

LOWLAND MAYA FORTIFICATIONS

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THE PURPOSE of this paper is to review the evidence for, and implications of, Lowland Maya military architecture, particularly that *predating* the collapse of Classic Maya society at about 950 A.D. Apart from the pioneering work of Armillas (1951) and Palerm (1954) there has been no systematic analysis of Mesoamerican military architecture in general, let alone that of the Maya Lowlands. This neglect is particularly unfortunate because archaeologists are increasingly emphasizing warfare as a basic process in the evolution of complex societies—those which we label “civilizations” or “states.” This review of Maya fortifications constitutes a partial test of the hypothesis that warfare was an important factor in the evolution and structuring of Lowland Maya civilization (Webster, in press).

Considering the potential significance of warfare as both a process and symptom of socio-political evolution in the Maya Lowlands its identification in archaeological contexts is essential. Information indicating the presence of warfare in prehistoric contexts may be derived from a variety of sources, such as the analysis of prehistoric weapon-systems, representational art, and human osteological remains. Since, however, warfare is a systemic process I feel that data derived from settlement pattern studies have the greatest potential in determining its presence and implications. Inferences may be drawn from two basic dimensions of settlement pattern studies: (1) community location and patterning on the landscape; (2) functional analysis of configurations of individual sites. Proper inferences may only be drawn from the first category of information when settlement data concerning site patterning are both abundant and representative. At present data of this sort are lacking for most areas of the Maya Lowlands because of difficulties of doing intensive settlement surveys in a densely forested environment. The second approach, the analysis of defensive configurations at individual Maya sites, is followed here.

The identification and analysis of fortifications provides excellent positive evidence for the exist-

ence of prehistoric warfare in several respects. First, at least some vestiges of large-scale defensive systems, especially those consisting of masonry or earth, will be preserved almost indefinitely and are archaeologically quite visible. Defensive configurations are, moreover, usually sufficiently distinctive so that functional interpretations are straightforward. This is especially true in the Maya Lowlands where there are few natural features with defensive potential (e.g. rugged topography). Careful analysis of defensive systems provides information concerning the scale, intensity, tactics, and social organization of warfare—information which it is difficult to derive from other lines of evidence. Finally, the patterning of fortified sites on the landscape obviously has implications for widespread political and economic structuring.

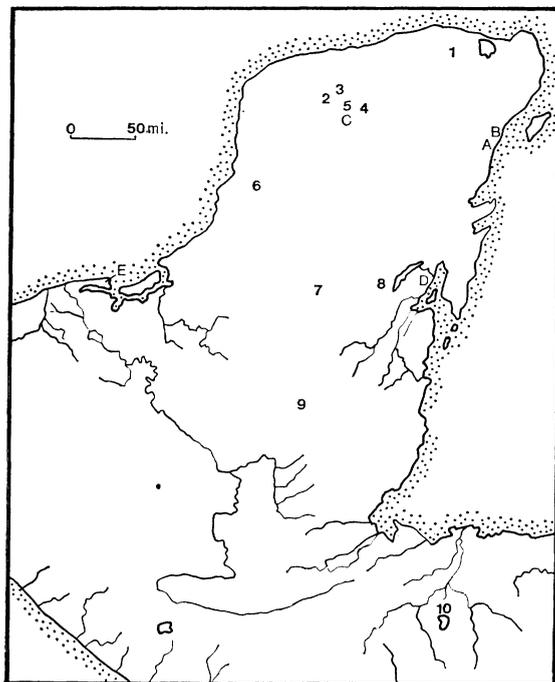
The following Maya sites, broken down by periods of construction, are either known to be fortified or possess constructional features which strongly suggest defensive barriers (map 1).

PRE-CLASSIC MAYA FORTIFICATIONS

During the Pre-Classic period of Maya prehistory, prior to about 250 A.D., the institutional foundations of Classic Maya society were laid, and it is in this period that we must seek the roots of warfare as a generative process. Unfortunately our knowledge of Pre-Classic settlement configurations is extremely limited; either these early settlements were so ephemeral that they have left few traces behind them or, perhaps more commonly, have been obscured or obliterated by subsequent construction.

LOS NARANJOS

Extensive earthworks which may represent the earliest fortifications in Mesoamerica were located during the French excavations at Los Naranjos, in the Lake Yajoa district of northern Honduras (Baudez and Becquelin, 1973). An earthwork system composed of ditch and embankments, approximately 1,300 m long, screens the eastern approaches to the principal, and earliest, archi-



MAP 1. Fortified sites in the Maya Lowlands. Numbered sites represent known or probable fortifications dated to the Pre-Classic or Classic Periods. Lettered sites are known to be late (Post-Classic—after ca. 1000 A.D.).

