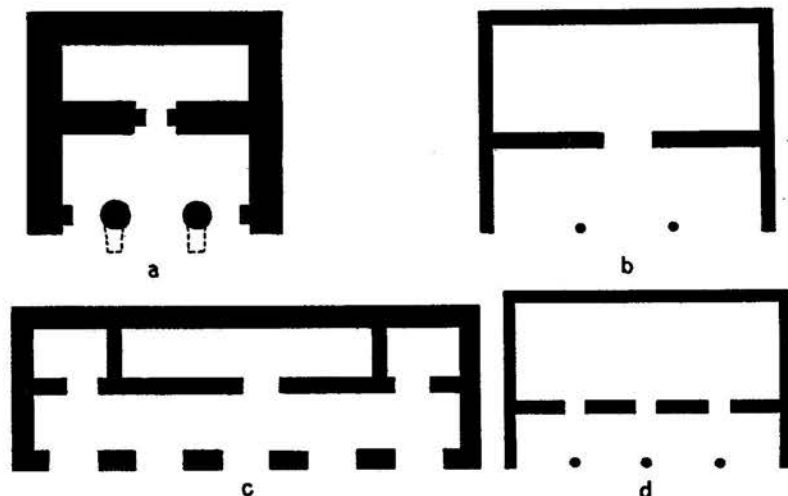


FIG. 35—HOUSE AND TEMPLE PLANS

- a: Temple of the Jaguars, Chichen Itza, Yucatan (after Holmes, 1895, fig. 39).
 b: Typical plan of modern houses in highlands west and north of Chichicastenango, Guatemala.
 c: Temple of the Inscriptions, Palenque, Chiapas (after Holmes, 1895, Plate XXIV).
 d: House 2, Los Encuentros, Guatemala.

statements; both probably used Landa's *Relacion* as a source of information. As already noted, modern houses in Yucatan do not have porches. A change in house plan has taken place, but because of the lacuna in detailed house description between Stephens⁴⁰ and Landa one cannot know when the change occurred.

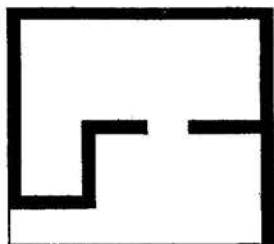


FIG. 36—PLAN OF HOUSE 5, CUILAPA, GUATEMALA

Prehistoric frescoes in the Temple of the Jaguars and the Temple of the Warriors at Chichen Itza, Yucatan, depict many dwellings with porches. The same roof slope covers both the house proper and its porch.⁴¹ Excavation of Uaxactun house mounds and surface inspection of Chichen Itza dwelling sites tend to support the evidence furnished by the frescoes.

Linguistics.—I present the following words with many misgivings. Although the Spanish word, corridor, was always used in the questions, and, whenever possible, the porch itself was indicated, I doubt that my informants always understood, for in two cases the word given was the same as that meaning 'mainpost' and in two cases it was the same as that for 'entrance.' The same words, however, occur in dictionaries, so it may be that they are right.

³⁷ Landa, 1864, p. 110.

³⁸ Molina Solis, 1896, p. 243.

³⁹ Spencer, 1898, chart at the end of the book.

⁴⁰ Catherwood's illustrations of Maya huts in Stephens, 1841 and 1843, show no recognizable porches.

⁴¹ Morris, Charlot, and Morris, 1931, 2: pls. 139, 159; see also Wauchope, 1934, pp. 118, 120 and figs. 2, b, c, 4.

- Probably the Mam word, **t wits xa**, 'front of the house,' comes closest to being an authentic native word for porch.

TABLE 21

LANGUAGE	PLACE	PORCH	LITERAL TRANSLATION AND REMARKS
Chorti			chipat , mouth of the house (Suarez)
Quiche	Quetzaltenango	ʃqan xa	Leg of the house; cf. mainpost (Table 2, p. 34) Cf. Basseta, who gives xacan ha .
Zutuhil	Santiago Atitlan San Pedro de Laguna	tʃiʔ xai (pa) r qan xai	Mouth of the house; cf. entrance (Table 20, p. 96) Leg of the house; cf. mainpost (Table 2, p. 34)
Mam	San Pedro Sz.	t wits xa	Front of the house
Jacaltec	Informant from Santa Eulalia	tenta	
Kekchi	Coban	nu qab	qab , house
Pokonchi	San Cristobal	tʃiʔ pat	Mouth of the house; cf. entrance (Table 20, p. 96)

PENTHOUSES

Construction.—These are sheds with sloping roofs projecting from a side of a house. The main roof is sometimes continued to a second line of uprights parallel to the house wall, according to LaFarge and Byers.⁴² All examples that I recorded had entirely separate roofs. In some cases the shed roof is pitched at approximately the same slope as that of the main roof, giving the impression that only one roof slope covers both structures (pl. 26,*d*; fig. 37,*a,b*). Usually, however,

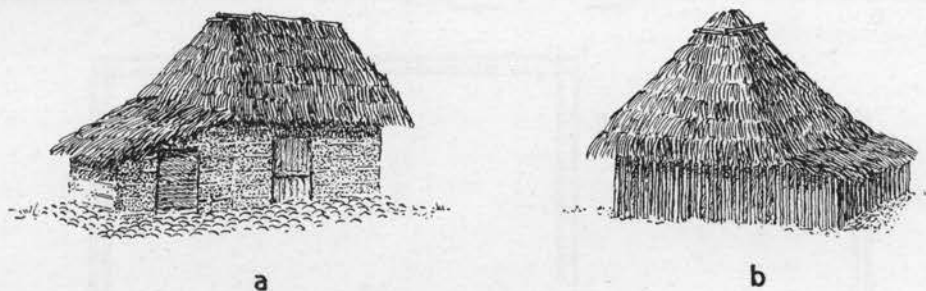


FIG. 37—PENTHOUSES

a: House 3, Cuilapa, Guatemala.

b: House 1, Mauricio, Guatemala.

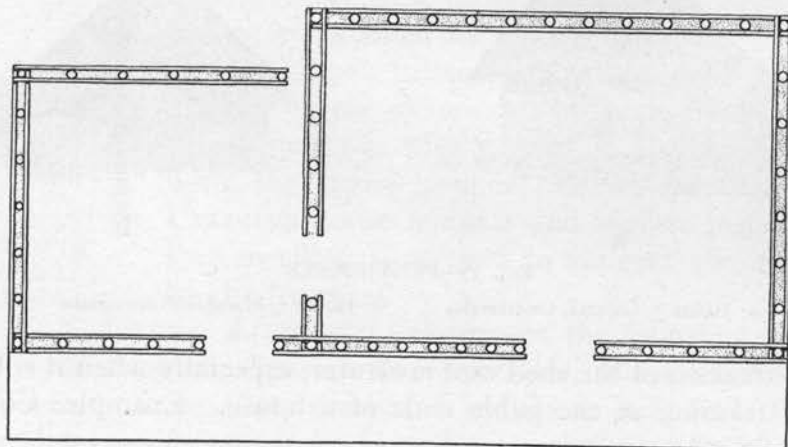
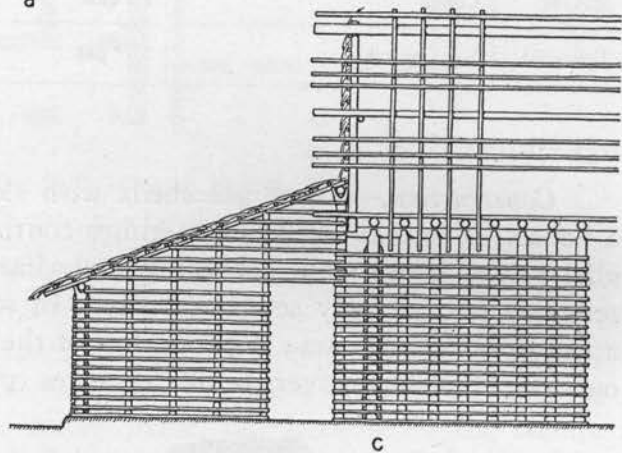
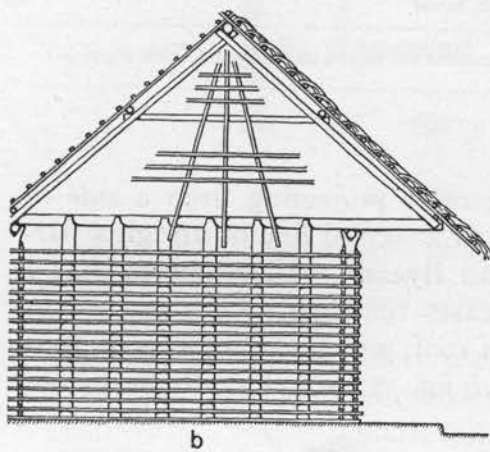
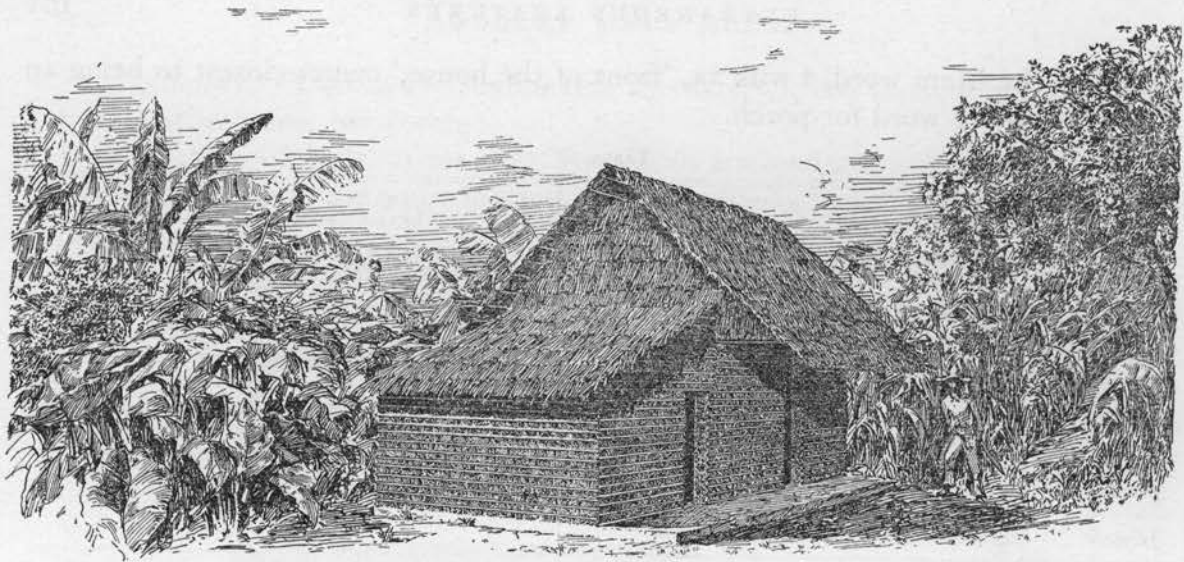
the line of demarcation of the shed roof is clearer, especially when it is built against a vertical roof framing at the gable ends of a house. Example: Coban, Guatemala (pl. 26,*c*; fig. 38).

Purpose.—Penthouses are generally used as storehouses or kitchens or both.

Geographical distribution.—No penthouses were observed in Yucatan or Campeche. In Guatemala they appear at Palestina⁴³ (Department of Quetzalte-

⁴² LaFarge and Byers, 1931, p. 46.

⁴³ Also called Suj.



0 1 2 M.

FIG. 38—HOUSE 6, COBAN, GUATEMALA

(Rectangular plan, penthouse shed, walls of mass adobe over cane framing, sugar-cane thatch, roof slopes overlapping gable ends, porch)

a: Perspective. *b,c*: Elevations. *d*: Plan.

nango, near the San Marcos boundary); from there northward to Huehuetenango they gradually increase and become typical features of house construction. They were also recorded at Coban (Alta Vera Paz), Mauricio (Department of Escuintla), settlements between El Transito and Nahualate (Department of Solola), a small town between Genova and Coatepeque (Department of Quetzaltenango), and in large numbers at Cuilapa (Department of Santa Rosa). LaFarge and Byers describe an example among the Jacalteca at Puxup, Guatemala,⁴⁴ and Blom and LaFarge report one among the Chontals at Comalcalco, Tabasco.⁴⁵

Linguistics.—In Coban, Guatemala (Kekchi), a penthouse is called **ral qab**, son of the house.

⁴⁴ LaFarge and Byers, 1931, p. 46.

⁴⁵ Blom and LaFarge, 1926, p. 136.

V

THATCH

MATERIALS

PALM

Method.—After palm fronds have been assembled at the house site (pl. 27,*a*), they must be trimmed before they are put on the roof. The Indians generally sit on the ground by a small wooden chopping block and with their machetes cut off stem and ends of the leaves to a uniform length (pl. 27,*b*). Ricketson has already described in detail the method of thatching roofs with palm leaves in the Peten, Guatemala.¹ In other parts of this country and Yucatan it is generally the same: the palm leaf is parted lengthwise into three unequal divisions, which are then hung over the roof rods in such a way that each tier of thatch overlaps the tier below (pl. 27,*d*). Lashing is usually unnecessary; according to Blom and LaFarge the lowland Tzeltals of Chiapas use liana lashing.² Sapper says that no roof rods are required when *corozo* palm leaves are used, for the leaf ribs themselves serve in the capacity.³ He says also that the ribs are cleft so that the points of the leaflets may point downward; the same is reported by J. Eric Thompson among the Maya of southern British Honduras.⁴ Blom and LaFarge write that repairs in the thatch of lowland Tzeltal houses are made by laying new leaves directly over the old, the stems being stitched into the thatch with liana and a wooden needle.⁵

In addition to roofs thatched with palm, one occasionally sees houses that are thatched all over. The thatch may be added to wooden wall construction (pl. 24,*a*) or, as is the case more often, it is itself the chief material of which the wall consists. When the latter is true, a simple framing of two or three stringers is the only additional construction necessary. The long fronds of palm are suspended from these stringers, often by the same method described above for roof thatch, or they may be packed under the stringers in an upright position (pl. 30,*b*). When walls are thatched with *confra* palm the leaf is stripped from one side of the stalk which is then fastened horizontally, stripped side upward, to the wall poles (pl. 30,*a*).

Geographical distribution.—Palm leaves are the standard thatch material in all southern Yucatan and western Quintana Roo (fig. 39). With the exceptions of Valladolid and Tizimin it is standard in eastern Yucatan also. Beginning with Temax and Izamal in the east and Muna and Maxcanu in the southwest, palm shares equally with grass in frequency of use. The latter dominates the northern and central parts of the state, but even here palm reappears as standard thatch

¹ Ricketson, 1927, p. 31, fig. 6.

² Blom and LaFarge, 1926, pp. 341-42.

³ Sapper, 1905, p. 27.

⁴ J. E. Thompson, 1930, p. 92.

⁵ Blom and LaFarge, 1926, pp. 341-42.

in several places: Kanazin; a town between Kanazin and Acanceh; and certain towns, such as Chicxulub, along the north coast. Straw and palm are about equally divided at Hunucma in northwest Yucatan. At Motul, Cansahcab, and Temax in the north and at Seye in central Yucatan, palm is used only for patching or for reinforcing the straw around the eaves, where the latter material is often too wispy and fragile to withstand wind.

Palm is standard thatch at every town I visited in Campeche except the city of Campeche, where grass is found side by side with it.

Palm thatch is found in Guatemala in four main areas: (1) the semi-mountainous, semi-desert country south of Zacapa and the Motagua River (Zacapa, Chiquimula, San Esteban, Santa Elena, San Juan Ermita, Jocotan, and others); (2) southern Alta Vera Paz and southern Baja Vera Paz; (3) the West Coast at most altitudes below 250 m.; (4) the Peten, including the Usumacinta frontier. Traveling westward over the railroad from Guatemala to Retalhuleu, for example, one sees palm thatch first at Mauricio (Department of Escuintla), which, on Urrutia's map of Guatemala, is the first town placed in the pale coloring which indicates an elevation of 250 m. or less above sea level.

Palm thatch extends north through the lowlands of Chiapas and Tabasco⁶ to the Gulf and from the lower Motagua through British Honduras⁷ to the northern coast of Yucatan.

Types.—Many kinds of palm leaf are used. In Yucatan 'šaan (*guano*)⁸ is standard everywhere that palm is the thatch material, with the exception of some north coast villages like Chicxulub. In the latter towns they use a palm called tšit.⁹ It has a much smaller, rounder frond than *guano* and the patterns formed by its arrangement as thatch are very attractive. The laths and common rafters must be spaced much closer together when tšit is to be fastened to them.

In Guatemala the *corozo* palm¹⁰ is probably the most widely used. The non-Indian huts at Puerto Barrios are thatched with *confra* palm. At Chiquimula they use the *palma real* and the *palma de coroz* (same as *corozo* palm). The *palma real* is also used in the Vera Paz. At Guatalon (Department of Solola) and Meza-tenango (Department of Suchitepequez) I saw houses thatched with cabbage palm. J. Eric Thompson reports cabbage palm and cohune palm leaves used in southern British Honduras.¹¹

Leaves of "chiapai, tcyapai, or chichon, ak'te" are reported by Blom and LaFarge from the lowlands of Chiapas.¹² Sapper says that the great leaves of the "fan palm called *cumumxan* by the Kekchi" are popular in northern districts where there are no corozos.¹³

⁶ Blom and LaFarge, 1926, pp. 135, 335.

⁷ J. E. Thompson, 1930, p. 91; Gann, 1918, p. 26.

⁸ Roys, 1931, p. 293: "šaan. *Sanal japa*, Wright. (Standl. 1920-26, 72). *Guano. Sabal mexicanum*, Mart. (Millspl. I, 355)."

⁹ *Ibid.*, p. 237: "chit. *Thrinax argentea*, Lodd. (Millspl. I, 335). *T. Wendlandiana*, Becc. (Gauger.) A palm with large fan-shaped leaves growing on the northern sea-coast."

¹⁰ Sapper, 1905, p. 24: "Corozo palm (*attalea cohune*)."

¹¹ J. E. Thompson, 1930, pp. 91-92.

¹² Blom and LaFarge, 1926, p. 335.

¹³ Sapper, 1905, p. 24.

Linguistics.—

TABLE 22

LANGUAGE	PLACE	PALM THATCH	LITERAL TRANSLATION AND REMARKS
Maya	Yucatan	' <i>ʃaan</i>	<i>zictah</i> , to thatch (Ticul) <i>zicbil</i> , to thatch with palm (Perez) ¹⁴ <i>xaan</i> , <i>guano</i> palm (Ticul; Perez) ¹⁵
Chorti	Jocotan	' <i>ʃaan</i>	
Quiche	Chichicastenango	<i>mes 'bal</i>	In Quiche <i>ʃan</i> means adobe
Cakchiquel	San Sebastian	<i>tut</i>	
Mam			<i>xaah</i> (Reynoso)

GRASS

Method.—Grass must be lashed to the roof framing, but the process of thatching with it is just about as rapid as thatching with palm, or more so. The operation was observed at Temax and Telchac Pueblo, Yucatan. The grass is cut and tied up in sheaves, which lie on the floor under the roof or on the ground outside (pl. 28,*a*). When the supply of grass used by a thatcher on the roof is exhausted, someone climbs down and tosses up another sheaf, holding it by the loose ends and swinging it several times to gain momentum and aim before releasing it, stalk ends upward. At Telchac four men were working on the roof and one was kept busy on the ground preparing the materials. Each roof man rested one foot on a little scaffold consisting of a flat-sided pole suspended from the roof framing (pl. 28,*b*). When the man on the roof has caught the new sheaf of grass, he unties it and stores it within close reach by stacking it behind a long thin stick, which is tied in a vertical position to one of the rods of the roof framing (pl. 28,*b*; fig. 40,*g*). At Panajachel, Guatemala, a long pole standing up through the framing from the floor below served the same purpose as the stick (pl. 28,*c*). From this supply the Indian selects a large fistful of grass, squeezes it together at the stalk ends, and pats it into shape with the other hand to get all edges even. Then he waves it once to shake off loose wisps and sometimes pulls them out when this fails. Then he swishes the bunch down on the rod, pushes it firmly against the last bunch, and lashes it in position, stalk ends upward and lower ends overlapping the tiers below (pls. 28,*d*, 29,*d*). At Panajachel, Guatemala, the thatch bundles were attached to every other pair of rods and overlapped from three to four tiers below (pl. 28,*c*).

Lashing is done with strips from a henequen stalk, which has been chopped at the base to facilitate removal of the strips (fig. 40,*e*). When the end of one strip is reached, a new one is attached to it in the manner illustrated in figure 40,*h*. Methods of lashing differ slightly in Yucatan and Guatemala. In Yucatan the lashing strip passes in front of the entire bundle and then around the rod and

¹⁴ Perez, 1866-1877, p. 418.¹⁵ Perez, 1866-1877, p. 386; 1898, p. 85. Cf. Motul and *Col. de Doc. Inéd.*, 1898, pp. 111, 172; 1900, p. 213.

on to the next bundle (fig. 40,*d*). In Guatemala the bundle is parted and the strip, after passing in front of the bundle and around the rod as before, is inserted into the parted bundle from behind and emerges again in front to pass to the next bundle (fig. 40,*f*). To save hands from being blistered by continued jerking on a henequen strip, the latter is wrapped each time around a small stick, the worker jerking the stick instead of the lashing strip (fig. 40,*d*). The stick is suspended by a thong from the wrist so it will not fall out of reach when the worker releases it to handle the grass. The man at Panajachel, Guatemala, worked with his bare hands (pl. 28,*c*). He said that 150 sheaves were required by the roof of his small kitchen.

In Yucatan, straw at the eaves is often underlaid with palm, because the wispy ends of grass are not sufficiently sturdy to withstand wind. Under the thatch of Jacalteca houses, according to LaFarge and Byers, a fine grade of grass is first laid down, not bound into bundles. Over this is placed coarser grass or straw, which holds down the under thatch.¹⁶

Geographical distribution.—Grass or straw thatch in Yucatan (fig. 39) is concentrated in the north central part of the state. In the west and northwest (Muna, Maxcanu, and Hunucma) it is used about as frequently as is palm. It reappears as the standard thatch material at Tizimin. The only place where I saw it in Campeche was at the capital. Apparently it is used nowhere else south of Muna and Halacho.

Grass thatch is popular in Guatemala, especially in the central highlands. Above altitudes of about 2500 m. grass suitable for thatch grows in large quantities. A man at Panajachel on Lake Atitlan said that he had to "go up higher" to get it; Panajachel has an altitude of about 1560 m. The grass grows with especial luxuriance in the country between Los Encuentros and Tecpam (2500–3000 m.) and between San Juan Ostuncalco and San Pedro Sacatepequez (2500–3000 m.).

Types.—Three or four kinds of grass are used for thatch in Yucatan. Informants at Telchac Pueblo and Izamal named two kinds: (1) *koʃol ak'*,¹⁷ the savanna grass, which has a heavier stem and lasts longer than other kinds;¹⁸ (2) *tʃak 'suuk*,¹⁹ the field grass, which is so named in Maya because of its darker, reddish color (*tʃak*, red; *'suuk*, grass). At Muna field grass is generally used, and *ku 'suuk*,²⁰ a "finer" grass that grows in the woods, was also mentioned. The latter is not very good for thatching purposes; it is more widely used as horse fodder.

¹⁶ LaFarge and Byers, 1931, p. 40.

¹⁷ Roys, 1931, p. 258: "koʃol-ac. Beach-grass. (Pio Perez, 1866–77). Lit. mosquito-grass."

¹⁸ P. 116, *infra*.

¹⁹ Roys, 1931, p. 312: "zuuc. Probably *Eragrostis mexicana* (Lag.) Link. *Bayal*. (Pio Perez, 1898, p. 104). *zuuc* is defined as a grass or *zacate* by the Motul and Pio Perez dictionaries. The *Bayal*, or *E. mexicana*, belongs to the grass family and is 12 to 14 inches high, common in open lands."

²⁰ *Ibid.*, pp. 258, 225: "kuk-zuuc. See *citam-ac*" "*citam-ac*. Lit. peccary-grass. Described as a 'long plant' used for thatching houses; also called *kuk-zuuc*. (Rel. de Yuc. I, 263)."

FIG. 40—DETAILS OF THATCH

a: Palm (from interior), House 3, Piste, Yucatan.

b: The same (from side).

c: Grass (from interior), House 1, Panajachel, Guatemala.

d: The same (from side).

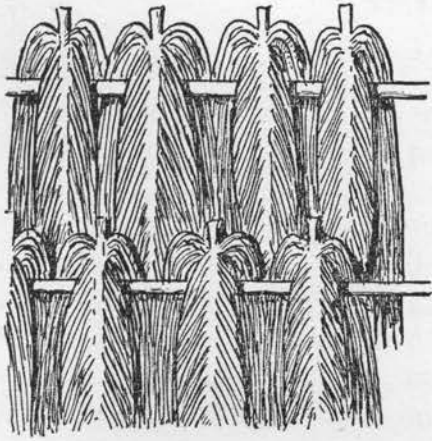
e: Stripping henequen from stalk, Temax, Yucatan.

f: Grass (from exterior), House 1, Panajachel, Guatemala.

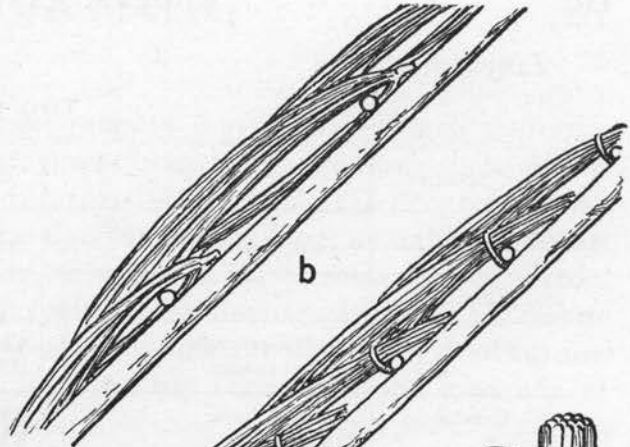
g: Grass supply, from same.

h: Knot for new lashing strip, from same.

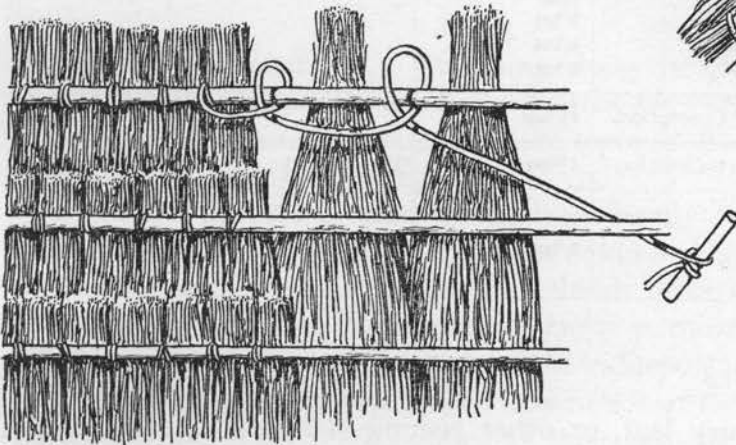
i: Sugar cane, House 2, San Cristobal, Guatemala.



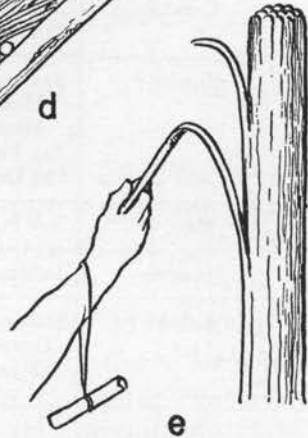
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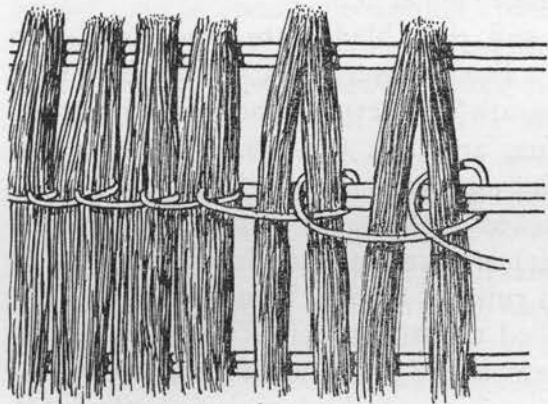
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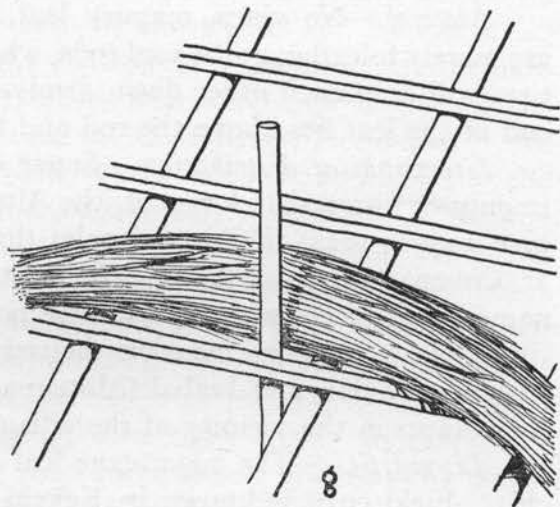


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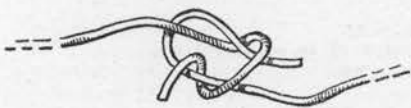


e

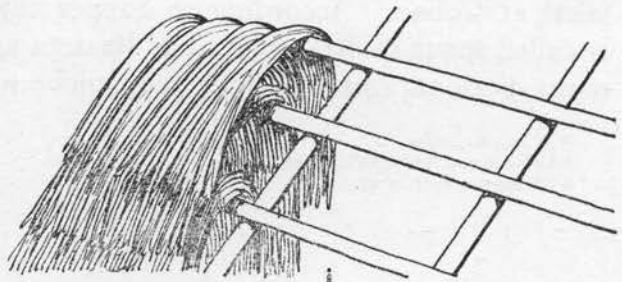
f



g



h



i

(See facing page for legend.)

Linguistics.—

TABLE 23

LANGUAGE	PLACE	GRASS THATCH	LITERAL TRANSLATION AND REMARKS
Maya	Izamal, Yucatan	'suuk	Cf. Motul, which gives zuuc
Chorti			quim (Suarez)
Quiche	Chichicastenango Quetzaltenango	q'i'es ri k'im	kim (Anonymous)
Cakchiquel	Santa Apolonia San Sebastian	k'in k'im	
Zutuhil ²¹	Santiago Atitlan House 1 House 1B San Pedro de Laguna San Lucas Toliman	tam k'im k'im k'im	
Mam	San Pedro Sz. and Concepcion	tʃ'um	
Jacalteco	Informant from Santa Eulalia	tʃ'im	tcin (LaFarge and Byers) ²²
Kekchi	Coban Houses 4 and 5 San Juan Chamelco	k'im ²³	

SUGAR CANE AND CORN BLADES

Method.—No vines, maguey leaf, or other lashing is required. The blades are merely folded over the roof rods, which must be close together so the overlapping tiers will hold each other down firmly (fig. 40, *i*). Sapper writes that the shorter end of the leaf lies above the rod and the longer under it.²⁴

Geographical distribution.—Sugar cane and corn blades are used for thatch in only one area that I visited, the Alta Vera Paz of Guatemala. Even here they give way to grass thatch and palm thatch south of Tactic. They were observed at Coban, San Juan Chamelco, Santa Cruz, and San Cristobal. At the last-named town there was a house with both roof and walls thatched with sugar cane (pl. 30, *d*). Stephens mentions houses thatched with blades of corn at a rancho between Gualan and Izabal (Motagua River) and at Gualan, Guatemala, and at four places in the vicinity of the village and ruins of Copan, Honduras.²⁵

Linguistics.—The sugar-cane leaf is called **akaxi(1)** at San Cristobal (Pokonchi). Field corn is known in Kekchi as **ʃakwax** at San Juan Chamelco and as **ʃakal** at Coban. According to Sapper the position of the leaves in roof thatch is called **tusuc** in Kekchi.²⁶ The Basseta and Ximinez dictionaries and an anonymous dictionary of 1787 give the Quiche word for field corn blades, **patzam**.

²¹ P. 174, n.1, *infra*.²² LaFarge and Byers, 1931, p. 40.²³ Cf. Sapper, 1905, p. 27.²⁴ Sapper, 1905, p. 27.²⁵ Stephens, 1841, 1: 58, 64, 90, 91, 107, 109.²⁶ Sapper, 1905, p. 27.

MISCELLANEOUS

Larrainzar²⁷ and Clavigero²⁸ mention maguey leaves as a thatch material. Stephens reports a house thatched with cypress branches (at the top of the Sierra Madre, 12 miles from Huehuetenango, Guatemala)²⁹ and another "thatched with the branches of trees" (at Iztapa on the Pacific coast of Guatemala).³⁰ *Purchas his pilgrimes* contains the following note on a house, "The rooffe was of Reeds, or stalks of Herbs."³¹ Sapper writes that where no palms are available makeshift thatch is formed of the "broad long leaves of platanillos (*heliconia* sp.) or of certain acacias."³² Banana leaves are sometimes used by Tzeltals in the lowlands of Chiapas, according to Blom and LaFarge.³³

MEMBERS TO BE THATCHED

ROOF CREST

Method.—Completion of thatching along the crest of the roof is an important operation, because the thatch here must be watertight so that it will start rain-water rolling to the roof slopes. Loose ends of thatch must be so arranged that winds will not whip it out of position.

A false ridgepole is used almost universally throughout the Maya area. It lies directly over the ridge-piece and the common rafters, resting in the V's formed where the latter cross each other. It holds down the thatch so that the latter can pass over the true ridgepole. Usually a thinner pole is laid longitudinally along the roof at each side of the false ridgepole and just below it. This side thatch pole (pl. 4,*b*; fig. 41,*a*) holds down ends of the thatch that is laid across the ridge. The poles are often crossed at their ends by short poles (pl. 4,*b*; fig. 41,*a*) and sometimes additionally braced by light crosspieces placed at intermediate points along their entire length (fig. 41,*d*). The latter are seen in one of the houses photographed by Gordon at Santana on the Uloa River, Honduras.³⁴ All these small thatch poles are lashed through the thatch to rods and rafters of the roof framing. Short, heavy sticks are sometimes similarly attached below the cross-pieces of the thatch poles (fig. 41,*a*) or along each roof slope just below the ridge (fig. 41,*b*). One occasionally sees very heavy false ridgepoles, with diameters about equal to those of the ridge-pieces themselves; at the same places thatch poles are also heavy. Examples: Jocotan, Miriam, Cuilapa (pl. 26,*d*), Guatemala.

Palm is generally placed transversely across the ridge (fig. 41,*c*). The leaves are squeezed firmly together and form a snug, watertight crest. In rare cases they are laid lengthwise along the ridge, but they are probably underlaid by transversely arranged fronds. Examples: Guatalon (Department of Solola), Las Cruces (Department of Retalhuleu), Guatemala.

Straw can be arranged more neatly at the crest than can palm (pl. 18,*a*). The depiction of thatch crests in ancient Maya frescoes³⁵ does not seem so con-

²⁷ Larrainzar, 1878, 5: 72.

²⁸ Clavigero, 1817, p. 232.

²⁹ Stephens, 1843, 1: 233.

³⁰ Stephens, 1841, 1: 288.

³¹ Purchas, 1626, p. 885.

³² Sapper, 1905, p. 24.

³³ Blom and LaFarge, 1926, p. 335.

³⁴ Gordon, 1896-1901.

³⁵ Wauchope, 1934, p. 117, fig. 2,*a*.

ventional after one has seen how sharply the crests of modern houses are silhouetted against the sky. Yucatecan Indians sometimes lay bundles of straw lengthwise along the ridge and cover these transversely with other bundles, the ends of which overlap the uppermost tier of thatch on the slopes (fig. 41,*d*); in such cases the longitudinally placed bundles take the place of a false ridgepole. Otherwise the bundles are laid across the ridge under the false ridge-piece. West of the Rio Bajo (Department of Chimaltenango), Guatemala, another method is common: the uppermost tier of straw bundles on each slope is allowed to project well above the ridgepole. These stalk ends are bound in bunches, which lie side by side and are lashed to each other (fig. 41,*e*), giving a very trim finish to the thatch. At San Juan Ostuncalco (Department of Quetzaltenango) these bundles usually cross each other over the ridge and are bound together in this position (fig. 41,*f*).

When the last two methods are used, a device may be needed to shed rain from the tufts of straw to the smoother roof slopes. One of the following is generally used:

1. The thatch crest is encased in mud or plaster and mud, with tiles laid on top. Examples: Zaragoza and Patzicia (Department of Chimaltenango), Guatemala. The entire top of the roof, including the crest and the first tier or two of slope thatch may be encased in a lime mortar which is spread in a thick, uneven, and sometimes perforated coat directly on the straw (fig. 41,*g*). Example: Santa Apolonia (a Cakchiquel town northeast of Tecpam), Guatemala.

2. Sods of moss are laid on top of the crest. Examples: Valladolid, Yucatan; Patzum (Department of Chimaltenango), Guatemala. People at the latter town seem to take little care in making their thatch neat or watertight. It is bumpy and laid on in great clumps with many loose wisps projecting.

3. A picturesque practice is that of placing large potsherds along the ridge (pl. 29,*c,d*; fig. 41,*i*)³⁶ or capping the summit of a pyramidal roof with an inverted vessel of pottery (pls. 6,*d*, 24,*c*, 29,*d*; fig. 41,*h*). Both sherds and complete vessels were observed at Santiago Atitlan, San Pedro de Laguna, and San Lucas Toliman (all on Lake Atitlan), Guatemala; they are reported by Sapper,³⁷ but since I saw no examples in the Alta Vera Paz, it is doubtful whether he refers, as usual, to this department of Guatemala. Sherds on the ridge were seen also at San Sebastian (Department of Solola) and at Jocotan (a Chorti town in the Department of Chiquimula), Guatemala; LaFarge and Byers report this feature among the Jacalteca³⁸

³⁶ The same result (that of watershed to the roof slopes) is now often effected by means of a long strip of galvanized iron.

³⁷ Sapper, 1905, p. 27.

³⁸ LaFarge and Byers, 1931, p. 42.

FIG. 41—CREST OF THE THATCH

a: False ridgepole and thatch poles, House 3, Lerma, Campeche.

b: Thatch poles, Becal, Yucatan.

c: Palm thatch, false ridgepole, and thatch poles, House 1, Oxkutzcab, Yucatan.

d: Bundle of grass used as false ridgepole, and thatch poles and their supports, House 1, Telchac Pueblo, Yucatan.

e: Stalk ends of grass tied up vertically, Zaragoza, Guatemala.

f: Same crossed, San Juan Ostuncalco, Guatemala.

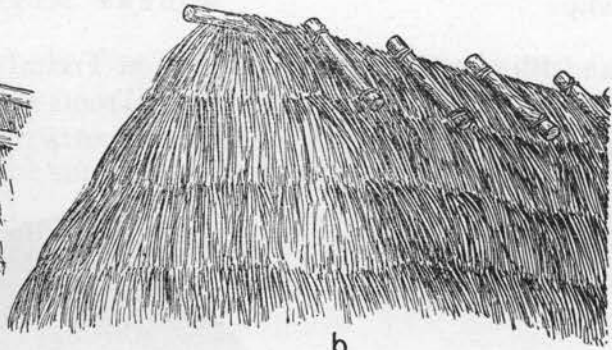
g: Crest encased in lime mortar, Santa Apolonia, Guatemala.

h: Bowl of pottery inverted over peak of pyramidal roof, Santiago Atitlan, Guatemala.

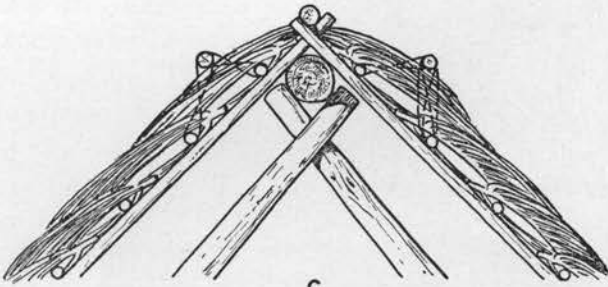
i: Potsherds along ridge, Santiago Atitlan, Guatemala.



a



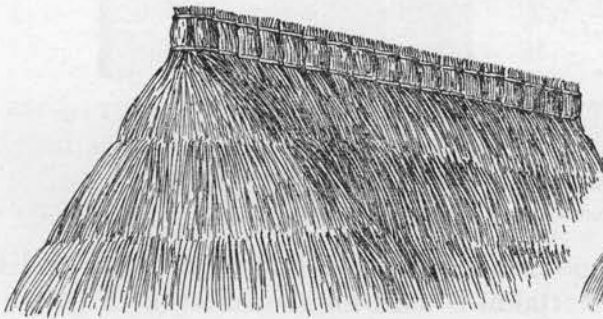
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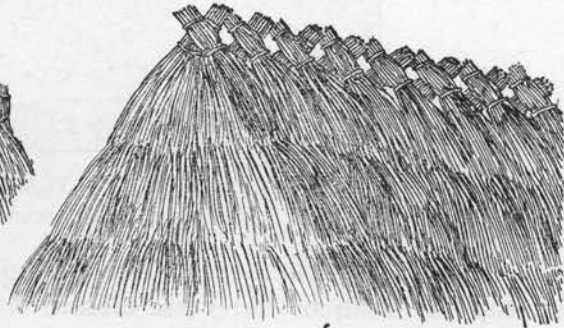
c



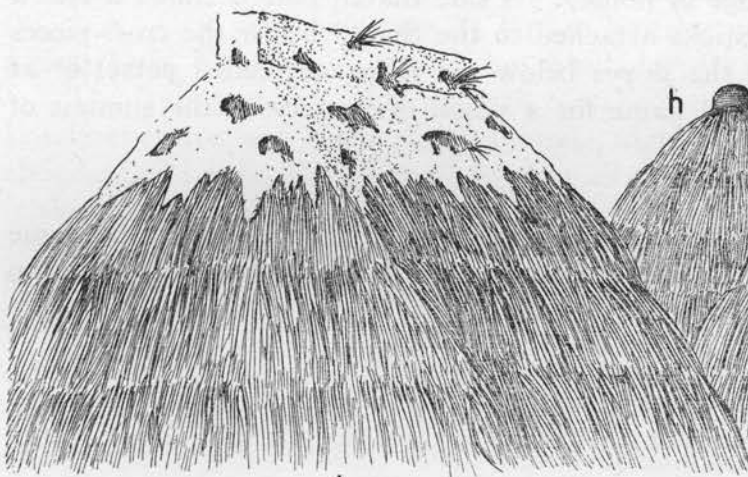
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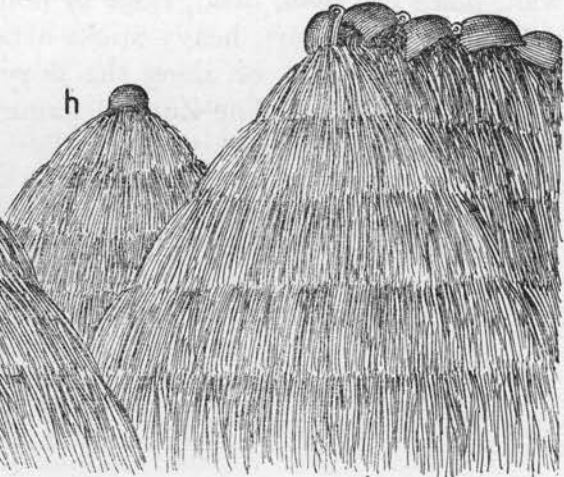
e



f



g



h

i

(See facing page for legend.)

and Blom and LaFarge found it on Tzeltal houses at Tenango, Chiapas.³⁹ Entire vessels were observed on pyramidal roofs at Patzicia also (Department of Chimaltenango, Guatemala).^{39a} Schuller reports the same practice among the Huastec of San Luis Potosi, Mexico.^{39b}

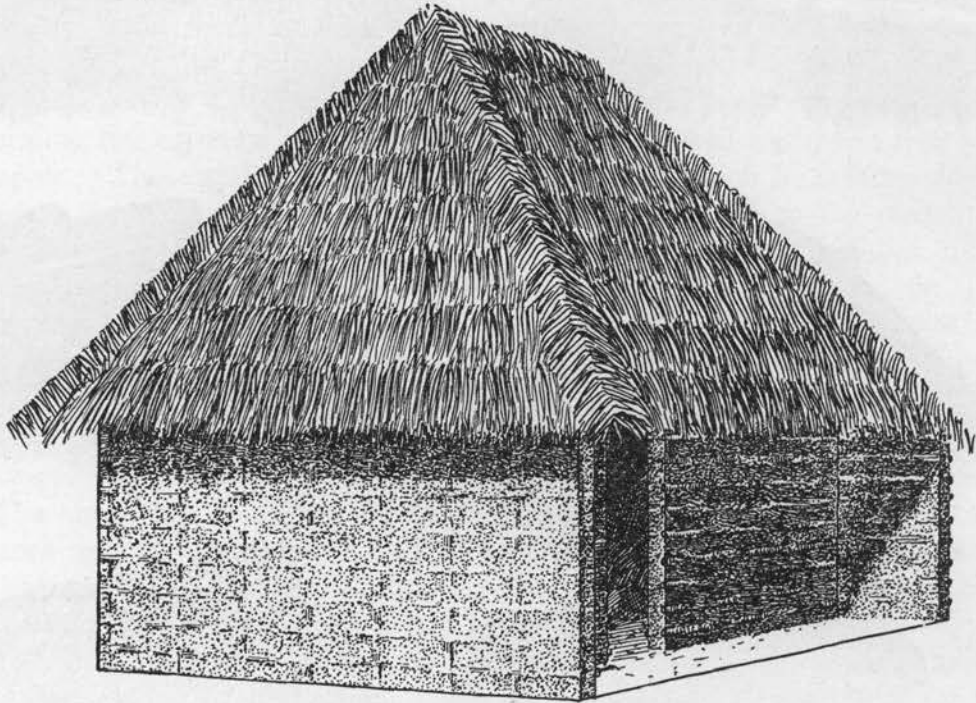


FIG. 42—THATCH FLASHING AT THE HIP RAFTERS
Between San Juan Ostuncalco and Palestina, Guatemala.

