

Xochicalco: Urban Growth and State Formation in Central Mexico

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Archeological research in Central Mexico has for several decades been concerned with the question of state origins and the emergence of urban life at Teotihuacán (1). Although more is known now about the origins of some institutions, the mechanisms propelling the spread of urbanism throughout Central Mexico are still obscure. Teotihuacán was one of the largest pre-Hispanic cities in the New World, but it did not

Mayan colony (4), an early military fortress (5), a religious shrine and center of origin for the Quetzalcóatl cult (6), and even as the fabled Tamoanchan, the earthly paradise of Nahuatl mythology (7). Archeologists have disagreed even about major episodes of occupation and whether Xochicalco became a major center before (8), during (2), or after (9) the florescence of Teotihuacán culture in the Valley of Mexico.

Summary. The appearance of regional city-states in pre-Hispanic Central Mexico corresponds with the disruption of socioeconomic relationships throughout Teotihuacán's political domain after 650 A.D. Surface reconnaissance and mapping at Xochicalco provided information on the growth and organization of one of these urban centers. The data indicate that Xochicalco was a well-planned urban center and capital of a regional city-state that extended its domain throughout western Morelos by military conquest.

foster the appearance of urban centers within its political domain. Urbanism did not spread throughout Central Mexico until after Teotihuacán's political decline during the Epiclassic period (650 to 900 A.D.). Examination of the growth and organization of Xochicalco, which was one of the first independent urban centers to appear during the Epiclassic, should contribute to an understanding of pre-Hispanic urban processes.

The cultural origins of Xochicalco have been debated by historians since the late 18th century. Some have suggested that Xochicalco was important primarily as a center of long-distance trade with mercantile contacts ranging into Guerrero (2), Oaxaca, the Gulf Coast, and the Maya lowlands (3). Xochicalco has been characterized as a

The Xochicalco Mapping Project (10) was initiated in 1978 to study the development of urban-state political systems into the western part of the state of Morelos. There were three goals: (i) to map and establish the size of Xochicalco in each of its major developmental periods; (ii) to explore the site's architectural design as a means for investigating its internal sociopolitical organization; and (iii) to obtain data regarding Xochicalco's role in social, political, and economic systems throughout western Morelos. The new information presented on Epiclassic urban development at Xochicalco is based on a synthesis of regional settlement data collected from the Coatlán region 15 km southwest of Xochicalco (11) and a refined ceramic chronology (12).

Regional Environment

Xochicalco is located in a group of low mountains in the western Valley of Morelos, 60 km southwest of modern Mexico City (Figs. 1, 2, and 3). The Valley of Morelos is essentially a series of small parallel valleys where many rivers flow within deeply incised canyons and good alluvial farmland is limited. The climatic zone is the subhumid *Tierra Templada*, with precipitation that was normally adequate for productive pre-Columbian agriculture. The climate would have supported a semitropical woodland zone with high soil humidity and a grassland-thorn forest with a low subsurface water table and poor humidity retention.

Xochicalco is located in one of the poorest agricultural regions in the state, which suggests that control of agricultural productivity was not a critical factor for internal stratification processes at the site. Soils tend to be thin, rocky, or coarse-grained deposits formed from Pliocene conglomerates; they have poor moisture retention and are generally between 10 to 45 cm in depth. Only a few hectares of good alluvial bottomland are found within a 5-km radius of the site, and these are confined to the sharply incised channel of the Tembembe River. The majority of agricultural land is 100 to 150 m above the water table of the Tembembe and does not support seasonal agriculture without periodic fallowing. The hillsides are unsuitable for agriculture today, and much of the upland valley northeast of the site has not been under cultivation since the early 16th century (13).

Settlement Survey

To establish the demographic limits of Xochicalco, traces of perishable domestic structures as well as stone masonry construction used in large civic and ceremonial structures had to be recorded. Fifteen square kilometers were surveyed to identify the outer edge of domestic

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residence and to estimate the intensity of small settlement clustering in the immediate vicinity of the site (14). The area was subdivided into small segments and surveyed on foot. The survey began at the summit of Cerro Xochicalco and followed the distribution of residential debris into the surrounding area. Because of a long tradition of site conservation in Mexico, architectural features on all the residential terraces had been preserved. Also, the site had never been plowed, allowing the mapping of in situ residential architecture. On Cerro Xochicalco all visible architecture such as house walls, exposed floor zones, patios, mounds, and platforms were mapped at a scale of 1:200.

A total of 1401 surface collections were made by a combination of techniques. These collections were phased into one of seven chronological periods established by Guillén for western Morelos (12). Establishing an accurate chronology was challenging since regional ceramic assemblages in western Morelos often differ significantly from the better known Valley of Mexico sequence. The period designations used here are based on Guillén's analysis of stratigraphic materials from 6 sites excavated in western Morelos during 1976 and 1977 by the Proyecto Coatlan (15).

Cultural Development at Xochicalco

The earliest occupations at Xochicalco date to the Middle and Late Formative periods when the population was concentrated in a few small settlements overlooking the Tembembe River. Two small Middle Formative hamlets (500 to 900 B.C.) covering 0.21 ha were located on the river's lower alluvial terrace west of the site's ceremonial precinct (15). Middle Formative groups in western Morelos favored locales with rich agricultural bottomland where a high subsurface water table made year-round agriculture possible with the aid of small-scale irrigation techniques. The area and density of settlement increased during the Late Formative period (500 B.C. to A.D. 200), and communities shifted from the narrow alluvial terraces into the arid upland valley above the Tembembe River. Settlement covered a total of 5.5 ha with the majority of population located in two small villages at Tlacuatzingo and location TF-175/175 (15). The appearance of communities in the broad arid upland valley is an important demographic shift found throughout western Morelos and reflects an increased reliance on rainfall agriculture during this period.