- | | |
|----------------------------|-----------------|
| 1 Dzonotake | 9 Tikal |
| 2 Cuca | 10 Los Naranjos |
| 3 Ake | A Tulum |
| 4 Chacchob | B Xelha |
| 5 Muna | C Mayapan |
| 6 Edzna | D Ichpaatun |
| 7 Becan | E Aguacatal |
| 8 La Victoria and Acatucha | |

tectural group at the site. At its northern end the ditch terminates near an extensive swamp, while the southern end approaches the lake shore itself (this pattern is reminiscent of the northern ditch at Tikal, which articulates at either end with large logwood swamps—see below). The ditch and embankment are variable in size throughout their length and are much eroded and silted up; judging from the published profiles (*ibid.*, fig. 30) the ditch was about 10 m wide and 7 m in depth, as measured from the top of the adjacent embankment.

Unfortunately only very limited attention was focused on the earthworks during the excavations at Los Naranjos, and their function remains in doubt. The excavators originally felt that the ditch was dug for drainage purposes, but no

water-laid deposits were found in its bottom, and the bedrock is too porous to hold water (*ibid.*, p. 53). They assign defensive functions to the earthworks largely, one feels, because no obvious alternatives present themselves. Nevertheless, there can be no doubt that the ditch and embankment formed a considerable barrier quite consistent with defensive considerations.

If the Los Naranjos earthworks are indeed fortifications their configuration indicates that they were erected not only to protect the major organizational center from an attack from the east, but also a considerable sustaining area. A second system of earthworks about 3,200 m in length was later erected still further to the east, protecting a sizable portion of the lake-shore plain.

Sherd collections from the original ditch have strong Olmec affinities (*ibid.*, p. 412) and relate to the Jaral Phase (800–400 B.C.), strongly suggesting construction during the middle Pre-Classic. The second embankment system was built sometime during the very long Eden Phase (400 B.C.–550 A.D.) and so may be of either Pre-Classic or Classic date.

BECAN

Only one defensive system pre-dating the Classic Maya collapse has been extensively examined—that at the site of Becan in southeastern Campeche, Mexico (Webster, 1972, 1974). Becan is a small center completely surrounded by a dry-ditch and parapet. The main component of the fortifications is a kidney-shaped ditch 1.9 km in circumference with an average width of 16 m and depth of 5.3 m. It encloses an area of 0.19 km². An inner parapet consisting of fill removed from the ditch was originally about 5 m high, and any enemy force attacking Becan would thus have faced a wide ditch backed by a vertical obstacle about 11 m in height. Access to the site was provided by seven causeways which are simply natural bridges of limestone left in position when the various ditch segments were excavated. Becan was also partially screened from attackers by extensive swamps on the northeast and southwest.

An enormous amount of labor was expended on the Becan fortifications. Approximately 117,000 m³ of fill were removed from the ditch and disposed of on the embankment or elsewhere, a project requiring an estimated 352,000 man-days of labor.

Ruppert and Denison (1943), who originally discovered Becan, felt that the ditch was meant to be a water-filled barrier. My excavations revealed that not only were there no water-deposited sediments in the ditch, but that its configuration and geological situation clearly rule out this interpretation. Nor does Pollock's borrow-pit interpretation fit (Pollock, 1965: p. 395). Becan is obviously a fortified center.

Over 33,000 identifiable sherds were recovered from contexts associated with the defensive system and provide the basis for a chronological placement of 100–250 A.D., or late Pre-Classic, for the fortifications as a whole. This date is somewhat earlier than that proposed in my previous publications (250–450 A.D.) and is based upon a slight realignment of the ceramic sequence as a result of further stratigraphic testing by Joe Ball, the project ceramist (personal communications). I would agree with this late Pre-Classic placement, although the fortifications certainly continued in use well into the Classic period. In fact there is evidence from both construction and sherd distribution that Becan was threatened or attacked during the Early Classic.

CLASSIC PERIOD FORTIFICATIONS

The Classic period (*ca.* 250–950 A.D.) currently constitutes a serious gap in our knowledge concerning Lowland Maya fortified sites. This is rather ironic since we have good evidence for large-scale military architecture for the bracketing Pre-Classic and Post-Classic periods. Two explanations come to mind. The first is that the Classic Maya were indeed as "theocratic," intellectual, and tranquil as many scholars have traditionally assumed, and that politically significant warfare was virtually absent. On the other hand the gap may be a product of insufficient archaeological research. In my opinion the second explanation is the correct one. Certainly the Classic period was characterized by patterns of development and stresses to which warfare may at once have been an appropriate response and stimulus; these include rapid population growth and probable population pressure, the appearance of numerous autonomous and potentially antagonistic political units with hereditary elites, and strong external pressures. Motifs relating to warfare are conspicuous in Classic Maya art and inscriptions. Under these circumstances the identification of a Classic tradition of military architecture is to be anticipated, and strong circumstantial

evidence does suggest that a number of classic sites were fortified.

BECAN AND LOS NARANJOS

Both of the sites previously discussed continued to be occupied throughout the Classic period. The Becan fortifications continued in use at least throughout the Early Classic, and the larger earthwork at Los Naranjos may be a Classic construction.