Materials.—Yucatecan false ridgepoles are made of **elemui**⁴⁰ at Piste and of **su'tup**⁴¹ at Tikuch. At Piste **elemui** or **tʂakni** is used for the side thatch poles.

Linguistics.—The Yucatecan Maya term for false ridgepole is **pak hool** (**pak**, wall, place on; **hool**, head, ridge of house). A side thatch pole is called **u tʂe' il pak hool**. The short, heavy sticks attached to the thatch below the cross-pieces of the thatch poles, or along the slopes below the ridge, are called **petsetʂe'** at Tizimin, Yucatan. The Zutuhil name for a vessel of pottery at the summit of a pyramidal roof is **mo'**.

HIP RAFTERS

Method.—In four-sided roofs the hip rafters are covered with straw in the same way that ridges are sometimes thatched: bundles are laid across them to overlap the adjacent thatch of the roof slopes (fig. 42).

EAVES

Trimming.—Thatch at the eaves is sometimes left just as it is put on, uneven and straggly (pl. 18,*d*), but usually it is trimmed to the desired height. In Yucatan

³⁹ Blom and LaFarge, 1927, p. 380.

^{39a} Since this publication has gone to press, there has appeared an article which discusses the distribution and antiquity of American roof-apex caps of clay (Linné, 1938).

^{39b} Schuller, 1924, p. 143.

⁴⁰ P. 48, n. 82, *supra*.

⁴¹ P. 48, n. 81, *supra*.

and Campeche thatch that hangs over the doorway is almost always trimmed, though the remainder along the eaves may not be. This is due to the fact that roofs do not project beyond the walls as far as they usually do in Guatemala, and it is necessary that thatch over the door be trimmed so that one can enter the house without stooping (pl. 24,*a*).

Reinforcement.—As has been mentioned heretofore, straw thatch is often underlaid with palm at the eaves to provide reinforcement against winds that, except for this brace, would tear away the wispy ends of grass.

Height.—This varies greatly depending chiefly on the height of the house walls and degree of slope of the roof. Yucatecan houses with walls of horizontal wattle usually have lower eaves than houses with other types of wall construction (pl. 16,*a,c*). The little low kitchens with dry rubble walls seen in large numbers at Hunucma, Yucatan, have such low eaves that the thatch almost sweeps the ground. On the other hand, a house with high walls and closely trimmed thatch (pl. 18,*b*) may have eaves that one can scarcely reach with an upraised hand. In Guatemala the lowest eaves were observed at San Sebastian in the Department of Solola (pl. 29,*c*) and at Santiago Atitlan, where the upper cane part of the walls is usually hidden by low-hanging thatch.

WALLS

Method.—Palm-thatched walls have been described on page 104. When grass is used, rods are attached to the wall framing and the method of thatching is similar to that used in the case of roofs.

Geographical distribution.—Partially or entirely thatched walls were recorded at Chan Kom, Chichen Itza, Chichimila (pl. 24,*a*), Quintana Roo, Tunkas, and Dzitas in Yucatan, at Mukuchakan (pl. 6,*c*) in Campeche, and in Guatemala at Puerto Barrios (pl. 30,*a*), Chiquimula, Jocotan (pl. 30,*b*), San Juan Ostuncalco, San Cristobal (pl. 30,*d*), Coban (pl. 29,*b*), between Los Encuentros and Tecpam, between Tecpam and Santa Apolonia, and also between Sija and Huehuetenango (pl. 30,*c*). The walls of houses at Puerto Morelos on the coast of Quintana Roo and at Yula, Yucatan, illustrated by Shattuck,⁴² are thatched.

The large number of houses with thatched walls in the high country between Los Encuentros and Tecpam, Guatemala, should probably be attributed to the abundance of good thatch grass in that environment. It is also very cold here (elevation 2500–3000 m.); I do not know whether or not walls thickly thatched keep a house warmer than do walls of mud. Much of the earth in this area is black, like that found in tundra regions, and is probably not well suited for wall construction.

DECORATION OF ROOF THATCH

Roof thatch, especially that along the ridge, is sometimes decorated with small objects. At Patzicia (Department of Chimaltenango) and Palestina (Department of Quetzaltenango), Guatemala, a little wooden cross is often inserted

⁴² Shattuck, 1933, pls. 38,A, 45,B,C.

in the thatch midway along the ridge of the roof. I was informed that at Tactic, a Pokonchi town south of Coban, Guatemala, small clay images of birds and other things are attached to the thatch, but when I passed through the village before dawn one morning it was still too dark to see them. The use of bird images on a thatched roof reminds one of some architectural decorations at the ruins of Uxmal, Yucatan. Sapper, describing a shrine (*ermita*) at Lake Izan, writes: "On the east roof between fresh palm leaves were stuck bird feathers, especially of the guacamaya, and mandibles and skulls of monkeys."⁴³

DURATION OF THATCH

MODERN ESTIMATES

Informants at Muna, Yucatan, and at the city of Campeche said that grass is better than palm as thatch material because it lasts, according to the man at Muna, about thirty years, while palm lasts only about ten years. The Campeche informant gave lower estimates: about twelve years for grass and about six years for palm. At Santa Apolonia, Guatemala, I was told that grass thatch lasts about six years. At Telchac Pueblo an Indian said that savanna grass lasts from twenty-five to thirty years, field grass from twenty to thirty. Both are preferable to palm, which lasts only fifteen years, according to this informant. That grass is preferable to palm for thatch is also shown by the fact that the former is used in almost all places where both materials are available; palm, on the other hand, is generally used only in those areas where no grass suitable for thatch is to be found (fig. 39).

Dr. Gaumer, a physician at Izamal, pointed out the fact that the thatch on kitchens lasts longer than that on dwellings, because smoke from the fire lodges on the thatch and protects it from insects and rodents.

SIXTEENTH-CENTURY ESTIMATES

Replying to Philip II's questionnaire the official at Dohot and Cabecera de Tetzimin writes that palm leaves make very good covering, which lasts five or six years without rotting, and that "if the forked posts and other wood with which they make the said houses are of tough [*rrezia*] wood, it lasts ten or twelve years. . ."⁴⁴ The Hocaba *Relación* reports that straw lasts four or five years; the "Cotuta y Tibolon" report estimates five to six years.⁴⁵ An official of Santa, Tabasco, writes, ". . . a house of these [woods], being well constructed of seasoned materials, lasts twelve and fourteen years, at the end of which it happens that only the roof or some post and pole is changed, if by chance there is any need of this, and in this condition it lasts twenty years."⁴⁶

It is interesting to compare all these figures with the following statement from a section on roofing in a modern engineering book, "A good thatch roof has been known, when well put on and composed of sound straw, to last from 10 to 14 years."⁴⁷

⁴³ Sapper, 1891, p. 893.

⁴⁴ *Col. de Doc. Inéd.*, 1900, 13: 213.

⁴⁵ *Col. de Doc. Inéd.*, 1898, 11: 92, 100.

⁴⁶ *Ibid.*, 1898, 11: 371.

⁴⁷ International Correspondence School, sec. 56, p. 14.

VI

INTERIORS

KITCHEN END

FIREPLACES

Number and position.—Most home activities center around the hearth, which is always situated in one end or corner of the house (or of the kitchen, if this is a separate structure). The side (right or left from the main entrance) and the direction of the house end occupied by the fireplace were recorded in twenty-four Yucatecan and three Guatemalan houses, but no significance can be attached to the Indians' selections. In Yucatan the hearth is usually located near a main-post. Sometimes there are two fireplaces in the same house, generally in the same end. One is used for cooking tortillas and the regular meals; water is kept hot or a stew kept simmering all day on the other, which is usually the smaller of the two. A small stack of wood (pls. 31,*a*, 33,*b*) is near the fireplace at all times and the fire rarely goes out during the day or night. When the woman of the house is not busy with other work she can always be found on her knees (pl. 32,*a*), sitting cross-legged (pl. 32,*b*), or squatting on a little concave-surfaced bench by the fire, fanning it industriously with a firefan (pl. 32,*a*) or some substitute, and adding fuel when necessary. If she has nothing else to cook, she makes tortillas for future consumption. When one enters the house she seems to feel it her duty, no matter what the time of day, to attend immediately to the fire with such assiduity that her guest's eyes are soon streaming with smoke-induced tears.

Construction.—The hearth generally consists of three round stones, the fire in the center being fed from three sticks, one between each two adjacent stones. The stones are usually about 30 cm. in diameter; the smallest observed were only 15 cm. in diameter. In Guatemala the fireplace is occasionally mounted on a table staging, which carries a bed of rubble with clay or mud on top. The table legs are embedded in the floor.

Identification in ruins.—Unless moved purposely, the fireplace should be found in prehistoric house sites. I was almost always able to find it in abandoned modern houses. The stones, being fairly large and heavy, are not likely to be moved accidentally; neighbors or the former inhabitants, however, sometimes remove them for re-use in another house. The stones are identifiable not only by their shape but also by the fact that they always show the effects of heat and smoke and by the deep layer of ash and charcoal that can usually be found between them in the floor (pl. 23,*a*). When a table supporting a fireplace rots away, I suppose its clay bed, burnt hard and red and heavily coated with ash, collapses between or very near the leg holes in the floor, thus making recognition of this type of hearth possible.

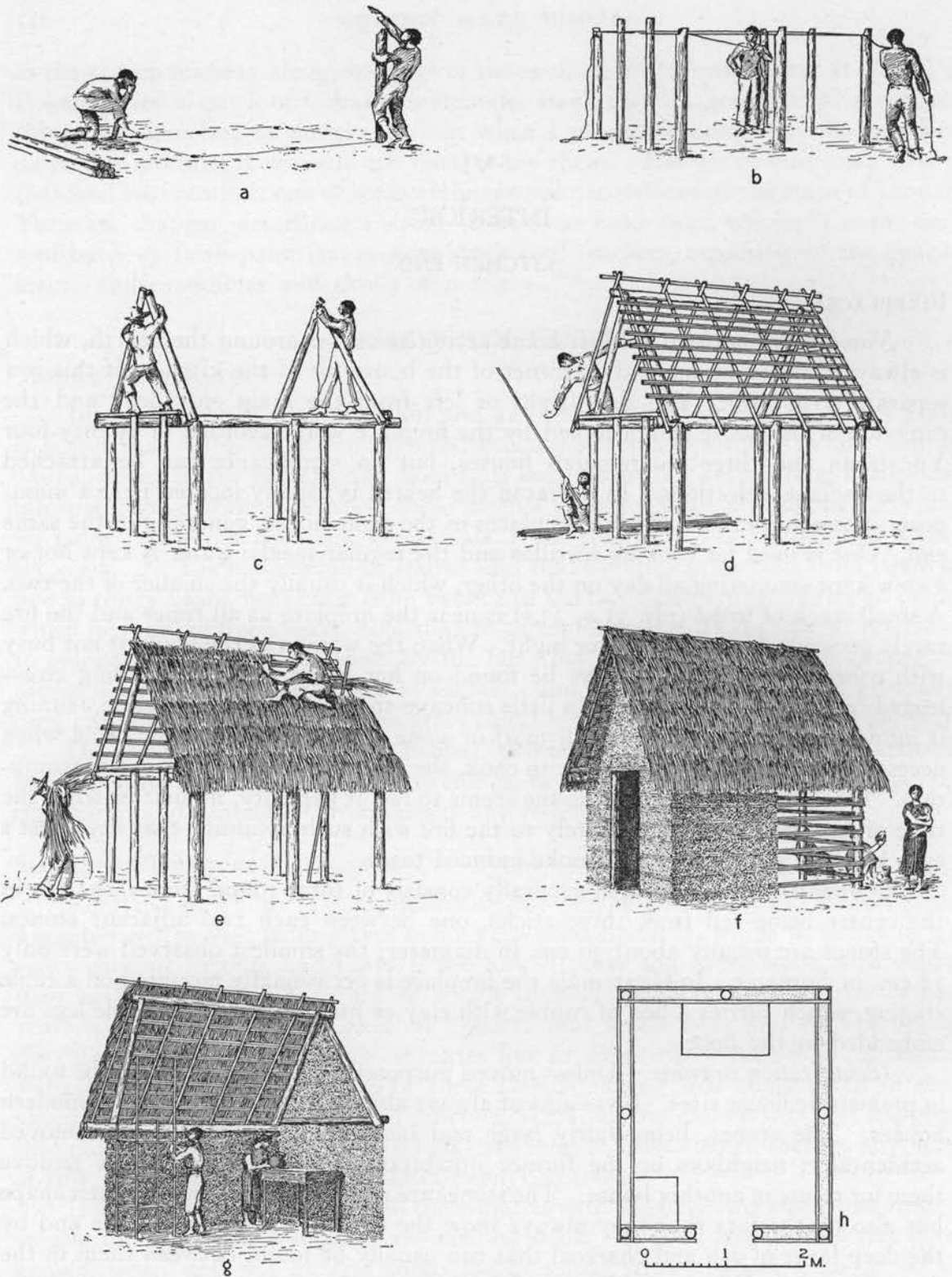


FIG. 43—STAGES IN HOUSE CONSTRUCTION, HOUSE 1 (SMALL KITCHEN), PANAJACHEL, GUATEMALA

- a*: Digging post holes and determining correct height of mainposts by sighting at imaginary angle of rafters to desired height of ridgepole.
- b*: Making height of mainposts uniform.
- c*: Erecting A-frames.

- d*: Completing roof framing.
- e*: Thatching roof.
- f*: Work stopped for lunch. Walls are partially completed.
- g*: Furnishing interior.
- h*: Plan of above kitchen.

E. H. Thompson reports the excavation of three-stone fireplaces in ancient house sites at Labna, Yucatan.¹ Clay firedogs, discolored by heat, were found in several ancient dwelling sites at Zacualpa (Department of Quiche), Guatemala.² Most of them bore imprints of wooden cross-pieces.

Geographical distribution.—Three-stone fireplaces set directly on the floor are used throughout the Maya area. Supporting tables of the type heretofore described were recorded at Chiquimula, San Pedro Sacatepequez, Panajachel (fig. 43,g), and Zacualpa (Department of Quiche), Guatemala. They are mentioned by Blom and LaFarge in a Chontal house at Comalcalco, Tabasco,³ and by Stephens at a rancho on the Motagua river between Izabal and Gualan, Guatemala.⁴

Linguistics.—

TABLE 24

LANGUAGE	PLACE	FIREPLACE	REMARKS
Maya	Yucatan	k'oben	Also means kitchen when this is a separate structure koben (Motul; Perez; ⁵ Ticul)
Quiche	Quetzaltenango Santa Cruz Quiche	squb squp	}xcub (Ximinez)
Cakchiquel	Santa Apolonia	sq'up	
Zutuhil	Santiago Atitlan	squp	
Mam	Concepcion	squp	
Jacalteco	Informant from Santa Eulalia	joketj	
Kekchi	Coban	q'up	
Pokonchi	San Cristobal	isqub	

UTENSILS

In the same end of the house with the fireplace one finds various kitchen utensils and pottery (pl. 32,c). Corn-grinding stones,⁶ both hand stones and stationary stones, lean from the floor against a wall (pl. 32,a) or lie in the hand-hewn wooden troughs which generally support them when in use (pl. 31,a). The trough legs are often embedded in the floor; it is possible that these could be located in a prehistoric house floor. Corn-grinding stones are often kept after they have broken. In several houses fragments had been stored on a table, in a corner, or outside the house at the base of the walls. Excavation of house mounds at Uaxactun revealed a similar practice in Old Empire times. House Mound I, for example, yielded six

¹ E. H. Thompson, 1892, p. 262.

² Wauchope, 1936, p. 129.

³ Blom and LaFarge, 1926, p. 136.

⁴ Stephens, 1841, 1: 58.

⁵ Perez, 1866-1877, p. 178; 1898, p. 42.

⁶ Now often replaced in Yucatan by metal corn mills mounted on a post, table, or the old trough itself (pl. 31,a). Large community mills, which charge a fee, are also common in larger towns.

hand stones, of which only one was intact, and three stationary stones, all broken.⁷ E. H. Thompson found fractured corn-grinding stones during his excavation of ancient houses at Labna, Yucatan.⁸ Many similar stones, in most cases broken or worn completely through, were excavated from house ruins at Zacualpa, Quiche, Guatemala.⁹

Most kitchen utensils are stored with the pottery on tables adjacent to the wall (pl. 32,*c*). They include wooden spoons, dishes, platters (pl. 37,*b*), chocolate bowls and beaters (pl. 33,*c*), gourd ladles, dishes, and bowls (pl. 33,*b,c*), possibly a metal griddle and kettle (pl. 33,*b*), a knife of modern manufacture, a galvanized iron bucket, or a gasoline tin (pls. 16,*b*, 33,*b*), and a few odd pieces of china (pl. 32,*b*).

POTTERY

Number and types.—These were recorded in order that the ceramic equipment of modern and ancient dwellings might be compared. In Yucatecan houses there are from two to eight large vessels, such as jars and storage bowls, and many smaller bowls for dipping, serving, and storing. At least one of the large vessels is kept full of water. House 1 at San Cristobal (Alta Vera Paz), Guatemala, had four large jars, a small pitcher, a large bowl, and numerous smaller vessels (pl. 32,*b*). House 4 at San Lucas Toliman (on Lake Atitlan), Guatemala, was well stocked with bowls of all sizes, small jars, a big pot-shaped vessel with bulging sides and incurved rim, handled vessels, and many small dishes (pl. 32,*a*; fig. 44,*b*). Large jars or other vessels for water storage are often set on flat-topped rocks on the floor near a wall (pl. 33,*b*). The stones are usually comparable in size to those of the fireplace. In a house at Chichimila, Yucatan, a small table was built of rocks, with a large bowl set on top.

Geographical distribution.—There is more pottery in Guatemalan houses than in Yucatecan, probably due to the fact that the manufacture of ceramics in Guatemala is not limited to certain towns to the extent that it is in Yucatan, and also due to the much greater number of itinerant peddlers in the former country.

In ancient houses.—A tremendous number of potsherds, largely cooking ware, is almost always found in the excavation of prehistoric Maya houses. Examples: House Mounds I, II, III, and IV, at Uaxactun;¹⁰ Mounds I, II, and III, at Zacualpa;¹¹ and Mound 21 at San Agustin Acasaguastlan,¹² Guatemala. These potsherds are removed not only from floors but also from platform fill and mound accumulation. Even taking this into consideration, it is clear that much more pottery was used in the ancient houses, or that the houses were occupied for longer periods of time than they are today, or that broken pottery was not thrown out of the house as often as it is by modern Indians.

MISCELLANEOUS

In House 22 at Valladolid, Yucatan, a heap of ashes lay between the fireplace and the wall. The ashes were banked against the wall. Although no bowls

⁷ Wauchope, 1934, p. 138, and pl. 5.

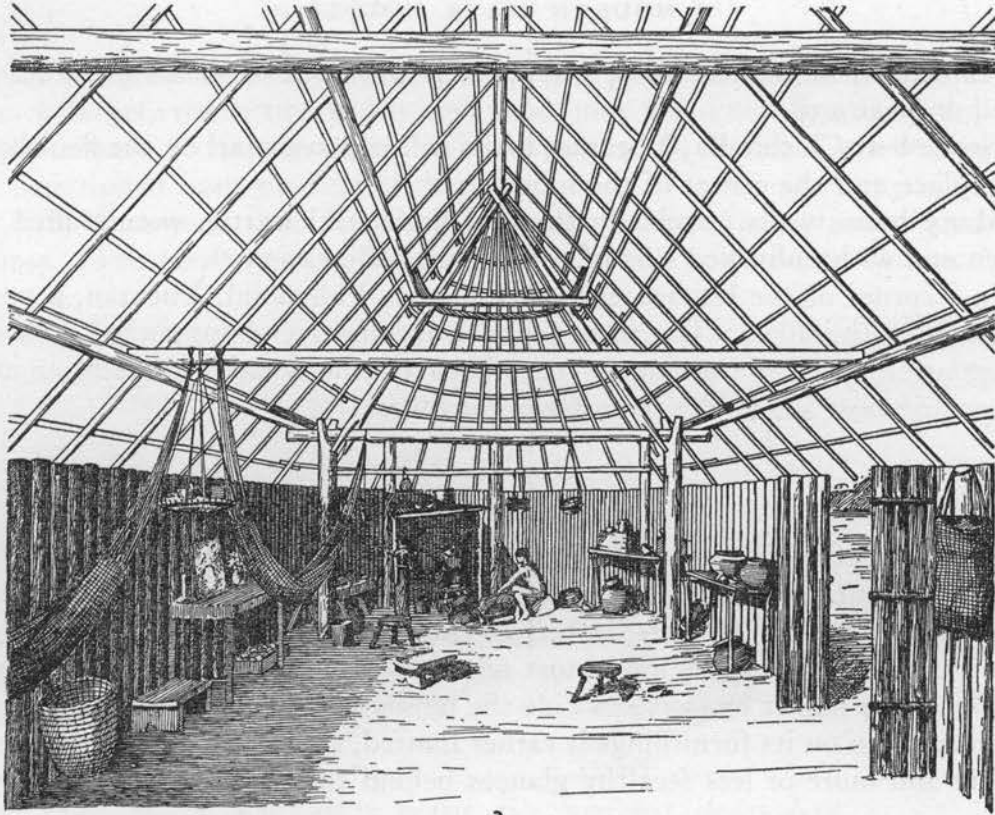
⁸ E. H. Thompson, 1892, p. 262.

⁹ Wauchope, 1936, p. 129.

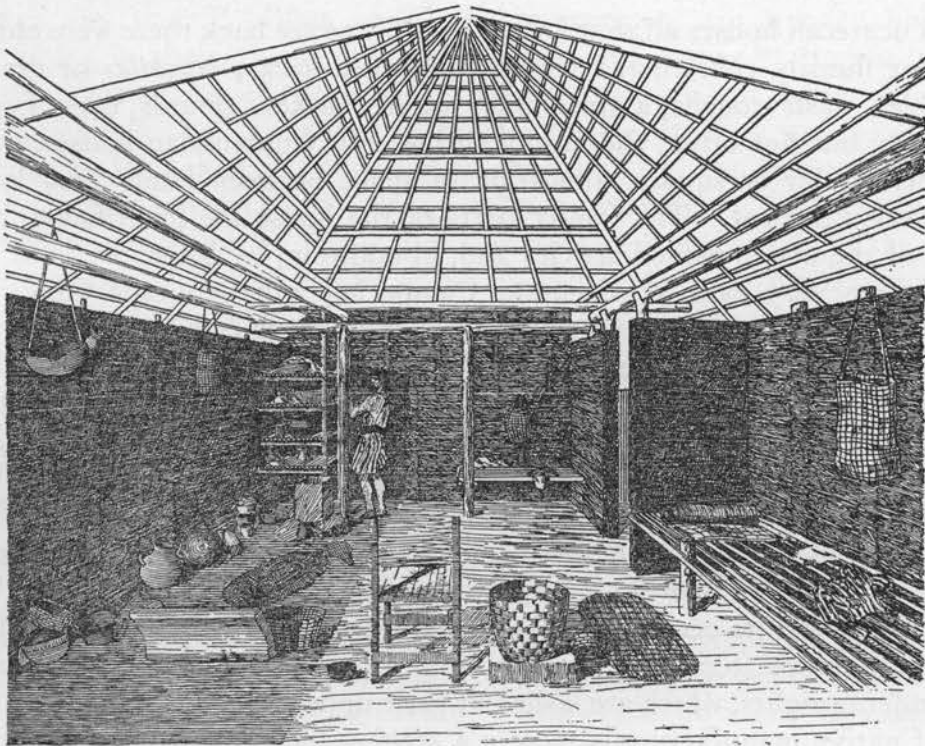
¹⁰ E. B. Ricketson, appendix to Wauchope, 1934.

¹¹ Wauchope, 1936, pp. 128-29.

¹² Kidder, 1935, p. 118.



a



b

FIG. 44—HOUSE INTERIORS

a: House 3, Chan Kom, Yucatan.

b: House 4, San Lucas Toliman, Guatemala. Thatch omitted to show roof framing more clearly.

were embedded in the ash heap, I suppose it was used in washing clothes as described on page 138.

House 8 at Chichimila, Yucatan, had a pile of loose marl on the floor between the fireplace and the center of the room.

Many house walls, especially those of horizontal wattle, were stuffed at the kitchen end with unhusked ears of corn (pls. 18,*d*, 31,*c*, 33,*c*).

In a corner of the kitchen end of House 10, Valladolid, Yucatan, a post was emplaced in the floor. The three forks in its upper end supported a basin. A small gourd dish filled the empty space between the bottom of the basin and the point on the post where the three forks converged.

FAMILY END

CONSTRUCTION

This part of the house in Yucatan occupies the end opposite the kitchen end. It is often partitioned from the rest of the house by a light wooden framing, consisting of about three uprights, lashed at their upper ends to the crossbeam, and about four cross-pieces, the lowermost resting on the uneven floor. Shawls hung over one of the higher cross-pieces hide the family end of the house; for this reason my information on its furnishings is rather limited, collected as it was by means of impolite and more or less stealthy glances behind the screen (*k'asal* in Maya).

FURNITURE

In Yucatecan houses all that I was ever able to see back there were old clothes, ornate but flimsily constructed trunks, henequen sacks, *muchilas* or draw-string bags, tables, wash troughs, a great many woven baskets, gourds, ears of corn, and occasionally but not often, the family shrine. In Guatemalan houses, which are either rectangular or square, allocation of space between family and kitchen is not so clearly defined. The family parts of the house are identifiable, however, by most of the above-named articles and, in addition, by beds.

Beds are very rare in Yucatan, Campeche, and Quintana Roo. Outside Merida only one was observed, and that in a most unexpected place. On the trail to Lake Chichankanab I spent the night at a small settlement called Dziuche, Quintana Roo. E. Wyllys Andrews, who was making the trip with me, and I arrived in the middle of the night and hung our hammocks in a small hut, already occupied by two people, one of whom slept in a hammock between us. The other person had a most unusual bed in one end of the hut. It stood high off the floor on a platform of poles, but whether or not there was any kind of a mattress could not be determined because of a mosquito net that completely enshrouded both the top of the bed and its occupant. Beds in Guatemala are often screened from the rest of the room or from the entrance by means of a large woven mat suspended from slender uprights, which are lashed at their upper ends to a crossbeam (fig. 45). A bed of native manufacture is merely a staging built out from one of the walls and covered with mats and blankets. The legs are usually emplaced in the floor. Houses 1 and 4 at San Lucas Toliman each contained two beds of this type.

In House 4 the smaller, only 75 cm. wide, was probably for children; the other was much larger, the entire width and about one third the length of the porch being partitioned for it (fig. 44,*b*). The larger bed of House 1 was located in a corner partitioned from the rest of the room.

J. Eric Thompson describes bark beds among the Maya of southern British Honduras. The beds consist of four low posts driven into the ground, with bark

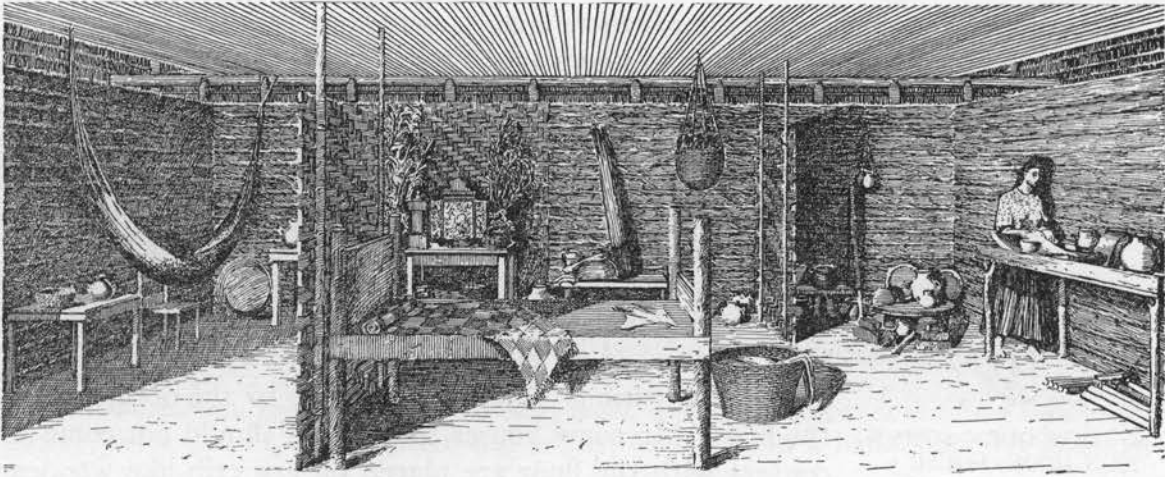


FIG. 45—INTERIOR OF HOUSE, SAN CRISTOBAL, GUATEMALA

stretched across them.¹³ Blom and LaFarge mention two wooden beds, built like low tables, in the corners of a Tzeltal house in Chiapas.¹⁴ Stephens records in 1843 the construction of three beds in the Convent of San Antonio de Guista, Guatemala, as follows, “. . . the style of them was new: they were made of long sticks about an inch thick, tied with bark strings at top and bottom, and resting on crotches about two feet high, driven into the dirt floor.”¹⁵ At Copan, Honduras, he mentions a wooden frame that was used for a bed in one of the houses.¹⁶ As for the ancient Maya, Larrainzar writes that they used mats of rush or of palm or beds consisting of long reeds, joined by means of a strap.¹⁷ Gage refers to four or five in the second of two rooms in Guatemalan houses.¹⁸ Landa refers to Yucatecan bedsteads made of cane¹⁹ and Villagutierre states that in each room of Guatemalan houses there were a bedstead large enough to accommodate four grown persons and small beds for the children.²⁰

Plate 26,*b* shows an interesting cradle suspended in the porch of a house at Cuilapa, Guatemala.

MISCELLANEOUS HOUSEHOLD OBJECTS

Most of the central part of a Yucatecan house is occupied by hammocks, which are slung between crossbeams or other conveniently located sturdier members of the house framing (pl. 43,*a*). Adult members of the family have larger ham-

¹³ J. E. Thompson, 1930, p. 92.

¹⁴ Blom and LaFarge, 1926, p. 336.

¹⁵ Stephens, 1843, I: 239.

¹⁶ Stephens, 1841, I: 107.

¹⁷ Larrainzar, 1878, p. 77.

¹⁸ Gage, 1702, p. 318.

¹⁹ Landa, 1864, p. 110.

²⁰ Villagutierre, 1701, p. 312.

mocks; children have small ones and infants generally sleep with their mothers. When one enters a house he is invited to sit down in a hammock or on a short three-legged stool (pls. 32,*c*, 33,*c*) or on a little wooden seat with a concave upper surface (*banquillo*, see pl. 33,*c*), with which the house is plentifully supplied. Many Indian houses now have a chair or two of modern manufacture (pl. 34,*c*).

The family shrine (figs. 44,*a*, 45), which will be described elsewhere (p. 142), is generally located against the wall either in one end of the house or at one side of a door or directly opposite the door if there is only one entrance.²¹ Various things are employed for storage. Attic roof floors (pp. 52-53), tables, baskets (pl. 32,*a*), sacks (pl. 31,*a*), and trunks have already been mentioned. Large wicker trays (pl. 32,*c*), smaller trays of coiled liana (pl. 33,*b*), and, in Guatemala, net bags (fig. 45) are often suspended from the roof framing as protection from rats and



FIG. 46—WOODEN SUSPENSION HOOK, HOUSE 3, PISTE, YUCATAN

domestic animals and fowls. Sometimes baskets and even pottery are hung against a wall (pl. 32,*b*). In House 3, Piste, Yucatan, a wooden hook (*kokotse*)²² about 35 cm. long and notched at its upper end (fig. 46) was suspended from an arm of an extra A-frame. It was used for suspension of various objects, according to the occupant of the house. In some houses things that should not come in contact with the floor are placed on low crib-like wooden platforms. Table framings usually consist of four forked uprights supporting cross-pieces at each end; the cross-pieces carry longitudinal poles, which, in turn, support a staging of small sticks (pl. 32,*c*). Table legs are sometimes embedded in the floor.

House 4 at San Lucas Toliman, Guatemala, had a four-story set of shelves in one corner (pl. 32,*a*). Two uprights had been erected, one against a wall, the other about an equal distance from both walls. Lashed to them at one end and thrust into the mud-daubed wall at the other end were cross-pieces, which supported cane shelves (fig. 44,*b*). Twined baskets, gourds, and pottery were stored on the shelves. At Panajachel, Guatemala, the builder of House 1 put in a set of these shelves (fig. 43,*g*). He lashed the upper ends of the uprights to rods in the roof framing. Longer single shelves are similarly constructed in Yucatecan houses (pl. 33,*b*). A very slender but deep pole hole in the burnt clay floor near a corner of a house room excavated at Zacualpa (Department of Quiche), Guatemala, probably supported the upright for a set of shelves like the examples heretofore described.

Large woven mats are hung against the walls in many Guatemalan houses (pl. 34,*b,c*). There are usually some smaller mats on the floor. A man's personal belongings are very little in evidence around any Indian house. An extra pair of sandals, those worn to the fields, as a rule lies somewhere on the floor. His water gourd, from which he drinks when at work or on the trail, generally hangs from a mainpost. If he owns tools, they are likely to be stored almost anywhere.

²¹ Shrines may also be housed in a separate structure built for this purpose (p. 135, *infra*).

²² The Perez dictionary gives *cocolche* (1866-1877, p. 53) and *kokliche* or *kokche* (1898, p. 42).

At a house in Tizimin, Yucatan, I remember seeing two axes hung over a wall stringer with their blades inserted between the vertical wall poles; at another house here a hoe and a sledge hammer were thrust handle first into the walls of horizontal wattle (pl. 31, *a*).

Pigs, dogs, chickens, and, in Guatemala, pigeons (pls. 18, *b*, 24, *c, d*, 25, *b*), wander in and out of the house at will. At Valladolid, Yucatan, a setting hen had her nest, made of coiled liana, inside one house on the floor.

Guatemalan floors are often strewn with pine needles (pl. 34, *c*). Fiesta decorations will be described on page 143.

The following list of furnishings is compiled from a description by LaFarge and Byers of a Jacalteca house interior:²³

1. A table with a stone for grinding corn and a chest on legs. (The table was a board supported by two sticks laid across four upright forked sticks.)
2. Fireplace in one corner. (It consisted of three stones with firedogs arranged in a star-shaped position.)
3. Large pot, supported by the stones of the fireplace.
4. Another large pot, a smaller pot, and two pitchers. A large water jar and two three-handled jars in a corner.
5. Two tortilla griddles, a small round bowl, a clay colander for washing lime from hominy, some gourds, some wicker and twined baskets, and a hand stone for grinding corn.
6. No beds, but two mats.
7. A machete, tump line, and basket pouch.
8. A net over the fire (hung from the roof-tree) held meat and tortillas. Packages of pig and snake fat (ointments) hung from stringers.
9. Heavy blanket from Quetzaltenango.

The following list outlines a description by Blom and LaFarge of the interior of a Tzeltal house in Chiapas:²⁴

1. Two wooden beds built in the corners.
2. Altar (a table) with large cross at the back.
3. Table in front with stones for grinding corn.
4. Fireplace of two broken jars and two small rocks, with the logs placed in a star-shaped plan between them. Three-stone fireplace outside.
5. Tortilla griddle over the fireplace.
6. Drying basket. Racks over the fireplace at the level of the eaves, thus protected from insects by smoke.
7. Another table for corn grinding stones.
8. Hammock, two mats, a three-legged stool.

The three authors quoted above also describe other house interiors. Blom and LaFarge mention a Tzeltal house at Cancuc, Chiapas, which had a partition probably hiding beds.²⁵

Gann writes that the furniture of a Maya house in southern Yucatan and northern British Honduras consists of a small round cedar table, seats or blocks of

²³ LaFarge and Byers, 1931, p. 45.

²⁴ Blom and LaFarge, 1926, pp. 336-39.

²⁵ Blom and LaFarge, 1927, p. 389.

wood about 7 to 10 cm. high, calabashes, earthen water jars, tortilla griddles, hammocks, and an altar with images.²⁶

J. Eric Thompson reports that there is no true sex segregation in Maya houses of southern British Honduras, but that sometimes the men's sleeping and visiting quarters are in one house and the women stay in a separate kitchen. Married couples sleep in the living room. If the living room and kitchen are under the same roof, they are sometimes divided by a flimsy partition. Furniture is as follows: three-stone fireplace supporting a griddle or pots; no ovens; bark bed; pottery; calabash; low seats (wooden blocks about 10 to 13 cm. high); one or more tables in the kitchen; storage poles on the crossbeams; notched pole ladder to this attic; sometimes altars.²⁷

EARLIER DESCRIPTIONS

Bancroft writes that Guatemalan houses generally ". . . have but one room; two or three stones in the centre of the hut compose the fireplace, and the only egress for the smoke is through the door. The room is scantily furnished with a few mats, a hammock, and some earthenware."²⁸

Norman describes the houses in the environs of Merida, Yucatan, in 1843:

I then visited the Indians in the suburbs. Their simple huts were comfortable, so far as mud and stone could make them, and tolerably clean. Their furniture is composed of nothing more than a few earthen vessels, calabashes, and hammocks swung across the room. The walls of some of them were ornamented with rude wooden crosses; and, occasionally, pictures of saints in tin frames.²⁹

Stephens in 1843 gives the following description of a hut which he and Catherwood visited at Chunhuhu, Yucatan, near Xampon and Sacbey:

The hut of which we thus became the sudden and involuntary masters was furnished with three stones for a fireplace, a wooden horse for kneading maize upon, a comal for baking tortillas, an earthen olla, or pot, for cooking, three or four waccals, or gourds, for drinking-cups, and two small Indian hammocks, which also were demanded and given up. Besides these, there was a circular dining-table about a foot and a half in diameter, supported by three pegs about eight inches high, and some blocks of wood about the same height for seats. Overhead, suspended from the rafters, were three large bundles of corn in the husk and two of beans in the pod; and on each string, about a foot above these eatables, was half a calabash or squash, with the rounded side up, like the shade over a lamp, which, besides being ornamental, filled the office of a rat-trap; for these vermin, in springing from the rafters to reach the corn and beans, would strike upon the calabash, and fall to the ground.³⁰

Of a hut at the Copan ruins, Honduras, Stephens says:

The back part was thatched, and piled up against it was Indian corn three ears deep. . . . In the corner in front was the bed of Don Miguel and his wife, protected by a bull's hide fastened at the head and side. The furniture consisted of a stone roller for mashing corn, and a comal or earthen griddle for baking tortillas, and on a rude shelf over the

²⁶ Gann, 1918, p. 27.

²⁷ J. E. Thompson, 1930, p. 92.

²⁸ Bancroft, 1886, p. 692.

²⁹ Norman, 1843, p. 41.

³⁰ Stephens, 1843, 2: 127-28.

bed were two boxes, which contained the wardrobe and all the property of Don Miguel and his wife.³¹

Larrainzar writes of the ancient houses:

It seems that among them there was not known in general the use of the table and of seats, for they ate on the floor, on some mats which they stretched on it for that purpose. Their seats are confined to some little low benches of wood, rush, or canes.

The Abbé Brasseur de Bourbourg, in speaking of the Mayas, says that the furniture and utensils which they used were few. . . . The chairs on which they sat, with legs crossed like Orientals, were of wood and precious metals, imitating the forms of an animal, tiger, lion, eagle. . . .³²

Larrainzar then describes the uses of stones for grinding corn, the tortilla griddle, gourds and calabashes. Finally he writes:

Among the furniture, of which the same Indians commonly had use, ought to be enumerated the ollas and vases of clay for their foods and drinks: the braziers and incense-burners, where they burned copal and other aromatic herbs in honor of their idols; the mats with which they covered the floor for certain uses, and the screens [curtains?—*cortinas*] with which many adorned the doors of their homes and the windows.³³

Gage writes as follows, "Few there are that set any Locks upon their Doors, for they fear no robbing, neither have they in their houses much to lose, Earthen Pots, and Pans, and Dishes, and Cups to drink their Chocolate, being the chief Commodities in their House."³⁴

³¹ Stephens, 1841, I: 109.

³² Larrainzar, 1878, p. 77.

³³ *Ibid.*, p. 80.

³⁴ Gage, 1702, p. 318.

VII
MISCELLANEOUS PROPERTY
GEOGRAPHICAL DISTRIBUTION

YUCATAN AND CAMPECHE

Almost every family in these two states has, in addition to its dwelling, other property which lies usually back of the main house or to one side of it (fig. 47). A separate kitchen, a storehouse, a beehive shelter, chicken houses, vegetable and flower gardens, fruit trees, and possibly a well and an oven, are often seen within the boundary walls of the yard. Domestic animals and fowl are also common.

GUATEMALA

Here one is not likely to find so much additional property in town, although the oven is fairly common. Sweat baths, often seen in the Lake Atitlan region, and granaries, found in large numbers in the northern and northwestern highlands at altitudes between 1800 and 3150 m. are features found in this country but not in Yucatan. Isolated Guatemalan families, on the other hand, often live on a well-equipped farm.

TYPES

BEEHIVE SHELTERS

Construction.—The shelters covering beehives in Yucatan are constructed like a house except for the fact that there are no walls (pl. 35,*a,b,c*). Since the roof is lower than that of a regular house, the ridgepole is generally carried by forked king-rods instead of A-frames. The base of each king-rod rests on the ground. Where this upright passes the crossbeam it is lashed to the latter. Beehives are stacked against a rack of poles which run diagonally upward from the ground on each side of the center to the innermost of three longitudinal poles (pl. 35,*b*). The two end crossbeams carry two sets of longitudinal poles. The diagonal rack poles cross alternately from each side to lean on the central longitudinal pole of the set of three opposite them (fig. 48,*c*). A long log lies on the ground at the base of each stack of beehives (pl. 35,*b*); braced by the corner posts of the shelter, these logs prevent the cylindrical hives from rolling off the rack onto the ground (fig. 48,*c*).

The beehives are sections cut from hollow logs. They are plugged with removable wooden stoppers at each end. One small hole is left in a circular depression in the side (pl. 35,*b*); this is the bees' entrance. A cross is always carved in the wood around the hole or immediately above it. Jacaltec beehives in Guatemala are described by LaFarge and Byers as long narrow boxes, which are slung from the eaves in front of the porch.¹

¹LaFarge and Byers, 1931, p. 48.