Population grew during the Classic period (200 to 650 A.D.) although the data

indicate that Xochicalco did not develop into a major urban center at this time. The Classic occupation covered 31.94 ha, 80 percent of which was at Tlacuatzingo south of the ceremonial zone (Fig. 3). Elsewhere throughout the site population was divided into small groups that were scattered across the landscape. No evidence of dense population clustering on the sides of Cerro Xochicalco was recovered during the survey. A thin veneer of residential debris was recovered from only 4 ha on South Hill indicating a dispersed settlement pattern. While subsequent Epiclassic occupation was relatively dense it did not cover the slopes of Cerro Xochicalco with a thick continuous deposit of architectural or artifactual debris, or both, which would prevent identification of a substantial earlier occupation if one was present.

Test excavations in 1977 showed that several small temple mounds were constructed at Tlacuatzingo; they are the only public architecture within the Xochicalco archeological zone that can be dated to the Classic period. All of the monumental buildings excavated by other investigators in the ceremonial zone lack Classic period substructures or have Epiclassic debris in the fill (16). Saenz (17) established that the Temple of the Plumed Serpent, perhaps like many other important Epiclassic monuments in the ceremonial zone, was constructed directly on bedrock without underlying Classic deposits present. While early mounds could have been demolished during the expansion of the ceremonial zone during the Epiclassic period, it is expected that some debris would have been incorporated in the fill of later constructions, as was found at Temascal (18). Finally, all Teotihuacán-style ceramics recovered from architectural contexts are late variants corresponding to Metepec materials (650 to 750 A.D.), which postdate the period considered here. Although Middle Classic materials recovered from the Offering Chamber of Edificio A are often cited as evidence for contemporaneity with Teotihuacán (2), these earlier excavations produced a potpourri of materials, including foreign trade goods and local Epiclassic ceramics (19), indicating that the Teotihuacán materials were probably cultural heirlooms. If Classic period architecture is found in the ceremonial core, it is likely to be of modest proportions.

Xochicalco grew rapidly at the start of the Epiclassic (between 650 and 900 A.D.), reaching its maximum area of 4 km² midway through the period. The top of Cerro Xochicalco underwent extensive architectural remodeling and became the site's administrative and cere-

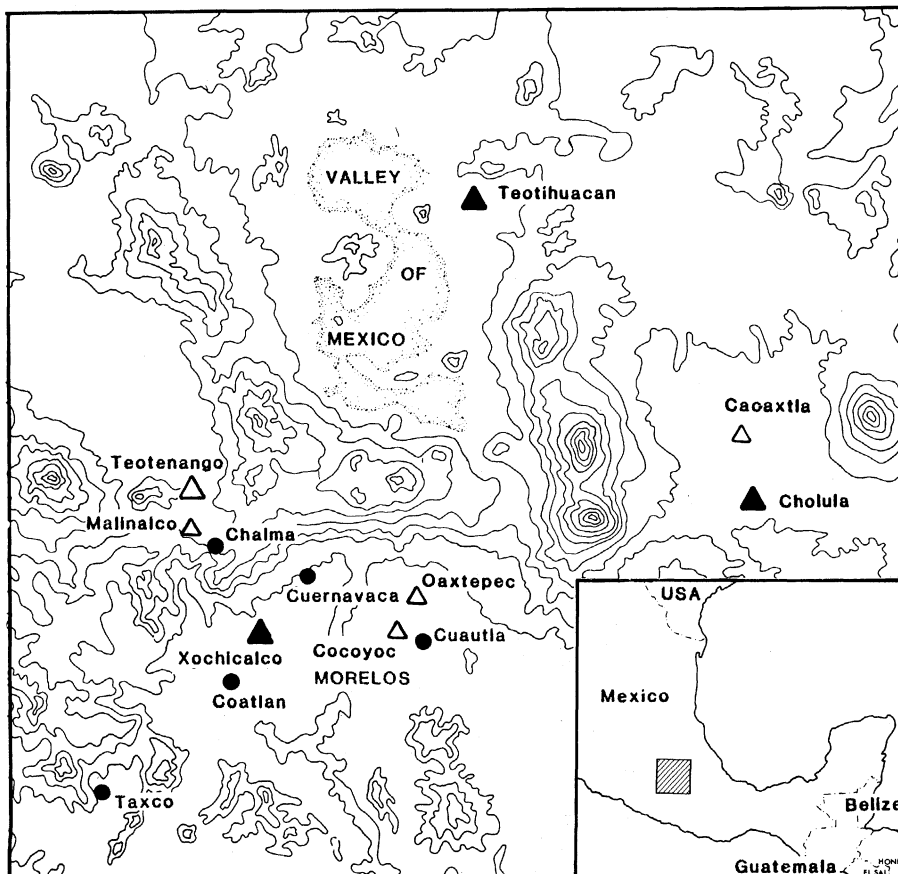


Fig. 1. Location of the Xochicalco Mapping Project in Mesoamerica. Triangles represent archeological site and circles represent modern cities.

