

CULTURAL ECOLOGY OF THE MAYA LOWLANDS

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PART II

PRE-HISPANIC SETTLEMENT PATTERNS

Introduction

We have previously asserted that slash-and-burn agriculture tends to produce a dispersed rural population pattern. In terms of simple convenience, of course, it is always advantageous for any rural population, regardless of the system of agriculture, to reside on the holdings, in other words, a rancheria settlement pattern. We have noted that the modern population in Tabasco follow this pattern of settlement. With slash-and-burn agriculture, this single factor operates even more strongly in favor of such a pattern, since the size of the holdings required for a balanced subsistence system is considerably greater than in most agricultural societies, and even small nucleated communities would require considerable tracts of land for their subsistence. Other factors, however, nearly always operate besides this primary one. A desire for socialization might even be considered as another primary factor affecting settlement patterns, on par with that of convenience.

Looking at the settlement patterns of other areas of the world where this system is practiced, we find generally that complete dispersion of population, as in the case of modern rancherias in Tabasco, is rare. The most common pattern is the small nucleated hamlet with a population of less than one hundred people and usually exceeding twenty. One might consider this kind of settlement as a compromise pattern in response to the above

stated principles. Usually it has a kin-like structure, being composed of an extended family, a lineage or a small deme.

Secondary factors which might act to produce large nucleated villages even with slash-and-burn agriculture would be (1) state policy, as in the case of Yucatan in the 16th Century, where the Spanish priesthood and government clustered the population of hamlets into villages and towns to facilitate conversion and tax collection. Conceivably the pre-Hispanic ruling class might have attempted the same thing to assume a tighter control over labor resources. (2) Warfare. Two responses might be expected as a result of an intense war pattern. a) Complete seclusion and even construction of stockades around the small hamlet as in the case of many of the groups in New Guinea (Mead), 1950 nucleation into large walled communities as with the Tupinamba of Brazil. (3) Limited, highly localized water resources. Some tribes in Bechuanaland in Africa reside in large communities because of the scarcity of water resources (Shapera 1937). In northern Yucatan this may have operated as a factor since there is no surface drainage and one might expect population to have clustered near the cenotes or natural wells. (4) Patterns of social organization that would involve larger groupings such as clans or demes. (5) Part-time specialization based on specific localized resources and (6) Permanent commercial orchard cultivation (in Mesoamerica cacao) linked to a broader regional economy.

In assessing the settlement pattern of any given segment of the Maya area, all of these operative forces must be considered.

With this brief statement of principles, we will now pass to the data bearing on pre-Hispanic settlement patterns for the Lowland Maya.

Documentary Data

For the Lowland Maya area, Roys has summarized the documentary data on settlement patterns and population for the 16th century in two publications (1943, 1957). On the basis of his study the following patterns emerge: 1) Population was unevenly distributed even in the areas of heavy population with tracts of uncultivated forest interspersed between areas of heavy agricultural utilization. 2) The total population was not particularly heavy and was probably about as dense as most

of the state of Yucatan today (approximately 400,000 rural population in the 1950 census in an area of 40,000 km²). 3) The basic agricultural system was slash-and-burn agriculture with communal land ownership and with small permanent fruit orchards owned privately by the elite class. 4) There were two basic types of communities, the small rural hamlet of half-dozen or so extended families occupied by the farming class, and a ceremonial center with a small elite residential population of priests and rulers. 5) Larger zonal patterns involved a hierarchy of territorial groupings in the following order: a) small hamlets as above, b) a basic territorial group involving one small elite residential center-ceremonial complex plus a larger number of rural hamlets widely dispersed over the dependent territory. Near the center were the permanent orchards and the population gradually tended to thin out towards the edge of the territorial region. c) Larger political states including a number of the smaller territorial groupings and with a larger ceremonial elite residential cluster as the center of the entire unit. Frequently there were tracts of unused forest between the constituent divisions and in some cases settlement was continuous. d) In a few cases even larger territorial groupings occurred and were called by the Spaniards "provincias", and ruled by an official called the Halach Uinic. (See below in the following section).

This reconstruction of the settlement pattern by Roys is strikingly supported by archaeological data. A number of detailed analysis of Classic settlement patterns have been published. Willey on the Belize Valley (MS), The Ricketsons at Uaxactun, 1937, Hester, 1951-52 and Brainerd, 1956, for Northern Yucatan, Bullard in the Peten, 1960, myself at Tancah on the east coast and the Chontalpa area in Tabasco.

Archaeological Data-Classic Period Northeastern Peten

Bullard's analysis of classic zonal and community patterns for the Peten agrees very closely with Roys analysis of documentary data for northern Yucatan for the Conquest period. The Maya apparently built pole and thatched dwellings on top of elevated stone platforms. These occur archaeologically, sin-

gly, or in clusters of two to four arranged around a patio. Single platforms are probably nuclear family residences and clusters exceeding one presumably represent extended family groups. Each group or isolated platform of this type was considered by Bullard to be a single "house", i.e., a family residence. The "houses" occurred in clusters of from five to twelve within an area of 4 to 9 hectares, the archaeological counterpart of the hamlet.

For every 50 to 100 houses there was a small ceremonial complex, the whole making up what Bullard calls a "zone", the pre-Hispanic counterpart of the smallest territorial unit noted by Roys. As in the case of the Conquest period, sometimes they occur isolated from other similar units and in other cases coalesce with them. The final territorial unit includes a major ceremonial center with several constituent zones with an average size of 100 km.² for the total territorial group. These clearly are the larger noted territorial groupings, ruled by the Batab, and noted for the Conquest period in Roys' analysis.

There is, apparently, an extraordinary continuity in Maya settlement patterns over some 2,000 years. On the basis of my study of modern Valladolid hamlets, I would assume that the hamlets were very unstable communities and repeatedly abandoned and reoccupied. Of considerable interest is the fact that the major ceremonial centers were not necessarily situated within areas of heavy settlement and their location with respect to such areas was purely fortuitous. If there happened to be a minor center or two near them, then the house mound concentration would be relatively dense. Even minor centers were linked to heavy populations only in a zonal sense and the impression I have from Bullard's data is that most of the house platforms, regardless of their nearness to ceremonial precincts, were residences of the rural farming population.

This general picture of Classic Maya settlement patterns in the Peten is supported by Ricketsons' survey of Uaxactun, a major site. Ricketsons' survey disclosed only 78 house platforms (in this case he is counting individual mounds, not family groups) in an area of 227 hectares or an absolute maximal density (assuming contemporaneity of occupation of all 78) of only about 140 people per km.² Modern urban communities in Central Mexico today have minimal densities of 2,000 per km² and often run from 8,000 to 10,000. These

house mounds clearly represent a rural population and were probably not all occupied simultaneously.

The greatest of all Classic Maya centers in size, grandeur and number of its religious and civic buildings is undoubtedly Tikal, also situated in the northeastern Peten. Because of its size, some writers have even considered it the capital of the entire Lowland Maya area. It was more probably the center of a large "provincia", like the Post-classic Province of Mani. If any Maya center had an urban settlement pattern and socio-economic system during the Classic period, it should be Tikal. The University of Pennsylvania, over the past five years, has carried out extensive excavation and clearing of vegetation from the ceremonial center. The architectonic center is made up of pyramids and multi-room "palaces" occupying some one hundred hectares (250 acres) of terrain, although the remains were actually scattered over some 250 hectares. They occur in clusters arranged around courts on hilltops or ridges and are connected by causeways or *saches*. The University project also involves an extensive survey of the area around Tikal to determine the distribution of houses. An area of sixteen square kilometers was divided up into 500 meter squares and all house platforms were mapped. The survey has revealed the following facts to date:

1. Approximately twenty-five to thirty percent of the area is occupied by swampy *bajos*, separated by high ridges and hills. Housemounds tend to occur on high ground in hamlet-like clusters, similar to Bullard's rural settlements.

2. House platforms occur usually in clusters of two to four around a patio. Numerous cases, however, of isolated platforms occur.

3. There is considerable variation of house mound density over the grid, varying from four to 131 house mounds per square (each square being 25 hectares), or from 2 to 35 "houses" using Bullard's definition of a house. The population density would range from 16-524 per square kilometer calculating four persons per house if we assume contemporaneity of residence.

