

Prehispanic Adaptation in the Ixtapalapa Region, Mexico

Survey of settlements contributes to the analysis of cultural adaptation and change in the Valley of Mexico.

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During the last 10 years, a series of archeological projects emphasizing intensive surveys of Prehispanic settlements have contributed substantially to the understanding of the nature of Prehispanic cultural adaptation and change in the Valley of Mexico. These projects include Millon's study of Teotihuacan (1, 2), Sanders' survey of the rural Teotihuacan Valley (3), Parsons' survey of the Texcoco region (4), and Armillas' study of chinampas in the Valley of Mexico's ancient lake system (5) (Fig. 1). I present briefly the results of the fifth project of this type, a survey undertaken in 1969 of settlements in the Ixtapalapa Peninsula region (6).

The Valley of Mexico was chosen for intensive archeological research because of its importance as a "nuclear center" in Prehispanic Mesoamerica—that is, it was one of the foremost loci of innovation and sociocultural evolution during most of the Prehispanic period (7). From A.D. 0 to A.D. 700, it was the locus of Mesoamerica's most important urban center, Teotihuacan, which was at the same time possibly the focus of the first pan-Mesoamerican empire. Teotihuacan reached a maximum size of approximately 200,000 inhabitants, making it one of the largest cities in the world at that time (2).

During the century or so before the Spanish conquest (in the 1520's), the Valley of Mexico, as the seat of the Aztec empire, was again a key area, and exerted a strong influence over much of northern Mesoamerica. The valley remained a key area during the Colonial period, and to this day it is the heartland of Mexico.

Other factors have encouraged researchers to conduct large-scale surveys of settlement patterns in the Valley of Mexico. Stratigraphic excavations carried out since the early 1900's have established the main outlines of the later prehistoric sequence. (Table 1). Also, surface survey is an effective means of collecting data in the valley both because there is no dense vegetation that would obscure Prehispanic remains and because, in this area of thin soil, most sites are exposed. Cultural features, such as pyramid platforms, terraces, and residential mounds, are generally well preserved and can usually be dated by association with ceramic debris (Fig. 2). The only notable exception to these favorable conditions is the area now covered by Mexico City.

Intensive surveys of settlement patterns in the valley have been emphasized recently because they are relatively inexpensive and simple, and because they give a broader picture of the processes of cultural change than

do examinations of single sites in isolation. Numerous factors influence demography and the way in which a population is distributed over a region. Some of these factors are local—for example, conditions of soil and slope and the availability of water and natural resources; others are nonlocal—for example, the political and economic effects of empires. If the environment of a region has not changed significantly, most local factors that influenced settlement pattern and demography can be isolated by the archeologist. Deviations from the patterns determined on this basis can lead to hypotheses about other factors that influenced a local population. In this article, I describe briefly the environment and Prehispanic settlement pattern and demographic sequence of the Ixtapalapa Peninsula region (the survey region), and present a series of hypotheses on the nature of sociocultural change and adaptation in the Valley of Mexico, relying primarily upon these data alone.

The methodology of the Ixtapalapa survey of settlement patterns consisted of systematically examining the area and plotting archeological features on aerial photographs (scale 1:6000). The location, size, and complexity of sites were recorded, along with information regarding periodization and density of cultural debris. In addition, the nature of the environment of each site was noted, including such factors as soil depth, slope, dominant vegetation, and modern uses of the land. Based on the size and estimated density of occupation, rough estimates of population can be made for each site.

Environment

The Ixtapalapa Peninsula region is located in the south-central portion of the Valley of Mexico (Fig. 1). It includes an area of approximately 215 square kilometers. The western and central portions of the region consist of a chain of post-Pliocene volcanic cones, two of which exceed 2700 meters in elevation. Before the lake

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system of the valley was drained, this volcanic chain partially separated the freshwater Lake Chalco-Xochimilco from the saline Lake Texcoco, leaving only a small channel connecting the two at the west edge of the peninsula. Eastward, the survey region extends to the forested chain of mountains that defines the east edge of the Valley of Mexico.