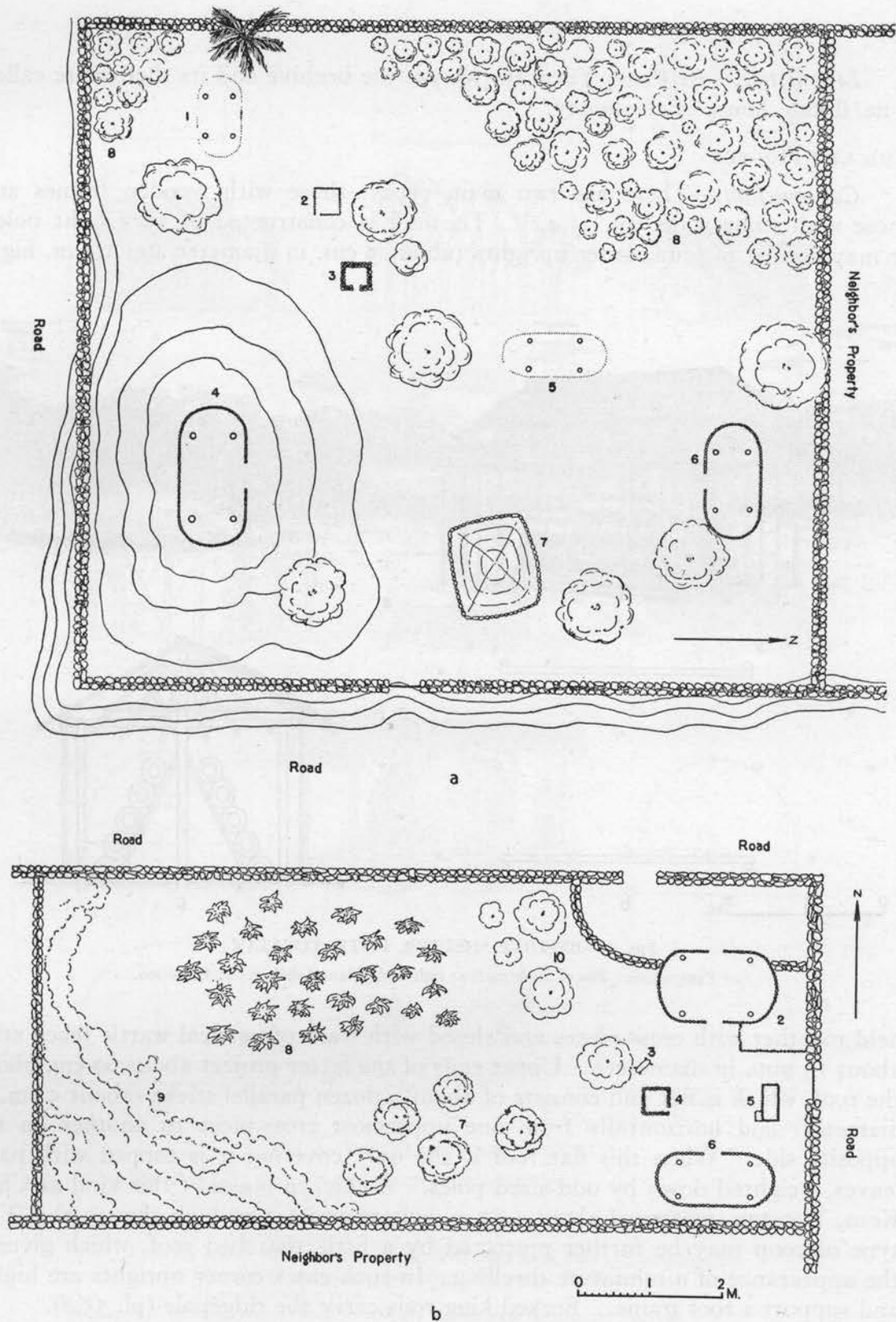


FIG. 47—PLANS OF PROPERTY ASSEMBLAGE

a: House 3, Chan Kom, Yucatan (2-meter contours sketched).

- 1, Beehive shelter.
- 2, Wooden chicken house.
- 3, Stone chicken house.
- 4, Dwelling.
- 5, Shelter.
- 6, Storehouse.
- 7, Pile of loose marl.
- 8, Trees.

b: House 2, Chan Kom, Yucatan.

- 1, Dwelling.
- 2, Fence-enclosed garden.
- 3, Wash trough.
- 4, Chicken house.
- 5, Chicken house.
- 6, Storehouse.
- 7, Fruit trees.
- 8, Plantain trees.
- 9, Uncleared bush.
- 10, Trees.

Linguistics.—At Piste, Yucatan (Maya) the beehive and its shelter are called *u na' il kab*, house of the honey.

CHICKEN HOUSES

Construction.—There are two main types: those with wooden frames and those with stone walls (pl. 35, *a, c*). The first is constructed of very light poles. It may consist of four corner uprights (about 5 cm. in diameter and 1.3 m. high)

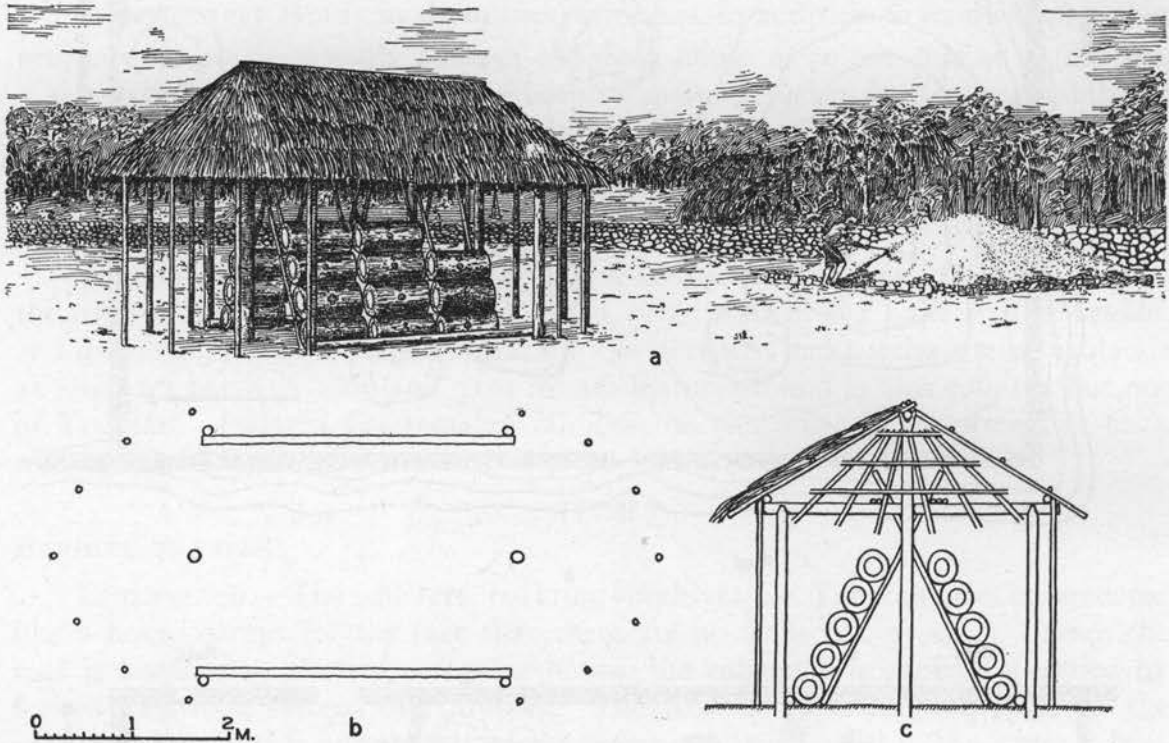


FIG. 48—BEEHIVE SHELTER, PISTE, YUCATAN
a: Perspective. Pile of loose marl at right. *b*: Plan of shelter. *c*: Elevation.

held together with cross-pieces and closed with walls of vertical wattle (each stick about 13 mm. in diameter). Upper ends of the latter project about 60 cm. above the roof, which is flat and consists of about a dozen parallel sticks (about 5 cm. in diameter) laid horizontally from one uppermost cross-piece to another on the opposite side. When this flat roof is the only covering it is topped with palm leaves, weighted down by odd-sized poles. A chicken house of this kind at Chan Kom, Yucatan, measured about 1.85 m. square and 1.3 m. high (fig. 49, *a*). This type of coop may be further protected by a little thatched roof, which gives it the appearance of a miniature dwelling. In such cases corner uprights are higher and support a roof frame. Forked king-rods carry the ridgepole (pl. 35, *d*).

An unusually large chicken house was under construction at Nictcha, Yucatan. Corner uprights supported cross "beams" and the latter carried plates, as

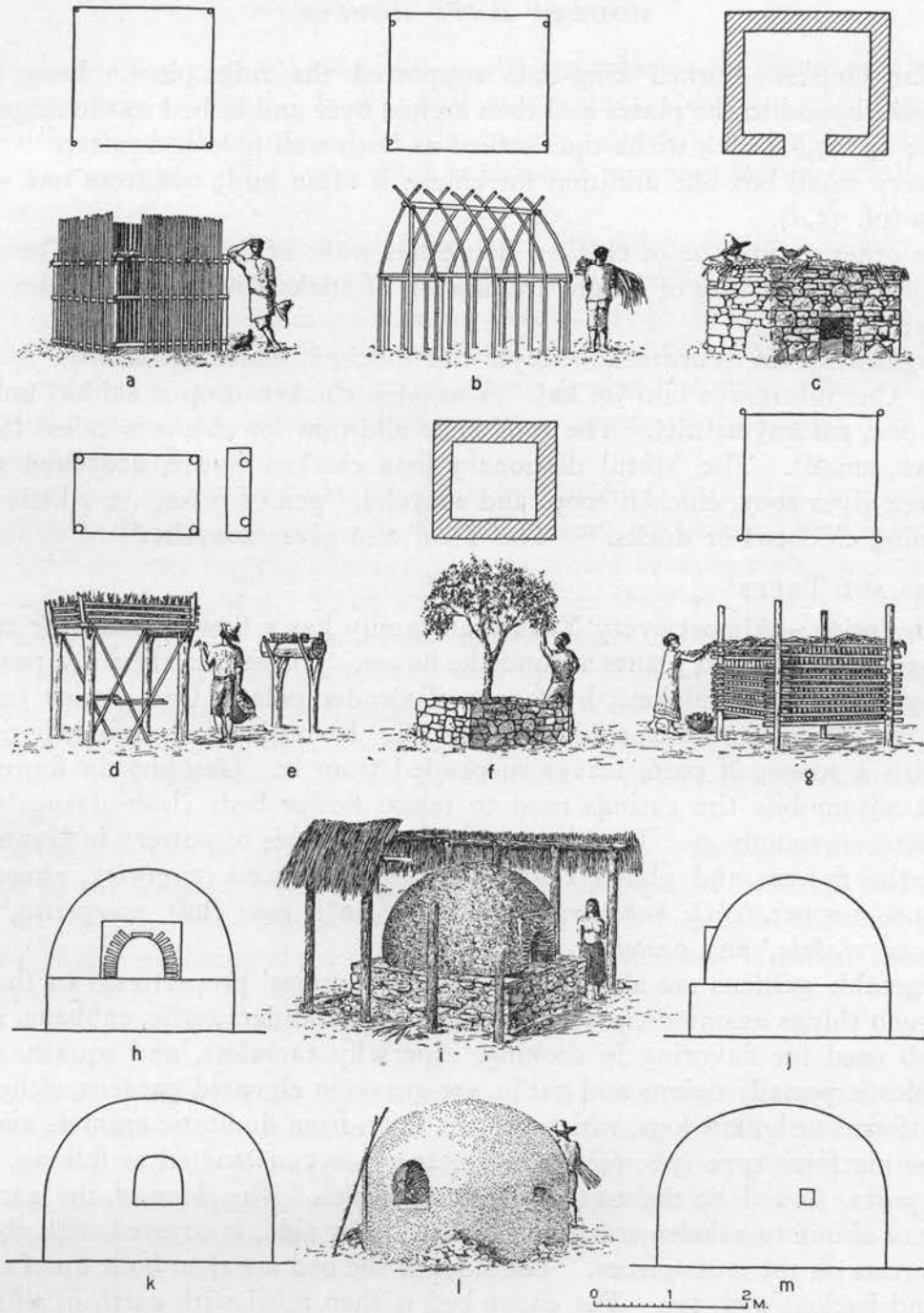


FIG. 49—MISCELLANEOUS PROPERTY

Rows I and II—plans and perspectives of chicken houses.

a: Chan Kom, Yucatan.

b: Nictcha, Yucatan.

c: Chan Kom, Yucatan.

Rows III and IV—plans and perspectives of onion beds, fruit tree, and corn bin.

d: Elevated onion bed, platform type, Xocenpich, Yucatan.

e: Same, hollow-log type.

f: Fruit tree enclosed by low dry rubble wall, Xocenpich, Yucatan.

g: Corn bin, Xocenpich, Yucatan.

Rows V and VI—elevations and perspectives of ovens.

h, j: Elevations of *i*.

i: Oven and its shelter, House 2, Jocotan, Guatemala.

k, m: Elevations of *l*.

l: Oven, House 4, Telchac Pueblo, Yucatan.

in regular houses. Forked king-rods supported the ridge-piece. Long pliant withes were bound to the plates and then arched over and lashed to the ridge-piece (pl. 36,*a*; fig. 49,*b*); each withe thus served as both wall pole and rafter.

A very small box-like addition for chicks is often built out from one side of the coop (pl. 35,*d*).

The other main type of chicken house has walls of dry rubble. The roof is generally flat, consisting of a light framework of sticks covered with palm leaves (pl. 35,*a*; fig. 49,*c*).

Linguistics.—In Yucatecan Maya the chicken house (*gallinera*) is called *soi kaʃ*. One informant said *ʃoi kaʃ*. A wooden chicken coop is *soi kaʃ kolotʃeʔ*; a stone one, *soi kaʃ tu'nitʃ*. The *gallinerita* addition for chicks is called *tʃan soi kaʃ* (*tʃan*, small). The Motul dictionary lists chicken house, *ucoycheil ulum*.² The Perez gives *zooy*, chicken coop, and *zooyche*, "pen of poles, . . . little house for keeping chickens or ducks."³ The Ticul also gives *zooyche*.⁴

GARDENS AND TREES

Description.—Almost every Yucatecan family has a flower garden or at least a few flowers and potted plants around the house. Sometimes these are protected from pigs, dogs, and chickens by fences of slender poles. One garden fence at Chan Kom had a gate which could be lifted off. It consisted of a single horizontal stick with a screen of palm leaves suspended from it. Gasoline-tin flower pots and old automobile tire casings used to retain flower beds clash strangely with their rustic surroundings. Plants are also kept in bowls of pottery in Guatemala. Among the flowers and plants I found Virginia tobacco (*virginia*), sweet basil (*albahaca*), pepper (*chile habanero*), poppy (*uʃtʃeʔ*), rose (*lol*), *margarita*,⁵ heart of Juanita, *clabela*,⁶ and *pastora*.

Vegetable gardens are also found on some families' properties. In them are raised such things as onions, peppers, tomatoes, coriander, garlic, cabbage, *epazote* (an herb used for flavoring in cooking, especially tamales), and squash. Some vegetables, especially onions and garlic, are grown in elevated gardens, either crib-like platforms or hollow logs, which protect them from domestic animals and fowl.

The platform type (pls. 6,*c*, 37,*d*; fig. 49,*d1*) is constructed as follows. Four corner posts, forked at the top, carry cross-pieces. The floor of the garden, a staging of about two dozen small poles laid side by side, is covered with sheets of tin and rests on the cross-pieces. The sides of the bed are then built up of stacked poles and backed with tin. The entire bed is then filled with earth in which the vegetables are to be planted. Access to the bed is had by a step which consists of two short cross-pieces lashed to two diagonal poles a little below the point where they cross in running from ground to floor-supporting cross-pieces. Stagings generally stand about 1.2 m. high and measure about 1 m. wide and 1.65 m. long. The bed is about 35 cm. deep. Stephens describes a vegetable bed of this type that he saw at "Sabachsche," between Ticul and Bolonchen, Yucatan.⁷

² Motul, MS. (Spanish-Maya), leaf 120.

³ Perez, 1866-1877, p. 107; 1898, p. 97.

⁴ Ticul, p. 203.

⁵ Common daisy, marguerite, periwinkle.

⁶ *Clavel*: pink, carnation.

⁷ Stephens, 1843, 2: 41.

The hollow-log type (pl. 36,*d*; fig. 49,*d2*) resembles a slit drum with the percussion members removed. It is a hollow longitudinal section of a log of soft wood, such as the silk cotton (*ceibo*), the ends not opened, supported at each end by a forked upright. The log is filled with earth in which onions or other vegetables are planted.

Yucatecans highly prize their fruit trees. A fairly wealthy Indian usually owns many trees on his property (fig. 47) and, according to Redfield,⁸ on other people's property also. Among the fruits I recorded are *chinas* (the sweet orange) and *naranjas* (the sour orange), plums (*šam a' bal* and *tš'i' a' bal*),⁹ custard apples (*op*),¹⁰ guanabanas, papayas, plantains (*haas*),¹¹ and bananas. One also sees a tree called *tuspana* and another called *uayam* or *uayum*;¹² the former may or may not have been a fruit tree.

Guatemalan houses, especially those in the Alta Vera Paz, are sometimes almost hidden by surrounding trees or cornstalks. At Coban I had difficulty in finding a house that I could photograph as a whole because coffee trees grew up to the walls of the houses. Even when no coffee trees are nearby, the house is almost always hidden by tall cornstalks on every side. Some idea of this situation can be gained by examining plates 25,*b* and 29,*b*. The Kekchi house in the latter plate was photographed from a high bluff overlooking the entire cornfield.

Bancroft, describing the "wild tribes" of Central America, writes that in Guatemala ". . . the houses . . . are surrounded by neatly kept gardens, enclosed in hedges."¹³

Antiquity.—The *Relación de los Pueblos de Chuaca y de Chechimula*, Yucatan, reported to the King of Spain about 1577, ". . . likewise he ordered them to set fire to all the fruit trees which they had behind their houses in the said town."¹⁴

Linguistics.—The elevated platform type of onion bed is called *kaantše'* in Yucatecan Maya.

GRANARIES

Yucatan.—Granaries for the storage of corn are sometimes built outdoors rather than inside the storehouse. Unhusked ears of corn are stored in a crib of poles (pl. 37,*c*; fig. 49,*g*) built in the following way. Four slender corner posts are driven into the ground; for these a wood called *tsalamis*¹⁵ is used at Xocenpich. Cross-pieces of the same diameter (about 7 cm.) are lashed to these uprights

⁸ Redfield, 1934, p. 67.

⁹ Roys, 1931, p. 235: "chi-abal. *Spondias mombin*, L. (Standl. 1920-26, p. 656). *Cirueta morada*. (Gauger.) Described as a shrub which frequently spreads along the ground and often becomes a small tree. 'There is another (plum) which is good and which they call *yx-chi-abal*, which is green when it ripens, and has a small seed.' (Rel. de Yuc. I, 169)."

¹⁰ *Ibid.*, p. 271: "op. *Annona reticulata*, L. Custard-apple, *Annona colorada*. (Standl. 1920-26, p. 284; Seler, 1902-08, III, 568). Reproduced Standl. 1928, Pl. 25. This is a tree 14 to 24 feet high with a red or reddish brown fruit."

¹¹ *Ibid.*, p. 244: "haaz. *Musa sapientum*, L. (Millsp. I, 358)."

¹² *Ibid.*, p. 292: "uayam, or uayum. *Talisia oliviformis* (H. B. K.) Radlk. *Guayo*. (Standl. 1920-26, p. 708; Millsp. I, 403; Gauger.) Described as a tree 60 feet high, common in the forests and cultivated in the villages. 'uayam. A palatable little fruit of this land, and the tree which bears it.' (Motul.) 'There is another very fresh and beautiful tree which bears a fruit which is no more nor less than hazel-nuts, with its shell. Beneath this shell it has a fruit like cherries and large pit. The Indians call these *uayam* and the Spaniards, *Guayas*.' (Landa, 1900, p. 392)."

¹³ Bancroft, 1886, p. 693.

¹⁴ *Col. de Doc. Inéd.*, 1900, 13: 69.

¹⁵ Roys, 1931, p. 290: "tsalam. *Lysiloma bahamensis*, Benth. (Standl. 1920-26, p. 390). *L. latisiliqua*, L. (Millsp. I, 300; Gauger.) Reported from forests near Izamal as a tree 80 feet high. The flowers are white and the flat fruit is 5 to 6 inches long and an inch broad."

about 35 cm. from the ground. They carry a staging of poles laid side by side. The sides of the granary are built to a height of about 1.35 m. as in a crib. Ears of corn are then packed in closely in a vertical position. When full, the crib is covered with leaves of *guano* palm; in some cases a shelter is built over the whole thing.

Guatemala.—There are many granaries for wheat in the northern and north-western highlands at altitudes between 1800 and 3150 m. One of these, a small structure thatched all over with long grass, is shown in plate 30,c. This site had been leveled and cut away to obtain good drainage. There were signs of its use as a threshing floor also.

KITCHENS

Description.—Cooking is often done in a separate hut. In Yucatan this is generally located directly back of the main house and is usually identical with it, both in construction and in size. Minor details may differ; for instance, a house with vertical wall poles is often associated with a kitchen which has walls of horizontal wattle. Another type, already mentioned (pp. 75-76, 115) is the little stone hut kitchen found in large numbers in Hunucma. It has very low dry rubble walls with a low-pitched thatched roof, the eaves of which almost reach the ground. Besides housing fireplace, kitchen utensils, and pottery, the kitchen may also serve for storage, but better-equipped families have a separate storehouse.

Linguistics.—In Yucatan (Maya) a separate kitchen is called by the same name as a fireplace, **k'oben**.

OVENS

Description.—Bread is baked in dome-shaped ovens of rubble masonry which stand on platforms paved with bricks (pl. 37,a). Those of Yucatan and Guatemala do not differ except for the fact that adobe is often used in the construction of the latter. The dome is achieved by laying rubble masonry over a wooden form, which is removed later. Walls are generally about 30 cm. thick and plastered on the exterior. There is a front door usually about 65 cm. both in width and in height. A small outlet for ashes on one side of the oven is usually about 20 cm. square and is about 85 cm. above ground (fig. 49,l). The platform, about 75 cm. high, is also built of rubble masonry and paved with bricks or, as in Guatemala, with flat slabs of adobe (fig. 49,i). The oven is fired with wood and long, dried grass. Usually it is located away from the house, either in the open (fig. 49,l) or under a shelter (pl. 37,a; fig. 49,i). In Guatemala one sometimes sees an oven built on the porch of a house.

Antiquity.—An anonymous dictionary of 1787 gives the Quiche term meaning bread oven.¹⁶ An oven which served another purpose is mentioned in a *Relación* dated 1576 and sent by Palacio to Philip II. He is describing the "Province of Guatemala" and the customs of Indians there, and says, "... they extract the

¹⁶ Anonymous, 1787.

brine, for which they have need, from the earth which the sea bathes in its tides, and strain it [?—*cuencenla*] in ovens similar to those which the countrymen use . . .”¹⁷

ROCK ENCLOSURES FOR PIGS

Construction.—The walls are constructed of dry rubble masonry.

Geographical distribution.—They are found at most places in Yucatan.

SASCAB PILES

Description.—Many Yucatecan families keep large piles of loose marl (*sascab*) on their property. When anything is built that requires this marl, a ready supply is on hand. It is sometimes stored indoors in the storehouse, the kitchen, or the dwelling itself. More often it is kept outdoors, especially when there is more than can be conveniently accommodated under a roof (pl. 36,*b*; figs. 47,*a*7, 48,*a*). The heaps are retained by low stone walls. Identification of a marl supply on ancient property should be easy.

Linguistics.—The Yucatecan Maya equivalent of *sascab* is *sa'kab*.

SHRINES

Description.—In addition to small altars in the houses, one occasionally sees structures built to shelter more elaborate family shrines. An example at Chichimila, Yucatan, was situated near and to one side of the main entrance of the associated dwelling. It was small, with walls of vertical wattle and a ridgepole carried by king-rods. The north end, which faced the house door, was left open. Sacred pictures, crosses, and candles were grouped on a table-altar in the back. One of two shrines at Coban (Alta Vera Paz), Guatemala, was as small as this one at Chichimila. The other shrine belonged to a religious semi-secret society (*cofradía*); it was a full-size house, constructed exactly like the dwellings of that town.

Boddam-Whetham writes of Coban, Guatemala, in 1877:

Besides the saints and shrines that are seen in all the native houses here, there are many Indian chapels known as “Saints’ Houses,” which are used for feasts and ceremonies. Some of them bring a very good revenue to the priests, that of San Domingo affording about three hundred dollars a year. Life size figures and altars fill these chapels, and before them are lighted candles and offerings of fruit and flowers.¹⁸

Sapper describes the interior of an *ermita* (shrine) at Lake Izan. On entering the east side one saw opposite the entrance two hanging shelves, on which stood a number of clay bowls (each with a face-mask fastened to the rim), two wooden troughs carrying vases with copal, a small rod with a disk in front, and some musical instruments. On the beams lay bow and arrows. In front of the house stood a pot with its stone top still unfinished. On the east roof, between fresh palm leaves, were stuck bird feathers, especially those of the *guacamaya*, and mandibles and skulls of monkeys.¹⁹

¹⁷ *Col. de Doc. Ind.*, 1866, 6: 8.

¹⁸ Boddam-Whetham, 1877, p. 234.

¹⁹ Sapper, 1891, p. 893.

On the outskirts of towns and at intervals along the roads in Guatemala the traveler comes on small shelters, which offer him a place to rest, protection from the rain, and crosses for his devotionals.

STOREHOUSES

Description.—These may or may not have walls; more often they do (pl. 36,*b*). Otherwise they are built like a dwelling. There is usually only one door. Inside one generally finds a crib or corn bin; an example at Chan Kom was about 1.8 m. square and 50 cm. high. Several large twined baskets, containing such things as beans and *macal*²⁰ are usually suspended from the walls, laid on the floor, or stored away on a roof floor. One end of the storehouse may be filled with a big heap of lime. This is retained by short sections of logs about 15 cm. in diameter. The remainder of the house is generally well filled with piles of oranges and squashes, old boxes and hammocks, and the many odds and ends that an Indian family accumulates but does not discard.

SWEAT-BATH HUTS

Description.—The construction of a sweat-bath hut is simple (pl. 37,*b*).²¹ The walls are of rubble set in adobe mud; lava is used at Santiago Atitlan, Guatemala. Across the tops of the walls rest poles, which support a roof of mud with some rubble admixed. Each door jamb is composed of large stones set on end and capped by a smaller stone that carries the wooden lintel. The lintel consists of two pieces of wood, one on top of the other. It is really the first of the crossbeams that bridge the gap between the side walls and support the roof. Small firewood is usually stacked outside the hut. In towns where several houses are located within the same boundary walls, as at Santiago Atitlan, there is usually only one sweat bath for the houses thus associated.

LaFarge and Byers describe Jacalteco sweat baths. These are low and sometimes semi-excavated. They are about 1 m. high and 1.5 m. wide. The walls are of stone and mud; the gabled roof is of boards, with small stones and mud. At San Miguel they are sometimes covered by a thatched shelter. There may be a permanent slab oven at the back, inside. Sweat baths here are forbidden by law.²² Blom and LaFarge write that Tzeltal sweat baths in Chiapas are cubes of wattle thickly plastered.²³ For purposes of comparison I shall quote Starr on sweat baths at Tantima, Mexico:

Many of the houses had *temascals*, differing considerably from those of Puebla and Tlaxcala. They are rectangular; the walls are built of poles, set upright, close together, and strengthened by being lashed to a horizontal timber set midway of their height. The roof is a round vault or arch of poles set lengthwise. The whole is neatly plastered

²⁰ An edible root (*Xanthosoma violaceum*, Schott.).

²¹ I do not refer here to the larger community bath houses fed by hot springs, such as those at Almolonga (near Quetzaltenango), Guatemala.

Since this publication has gone to press, F. M. Cresson's paper on sweat houses has appeared. The reader is referred to this article (Cresson, 1938) for a much more complete description, distribution account, discussion, and bibliography of this subject.

²² LaFarge and Byers, 1931, p. 48; photograph on p. 43.

²³ Blom and LaFarge, 1926, p. 342; photographs on pp. 342, 343.

over with a mixture of mud and chopped straw, and in the front a cross is worked in the clay mixture, to insure good fortune.²⁴

Geographical distribution.—I did not see any sweat baths in Yucatan. There are a great many in the highlands of Mexico and in Guatemala, especially at Santiago Atitlan and other towns around the lake there.

Antiquity.—An eighteenth-century dictionary of the Quiche language gives the term for 'oven in which the Indians bath [*sic*] themselves.'²⁵ Gage writes that there "is scarce any House which hath not also in the Yard a Stew, wherein they bath themselves with hot Water, which is their chief Physick when they feel themselves distempered."²⁶

Mound III at Zacualpa (Department of Quiche), Guatemala,²⁷ contained a twice-used and once-heightened tomb, originally built as a semi-subterranean part of a house platform. Since its dimensions and wall construction were similar to sweat baths used today by Indians in the valley in which this Mound is located, and since there was a charcoal-filled oven on the original paved floor of the tomb, it seems probable that it was originally a sweat bath.

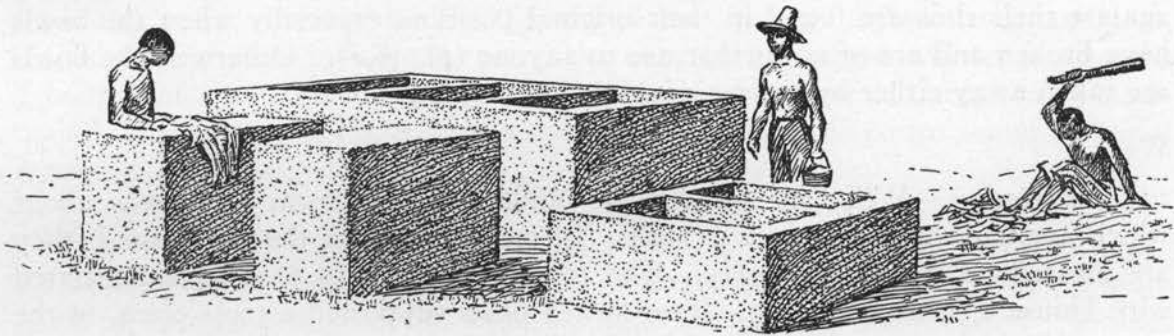


FIG. 50—TANNERY, SOTUTA, YUCATAN

Left foreground: two anvils for beating and scraping skins.

Right foreground: concrete tank for lime bath.
Right background: beating tšukum bark.

TANNERIES

Description.—Two tanneries, one at Temax and one at Sotuta, Yucatan, were similarly equipped (fig. 50). At each there were two big anvils, about a meter high and built of plastered rubble masonry, on which skins were spread for scraping. Tissue was scraped off with a knife. At one side of the anvils there was a double water tank of plastered rubble masonry, each tank (*pila de cal* or *encalador*) about 55 cm. deep. Here skins were soaked in a lime bath to soften them and remove the dirt and dried blood. Another tank stood back of the anvils; it was about 4 m. long, 2.5 m. wide, and 1 m. deep. It had three compartments filled to a depth of about 15 or 20 cm. with soapy-looking water. The soapy appearance was due to the pounded-up tšu'kum bark which was added to the water for tanning the skins after they were removed from the lime-bath tank. Under the same

²⁴ Starr, 1908, p. 283.

²⁵ Anonymous, 1787.

²⁶ Gage, 1702, p. 318.

²⁷ Wauchope, 1936, p. 129.

shelter which covered the larger tank at Sotuta there was a heap of t̄ʃu'kum bark. An Indian squatted by it, beating the shredded bark with a wooden club. With his right foot he would push more bark under the club. Another man scraped skins and tended the baths. Later a third man arrived with his dogs and oxcart, the latter piled high with skins which he had evidently bought from villagers. The entire place was swarming with flies attracted by the stench from the skins.

If similar tannerries existed in ancient times, they could be easily recognized upon excavation.

WASH-BOWL AND WASH-TROUGH SHELTERS

Description.—Clothes are washed in the house or under a shelter outside. Usually a large dug-out wash trough is used (pl. 36,a), but in many places one sees big bowls of pottery embedded in the ash heaps which are part of the cleansing equipment (pl. 36,c). These could readily be identified if found at an ancient house site. I recognized the remains of several near abandoned houses. The ash heaps were partially solidified by water and in all cases the imprints left by the bowls were still clear. Sometimes the bowls and the rocks which are packed against their rims are found in their original position, especially when the bowls have broken and are of no further use to anyone (pl. 36,d). Otherwise the bowls are taken away either by the moving family or by neighbors.

WELLS

Description.—Wells are usually for public use and form a nucleus about which a square or small plaza is built. In many cases, on the other hand, they are located on private property. The following record is of a well associated with House 2, Piste, Yucatan. Two forked posts supported a cross-piece, to the center of which a metal pulley of modern manufacture was attached. The well bucket (also of modern manufacture rather than of bark construction) was suspended by a rope which ran through the pulley. A concrete water tank abutted against one corner of the well platform. The owner of the well said that it was about 13 *brazos* deep; *brazos* are arm spans, so the well was probably about 21 m. deep.

VIII

NON-MATERIAL ASPECTS

COMMUNAL LABOR AND OWNERSHIP

IN MODERN TIMES

There is an increasing trend at the present time away from the customary communal labor and ownership of houses toward building through individual initiative and personal ownership. When a man hires professional masons or help, as observed at House 1, Panajachel, and at Zacapa, Guatemala, and as reported by Redfield at Chan Kom, Yucatan, one is inclined to agree with that author's prediction that houses built in this way will be considered personal property in the future, and when they are sold, the entire proceeds will be pocketed by the owner, rather than reverting partially to the village treasury as heretofore.¹

Communal labor is still widely practised in the construction of both private huts and public works. Redfield describes the system (*fagina*) at Chan Kom, Yucatan;² LaFarge and Byers record the customs connected with it among the Jacalteca of Guatemala;³ Bancroft mentions it in his general account of Guatemala;⁴ and Sapper writes of it as a society function in the construction of burial houses in Yucatan in 1897.⁵

IN SIXTEENTH CENTURY

The official at Sotuta and Cibolon, Yucatan, answering Philip II's questionnaire of 1577, states that the Indians build their houses very easily, "because they help one another to make them."⁶ The *Relación de Quinocama ó Moxopipe* reports, "... it is customary to help one another to make their houses and in pay for their labor they give them to eat and to drink according to their manner until the house is finished."⁷ It is still customary for the owner of the new house to feed his otherwise unpaid helpers.⁸

DIVISION OF LABOR

SEX

The entire construction and repair of houses is done by men. The San Pedro Indian and his little boy, building a house at Panajachel, Guatemala, did all the actual work, but occasionally the man turned to his wife for advice concerning details which would interest her, such as the height of shelves, and the position and height of the fireplace. She sat near-by almost all day long, nursing her youngest child or feeding it tortillas to quiet it, preparing lunch for the workers, and so on.

¹ Redfield, 1934, pp. 33, 66-67.

² *Ibid.*, p. 78.

³ LaFarge and Byers, 1931, p. 40.

⁴ Bancroft, 1886, p. 693.

⁵ Sapper, 1897, p. 275.

⁶ *Col. de Doc. Ind.*, 1898, II: 100.

⁷ *Ibid.*, p. 263.

⁸ Bancroft, 1886, p. 693; LaFarge and Byers, 1931, p. 40.

AGE

The little boy helping his father here at Panajachel was too small even to help lift the larger timbers, but he took an otherwise active part in the building. He helped dig post holes, held ropes for measuring, fetched bundles of thatch, sat on the ends of logs to steady them for cutting, and was useful in a dozen other small ways. It is not surprising that almost every Indian knows the smallest details of house construction and is familiar with the names of all the house members and the kinds of wood used for each. He watches and helps in the construction of houses as a child; he plans and supervises personally the construction of at least one house of his own; he assists in the building of many townsmen's houses.

TIME

Redfield reports that three men at Chan Kom, Yucatan, spent 16, 38, and 63 days, respectively, out of a given year in building their own and other people's houses.⁹

BELIEFS CONCERNING THE FELLING OF TREES

At House 9, Valladolid, Yucatan, I was told in an off-hand manner that materials for the house had been cut when the moon was full. I made only casual note of this statement at the time, but later at Tizimin another informant said the same thing, so I asked whether this was customary and why. The reply was interesting: if wood is cut when the moon is not full, it will split, break, rot, or crumble to pieces; in short, it is no good for use in house construction. On being asked why this was the case, the man replied that he did not know exactly, but that many believe that when the moon is full it is "complete, mature, and strong" and that plants are correspondingly strong and mature. He said that fruit trees, for instance, do not bear good, sweet, mature fruit until the moon is full. The same information was given at San Cristobal (Alta Vera Paz), Guatemala. Redfield reports that at Chan Kom, Yucatan, the new moon is sometimes referred to as the green or unripe moon, the full moon being called 'full pot moon.' He also writes that fruit trees and root crops are best planted just after the moon is full.¹⁰

REASONS FOR DENIAL OF ENTRANCE TO HOUSES

Two reasons were offered as explanations by persons who denied me entrance to their houses. The most common was that given by women: the man of the house was not at home; I should return when he had come back from his field. The next most common excuse was that someone inside the house was sick. This statement was always made in a matter-of-fact sort of way, as if it automatically precluded me without more discussion.¹¹

⁹ Redfield, 1934, p. 80, Table 5.

¹⁰ *Ibid.*, pp. 205-06.

¹¹ On a few occasions I was permitted entrance to houses where there were sick occupants. I remember one particular visit at a hut in Chichimila, Yucatan, where a man lay in his hammock, apparently very weak from some illness. At my inquiry he said faintly that he was suffering intensely from malaria, and that he could scarcely move, and asked me to pardon him for not talking. I proceeded with my work and eventually began questioning an old woman there about houses she remembered from childhood. The invalid became interested, put in a word here and there, and finally forgot his affliction entirely, sat up with his feet on the ground, and joined enthusiastically in our discussions.

Only one man admitted frankly that he just didn't want me in his house. This happened at Santiago Atitlan, Guatemala, where other foreigners also have experienced difficulties. The increasing number of tourist visitors in the last few years has made the population tip-minded and one must arm himself with pennies if he hopes to take photographs or gain interviews. Even bribes would not influence the man mentioned above, however. On my first visit to Santiago Atitlan I hired a small boy to carry my equipment. He was not an Indian but he spoke Zutuhil and said that he knew everybody in the village. We were turned away from approximately fifteen houses during an hour and a half. On several subsequent visits a popular Zutuhil-speaking launchman accompanied me and we were welcomed at every house I wished to inspect.

At Tikuch, Yucatan, a man would not permit me to photograph his house because it was under construction. He said that I could return and take all the photographs I wanted when it was finished.

TYPE OF HOUSE RELATIVE TO RANK OF OWNER

IN MODERN TIMES

When a Yucatecan Maya has achieved a certain amount of wealth and prestige he sometimes wants to build a house of the Spanish type. If this is impossible he will erect rubble masonry walls around his bush house and build a cement floor over the old earthen one, or construct a new house which is different from the old one in being rectangular instead of apsidal, and probably whitewashed in imitation of the painted masonry walls of plaza structures (pl. 7,*a*). This tendency is well illustrated in Chan Kom, Yucatan, where fifteen out of thirty-four houses are of masonry construction.¹² I visited five of these (four on the main plaza) and in each case found the house almost devoid of furniture, the entire family living in a bush house (generally called a kitchen) in the back yard. The front house was a display; its owners found themselves more comfortable in the old-style hut to which they were more accustomed.

IN ANCIENT TIMES

Most historians agree that houses in ancient times varied according to the ranks of their owners. Molina Solis raises almost the only dissenting voice, "The houses [of Yucatan] were almost entirely of straw, without distinction between rich and poor."¹³ Larrainzar¹⁴ held the view which has also been expressed by Genet and Chelbatz in the following statements:

The houses of the lower classes did not necessitate a great architectural knowledge: they were of trunks of wood and of clay, of cylindrical form, with an opening for the door and covered with leaves of a kind of palm called *ak*.

The dwelling of the notables and the rich was more complicated: it was rectangular and the walls, formed of poles covered with clay, were pierced by two doors, one opening

¹² Redfield, 1934, p. 33, n. 2, reports the same count, showing that neither proportions nor numbers changed between 1931 and 1934.

¹³ Molina Solis, 1896, p. 243.

¹⁴ Larrainzar, 1878, p. 73.

on an interior court, the other on the street; on this side the roof, composed of woven leaves of *ak*, projected prominently, in such a way as to form a sort of gallery; in summer, in order to sleep, the men established themselves here.¹⁵

Practically all of the *Relaciones* replying to Question 31 of Philip II's circular in 1577 describe the "straw houses" (*casas de paja*) and then add that some chiefs had houses of masonry (*casas de cal y canto*). It is obvious that many of the *Relaciones* were written by the same person, but the wording of several others is sufficiently different to indicate separate authorship. The *Relación de Cinanche*, for example, says that some *señores y principales hombres* (lords and chief men) have better houses;¹⁶ the *Relación de Hocaba* speaks, instead, of *algunos caciques* (some chiefs).¹⁷ The *Relación de Motul* reports that the chiefs have stone houses more for the sake of authority than for their own comfort.¹⁸

Charles V, in a dispatch to Cortez in 1523, orders him to apportion the plots of property among the people according to their rank.¹⁹

THE FAMILY SHRINE

IN MODERN TIMES

The family shrine or altar²⁰ usually stands with its back against the interior surface of a house wall. In Yucatan it is opposite the main door, to one side of it, or in one end of the house. The side (right or left from the main door) and the direction are of no significance. The shrine consists of a small table with a picture of a saint on top. There are generally candles in front of the picture. In Guatemala, table, picture, and candles are practically the same as in Yucatan and Campeche. Flowers often decorate the shrine; various offerings, such as copal and tobacco, lie in front of the picture. A large woven mat hung against the wall back of the shrine at House 1, San Cristobal (Alta Vera Paz), Guatemala (pl. 34,c).

Crosses and images of saints are also mentioned in altar descriptions by other writers.²¹

IN ANCIENT TIMES

Las Casas writes, "when the Guatemalans built a new house they were careful to dedicate an apartment to the worship of the household gods; there they burned incense and offered domestic sacrifices upon an altar erected for the purpose."²²

¹⁵ Genet and Chelbatz, 1927, p. 192.

¹⁶ *Col. de Doc. Inéd.*, 1898, II: 141.

¹⁷ *Ibid.*, p. 92.

¹⁸ *Ibid.*, p. 87.

¹⁹ *Col. de Doc. Inéd.*, 1900, 13: 364.

²⁰ Gann, 1918, p. 27, gives *canche*, 'altar' (southern Yucatan).

²¹ For other references to altars see:

Blom and LaFarge, 1926, p. 337 (Jacalteco house, Chiapas).

Gann, 1918, p. 27 (Maya houses in southern Yucatan and northern British Honduras).

Norman, 1843, p. 41 (Maya houses near Merida, Yucatan).

Stephens, 1841, I: 28 (Carib houses at Punta Gorda, British Honduras).

Ibid., p. 64 (Indian house in suburbs of Gualan, Guatemala).

²² Bancroft, 1886b, p. 786, quoting Las Casas, cap. 124.

FESTIVAL DECORATIONS

During festivals the Guatemalan house interiors may be elaborately decorated. At one end of House 4, Chichicastenango, Guatemala (pl. 34,*d*), there was a shrine with a picture of a saint. In front of it stood a table covered with a checker-woven mat and a white cloth, and profusely decorated with gladioli and other flowers. Candlesticks stood on the table. At one side of the room, near the door, a long wide bench was covered with a white cloth and decorated with flowers. The intermediate crossbeams of the house were hung with leaves of the mammee (*mamey*)²³ and plants called *ek*. The floor was strewn with pine needles.

NEW-HOUSE CEREMONIES

IN MODERN TIMES

Most Indians denied any knowledge of ceremonies at the inauguration or completion of house building, other than the customary blessing by a Catholic priest. One informant at Tizimin, Yucatan, said at first that he knew of no rites of this kind, but when I told him of our custom of laying cornerstones, in which we place documents, coins, and other objects, with a short accompanying ceremony, he gave me the following information. When a house is completed a hole is dug in the center of the floor and in it are placed some holy water, a sacrificed chicken, and some silver. Prayers are then offered for the safety of the house and its occupants. Incense is burned in the hole in order that the smoke may drive away evil spirits. The cache in the floor is then sealed with marl and earth. The same thing is done when the first mainpost hole is dug. A very reliable informant at Pisté, Yucatan, did not know of any procedures like these.

Redfield describes an elaborate new-house ceremony performed at Chan Kom, Yucatan. The house itself is the object of propitiation; sacrificial foods and drink are prepared and offered successively to the important members of the house framing.²⁴

At Chichen Itza I watched the Catholic ceremony of blessing a new Indian house. When everyone had gathered in the room the priest vested and read a passage from his breviary. Hyssop, a glass of water, and a package of salt lay on a table before him. He put some salt in the water and dipped the hyssop into it. He then took the latter in one hand and his breviary in the other and walked along the walls of the house, sprinkling them with the wet hyssop. He started in the north end of the house, went out the front door, walked the length of the porch sprinkling the posts, then back into the room and around the other walls. When he reached the point where he had started, the ceremony was finished; he removed his vestments.