4. There is a large area in the center, adjacent to the ceremonial center, of some eight square kilometers (half of the total area) where the density is approximately double that of the peripheral eight kilometers. In some parts of the center,

especially to the south, there are clusters of much larger house mounds, that must be elite residences. The vast majority of them, however, are similar in size to Bullard's rural houses.

5. The total number of housemounds over the sixteen square kilometers of survey area is approximately 2,200, with an average density of 138 housemounds per square kilometer. If we make the assumption made before that each platform is the residence of a single family, and that each cluster of one to four is an extended family, and estimate the average nuclear family at four persons, the following demographic evaluation might be made of Tikal, if all the housemounds were occupied simultaneously. a) the total population of the surveyed area 8,800, b) the density of the total area 525-550 per square kilometer, c) density of the eight kilometers in the center 750, and d) density of the peripheral eight square kilometers 350. Even assuming contemporaneity, the population density of Tikal is clearly not urban, nor is it markedly higher than in the rural areas surveyed by Bullard.

Belize Valley

The surveys and excavations conducted by Gordon Willey, with the assistance of Glass, Bullard, Orcott, and Ladd, have revealed considerable data on Maya settlement patterns. They surveyed a section of the Belize River valley in British Honduras, approximately 50 miles east of the site of Tikal, or near the heart of the Old Empire Maya civilization. The local environment involves a major river, with a nearly continuous band of flat alluvial plain on both sides, several kilometers wide, bordered in turn by limestone hills with scanty soil cover. The alluvial plain appears as two river terraces, the lower one of which floods during part of the year. The plain is covered by dense tropical forest as are the slopes bordering it. In order to get an impression of the over-all zonal settlement pattern, the field group surveyed areas cleared for modern agriculture, and checked trails between such areas for further evidence of settlement. At these clearings in the alluvial plain, more careful survey, plus extensive excavations, were carried out. The data is summarized below:

1. The Barton Ramie "site", in a clearing exceeding slightly one square mile, 262 housemounds were found. Each consists of a flat-top rectangular platform 15-30 meters long and between one and two meters high. Upon excavation, they found superimposed floors dating, in a few cases, from the Pre-classic through the various phases of the Classic period. Late Classic occupations was much more common than Early Classic, and Classic in general was much more common than Preclassic occupation. The Post-classic occupation seems to be nearly absent. The total population profile closely parallels events all over the central Maya area. Also found in the clearing at Barton Ramie were one pyramid twelve meters high, thirteen structures that Willey calls "plazuela mounds", each consisting of a large platform surmounted by three to four mounds arranged around a patio. Excavation indicates a strong probability that the plazuelas were residences of important people (i.e., the size of the structure, and the elaborateness of the burials). The density of housemounds at Barton Ramie would involve a population of approximately 400 to 500 per square kilometer, assuming 4 persons per platform. Intensive survey revealed the fact that house structures continue in roughly the same density up-and down-stream from the site on the upper terrace of the alluvial plain, diminish sharply to near absence as you go up the slope of the hills and are scantily represented on the annually flooded lower terrace.

2. Spanish Lookout, on the opposite side of the river, was another clearing surveyed by the group. An area measuring 600 meters to a side included within it 77 mounds, all on the upper river terrace. The density here calculates somewhat higher than the Barton Ramie site, with approximately 800 to 900 per square kilometer. In both Spanish Lookout and Barton Ramie "sites", there was no clear definition of the "site", since house structures continue in the uncleared forest up-and down-stream on the upper terrace of the river, diminishing only as one goes up the slope or down to the lower terrace. In the cleared area at Spanish Lookout was also found a large plazuela group with a small summit pyramid.

At Baking Pot, one of the two major ceremonial centers in the survey area (the other being Benque Viejo), they surveyed another clearing. The site is located in the alluvial plain and consists of two groups of pyramids and multiroom palaces,

connected by a *sacbe*, and situated 300 meters apart. In the cleared area they counted 90 house platforms. Although no measurement of the cleared area is given in the report, it is stated that the concentration is no greater than in the general plain, or in the two "sites" described, and Willey notes the sharp contrast between the haphazard, random distribution of house-mounds and the formal, geometric plan of the ceremonial precincts. The second center, Benque Viejo, is a hilltop site and lacks the clustering of house mounds, as is generally true of the slope and hill area bordering the plain.

The general survey conducted by the field group indicates a nearly continuous ribbon of settlements on each side of the river on the upper terrace. Barton Ramie and Spanish Lookout are not definable "sites" or "communities", but parts of a riverside ribbon of settlements. Presumably pyramids represent foci or ritual activity and symbols of community identification, for segments of the strip, but more detailed mapping is needed to define the spacing of such centers or foci of social control. This basically rural pattern seems not to be affected by the presence or absence of major ceremonial centers, and the latter seem not to operate as factors affecting settlement density. The scarcity of housemounds on the nearby slopes would indicate that the population residing in each segment of the settlement ribbon used tracts of hillside for slash-and-burn maize cultivation, and there is a strong possibility that much of the riverside land was planted in cacao groves. The conditions of soil moisture seem to be ideal for such a system of cultivation, and to a certain extent, it would explain the high population density since cacao groves need constant care in distinction to slash-and-burn maize fields. If this were true, then the high density of population indicated by the housemound concentration is possible, but still seems a little high, even if relatively extensive tracts of hillside were used. The possibility of a more intensive system of grain cultivation we have already discussed in Part I. I believe this is perhaps the most improbable explanation. If we assume only one-quarter of the mounds to have been occupied simultaneously, then a respectable density of 100 to 200 per square kilometer of population may be calculated. This is within the limits of a system of maize cultivation of the plain and the neighboring slopes, plus small cacao groves. The higher density, assuming all housemounds were occupied simultaneously, would mean

a nearly commercial specialization of cacao growing, which does not seem reasonable to me. Willey suggests that the fertility of riverside plains, plus the use of the river for transportation, were probable factors producing the ribbon-type settlements, and I would add cacao as another factor.

Chontalpa, Tabasco

In 1953, the author participated in the first field session of the New World Archaeological Foundation in Mexico as a graduate student. Most of the field work was conducted within a territory occupying a strip 10 kms. wide and 30 kms. long bordering the west bank of the Grijalva River from Huimanguillo to Cardenas (see Part 1). This general area today is part of a larger region known as the Chontalpa. The field work was specifically oriented towards settlement patterns analysis and involved survey and description of some fifty to sixty sites, extensive excavation of two of them, and small test trenching of a half-dozen others. The full report is still pending and the below analysis is taken from the field and laboratory notes.

Besides the primary survey area mentioned, excavation and survey was carried out on some of the tributaries of the Tonalá drainage to the west at the two rancherías of San Fernando and San Miguel. Within this large territory there are striking differences in environment. Major ecological components of the over-all survey area are: 1) Grijalva flood plain, the prize agriculture zone, where all of the plantation cultivation occurs, best land for slash-and-burn maize cultivation and where most of the population resides. It is an area of cacao and banana orchards and subsistence slash-and-burn cultivation. 2) Forested land lying outside the Grijalva flood plain, much less densely populated and used entirely for slash-and-burn subsistence cultivation. 3) Savannahs, a surprising percentage of land is covered by savannahs. The fact that they are described by Cortez for the 16th century, plus lack of archaeological sites, suggests that they are ancient. These are used only for cattle pasture today and probably served only as hunting grounds in pre-Hispanic times.

The same basic ecological patterns, excluding cattle herding, were found in the same area during the Conquest period and

the 16th century. Owners of large estates apparently owned slaves and specialized in cacao cultivation.

In the test strip which we mention of 300 kms² (which included all the noted ecological zones) the total population in 1950 was approximately 12,000 people or nearly half of the total population of the municipio. The area of the municipio as a whole is 3,520 kms.² The over-all density of the municipio is only seven per km², but in the test strip it rises to approximately 40. Within this area the flood plain covers approximately 100 km² or one-third of the total surface area.