The survey region can be divided into three broad environmental zones, each distinct in terms of variables such as slope, soil depth, and degree of erosion, availability of water, and dominant vegetation.

1) The lakeshore plain zone ranges in elevation from the level of the Prehispanic lake system, at 2240 meters, to 2280 meters. This is the deep-soil, generally flat, alluvial plain along the bases of the volcanic cones and the piedmont. It is the best zone for agriculture in the region because the deep soils retain moisture relatively well and they are not greatly susceptible to erosion.

2) The piedmont zone ranges in elevation from 2250 meters to 2750 meters. Actually, this zone could be subdivided, but for the purposes of this article I will consider it as one zone. Several aspects of the environment of this zone make agriculture here more precarious than it is in the

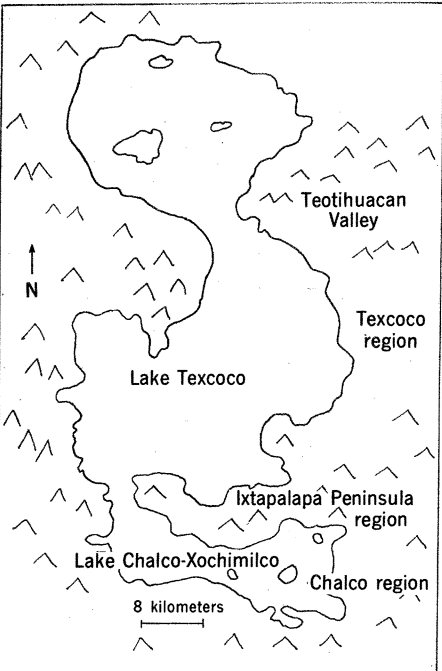


Fig. 1. The Valley of Mexico showing the survey regions and the lake system.

lakeshore plain zone: (i) flatland is at a premium, (ii) soils are thin and therefore do not retain moisture well, and (iii) because of the dominance of sloping terrain, soils are highly susceptible to erosion. The least desirable portions of the piedmont zone are used today primarily for the cultiva-

tion of two xerophytic domesticates, nopal and maguey, which are well adapted to dry, thin-soil conditions (Fig. 3).

3) The sierra zone is above 2750 meters in elevation. It is not now, and apparently never has been, permanently occupied by human populations, probably because summer frosts preclude maize cultivation. This zone is covered with a dense forest of oak and pine, and its use today is restricted to grazing, hunting, and the collection of wood products.

For Prehispanic cultivators, life in the Ixtapalapa Peninsula region was not easy. Besides the threat of frost damage to crops, which is present everywhere in the Valley of Mexico, the region receives only about 600 to 700 millimeters of precipitation annually. Irrigation is essential to the success of agriculture every year (8), but there are not now, and apparently never have been, in the survey region permanent streams that are suitable sources of water for irrigation. However, before the drainage of the Valley of Mexico lake system, which began in the 16th century, the water table of the lakeshore plain zone adjacent to the lakes was probably very near the surface, thus simple irrigation with water from shallow wells was feasible. Unfortunately, there is no archeological evidence, to date, for these shallow irrigation wells.