In a description by LaFarge and Byers of the building of a new Jacalteco house in Guatemala most of the feasts are for the benefit of the helpers. In one case, however, the neighbor-helpers sit up all night, with feasting and music after the first day's work, to keep the devil from entering the house.²⁵

²³ *Mammea americana*, n. o. Guttiferae.

²⁴ Redfield, 1934, pp. 146-47.

²⁵ LaFarge and Byers, 1931, p. 40.

IN ANCIENT TIMES

If ceremonial objects are cached in house floors by some modern Maya, it is quite possible that traces of a comparable custom might be found in ruined houses of the ancient Maya.²⁶ Cogolludo states that a new dwelling could not be occupied until it had been formally blessed and purged of the evil spirit.²⁷ Excavations of these prehistoric dwellings should include a thorough investigation of the floor and mainpost holes.

MISCELLANEOUS NOTES ON THE BEHAVIOR OF INFORMANTS

The hesitancy of the Tizimin informant in telling of new-house ceremonies calls to mind other cases when Indians seemed reluctant to tell something they may have had in mind.

Informants almost always hesitated and racked their brains for a word to give me instead of their usual term for a member of the roof framing generally called road of the rat. Sometimes they eventually gave this phrase of their own accord, but with obvious embarrassment. In some cases, when only a Spanish word or a clear corruption of a Spanish word was forthcoming, I asked whether there was not a word which meant, in their language, road of the rat. In practically every case the question aroused much nudging and laughter but also quick results, for every listener would point immediately to the timber thus named. I do not think there is any significant explanation for this behavior. The only suggestion that I can offer is merely that the term is a humorous one, a survival of a very ancient slang expression, and the Indians prefer to use something more dignified rather than risk being laughed at. Suppose, for example, that a scholarly-minded foreigner, collecting English words, should ask us the correct term for a Congressman who must continue his duties in office after his defeat at the polls. We would think immediately of "lame duck" but we would probably try in vain to think of a more dignified word. North Americans are probably not so easily embarrassed in a case like this, but we should certainly laugh, just as the Maya do, if we finally gave him the term or if the foreign scholar eventually had to suggest it to us.

The Indian is also reluctant to give an analogous thing the name of the original. This may possibly be due to a conscientious desire not to give misinformation, but I believe there is something else, something in his way of thinking, that might better explain it. Example: House 5 at Coban (Alta Vera Paz), Guatemala, was so long that single longitudinal timbers were impossible; in their place there were several long, thin, overlapping poles bound end to end. I pointed to these specifically and asked for their Kekchi names. The informant could not say what they were called. I tried again and again but each time he shook his head. We stepped across to a shorter house, only a few meters away, and I immediately pointed to the analogous but full-sized and single timbers in its roof framing. He gave the

²⁶ I remember seeing A. V. Kidder find a sub-floor cache in the room of a pueblo in New Mexico; in a small depression capped with a stone slab lay two parrot skeletons and some ceremonial objects.

²⁷ Cogolludo, 1867, bk. 4, chap. 4, pp. 295-96.

words for them without hesitation. The poles in House 5 were in exactly corresponding positions in the roof and served exactly the same functions as the timbers in House 6, but in his mind they evidently were not real 'purlins' or 'plates' or 'rods.'

NUMBER OF OCCUPANTS PER HOUSE

IN MODERN TIMES

A series of seven houses in Valladolid, Chichimila, and Yalkom, Yucatan, shows a mode of 4 and an average of 3.8 occupants per house. Shattuck's estimates at Dzitas, Yucatan, average 4.5 per house, there being 260 family houses and a population of 2426 (according to the official census) or 1177 (according to Shattuck's census).²⁸ His Chan Kom figure is much higher; here he records a population of 197 with 26 houses occupied, an average of 7.5 persons to the house.²⁹ Redfield's table on the composition of households at Chan Kom gives the "average number of persons per small parental family" as 5.1, and the "average number of persons per household" as 5.6.³⁰

IN ANCIENT TIMES

Three of the house mounds³¹ excavated at Uaxactun yielded between them 13 burials, but it can be shown that only seven or possibly eight of these belonged to dwelling levels, the other five or six coming from a burial mound period.³² In addition, the two burials from House Mound IV were not contemporaneous, for one lay on an old plaza floor beneath an undisturbed platform floor, while the other lay beneath the undisturbed floor of a filled-in room stratigraphically at least one and possibly two periods later.³³ Pottery from the two burials belongs to the same Uaxactun ceramic period, however. Summarizing, we have 3 burials from House Mound I, either 2 or 3 house burials from House Mound II, and a single burial from each of two levels in House Mound IV.

The danger of application of these figures to population estimates of ancient houses will be discussed in the next chapter on pages 151-52.

²⁸ Shattuck, 1933, p. 106.

²⁹ *Ibid.*, p. 140.

³⁰ Redfield, 1934, p. 91, Table 6.

³¹ House Mounds I, II, and IV.

³² Wauchope, 1934, pp. 143-47.

³³ *Ibid.*, fig. 16, and pp. 154-55.

DISCUSSION

GROUND PLANS

SUMMARY OF GEOGRAPHICAL DISTRIBUTION

The geographical distribution of modern ground plans can best be considered as in the form of a great oval which we shall follow in a clockwise direction. Starting at the Maya-inhabited regions of southern Yucatan and northern British Honduras, we can follow rectangular houses south through the Peten and the Baja Vera Paz of Guatemala on one side and through an isolated group of Maya in southern British Honduras on the other to Guatemala lowlands at Lake Izabal and the lower Motagua, and to the semi-arid areas around Zacapa, Chiquimula, Jocotan and adjacent Honduran territory. Thence climbing westward, we find them persisting through Kekchi and Pokonchi territory in the Alta Vera Paz and through the many linguistic groups in the western highlands from Cuilapa and Guatemala City to the West Coast and the Chiapas frontier.

In the southwest highlands of Guatemala we encounter the first significant variation, that of square houses with pyramidal roofs. This type is found in a few of the more isolated Indian villages, such as the lake towns of Santiago Atitlan, San Pedro de Laguna, San Lucas Toliman, the Cakchiquel towns of San Sebastian to the west and Santa Apolonia to the east. There is some evidence that the square house in this area is an older, more aboriginal type than the rectangular. The square house also appears slightly north of here as a feature of certain Tzeltal groups of Chiapas, though here, as in Guatemala, it shares the field with rectangular dwellings.

We have now crossed the frontier and shall proceed north through the highlands of Mexico on one side and the Usumacinta valley on the other. Rectangular houses still predominate, among their builders being the Maya-speaking Lacandones to the east. But at the same time we begin to encounter houses with semi-circular ends. These apsidal houses are found at Lake Petha and Lake Izan on the east, and (associated with rectangular houses) in the Usumacinta region at Yaxchilan and Las Campañas (also called Salvamiento). Rectangular houses with round corners also occur at Piedras Negras and El Retiro. As we go farther north, we find more apsidal houses among the Chontals of Tabasco, while not far west and northwest in the Mexican highlands are rounded corners at Pantepec, at two towns near Cordoba in northern Oaxaca, and at two settlements in the vicinity of Escobedo in eastern Guanajuato. True round houses with conical roofs occur at the Triqui town of Chicahuastla, the coast settlements of western Guerrero, and among the Totonac at Orizaba and Cordoba, Vera Cruz.

If we continue our oval itinerary and stay far enough inland from the Campeche coast, we find apsidal houses increasingly frequent as we approach Yucatan.

At Champoton and Lerma, however, on the coast of Campeche, the rectangular houses still dominate. Rounded ends gain at Mukuchakan and China, and when we reach the city of Campeche they form about 50 per cent of the total number of houses. From this city northward, the apsidal house is the outstanding type and continues to be as we complete the oval by turning east across Yucatan. Catmis in the south, near Lake Chichankanab, is the first town to reflect the rectangular houses typical of the point at which we started. Even Chan Santa Cruz, an isolated Maya town still farther south, clings to the apsidal house plan of its relatives farther north.

If we continue east across Yucatan instead of turning south we find rectangular house percentages high at Tizimin. This fact probably reflects the predominance of rectangular houses on the East Coast and Cozumel Island, with which Tizimin is in closer contact than is any other eastern outpost of "civilized" Yucatan.¹ The house with flattened ends, that is, the rectangular house with rounded corners, which is probably a result of an attempt to build a rectangular house on a basically apsidal house framing, is found in the places where apsidal and rectangular plans struggle for the majority: Tizimin, Catmis, and Campeche.

REMARKS

In view of the bearing of house types on problems of prehistory in other areas of the world,² we should not ignore its probable cultural significance in the Maya area. The crying need for more archæological data is apparent when we review our present information: the earliest Old Empire houses yet excavated (Uaxactun, below Structure A-V) were apsidal; four later Old Empire houses at the same site were probably rectangular; surface sites at Chakantun are apsidal;³ all prehistoric dwellings so far excavated in the Guatemala highlands (Chukumac⁴ and Zacualpa) and one in the Baja Vera Paz (San Agustin Acasaguastlan) were rectangular; thirteen undated prehistoric houses at Chichen Itza and other small habitations at Kabah and Sayil were probably rectangular; sixteenth-century houses in Yucatan may have been rectangular; and Yucatecan dwellings have been prevailingly apsidal since at least 1843 and probably earlier, while other modern houses in the Maya area are almost invariably rectangular.

Any attempt at historical reconstruction based on a combination of these modern data and our scanty archæological evidence would be hazardous at this time. I believe, nevertheless, that they are important and that someday we shall find a significant correlation between the distribution of ground plans and events in Maya history and prehistory. A few points already hint the possibilities:

¹ I.e., those parts readily accessible by train, automobile, or flat car.

² For examples: (1) oval pit houses, rectangular gabled dwellings, and megaron houses in the Neolithic and Bronze Ages of eastern and central Europe; (2) J. L. Myers' theory of the correlation of the first oval houses in Greece with the appearance of Minyan ware and Indo-European speech; (3) the occurrence in Polynesia of rectangular houses built on raised platforms in the supposedly older and marginal cultures (except in New Zealand and Chatham, where round houses were built), and apsidal dwellings built on the ground in the western and presumably younger cultures; (4) the sequence of house types in the Anasazi, Hohokam, and Mogollon cultures of the southwest United States.

³ Information supplied by E. M. Shook.

⁴ Lothrop, 1933, pp. 18-22.

1. Modern round houses and modern dwellings with either rounded ends or rounded corners outside Yucatan are to be found chiefly in the west. It may be that this western area is their home (as one may well believe in view of Tozzer's identification of round huts depicted on Chichen Itza frescoes as Nahua, and Pollock's research proving that round structures were dedicated to the worship of the Mexican God of Wind, Quetzalcoatl) and that both ancient and modern houses of this type on the Yucatan Peninsula are derived thence. Or, the Mexican houses may be survivals of an old form possibly diffused from the east (as one might also conjecture from the occurrence of early apsidal dwellings at Uaxactun and from the widespread popularity of apsidal houses in the modern Maya villages of northern Yucatan and Campeche). Which alternative is true is obviously an important problem.

2. The sequence of prehistoric house types in the Peten and in northern Yucatan needs further clarification. Rectangular house platforms appear at a later period than that of the apsidal dwellings under Structure A-V at Uaxactun. We do not know whether the former displaced the latter permanently, whether the two persisted contemporaneously, whether the rectangular houses were present but have not yet been found in the earlier period, or whether the rectangular platforms supported apsidal superstructures (a remote possibility) and rectangular houses were unknown there.

3. It is not known when apsidal houses first appeared in Yucatan. Should we look to the south or to the west for their derivation, were they introduced after Chichen Itza, Kabah, and Sayil had been founded, or did they originate in Yucatan? If we find an affirmative answer to the last question, we will have remains of a period much earlier than is yet known or recognized in Yucatan.

4. Although frequency of the apsidal plan in Yucatan and Campeche seems to be in direct proportion to the incidence of pure Maya population, speakers of Yucatecan Maya outside these states do not always build apsidal houses—witness the Lacandones, and the Indians of northern British Honduras. In this connection it is very interesting that the surface house sites at Chakantun are apsidal and sometimes dumb-bell shaped in plan, for Lundell assigns this group (evidence not given in his report) to the supposed late occupation of the Peten after 1450,⁵ and J. E. Thompson tells me that among the modern rectangular houses at Succotz and San Antonio Cayo in central British Honduras there are a few houses with rounded corners. Indians at both these towns speak Yucatecan Maya, the Succotz people having moved there from the Lake Flores region in the late nineteenth century and the San Antonio group having come, according to Thompson, from Yucatan. Rounded corners, as we have already shown, may be the result of an attempt to build a rectangular house on a basically apsidal framing.

5. In the Guatemala highlands, rectangular houses (some of which are square) seem to have held the stage to the exclusion of all other types from prehistoric times to the present. Only further excavations will reveal whether this is true also of the earlier periods, whether the same situation existed in the Mexican highlands, and whether the rectangular house in these presumably longest-inhabited uplands antedates all other forms.

6. In view of the probability that round, rectangular, apsidal, and round-cornered houses are structurally interrelated, it seems likely that when we get solutions to one or two of the problems suggested above, the others can be solved on the basis of structural (i.e., functional) relationship. In this, however, one should exercise the utmost caution, for we know that they are not necessarily related; some pyramids, for example, are round, some square, and some have rounded corners, showing that ground plans can vary independently of superstructure. On the other hand, the plans of dwellings and the actual construction of the house framing are much more closely interrelated than is the case with pyramidal structures.

⁵ Lundell, 1934, p. 175.

RECOMMENDATIONS

This tangle of certain and doubtful information formulates a problem that is challengingly interesting. In the above discussion, for instance, we find ourselves attempting an ancient interpretation of data that are almost entirely modern, an endeavor that is doomed from the start. For in the four hundred years that have elapsed since the first veneer of European civilization was administered to aboriginal Central America, the house types that once existed there must have undergone considerable geographical rearrangement as the country was opened more and more and forces of diffusion were given wider play. Significant changes in house construction have probably taken place even within the last fifty years. Why should we struggle with a knot that has been squeezed tighter and tighter over a period of four centuries, when through archæological investigation we have a surer means of untangling it? Our principle of working from the known to the unknown has already served its purpose; it has formulated the problem and furnished data with which to interpret better the future excavation of houses. I therefore recommend any part or all of the following program:

1. Excavation (not surface inspection) of house remains in the environs of Chichen Itza, Yucatan. This would settle the question of whether the ancient houses here were apsidal or rectangular (as their surface appearance suggests). Sample excavations at different parts of the city should reveal whether a second type of house was introduced during the occupation of Chichen Itza, and if this should prove to be the case, pottery and artifacts should establish which type was earlier. These examinations would acquaint the archæologist with this specialized type of digging and make it possible for him to recognize and interpret surface sites more easily and with less excavation.

2. An archæological reconnaissance of ancient house sites in Yucatan, Campeche, and eastern Chiapas.⁶ This would supply additional information regarding the possible western source of round and apsidal house plans. The sites to be visited should be selected with the possibility in mind that variations may be correlated with chronological periods, pre-Columbian province boundaries, routes of the so-called Greater and Lesser Descents, and so on. The reader may well be of the opinion that too many factors are here being injected into the subject of houses. Every possible consideration is mentioned, not in the belief that they are all related to the house situation, but in order that future investigation may be conducted by some methodical plan rather than by chance sampling.

3. Excavation of some ancient house sites in Mexico.

4. Further excavation of Old Empire houses.⁷ This should clarify the problems raised by the excavation of dwellings at Uaxactun.

5. Excavation of early Guatemala highland houses. Late houses here and in the Baja Vera Paz have already been investigated.⁸

TEMPLE PROTOTYPE THEORIES

Catherwood was probably the first person to call attention to the similarity (in the Maya area) of certain structural and decorative elements of temple architecture to features of hut construction. He believed that the Vitruvian theory,

⁶ Hacienda Tepancupan in eastern Chiapas is recommended by Blom, 1934, p. 139.

⁷ For previous excavations see Mason, 1933, pp. 93-94; Stone, 1934; Wauchope, 1934; and others summarized by Wauchope, 1934, pp. 127-31.

⁸ See Lothrop, 1933, pp. 18-21; Kidder, 1935, pp. 117-19; Wauchope, 1936.

by which the forms of early Greek temples are traced to the influence of their original timber construction, is applicable to Maya temples also.⁹ E. H. Thompson derives the temple from the bush house, finding prototypes for arches in the hut roof, for cornices in the crest of the thatch and in the eaves, and for vault beams in the upper crossbeams.¹⁰ The hypothesis has also been advanced that half-columns (typical of Puk-Labna and pre-Nahua Yucatecan architecture) were derived from the wooden wall poles of bush houses, banded columns representing poles that are lashed together with vines (pl. 15,*a*). It has been suggested that stone latticework is a reflection of wooden prototypes (pl. 15,*c,d*) and that the decoration on the east range of the Monjas Quadrangle at Uxmal, Yucatan, imitates log-cribbing (pl. 15,*d*).¹¹

Spinden objects to these hypotheses on the ground that chronology interferes with their acceptance. He points out that half-columns and latticework and the Monjas decoration at Uxmal are late architectural features, compared to those farther south. He believes that Maya wall construction is derived from adobe prototypes which were later faced with a veneer of stone, and cites the earthen core of some early buildings as the surviving indications of this derivation.¹²

Hut-like niches in the upper zones of the Monjas Quadrangle (pls. 14,*e*, 15,*c,e*) and the Casa del Adivino at Uxmal (pl. 14,*c*), of Edifice 1 at Chacmultun, and of the Portal (pl. 15,*c*) and the Palace at Labna have already been described.¹³ To these Blom adds the House of the Birds at Uxmal and the Palace at Dzilbiltun, "where the entire roof structures have been built in imitation of a thatched roof."¹⁴

I have already pointed out the resemblance of an elaborate house substructure at Valladolid, Yucatan, to the steps and benched side-walls of many ancient temple rooms (p. 15), as well as the similarity of plan in houses with vestibule porches and some ancient temples (p. 98). To these resemblances we may add the striking likeness between the profiles of heavily plastered hut walls of vertical poles with heavy stringers (pl. 14,*a*; fig. 22,*a*) and the profiles of certain temple façades (fig. 22,*b*). In the Champoton example which I have selected for illustration, the rubble masonry foundations correspond to the basal zone of the temple, the lowermost and central stringers to the mouldings of a three-member medial cornice, and the uppermost stringer, generally hidden by overhanging eaves, to the upper cornice. Other houses, with only one stringer, resemble more closely the profiles of earlier temples with their single-member cornices. In many cases at Champoton there was no wall foundation and the bases of the wall poles (from the lowermost stringers to the ground) were left unplastered. The resemblance here to a basal zone of half-columns was remarkable.

I think it is a mistake to look on these resemblances as survivals of wooden prototypes. Undoubtedly the first temples were of wood or, as Spinden suggests,

⁹ Catherwood, 1844, pp. 9, 10.

¹⁰ E. H. Thompson, 1911.

¹¹ Spinden, 1913, p. 132, referring to Viollet-le-Duc and Charnay, 1863, pp. 64-68.

¹² *Ibid.*, pp. 132, 133, n. 1.

¹³ Wauchope, 1934, pp. 122-23.

¹⁴ Blom, 1934, p. 139.

of adobe. But to say that features characteristic of these original forms should survive in stone, and to interpret them always as architectural vestiges is not necessary. We do not try to interpret mask panels or snake motifs as survivals of anything. The ancient architects probably sought new decorative motifs just as our modern architects do. That they should find attractive subjects in certain bush-house features was perfectly natural; that they should work them into their decorations for stone buildings was the logical result. When the modern architect uses modified Maya motifs in his buildings, it does not mean that his twentieth-century architecture reflects a Maya origin in the far distant past.

Therefore I regard stone half-columns, hut-like niches, cornices, and possibly stone imitations of latticework and log-cribbing as deliberate copies, not survivals, of wooden construction. They survived according to the success with which they were received as decorative features, and not as surviving testimonials of wooden prototypes. If this view is taken, one need not be troubled with the chronological difficulties which confront the prototype protagonist. The three-member cornice is a late architectural form, but a connection between cornice mouldings and wall stringers is still possible. The connection, if there is such, between temple and hut-wall profiles comes nearer warranting a prototype interpretation than any of the other resemblances, for upper and lower zones of façades and mouldings of cornices are found in the oldest Maya buildings. But even here I should prefer to consider the likeness due only to imitation for purposes of decoration, even though the original idea may have been forgotten during the centuries that these features survived.

ESTIMATING ANCIENT CITY POPULATIONS

Population estimates of a ruined city have been based partially on the number of house mounds in the environs of the city, the probable number of occupants per house, and the number of years that a house is occupied before being abandoned. This method is of doubtful validity.

Estimates of the number of occupants per modern house range, as has already been reported on page 145, from a mode of 4 and an average of 3.8 to an average of 7.5 persons per house. Redfield's average of 5.6 per household should probably be accepted as closest for the Maya area as a whole. Excavations at Uaxactun showed merely that a house was usually abandoned after not more than three deaths in the household; there is no way of knowing how many members of the family were left.

Turning now to length of house occupation,—a series of twenty-nine dwellings at Valladolid and Chichimila, Yucatan, showed an age range of from one to thirty years, averaging 12.7. It is clear that this figure cannot be used in population estimates. Most of the houses probably continued to be occupied until they were twenty-five or thirty years old, the latter being the maximum age recorded. The only way of finding a true figure is that of recording the ages of houses at the time of their abandonment, a task which obviously presents many difficulties.

Many objections can be raised to estimates based on unexcavated house mounds:

1. One has already been mentioned: because of deaths in the household, houses were often abandoned before their age required it. J. Eric Thompson states that as a rule a house was deserted after one death in the household, but that if the family was large enough, courage was greater and the people stayed in the house.¹⁵ Uaxactun house remains yielded as many as three burials to one habitation level.

2. The ancient Maya were much more likely than are the modern to build a new house directly over the site of an old one. Even today old Indians often say that they have lived from forty to sixty years on the same property, but they build their new houses to one side of the old, thus leaving two recognizable house sites. The dwellings excavated at Uaxactun and at Zacualpa presented from one to five occupation levels. In one case the upper level was that of a burial mound; three had been used later as crematory cemeteries. In another the earlier house platform had been modified and used thereafter probably as a temple or shrine. The house excavated by A. Ledyard Smith at Uaxactun underlay a tremendous palace structure.

3. There is no way of knowing how many of the total number of unexcavated house mounds belonged to a given period in the city's history. The Uaxactun house mounds dated to at least three different ceramic and architectural periods. Even if the population estimate is to be based on excavated house mounds, one should know the chronological aspects of the city's pottery almost in terms of years, for a single long ceramic period may embrace several generations.

Assuming that all the house mounds have been excavated, I think we might assign a Maya generation or a little more (from twenty to thirty years) to each house occupation level, provided, of course, that more accurate dating is not afforded by the circumstances encountered. Thirty years was the maximum age of a house in the small series I recorded. We must remember that about twelve or fifteen years is spent by a child under his parents' roof. Taking the maximum figures in each case, and adding fifteen to thirty years for the man to live in his own house, we arrive at a very rough but probably fairly close estimate of forty-five years, spent (by one individual) under two roofs. If the man lives to be much older than this, the chances are that he will not build a new house, but will move into one of his children's houses to spend the rest of his life in their care.

DURATION OF ARCHÆOLOGICAL PERIODS

Only under extraordinarily favorable circumstances is it possible to determine the approximate duration of an archæological period (based, for instance, on ceramic or architectural changes) in terms of years. If we accept thirty years as a valid approximation of average duration of house occupancy, excavation of a series of house mounds whose total range of occupancy covers a complete archæological period might enable one to discover the approximate length of that period in terms of years. Unless the changes (ceramic, for instance) in that period had already been very closely subdivided, one would encounter many difficulties. Even if a large number of subdivisions of overlapping periods were represented

¹⁵ J. E. Thompson, 1927, p. 74.

in the levels excavated, one would have no way of knowing whether these divisions were those of a continuous occupation or whether they were separated by intervals during which the houses were not occupied at all.

A RECOMMENDED FUTURE EXCAVATION

The chapter in this report dealing with miscellaneous property reminds one of the outstanding need of a complete excavation of the domestic architecture of some small Maya village. Such a project has been too long neglected in Maya archæological research.¹⁶ If we are to reconstruct the story of Maya civilization from a study of its monuments and temple structures alone, we shall have a very one-sided story to record. As Kidder, Tozzer, Blom, and others have already pointed out, the modern tendency among investigators is happily turning into more practical and less spectacular channels of research.¹⁷ I do not imply that work on large structures is not absolutely necessary; most of what we already know and much of what we learn in the future must come from large-scale excavation in the great buildings and rubbish heaps that alone can furnish series of strata covering long periods of time. Even archæological exploration without digging was, and to a certain extent still is, a necessary step in the program of research. In addition, however, we need an excavation that will tell us how the great mass of the people lived: what sort of houses they built; what household pottery and implements they used; how their villages were assembled; whether or not they had boundary walls, storehouses, sweat baths, concrete water tanks; whether each household was a self-sustaining unit or whether there were community trades as revealed by tanneries, salt ovens, and so on. Suppose that archæological research in the southwest United States had been directed toward kivas alone!

Almost every subject investigated for this report has been observed from an archæological point of view. I believe that many things with social and religious implications could be found in a carefully excavated small village site. Community trades, the social significance of boundary walls, the allocation of space indoors to kitchen end and family end, and the new-house ceremonies hinted by sub-floor caches are only a few of the things that might be recognized in an excavation of this type.

¹⁶ E. H. Thompson, 1886, p. 252: "I believe that much useful knowledge can be obtained from the sites of what were once the ancient Maya houses. In the search among the grander ruins, this fact has been overlooked; and yet some of the most obliterated sites may yield more facts, and a clearer insight into Maya history and home life, than the massive piles that tower above them."

J. Eric Thompson, 1931, p. 336: ". . . the smaller residential mounds offer much greater possibilities of a reconstruction of Maya history than do the ceremonial centers. In the former are found larger numbers of burials, and it is on the funeral furniture that we must depend to a very large extent for our knowledge of the Maya."

¹⁷ Kidder, 1930, pp. 91-130; Tozzer, 1934, p. 12; Blom, 1934, pp. 138-39.

CONCLUSIONS

1. Present-day Maya villages are probably assembled more systematically than were the residential sections of their ancient towns. Archaeological evidence tends to show that the prehistoric houses were haphazardly located, singly or in small clusters, in the environs of the main groups of buildings. Orderly arrangement of modern towns, on the other hand, is a governmental policy which can be traced back to 1523. Better construction is put into houses along the more important streets of the larger Indian towns; the same tendency in smaller towns is seen in a construction which, though cheap, imitates city architecture.

2. The discovery at Uaxactun of some ancient walls similar to those which mark the boundaries of individual properties today, suggests the possibility of some day confirming Landa's record of an ancient social situation that still exists in several modern villages: a man who can afford to, builds additional houses on his own property, renting them to poorer tenants for stipulated services or lending them to relatives who cannot afford dwellings of their own.

3. Isolated houses are rare in Yucatan and Campeche, but common in Guatemala.

4. The avoidance of poor drainage, outcrops of rock, and deep gullies is the main objective in the choice of a house site. Location once selected, the floor of the house is generally the leveled surface of the ground itself, sometimes improved by an addition of earth and marl. Low platform substructures are often built to support the houses; in many cases the substructures are practically identical in construction, general dimensions, and shape with those excavated from house mounds at Uaxactun. This resemblance is carried still further in the terraces with which some substructures are provided. Neither modern nor ancient platforms can always be correlated with topography: they are not often necessary for a level house site and they are seldom, if ever, essential to proper drainage. The modern ones may therefore be mere survivals of a former custom to which the Maya have unconsciously clung, while these older ones, in turn, may have been built in imitation of the temple style. Apparently no large substructures were erected for the thirteen ancient houses examined at Chichen Itza, although what may be house substructures are depicted on frescoes in the Temple of the Jaguars there. If it can be shown through excavation that the Yucatecan Maya did not build house platforms long ago, further research would be necessary to determine when and why the practice was temporarily abandoned after the Old Empire period in the Peten.

5. Stones laid about the bases of house walls furnish a fairly reliable means of identifying the ground plans and dimensions of ancient dwellings and some modern abandoned ones. In this way was revealed the fact that several prehistoric houses at Chichen Itza confirm Landa's statement that they had an enclosed living room in the back and an open porch in the front, a door being left in the

dividing wall between the two. Other ancient houses at Chichen Itza were single rooms enclosed by walls on three sides, the front being left open. Still others consisted of three or possibly four rooms facing on porches, located side by side, and probably once covered by a single roof. Modern examples of the first and third types were recorded; the fact that most recent Indian dwellings are of the single-room type, but not open on one side, leads one to believe that this may have been the case in the Chichen Itza single-room houses.

6. Houses in the Maya area are either apsidal (rectangular with semi-circular ends of apses), flat-ended (rectangular with rounded corners), rectangular, square, or round in ground plan. The geographical distribution of these types has been summarized on pages 146-47. In Yucatan and Campeche frequency of the apsidal plan seems to be in direct proportion to the incidence of pure Maya population. Rectangular houses in Yucatan and Campeche, on the other hand, occur in greater numbers where the population is weak in Maya blood and speech. The house with flattened ends (rounded corners) is probably the result of an attempt to build a rectangular house around a framework which retains the bundle roof purlins typical of fully semi-circular apses. They are found in Yucatan in those areas where rectangular houses either share with apsidal houses in frequency of occurrence or outnumber them. Square houses are found in a few Guatemala highland towns only. There is some slight evidence that this type of house, with its pyramidal roof, is an older one than the regular rectangular house with ridgepole. True round houses with conical roofs are limited to one Indian town in Oaxaca, negro coast villages in Guerrero, and some Totonac villages in Vera Cruz.

Evidence based on interviews with old men, on a survey of house-plan distribution in Tizimin, and on a study of word usage at Muna indicates that apsidal houses in Yucatan not very long ago outnumbered rectangular houses much more than they do now. The latter cannot be called a new invention, but where they are found in Yucatan today they are probably a relatively recent introduction or re-introduction. When apsidal houses first appeared in Yucatan and whence they came are questions that cannot be answered at the present time because of the great lack of archaeological information and of documentary house data for the period between the sixteenth and early nineteenth centuries.¹ It is possible that round houses originated in the west and that apsidal houses were the result of easterners' attempts to copy the round dwellings on a basically rectangular framing; but it is difficult to reconcile such a hypothesis with the very early occurrence of apsidal houses in the Peten. Most students of Maya prehistory would probably prefer to derive the many Yucatecan and the few scattered western apsidal houses from those of the Peten of Old Empire times. But here we are confronted with the difficulty that all ancient Yucatecan houses so far observed are apparently rectangular and there is no evidence to date that apsidal houses were there even as late as the sixteenth century. Actually we can trace them back only about a century, although it seems most probable, in view of their present wide distribu-

¹ Pp. 19-20, *supra*.

tion, that they appeared much earlier. Equally perplexing are problems of the origin and sequence of house plans in the Peten and in Mexico.² We should attempt to solve these, especially in view of the valuable correlations that have been found to exist between the plans of dwellings and problems of prehistoric chronology in other areas of the world, such as central and eastern Europe, Polynesia, and the southwest United States.³

7. The order of procedure when a new house is built is as follows:

- A. Select site and clear it.
- B. Find, cut, and assemble materials.
- C. Dig mainpost holes.
- D. Erect larger members of framing.
 1. Mainposts.
 2. Crossbeams.
 3. Plates.
 4. A-frames.
 5. Ridgepole.
- E. Erect smaller members of framing.
 1. Roof purlins.
 2. Intermediate crossbeams.
 3. Roof bows.
 4. Intertwined end-roof purlins.
 5. Common rafters.
 6. Roof rods.
- F. Thatch the roof.
 1. Slopes.
 2. Crest of ridge and of hip rafters.
- G. Erect wall poles. (This may be done before or during roof thatching.)
- H. Erect inner withes to hold mud.
- I. Daub walls with mud.
- J. Prepare floor (if this is to be improved).

This same general order of procedure is similar to those reported by Sapper⁴ and Redfield;⁵ it differs from that of LaFarge and Byers⁶ only in the omission of the social and religious ceremonies which may take place. The time required to build a house depends on the number of workers and the type of house. Estimates from five informants range from 14 to 84 man-days.⁷ Redfield's estimate, which he itemizes, is 86 man-days.⁸

8. Indian houses throughout the Maya area are built on the same fundamental structural plan, regional differences being minor ones:

1. In Yucatecan houses mainposts are located usually well away from and inside the line of the walls, which are structurally independent of the rest of the house framing;

² For the full discussion, see pp. 147-48, *supra*.

³ P. 147, n. 2, *supra*.

⁴ Sapper, 1905, pp. 25-28.

⁵ Redfield, 1934, pp. 34-35.

⁶ LaFarge and Byers, 1931, p. 40.

⁷ House 1, Chan Kom, Yucatan, 8 men working 10 days (80 man-days); House 2, Piste, Yucatan, 1 man working 30 days (30 man-days); Lerma, Campeche, 3 men working 7 days (21 man-days); House 1 (small kitchen), Panajachel, Guatemala, 2 men working 7 days (14 man-days); House 4, Coban, Guatemala, 6 men working 14 days (84 man-days).

⁸ Redfield, 1934, p. 54.

in most Guatemalan houses mainposts are more numerous and are generally aligned with the walls, which therefore contribute theoretically to the support of the roof.

2. In Yucatan, crossbeams rest in the forks of mainposts and carry plates; in Guatemala mainposts carry the plates, which in turn support tie beams.

3. In Guatemala the pole plate is usually a large and additional member of the house framing and, distinct from the wall plate, is carried by the tie beams; in Yucatan the same timber often serves the purpose of both wall plate and pole plate, or if the former is separate, it is smaller and is lashed to the under surface of the common rafters.

4. Guatemalan main rafters are not always forked like the Yucatecan and they are differently footed to the nuclear house framing.

5. The chief weakness of the Yucatecan house lies through its longitudinal axis; in Guatemala the latter is strengthened by extra crossbeams and by the walls, which tend to foot the plates to the ground at shorter intervals.

9. The degree of preservation of a post hole after a house is abandoned depends on (a) the type of floor in which it was dug, (b) the condition of the ground or the presence of bedrock, (c) the way in which the post was destroyed (rotting, fire, and so on), and (d) the exposure of the hole. Post holes of a burnt house and those dug into bedrock or into masonry wall foundations are the easiest to locate at abandoned sites.

10. There are two main types of roof in the Maya area, the hip roof and the gable roof. Single-pitch or shed roofs are limited to temporary shelters and pent-houses. The gable roof is standard in only one Indian region, the Alta Vera Paz of Guatemala. Practically all roofs are quarter-pitch roofs, their angle of inclination ranging from 42 to 60 degrees. The quarter-pitch roof is the most economical; one-third pitch would give a better slope but would result in a greater wind load and more roofing material. The Indian's selection of type and depth of truss and pitch of roof is governed more by the length of materials available than by engineering knowledge.

11. The widespread use of adobe brick and mass adobe for wall construction in Honduras, Guatemala, and highland Mexico is an outstanding difference between the houses of these countries and those of Yucatan, where bush-house walls, with a few exceptions, are built of heavy vertical wall poles, or of light wattle (either horizontal or vertical), or of rubble masonry (either dry or wet). Wooden walls are often daubed with mud; imprints on chunks of adobe clay excavated at house sites near Zacualpa, Department of Quiche, Guatemala, show that this was done in ancient times also. Combinations of the types of wall mentioned above are also found; in some cases they strikingly resemble some of the ancient Uaxactun house walls which combined rubble masonry and wooden construction. With one exception, the existence in the sixteenth century of each sort of wall found in modern houses can be proved by means of early dictionaries and other documents; the exception, walls of mass adobe over a wall framing, can be traced to the first half of the seventeenth century and there is no reason to believe they were not built earlier.

Relatively recent shifts in the trend of Yucatecan wall styles are indicated in oral information given by old men and in the distribution of wall types relative

to the age of the town districts in which they are found. Stockade walls may have replaced horizontal wattle to a large extent in the vicinity of Valladolid, Chichimila, Tikuch, and Yalkom within the last two generations; on the other hand, walls of dry rubble masonry seem to have replaced stockade walls to a certain extent in the vicinity of Telchac Pueblo, Yucatan. Horizontal wattle is superior to stockade construction, being cheaper, easier to build and to daub with mud, sturdier against wind storms, and less likely to rot at the base. A study of abandoned and destroyed houses leads one to believe that under favorable circumstances all types of Maya wall construction could be recognized in ancient house ruins by means of post holes, the direction in which the walls collapsed, imprints on mud daubed on walls, and wall foundations. The present geographical distribution of wall types is due largely to the influence of environment and to diffusion, but there may be other historical factors involved, the nature of which I have been unable to determine. Wall types of Yucatan cannot be correlated with pre-Columbian province boundaries or with the supposed itineraries of the earliest ruling families.

12. Lashings at the junctions of various house-framing members were recorded in detail, but there is no significant distribution of the techniques used.

13. The use of windows in the modern Indian house is a very rare and probably a relatively recent introduction, notwithstanding an assumption to the contrary by some historians.

14. Three probably aboriginal types of door are used in the Maya area, but they are fast being replaced by doors of plank construction. Contrary to some writers' belief, there is some evidence that house doors similar to the native ones recorded were employed by the ancient Maya; they are mentioned in two seventeenth-century dictionaries. Curtains and doors of these three types were probably used on the doorways of some ancient temples also, for tie holes have been found in or near the door jambs. Recognition of the position occupied by the door in abandoned and ancient ruined houses is possible under favorable circumstances by the following indications: interruptions in the line of rocks surrounding the walls; interruptions in the line of ash or burnt adobe which marks the outline of dwellings destroyed by fire; marks left by wooden construction forming door jambs; raised paths or platform offsets approaching the door; and remains of masonry or adobe-brick wall foundations.

15. The striking resemblance between the profiles of ancient temples and those of heavily plastered huts with vertical wall poles and heavy stringers, between some ancient temple ground plans and the ground plans of Guatemala highland houses with closed-end or vestibule porches and overlapping roof, and between an elaborate house substructure at Valladolid, Yucatan, and the steps and benched side-walls of many ancient temple rooms, reopens the much-discussed question of the "temple prototype" theory. In spite of the probability that masonry temples developed from wooden or adobe mud prototypes, it is wisest to regard the similarities between some temple and hut features, both decorative and structural, as due to the ancient temple architects' desire for distinctive decorative motifs based on bush-house characteristics, rather than as actual survivals through the centuries

of the original features of a prototypical temple. In spite of the chronological difficulties involved, the similarity between late temple plans and those of houses with vestibule porches comes much nearer warranting a prototype interpretation than do the many resemblances discussed on pages 149-51.

16. Neither vestibule porches nor penthouses are found in Yucatan. Porches similar to those built today were used by the ancient Maya, a fact evidenced by the Uaxactun and Chichen Itza house remains, a statement by Landa, the presence of the word meaning 'porch' in two early Indian dictionaries, and some ancient temple frescoes.

17. Palm, grass, sugar cane, and corn blades are the main thatch materials used in the Maya area. Their geographical distributions are correlated with environmental factors. Methods for attaching a given kind of thatch do not vary materially between different regions. Grass is preferable to palm for thatch purposes; corn blades are the least satisfactory. Estimates of the time thatch lasts range among the modern Maya from six to thirty years for grass and from six to fourteen years for palm; sixteenth-century estimates range from four to fourteen years. Temple frescoes show that the ancient Maya employed some of the same methods used today to make the crest of the thatch watertight and to speed watershed from it to the roof. The most picturesque way of doing this today is to place large potsherds on top of the ridge or to invert an entire vessel of pottery over the tuft of straw at the summit of a pyramidal roof. These methods are employed by the Chorti at Jocotan, Guatemala, and by various groups in the highlands of this country and Mexico. Decorations, such as clay bird images and bird feathers, stuck in the thatch in some regions, are reminiscent of certain architectural decorations at the ruins of Uxmal, Yucatan.

18. On entering an Indian hut one's first impressions are of darkness and stifling smoke. Gage's description, written centuries ago, is still as accurate a one as I could quote:

Their Houses are but poor thatch'd Cottages, without any upper Rooms, but commonly one or two only Rooms below, in the one they dress their Meat in the middle of it, making a compass for Fire, with two or three Stones, without any other Chimney to convey the smoak away, which spreading it self about the Room, filleth the Thatch and the Rafters so with Soot, that all the Room seemeth to be a Chimney. The next unto it is not free from Smoak and Blackness . . .⁹

As eyes become gradually adjusted to the change of light, and lungs to the change of air, one feels that the little room is crowded with things (pl. 33, *b*), a feeling that changes to amazement that so few things can represent the total household property of a family. For within the small space enclosed by the house walls, the family sleeps, cooks, eats, entertains, worships, and loafs.

A complete record of house interiors and furniture was made for purposes of comparison with those of ancient times. As was the case in the seventeenth-century houses described by Gage, the modern Yucatecan house is generally

⁹ Gage, 1702, p. 318.

divided into a kitchen end, including fireplace and most of the household pottery, and a family end, in which are stored clothes, trunks, tables, and other belongings. The family end is often partitioned by means of a flimsy screen. The center of the house is occupied by hammocks, benches, and other objects. In Guatemalan houses the allocation of space is not so definite. Ancient Maya households probably used more pottery than do the modern, if we can judge by the number of potsherds yielded by ancient houses at Uaxactun, San Agustin Acasaguastlan, and Zacualpa, Guatemala. On the other hand, ancient houses may have been occupied for longer periods than they are today, or broken pottery may not have been thrown out of ancient houses as often as it is today. Hammocks are used in Yucatan, Campeche, Quintana Roo, and the Peten in preference to the sleeping mats and small wooden bed-stagings found in most parts of highland Guatemala. Indian beds, both Yucatecan and Guatemalan, are mentioned in sixteenth-century literature. Practically every house also has its family altar or shrine.

19. Notes of sociological, religious, and psychological interest related to this house study were recorded:

1. Communal labor and ownership, which we find mentioned in sixteenth-century sources, are apparently breaking down a little in many places before individual financing and ownership.

2. The entire construction and repair of houses is done by men, although the women may be consulted regarding shelves, height of fireplace, and other details which particularly interest them.

3. Children generally take a small part in helping their parents, and by the time they are ready to build for themselves they have assisted in the construction of several dwellings.

4. In areas where the population is less purely Indian the people know less about details of house construction, materials, and names of the house members.

5. Indians generally believe that the trees to be cut for house timbers should be felled when the moon is full; they say that trees, plants, and fruit are not strong and mature when the moon is "green and unripe."

6. Persons denying me entrance to their houses usually gave one of two explanations: the man of the house was not at home, or someone inside was sick. I was requested twice not to photograph houses, in one case because someone inside was sick, in the other because the house was not finished. General distrust of my motives was expressed frankly by only one person.

7. Most sixteenth-century accounts agree that houses varied in quality according to the rank of their owners, but this may not have been true before Cortez received instructions from Charles V to that effect. The same situation is found to a certain extent today; in several cases a wealthy Indian maintained a finer "display" house in front of the bush house in which he preferred to live.

8. Shrines and family altars are generally located inside the dwelling; sometimes they are housed under separate roofs. The shrines are composed largely of Catholic objects of worship today; in ancient times part of the house was set aside for worship of household gods, incense being burned and domestic sacrifices offered.

9. Private homes are often decorated for festivals.

10. Either Catholic or native ceremonies are observed on the completion of a new house. The burying of holy water, a chicken, and silver, the offering of a prayer, and the

burning of incense are features of the more aboriginal rite. Ancient houses were also formally blessed and purged of the evil spirit before occupancy.

11. Some Indians experienced embarrassment in giving me the native name for the roof timber known as 'road of the rat' in most Indian languages. This feeling is probably of no significance; it is very likely merely a reluctance to use slang before a stranger.

12. Informants hesitated to give an analogous thing the name of the original. This can best be understood by reading the example given on pages 144-45.

20. Estimates of the number of occupants per house range from a mode of 4 and an average of 3.8 to an average of 7.5 persons per house. Redfield's average of 5.6 per household should probably be accepted as closest for the Maya area as a whole.

21. A little more than a Maya generation, say 25 to 30 years, should be assigned as the tenure of each occupation level in ancient house mounds, unless more exact estimates are afforded by conditions encountered during excavation. Houses were probably abandoned after not more than three deaths in the household.