TIKAL

Puleston and Callender (1967) reported the existence of an extensive earthwork about 4.5 km north of the Great Plaza at Tikal. The earthwork consists of a ditch, cut down into the limestone bedrock, measuring about 4 m in width and depth. This ditch is backed by a rubble parapet, runs in a basic east-west direction across hilly and swampy terrain for a total distance of about 9.5 km, and terminates at either end near extensive logwood swamps which are themselves formidable natural barriers. Several causeways span the ditch, and at least one of them is wholly artificial.

Puleston and Callender originally speculated that the ditch was part of a canal system, as Baudez and Becquelin did for the Los Naranjos earthworks. But closer examination revealed that the configuration, topography, and porous bedrock ruled out this interpretation. The ditch is certainly too far from central Tikal to have conveniently functioned as a borrow pit. I am in complete agreement with their contention that the Tikal earthwork had defensive functions, especially because of its similarity to the fortifications at Becan.

Unfortunately only limited excavations were carried out on the Tikal earthwork and ceramic samples were rather small, reflecting, one supposes, the sparse population so far out from the center of the site. Good samples were derived from one of the causeways, and point to its construction between about 600 and 800 A.D. No terminal Classic or Post-Classic sherds were recovered (*ibid.*, p. 45). The ceramic evidence most strongly suggests a Late Classic date, but Early Classic (prior to 600 A.D.) construction certainly cannot be ruled out. It seems highly unlikely that any residual Post-Classic population could have mustered the labor to excavate the ditch, from which I estimate approximately 126,000 cubic meters of fill were removed. A comparable

earthwork has been found to the south of Tikal but has not been excavated.

The Tikal earthworks provide another example of defenses designed not to closely protect a densely populated civic and residential zone, as at Becan, but rather to screen an extensive sustaining hinterland. In this respect they closely resemble those at Los Naranjos.

CHACCHOB

The site of Chacchob, located in northern Yucatan about 20 km northwest of the modern town of Teabo, was mapped and quickly tested by Pollock and Stromsvik (1953). Several major architectural groups and numerous smaller constructions are surrounded by a rough stone wall with a width of 7–8 m and a height of 1–2 m. The wall system takes good advantage of natural rises in topography to enhance its strength (*ibid.*, p. 86) and may have been associated with a timber palisade. Chacchob is a compact site and the length of its defensive perimeter and enclosed area are almost exactly the same as at Becan—2 km and .19 km² respectively.

No dates are available for either the defensive system or interior architecture, but observable architectural elements seem to be in the Puuc style, which would indicate a probable range of 800–900 A.D., or Late Classic (Ball, 1974: p. 86). Existing ceramic collections from Chacchob, now in Merida, suggest a very long occupation, however, since Mamom sherds are present.

CUCA

Two concentric stone walls show up on aerial photographs at the site of Cuca, located approximately 20 km northeast of Merida to the north of the Chichén Itzà road in an area now devoted to henequin production (Kurjack, 1974). Cuca has never been mapped, but the inner wall encloses an area of about 6 hectares and 6–7 large architectural complexes, some of which reach a height of 15 m. The longer outer wall encloses a total area of 0.33 km² (Kurjack, personal communication). Although in ruined condition these walls definitely suggest massive defensive barriers; wall-rubble in sections I surveyed is about 7–8 m in width and 1–2 m in height, closely resembling the remains of the Chacchob wall.

No dates are available for any construction at Cuca, but some well-preserved architectural elements are visible and seem to relate to the late

Early Period (Late Classic), or Pure Fluorescent Period (*ca.* 800–1000 A.D.).

Similar features are conspicuous in aerial photographs of Aké and Muna, two other northern Yucatecan sites, but I have not investigated these features in the field and have no idea of their possible provenience. I suggest, however, that they are contemporary with Cuca. The wall at Aké seems to be only partially complete and may be a late construction, since it very obviously overlies several of the *sachbes* which are so numerous at that site.

DZONOTAKE

Roys and Chamberlain encountered an apparant ditch and parapet at the site of Dzonotake, which lies about 20 km northeast of Tizimin and about 1 km south of the present village of Dzonotake (Roys, 1943: p. 68). This is a small site, covering an estimated 4 hectares, but with 6–7 structures of respectable size (10–20 m in height). I observed a distinct, though much silted-up, ditch approximately 5 m wide on the northern edge of Dzonotake, with extensive rock rubble along its inner edge, suggesting a parapet. Because of the extremely dense vegetation (more closely resembling that of the Petén than northern Yucatan) I was unable to trace these features for more than a few hundred meters, but they may completely surround the site and certainly look like defensive barriers. No dates are available, no ceramic collections having been made (my permit allowed none) but the massive architecture suggests an early provenience. Judging from the unusually dense and well-preserved surface sherds Dzonotake had a long occupation, and I feel the earthworks will probably turn out not only to have had defensive functions, but will fall somewhere in the Classic period.