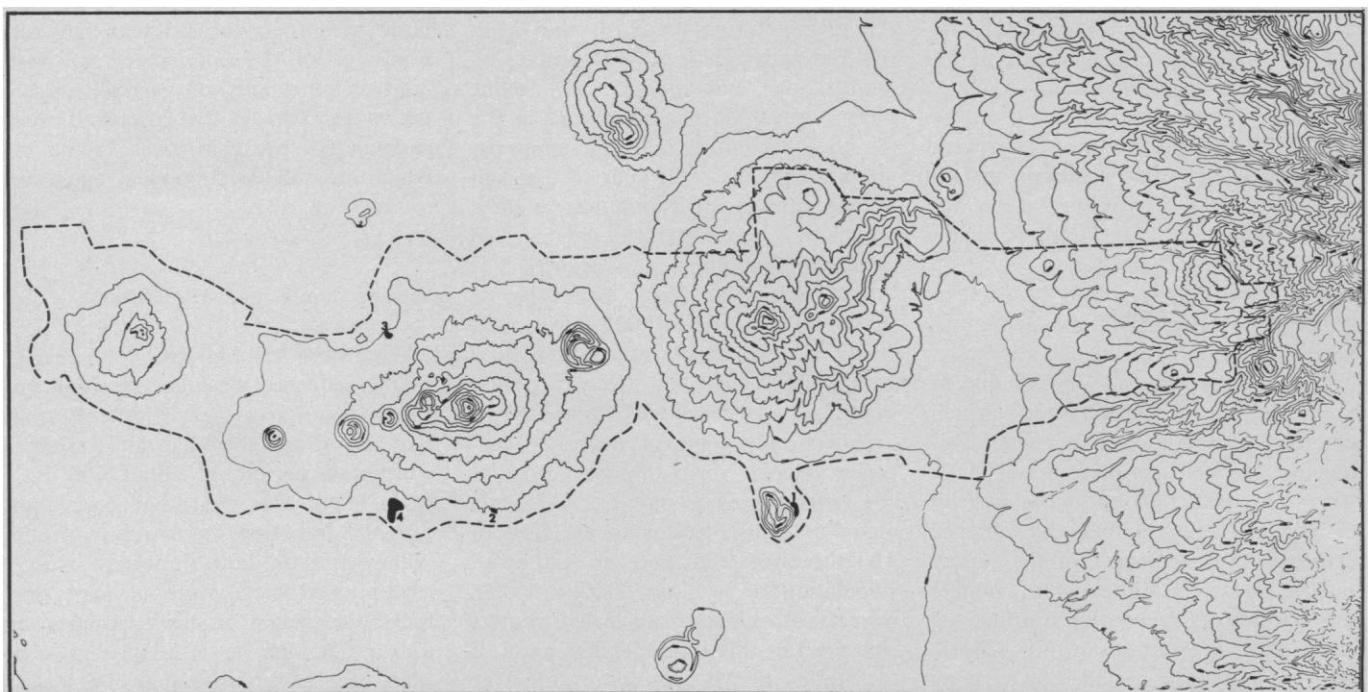
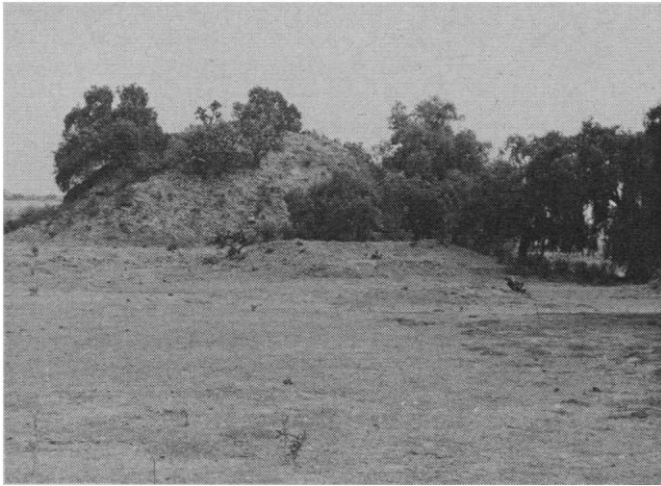
The Settlement Pattern Sequence

In order to describe the changes through time in settlement patterns and demography in the Ixtapalapa Peninsula region, I have arranged the chronological sequence for the Valley of Mexico into a series of settlement pattern periods.

1) The Early and Middle Formative period (circa 1150–600 B.C.) (Figs. 4 and 5) was a long period during which population levels remained very low

Table 1. The chronological sequence of the Valley of Mexico, modified from Sanders (3, p. 16) and Parsons (4, table 1, p. 30). Absolute dating of the ceramic phases is based on a combination of the radiocarbon method and cross-correlations with the Mayan calendar.