22. Population estimates of ancient cities based entirely on unexcavated house mounds are hazardous because the ancient Maya often re-used old house sites for new dwellings, sometimes converted old house sites into burial mounds and, probably because of deaths in the household, sometimes abandoned houses sooner than they ordinarily would have done. In addition it should be remembered that we have no way of knowing how many of the unexcavated house mounds of a city were occupied in a given period. Excavation of a series of house mounds whose total range of occupancy covers a complete ceramic period might enable one to discover the approximate length of that period in terms of years.

23. Additional property in Yucatan and Campeche may consist of a separate kitchen, a storehouse, a beehive shelter, chicken coops, a rock enclosure for pigs, a pile of loose marl, shelters for a wash bowl and a wash trough, an oven for baking bread, a separate shelter for the family shrine, a corn bin, a well, gardens and trees, and occasionally a tannery. In Guatemala one is not likely to find so much additional property in town, although the oven is fairly common and sweat baths and granaries are found in certain areas. Early literary sources mention salt ovens, wells, gardens and fruit trees, and sweat baths.

24. Materials used in house construction in many cases have not changed since the sixteenth century; there is no cause for belief that they were not used by the ancient Maya also.

25. The antiquity of many house features (already mentioned in this chapter) was proved by comparison of modern Indian terms with those found in early dictionaries. With sufficient linguistic data one might be able to describe the type of house used by the Maya at a time before the Maya-Quiche language branched into its present dialects, by assembling all the house terms which, though perhaps differing in sound today, are alike when translated literally into descriptive terms based on ideas totally unrelated to the house. Examples: intermediate roof purlin, 'road of the rat'; door or entrance, 'mouth of the house'; roof bow, 'toad's crutch'; ridgepole, 'head of the house'; penthouse, 'son of the house'; mainpost, 'leg of the

house'; and, also as an example although not a valid one because of its Spanish extraction, arm of the A-frame, scissors. If these slang expressions are used in eight or ten different languages and if it is proved that any one of these has been isolated from the others ever since their divergence from the old parent language stock, the expressions must have been given to the various house members before the language split up into dialects, for it is almost impossible that all the groups would acquire the same odd terms by chance. By collecting all such words one could prove that very ancient houses were not mere lean-to shelters but had such members as mainposts, roof purlins, fireplaces, doors, ridgepoles, and rafters.

26. Further excavation of houses is the only means of solving most of the historical problems that are left unsolved in this study. Complete excavation of the domestic architecture of a small village site is also recommended.

APPENDIX A

ANCIENT HOUSE SITES AT CHICHEN ITZA, YUCATAN

With Eugenio Mai of Piste as a guide I spent two days locating and superficially examining thirteen ancient house sites in the environs of the main ruins at Chichen Itza, Yucatan. When rows of dressed stones could be found by clearing away underbrush, vines, and leaves, measurements were taken and the plans of the rows recorded. Without excavation one should hesitate to attempt even a tentative interpretation of the sites thus examined. The arrangement of some of the rows of dressed stones and the relative heights of the areas thus enclosed, however, suggest certain house features that confirm Landa's account of ancient houses. For this reason it seems worth while to record here what was found.

The first day we followed a generally southern course, for John Bolles, a quondam staff member of Carnegie Institution, had told me that he had seen what might be an ancient house site near the Old Chichen trail. After locating this site we avoided trails as far as possible, using them only to accelerate travel from one locality to another.

After following the Old Chichen trail approximately 800 m., we turned off to the west and followed a stone wall through the woods. North of this stone wall and only about 50 m. from the trail we found the first site, evidently that which Bolles had mentioned.

House Site 1 (fig. 51,1) consisted of two artificially raised floors about 1.5 m. wide, 3.5 m. long, and 20 cm. high. They were retained by rows of small dressed stones and connected by a narrow strip of similar construction. These three high floors enclosed a lower area measuring 1.7×3.1 m. It is difficult to explain this unusual arrangement, the only one of its kind seen during our two days of inspection. The area enclosed by the little platforms is, alone, too small to be that of a house interior. It is also unlikely that the floor of a house would be at a lower level than that of terraces outside. Also, the raised floors are too small to be those of two separate houses. The only explanation that remains is that the walls of the house followed the outer edges of the two floors and their connecting strip, the interior of the house thus enclosed having built-up ends and a center that was at normal ground level. Entrance was presumably from the northwest side (fig. 51,1). If the occupants of the dwelling slept in one end and cooked in the other, it is possible that they would have built the ends of the house higher than the center to keep them dry during heavy rains.

A dry rubble wall, probably one of the many post-Spanish ones (albarradas) seen throughout that region, abutted against one of the retaining rows of stones.

There was a fairly steep downhill slope from what was presumably the back of the house (the southeast side). Several potsherds turned up when we were scraping away leaves to follow the rows of stones.

House Site 2 (fig. 51,2) was about 80 m. from this first house site. It was a rectangular area some 2.5×7 m., enclosed by four rows of dressed stones. The house faced slightly south of east. The line of stones on one long side was broken near the center, and the door of the house may have been here. We again came across several surface potsherds.

Leaving House Site 2 we headed south through the woods for about half a kilometer and came out on an old cornfield on fairly low land. A little north of the center of the field was a long low ridge, with many stones scattered over the surface.

House Site 3 (fig. 51,3), located on this ridge, was indicated by a series of rows of dressed stones about 15 cm. high, the plan of which suggested that three or four rooms had been joined in a row under one roof, with single walls between. Each room was rectangular and measured about 4×6.5 m. The rows of dressed stones (which probably marked lines of walls) separating the rooms, were wider than the back and side walls of the house. A wide stone wall marked what was presumably the front of each room. In each case this wall stopped about 1 m. from the dividing wall on one side. Access to the rooms was probably through these doorways.¹ Before each front wall a square area was enclosed by low rows of dressed stone. This area was divided by extensions of the same walls that separated the rooms from one another. Starting at right angles from each doorway jamb, a line of small stones ran parallel to each of the extended dividing walls.

The logical explanation of this plan is that the rectangular areas in the rear of the house were enclosed rooms, while those in front were porches (corridores) open at the front, one roof covering all units and their porches. The plan corresponds precisely with Landa's description of ancient Maya houses:

And then they built a wall in the middle dividing the house lengthwise, leaving several doors in the wall into the half which they called the back part, where they have beds: and the other half they whiten very nicely with lime . . . this half is the reception and guest room, and this part has no door, but [is] open the entire length of the house.²

A small stone drum stood just in front of one of the rooms near its door. Another lay near the back wall of the third room. These should not imply that the house had stone columns, for there were no other drums in the vicinity. They may have served as foundation drums for door jambs, like those (fig. 53) illustrated on a Mexican house in the Mendoza Codex.

We left this site, crossed the old cornfield and again entered the woods, continuing in a southern direction. After walking about half a kilometer we came on the fourth house site.

¹ Doorways in modern Indian huts are generally about 1 m. wide.

² Landa, 1864, p. 110.

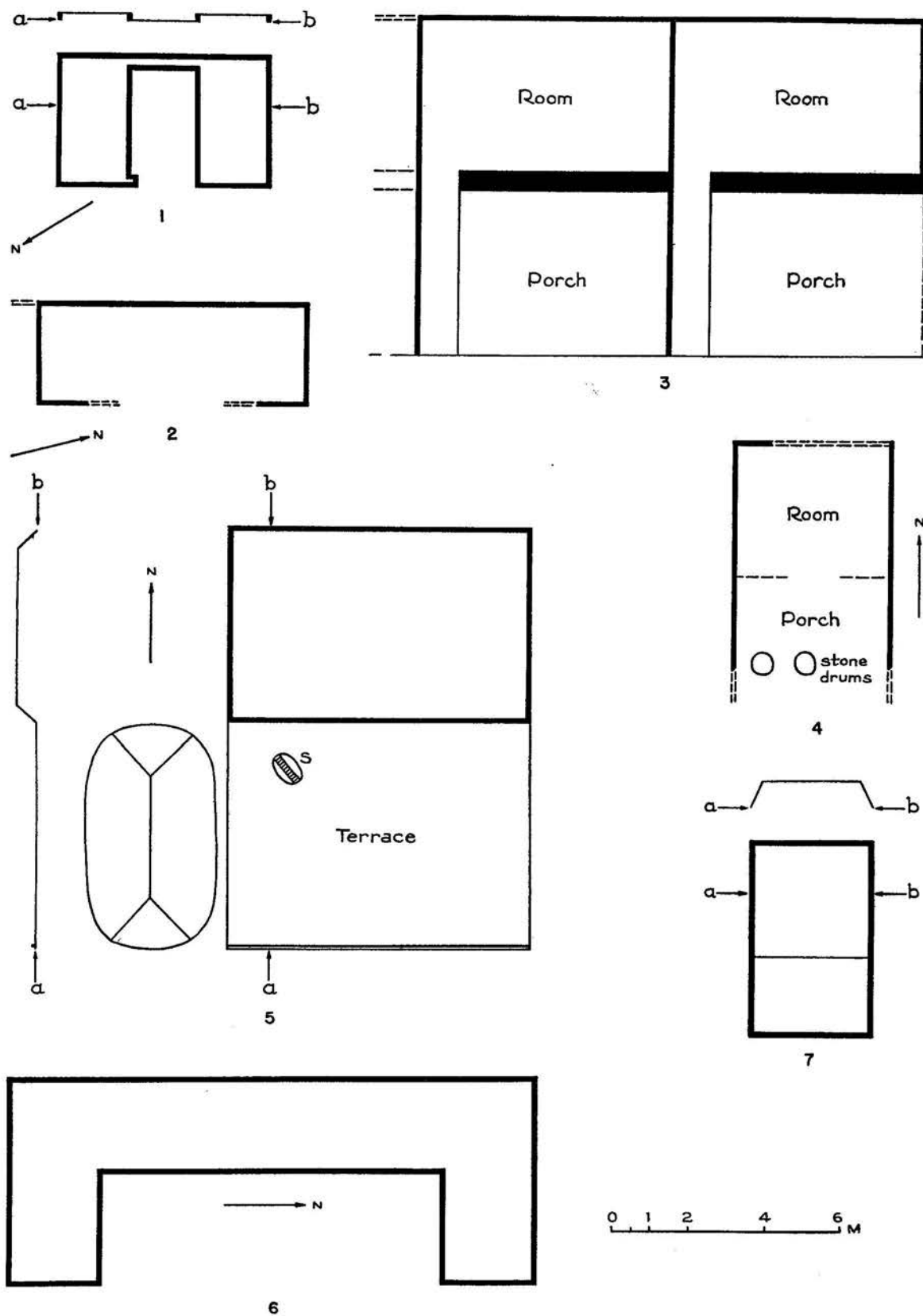


FIG. 51—ANCIENT HOUSE SITES AT CHICHEN ITZA, YUCATAN

House Site 4 (fig. 51,4) had two parallel rows of stones, about 4 m. apart, each row being about 7 m. long. They ran north and south. A corner at one end of the westernmost row of stones fixed the northern limit of the site. Both rows disappeared toward the south; since there were no corners, this must have been the open "front part" of the house. This probability was strengthened by the discovery of traces of a row of dressed stones running at right angles between the centers of the parallel walls. This was the dividing wall between living room and porch. Another 2 m. south of the dividing wall stood two small stone drums side by side. They were similar to those found at House Site 3. Several potsherds turned up as we scraped away at the surface of the ground, following up the lines of dressed stones.

We had lunch near this site and in the afternoon continued southward and eastward until we came out of the woods at the Temple of the Three Lintels. Then we reentered the woods, following a generally southeast direction until we were about 6 km. from the hacienda. Finally we turned abruptly eastward and continued through the woods, crossing the three trails which lead to Calera, Yula, and Nictcha. Each time we came to a trail we followed it south about 75 m. before taking to the woods again. After crossing the last trail and going through the woods a considerable distance, we returned to it and found ourselves not far from the hacienda. We did not find a single house site in the afternoon's search.

The next morning I planned to take a generally western course for the day. First, however, Mai said that he thought there were some sites, such as we had examined the day before, near the road to Piste. When we had gone down the road about 500 m. from the gate, we turned into the woods to the left of the road. Not far from here was a slightly raised area covered with surface stones.

House Site 5 (fig. 51,5) at first seemed to be too large and imposing to be a hut site but closer examination revealed that it was composed of three small units: a mound-like structure, a low platform, and a level rectangular area enclosed by rows of dressed stones.

The last-named enclosure was about 6×8 m. The rows of stones were low on three sides; the fourth (northern) boundary was a somewhat wider and higher stone wall. Just northwest of the center of this area lay a long block of limestone with a large groove running across one surface from the center of one edge to the center of the opposite edge. It had probably been used to conduct a stream of water into a stone receptacle (*pila*). Mai called it a *caño del techo*, roof gutter.

The platform, 50 cm. high, stood just north of the larger stone wall. Its east and west margins were aligned with those of the low enclosure. Here we probably have an arrangement similar to that of the typical Uaxactun house: a low platform substructure with a still lower terrace or porch on one side.

West of the porch and parallel to it was the small mound. Its length was that of the depth of the porch (about 6 m.). It was not flat on top like the average house platform, but was more dome-shaped, like a burial mound. It would be interesting to clear this site and excavate it. Besides getting details of the dwelling

site itself, we would probably learn the function of the mound. The only possibilities that suggest themselves to me are that it is (1) a burial mound or (2) a lesser temple or separate family shrine. House Mound II at Uaxactun was a dwelling converted later into a burial mound. House Mound IV at Uaxactun was a dwelling probably used later as a shrine.

House Site 6 (fig. 51,6), about 30 m. south of House Site 5, was a flat rectangular area 3×9 m., enclosed on three sides by a low wall 2.5 m. wide. A line of dressed stones marked the fourth (east) boundary, which was probably the front of the hut.

House Site 7 (fig. 51,7) lay not far south of the above remains. It was a rectangular platform about 75 cm. high, enclosed by rows of dressed stones, and divided unequally into two parts by an east-west line of stones. The southern part was about 3 m. square; the northern, 2×3 m. Here again is probably a living room and its porch, or "reception part," as Landa calls it.

Probably there were other house sites in the same vicinity, but it seemed better to go on rather than to spend too much of the morning at one place. We went back to the road and followed it to the outskirts of Piste, turning off to the left (westward) up a gradual slope for about 500 m. and then slowly doubling back in the general direction of Chichen. We soon came upon an old cornfield which was fairly level except for three or four hillocks projecting prominently above the tops of the tangled weeds that had overgrown the place completely.

House Site 8 (fig. 52,8). The first of these knolls was about 20 m. long (east-west) and 17 m. broad. It was a natural formation, but a number of large stones which prevented the slopes from washing away had either been placed there for retaining purposes in ancient times or thrown up by modern Indians while clearing their field. The surface of the projection was obscured not only by weeds and brush, but also by a carpet of closely matted green vines and creepers. By slashing this aside with our machetes, entirely at random, we finally located some dressed stones. To clear the parts wanted was then an easy matter.

The outline of the structure thus exposed was interesting. A single east-west wall turned south at right angles at each end to form end walls. The rectangular area thus bounded was divided by walls into three parts. The central room was about 4 m. square, the others slightly smaller. About 4 m. south of the three rooms and parallel to the long axis of the entire unit lay a line of dressed stones, which probably marked the outer margin of a porch. Mai, also, gave an independent opinion that the level place between these stones and the rooms was a porch.

House Site 9 (fig. 52,9) was an almost identical site on another elevation in the same cornfield, about 40 m. northeast of House Site 8. The only difference in plan was the fact that the back wall of each room was set back progressively farther from the front. The northernmost room was therefore the deepest, the distance from front to back wall being 4.5 m. and its other dimension 3 m. The corresponding figures for the shallower rooms were 2.5×4.5 m. and 3×6 m. The

porch of this house was about 2.5 m. wide. We found a stone water receptacle and turned up several potsherds with our machetes.

Leaving the cornfield for the woods we went eastward for a short distance and stopped for lunch on top of a high ruined pyramid, continuing later in a straight line eastward through the woods. About 300 m. from the pyramid we entered a very low, flat section, wooded but practically devoid of underbrush. Groups of undressed stones and small mounds only 40 or 50 cm. high were scattered about at short distances from each other. Among these groups we found two that had dressed stones aligned in rows.

House Site 10 (fig. 52,10), the first of these two, had a somewhat different plan from any previously examined. It can best be understood by reference to the figure. Although the three "rooms" on the south side were similar to those at House Sites 8 and 9, entrance presumably being from their open (southern) ends, the porch lay behind the rooms rather than in front of them. Still farther north was another stone-enclosed section, its east and west ends marked by the same rows of stones that formed the ends of the rest of the house. The row of stones separating this last-named area from the porch was interrupted at one point (*x*). This interruption, about 1 m. wide, probably showed the position of a doorway formerly left in the wall. The northernmost division had a small inset (*y*), which jutted up about 30 cm. higher than the level of the rest of the site. A stone water receptacle was found within this northernmost area.

House Site 11 (fig. 52,11) lay within 50 m. of the above ruins. This house was composed of two adjoining rooms separated by a wall about 1 m. wide. Each room was about 3.5×4 m. A door 1 m. wide, left in the south wall adjacent to the partition, gave access to the rooms. There was a pila in front of the house.

We could find no other definite house locations in this neighborhood, but not far east of it we came upon some more. The presence of five stone water containers within a short distance of each other attracted us to them.

House Site 12 (fig. 52,12) was a room 3×3.5 m., enclosed on three sides by rows of dressed stones. A broken stone water receptacle lay inside the room, and behind the east corner there were two more. The house faced northwest.

House Site 13 (fig. 52,13) was located only some 15 m. west of House Site 12. It, too, faced northwest, if we consider the open side the front. The only room that could be completely cleared was about 3×3.5 m. wide. Its back wall continued in a northeast direction, but we could trace it only about 2 m. Two pilas lay between this site and House Site 12.

Leaving these remains west of us, we came out almost immediately on the Xnaba trail which we followed north to the Piste road, and so back to the hacienda at Chichen Itza.

Summarizing, we can say that, so far as can be seen from surface inspection, the house sites in the environs of Chichen Itza are usually grouped in small clusters of from two to four or more dwellings, located either on flat ground or on flat-sur-

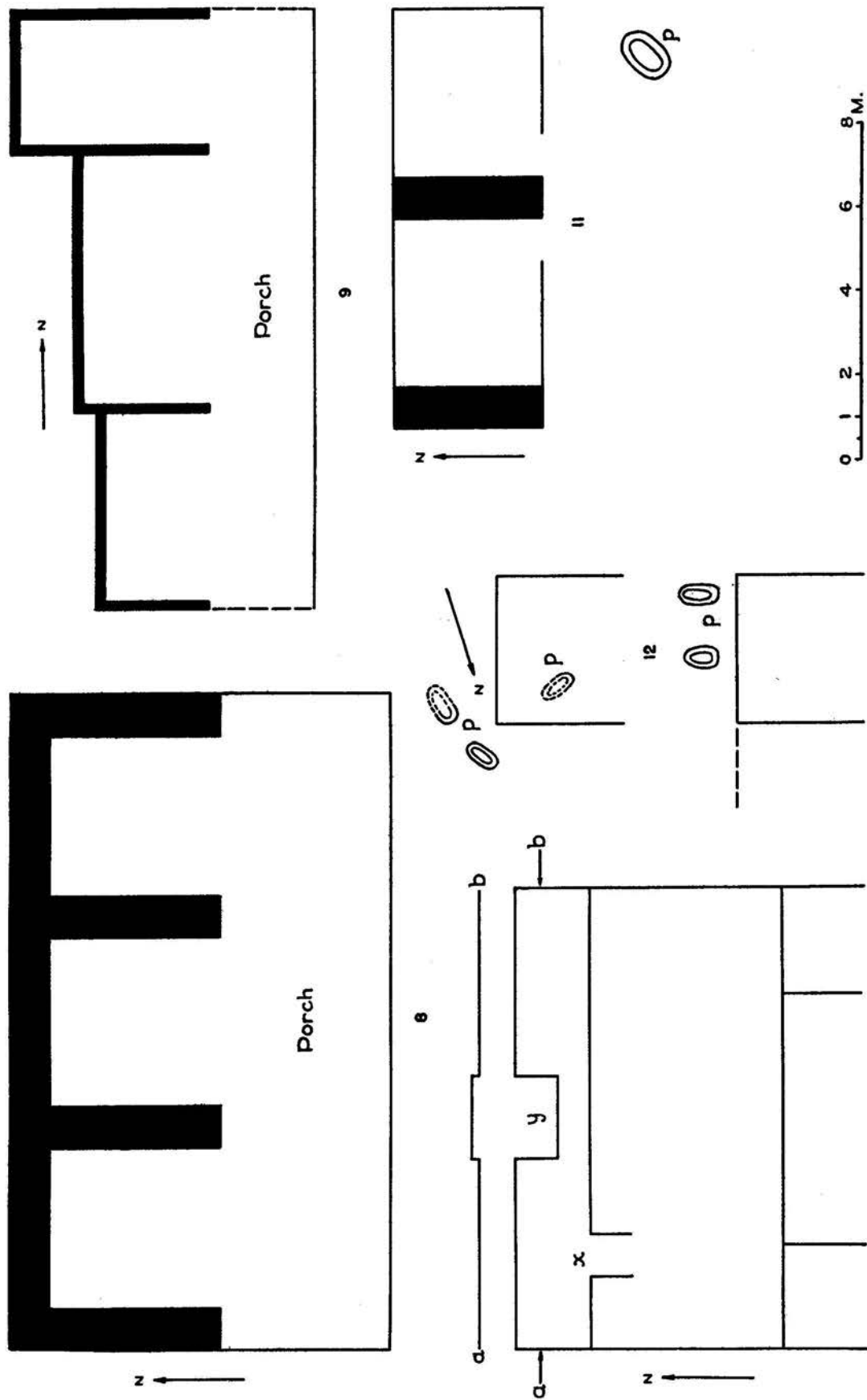


FIG. 52—ANCIENT HOUSE SITES AT CHICHEN ITZA, YUCATAN

13

10

faced natural hillocks. All are apparently rectangular in shape, but vary somewhat in ground plan. Some are single rooms enclosed by walls on three sides, the front being open. Some answer Landa's description of ancient houses in that they have an enclosed "back part," or living room, and an open "front part," or porch, a door being left in the dividing wall between the two. In some cases three or possibly four such arrangements of room and porch are located side by side and probably they were once covered by the same roof.³ Single stone drums, stone water receptacles, and potsherds are found at or near the house sites.

³ E. M. Shook tells me that he found similar multi-roomed, rectangular house sites at Sayil and Kabah, Yucatan.



FIG. 53—MEXICAN HOUSE SHOWN IN THE MENDOZA CODEX

APPENDIX B

EXTRACTS FROM LETTER OF M. J. ANDRADE

(NOTE: Dr. M. J. Andrade of the Department of Anthropology at The University of Chicago kindly consented to review the lists of Maya terms collected for this paper and to answer several questions pertaining to the editing of these words. In addition, he took the trouble to explain, in a personal letter, the various corrections and suggestions that he had made. After reading Dr. Andrade's letter, I was convinced that students in the Maya field, especially those who have occasion to refer in print to Maya and Spanish terms, would find it as helpful and as interesting as it was to me. At my request, therefore, Dr. Andrade gave me permission to publish as many extracts from his letter as I thought would be of general interest to the reader.—R. W.)

In answer to your questions pertaining to editing, I suggest the following principles and procedures. The Maya words should not appear in the same type as the English text. How the Maya should be printed, depends on what phonetic type is available. It would be preferable to have phonetic renderings in bold face, particularly in a monograph such as yours. If bold face can be used for the symbols of the International Phonetic Association, then the Spanish equivalents, when given, should be in italics. The English equivalents of Maya or Spanish words should be printed in whatever type is used throughout the publication, and they should appear in single quotation marks ('thus'), or without them, depending on the following conditions: (a) When the Maya words and the English equivalents are printed in columns, as when giving a vocabulary, use no quotations. (b) No quotations when the English equivalent is the last word of the sentence, or the last one within parentheses or square brackets. The principle is that the single quotations indicate that the English word is not a part of the text when periods, brackets, or spaces do not perform the same office. (c) Use single quotations in all other positions. That would be the ideal system, at least according to a preference not uncommonly exhibited in various linguistic publications.

If bold face type is not available for the IPA orthography, very probably the printer has these phonetic symbols in italic type, or one not differing much from italic, which, of course does not justify the use of italics for a different purpose. In such a case, the Spanish should be given in the same type as the Maya, but the word should be preceded by the abbreviation Sp. Then, if equivalents are given in Spanish as well as in English, the former should be in parentheses. Examples:

- (1) *kan* (Sp. *culebra*) 'snake', is the word used in this region.
- (2) *kan*, snake.

Literal translation, and any brief incidental information pertaining to words or phrases is most commonly given in square brackets. Hence, your fourth example should be presented in this manner:

The pole is called **kut** *moi* [**kut**, carry]

Concerning quotations from the Motul dictionary, or from any Maya writing which does not represent the present language, I suggest that they be transcribed exactly as found in the original. If it seems desirable to add a phonetic transcription for the benefit of those who are not acquainted with the traditional Maya orthography, it should be enclosed in square brackets, thus:

Motul gives **ppoc** [p'ok], hat

The reason for reproducing faithfully what is quoted from these sources is that we do not know how the words were pronounced, however plausible it may be to infer that their pronunciation did not differ much from that of present Maya. In some cases any phonetic transcription would be open to more definite objections. For example, on page 184 of the original manuscript of the Motul dictionary we find the particle *hij*. Since the *h* of this word is of the sort that the author calls "recia," and since some words written in Motul with double vowel are heard at present with a single vowel followed by a glottal plosive, while others are heard with a long vowel, or with two vowels, or with two vowels separated by a glottal plosive, we do not know whether the phonetic transcription of *hij* should be **xi'**, **'xii**, **'xi'i**, **xi:**, **hi'**, **'hii**, **'hi'i**, or **hi:**. No knowledge is available as to what is the phonetic equivalent of the distinction between "*h* simple" and "*h* recia." Tzeltal and some of the Guatemala languages seem to indicate that the "*h* recia" may have been some sort of velar or uvular voiceless fricative, but this is mere conjecture. It may very well be that the author of the Motul meant something entirely different from what we conjecture.

The double vowel in Maya presents a few difficulties. On this question I would trust the Motul dictionary rather than Pio Perez. It does not seem reasonable to conclude that since the time of Pio Perez the treatment of these vowels could have reverted to that presented by the Motul dictionary. Still, the present language conforms more closely to the Motul orthography on this point than to Pio Perez. Pio Perez leads one to think that almost any monosyllable can occur with a single or with double vowel. My experience with the present language is that such is actually the case if one asks an informant to pronounce an isolated word carefully. If one insists, many informants are willing to give double vowel inconsistently with many words which in connected discourse they themselves would never pronounce that way. It seems most reasonable to hold that the "real" language, if there be such a thing, is that which can be observed when it occurs in actual use, rather than when the words are uttered out of context for the benefit of the investigator. I would suggest that in case of doubt, Motul is the authority on this point. However, one does not know, as already indicated, whether the author of the Motul represents by his double vowels a vowel followed by glottal plosive or the double vowels with the various modes of pronouncing them at present. Nevertheless, if a word is given with a single vowel in Motul, I have found that it is invariably used as such in connected discourse at present. There are reasons to conclude that on the whole the traditional Maya orthography is more accurate and consistent than many of the phonetic transcriptions which some

modern investigators have offered for Yucatecan Maya as well as for other languages of the same family.

So far as my experience goes, one must distinguish four kinds of sounds of the k-sort in Quiche, Cakchiquel, Mam, and Jacaltec. The same thing may be true also of some of the other languages of Guatemala, but I do not know. The four k-sounds are, of course, voiceless plosives. The four kinds result from the fact that there are two points of articulation, velar and uvular, and both the velar and the uvular plosive can be either glottalized or non-glottalized. By being glottalized I mean, as seems to be usually meant, that partially or wholly coincident with the time during which the velar or the uvular articulation is made, the glottis is closed. Using the IPA notations, these four kinds of sounds should be represented by **k, q, k', q'**.

In Mam and in Jacaltec, but not in Quiche or Cakchiquel, so far as I know, there are three voiceless fricatives with corresponding affricatives which can be glottalized or non-glottalized. One of these articulations is retroflex, that is to say, the tip of the tongue is turned upward. In Jacaltec the aural effect of this sound resembles more closely some sort of *s* than in Mam, due in part to the fact that in Jacaltec this retroflex has an alveolar point of articulation, whereas in Mam the narrowest front passage of the air in this articulation is above the alveolar region. This difference between the two languages need not, of course, be represented by using two different symbols for the retroflex sounds. It would be trivial and inconsistent to do so. Inconsistent, because we are forced to represent many other different sounds by the same symbols. Identical sounds occur perhaps only when we cannot hear the differences. If there are identical sounds from some absolute point of view, we have no means of verifying their occurrence. The important thing is that these retroflex sounds should not be confused with their similar non-retroflex homorganics, not merely because we happen to hear that they are different, but because the native consistently uses one or the other without ever permitting them to be interchangeable, and because their consistent usage serves to distinguish several words which would otherwise be homonymous. If your printers have not the IPA symbol for the retroflex *s*, and it seems impractical to cast a special type for your monograph, then a convenient makeshift is to use the Greek sigma. The nine sounds concerned in these remarks are:

s, ts, ts'; ş, tş, tş'; ś, tś, tś'.

Of the Quiche, Mam, and Jacaltec words appearing on your manuscript, I have ventured to correct only those which I find in my field notes. As for Maya, all I have done besides making some minor corrections in familiar words, is to supply omissions of the glottal plosives, which, according to my notes, should be indicated. Such corrections could not have been made by consulting the Motul

dictionary, for the reasons already pointed out. For all other points I suggest that you consult the Motul dictionary. There is hardly any risk, I think, in assuming that the particular words of your notes should conform to the orthography found in the Motul. If this assumption should prove to be invalid in any instance, at least what you publish is Maya, whether or not it be modern Maya.

If you think it advisable, you may make some corrections in your Cakchiquel words, guided by certain principles which have been found to hold good so far as our knowledge goes. Cakchiquel has velar and uvular voiceless plosives (*k* and *q*). There is a high degree of probability (I dare say, close to unit) that if Quiche, Mam, and Jacaltec have *q* in a given word, and Cakchiquel has a cognate word corresponding to it, such a word will not have *k* instead of *q*. For Zutuhil I cannot give you any advice, since I have done no field work on it.¹ There is another general principle for which I have found only one exception. If a word in a given language of the Maya family has any one of certain five glottalized consonants, the cognate words of the other languages have corresponding glottalized consonants. These five consonants are: *ts'*, *tʃ'*, *tʃ'*, *k'*, *q'*. By corresponding glottalized consonants I mean this: for a given word, one language may have *k'*, *ts'*, or *tʃ'* where another has any one of these three consonants, but if the consonant is glottalized in one language, it is also glottalized in the other. In some instances I have mistrusted the transcriptions of other investigators who presented exceptions to this principle, and upon checking on them in the field, I have found without the least room for doubt that there were no such deviations from the rule. The one exception I have thus far met with is in the word for 'blood'. This word is *tʃik'* in Mam and Jacaltec, *ʃits'* in Huastec, *kik'* in Quiche, but in Yucatecan Maya the initial consonant is glottalized: *k'ik'*. Evidently, a change has occurred in Maya, perhaps due to articulatory anticipation, for it is too much of a coincidence that the other languages should hit upon the same change independently, particularly Huastec, which has plain *ʃ* for *tʃ* only where the other languages have unglottalized *tʃ* or *k*. This exception is less than one tenth of one percent of the instances in which I have tested the rule.

¹ Since the time when this letter was written Dr. Andrade has studied Zutuhil and found that the language spoken at San Lucas Toliman is Zutuhil.—R. W.

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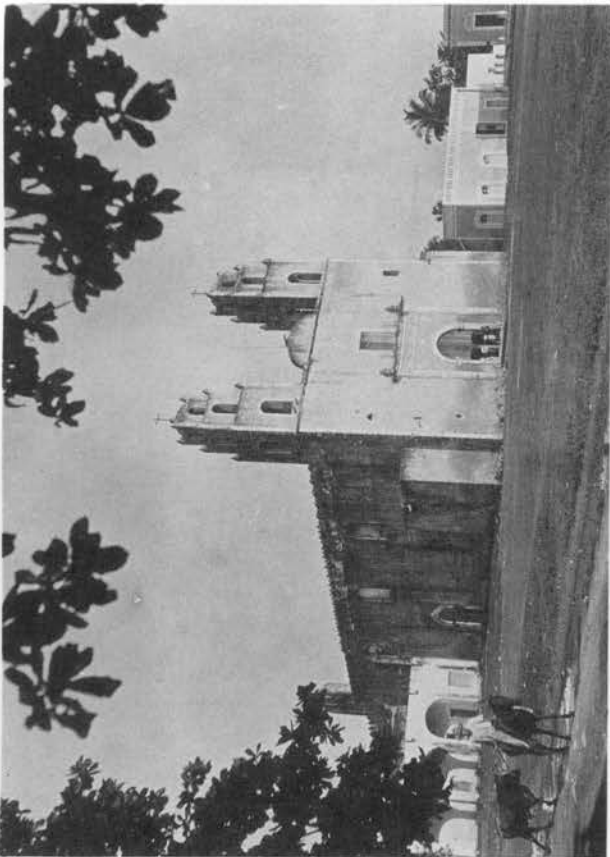
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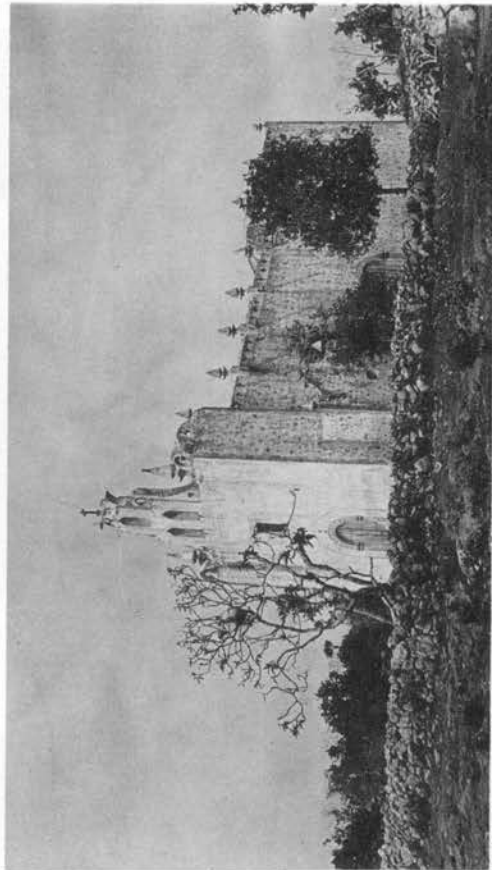
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b



a

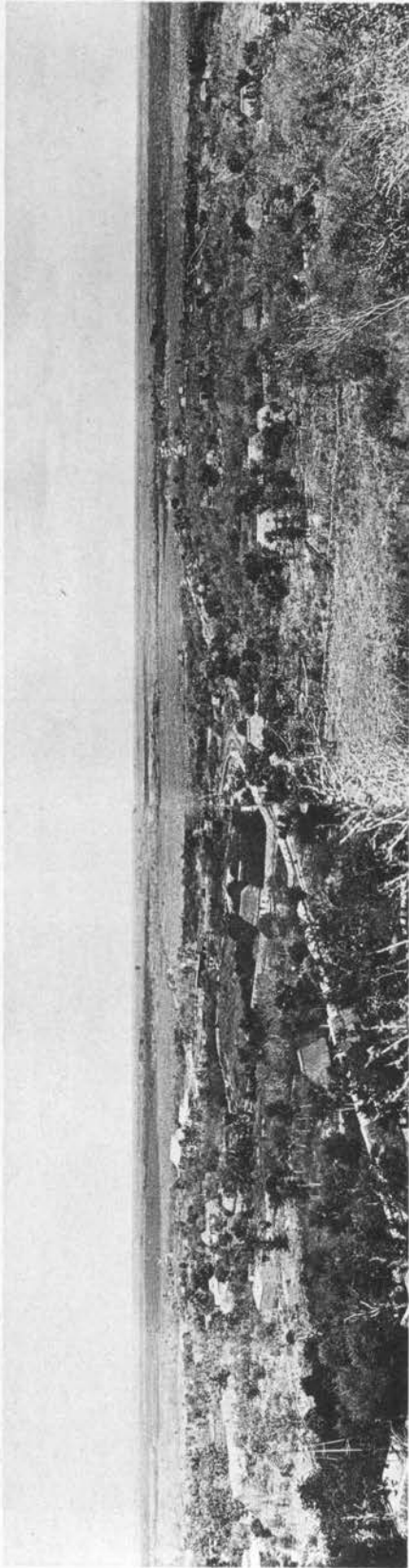


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c

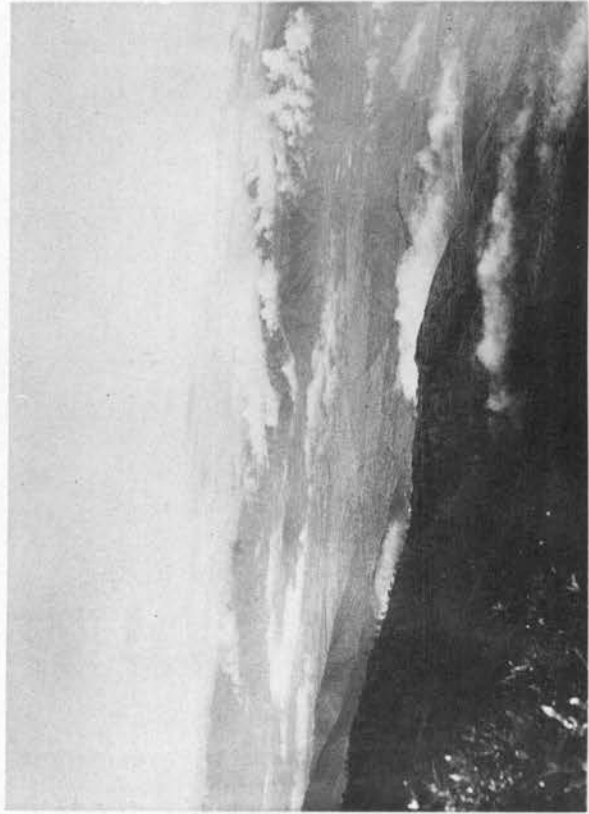
MAIN PLAZAS AND CHURCHES, YUCATAN
a: Temax. *b*: Valladolid. *c*: Tizimin. *d*: Yalkom.



a



b

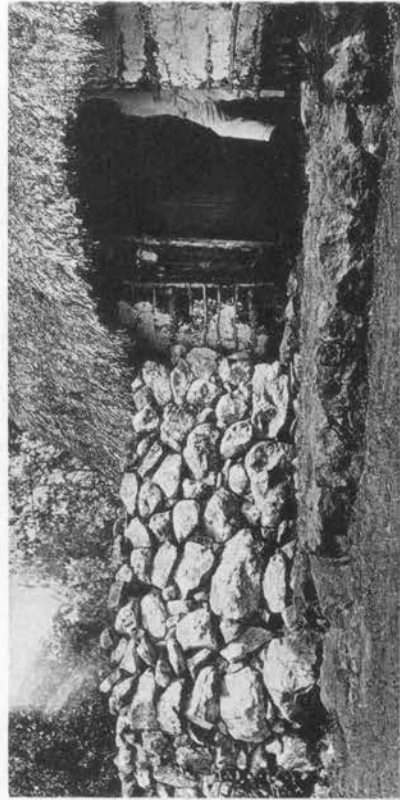


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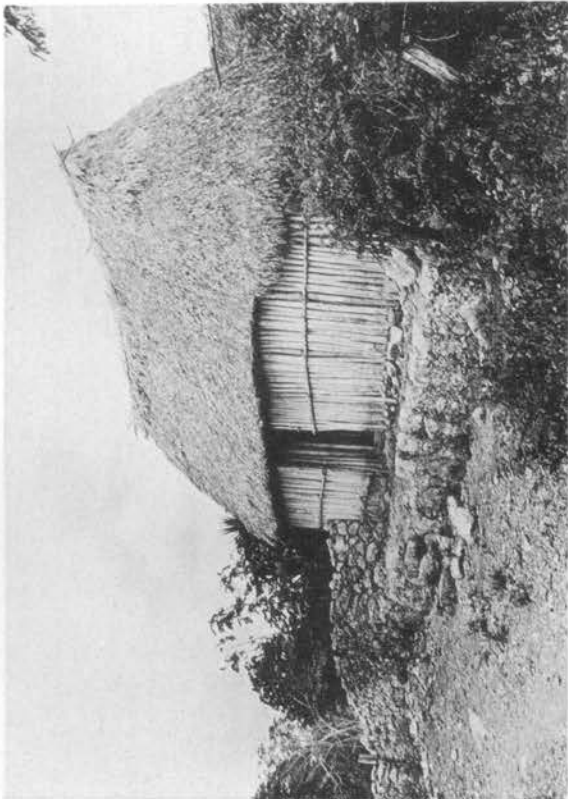
VILLAGE AND PROPERTY ASSEMBLAGE
a: Izamal, Yucatan, photographed from the summit of the Great Pyramid.
b: Chichimila, Yucatan.
c: Salama, Guatemala.



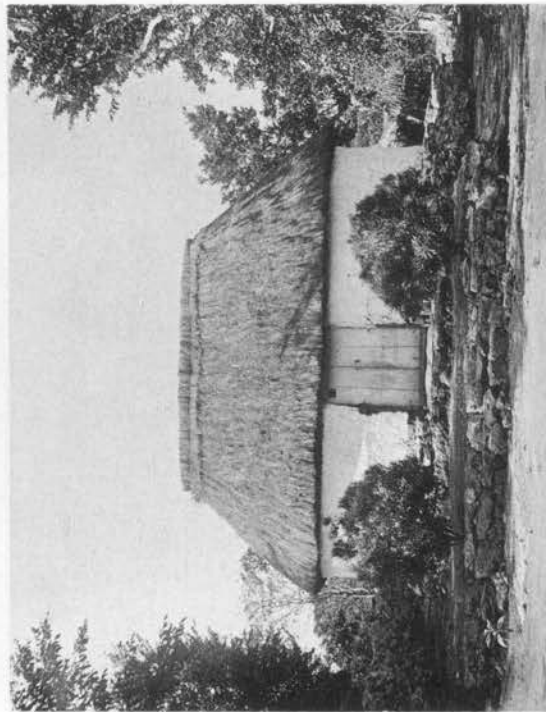
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d

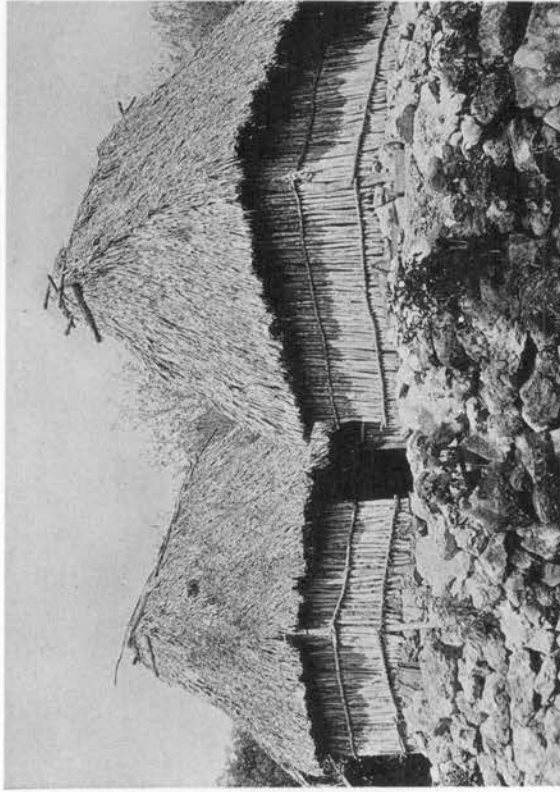


a

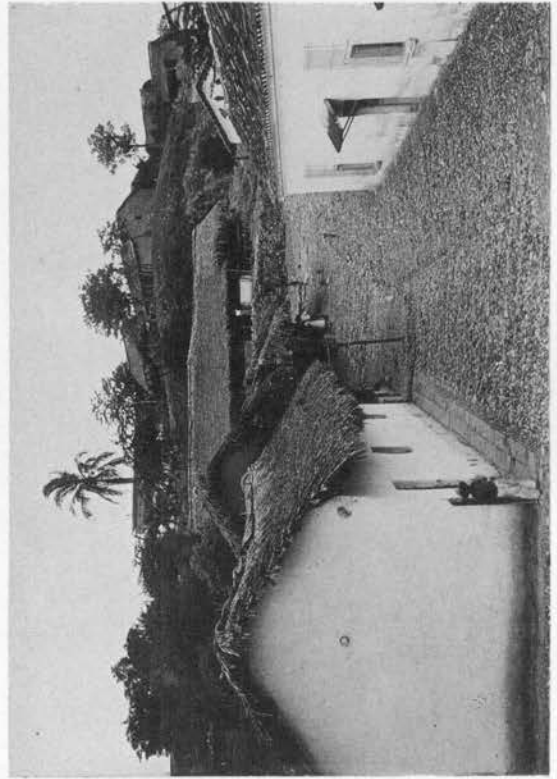


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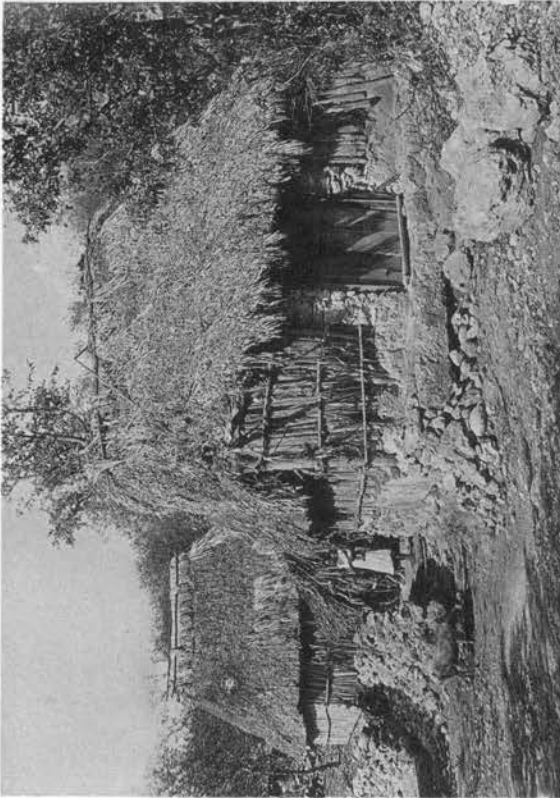
PLATFORM SUBSTRUCTURES, YUCATAN
a, b: Tizimin. c: Temax. Note offset terrace. d: Valladolid.