EDZNA

Matheny (n.d.) identified possible defensive earthworks associated with an extensive, and at least partially artificial drainage system south of Edzna, in western Campeche. Hopefully recent work at that site will substantiate his assertion that these are indeed fortifications. If so, they will be *at least* of Classic age, if not older, to judge from the architecture at Edzna itself.

LA VICTORIA AND ACATUCHA

During his surveys in southwestern Quintana Roo, Harrison (n.d.) discovered two ridge-top

sites, La Victoria and Acatucha, which are apparently associated with wall systems. Both sites lie to the north of the Escarcega-Chetumal road, respectively 46 km and 29 km west of Chetumal. Neither the sites nor the wall systems have been dated, but this area is typified by heavy concentrations of Early Classic material (*ibid.*, p. 12) and lies only 30–50 km due west of Becan where, as noted above, massive fortifications were certainly in use during the Early Classic.

POST-CLASSIC FORTIFICATIONS

Both ethnographic and archaeological evidence abundantly documents widespread militarism in the Post-Classic (after 950 A.D.), at least partly influenced by intrusions from elsewhere in Mexico, especially the Central Highlands and the Gulf Coast. Several fortified archaeological sites have long been known for the Post-Classic, and have been frequently and fully described in the literature. They will be only briefly reviewed here.

TULUM

Perhaps the best-known fortified Maya site is that of Tulum, on the coast of Quintana Roo (Lothrop, 1924; Sanders, 1960). A major system of dry-laid stone walls defends three sides of the site, the seaward side being practically inapproachable because of precipitous limestone cliffs. The so-called Great Wall runs parallel to the coast (N-S) along the landward perimeter of the site for a distance of 400 m. Two shorter walls, measuring about 170 m, run between this long section of the Great Wall and the sea on the north and south. The total walled zone measures about 7 hectares, and all of the major architectural complexes at the site lie within it. Another smaller and less impressive wall system protects a 5-hectare area just to the south of the Main Enclosure, and a series of stone breastworks crisscrosses the rocky cliffs still further south (Sanders, 1960: p. 175).

The Great Wall at Tulum is of impressive size—about 8 m wide and 3–4 m in height. It is by far the most massive constructional feature of the site; one gets the distinct impression that more labor and material went into the wall systems than into all the civic, domestic, and ceremonial architecture combined. Obviously defense was a prime consideration.

Lothrop originally assigned Tulum to the period of 1201–1458 A.D., thus making it contemporary

with Mayapan's dominance of northern Yucatan. Sanders's ceramic seriation (1960: pp. 184–185) reinforced this view and suggested that Tulum was occupied intensively only for about 200 years, and largely abandoned only 50 years before initial Spanish contact.

ICHPAATUN

A site with striking architectural similarities to Tulum is Ichpaatun, located in southern Quintana Roo just north of Chetumal. Sanders notes that "Like Tulum the enclosed area is rectangular with the long axis parallel to the beach and is surrounded by three walls, the east side being delimited by the sea" (1960: p. 203). The wall system protecting Ichpaatun has a total length of about 1,470 m and encloses roughly 27 hectares. Despite the large size of the enclosure the internal architecture is quite unimpressive when compared with Tulum. Even more than at Tulum one gets the impression that most available construction labor went into the defensive system. As at Tulum the wall consists of dry-laid stone piled up to an average height of about 3 m, with a width of 4–5 m.

Although a Classic stela was found at Ichpaatun bearing a Long-Count date of 9.8.0.0.0. 5 Ahua 5 Chen, and there is a small scatter of Classic pottery as well, Sanders (*ibid.*, pp. 203–207) points out that ceramic correspondences between Ichpaatun and Tulum are extremely close. This fact, together with the very similar lay-outs of the two sites, suggests that the fortifications should fall roughly into the period between 1200 and 1450 A.D. Gann suggested that Ichpaatun was actually the city of Chetumal, which apparently endured as an important center of commerce until late in the sixteenth century, but Scholes and Roys (1948: pp. 83–86) feel that Ichpaatun was abandoned before Spanish contact, thus reinforcing Sanders's view.

XELHA

Only a few kilometers to the north of Tulum lies the site of Xelha, which occupies the tip of a small peninsula jutting out into the sea (Lothrop, 1924). The landward side of the peninsula is crossed by a low stone wall 2–3 m in height and 0.042 km in length. The area enclosed is only 0.04 km² and contains little monumental architecture. The Xelha lagoon is deep and well protected, offering excellent access to the site by sea.

AGUACATAL

The site of Aguacatal (Matheny, 1970) is located on a peninsula jutting out into the Laguna de Terminos, near the southwestern border of the Lowland Maya culture area. Several large architectural groups are scattered over the peninsula, the tip of which is cut off from the rest of the site by an embankment over 600 m in length, forming an isolated compound of approximately 50 structures called the Ciudadela. Sections through the embankment indicate that it was constructed mainly of earth and shell, and is about 8 m in width and 2 m in height. Although Aguacatal is a fairly compact site, only a portion of it is defended by the earthworks, apparently offering a refuge to the bulk of the population.