The Chontalpa offers a series of exceedingly difficult problems for large scale, temporally economic techniques of settlement pattern analysis. Exuberant vegetation make site survey difficult and the lack of plowing, plus the heavy vegetation makes surface sampling almost impossible. Complicating the latter problems is the fact that the settlement pattern is apparently one of small scattered hamlets and ceremonial centers without large associated populations as we shall demonstrate shortly. All of the formal civic architecture such as pyramid bases, house platforms and ball courts are of earth construction making dating by architectural style impossible. The only technique of dating usable is test trenching. Facilitating site survey would be the presence of milpas, artificial pastures for cattle, and orchards. As a consequence most of the sites found were not dated so that we cannot trace settlement pattern changes in time but can only discuss them in atemporal terms.

The great majority of sites are small and fall into the general category of hamlets and may be divided into three descriptive types: 1) one or two isolated earth pyramids, 3 to 6 meters high with no house mounds in the vicinity; 2) small clusters of 3 to 12 house platforms with no associated ceremonial architecture, and 3) the same as "2", but with a pyramid or two and with a large high platform which might have been a residential platform of a local religious or political leader. The bulk of the population of the Chontalpa, from the beginnings of agriculture in the area, probably resided in types 2 and 3, and these may be considered as standard rural settlements. It corresponds rather closely to the modern Valladolid hamlet in eastern Yucatan. One is tempted to equate such settlements with the extended family patterns of social organization which Roys notes as characteristic of the area in the Conquest period.

A second general type of site may be called a small ceremonial center. The site of Sigero was not only completely surveyed, but intensively excavated and is a good example of this type. Although Sigero was a Post-classic site, it is similar to many Classic sites in the area. The center consists of a central, formally oriented plaza with a pyramid on the north side seven meters high, a large residential platform to the west, which was probably the residence of the local cacique, a ball court on the east and two low platforms to the south. Three small pyramids are isolated from the main plaza and some 15 to 20 low oval mounds, all less than one meter high, probably house structures, complete the surface architecture of the site. The main group occupies an area of two hectares in extent and the entire area surveyed covers some 15 hectares. One of the low mounds was excavated and it was identified as a house structure with a definite floor level. The mounding of the structure apparently represents the debris of the collapsed roof and walls rather than a true basal platform. The average house mound is approximately 10 meters in diameter so that the occupants probably represent a single nuclear family. They occur in small loosely planned clusters of two to four that may represent extended family aggregations. Heavy refuse deposits are exceedingly rare and occupation, on the basis of the seventeen trenches excavated over the noted surface area, was exceedingly scanty. The site is clearly a ceremonial center in the Classic Maya sense with only a slight population nucleation at the center, certainly less than 150 to 200 people. The entire population could well have consisted simply of retainers and the family of the cacique and his household. Sigero was undoubtedly a center for a much larger population scattered over several square kilometers of neighboring territory and residing in small extended hamlet clusters of the type noted. The settlement pattern resembles the vague civic center one finds today in many modern Tabascan rancherías, or a congregation of the Tajin type. (See Kelly and Palerm, 1950). The survey was not complete enough to resolve the possibility that Sigero itself was probably dependent on a larger territorial state center. Such larger centers did exist in the preceeding Classic period. Sites of the character and size of Sigero are probably, next to the noted hamlets, the most abundant community type in the

Chontalpa. The occupation apparently was extremely short since heavy sherd deposits were not found, even in the housemound.

In terms of the size and number of public buildings, indications of occupation, size of residential population, and complexity and richness of technology, the largest communities in the survey area are represented by some five sites of which Tierra Nueva is typical. These may be called large ceremonial centers. (In comparison with ceremonial centers in the Peten however a site like Tierra Nueva is comparable to Bullard's "small ceremonial center") Tierra Nueva is a Late Classic site and during the 1953 season was the scene of intensive excavations conducted specifically to ascertain its settlement patterns. In order to facilitate survey, a 20 meter grid was superimposed over the area by cutting trails through the secondary forests and high grass pastures. The main survey area covered by the grid is 500×500 meters. A separate group of mounds were mapped 150 meters north of the primary survey area and another separate group approximately one kilometer to the west.

The site includes a large central plaza measuring 120 meters east and west, by 180 meters north and south. These are overall measurements, taken along the outside of the surrounding structures. The latter includes three pyramids, 8 to 9 meters high, 4 pyramids, 3 to 4 meters high, one pyramid 5 meters high, a small ball court and a large 3-meter high rectangular platform that was probably the substructure of the local cacique's palace.

Within the general grid area and in the northwest corner of it is a separate cluster of mounds that includes a ball court, and two pyramids 4 to 5 meters high. North of the main plaza are two 3 to 4 meter-high pyramids, west of the plaza is a pyramid 4 meters high, and finally, southeast of the plaza, are two isolated pyramids each 3 meters in height. At the southern end of the site is another 3-high meter pyramid. The isolated northern group, includes a six meter high pyramid, a two meter high mound and a ball court, but with no house mounds associated with the group. The west group, situated one kilometer from the main grid area has a pyramid 7 meters high and three housemounds. All these constructions are of earth. Within the 500 meter grid were mapped 80 housemounds. All but 7 are below one meter in height, and are oval shaped earth mounds.

They occur in definite clusters rather than evenly throughout the survey area and just adjoining the east side of the plaza is the densest concentration of them with 24 in an area only 120 by 100 meters, or a little over one hectare. There are four small clusters of house mounds numbering 2 to 4 each in various places over the grid and finally there is a great arc of nearly continuous platforms that runs southwest of the plaza and including 3 clusters of 8 to 12 mounds in each. The various separate clusters of house mounds around the site are generally associated with one of the isolated pyramids. The house mounds range in size from 10 to 30 meters in diameter and individual mounds probably represent occupation by nuclear families, clusters by extended families or possibly some larger kin group.

If the total population of the site is represented by the house mounds alone, it could not have exceeded some 400 to 500 people with an internal population density of some 1600 to 2000 people per square kilometer, or about that of a modern Yucatecan village. Surprising, in terms of the number and size of the civic and religious structures, is the relatively small size of the population. Tierra Nueva was undoubtedly the capital of a state as large as a Central Mexican city state and we would expect a community of several thousand people if the settlement pattern of the two areas were the same. The site is comparable in many ways to a site in Quintana Roo which I excavated in 1954 called Tancah (see below). General survey revealed the fact that unlike the Belize Valley pattern, Tierra Nueva was a delimitable settlement unit with no house structures occurring immediately outside the survey area.

Besides survey, one complete house mound was excavated to determine its function more definitely. The nature of the deposits and the cultural debris identified it definitely as a house structure. As at Sigero the term platform does not apply to these low Tabascan mounds, since the height was apparently due to successive floor constructions, not the result of the building of a formal substructure for a house. A succession of clay floors were found with associated hearths of charcoal, potsherds, stone tools, spindle whorls and post molds of pole and thatch structures. House mounds are usually less than one meter in height with a few of them reaching an elevation of $1\frac{1}{2}$ meters. The differences in elevation are probably related to the number of successive floors.

In order to test the hypothesis that a count of the house mounds alone would give a maximal population estimate for the site, we excavated 157 trenches over the grid area at intervals of 40 meters. All these trenches are 1×2 meters in surface area and all were excavated to the base of the archaeological deposits. The results of this testing tend to confirm our estimate of the population size and density. Heavy sherd deposits tend to occur in and around mound clusters, especially in the small densely settled zone east of the plaza. Heavy deposits also tend to occur sporadically, and are limited in area rather than occurring in dense continuous zones, even in the small urbanized areas mentioned. These deposits are completely absent in the isolated north group. The data, therefore, tends to support the population reconstruction above. Eighty-four of the trenches produced less than 51 sherds, 29 from 51 to 100, 19 from 101 to 200, and 25 trenches over 200 sherds. Of the latter class, eight were in the one hectare area of heavy house mound clusters, in other words, $1/3$ in an area of only $1/25$ of the central grid area.

We have then a relatively large plaza, with 21 substructures of civic and religious buildings and a very small resident population, $1/4$ of which appears to have resided in a small one hectare cluster located adjoining the plaza, and the balance scattered over an area of 24 hectares with a total maximum population of 400 to 500 people. The entire occupation fits into one relatively short phase of the Mesoamerican sequence, the Late Classic, and probably does not completely span the period since little internal chronology can be detected in the ceramics. I doubt that the site was occupied more than a century or two.