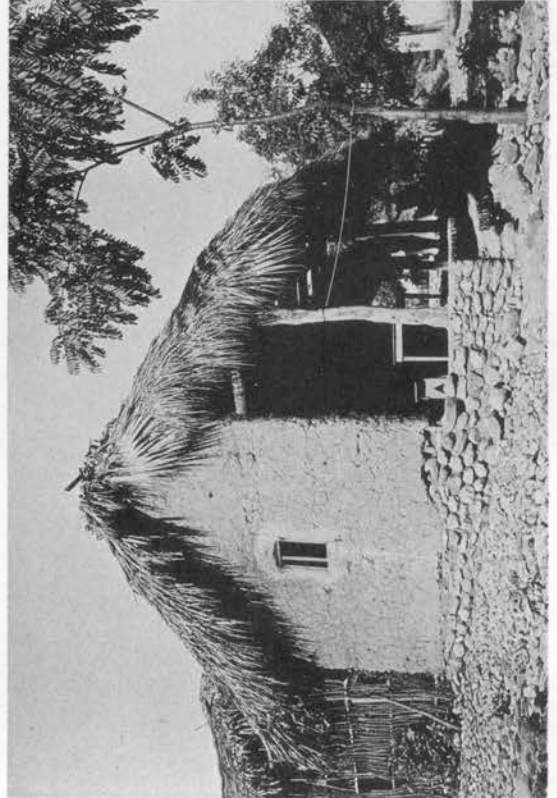
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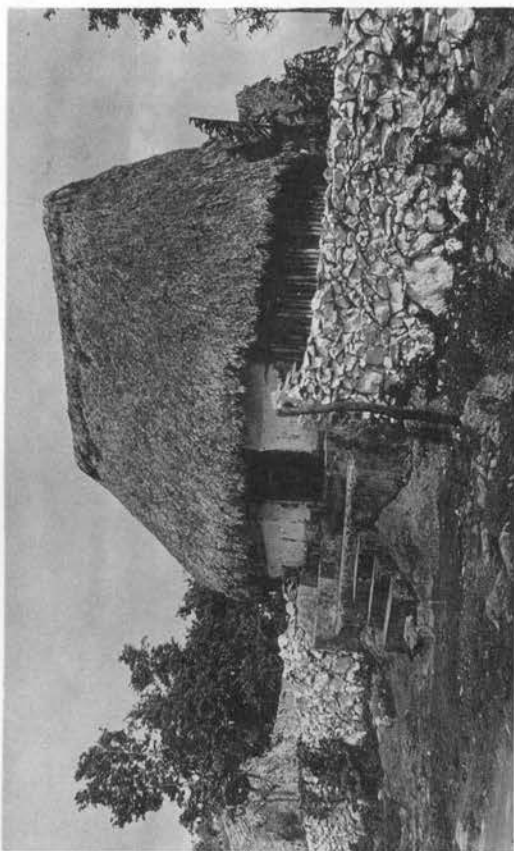
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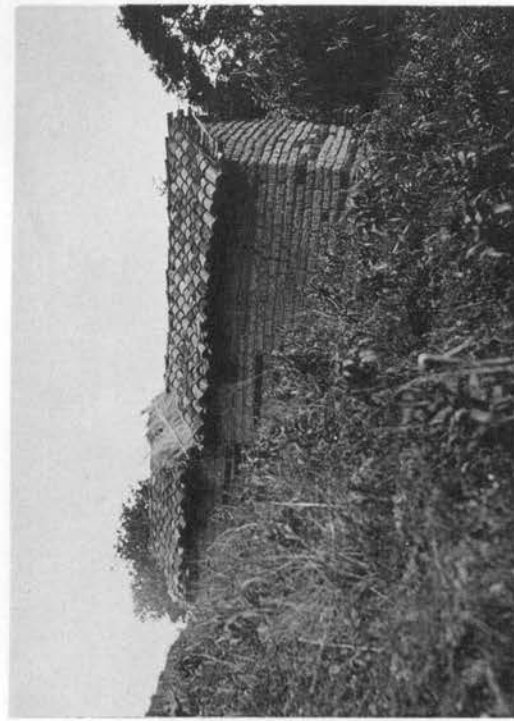
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PLATFORM SUBSTRUCTURES

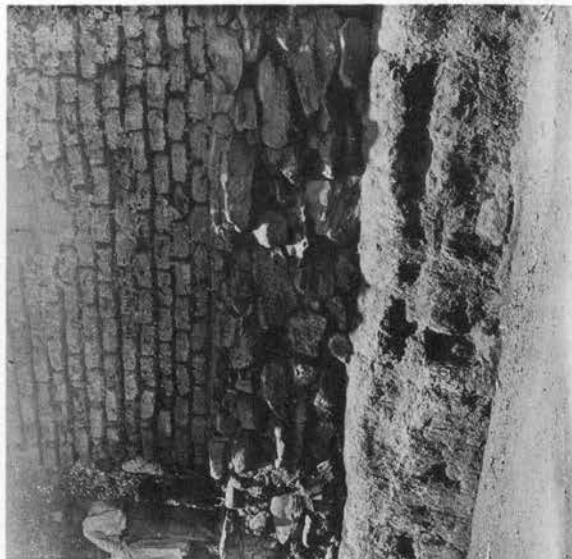
- a: Lerma, Campeche.
- b: Lerma, Campeche.
- c: San Juan Ermita, Guatemala.
- d: Jocotan, Guatemala. Note multiple-roomed Chorti house under one roof and built on one high platform in center background.



a



b



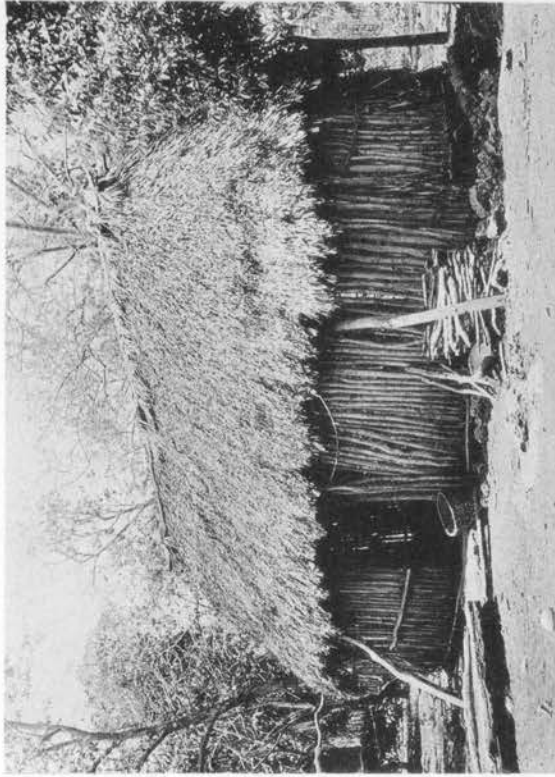
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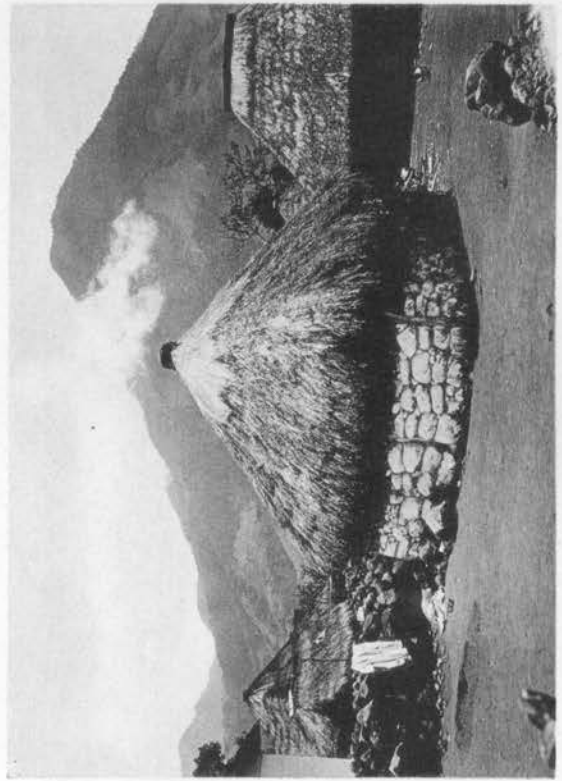
d

SUBSTRUCTURES

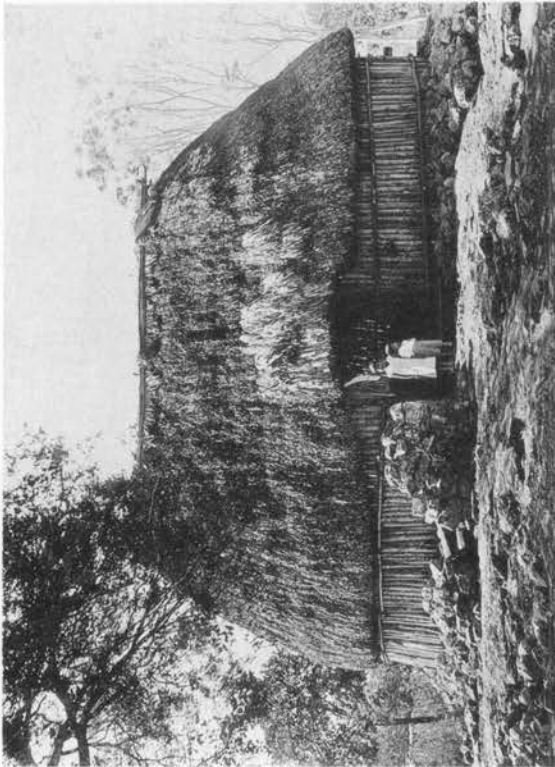
- a: Valladolid, Yucatan. Note resemblance to steps and benched side- and back-walls of ancient temples.
- b: Between Santa Cruz Quiche and San Francisco, Guatemala; terrace cut into hillside.
- c: Cuilapa, Guatemala; artificial platform built over natural platform.
- d: Uaxactun, Guatemala; Carnegie Institution staff house built on leveled surface of an ancient mound.



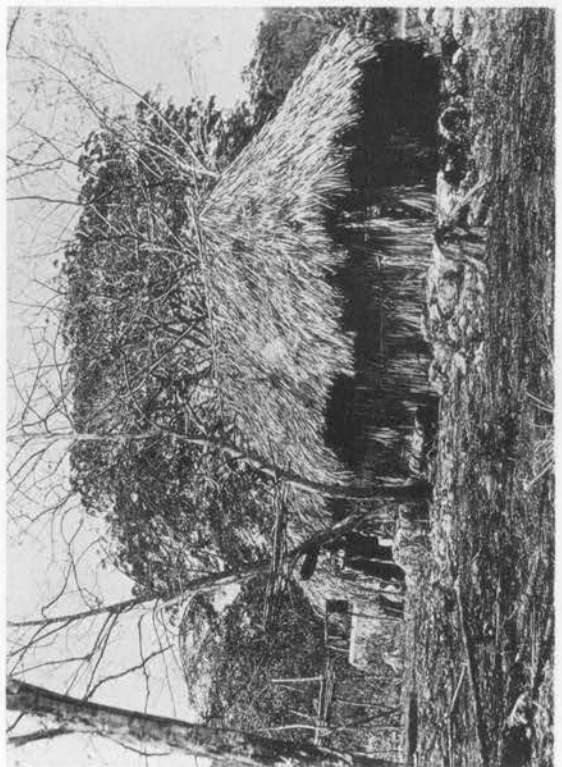
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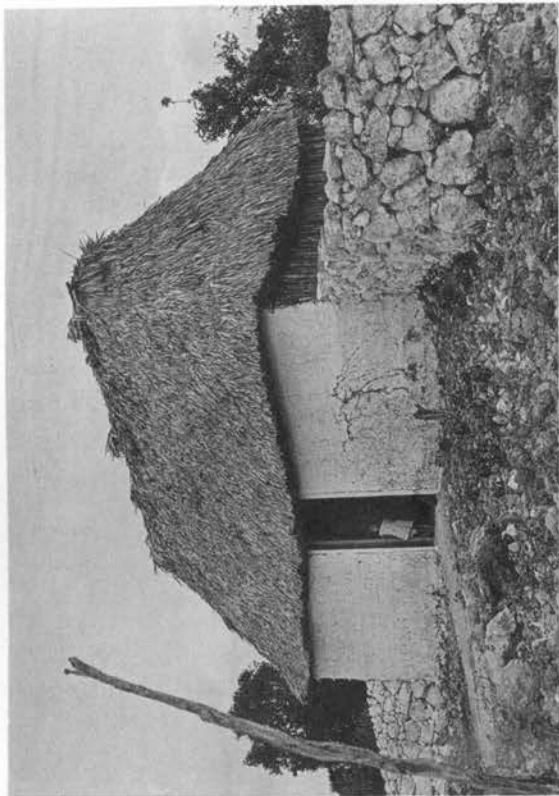


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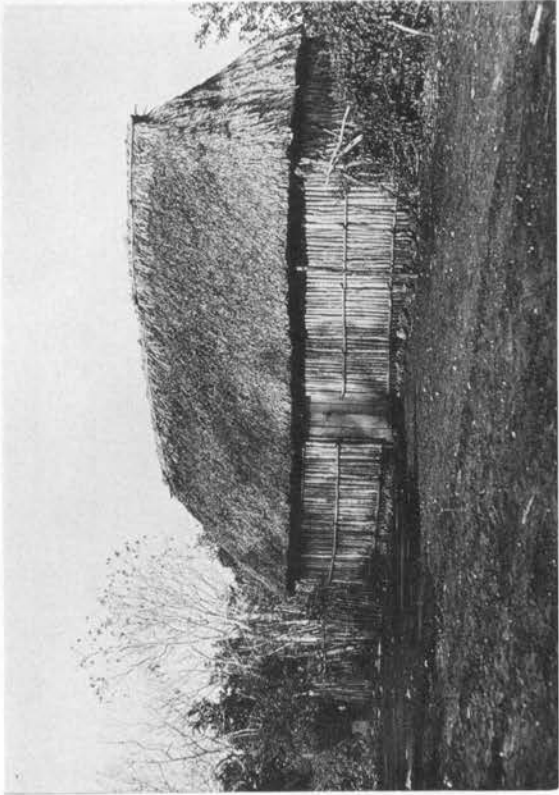


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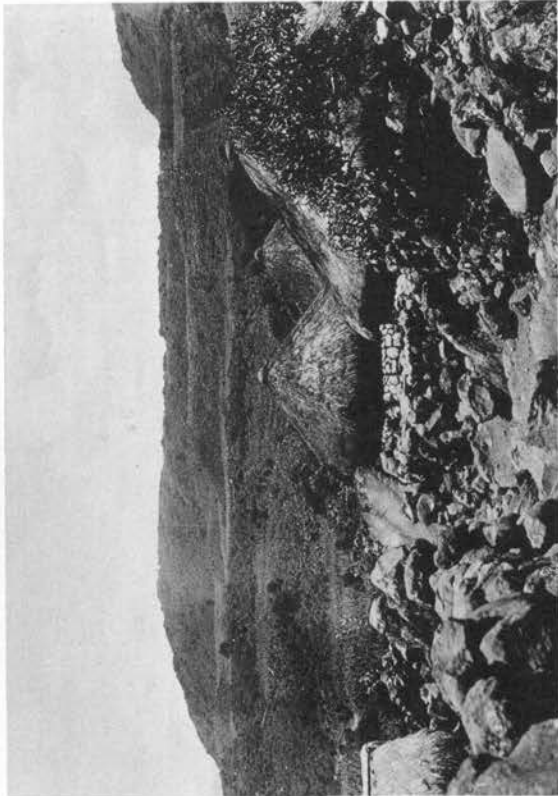
HOUSES ILLUSTRATING TYPES OF GROUND PLAN
a: Apsidal, Chan Kom, Yucatan.
b: Flattened ends, Tizimin, Yucatan.
c: Rectangular, Mukuchakan, Campeche.
d: Square Zutuhil house, Santiago Atitlan, Guatemala.



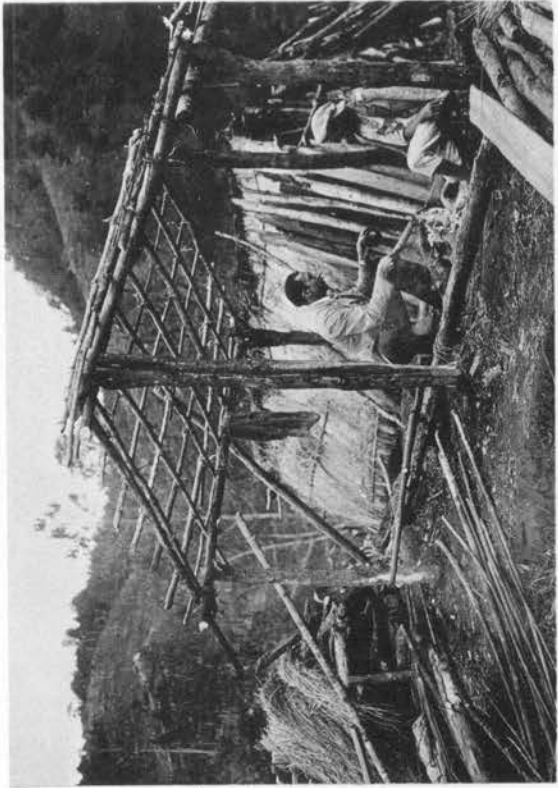
a



b



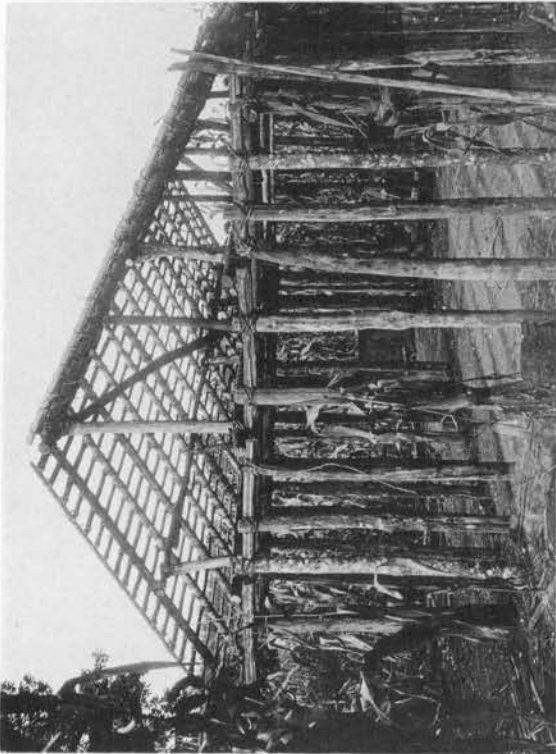
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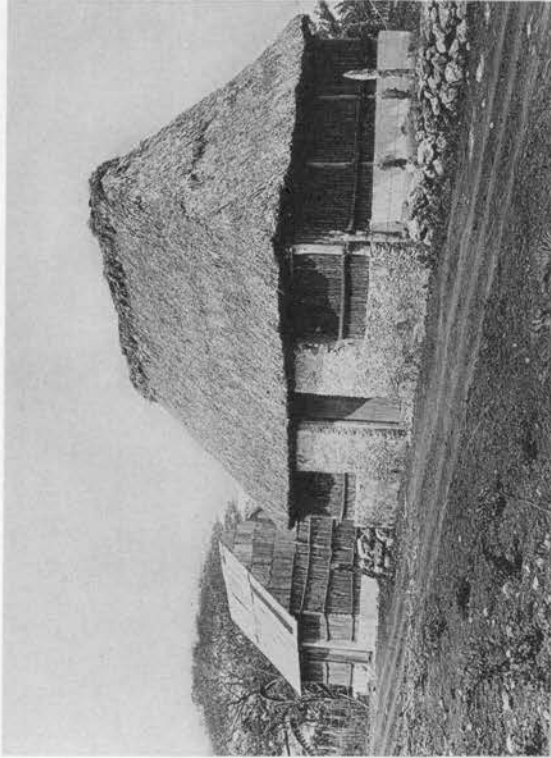
d

RECTANGULAR AND SQUARE HOUSES

- a*: Xocempich, Yucatan.
- b*: Tizimin, Yucatan.
- c*: Santiago Atitlan, Guatemala. Note superimposed lava flows in background.
- d*: Between Tonicicapan and San Francisco, Guatemala.



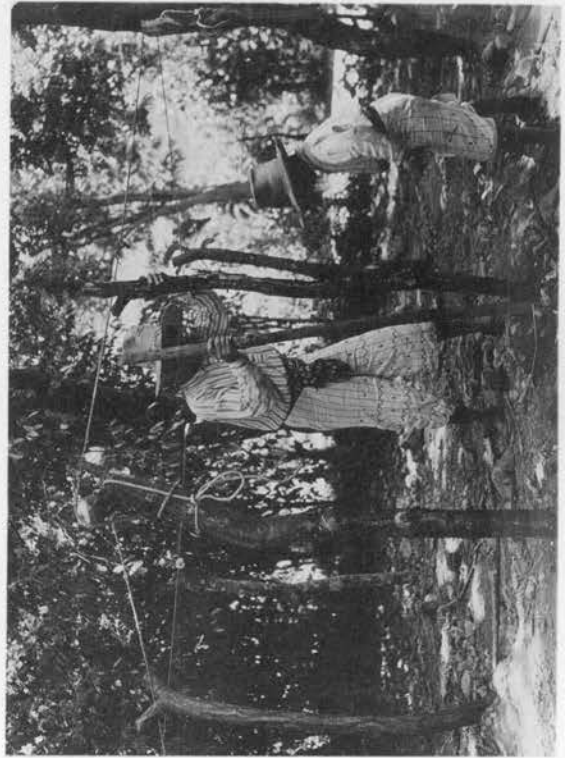
a



b



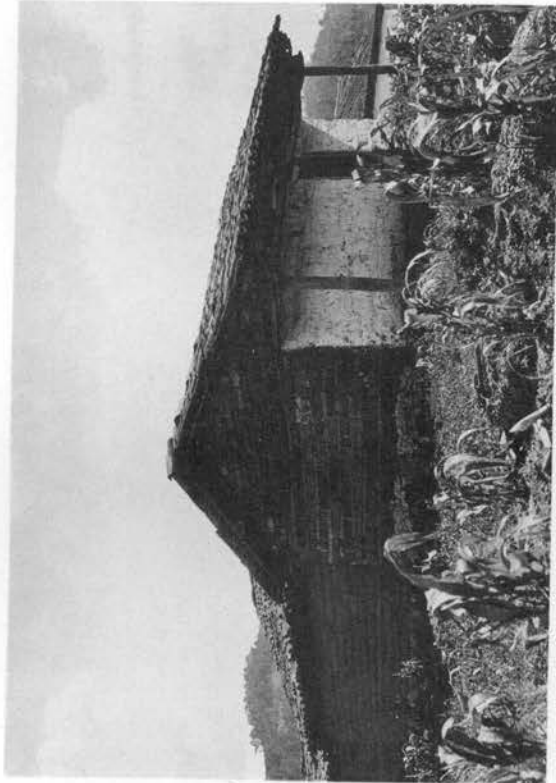
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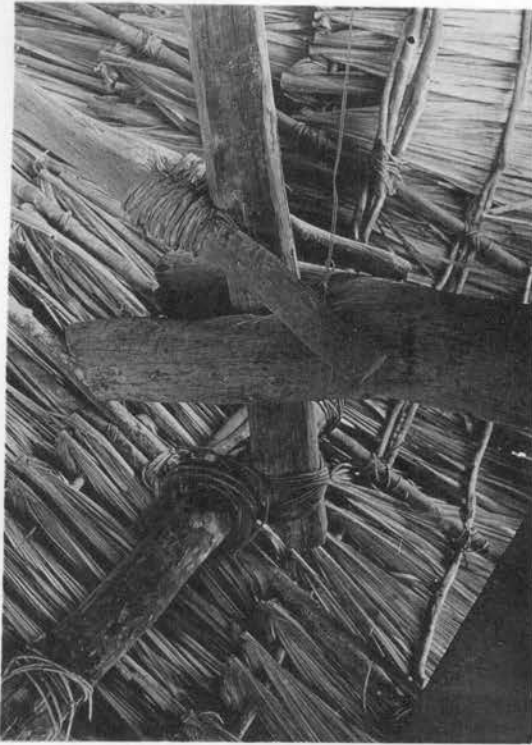
d

MAINPOSTS

a: Smaller, notched mainposts in line of walls, Coban, Guatemala.
 b: Larger mainposts in line of walls, Champoton, Campeche.
 c: Setting up forked mainposts for small kitchen, Panajachel, Guatemala. Indian tests poles for uniform height by tying cords between them.
 d: Filling and tamping post hole after new mainpost has been set in position, Panajachel, Guatemala.



a



b



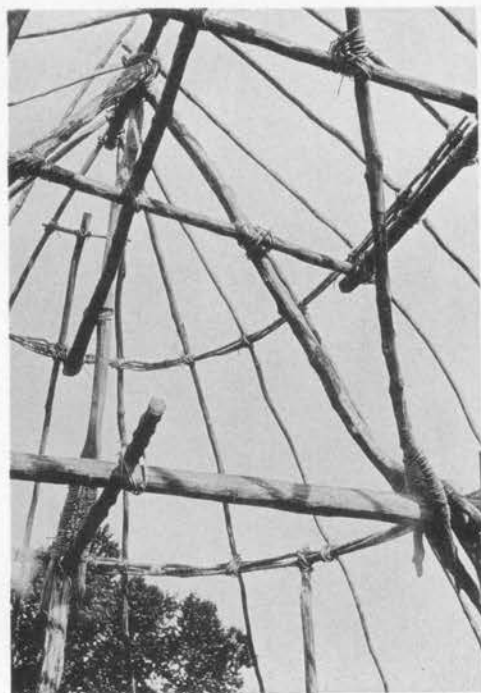
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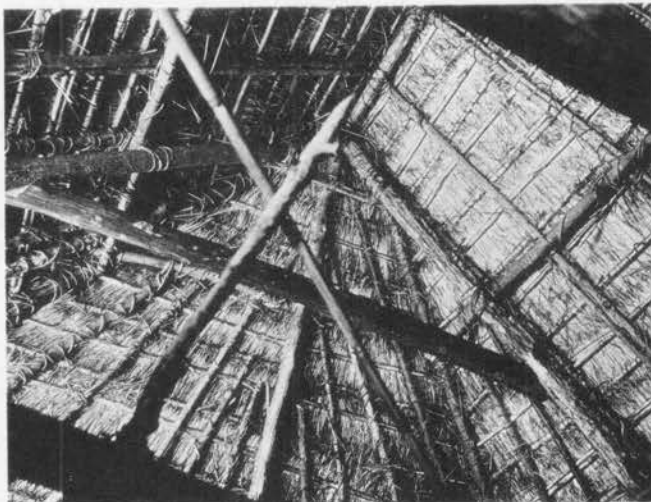
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MISCELLANEOUS CONSTRUCTIONS

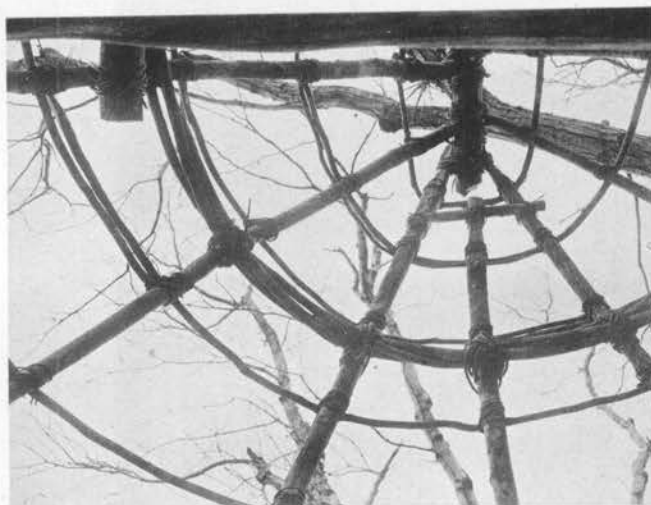
- a: Chichicastenango, Guatemala; adobe brick houses with pillars, machine-cut timbers, and tile roof.
- b: Chichen Itza, Yucatan; detail of forked mainpost, cross beam, plate, arm of A-frame, common rafters, roof rods, and palm thatch.
- c: Jocotan, Guatemala; house framing.
- d: Teimul, Yucatan; longitudinal sag due to wind storm, the house being braced by stout pole near door.



a



c



d



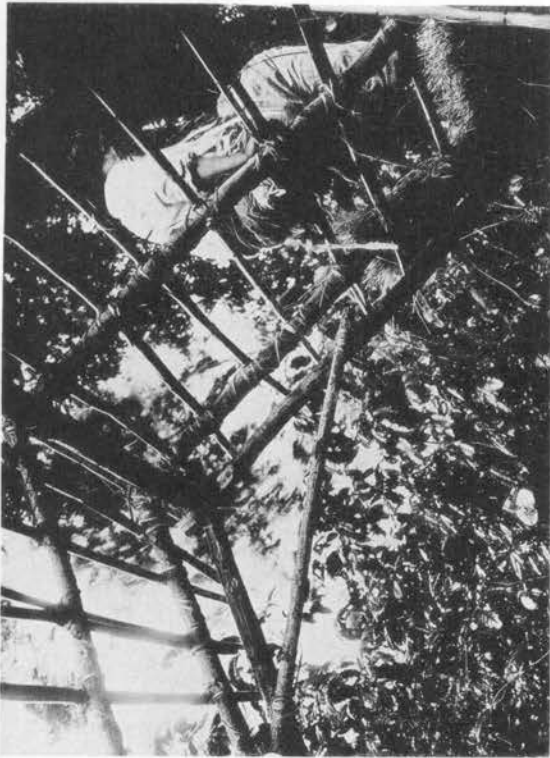
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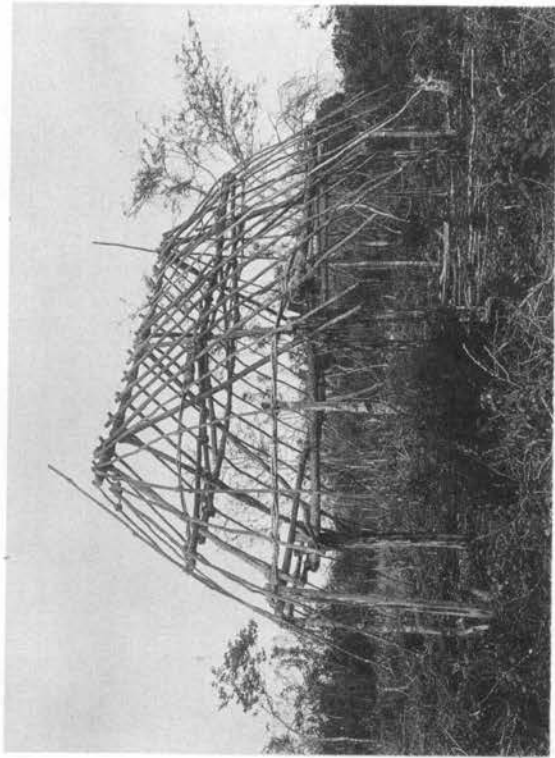
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HOUSE FRAMINGS

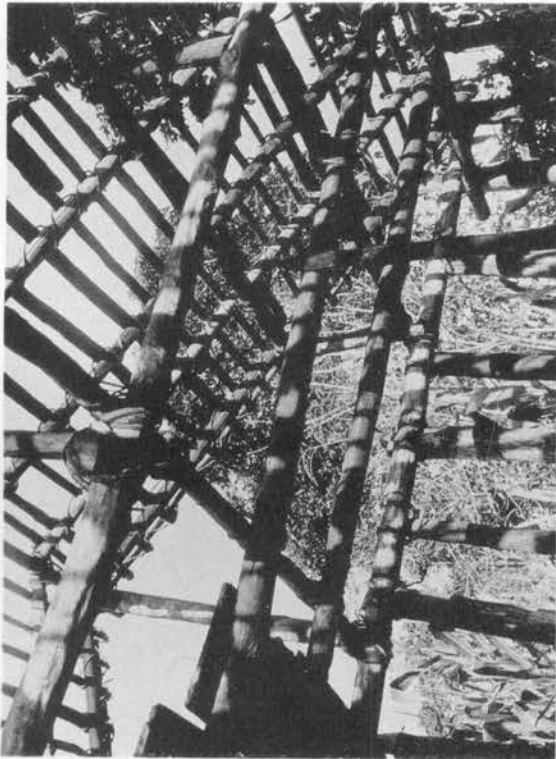
- a*: Apsidal house, Tizimin, Yucatan. Note additional forked brace in end and additional leaning A-frame.
- b*: Abandoned apsidal house, Xocenpich, Yucatan. Note double A-frame bar.
- c*: Rectangular house, San Lucas Toliman, Guatemala.
- d*: Apsidal house, Chichen Itza, Yucatan.
- e*: Detail of rounded end of same.



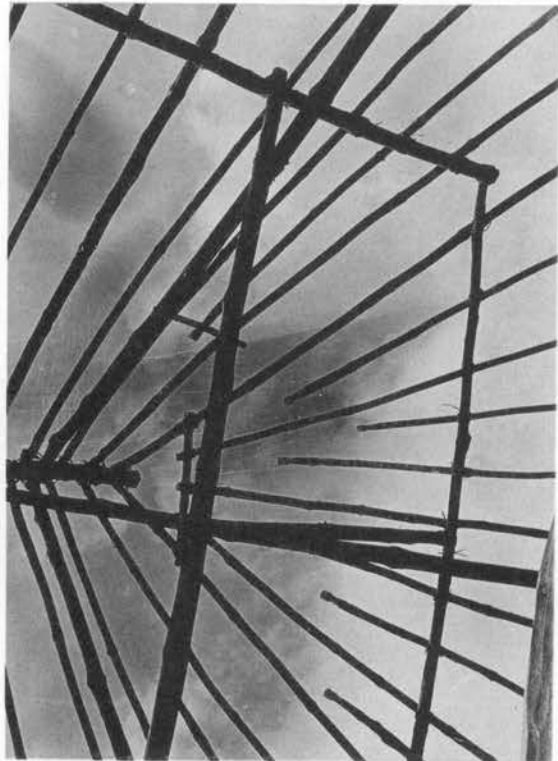
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d



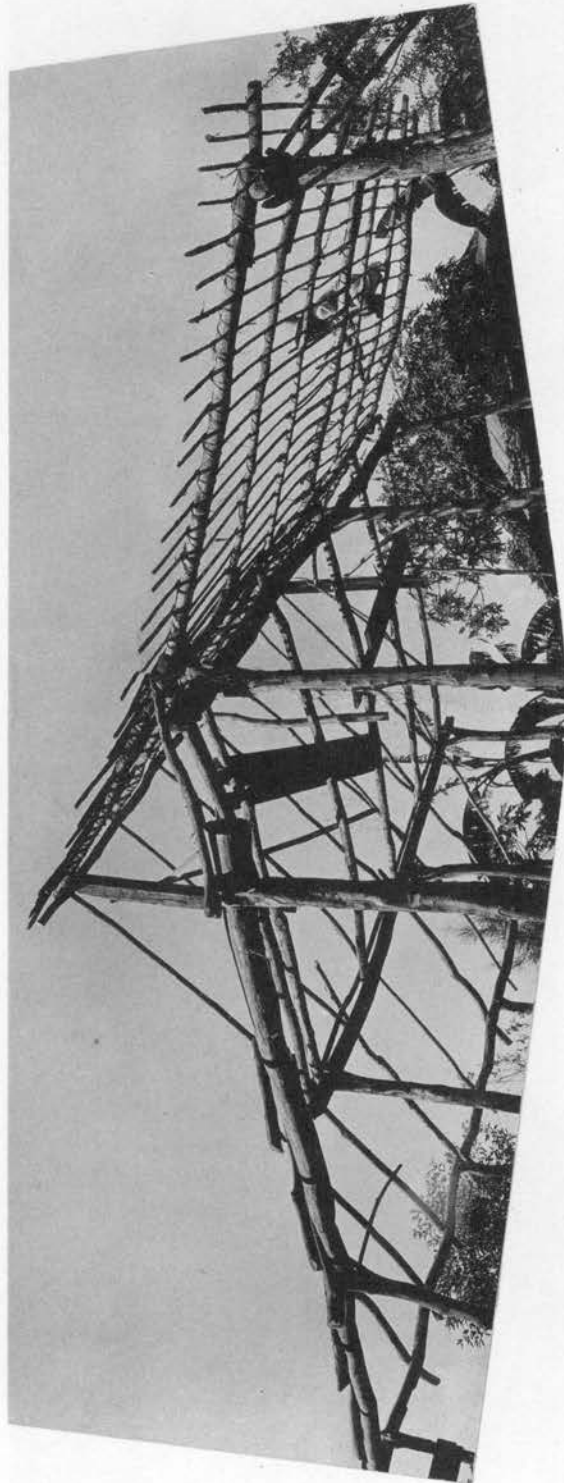
a



c

HOUSE FRAMINGS

- a: Rectangular Kekchi house, Coban, Guatemala.
- b: Small rectangular Cakchiquel kitchen, Panajachel, Guatemala.
- c: Rectangular house, Champoton, Campeche.
- d: House with flattened ends, Tizimin, Yucatan.



a



b



c

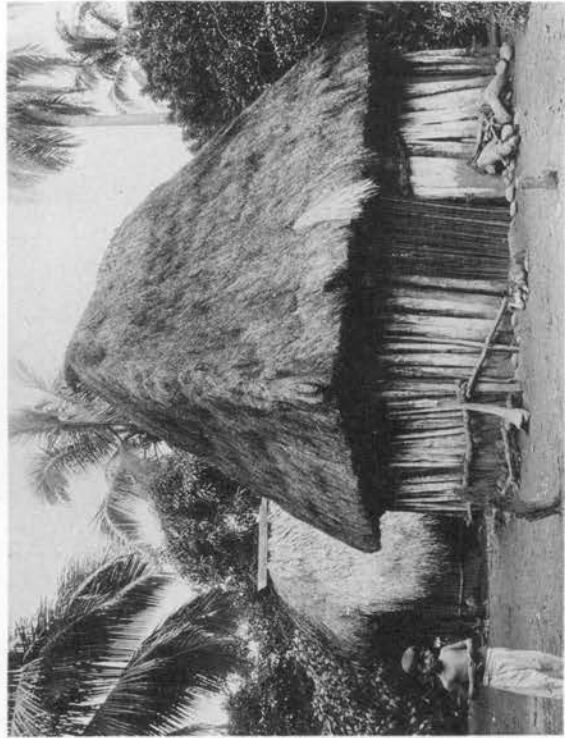
HOUSE FRAMINGS

a,b: Non-Indian rectangular house, Zacapa, Guatemala.

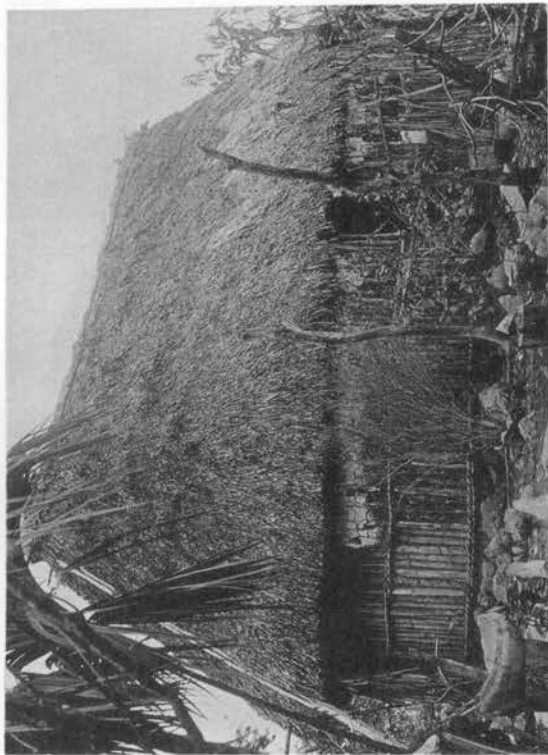
c: Lashing end roof rods to roof framing of apsidal house, Chichen Itza, Yucatan.