Aguacatal experienced a very long sequence of occupation, dating back at least to late Pre-Classic times. There was an apparent decline in population at the end of the Classic (*ibid.*, 121), but Aguacatal retained some importance, perhaps due to its convenient location *vis-à-vis* long-distance trade (see below). To judge from the ceramic distribution the embankment delineating the Ciudadela is entirely of Post-Classic construction.

MAYAPAN

The great Post-Classic center of Mayapan is perhaps the best-known fortified site in the Maya lowlands, and the most urban in its configuration (Shook, 1952). Mayapan is completely surrounded by a low stone wall 1.5–2.5 m in height, and fully 9.1 km in length. This outer wall should perhaps be regarded as a breastwork rather than a full-fledged protective wall. A second low wall delimits the ceremonial precincts of Mayapan, and could have offered a second line of defense, as could the numerous interior walls defining residential compounds.

In addition to the archaeologically known defensive systems described above, early Spanish accounts clearly indicate that many Conquest-period sites were fortified. Champoton was apparently walled and Cortez encountered several communities strongly fortified with ditches and palisades during his march through the Cehache country to the north of Lake Peten Itza (Scholes and Roys, 1968: pp. 70, 325). Tayasal, the Itza capital in the lake region of the northeastern Peten, was located on an island (as yet unidentified) and while not formally fortified was certainly in a defensible position.

Before considering the implications of the defensive systems described above several points should be made about the present state of our knowledge of Maya military architecture. First, as Puleston and Callender point out (1967: p. 48), this knowledge is undoubtedly limited more by insufficient archaeological exploration than any paucity of fortified sites themselves. Many more remain to be found. At Calakmul, for example, Ruppert and Denison (1943) identified a long wall fragment on the periphery of the site which could be the remains of a defensive barrier (although they did not offer this suggestion). The concentric wall systems at Cuca were only recently recognized even though the site has been known since 1942 and is in cleared country. I can well imagine they might never have been noticed in heavily forested country. Saenz (1972) has even suggested that the great Pure Fluorescent center of Uxmal may have been fortified.

Second, the obvious lack of fortifications at many Maya sites cannot be taken to indicate a lack of warfare in the wider society. In fact the decision to erect formal fortifications is only one of many appropriate responses when the need for community defense arises (see Rowlands, 1972, for a detailed discussion of defensive considerations). Many large architectural structures built for other purposes had defensive potential. The temple-pyramid was literally and symbolically the last redoubt in many Mesoamerican communities, and long range structures such as found at Uxmal and Palenque would have been highly defensible. In some cases Maya centers were defensible for topographic reasons, as Hammond (1974: p. 316) notes for Lubaantun.

IMPLICATIONS

The military architecture reviewed above has a number of implications concerning patterns of Maya warfare. First of all, warfare was a potent political force, motivating as it did enormous expenditures of energy to produce formidable defensive systems. Moreover, inter-group conflict certainly was not confined to mere raiding for slaves or sacrificial victims as has sometimes been maintained. More formal, large-scale military operations are implied by the massive size of some of the fortifications, especially at Becan. We know that the Post-Classic Maya were capable of fielding forces numbering in the thousands (e.g. see Diaz, 1963) and there is no reason to maintain that their ancestors lacked this capability.

This is not to suggest that the quick, sharp raid was not an important tactic in Maya warfare; in fact such raids could have been timed to disrupt the delicate agricultural cycle of an enemy group, or quickly to kill or capture elite personnel at enemy centers. The point is, of course, that the scale, intensity, and tactics of warfare are not directly related to its political effects. Such raids may have been particularly suitable since the Maya, lacking beasts of burden, probably faced logistical problems in prolonged operations in enemy territory. These same difficulties would, of course, have made protracted sieges impossible, thus increasing the efficacy of fortifications.

None of the Maya defensive systems so far discovered is particularly sophisticated as pre-Colombian military architecture goes. This may be partly a result of the general lack of naturally defensible positions which are such valuable adjuncts to highland fortifications. Even so, multiple lines of defense such as surrounded the impregnable Aztec fortress of Oztuma (Armillas, 1951: pp. 81-82) are usually lacking, except perhaps at Cuca, as are the projecting bastions of the Chimu fortress of Paramorga in the Fortaleza Valley of Peru (Robertson, 1968). In some cases, such as Becan, this lack of sophistication is counterbalanced by the sheer size of the defensive barriers. Multiple lines of defense may have been unnecessary since long-range weaponry was probably rather poorly developed among the Maya, especially in Classic and Pre-Classic times.

Although lowland fortifications are often dwarfed by their highland counterparts, it must be remembered that most Maya polities were quite small in comparison to highland states, and possessed correspondingly small labor resources. But by the same token military forces were no doubt also restricted in size, and the fortifications de-

scribed above seem appropriate defensive adjustments within the context of Maya warfare.