Trenches were excavated in two of the ceremonial structures, and the house mound was completely excavated providing some clues as to the socio-economic functions of the center. Excavation around the pyramid structures revealed a great number and variety of specialized cult objects in clay and stone in the form of incense burners, offering jars, sacrificial daggers, and large hollow figurines of the generic Late Classic Maya style which indicate a regional variant of the general Mesoamerican ceremonial complex. These objects were undoubtedly made by and used by full-time specialists for the formal ritual based on the calendar. Excavation in the areas of settlement reveal the presence of an elite residential group with such imported luxu-

ries as fine orange and fine grey pottery, obsidian and "jade". The sample also included a locally made polished black serving ware which is of exceptionally high quality compared to Mesoamerican ceramics as a whole. Figurine molds were found in one of the house mounds, plus numerous pottery polishing stones, along with clay whistles and spindle whorls, perhaps indicating the house of a craftsman.

Tierra Nueva was probably a ceremonial and elite residential center for a territory within which would be a number of Sigeró-like secondary centers and a large number of small dependent rural hamlets. With a lack of chronological data for other sites of similar size, and presumably similar political rank and power, it is difficult to even roughly delimit the size of the territory tributary to the site. There is a site of comparable size seven kilometers to the north and another one seven kilometers to the northwest so that the dependent district was probably not very large.

On interest, in terms of the socio-political relationship of communities is the relationship of a site like Tierra Nueva with all earth construction and relatively small size to the huge site of Comalcalco with brick architecture, dated monuments, stucco modelling on the walls and vastly greater size and number of civic buildings. The occupation of Comalcalco apparently is Late Classic. The site has all of the attributes of Maya civilization. Tierra Nueva has only one specific relationship to Classic Maya culture—that of the figurine style, but the ceramics of the two sites are nearly identical. I have visited the site of Comalcalco several times, in each case short visits of an hour or two, and was struck with the general paucity of house structures. Until a more detailed survey is made, however, all that can be said about the settlement pattern of Comalcalco is that it was probably similar to such Maya centers as Tikal and Uaxactun. Comalcalco may have been the capital of a relatively large compact state which included much of the region known today as the Chontalpa. Actually, the immediate area, roughly the present municipio of Comalcalco, is the prize cacao-banana area for Tabasco, and it could have supported a site the size of Comalcalco without additional territory. The municipio has a surface area of 420 kilometers and in 1950 had a population of nearly 34,000 people with a density of 80 per square kilometer, of which only

4,000 or 5,000 were urban. This dense population is made possible today by the fact that most of the area is in cacao orchards and little land is used for slash-and-burn agriculture. A similar situation may well have been the case in Late Classic times. If one looks at Roys' map of the distribution of communities in Tabasco at the time of the Conquest, at that time, as well as in the Lake Classic period, the part of the general region of the Chontalpa around Comalcalco seems to have been the major population center.

Quintana Roo

In 1954-55 I conducted surveys and excavations in Quintana Roo for Carnegie Institute. On the basis of these studies, four basic types of sites seem to occur in Quintana Roo during the Classic period. First, and very common, is what we might call the Tancah settlement pattern type, after the site for which we have most complete data. In this type, the site is composed of one or more ceremonial plazas surrounded by religious buildings, mainly temples, with scattered individual religious structures or small groups at some distance from the main center. In major centers these out-lying units form groups or clusters; in smaller ones they are more likely to be detached individual temples and pyramids. Along with these religious buildings are a limited number of what are probably platforms for pole-and-thatch residences. In Quintana Roo they are usually large structures and very limited in number, but there is considerable variation in the degree of concentration and in the total number of these structures. In an intensive survey around Kantunil Kin, very few house platforms were observed. Tancah, which is smaller than Kantunil, has many more. In general, coastal sites show more evidence of occupation (i.e., house platforms or surface indication of habitation refuse) and Post-classic sites show more than Classic. Also, sites with Late Classic occupations show more refuse than Early Classic. In spite of the variation, however, we do not find large nucleated populations at any site of this class, and the large size of most of the platforms indicates a few well-to-do families in full-time residence. If some of the coastal centers were small merchant communities, the more abundant evidence of population con-

centration would be explained, but even so the population was small, and true towns or cities are lacking.

The second type of site consists of an isolated shrine, including one or two temples or a temple and a dormitory, situated within a few hundred meters of the beach or on rocky headlands or shores of bays and overlooking the sea. Probably they were shrines for traveling merchants or fisherman, and they are very numerous in the territory.

The third type, possibly the most common of all, is the farming hamlet. Extending inland from Tancah for at least two kilometers are a large number of these small sites, each including a half-dozen to a dozen house platforms, often associated with a single small pyramid. They undoubtedly represent small hamlets of farmers, and there are probably thousands of them in the territory.

Tancah is one of the largest of all ceremonial centers in Quitana Roo. It has been described in detail by Lothrop (1924), who mapped the two major groups, A and B, and described the individual structures in them. Group A consists of 11 structures around a somewhat trapezoidal-shaped plaza with the small end of the trapezoid to the east. The plaza is oriented almost due north, but not all the individual buildings are oriented exactly on this axis. If all the group were enclosed in a grid square, it would measure about 80 m. north-south and 70m. east-west. The plaza is small, measuring about 40 m. in its greatest dimension. The 11 surrounding structures, are entirely religious in function, and include two temples on high terraced pyramids, 2 others on high single terrace bases, one on a very low platform, 2 mounds of indefinite type, 3 altar-like platforms, and one low stone-walled enclosure. The only structure of imposing size is Structure 1, which, being less than 7 m. high from the top of the summit temple to the plaza floor and about 18 m. square at the base, is large only in comparison with the others at the same site.

Group B, situated approximately 80 m. southwest, includes 12 structures grouped around an elongated irregular plaza. In surface area and plaza size the group is similar to Group A. All these buildings, too, are religious in function, including 3 high pyramids with summit structures, one unclassifiable mound, one temple on a low platform, and 7 altar-like plat-

forms. Again, all structures are small in comparison with those in other parts of the Maya area.

An area measuring 200 m. east-west by 220 m. north-south, which includes Groups A and B, was completely crisscrossed by trails on a 20-m. grid. Alternate grid lines were extended to form an outer grid of 40-m. squares, mainly to the north and west, where most of the unmapped structures lay. This extension of the grid system runs 40 m. east of the inner grid, 80 m. north, and 120 m. west. It was not extended south, as that area was in pasture and no structures were seen there. The total area covered by the 20-and 40-m. grid squares, then, was 360 m. east-west and 300 m. north-south. It includes most of the constructions on the site except to the west.

Aside from the completely gridded area described, a few trails were extended further into the bush for a distance of 120 m. in all directions: five were cut north of the grid, one east, one south, and four west. Thus we had settlement-pattern data covering an area of 400 by 540 m.

Each of the grid squares was thoroughly searched for remains of stone construction or surface indications of occupation. Groups A and B are, with very little doubt, entirely religious in function; none of the structures could have served even as a priestly dormitory.

The following catalogue of structures outside of these two groups is complete except for a few structures to the west and northwest of which there are 15 at most, to judge from our western extensions of grid trails.

The 46 newly mapped structures may be summarized in the following list:

Large platforms without masonry structures	8
Large platforms with masonry temples on summits	3
Medium-sized platforms	5
Small platforms	8
"Altars"	4
Masonry temples	4
Pyramids	1
Dry stone walls	8
Retaining walls of terraces	5

Under the category of large platforms are eight that do not have religious structures of masonry on their summits. They are huge low platforms, three of them have simple rectangular

ground plans, and the others have inset or stepped plans. They are approximately 1 m. in height, and have an outside shell of roughly cut stone blocks and a rubble fill. They are from 30 to 60 m. long and from 15 to 40 m. wide. Their large size indicates that they were the bases for perishable structures used as either elite residences or more probably as priests' dormitories. Outside the carefully mapped area is another huge platform of this type.