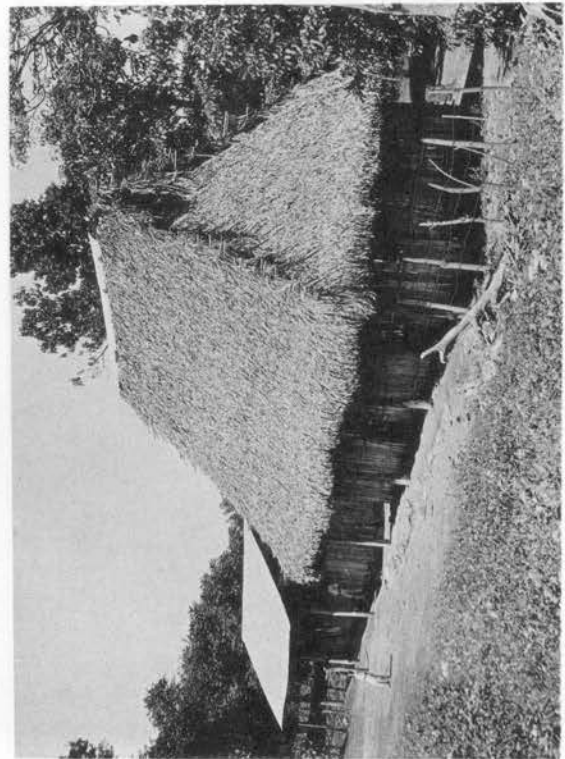
a



b



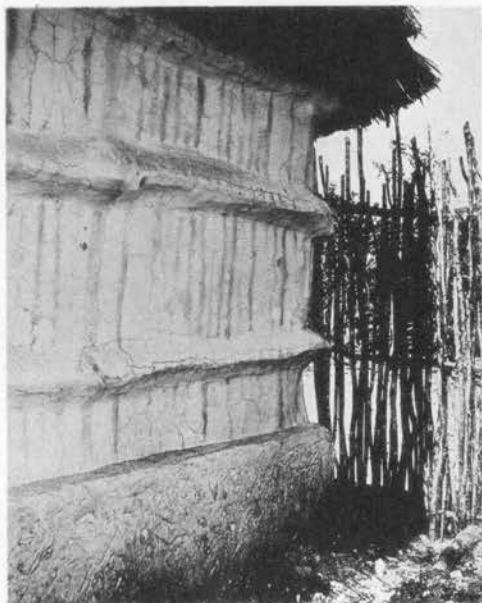
c



d

WALLS OF VERTICAL POLES

- a*: Chan Kom, Yucatan. Note fence enclosing garden at right.
- b*: Campeche, Campeche.
- c*: Between El Transito and Nahualate, Guatemala; split bamboo walls.
- d*: San Sebastian, Guatemala. Note cane door and heavy timbers serving as wall poles.



a



b



c



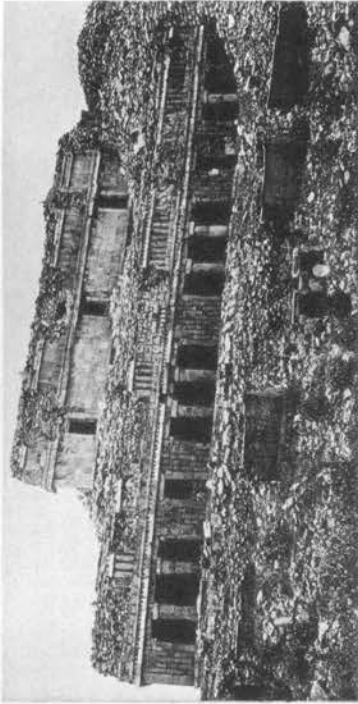
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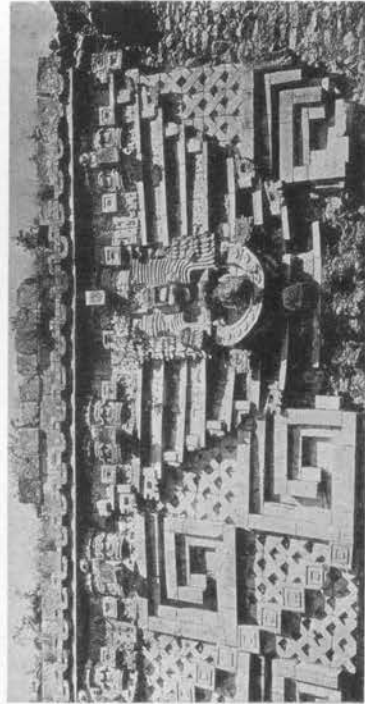
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HOUSES AND TEMPLES

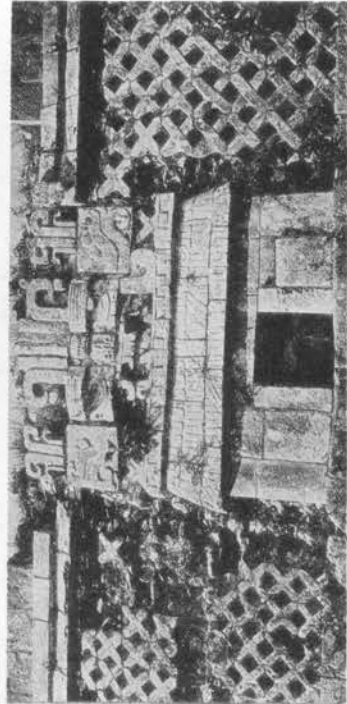
- a*: Profile of bush house at Champoton, Campeche. Note resemblance to profiles of some temple façades.
- b*: Interior view of house where wall poles are being lashed into place, with extra poles lying on floor. Note twisted pole plate extending farther back than usual.
- c*: Niches representing thatch-roofed huts as architectural decoration of upper façade, House of the Magician, Uxmal, Yucatan.
- d*: Partially thatched house with walls of vertical poles, Valladolid, Yucatan.
- e*: Niches representing thatch-roofed huts as architectural decoration of upper façade, south range of the Nunnery Quadrangle, Uxmal, Yucatan. Governor's House and House of the Pigeons in background.



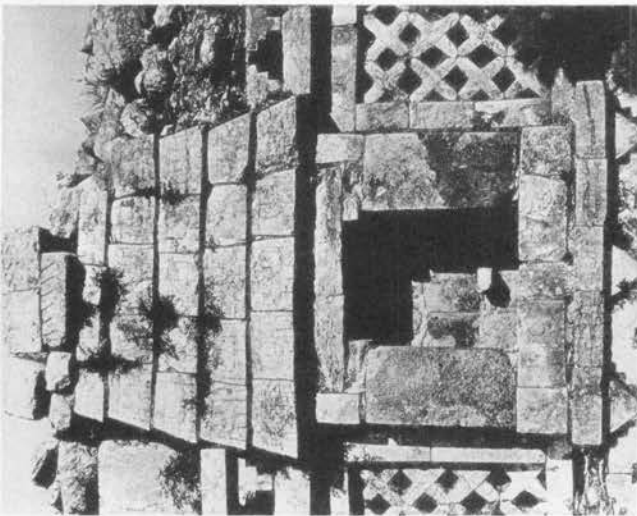
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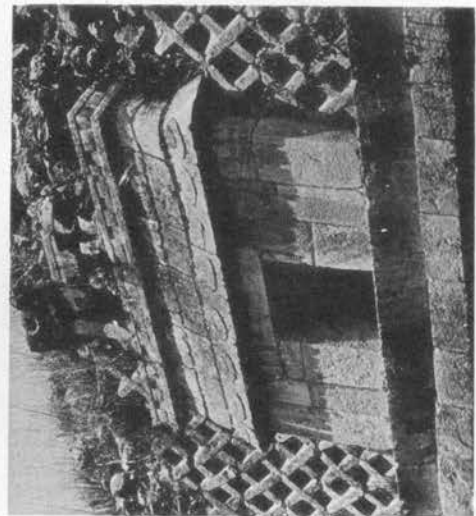
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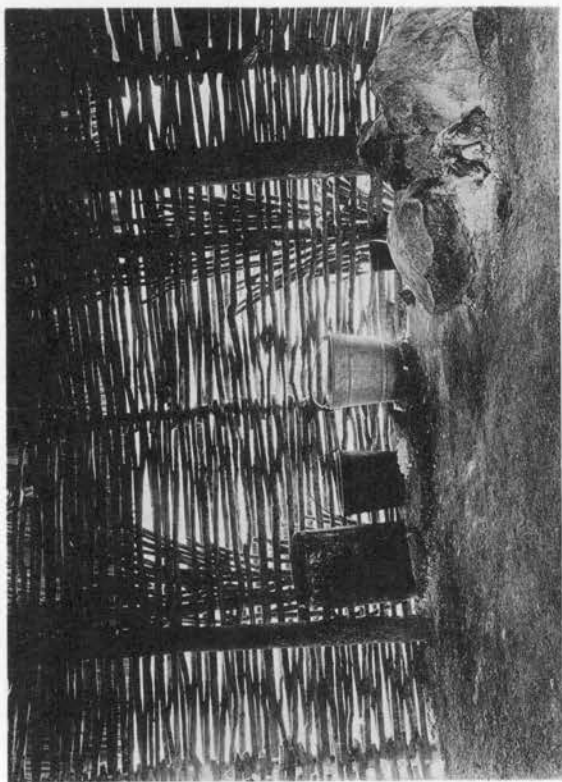


a

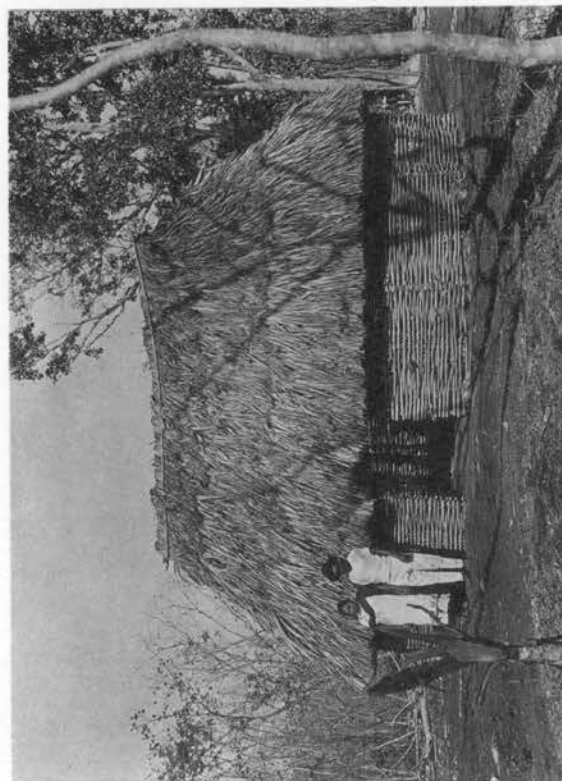


b

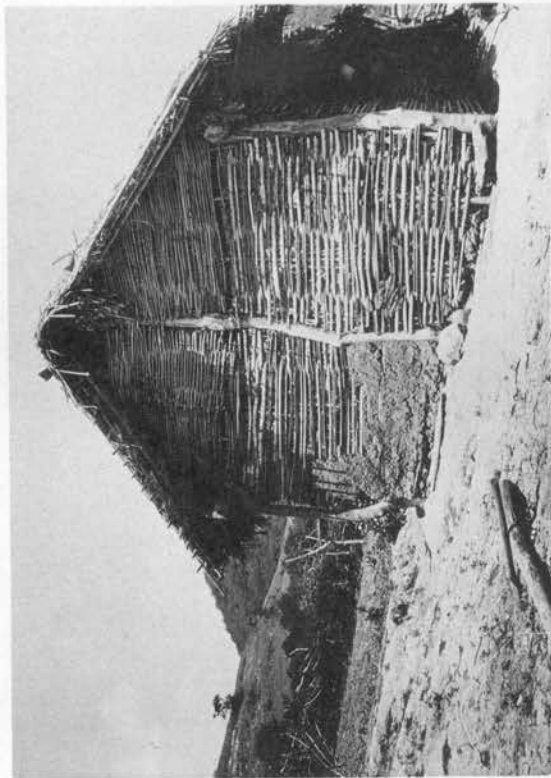
TEMPLE ARCHITECTURE ILLUSTRATING POINTS OF "TEMPLE PROTOTYPE" THEORY
a: Niche representing thatch-roofed hut as upper façade decoration from the Portal, Labna, Yucatan. (Photographed by H. E. D. Pollock.)
b, c: The same construction from south range of Nunmery Quadrangle, Uxmal, Yucatan.
c: Half-columns, the Palace, Sayil, Yucatan.
d: Architectural decoration possibly representing log-cribbing, east range of Nunmery Quadrangle, Uxmal, Yucatan.



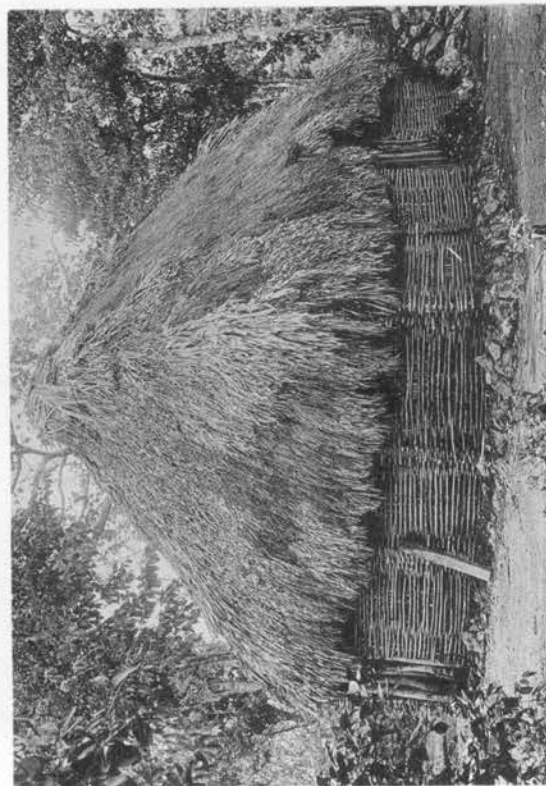
b



a

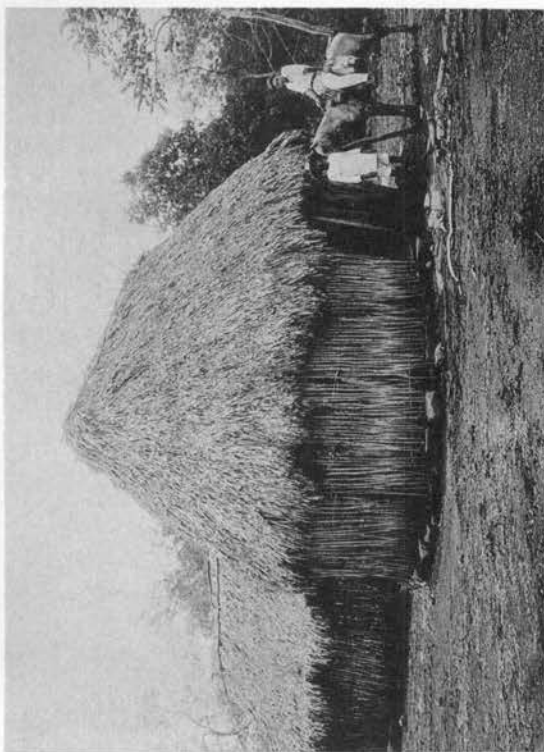


d



c

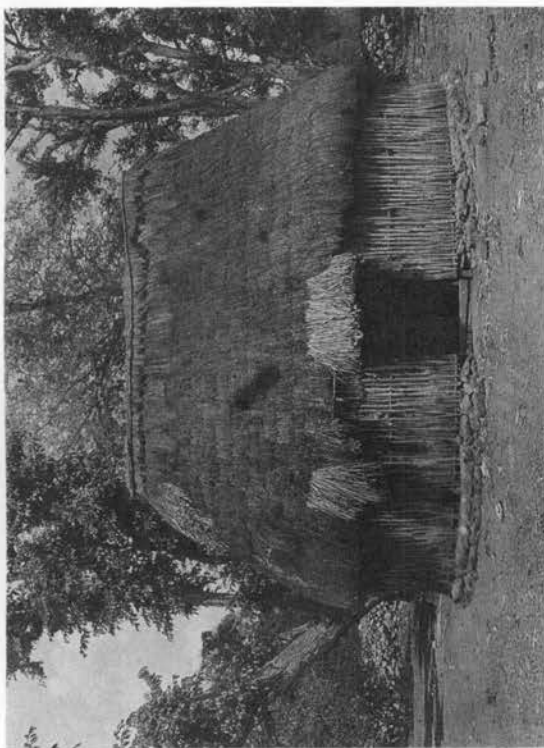
WALLS OF HORIZONTAL WATTLE
a: Pisté, Yucatan.
b: Interior view of the same.
c: Valladolid, Yucatan.
d: Morazan, Guatemala.



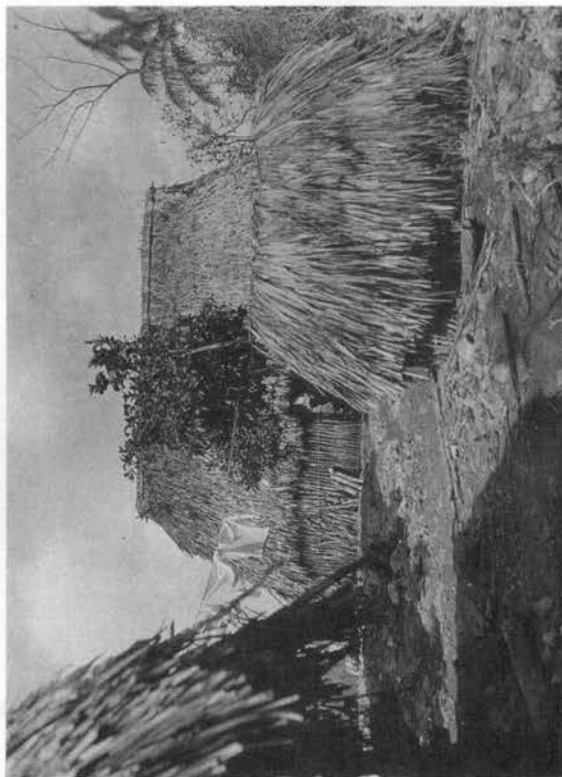
b



d



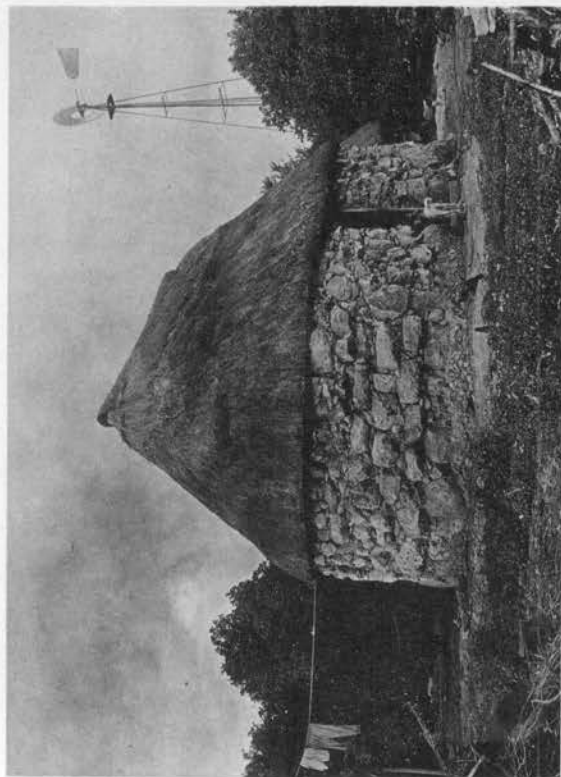
a



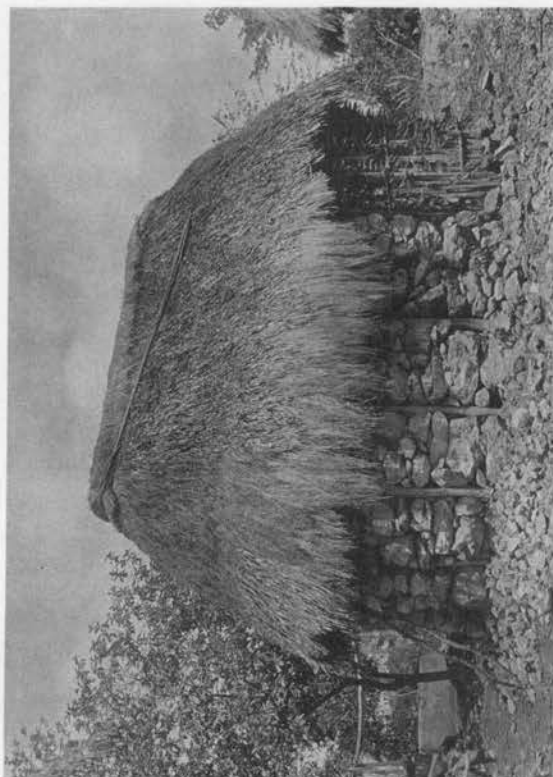
c

WALLS OF VERTICAL WATTLE

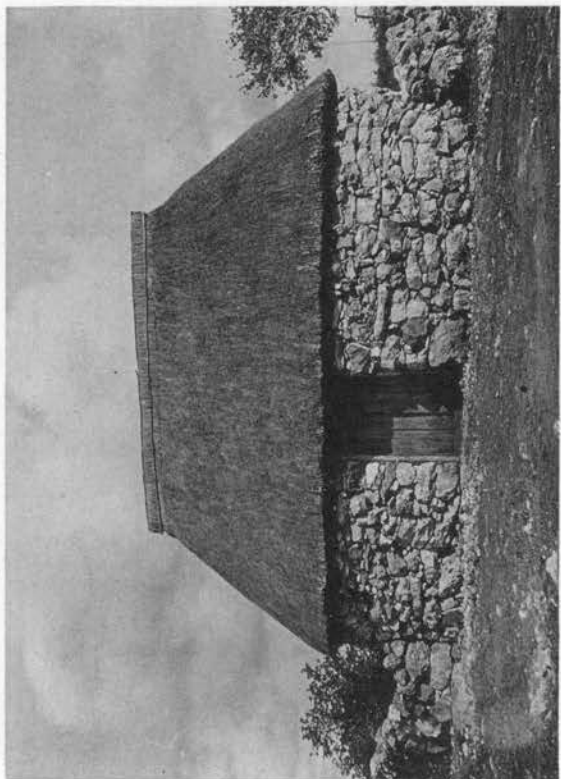
- a: Sotuta, Yucatan. Note foundation stones at base of walls.
- b: Sabacche, Yucatan.
- c: Nictaha, Yucatan; chicken house in center foreground, wash trough shelter in left foreground.
- d: Nictaha, Yucatan; abandoned house. Note twined-vine door.



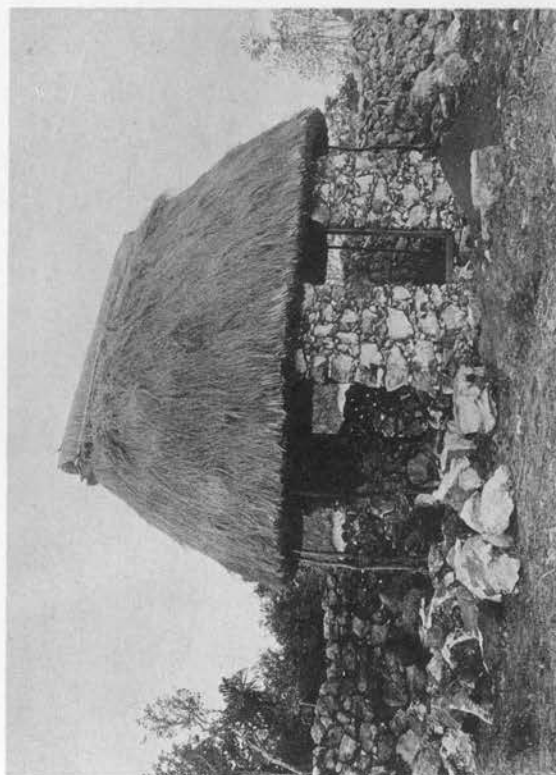
b



d



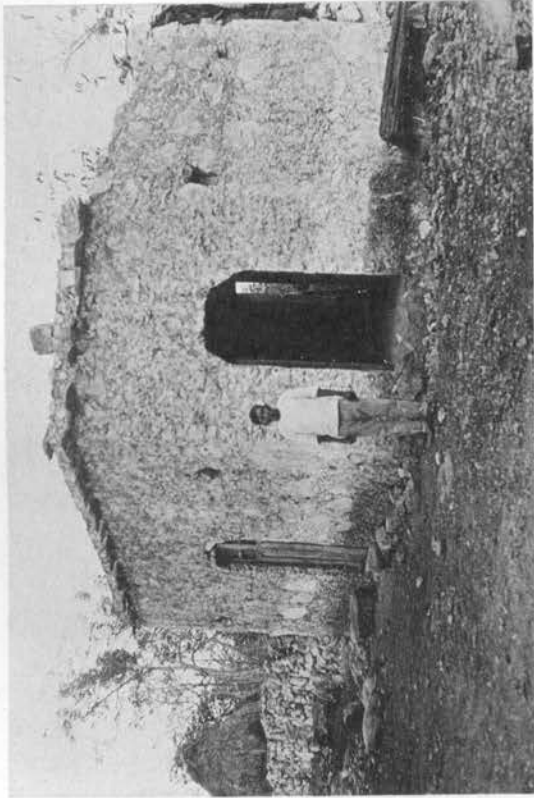
a



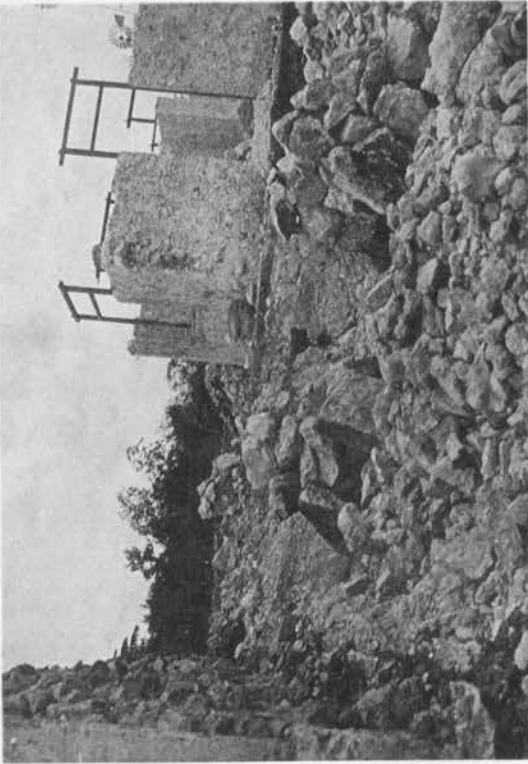
c

WALLS OF DRY RUBBLE

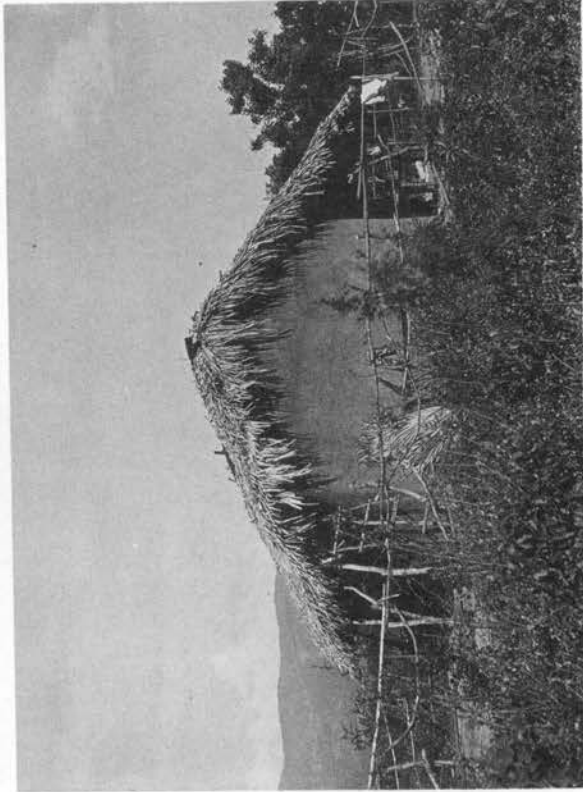
- a: Telchac Pueblo, Yucatan.
- b: Temax, Yucatan.
- c: Motul, Yucatan; walls in process of construction.
- d: Hunucma, Yucatan. Note poles left in wall.



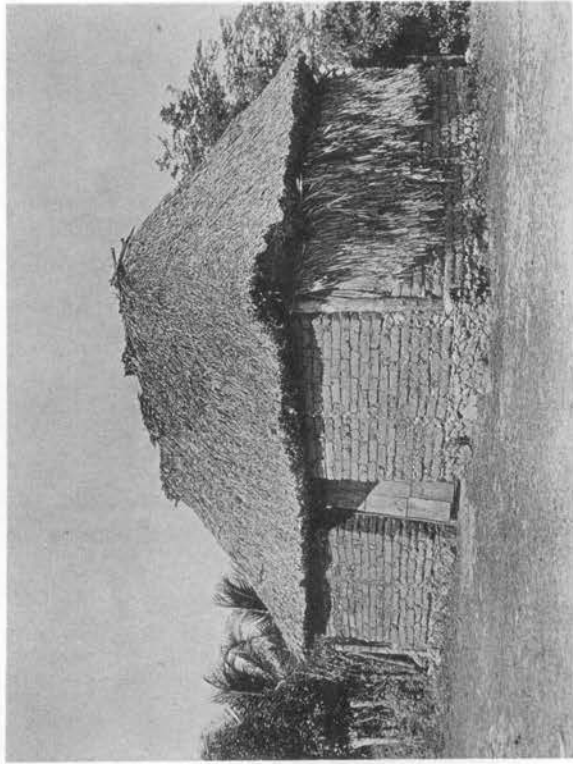
a



b



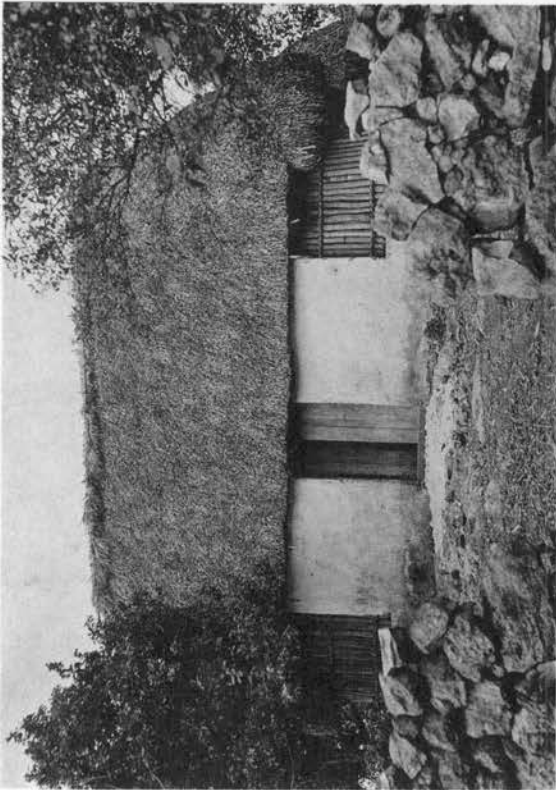
c



d

WALLS

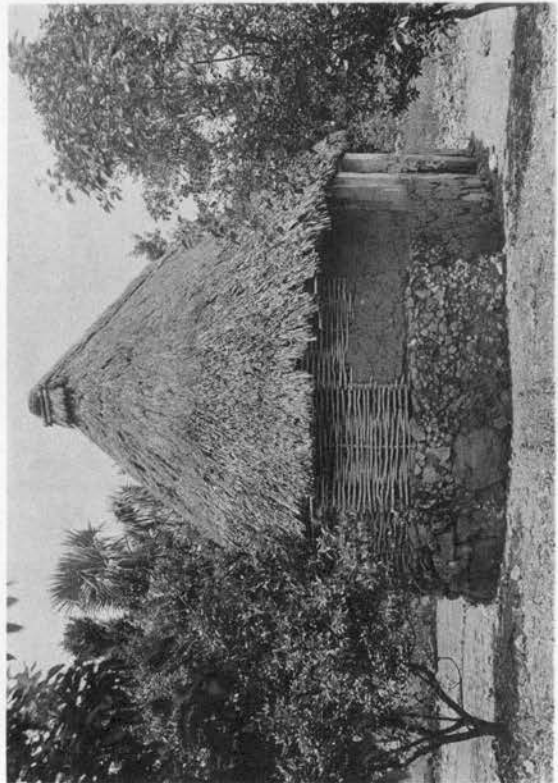
- a*: New Spanish-type house with walls of rubble masonry, Chan Kom, Yucatan.
- b*: Quarrying rock for rubble masonry walls of house in background, Merida, Yucatan.
- c*: Walls of mass adobe over cane framing, Chiquimula, Guatemala.
- d*: Walls of adobe brick masonry, Champoton, Campeche.



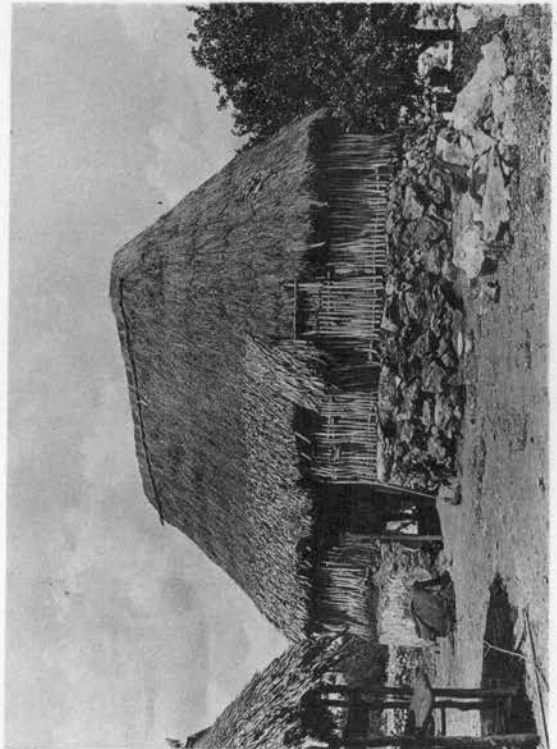
a



b



c



d

WALLS COMBINING STONE AND WOODEN CONSTRUCTION

a: Rubble masonry and vertical poles, Xocenpich, Yucatan. Note masonry door "flanks."

b: Dry rubble masonry and horizontal wattle, Dzilam Gonzalez, Yucatan.

c: Rubble masonry and horizontal wattle, Dzilam Gonzalez, Yucatan.

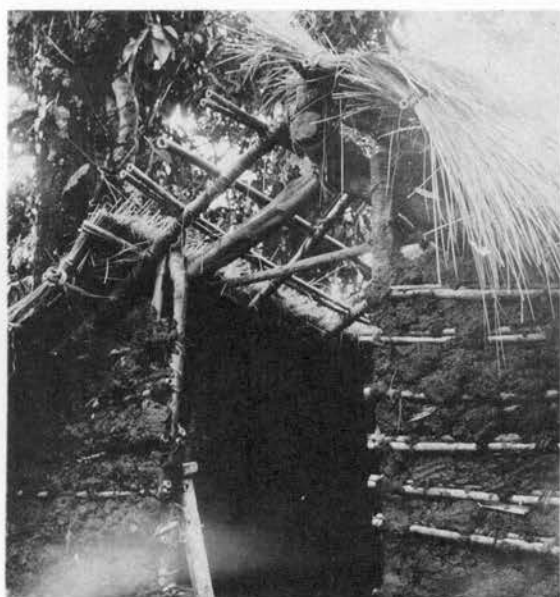
d: Rubble masonry and vertical wattle, Sotuta, Yucatan.



a



b



c



d

WALLS

a: Walls of mass adobe over heavy wooden framing, Palestina, Guatemala.

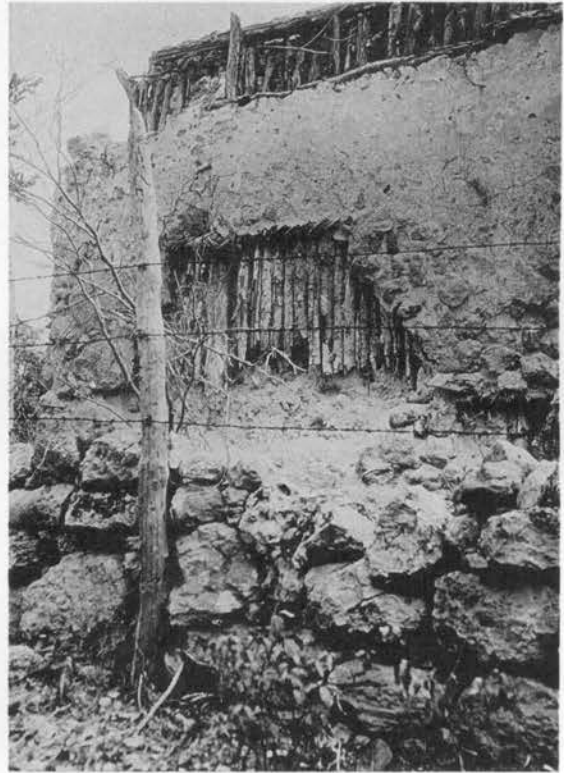
b: Walls of mass adobe and rubble over cane framing, Los Encuentros, Guatemala.

c: Mass adobe freshly applied to cane framing, Panajachel, Guatemala.

d: Whitewashing adobe brick wall by means of shredded cornhusk attached to end of pole, Santa Rita Chamas, Guatemala.



a



b



c



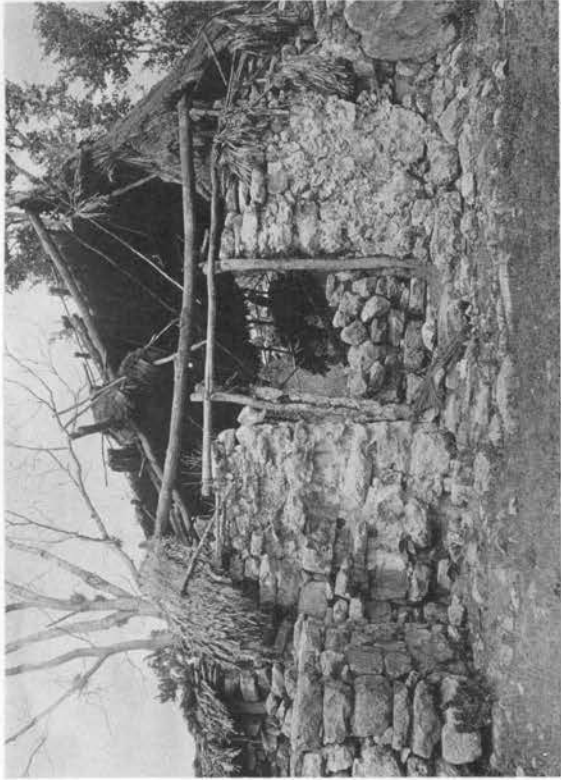
d

ABANDONED HOUSES

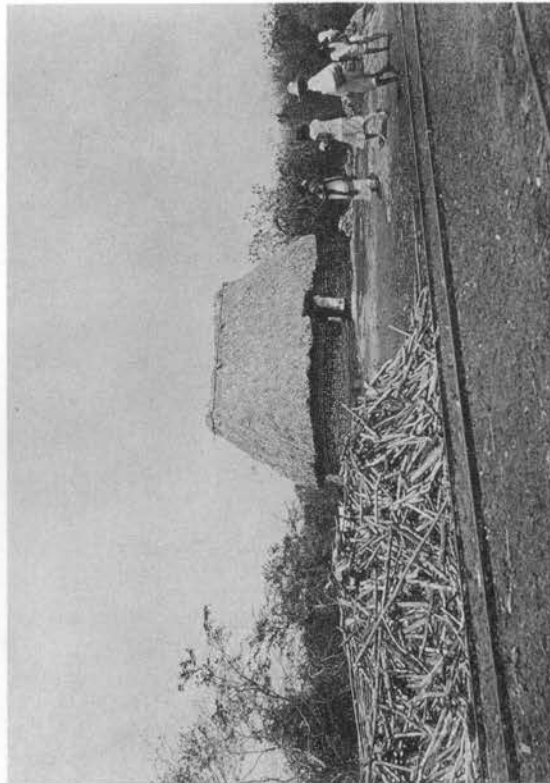
- a*: Xocenpich, Yucatan. Apsidal plan of house indicated by stones at base of former walls; three-stone fireplace still in position.
- b*: Campeche, Campeche. Outer covering of rubble masonry and plaster has fallen away, revealing core of vertical wall poles.
- c*: Tizimin, Yucatan. Imprint of vertical wall poles left in heavy plaster beneath.
- d*: Chichimila, Yucatan. Framing, wall poles, and plaster have collapsed.



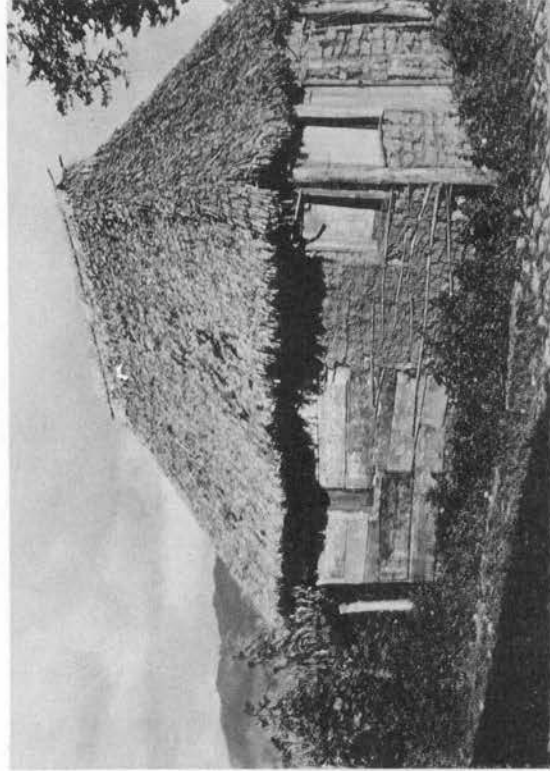
a



b



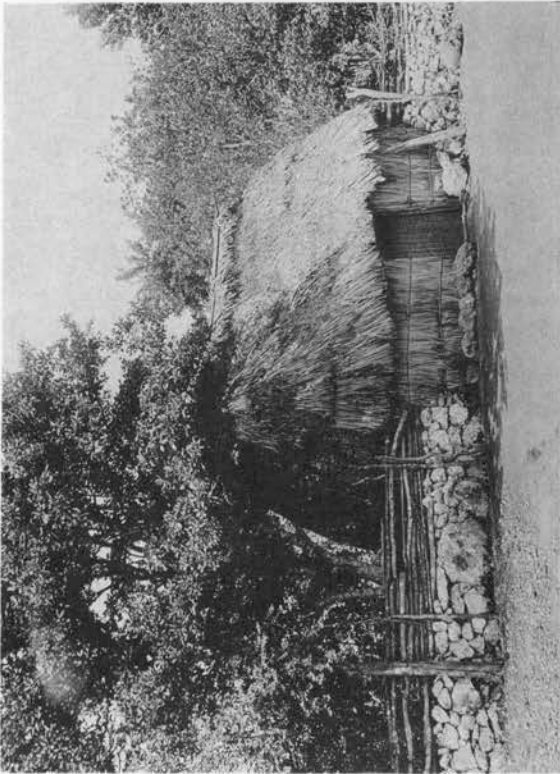
c



d

ABANDONED AND OCCUPIED HOUSES

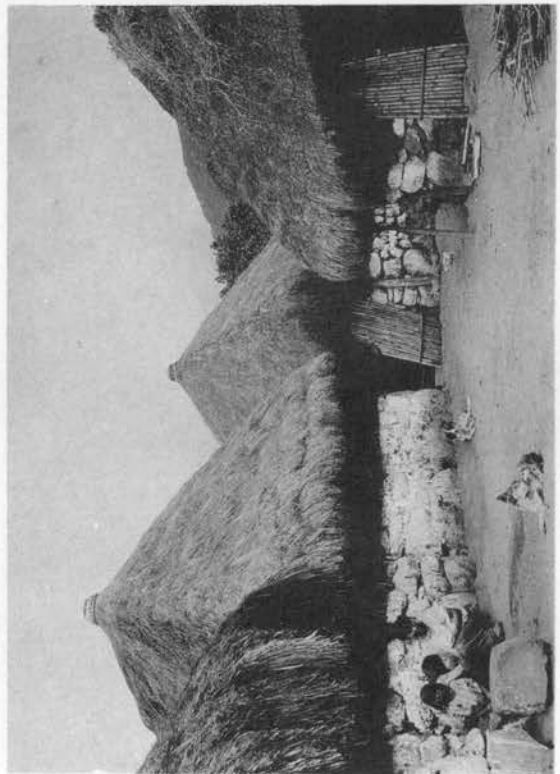
- a: Xocempich, Yucatan; abandoned house site. Three-stone fireplace and ashes at left. Paper on stick marks location of one of post holes of former wall.
 b: Dzilam Gonzalez, Yucatan; abandoned house with walls of rubble masonry.
 c: Tinum, Yucatan; mud-plastered walls studded with stones for decoration.
 d: Santa Cruz (Alta Vera Paz), Guatemala; semi-modern house with windows, and walls half mass-adobe-over-cane, and half plank, construction. Sugar-cane thatch.