monial center (Fig. 4). Almost all of the monumental architecture visible today was constructed during this period. Because of irregular topography roughly half of the area consists of unoccupied hillsides, precipitous cliff faces, or irregular river and barranca drainages. Reconnaissance and mapping located remnant architecture and artifactual debris on only 2.04 km², which represents the actual area covered by resident population and freestanding architecture. Completed analysis suggests that 63 ha, or 31 percent of the total site area, were reserved for nonresidential and elite purposes. The total nonelite residential area at Xochicalco was 1.41 km², more than four times that found in the preceding period. The ratio of domestic space to the area occupied by special purpose or elite architecture is roughly 2:1. The percentage of the site devoted to special purpose or elite architecture was considerably higher than that at many ethnohistorically known urban centers in Central Mexico and suggests that Xochicalco was built primarily as a regional ceremonial and administrative center. Nonelite residences are found on the intermediate and lower slopes of Cerro Xochicalco, the adjacent northern plain, and at Tlacuatzingo south of the ceremonial core. Population crowding only occurred on

the upper residential terraces of Cerro Xochicalco, where it is often difficult to identify where one residence starts and another ends.

Survey of 4 km² east of Xochicalco provides an impression of rural settlement density in the immediate vicinity of the site. Only a single village site was found on the top of Cerro Jumil overlooking the Sabinos River. The absence of small sites across the arid upland plain suggests that Xochicalco did not attract, forcibly relocate, or rely on large segments of the regional population in its immediately surrounding hinterland. Settlement reconnaissance in the Coatlán region indicates that the population resided on elevated or easily defensible areas overlooking good alluvial bottomland where multicropping was possible with the aid of small-scale irrigation systems. Analysis of ceramic, lithic, and architectural data suggest that the Coatlán region was incorporated into Xochicalco's socioeconomic sphere and was part of a broad regional state covering much of western Morelos and neighboring portions of Guerrero. Rural groups appear linked to Xochicalco through regional administrative centers which supplied resources and may have paid tribute for the construction and maintenance of the large urban center.

Epiclassic Architectural Organization

Excavations and surveys during the past four decades have clarified some of the main characteristics of the early Xochicalco community. Specific architectural components investigated include temples, administrative buildings, ball courts, elite residences, streets, military defenses, and caves associated with a subterranean observatory (3, 5, 19, 20). Mapping of the preserved architecture reveals that the Cerro Xochicalco complex was organized and built following a carefully designed urban plan. The summit of Cerro Xochicalco was artificially flattened and large sections of natural bedrock were mined away to form open plazas or broad terraces where the site's most impressive monuments were constructed. The hilltop location posed a number of constraints on how space could be used and how different functional areas could be articulated with one another. The problems and irregularities of hillside terrain were overcome by designing the site as a series of five superimposed concentric circles (Figs. 2 and 5). Each level is an artificial terrace supporting either administrative or domestic structures. The central two rings of the design correspond to the uppermost portions of the site and were re-