It will be noted that most of the known fortified centers themselves are quite small (see table 1), often under 1 km² in area. Many large centers may have found defensive systems unnecessary, possessing as they did demographic superiority over potential enemies and also extensive sustaining areas which would have had to be penetrated by attacking forces, resulting in considerable advanced warning. Small centers, on the other hand, would have had no such advantages. Fortified centers would have partially compensated for the small size of defending forces and the shallow outlying population screen, and may have served as refuge areas in times of trouble. Mayapan and Tikal are major exceptions to the general small size of fortified centers, but both are rather anomalous. The Mayapan wall is rather insignificant as a defensive barrier, but given the urban densities which apparently characterized this center the potential number of defenders was huge. The Tikal ditch was not intended to be long defended, but merely to delay enemy thrusts and allow time for appropriate counter-measures.

When fortifications seemed warranted the Maya resorted to two basic defensive strategies. The first was to erect defensive barriers which screened sustaining areas as well as centers themselves, a pattern seen at Tikal and probably at Los Naranjos. Such strategy was most feasible, as we have seen, for large, densely populated regions with sizable labor and military resources. Defenses of this type are particularly difficult to locate since they may be far from concentrations of large civic architecture. Note that the Tikal ditch was not recognized until very recently, despite the fact that it was crossed for years by

TABLE 1*

Site	Area	Perimeter	Mass	Critical Width	Critical Depth	Perimeter/Mass
Tulum (Great Wall)	0.067 km ²	0.7 km	20,720 m ³	6 m	3-5 m	1:18
Xelha	0.04 km ²	0.042 km	483 m ³	6 m	2.6 m	1:11.5
Tikal (North Earthwork)	—	9.5 km	126,350 m ³	12 m	6.2 m	1:14
Chacchob	0.19 km ²	2 km	17,000 m ³	4-5 m	2 m	1:9 (+stockade?)
Becan	0.19 km ²	1.9 km	117,600 m ³	30 m	11.6 m	1:62
Mayapan	4.2 km ²	9.1 km	60,000 m ³	2.5 m	1.5-2.5 m	1:6.5
Ichpaatun	0.27 km ²	1.47 km	19,925 m ³	4-5 m	3 m	1:13.5
Aguacatal	0.20 km ²	0.6 km	5,400 m ³	8 m	2 m	1:9

* Most of the figures in this table are my approximations calculated from dimensions given in previously cited published reports concerning the various sites, or based upon my own field observations of Lowland Maya fortifications.

every visitor (including archaeologists) to Uaxactun. A second strategy was to fortify individual sites strongly, either with a continuous surrounding defensive barrier, as at Becan or Chacchob, or one strengthening a position already partially defensible for topographic reasons, as at Aguacatal and Xelha.

Two basic construction techniques seem to have been favored. Perhaps the most effective was the earthwork system, consisting of a deep barrier ditch backed by an inner embankment. Earthworks of this type have a number of advantages. No architectural sophistication is necessary for their construction and they do not consume large amounts of valuable commodities such as stone or timber. They do not rely upon naturally strategic positions but can be erected wherever soil, bedrock, and water-table conditions allow suitable excavation. Earthworks can be completed quickly and adapted in size and configuration to any military circumstances. Unlike timber stockades they are not burnable. They are superior to walls in that the juxtaposition of ditch and embankment produces an in-depth defense (see fig. 2). Interestingly enough, the earliest known Maya fortifications, Los Naranjos, Becan, and Tikal, were all built in this manner.

A second strategy was to protect a site with a dry-laid stone wall of varying height. All known Post-Classic fortified sites except Aguacatal (where stone was not commonly available) were of this type.

Either strategy or technique of fortification may have been used in conjunction with natural barriers (such as the swamps on the outskirts of Tikal and Becan) or with natural features which enhanced the artificial barrier. The Chacchob wall, for instance, takes good advantage of local outcrops of bedrock to, in effect, increase its height, while the Mayapan wall does not. Similarly timber stockades ("tulumche" in Maya) may have strengthened fortifications of either type, with variable results. The Chacchob wall would have been enormously enhanced by such a stockade, while the Becan earthworks would not. Perhaps small centers were protected by timber stockades alone.

Some idea of the comparative defensibility of various sites can be seen in figure 1 which contrasts average cross-sections of various Maya fortifications so that the vertical and horizontal barriers presented to an enemy are apparent. The superiority of the ditch embankment strategy is

evident. Notice that the most effective barriers are those of Becan and Tikal, which are also the earliest shown. Figure 2 shows a reconstructed section of the Becan fortifications including one of the seven causeways providing access to the site.

Table 1 compares six crucial variables for eight fortified lowland Maya sites: *area* (the area delimited by natural or artificial barriers); *perimeter* (length of artificial defensive components); *mass* (total amount of material moved during construction); *critical width* (average width of the horizontal obstacle presented to an enemy); *critical depth* (average vertical obstacle presented to an enemy) and a *mass/perimeter* ratio (mass of artificial material protecting a given length of perimeter—in this case cubic meters of material per meter of length). Except for Becan many of these values are only rough approximations, but will serve the purpose of gross comparison.