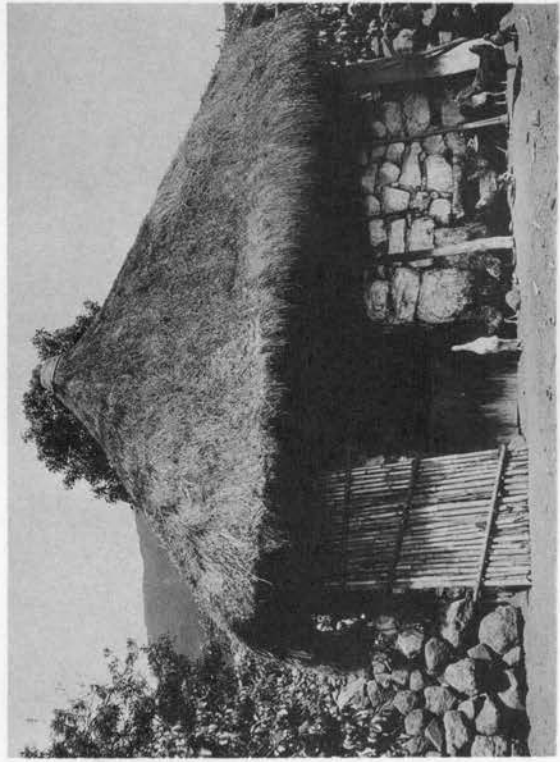
a



b



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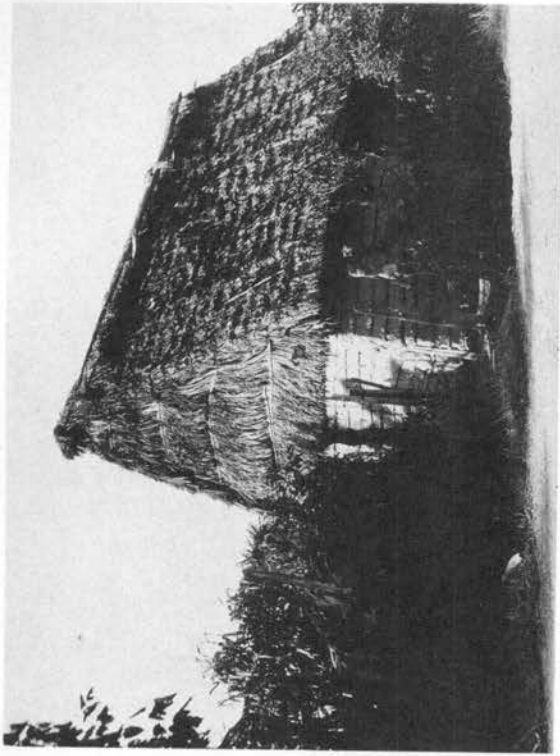
d

ABORIGINAL TYPES OF DOOR

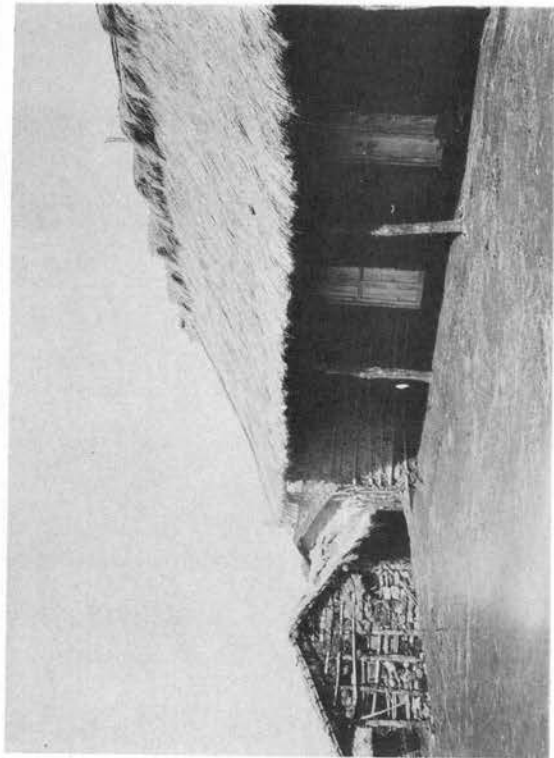
a: Twined-vine door, Tizimin, Yucatan.

b: Vertical poles lashed to stringers, Valladolid, Yucatan.

c, d: Cane Zutuhil doors, Santiago Atitlan, Guatemala.



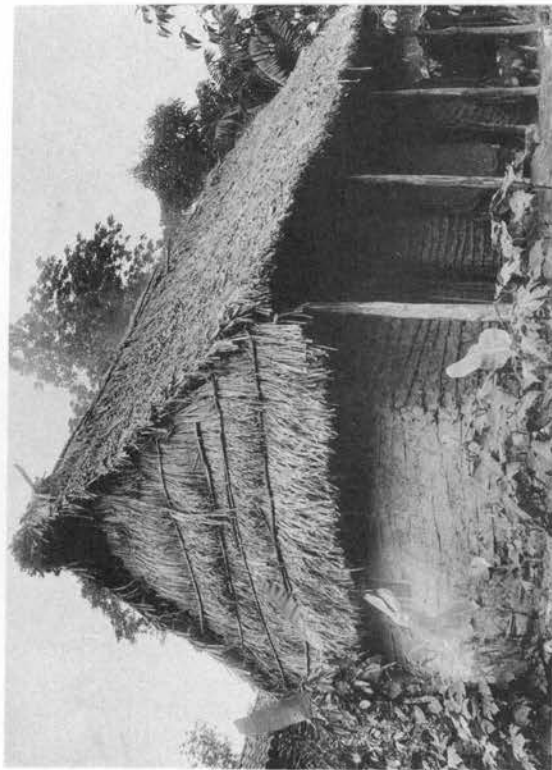
b



d



a

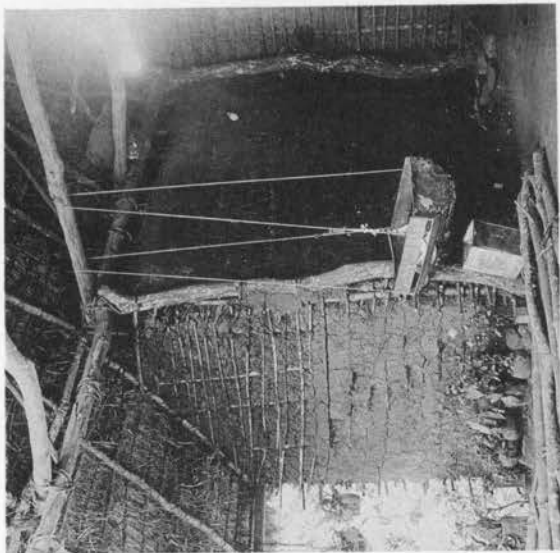


c

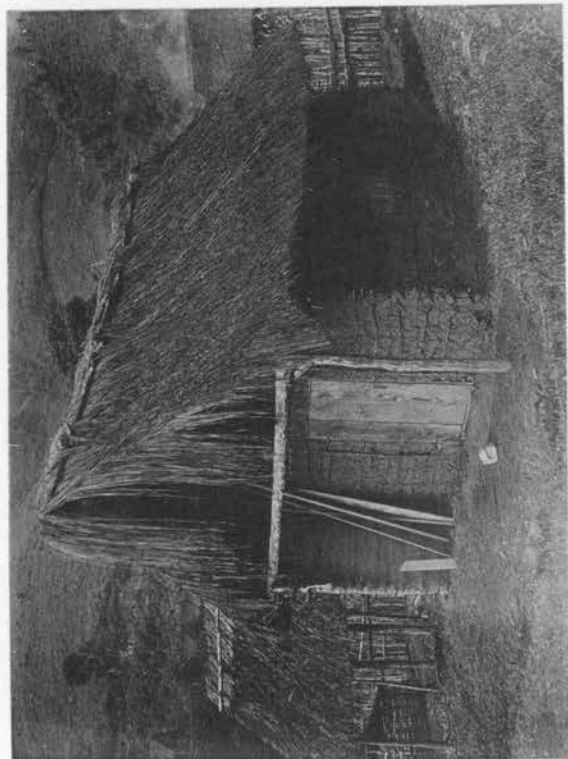
PORCHES

- a: Jocotan, Guatemala (Chorti). Note window.
- b: Coban, Guatemala (Kekchi); "visor" type porch.
- c: San Cristobal, Guatemala (Pokonchi).
- d: Los Encuentros, Guatemala.

In c and d note resemblance of ground plan to late temple plans.



b



a



c



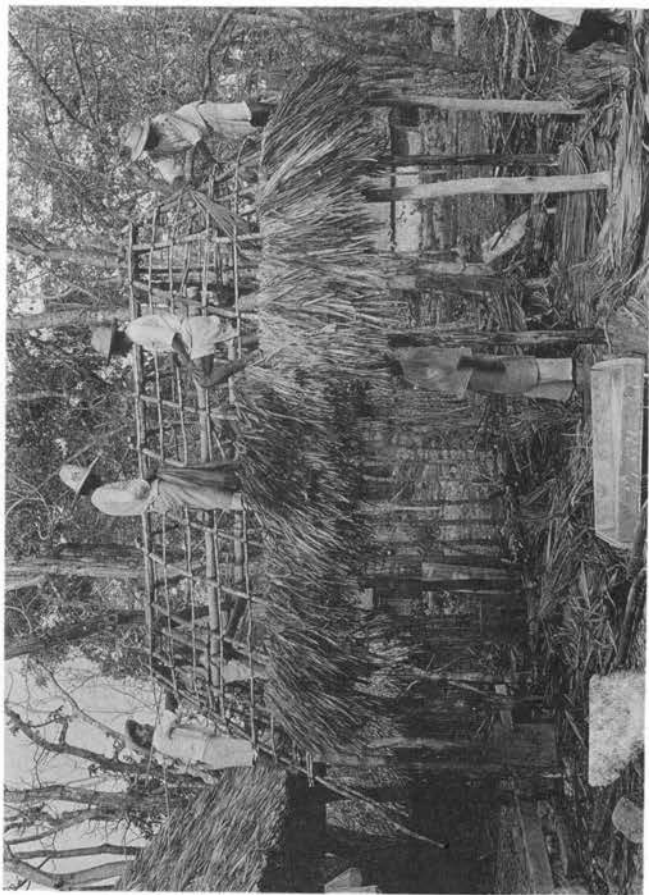
d

PORCHES AND PENTHOUSE SHEDS

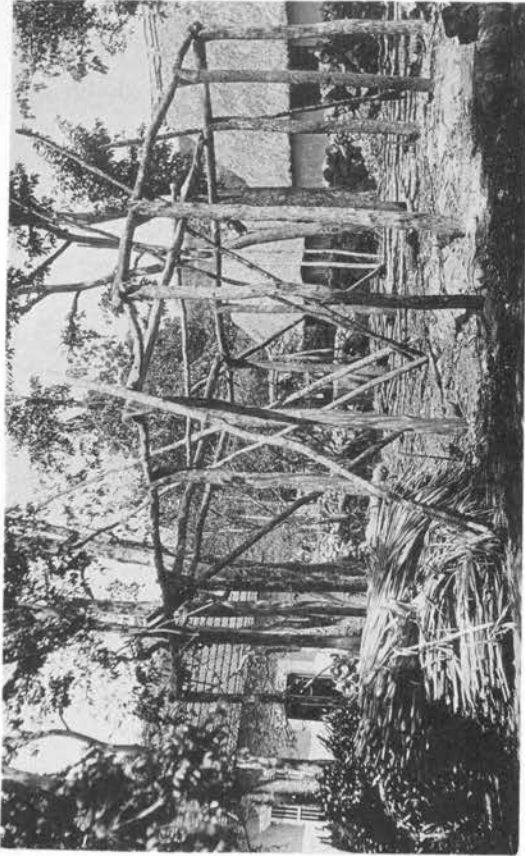
- a: Patul, Guatemala.
- b: Cuilapa, Guatemala. Note cradle.
- c: Coban, Guatemala.
- d: Cuilapa, Guatemala.



a



b



c



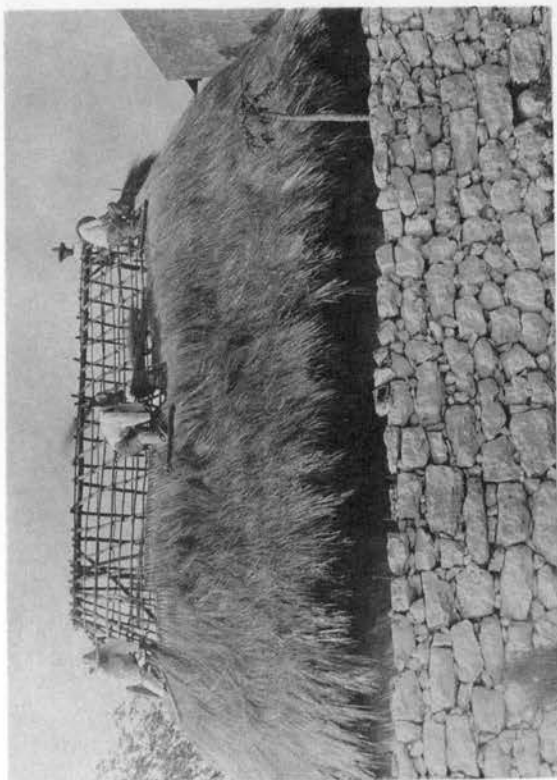
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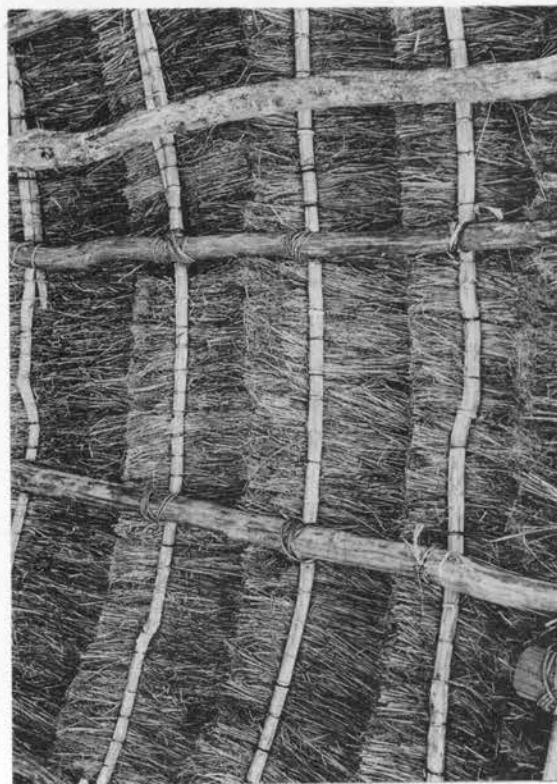
e

PALM THATCH

- a: Trimming palm to correct length, Chichen Itza, Yucatan.
- b: Palm assembled at house site, Lerna, Campeche.
- c: Thatching the roof, Chichen Itza, Yucatan.
- d: Detail of palm thatch, Chichen Itza, Yucatan.
- e: Another method of attaching palm thatch, Chiquimula, Guatemala.



b



d



a



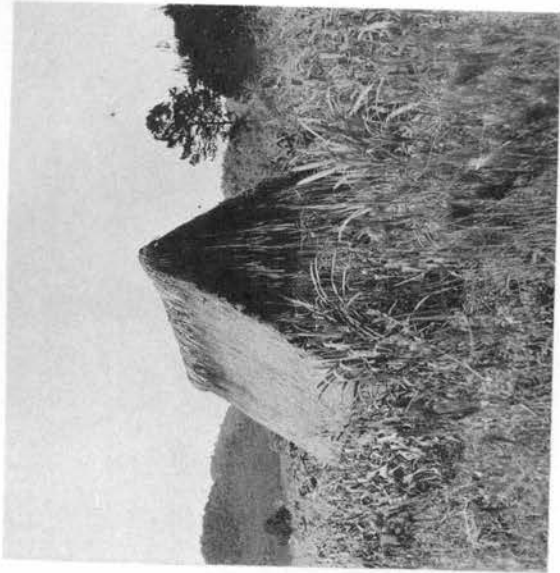
c

GRASS THATCH

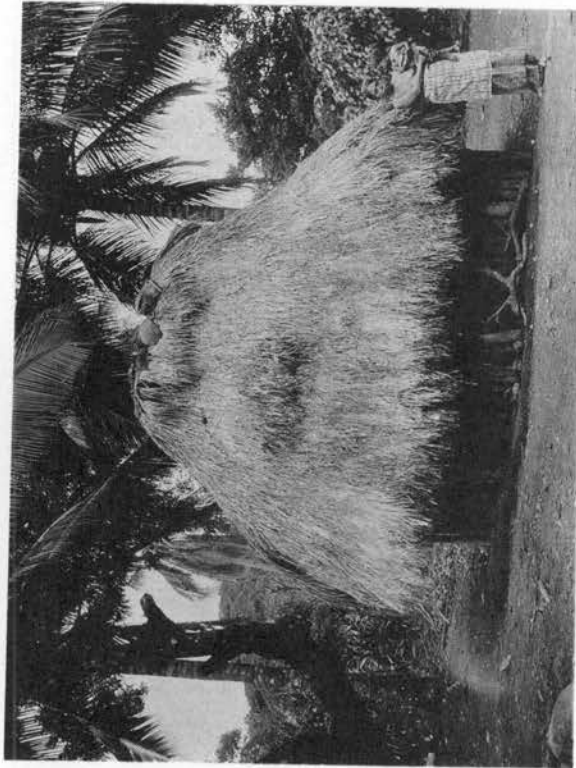
- a: Grass assembled at house site, Temax, Yucatan.
- b: Thatching the roof, Telchac Pueblo, Yucatan. Note "scaffolding" and sheaves of grass stored behind long pole.
- c: Lashing on the first tier of thatch at the eaves, Panajachel, Guatemala. Note sheaves stored behind long pole.
- d: Detail of grass thatch (from interior), Temax, Yucatan.



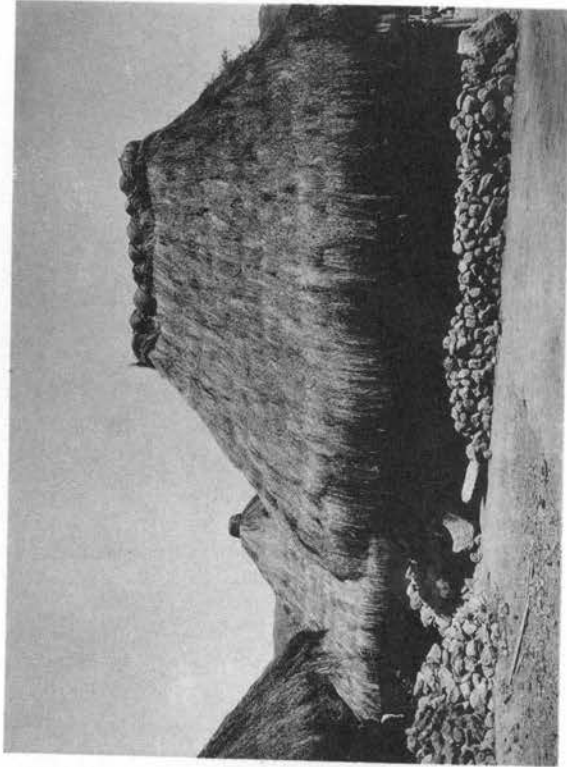
a



b



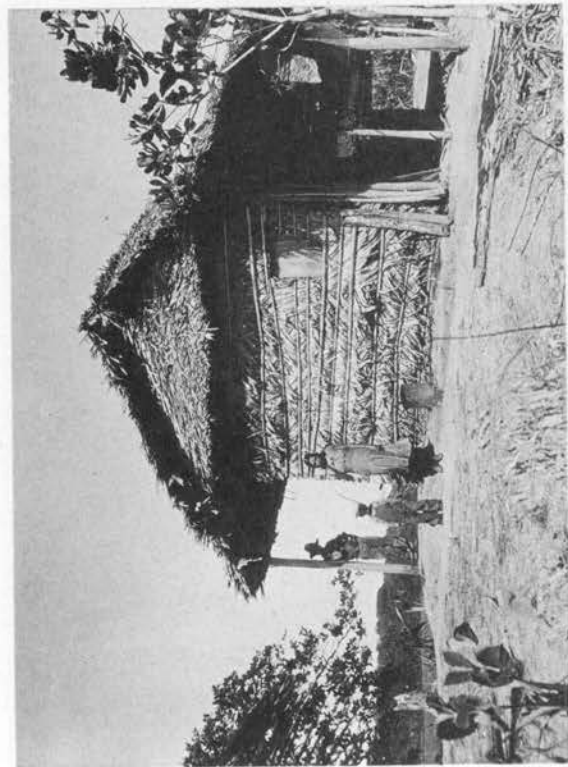
c



d

THATCH

- a: Grass-thatched roof (from interior), San Lucas Toliman, Guatemala.
- b: Kekchi house thatched with sugar cane, Coban, Guatemala.
- c: Cakchiquel house thatched with palm, San Sebastian, Guatemala. Note potsherds along ridge of rectangular house and single vessel inverted over peak of pyramidal-roofed square house.
- d: Grass-thatched houses, San Pedro de Laguna, Guatemala. Note potsherds along ridge of rectangular house and single vessel inverted over peak of pyramidal-roofed square house.



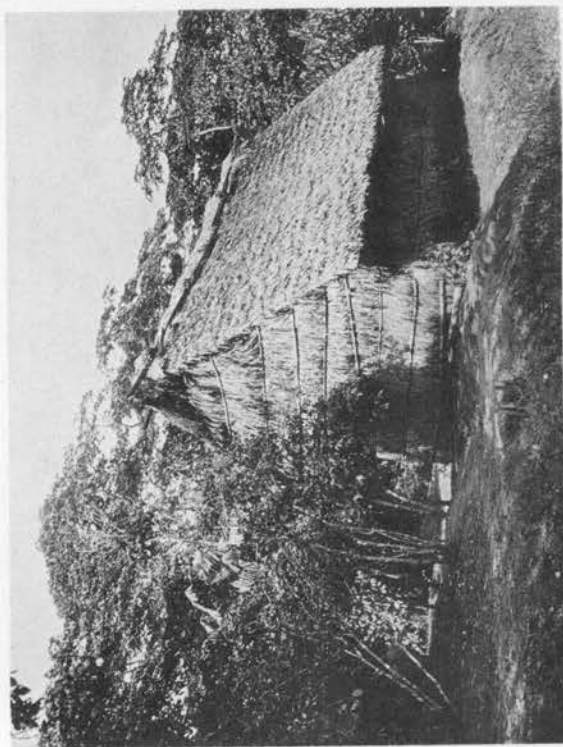
a



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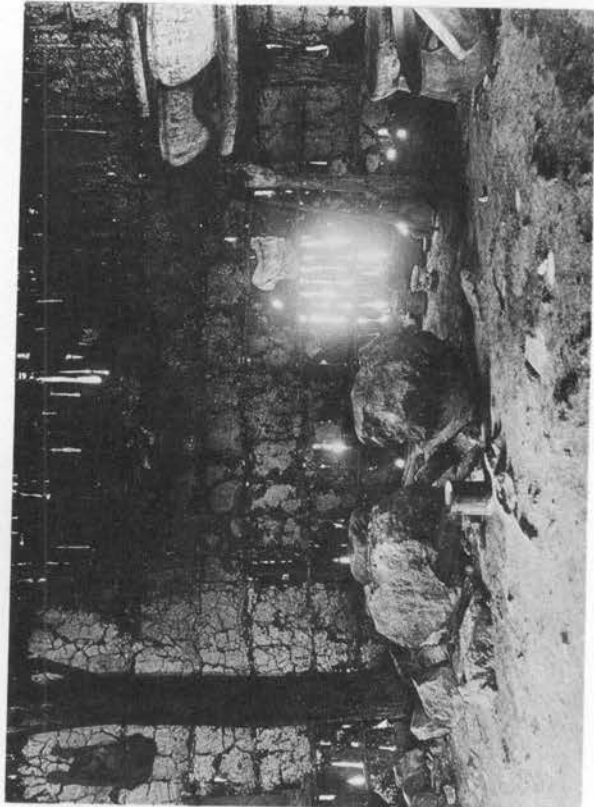
THATCHED WALLS

a: *Corozo* palm, non-Indian house, Puerto Barrios, Guatemala.
b: Palm, Jocotan, Guatemala.

c: Granary thatched with grass. Between Sija and Huehuetenango, Guatemala.
d: Sugar-cane thatching on Pokonchi house, on outskirts of San Cristobal, Guatemala.



a



b

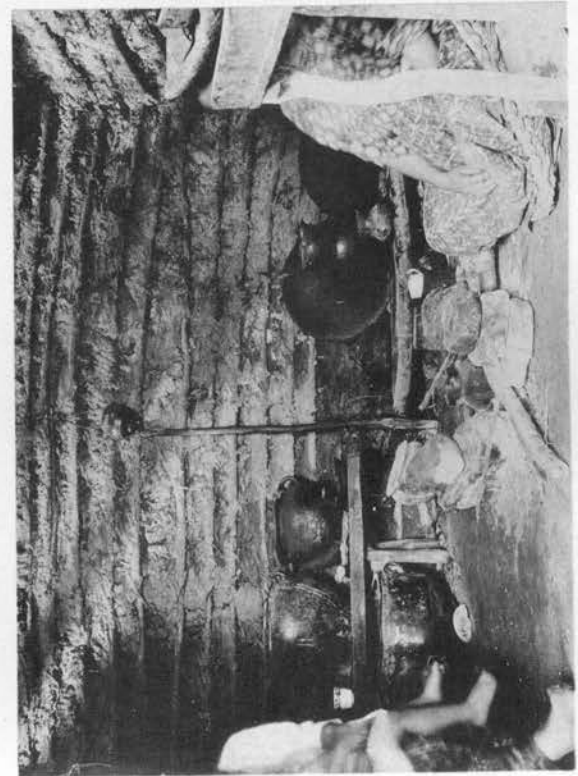


c

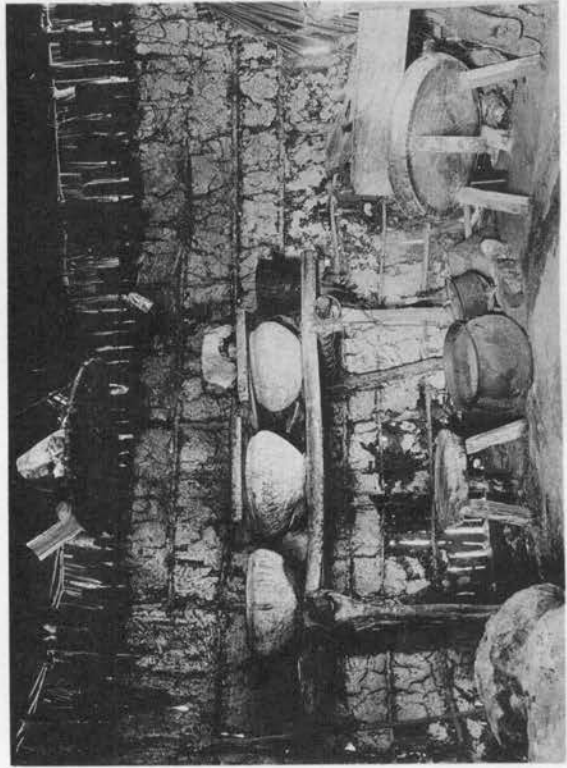
HOUSE INTERIORS, THE "KITCHEN END"
a: Tizimin, Yucatan. Note metal corn mill mounted on old trough for corn-grinding stones.
b: Chan Kom, Yucatan.
c: Valladolid, Yucatan.



a

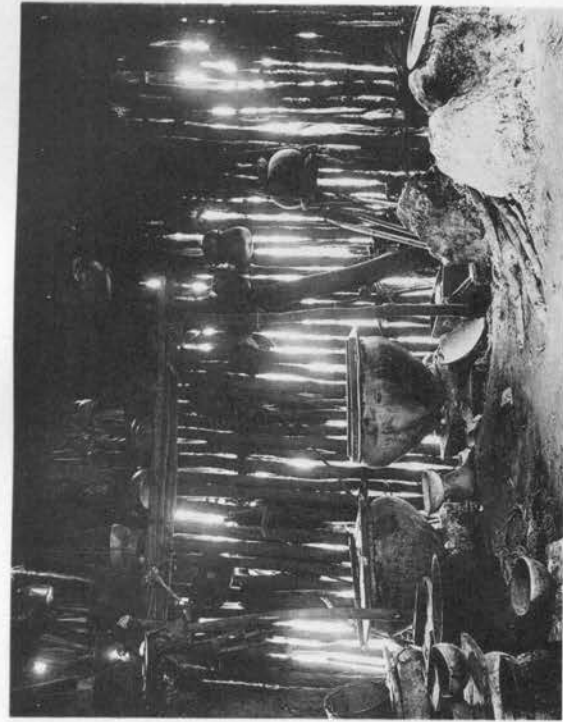


b



c

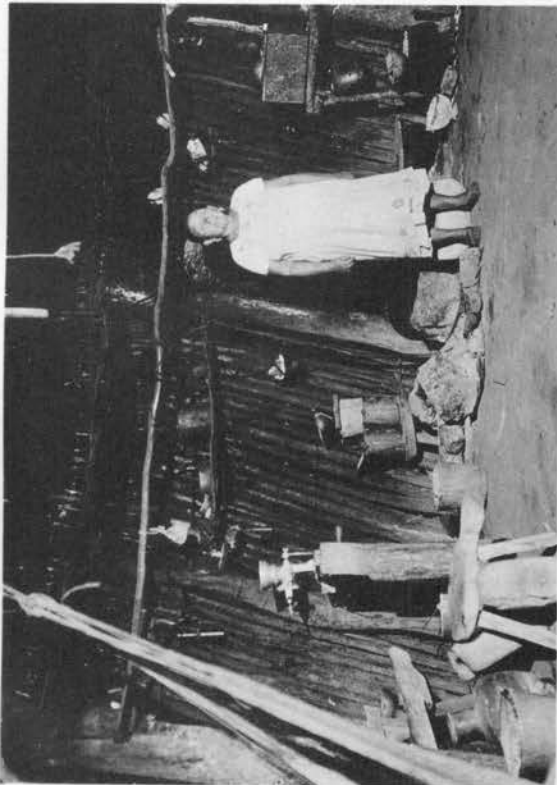
HOUSE INTERIORS
a: San Lucas Toliman, Guatemala. b: San Cristobal, Guatemala. c: Chan Kom, Yucatan.



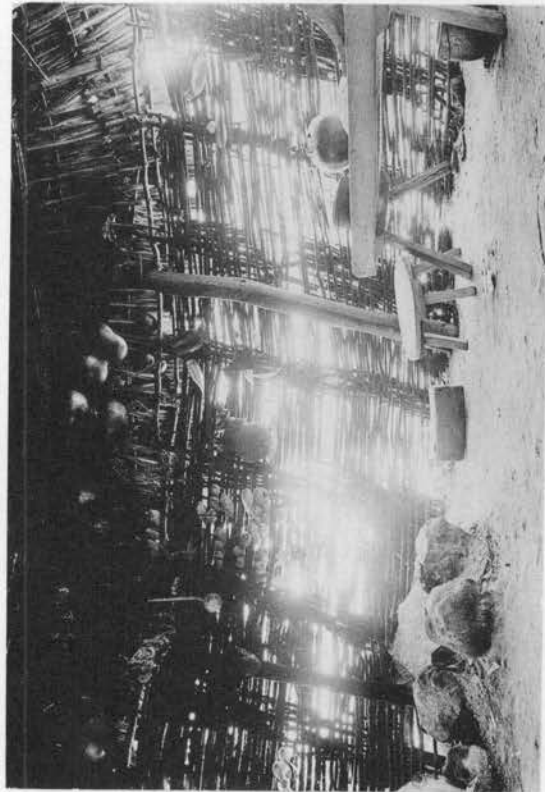
b



d



a



c

HOUSE INTERIORS AND EXTERIOR

a: Valladolid, Yucatan.

b: Chan Kom, Yucatan.

c: Tikuch, Yucatan.

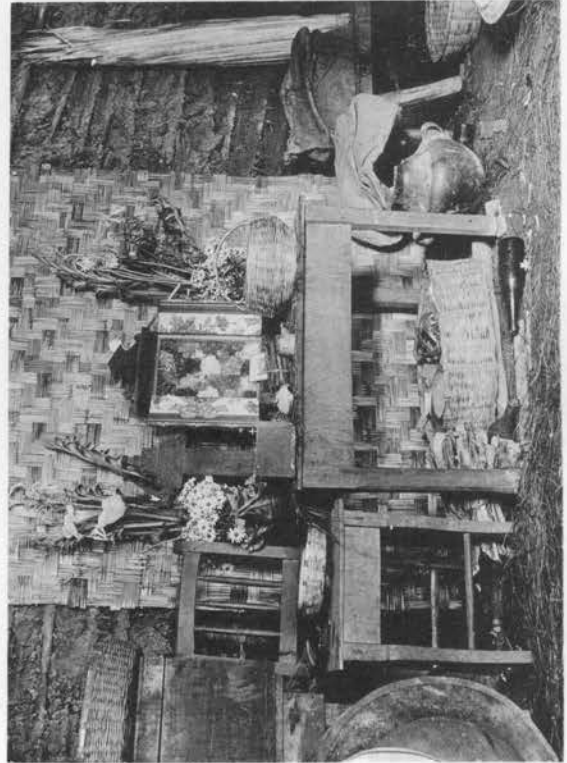
d: Apsidal house, San Jose, British Honduras (photographed by J. E. Thompson).



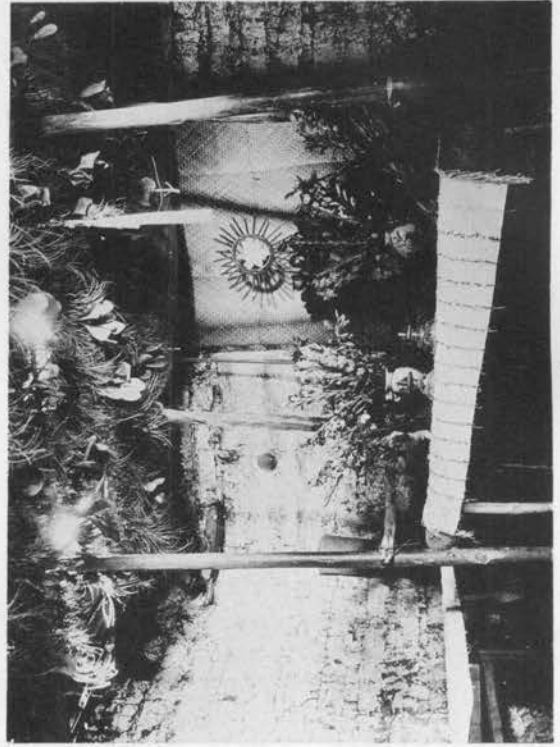
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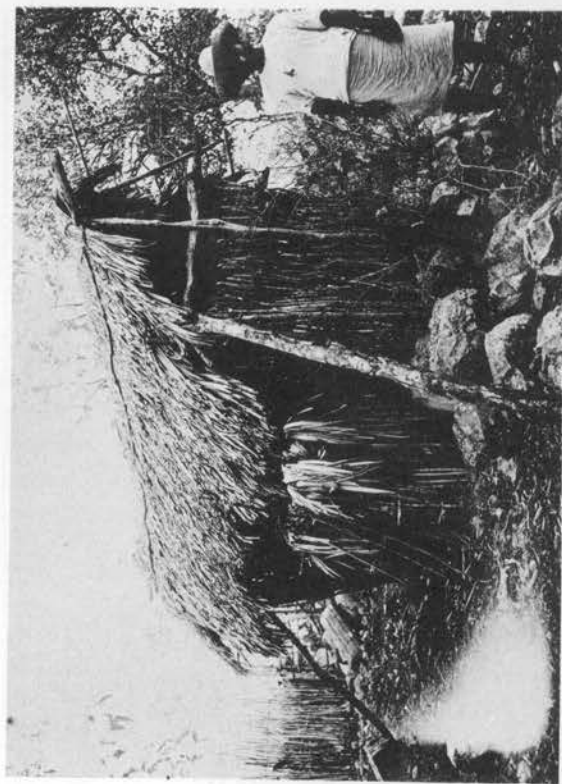
d

HOUSE INTERIORS

a: Chan Kom, Yucatan.
b: Detail of woven partitioning screen, San Cristobal, Guatemala.
c: Altar, floor strewn with pine needles, San Cristobal, Guatemala.
d: Festival house decorations and altar, Chichicastenango, Guatemala.



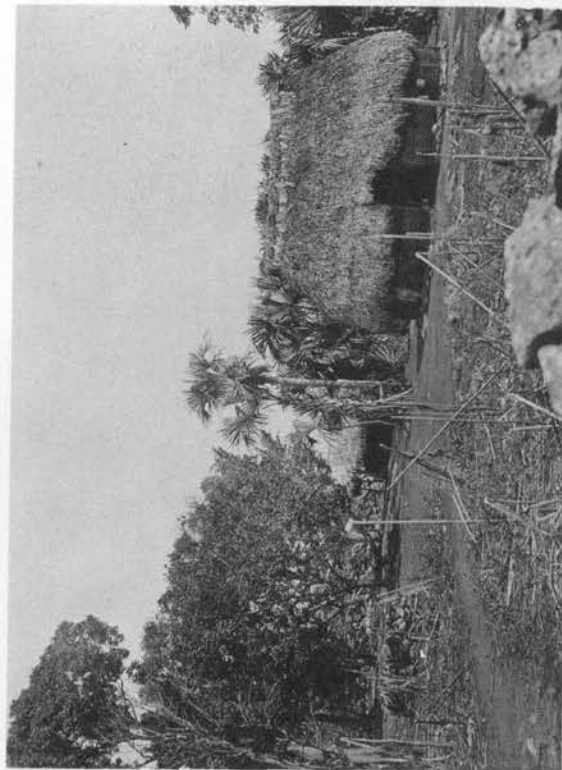
b



d



a



c

PROPERTY

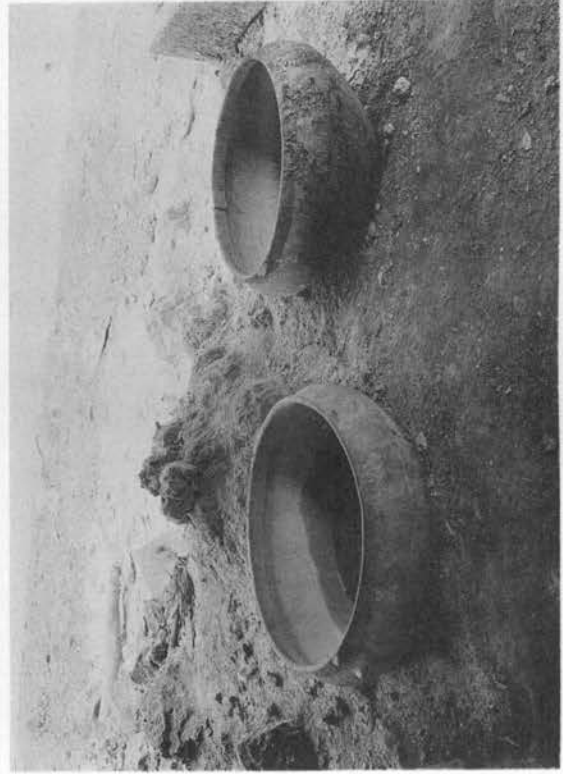
- a: Stone chicken house at left, wooden chicken house in center, beehive shelter at right, Chan Kom, Yucatan.
- b: Beehives, Xocempich, Yucatan.
- c: Stone chicken house at left, beehive shelter in center background, dwelling at right, Chichimila, Yucatan.
- d: Chicken house, Chan Kom, Yucatan; note small coop for chicks.



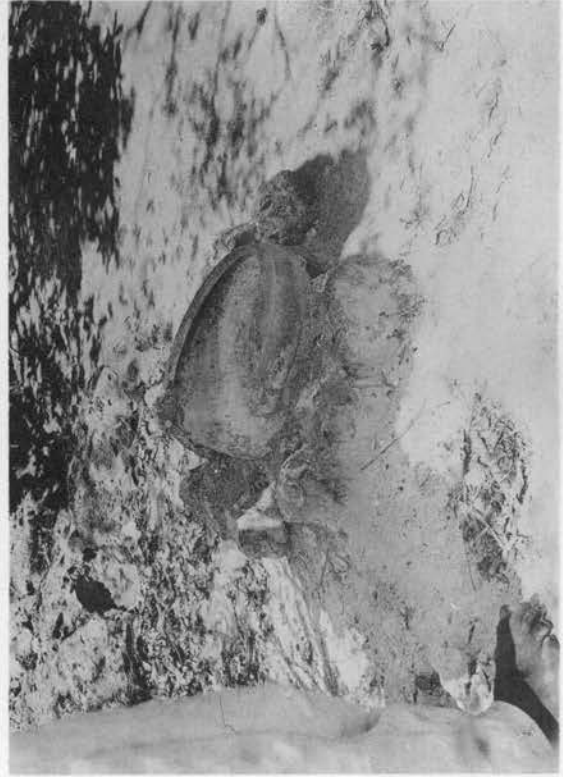
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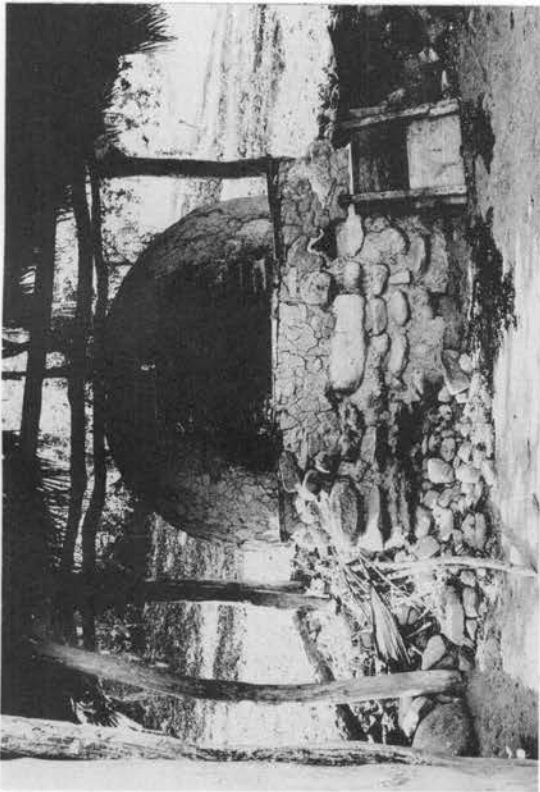
c



d

PROPERTY

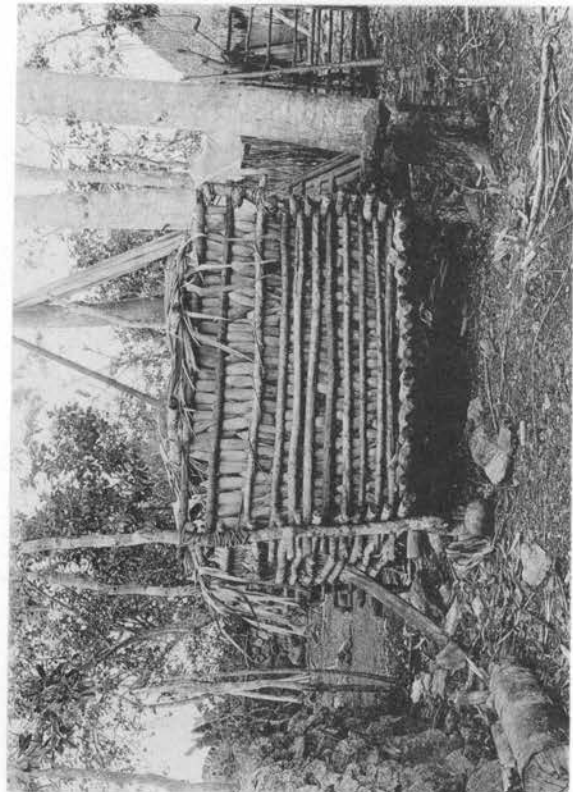
- a*: Chicken house under construction, Nictcha, Yucatan. Note assembled materials on ground.
- b*: Storehouse and pile of loose material, Chan Kom, Yucatan.
- c*: Wash bowls embedded in ash heaps, Valladolid, Yucatan.
- d*: Same at an abandoned house, Valladolid, Yucatan.



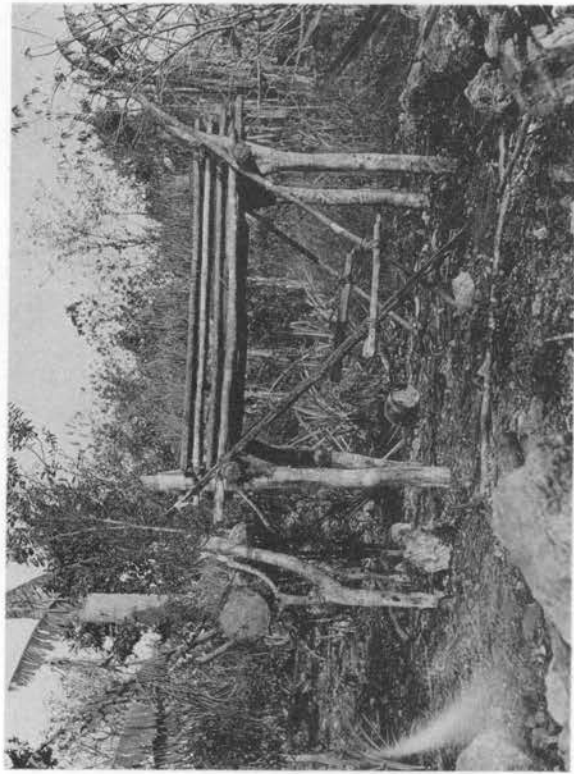
a



b



c



d

PROPERTY

- a: Oven and its shelter, Temax, Yucatan.
- b: Sweat bath, Santiago Atitlan, Guatemala. Note firewood in foreground.
- c: Corn crib, Xocenpich, Yucatan.
- d: Elevated onion beds, with hollow-log type at left and platform type at right, Xocenpich, Yucatan.