Estimated absolute dates	Teotihuacan Valley (ceramic phases)	Valley of Mexico (ceramic phases)	Ixtapalapa region (periods)
1500	Teacalco	Aztec 4	Late Aztec
1400			
1300	Chimalpa	Aztec 3	Early Aztec
1200	Zocango	Aztec 2	
1100	Huecoxtoc	Aztec 1	
1000	Mazapan	Mazapan	
900	Xometla	Coyotlatelco	Late Toltec
800	Oxtotipac		Early Toltec
700			
600	Metepiec	Teotihuacan 4	Late Classic
500	Xolalpan		
400		Teotihuacan 3	Early Classic
300	Tlamimilolpa		
200	Miccaotli	Teotihuacan 2	Terminal Formative
100	Tzacualli	Teotihuacan 1	
0			
100	Patlachique		
200	Tezoyuca	Cuicuilco	
300			Late Formative
400		Ticomán 3	
500	Cuanalan	Ticomán 2	
600		Ticomán 1	
700			Middle Formative
800	Chiconautla	Zacatenco	
900	Altica		Early Formative
1000			
1100		Ixtapaluca	
1200			



(Fig. 6). Throughout this time, communities in the Ixtapalapa Peninsula region were small, not more than a few hundred persons each, and were oriented toward exploitation of the lakeshore plain zone. A site of this period, located at Tlapacoya, has been investigated (9).

2) During the Late and Terminal Formative period (600 B.C. to A.D. 0) (Figs. 7 and 8) a number of significant changes occurred within the survey region and within the Valley of Mexico as a whole. In the survey region, population increased rapidly during the early portion of the period, then remained nearly stable (Fig. 6). For the first time in the Prehispanic sequence, beginning during the Late Formative period, there was a distinct hierarchy of communities in the survey region, ranging from local centers with populations in the thousands and with civic architecture, for example Tlaltenco and Tlapacoya (Fig. 9), to numerous smaller communities lacking civic architecture. For the Valley of Mexico as a whole, the site hierarchy was even more pronounced. Cuicuilco, in the southwestern corner of the valley, had a population estimated in the thousands or tens of thousands and impressive civic architecture (10), and Teotihuacan reached an estimated population of 5000 toward the end of this period (1). Contemporaneous with the rapid population growth, the appearance of large-scale civic architecture, and the marked hierarchy of site size and complexity in the survey region, the piedmont zone was colonized for the first time. Toward the end of this period, during the Tezoyuca-Patlachique phase, there is evidence of increasing competition and warfare. Although Tlapacoya continued to be occupied, other sites in the region were relocated to defensive positions on hill-tops and ridges. The same pattern has been observed in the Texcoco region and the Teotihuacan Valley.

3) In the Classic period (A.D. 0 to A.D. 700) (Fig. 10), the configuration of settlement changed drastically. These changes are undoubtedly due to the influence of Teotihuacan, which emerged as a large urban center during the Tzacualli ceramic phase (A.D. 0 to A.D. 100–200) (1). The paucity of Tzacualli and Xolalpan and Metepec ceramics (Late Classic) in the survey region makes it difficult to evaluate the nature of occupation during the early and late portions of the Classic settlement pattern period, but suggests

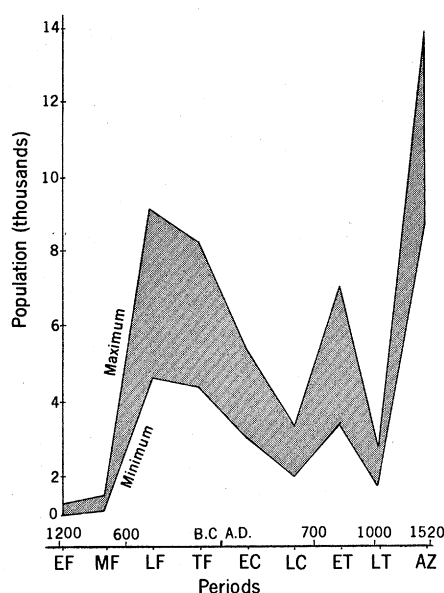


Fig. 6. Estimated population of the Ixtapalapa Peninsula region from the Early Formative through the Aztec periods.