Again the superiority of the ditch embankment systems is striking. The early earthwork systems, Becan and Tikal, are extraordinarily massive when compared to the Post-Classic wall systems (Tulum, Xelha, Mayapan). An estimated 10,000 man-days of labor went into the Becan system (Webster, 1972: pp. 269–270). This scale of labor expenditure is surprisingly high for what is, by Maya standards, a comparatively small center. Only the Tikal earthworks eclipse those at Becan, and only to a small degree. Except for Mayapan and, of course, Tikal, none of the fortified centers exceeds half a square kilometer in area; most are less than half this size.

The distribution of the fortified sites shown in figure 1 reveals what may be significant geographical patterning. All archaeologically known fortified Post-Classic sites, with the exception of Mayapan, are coastal centers. Three are on the eastern coast of the Peninsula, an area always somewhat underpopulated in Classic times. Ichpaa-tun, Tulum, and Xelha are thus strung out along a sea route up the east coast which we know was a major axis of trade, and perhaps pilgrimage, in late Post-Classic times (Scholes and Roys, 1948: p. 30). Aguacatal, on the Xicalango Peninsula, was conveniently situated to dominate trade routes involving the Usumacinta and Candelaria drainages. The former river system was a main route of communication with the Guatemalan highlands, while the latter was an important axis of trade between the British Honduras-Petén region and the Gulf Coast (Matheny, 1970: pp. 119–120).

Overland trade also took place across the base of the Peninsula, and several towns along this route encountered by Cortez, such as Potonchan in Tabasco, were defended by various sorts of fortifications (Scholes and Roys, 1948: pp. 36-37). All of the known fortified Post-Classic centers except Mayapan were, then, very probably strongholds of what Sabloff *et al.* (1972: p. 403) have called ". . . a new merchant elite who rapidly rose to a position of economic and political ascendancy from Tabasco to the East Coast."

Perhaps one of the most significant potential contributions of the study of Maya fortifications lies in its implications concerning political geography. The application of locational analysis models to Maya settlement patterns is still in its infancy (Hammond, 1974) and is still hampered by inadequate settlement data, both distributional and chronological. If warfare was among the processes which produced and perpetuated autonomous, hierarchically organized Maya polities,

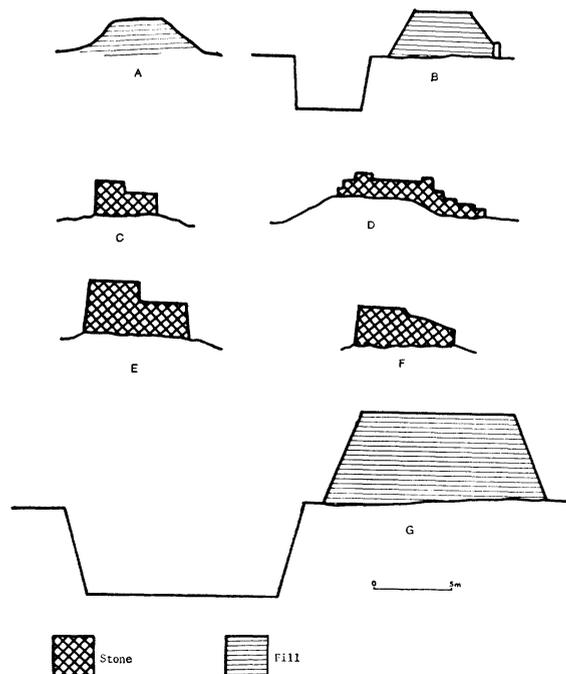


FIG. 1. Comparative cross-sections of various Maya fortifications. (A) Aguacatal (after Matheny, 1970); (B) Tikal (my reconstruction after Puleston and Callender, 1967); (C) Mayapan (after Shook, 1952); (D) Chacchob (after Pollock and Stromsvik, 1963); (E) Tulum (Great Wall only—after Lothrop, 1924: p. 70); (F) Xelha (*ibid.*, p. 134); (G) Becan—reconstruction based on averaged measurements taken during the 1970 season.

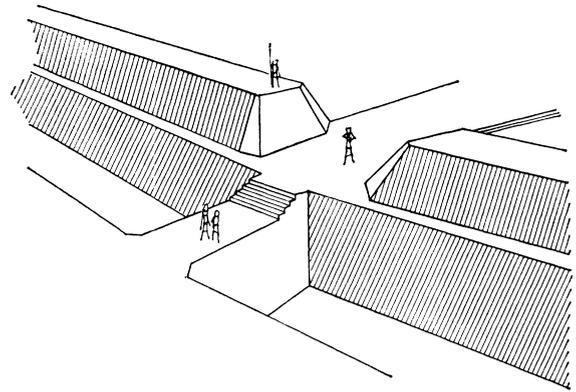


FIG. 2. Reconstructed cross-section of segment of the Becan defensive system, showing causeway, ditch, and embankment.

and if military architecture commonly occurred, then the distribution of fortified centers is an important key to overall political structuring. Unfortunately the existing evidence is too sketchy to be used in this fashion. Known fortified sites are not closely juxtaposed, with the exception of the probably contemporaneous Cuca-Aké-Muna concentration in northwestern Yucatan.