Most of the medium-sized platforms are rectangular in ground plan; a few are square, and one is L-shaped. In basal area they run around 200 to 300 sq. m., and they could have supported substantial-sized houses. There were 5 of them in the mapped area and approximately 5 more just west of the end of our formal grid pattern, but within the area reached by the western trail extensions, making 10 in all.

Small platforms numbered 8 within our site plan, but at least 7 more lie northwest of our surveyed area. I suspect that the total number of structures of this type at Tancah within the area defined as the site may run as high as 20, but not more. They, too, could have served as bases for small houses of the size found in modern Yucatecan villages. Extending westward from the area defined as the site of Tancah are numerous clusters of some 6 to 12 small platforms, along with 1 or 2 medium-sized platforms and a small pyramid, each cluster forming a distinct group, perhaps hamlet-type settlements dependent upon Tancah.

In summary, we find at Tancah the following structures which may have served as residential platforms: 1) 9 large platforms, possibly priests' dormitories or elite residences; 2) 10 medium-sized platforms which could have served as platforms for rather large houses; 3) at least 15, possibly as many as 20, platforms that could have supported individual family houses like those used today in Yucatecan villages.

Even if we assume all these structures to have been inhabited simultaneously the total population at Tancah could not have numbered more than a few hundred inhabitants, including priests and proletariat. These structures are scattered over an area measuring 480 by 420 m., or approximately 20 hectares. To test the settlement pattern further, small trenches were excavated at the junctions of grid lines to test the depth of soil density of ceramic remains, and presence of features such as

hearths, burials, and house floors. The trenches were all 1 by 1.5 m. in surface area and wherever possible were excavated to bedrock.

Grid Line 5 limits the site to the east with but one of the trenches yielding over 25 sherds, and Grid Line 16 running at right angles to and east of this trail with three trenches did not yield a single sherd. The southern limits of the site as far as refuse concentrations are concerned lie within 100 m. of Group A and 40 m. of Group B. To the north the heavy deposits end but 80 m. from the north edge of Group A. Grid line extensions north and south of these points revealed in many trenches a complete absence of sherds, in others less than 10. To the west the site was not delimited by the survey, but it probably does not extend more than 50 m. west of our grid-line extensions and may be much less as there are few structures in that area. Except to the east, where the terrain drops off sharply to the coastal swamp, there are no ecological reasons for these sharply defined limits. The area of fair to heavy ceramic deposits, then is limited to long, narrow rectangle measuring 280 m. north-south and about 480 m. east-west.

Within this area of sherd concentration, the distribution is very uneven and with a few exceptions is related to the position of the described architectonic features. In a large area between Group A and Structures 42 and 51, forty-three trenches were excavated, of which only 4 yielded more than 25 sherds. This area is also bare of architectural features except for Group B itself. Of the 17 trenches that yielded an excess of 100 sherds, 11 form a ring around Group A and obviously represent rubbish deposits from the use of the religious precinct rather than occupation debris (unless it could be believed that the surrounding population used the outskirts of the plaza as a town dump!) Four others lie off the edges of large platforms in the western edge of the site. Of the 31 trenches yielding between 50 and 100 sherds, 11 were along the edges of Group A, 12 off big platforms in the northwest quadrant of the site, and 2 near large structures in the southwest segment of the zone. Some of the remainder are related to other isolated structures.

Not all the area of heavy sherd concentrations represent continuous occupation. Our sherd frequencies show a significant sorting-out by period from east to west. A small rectangle measuring 220 to 100 m., including in it Group A, was evidently

the Late Formative Early Classic center and was not utilized during the Late Classic period for either ritual or occupational purposes. A new ceremonial zone, Group B, plus the big platforms with summit temples, was constructed and a new habitation area set aside.

Most of the area south of the Plaza of Group A, which includes most of the rectangle of Late Formative-Early Classic occupation, shows clear evidence that it is a built-up zone. Most of the trenches reveal heavy concentrations of limestone fragments, and the terrain slopes down sharply both east and west. The area is probably the eroded remains of an extensive terrace running south from Group A. If so, the sherd material excavated may well be fill brought from surrounding hamlets and, therefore, not represent primary occupational debris. In its Early Classic occupation the area may have been a ceremonial center of the "Classic" type with next to no resident population.

The rest of the site shows a definite correlation between deep deposits with fair to heavy sherd samples and the platforms of varying sizes. The sherd frequencies consistently suggest a Middle to Late Classic Period dating, and we might visualize the Late Classic Period utilization of the site as including a ceremonial precinct to the south including Group B and Structures 42 and 51 with their small summit temples. The intervening space between those two ceremonial complexes was evidently occupied by an open plaza limited north and south by low, dry stone walls. To the west and north of the plaza was the elite residential district with platforms of various sizes arranged in courts or isolated. That the orientation of these structures seems not to have been co-ordinated also suggests their use as residences. This area of heavy settlement covered some 6 hectares, which, with the ceremonial zone to the south, indicates a total site area for the period of perhaps 9 to 10 hectares. The population included probably priests and a few craftsmen for temple maintenance, but there was no industrial proletariat at any period of occupation at Tancah.

The settlement pattern at Tancah differs markedly from that of modern Yucatecan communities, especially in a feature I am calling "top-heaviness", which seems to be characteristic of ancient Maya centers. By this word I mean that the religious or ceremonial center is extensive in relation to the occupation

zone, as compared with highland Mesoamerican sites. In functional terms we have a ceremonial zone without the outlying industrial wards of highland centers. In modern Yucatan a civic center of the size and complexity represented by Tancah would have a community of at least 2000 to 3000 people and a settlement zone extending at least 2 km. from the center in all directions. If, from a modern town like Izamal, all the thatch and pole houses were removed, leaving just the plaza and masonry houses within a block of the plaza (the houses of the Gente de Vestido), the settlement pattern at Tancah would be reproduced. The rest of the population instead of being nucleated as in modern communities would be scattered in the small hamlet communities represented by the smaller house mound groups west of Tancah.

Archaeological Data - Post-classic Period

There is a considerable body of data that suggests that true towns and possibly small cities were existent in some parts of the Lowland Maya area during the Post-classic period (at least during the final phase of the period).

In Quintana Roo, the site of Tulum was apparently a small town, and other sites along the coast such as Ichpaatun and Xcaret may be tentatively classified as such. They are characterized by the presence of residential palaces of masonry, more nucleated populations (as indicated by the closer spacing of houses and abundant surface refuse), and are surrounded by fortification walls. However, although the settlement pattern is more compact, the total population of the community remained small, probably because of the difficulty of producing and transporting food with slash-and-burn agriculture in such an unfavorable environmental setting as the east coast of Yucatan. The size of the *tributary area* of towns in Northern Yucatan seems to have been similar to that in Central Mexico, the limiting factor being transportation of basic foods in both cases. The much smaller size of the Yucatecan central town relates to the much smaller *tributary population*, which in turn was limited by the system of agriculture.

Bullard's data from the area around Lake Peten in the southern peninsula would also suggest a more compact nuclea-

ted settlement pattern for the Post-classic period for some centers. (op. cit.)

As we have noted in Part I, although most of the southern peninsula of Yucatan was uninhabited or slightly populated during the Post-classic period, there was, however, a small cluster of settlements around Lake Peten Itza. Bullard's description of the site of Topoxte, quoted in full below, would indicate a tightly nucleated town similar to Tulum in size.

"Only settlements of the Classic period have been considered so far in this paper. On a group of islands in Lake Yaxha is a community that is almost surely Post-classic in age. On one of the islands is a small ceremonial group known as Topoxte (Maler 1908: 55-60; Lundell 1934: 182-5). The island in question is about 400 by 200 m. across. Exclusive of the ceremonial group of 10 or 12 buildings, there are between 80 and 100 house platforms crowded on to the little islands. Most are on large terraces made to provide level places on the irregular rocky ground of the island. Construction occurs almost everywhere to within about 4 m. above the present lake surface. Two nearby islands are likewise crowded with house structures. We have here a very different type of settlement than prevailed in the same area during earlier times: a true town or small city of at least 200 houses clustered tightly around a ceremonial center on a group of islands."

The population density of the site (assuming each platform to be the residence of a nuclear family) would be approximately 5000 per km.², but again, the total population is smaller than one thousand inhabitants.