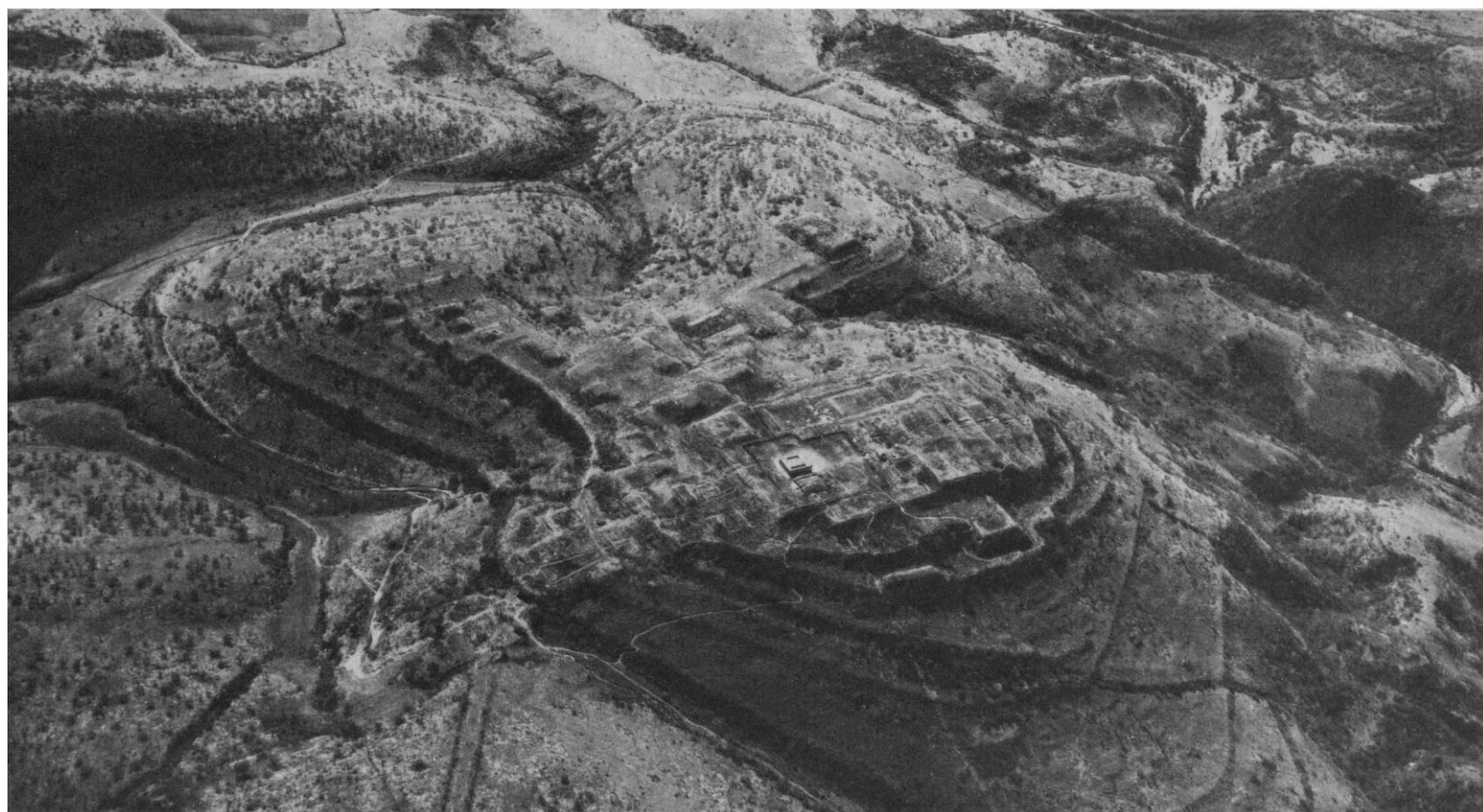


Fig. 2. Aerial photograph of the Xochicalco site showing its hilltop location and the concentric arrangement of residential terraces.

served for a variety of elite and ceremonial activities. The outer or lower three rings were used primarily for residences, with a few small-scale civic-ceremonial structures interspersed throughout. Ac-

cess between the vertically separated but adjacent portions of the site was made possible by a series of ascending streets or causeways.

At the center of the urban plan is the

Acropolis complex, which is located on the highest portion of Cerro Xochicalco, and apparently functioned as the site's most exclusive elite-ceremonial precinct. The Acropolis is isolated from adjacent areas by sharply ascending terrace facades and streets connecting other portions of the site do not lead directly into this complex. The dominant feature of the Acropolis complex is the Plaza Ceremonial, a walled patio group that contains three of the site's most important temple mounds, the Pyramid of the Plumed Serpent, Montículo 2, and Edificio A. Most of the elaborately carved monuments have been found within this walled precinct including the elaborate Plumed Serpent facades (Fig. 6, A and B) and the site's three famous stelae (21). On the western side of the Plaza Ceremonial is an extensive residential complex that apparently housed the site's ruling elite. All evidence for calendrical and astronomical observations at Xochicalco are found within this central zone. The vertical sighting shaft of the underground Observatorio is located directly adjacent to the Plaza Ceremonial, and the entrance to the cave was reached by an accessway descending from the upper Acropolis zone (22).

The second level in the architectural plan is another elite-ceremonial zone that includes the northern ball court terraces and the architectural groups on the southern and western hills. An important component of this zone is a mound and patio complex called the Plaza Central located south and 10 m below the Acropolis complex (Fig. 5). Ease of access throughout this zone and into the Plaza Central distinguishes this group from the Acropolis complex. The Plaza Central was easily accessible to both the local and regional population. Paved roadways extending throughout the site and into the surrounding countryside all converge and end at the entrance to this group (23). It is significant that the principal road and entrance leading into the site leads directly into the Plaza Central and terminates at the base of Edificio E. This mound, while lacking the elaborate carved facades of the Pyramid of the Plumed Serpent, is the largest temple mound at the site and probably was the primary focus of public worship. Edificio E reaches a height of 21 m above the floor of the Plaza Central and is situated in such a way as to be visible from hilltops more than 15 km southwest of Xochicalco.

It appears that Xochicalco was deliberately divided into areas of public and restricted space. The Plaza Central and Edificio E may have been the visual,