A major point of interest is that defensive arrangements give us valuable insights into one of the thorniest problems faced by the Maya archaeologist—how does one delimit a Maya site? The construction of defensive barriers by the Maya themselves provides us with at least a partial "emic" solution to this question. Most of the known fortifications protect relatively restricted zones heavily built up with monumental civic architecture; these same zones seem not to have been occupied to any degree by anyone except elite personnel and their immediate retainers. The major exceptions to this pattern are the earthworks screening Tikal's hinterland, and perhaps that of Los Naranjos, and the wall encircling the urban zone at Mayapan. Fortifications, then, were usually intended to protect centers of *organization*, not of *population*, and by inference the elite decision-making personnel who resided within them. They were not designed to protect a community, if by "community" we imply Willey and Phillips's definition of a *site* as an area ". . . fairly continuously covered by remains of former occupation" (1958: p. 18).

At Becan, for example, there are numerous outlying domestic structures quite close to the ditch, but the ditch itself was carefully positioned

to enclose *only* the civic architecture (only a handful of house-mounds of uncertain date lie within this precinct). If Adams's (1974) calculations for the elite population of Uaxactun are even remotely correct, this defensive strategy would directly protect, then, only a small elite population numbering, say, in the few hundreds. Needless to say those directly protected were not responsible for the enormous earthwork system at Becan (or the walls at other sites) except in a managerial capacity—labor was recruited from the sustaining hinterland. Nor would the elite population of Becan, or the other centers of comparable size, have been capable of successfully defending, for any length of time, long defensive perimeters against determined enemies. Rather the organizational centers would have acted as shelters for refugees who would become defenders once inside the barriers.

Maya defensive strategy thus represents a compromise response to the problem of defending a sustaining population in an environment in which a basic defensive tactic—community nucleation—was either impossible or impractical. What was protected was not the bulk of the population, but rather the organizational apparatus around which that population could rally and which could formulate effective military counter measures. It follows that the organizational apparatus was itself a prime target, that a primary managerial role of at least some of the Maya elite was of a military nature, and that the organizational center was the heart of the Maya community in strategic terms. Interestingly enough although there are Maya fortifications there are no Maya forts, in the sense of sites with purely defensive, military functions.

The major implication to be drawn from the above discussion is that, judging from the presence of military architecture alone (quite apart from converging or reinforcing lines of evidence), large-scale warfare characterized Maya society throughout most, or even all, of its developmental sequence. In fact, if military architecture is our criterion of judgment, the lowland sequence appears more highly dominated by warfare than that of the supposedly more militaristic highlands, where the first formal military architecture only appears at Xochicalco sometime in the ninth-tenth centuries A.D. (Armillas, 1951: pp. 81–82; William T. Sanders, personal communication). It is hoped that we can now discard the old concept of a peaceful, theocratic Classic Period

in opposition to a militaristic Post-Classic tradition—a concept which has long been suspect but which has maintained a surprisingly tenacious hold on the minds of some archaeologists (e.g. see Voorhies, 1973: p. 488).

As I have suggested elsewhere (Webster, in press) there were operating throughout the Maya developmental sequence processes (e.g. population growth and expansion, resource limitation, differential access to wealth, etc.) which would have generated an intensely competitive social environment. Warfare may thus be seen as primarily an internal process, and the application of a general competition model (Webster, 1975) has great potential in investigating and explaining the emergence of the hierarchical aspects of Maya culture.

Conceptually apart from these internal processes, but ultimately inseparable from them, are a number of stress-points or periods which, seen from the culture-history point of view, may be correlated with unusual levels of military activity. These include:

1. The rapid population of the late Pre-Classic (Chicanel Horizon).
2. Proto-Classic intrusions at some centers.
3. Teotihuacan influence, whether early (as suggested by Pendergast, 1971) or concentrated in the fifth–sixth centuries at major sites such as Tikal.
4. Expansion of the Classic “elite syndrome” after 500 A.D.
5. The hiatus of the sixth century A.D.
6. “Foreign” intrusions in the Usumacinta-Pasion drainages in the eighth–ninth centuries A.D.
7. Collapse of the core area in the ninth–tenth centuries A.D.
8. Fluorescence of the Puuc centers between about 800 and 1000 A.D.
9. Toltec intrusions of the tenth century A.D.
10. Rise of Mayapan hegemony.

While still fragmentary then, our present knowledge of Lowland Maya fortifications strongly supports the hypothesis that warfare was an integral component in the process of the evolution of Maya culture, its socio-political structuring, and the eventual collapse of its Classic manifestation.

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