The most impressive of all the Post-classic towns in the Lowland Maya area is undoubtedly Mayapan. Here, over a five-year period, the Carnegie Institute carried out an intensive study of settlement patterns involving survey and excavation. Their data is summarized below: (Pollock, Roys, Proskouria-koff, Smith, 1962).

Mayapan, like Tulum is surrounded by a fortification wall, in this case 9 kms. long with 12 gateways. The wall encloses a huge oval 4.2 km.² in surface area.

The terrain within the oval is rocky and broken, with a great number of low limestone hillocks ranging from 2-4 meters high, separated by depressed areas, has a very scanty soil cover, and is covered by scrubby jungle vegetation. Within the oval are 26 cenotes, most of which are located in the central area and the southwest quadrant of the site. The presence of cenotes was

undoubtedly one of the main factors determining the selection of the site for settlement.

In the center of the oval is a small, compact ceremonial-civic center covering 6.4 hectares and including approximately 100 "structures". Forty other ceremonial and civic structures are found in four outlying groups (but within the wall). Most of the ceremonial structures occur in clusters, called by Proskouriakoff "ceremonial groups", each of which includes one or more "colonnaded halls" (she suggest that they functioned as *telpochcalli* like men's houses), "raised shrines" (small pyramid temples) and oratories. Twenty-one such groups occur in the central cluster and five others in the outlying groups.

Some of these clusters are semi-isolated, but others are part of larger groups she calls "temple assemblages" and are associated with one of the ten pyramid temples. One of the latter is the so-called "castillo", the largest structure on the site. Furthermore, the entire central civic zone seems to have a single over-all plan with the castillo "temple assemblage" as the focus.

The civic center of Mayapan resembles that of Central Mexican towns and cities rather than Maya ceremonial centers in that most of the important structures occur in a single large, compact group with an over-all plan. It also resembles such Highland Mexican centers in that the ceremonial precinct occupies only a fraction of the "site" and in that only a small percentage of the surface structures are of civic or religious functions. Only 1.52% of the area within the wall at Mayapan is occupied by the civic center and about 3% of the mapped structures are religious in function.

The most striking difference between Mayapan and Classic Maya centers, is demonstrated by the number and density of residential structures. The Carnegie group classified the surface structures of the site as follows:

I. Total number of structures	4140	
A. Religious and civic	140	
B. Residential	4000	
1. Located outside the wall	125	
2. Located within the wall	3875	
a. House platforms		2100
b. Secondary structures associated with 'a'		1775

Of the 3875 residential structures located within the wall, 2800 were distributed in little groups of functionally interrelated structures, and 1100 as isolated structures. Of the latter, 700 are definitely house platforms and the balance consisted of terraces or were too poorly preserved to classify.

The 2800 structures occurring in groups were distributed in 1100 definable groups. Each group consisted of one or more house platforms, a kitchen, and in some cases, an oratory. The number of structures per group ranged as follows:

2 structures	approximately	750
3 structures		240
4 structures		65
5 structures		16
6 structures		7
7 structures		2
9 structures or more		3
		<hr/>
		1083

The number of house platforms per group range from 1-4 and were distributed as follows:

1 platform	over	600
2 platforms	over	300
3 platforms	about	35
4 platforms	possibly	3

The residential groups were laid out in little patio complexes like the ceremonial groups, but the residential area as a whole does not have a formal plan. Favored house sites were tops of knolls, the total plan is disorganized and haphazard outside of this trend. The density varies and tends to be much heavier arounds the civic center and in the southwest quadrant corresponding with the cenote distribution. Most clusters apparently had well defined house lots surrounded by low, dry stone, boundary walls.

Houses may be sorted into two basic status levels as based on the quality of masonry, amount of stone and lime versus perishable materials used in wall and roof construction, number of rooms and structures in the group and complexity of floor plans.

The lower class lived in small 2-room houses built on low

platforms of stone and earth. Only the floors and lower portions of the walls were built of masonry, the balance of the house was constructed of poles and thatch. They did, however, possess masonry sleeping benches.

Approximately 50 houses occurring in 30 groups were clearly the residences of more important people. The walls were built entirely of masonry, the roof of wooden beam and lime concrete and supported by stone columns, the floor plan included lateral rooms, and the back room was frequently divided into several rooms, one of which was elaborated into a shrine. Associated with the houses and completing the assemblage were elaborate shrines, oratories and vaulted tombs. All but a few of these 30 groups were located close to the civic center.

The authors feel that the short time span of the site and degree of congestion argue for contemporaneity of use of all or most of the residential structures, a position with which I strongly concur. The 2100 structures classified as house platforms they estimated would have been occupied by 11-12000 people (assuming an average of 5-6 per house-the size of the modern Maya family). The range could be extended from 8400 to 21,000 dependent upon whether each house sheltered a nuclear family of four or an extended family of ten persons.

The contrast between the Classic center of Tikal and the Post-classic center of Mayapan is striking.

	<i>Tikal</i>	<i>Mayapan</i>
Size of civic center	100 hectares	approx. 8 hectares
Surveyed area	16 km. ²	4 km. ²
Definition of "site survey"	arbitrary	wall + sharp decrease in house structures outside the wall.
Number of house platforms	2200	2100
Density of house platforms per km. ²	140 (approx.)	500 (approx.)
Total population (4 per house)	8800	8400
Population density (approx.)	550	2000
Possibility of contemporaneity of occupation of house platforms	Probably not	Almost certainly were
Time range	Late Pre-classic Entire Classic Scanty Post-classic or 1500 years	Not over 200 years

The population density of Mayapan was approximately the same as many modern Mexican towns and was four times that of Tikal. (Again assuming contemporaneity of house occupation).

Mayapan, and some other Northern Yucatecan sites, during this period, had settlement patterns similar to those of Central Mexico (where the pattern is considerably older as well as much more common), and it is difficult to escape the conclusion that the pattern was introduced by the Mexican invaders. All such communities for which we have data were very small except Mayapan. Even if we take my lower estimate Mayapan must be classified as a large town or a small city. In modern Yucatan, there are several communities equal in population to Mayapan and one, Ticul, is supported by slash-and-burn cultivation. The evidence at Mayapan illustrates, in a pre-Hispanic period, the principles briefly discussed in Part I. With a slash-and-burn cultivation and primitive transportation, it is exceedingly difficult to maintain a large nucleated population as the rarity of such sites demonstrates. The settlement pattern of a site, however, is the result of multiple factors, and in this case, as during the Colonial period, the political institutions intervened to alter the normal pattern of ceremonial center-hamlet that had been the regional pattern of Lowland Maya settlement since Late Pre-classic times.

The socio-economic role of Mayapan, in relationship to other smaller communities, however, does seem to have been somewhat different from that of the Central Mexican town. The following quotation from Tozzer's translation of Landa illustrates the point.

"In this enclosure they built houses for the lords only, dividing all the land among them, giving towns to each one, according to the antiquity of his lineage and his personal value. And Kukulcan gave a name to this city — not his own as the Ah Itzas had done in Chichen Itza, which means the well of the Ah Itzas, but he called it Mayapan, which means "the standard of the Maya", because they called the language of the country Maya, and the Indians (say) "Ichpa", which means "within the enclosures". This Kukulcan lived with the lords in that city for several years; and leaving them in great peace and friendship, he returned by the same way to Mexico, and on the way he stopped at Champoton, and, in memory of him and of his

departure, he erected a fine building in the sea like that of Chichen Itza, a long stone's throw from the shore. And thus Kukulcan left a perpetual remembrance in Yucatan.

After the departure of Kukulcan, the nobles agreed, in order that the government should endure, that the house of the Cocombs should have the chief power; because it was the most ancient or the richest family, or because at this time he who was at the head of it was a man of the greatest worth. This being done, since within the enclosure there were only temples and houses for the lords and the high priest, they ordered that other houses should be constructed outside, where each one of them could keep some servants, and to which the people from their towns could repair, when they came to the city on business. Each one then established in these houses his mayordomo, who bore for his badge of office a short and thick stick, and they called him caluac. He kept account with the towns and with those who ruled them; and to them was sent notice of what was needed in the house of their lord, such as birds, maize, honey, salt, fish, game, cloth and other things, and the caluac always went to the house of his lord, in order to see what was wanted and provided it immediately, since his house was, as it were, the office of his lord." (Tozzer, 1941.)