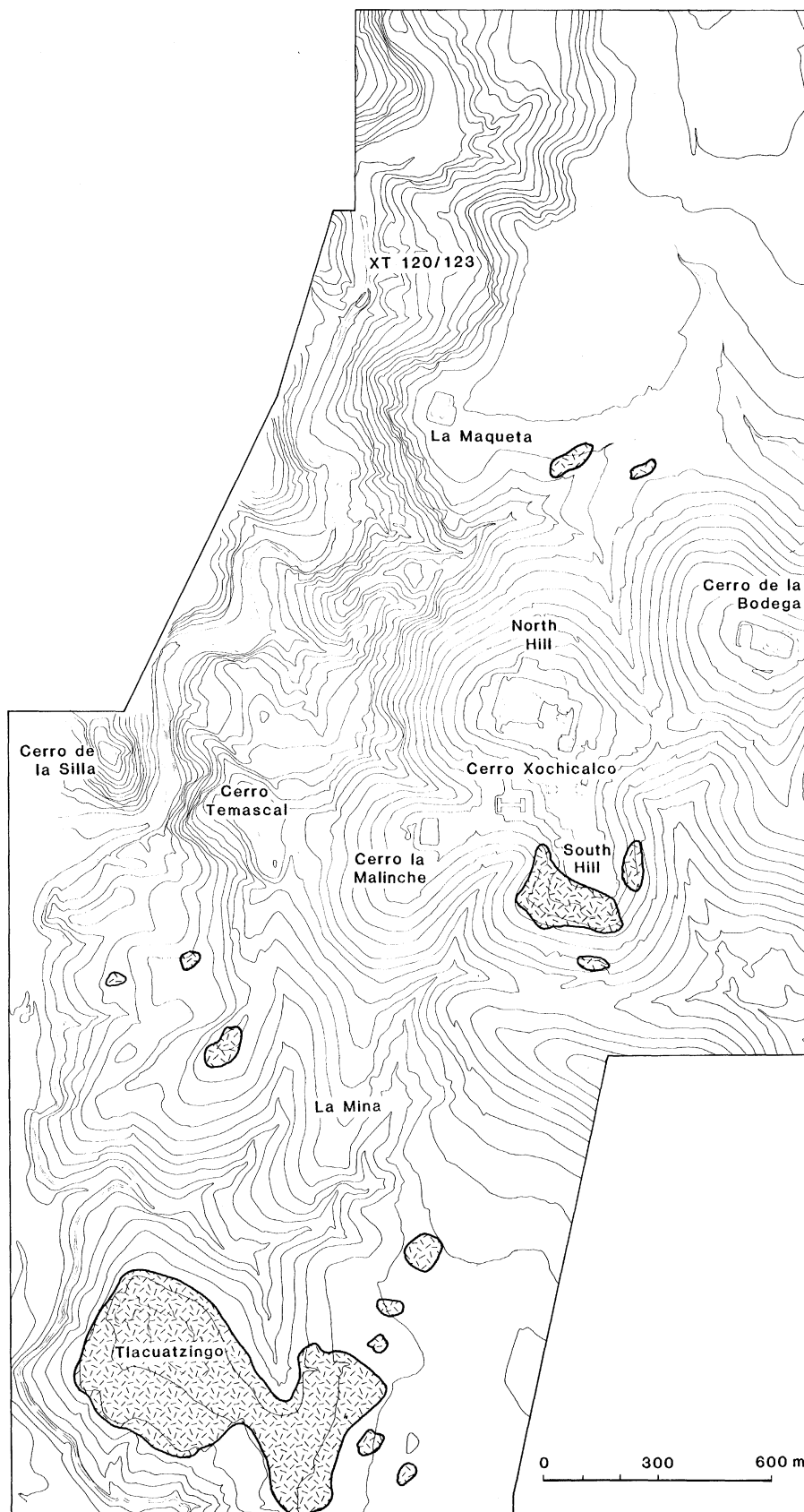


Fig. 3. Classic period occupation and topographic divisions at Xochicalco.

architectural, and symbolic focus for the population at large. Restricted architectural space, on the other hand, was designed for the exclusive use of a small segment of the society or was only open to the public on rare occasions. The upper Acropolis complex was such a restricted space; early excavations were unable to identify routes of access into the Acropolis complex, which appears to have been purposefully disarticulated from the rest of the site (24).

The lower three terraces encircle the hill and divide it into several sharply divisible vertical segments that were used primarily for nonelite domestic residence. These terraces average between 8 and 12 m in width and are 1 to 2 km in length. The three large concentric terraces appear to have been designed as distinct site segments. The regularity and symmetry of the large terraces suggest that they were laid out and built simultaneously as part of the total site plan. Although movement was possible between the terrace levels, the steep terrace faces were an integral part of the site's defenses. Access was restricted to a small number of points that included

the main streets ascending the hill and small ramps at the ends of the terraces. A defensive wall and moat ring the base of Cerro Xochicalco, protecting the residential zones and clearly distinguishing the hillside complex from the rest of the site.

The people appear to have been organized into extended family groups that occupied residence compounds between 350 and 1000 m² in size (25). Individual families occupied rooms or structures within a compound, which faced onto or was connected to a central patio. Residence compounds were enclosed by walls, or structures were built adjacent to one another to form a continuous walled facade on the exterior of the compound. These compounds formed the basic economic unit in the society and available data indicate that craft production was organized at the family level. The excavation of two household compounds in 1977 showed that the patio was the central work and ceremonial area for the residence (26). Three obsidian production areas were identified that were coterminous with the boundaries of residential compounds. Resources ap-

pear to have been shared by members of the residence compound. Many compounds have a single small cave cut into bedrock, which, while too small for habitation, would have been suitable for storing agricultural produce and other products. Surface materials in the caves often contained evidence of high frequencies of ceramic storage and service vessels.

The density of occupation diminished on the south and west sides of the site, where individual households appear to be separated from one another by small agricultural plots. Several areas within the Xochicalco zone appear exclusively reserved for agriculture. The XT-120/123 hillside and the La Mina ridgetop shown in Fig. 3 were extensively terraced but are quite distinct from the residential terraces. The dimensions of XT-120/123 terraces vary between 0.75 and 2.0 m in width and may be up to 130 m in length. They seldom exceed 15 to 20 cm in height and are too narrow for a house. I feel these were agricultural terraces. Their total terraced area only covered 8.6 ha and is too small to have had an important economic value for the site as a whole. The presence of a small cere-