that the population might have been very low during those times. Figure 10 shows the sites that contain predominantly Miccaotli and Tlamimilolpa ceramics (during the middle range of the Classic period). During this time, the population of the region resided in small, evenly scattered communities. In contrast to the preceding period, these communities were not densely occupied, and what little civic architecture exists is on a much smaller scale than that of the Late and Terminal Formative period. Population density declined from the preceding period (Fig. 6). Most sites are located on or near the lakeshore plain zone, a pattern comparable to the occupation of the region during the Early and Middle Formative period. This process of ruralization and population decline characterizes the Classic period in the Texcoco region as well, and contrasts sharply with the settlement pattern and demography of the Teotihuacan Valley, which was characterized by marked urbanism and population growth.

4) During the Early Toltec period (A.D. 700 to A.D. 900) (Fig. 11), many of the small, apparently rural communities of the Classic period continued to be occupied, but a large, architecturally complex, nucleated center developed near the west end of the survey region at Cerro de la Estrella. This site covers an area of 169 hectares and had an estimated population of at least 2000 to 4000. Several other large, nucleated centers appeared at this time in other parts of the Valley of Mexico, for example at

Portezuelo in the Texcoco region. These centers probably replaced the power vacuum left by declining Teotihuacan; on the periphery of the Valley of Mexico, this vacuum was filled by three major regional centers—Tula, Cholula, and Xochicalco (Fig. 12).

5) During the Late Toltec period (A.D. 900 to A.D. 1100) (Fig. 13), the Valley of Mexico was apparently dominated by the Toltec empire, which was centered at Tula, Hidalgo. In the survey region, this period was characterized by ruralization and population decline (Fig. 6). The population of the region resided in a series of small, evenly scattered communities lacking significant civic architecture. Most sites were located on or near the lakeshore plain zone, duplicating the pattern observed for the Early and Middle Formative and Classic periods. Ruralization and population decline characterized this period in the Teotihuacan Valley, and the Texcoco region as well.

6) In the Aztec period (A.D. 1100 to A.D. 1520) (Fig. 14), population increased to the highest levels of the Prehispanic period (Fig. 6), and a large portion of the population of the region resided in the urban centers of Ixtapalapa and Culhuacan. A wide range of environmental settings was occupied during this period, including, for the first time in the sequence, the lake system. What little excavated archeological evidence exists, combined with my impressions and the descriptions of the area made by Spanish explorers, indicates that Culhuacan, Ixtapalapa, and Mexicaltzingo, another large community located near the western edge of the survey region, were constructed wholly or partially on artificial surfaces in the lakes and were surrounded by chinampas, some of which are still visible and in operation today (Fig. 15).

Interpretations and Hypotheses

The most striking period of change in the sequence was the transition between the Early and Middle Formative period and the Late and Terminal Formative period, at about 600 B.C. It is likely that the rapid population growth and first occupation of the piedmont zone, both important aspects of this transition, were at least partially the result of new varieties of maize that were better adapted to such high, dry environments as the Valley

of Mexico (11). Sanders (3, p. 168) and Parsons (4, pp. 309–313) suggest that these changes can also be attributed to more elaborate soil- and water-control techniques, but there is little evidence from the Ixtapalapa Peninsula region to support this idea. The other changes, such as the beginnings of large-scale civic architecture and the appearance of a marked hierarchy of communities, are more difficult to explain, but I suggest that several factors may have been important.