What Mayapan seems to have been is a gigantic elite residential complex (nobles and household dependents) for the ruling class of the entire northern half of the peninsula and lacked the industrial proletariat of Central Mexican urban communities.

The above quote would also suggest that the maximal population of lords and their followers were seasonal.

SOCIO-ECONOMIC PATTERNS OF THE YUCATAN MAYA IN THE 16TH CENTURY

We will here summarize Roy's published studies of the socio-political patterns of the Yucatecan Maya for the sixteenth century as the basis for the evaluation of Classic period community typology and social structure.

Social Stratification. There were three social classes in Maya society, 1) the Almahen, or nobles, which class included the political officials, priesthood, military orders and merchants.

This class believed itself to be descended from Mexican invaders, although most of the family names were Maya, and such names occurred also in the lower class. They apparently had rights over preferred lands, although land tenure in Yucatan seems to have been generally of the communal type. This class resided in the ceremonial centers and towns. 2) The commoners, primarily farmers and part-time craftsmen, and living in small hamlets. This class made up the bulk of the population. 3) Slaves. Most of the people from this class were war captives, or criminals.

Kin Groups. The population of Northern Yucatan was divided vertically into 250 unilineal descent groups, which cross-cut the above social classes. People of the same patronym were considered as kin, each had a patron deified ancestor, was exogamous, and was a mutual hospitality group. They apparently were patrilineal descent groups of considerable size (the average was approximately 2,000 persons per group). They were not localized, although there was a tendency for certain patronyms to be heavily concentrated in some provinces rather than others. They were probably patri-sibs, using Murdock's terminology, and were theoretical rather than true descent groups. These groups undoubtedly served as a powerful integrative factor in a society stratified into well-defined social classes. The sibs were divided into patrilineages, or true descent groups, and it appears that the noble class in each province were actually derived from a few patrilineages of the dominant sib or sibs. The rural patrilineages were probably localized, and I suspect that each rural hamlet was a localized group of this type. Finally, the Maya lived in extended family dwellings, that is, a group of patrinely related males resided together in a small family cluster of houses.

Territorial Divisions. The Spanish sources divide up northern Yucatan into territorial divisions called by them "provincias". These range in surface area from 1200 to 9000 square kilometers and in population from 30,000 to 120,000 according to our population estimates. Many of these provincias were politically organized states, under an authoritarian ruler. Others were loosely organized confederations of smaller states. Where the provinces were unified, they were ruled by an official called the Halach Uinic, which office was restricted to a specific lineage in each province, and usually passed from father to

son. He was an authoritarian ruler, the military head of the state, civil governor, and head of the priesthood. He was also the Batab of one of the smaller divisions of the state, and received taxes in tribute from the population. He exacted tribute in labor and goods from the other tributary states, received fees from litigants in judicial cases, and owned cacao groves and slaves. His position involved all the trappings of royalty characteristic of such rulers all over Mesoamerica, i.e., special insignia of rank, use of the litter, possessions of a harem, and an imposing retinue of assistants and servants and with the usual court ceremony, pomp and protocol.

Under the Halach Uinic, a provincia was divided up into what the Spaniards called "pueblos", each ruled by a petty despot whose court and position was similar to the Halach Uinic, on a smaller scale. The ruling official was called a Batab, and was a member of the same lineage as was the Halach Uinic, and usually appointed by him, although the son of a deceased Batab usually was chosen. His functions were military, judicial and administrative, as in the case of his superior, and in provinces that were not politically unified, he was the independent head of the state. Below the Batab, the political structure is less clearly understood. Roys mentions the following status positions:

Ah Kulel — a special class of deputies or assistants to the Batab, who were his agents and messengers.

Nacom — a war chief.

Ah Kuch Cab — these made up a council of assistants to the Batab, and were heads of the divisions of the pueblo, which are called by the Spaniards, "barrios".

All of the above officials were appointed to office by the Batab. The Holpop, which title means the 'head of the mat', were intermediaries, between the Batab and the people. Two small villages in Mani province were ruled by Holpops, instead of Batabs. They seemed to have had generally, religious function (presiding officials over dances and festivals). I suspect that they were sib or lineage heads of the lower class, but their functions are not clear.

Topil — who were kind of constables and represented the lowest level of officialdom.

Warfare between the territorial states was common, and the

heads of the above units functioned as war leaders, although the actual conduct of war seems to have been entrusted to the Nacom, an official who was appointed by the Batab for a three-year term. There apparently was also a small force of semi-professional warriors called Holcoms, that fought as an elite corp.

Religious Institutions. The religious institution was headed by the Halach Uinic. Under him were orders of professional priests, apparently divided into two basic types: Chilan, or prophets, and Nacons, or sacrificial priests. There were presumably priestly colleges like the Aztec Calmecac, and the priesthood resided in monastery-like buildings attached to the temples in the ceremonial centers.

Economic Institutions. One of the powerful factors stimulating trade, community and regional specialization, and therefore, institutions such as markets, craft guilds, and professional merchant classes in the central and southern highlands of Mexico and the highlands of Guatemala is the environmental complexity of such areas. With primitive transportation, markets can only develop where zones of differing productions are closely spaced, since such markets depend upon a high volume of trade. These conditions are absent over the huge province of the lowland Maya, except the southern edge where the Guatemala and Chiapas highlands are within easy walking distance with their more variable ecological zoning. Even today, as Sol Tax has pointed out (1957), there is a striking difference between the pattern of trade and specialization in highland Guatemala as opposed to northern Yucatan. In the former we find regional markets, specialization by village and town, and peasant villages depend upon trade for their technology as much as urban populations do. This is not to argue that trade and some specialization was absent in the Maya area. There are variations in environment, but these are composed of broad zones that gradually shift from one to the other and lack the compact, sudden transitions of highland Mesoamerica. Cotton, for example, was grown in the drier areas to the North; cacao in the wetter zones to the South; salt was gathered along the beach; and so forth. But these specializations are hardly comparable to highland Guatemala and Oaxaca. Even today regional markets are lacking in Yucatan and community speciali-

zation is feebly developed. Another factor that tends to reduce local trade is the system of farming. In the Valley of Mexico agriculture is so intensive that farmers must purchase even such items as firewood and wood for implements for farming tools from villages further up the slopes. House building materials tend to occur in localized spots and land is so scarce with the dense population that has resulted from the more intensive system of farming that specialization of agricultural crops must be practiced. All of these factors tend to intensify trade and community specialization. In slash-and-burn agriculture most of these resources are near at hand in the surrounding *acahuals* and unused tracts of forest. Roys' data with respect to the Yucatan Maya tend to support our contention that specialized economic institutions were feebly developed amongst the Maya. Most craftsmen were also farmers. Markets are reported only on the coast and they seem to be embarkation ports for trade with Tabasco and the highlands of Mesoamerica of a few limited luxury items such as salt, honey, and cotton cloth. The trade then relates to larger Mesoamerican symbiotic patterns, not intensive regional ones. There apparently had not even evolved a professional merchant class like the *Pochteca* in Central Mexico. Trade was the monopoly of the ruling class.

One more point must be stressed with respect to the nature of Maya exports to the Pan Mesoamerican market. They involve primarily agricultural products such as tropical fruits and cacao, or products that require little processing, such as salt; products that were gathered from the forests such as rubber, chicle, copal, feathers, and jaguar skins; or products that were produced by rural populations such as cotton cloth. None of these involve urban specialization or complex processing.

It is not entirely certain that all Yucatecan institutions ascribed for the Conquest period were native Maya, rather than introduced Mexican patterns, so that the application of these patterns to the Classic period must be done with extreme caution. I have attempted to correlate the social groups defined by Roys to his 16th century settlement patterns and to those of Bullard for the Classic period of the Peten in the following chart.