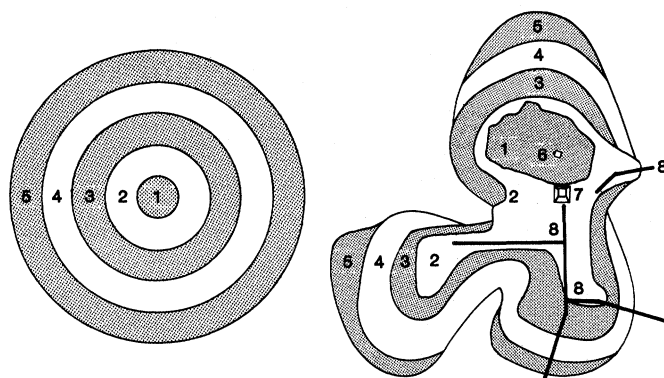
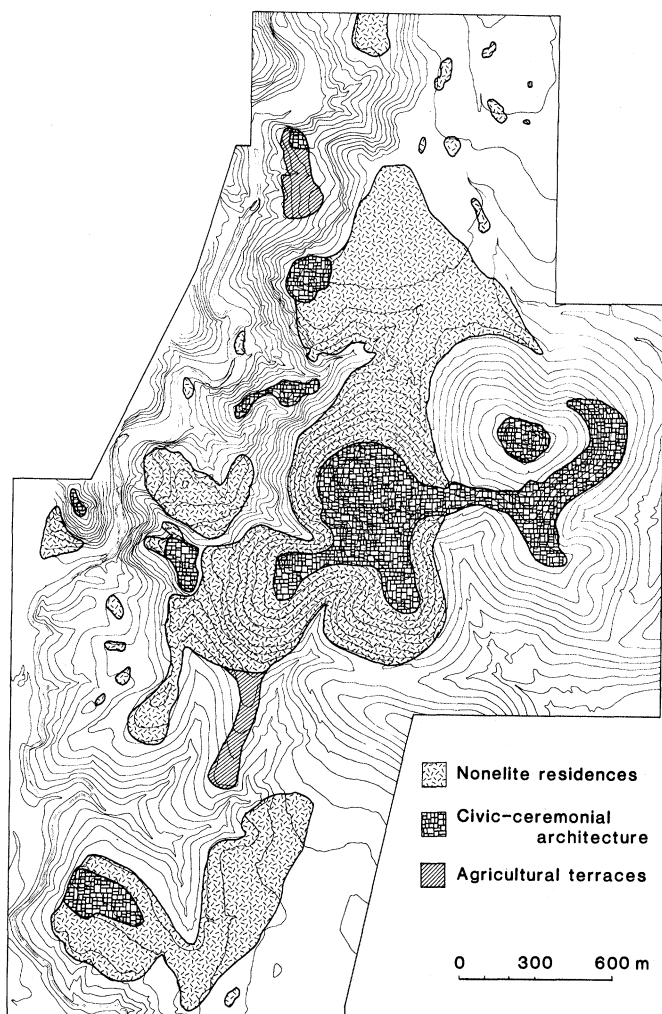


Fig. 4 (left). Epiclassic period occupation at Xochicalco. Fig. 5 (right). Comparison of idealized and actual concentric architectural divisions at Xochicalco: (1-2) elite zones, (3-5) nonelite residence, (6) Pyramid of the Plumed Serpent and Plaza Ceremonial, (7) Edificio E and Plaza Central, and (8) streets and pavements.

monial complex at the north end of the XT-120/123 terraces suggests that they were reserved for some special purpose or used to support the site's elite.

Special purpose architectural groups are also found on the adjacent hilltops of La Bodega, La Silla, La Fosa, and Temascal. The presence of platform mounds and small amounts of residential

debris suggest that these precincts had minor roles as both ceremonial and elite residence areas. They are located in naturally defensible locales and, in addition to high terrace facades, can have military fortifications including walls and moats. These precincts might represent fortified retreats used by groups residing outside the immediate confines of Cerro Xochi-

calco. This clearly was the function of the defensive enclosure at Cerro de la Fosa, where a wall and moat enclose a common hilltop that contains only two small platform structures. There are no indications of residences within the precinct which appears to have been built solely as a retreat (27).

Xochicalco's Decline

Xochicalco decreased in importance at the end of the Epiclassic, and the site was largely abandoned by 900 A.D. The subsequent Early Postclassic period (900 to 1250 A.D.) marks the end of both Xochicalco's regional political hegemony and its broader ceremonial influence. No building occurred in the upper ceremonial zone, and total residence only covered 11.5 ha, less than 10 percent of the total area it had during the preceding period (Fig. 7). The only ceremonial precinct used during this period was located in the fields north of Cerro Xochicalco. Although the exact causes for the site's decline have not been identified, Lítvak King (2) has suggested that the large site of Miacatlán 8 km to the southwest replaced Xochicalco as the dominant regional center in western Morelos. It is possible that the Xochicalco's decline was stimulated by the migration of hostile groups into the region from the Valley of Toluca and northern Guerrero (28).