Population growth during the Late Formative is reflected in the growth of the large Middle Formative sites at Tlaltenco and Tlapacoya, each of which was densely occupied and increased more than 300 percent in area. In addition, “budding-off” occurred (that is, new communities were formed). All of these “daughter” communities were smaller than the “parent” communities, and they lack evidence of civic architecture. Some of them were formed in the same environmental zone

that had been favored since the Early Formative—on or near the lakeshore plain zone. Significantly, however, some communities were established in an environmental setting that had not been previously occupied—the piedmont zone. The latter communities comprised an estimated 20 to 25 percent of the total Late Formative population of the region. The appearance of hardier varieties of maize was probably the key factor in full-time occupation of this agriculturally marginal

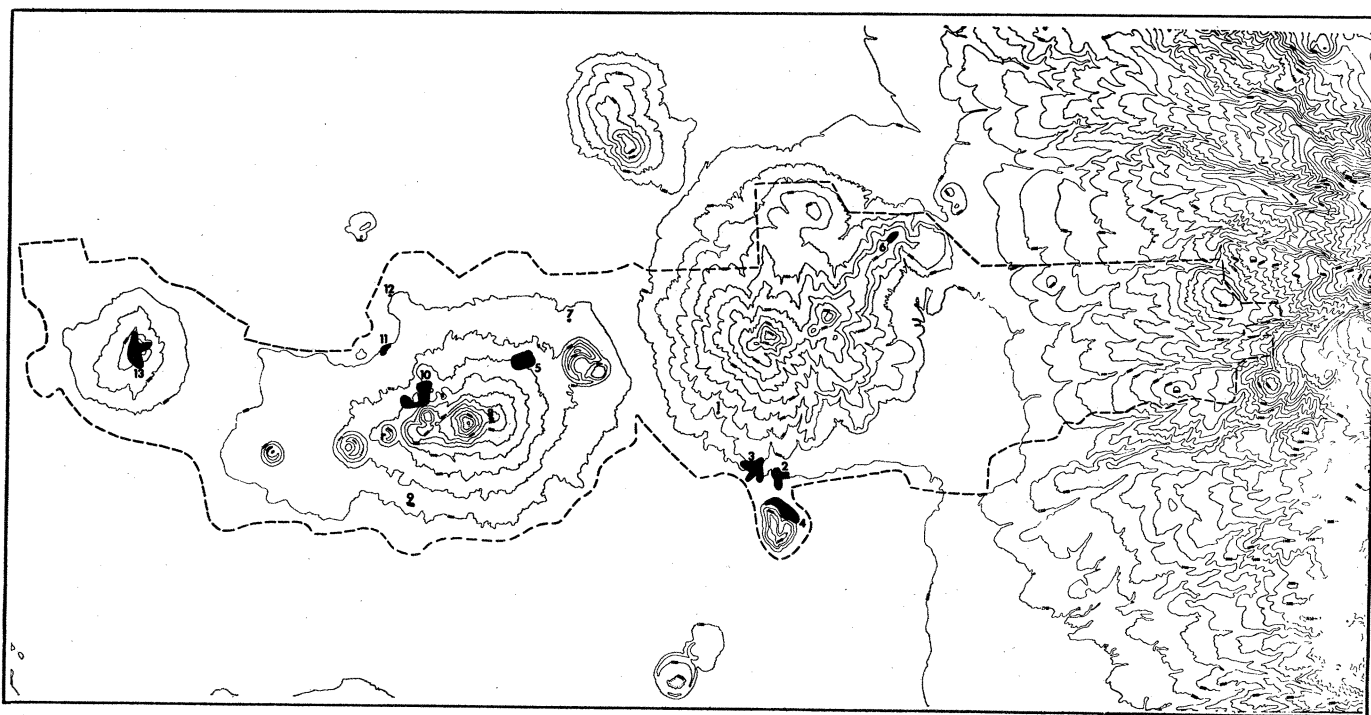
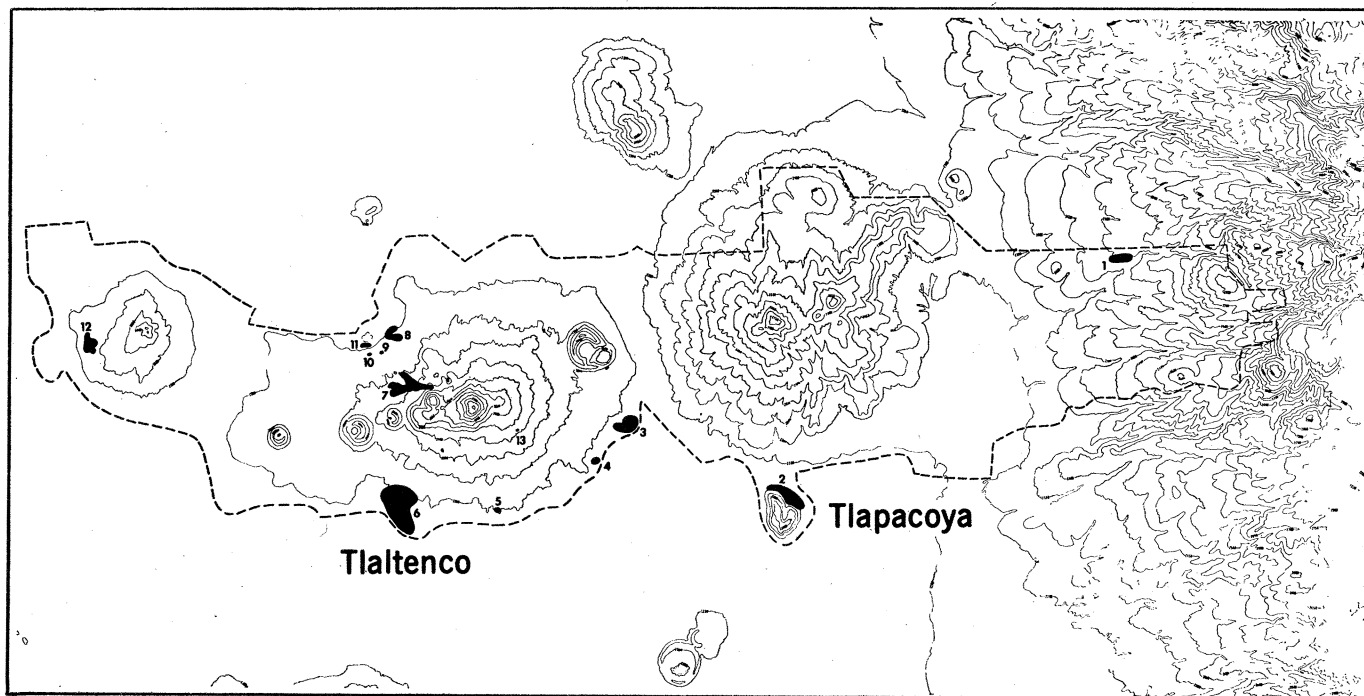