16th Century Territorial Divisions	Classic Archaeological Settlement Units	Socio-Economic Patterns Conquest Period	Kin Groups	Status Level
"Provincia" — territorial state 1200-9000 km ² 30-120000 people	All of Northeastern Peten capital at Tikal	Ceremonial Center — inhabited by the elite class Halach Uinic and his patrilineage plus servants, slaves. Political and religious leaders — mostly drawn from his lineage. Bulk of population nobles plus a small group of full time elite craftsmen. Total population "several thousand".	Elite class at C.C. one patrilineage	Almahen or nobles plus slaves
"Pueblo" — Either a territorial subdivision of a "Provincia" or a small independent state.	"District" ave. size 100 Km ² . Each with a "Major Ceremonial Center" as capital with temples, monasteries, carved stelae, dated monuments, ball court — eg. Uaxactun	Ceremonial Center — Batab, and his court similar to Halach uninc's entourage but smaller possibly also included professional warriors. Total population "several hundred".	Ditto	
"Barrio" — Subdivision of "Pueblo" — Administrative Unit	"Zone" ave. size 1 km ² . Each with a "Minor Ceremonial Center" composed of a plaza or two with pyramids, a monastery or two, but no stelae, dates or ball courts.	Ceremonial Center — Residential population consisting of A cuch Cab, a few resident priests, no elite full time craftsmen. Hamlets of farmers — part-time craftsman nearby. Entire population commoners. Total population not over that of a large hamlet.	Priests and ah cuch cab same patrilineage as Batab	"Free" peasants or commoners
"Estancia" — Small Hamlets 5-12 extended families or noble's estates, subdivision of "Barrio"	"Cluster" — 5-12 "Houses" concentrated in an area of 4-8 hectares on hill top or ridge — No ceremonial structures.	Hamlet — no marked social differentiation in pop. other than age & sex. Population subsistence farmers and part-time craftsmen. All one patrilineage. Probably 90% of Maya population in this category. Population 50-100 people.	In each district great numbers of patrilineages belonging to different patrisibs (latter crosscut territorial units above hamlet) but 1-3 sibs dominant in each "District".	
Extended family — Patrilocal — Residence in one "house"	"House" — group of 1-4 House platforms arranged around a patio.	Extended Family — Unit of economic cooperation in agriculture, common pantry, educational functions		
Nuclear Family	"Platform" — a single stone Platform which once had a pole walled, thatched roofed house on summit.	Nuclear Family — Unit of house residence, education, procreation, food consumption		

Conclusion

In summary, there were few integrative factors operating in ancient Maya society toward the formation of large socio-political groupings, and many disruptive ones. Kin ties, as we have noted previously, are an integrative force, but function effectively only in small group situations. Economic symbiosis of community to community of similar rank, or between centers and dependent communities, or larger regional patterns were all feebly developed. The ecological system lacks any characteristics that one can link with the integration of a large society. Slash-and-burn agriculture, unlike intensive irrigation agriculture, does not require the cooperation of even small groups. Such cooperation may in fact occur, but certainly not above a hamlet or lineage level, and large cooperatives of the type found in the irrigation state are nowhere represented. Furthermore, the system tends to relate to small communities or a hamlet settlement pattern, and the latter in turn promotes political atomism. Intensive warfare may act to promote the growth of a relatively large village with as many as one to two thousand people, but growth beyond that within a purely local socio-political framework would probably not occur because of the distance from agricultural fields. As our settlement pattern data show, communities of this latter type are rare in the Lowland Maya area.

The major factor that gave the state-like structure of Maya society its stability seems to have been the system of social stratification and the complex of religious services and symbols controlled and manipulated by the ruling class. Such complex socio-religious systems, however, we feel are the *products* of historical processes leading to civilizations, not *causes*. An analysis of Maya socio-religious organizations answers the question of how the civilization functions, but not the major question of its origin.

In a recent paper, I have attempted to define the term civilization as used by culture historians. My definition includes three basic elements: a) a successful utilization of the environment to the degree where a relatively dense population is produced; b) organization of a relatively large area and population in a single social system or organized society; c) division

of such a society into two basic classes —a large class of inferior status that provides surplus food and labor and small directive class that systematically channels this surplus into culturally specified directions. By definition, the culture of the Classic Maya, along with that of Mesoamerica as a whole, may be classified as a civilization. The main problem, as I see it, is to define the factors that were responsible for the evolution of a large stratified society of the type that we have labeled as a civilization. If the general characteristics of what we are calling civilization evolved in the Maya area, then clearly we must search for these factors in the rural society that existed in the Lowland Maya area before the appearance of the Classic civilization. As we have demonstrated, it is exceedingly difficult to see such factors operative within the kind of rural society characteristic of the region. One of the most powerful forces in the evolution of civilizations in Central Mexico was the process of urbanization. In an urban society one finds a stratification of communities —rural and urban— that depend on each other for services or goods which tends to result in a very large, tightly integrated society. Within the urban community itself, of course, this integration and symbiosis is even more marked. It is difficult to see how an organized society of this type could disintegrate as a result of factionalism.

With the intensive agricultural systems found in Central Mexico, where fields are small and close to the community, one can trace the evolution of village to town and even small cities as a process of improving and intensifying the production of crops in a relatively small area. As such big, basically rural communities grow, specialization and stratification as corollary growths may be functionally related to the growth of a large population, and such patterns of growth ultimately result in a large urban center made up of a great number of specialists whose services are inter-dependent.

In the case of the Lowland Maya, we are dealing with a Neolithic people living in a forested environment, practicing slash-and-burn grain cultivation. As we have previously demonstrated, this type of agriculture will support a relatively dense population (30-60 per square kilometer) without deleterious effects on the natural environment. We have argued that with primitive transportation and this type of agriculture, it is possible to support a small nonfood producing population of

priests, rulers, and elite craftsmen. But we feel that large urban communities cannot be maintained effectively with this type of a subsistence base.

The large territorial socio-political patterns of Central Mexico can be functionally related to this process of urbanization which process in turn can be visualized as a direct growth from the local rural pattern. The archaeological evidence suggests that urbanism in the Classic Maya society is lacking as a trait. The evidence from Uaxactun and Tikal, which are large ceremonial centers, and Tancah and Tierra Nueva and hundreds of other smaller similar ceremonial centers clearly demonstrates that the maximal population density or maximal population size of these centers was far below that of urban communities in Mexico today, or the contemporary urban center of Teotihuacan in Central Mexico. One of the most powerful forces of social integration of a large society is then lacking in the Maya area. Thompson has argued that the breakdown of Classic Maya society was primarily the result of the growing lack of identification of the rural population with their priestly leaders as the latter evolved a religious system increasingly divorced from the agricultural symbols and objectives of the supporting peasant population. If this were true, and considering the lack of other integrating forces, then the breakdown of Classic Maya civilization is understandable. Especially when such a trend apparently correlated with the ecological disaster that we have outlined in Part I.

All of the preceding leaves unanswered the one major question: Why did Maya civilization evolve in its ecological setting? We have demonstrated that it is exceedingly difficult to see any pre-civilizational pattern that may have operated within the region itself to produce the kind of a culture that we are calling civilization. The answer, I believe, lies in the broader patterns of growth of Mesoamerican civilization. In another paper I have discussed in detail the major points and will here briefly summarize them along with concepts of other recent studies.

1. Mesoamerica is a physically complex area and a large part of it (Oaxaca, Central Mexico, Highland Guatemala) were ideal areas for an ecological system to evolve with the essential characteristics that could have been the base for the evolution of civilization.

2. The complexity of the region and close propinquity of environmental strips made intensive trade between areas a necessity. Willey recently argued that the geographical complexity tends to channel the development of numerous sub-cultures and the mutual contacts between them tend to enrich the total pattern.

3. As the orbit of symbiosis expanded they included nearby tropical lowland areas and these were incorporated into the general Mesoamerican civilization.

4. Carneiro (1961) has recently demonstrated that slash-and-burn farmers in large, almost limitless areas of forest, tend to have "fronteristic" attitudes toward land use, and population density tends to be low and the growth of civilization is, therefore, retarded. In *circumscribed* areas the situation is different and the exhaustion of these smaller regions is quick, so that a filling in demographic process occurs with increasingly more efficient and more intensive patterns of a field rotation system. In Conklin's terms, an integral slash-and-burn system evolves. (1957.)

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