The site was partially reoccupied during the Late Postclassic period (1250 to

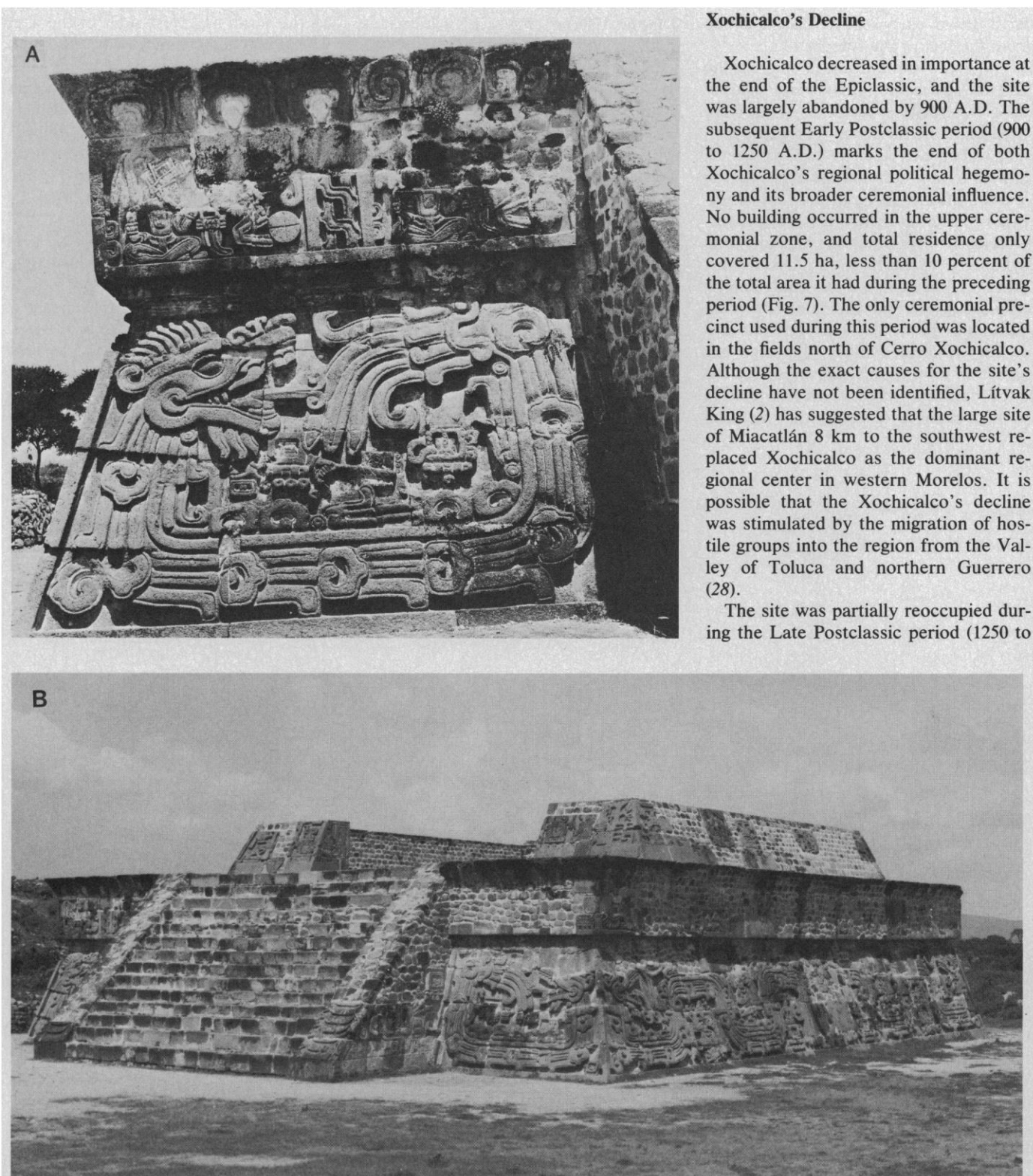


Fig. 6. (A) Bas-relief carvings on the northwest corner of the Pyramid of the Plumed Serpent, showing the serpent and hieroglyphs depicting calendrical and eclipse information. (B) Pyramid of the Plumed Serpent viewed from the southwest.

1519 A.D.) shortly after the arrival of Nahuatl-speaking Tlahuica groups in Morelos (28). Xochicalco grew to 92.4 ha during the late 13th and 14th centuries when a new civic-ceremonial precinct was constructed on the lower slopes of Cerro Temascal. Xochicalco was abandoned during the century preceding Spanish contact and is not mentioned in the early 16th-century sources either as one of the 60-odd Tlahuica city-states in Morelos or a subsidiary tribute town (28, 29). The site retained its importance only as a religious shrine, and the Pyramid of the Plumed Serpent was an important ancient monument (30).

Era of Conquest

The appearance of Xochicalco and other Epiclassic sites like Teotenango in the state of Mexico and Cacaxtla in Tlaxcala ushered in the era of the regional conquest state in Central Mexican prehistory. Xochicalco grew as the political, religious, and economic center of a large state that extended its domain over all of western Morelos and adjacent portions of Guerrero. Fortification around Xochicalco and militaristic themes in its iconography suggest that the site grew through warfare and conquest. Armed warriors are displayed on the Pyramid of the Plumed Serpent, conquest glyphs occur on several of the site's stelae, and a chacmool sculpture located in the Plaza Ceremonial portrays human sacrifice and dismemberment (31). The combination of these traits suggests that the war-sacrifice religious complex associated with the political expansion of the Late Postclassic Aztec became increasingly important in the religious cosmology of this period.

Evidence for regional unification of western Morelos comes in several forms. From an architectural perspective, Xochicalco's civic-ceremonial zone is unusually large in relation to its residential area. The scale and volume of construction probably required mobilization of large numbers of laborers and resources at the regional level. The civic-ceremonial area exceeds the needs of the resident population and is organized to reflect its regional function; the Plaza Central, for example, appears to have been designed as a public space to integrate the state's urban and rural populace. Rituals held here would have helped legitimize the religious and administrative functions of the ruling elite for rural populations in the hinterland. Sites immediately surrounding Xochicalco were linked to the center by a network of interconnecting

roads and pavements. Roads were followed more than 3 km from the site and traces of roads were found up to 7 km away (23).

The distribution of Xochicalco ceramics suggests that its socioeconomic domain embraced all of western Morelos and portions of northern Guerrero. Xochicalco ceramic and lithic assemblages do not overlap with similar assemblages from the Mexican Basin and eastern Morelos. Although Epiclassic Coyotlatelco-style ceramics predominate in the Valley of Mexico and Toluca, they rarely are found in western Morelos (15). The bulk of obsidian utilized at Xochicalco comes from the Ucaréo source near Zinapécuaro, Michoacán, even though Otumba obsidian was available closer to home from Epiclassic workshops at Teotihuacán (32). The differences found between the two areas appears to be the result of their polarization under separate and competing political centers.

Xochicalco's development has been explained in several different ways. One

suggestion has been that Xochicalco developed as a result of a power vacuum in Central Mexico after the collapse of Teotihuacán (9). Until recently this view has been reinforced by the belief that Teotihuacán was abandoned abruptly after the central ceremonial zone was destroyed by fire. While the ascendancy of the Xochicalco state correlates with the removal of Teotihuacán's old established elite, it does not follow that there was an immediate decline in political unity throughout Central Mexico. It is now known that Teotihuacán's decline was a gradual one; it continued to be the largest and most influential community in Central Mexico throughout the Epiclassic period, maintaining many of the important socioeconomic functions established during the Classic period (33). A second suggestion is that Xochicalco was a large center by 400 or 500 A.D. and competed with Teotihuacán for control of trade routes leading into Guerrero, presumably for control of tropical products such as cacao, greenstone,

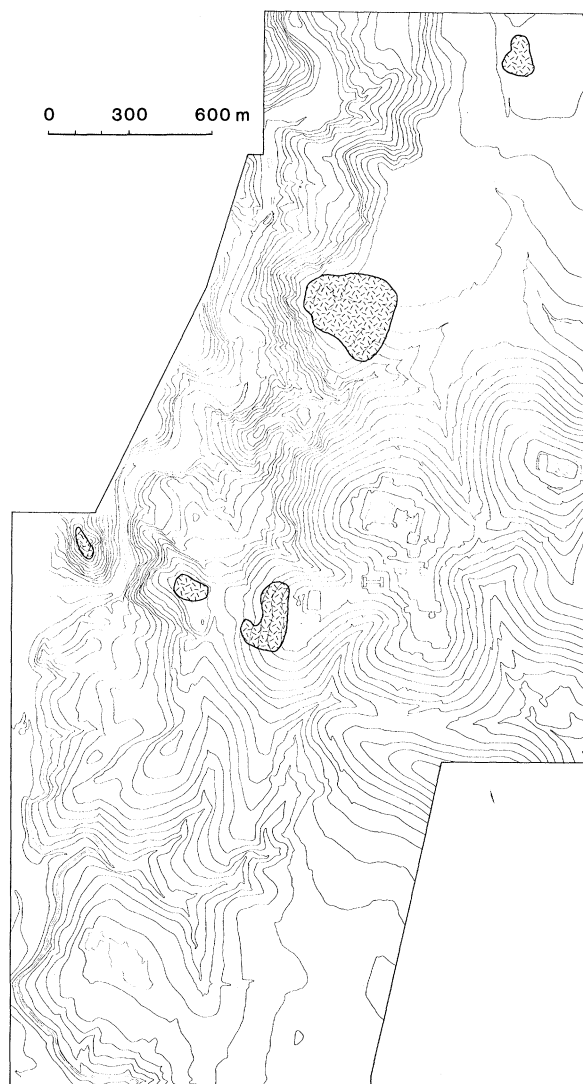


Fig. 7. Early Postclassic occupation at Xochicalco.

feathers, and cotton. In this scenario the loss of resource areas to competing centers at the end of the Classic would have been an important factor in Teotihuacán's decline (2).

Both models can be reconciled with the new information provided by the Xochicalco Mapping Project. We know that Xochicalco was too small during the Middle Classic to have competed with Teotihuacán or contributed significantly to the destruction of elite buildings along the Avenue of the Dead. While displacement of the established elite did not lead to an immediate abandonment of Teotihuacán, centralized political control was weakened enough to provide the opportunity for the formation of new elites in neighboring areas. Xochicalco established itself as a large and influential center early during the eighth century. It developed not within a complete power vacuum in Central Mexico, but during a period when Teotihuacán's influence was greatly reduced beyond the limits of the Valley of Mexico. It is at this time that Xochicalco would have begun to compete effectively for control of Morelos resource areas and the southern Guerrero trade route.

The question of why Xochicalco developed on a hilltop in western Morelos rather than elsewhere remains incompletely answered at this time. The site cannot be explained by the presence of favorable agricultural conditions; to the contrary, Xochicalco is located in one of the poorest agricultural areas in western Morelos. It is possible that Cerro Xochicalco was initially selected for occupation primarily because of the absence of dense occupation in the area. This was an important condition in the establishment of many Postclassic towns by groups in the Valley of Mexico, including, in part, the founding of Aztec Tenochtitlán.

Conclusion

Xochicalco has often been heralded as an important site on the basis of its impressive art and architecture rather than on a comprehensive understanding of its internal organization or resident

population size. Completion of the mapping project has established that Xochicalco was not particularly large by pre-Hispanic urban standards. Although occupation of the Epiclassic site covered a total area of 2.04 km², only 1.4 km² were used for nonelite residence and population is not densely crowded anywhere on the site except on the upper terraces of Cerro Xochicalco. From a demographic perspective, Xochicalco is only slightly larger than several regional centers in the Valley of Mexico with residential areas that covered 1 to 1.5 km² (34). Xochicalco is far smaller than Teotihuacán which still covered 5 to 6 km² during the Epiclassic and remained the largest site in Central Mexico until 900 to 950 A.D. (33).

Xochicalco reached its apogee during the latter half of the Epiclassic when Teotihuacán's influence did not extend far beyond the Valley of Mexico. The emergence of Epiclassic urban centers throughout Central Mexico appears to be a symptom of the weakening of Teotihuacán sociopolitical control in the highlands and not a direct cause for its decline. Xochicalco was the administrative center of an early city-state stretching throughout western Morelos and northern Guerrero and can best be described as a small urban center with regional, ceremonial, and administrative responsibilities.

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