Fig. 7 (top). Settlements of the Late Formative period. Patlachique phase.

Fig. 8 (bottom). Settlements of the Terminal Formative Tezoyuca-

zone, but subsistence activities must have been more precarious for these colonizers than for those who continued to exploit the lakeshore plain zone. In dry years, these daughter communities in the piedmont zone may have been dependent upon the more favorably situated communities. If so, this dependence may have contributed substantially to the sociocultural change during the Late and Terminal Formative period, since it represents the first time in the Prehispanic sequence that some portion of the population had differential access to preferred land. Other writers have noted the possible importance of this differential access and dependence in enhancing differential in status among the members of a population (12). Evidence of marked differentiation in status during the Late and Terminal Formative in the region is present in the form of a series of tomb burials, located in a large pyramid-platform at Tlapacoya that was excavated by Barba de Piña Chan (13). The individuals in these tombs were buried with numerous items, including goods obtained through long-distance trade, for example, seashells and jade. In contrast, the 12 nontomb burials excavated at this site and dating to this period were far less elaborate. The presence of large-scale civic architecture at Tlaltenco and Tlapacoya reflects the importance of these communities as parent communities controlling the optimal agricultural land, where high-status individuals or groups were in a position to organize and underwrite communal work efforts.

The formation of new communities in the piedmont zone by budding-off may have had another important consequence—that of fostering specialization and exchange of production, or symbiosis. While the piedmont communities did not have access to the deep soil of the alluvial plain and lacustrine resources such as fish, wildfowl, and salt, they were well situated for the cultivation of nopal and maguey, and some had ready access to the products of the sierra zone. Sahlins, in his study of social stratification in Polynesia (14), pointed out that, when budding-off occurs such that new communities are founded in distinct environmental zones where they no longer have access to the complete range of resources in a region, an exchange mechanism becomes essential to effect “equitable distribution of goods, by both reciprocal and re-

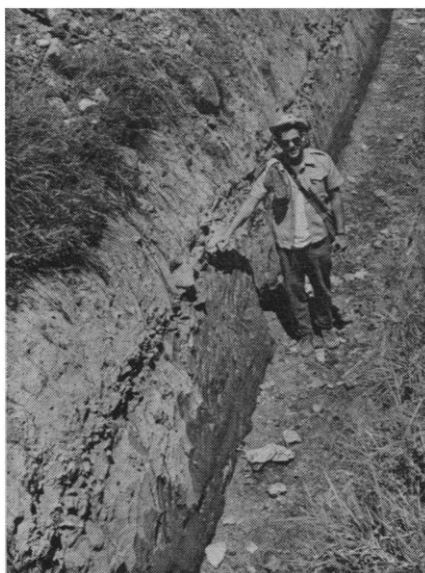


Fig. 9. John Jordan points to the dense layer of Late Formative debris in an open trench in the modern village of Tlapacoya.

distributive methods” (14, p. 216). As a result, the status of dominant individuals or groups can be enhanced because they serve as the focuses of the exchange networks. Flannery and Coe have discussed the possible importance of this factor in the origins of ranking and stratification in the highlands of Mesoamerica (15).

Whatever factors were responsible for the abrupt sociocultural and adaptive changes of the Late and Terminal Formative period, the Ixtapalapa Peninsula region was by no means unusual. The surveys conducted by Sanders (3) and Parsons (4) suggest that similar changes were occurring throughout the remainder of the Valley of Mexico. The significance of these changes in understanding the later evolutionary developments in the valley is, I suggest, that societies organized on the basis of ranking and stratification have great evolutionary potential in the context of the natural environment of the Valley of Mexico. As hierarchical organization became more pronounced, high-ranking individuals or groups would have been in a position to organize and underwrite the construction and maintenance of large-scale irrigation systems. Where these systems were feasible, they would have allowed increases in population density and would have further enhanced the position of those who controlled them. This process could eventually have resulted in the growth of “irrigation states” in which the power base of a ruling elite was largely the control and regulation of large-scale

irrigation systems. While there is evidence of increased status differentiation coupled with population growth during the Late and Terminal Formative period in the survey region, large-scale irrigation is not possible there; therefore, the area remained relatively static compared to the Teotihuacan Valley, an area where large-scale irrigation would have been feasible. After about A.D. 0, communities in the Ixtapalapa Peninsula region were abandoned, while the Teotihuacan Valley became the locus of Mesoamerica’s first large urban center.

Classic and Postclassic

Of the four settlement pattern periods distinguishable between A.D. 0 and A.D. 1520, two patterns, each with similar characteristics, can be identified. One of these patterns includes the Classic and Late Toltec periods, both of which were characterized by ruralization, low population, and emphasis on occupation on or near the lakeshore plain zone. In contrast, the Early Toltec and Aztec periods were similar in that relatively large proportions of the populations resided in large, nucleated centers and population density was relatively high. The differences between the two patterns may reflect the following conditions: during the Classic and Late Toltec periods, the population of the Ixtapalapa Peninsula region was dominated by large urban centers to the north—Teotihuacan during the Classic, and Tula, Hidalgo, during the Late Toltec. Apparently these urban centers had similar relations with the populations of their rural peripheries. The nature of the organization of these centers and the relations they maintained with rural populations cannot be completely described until much more archeological work is accomplished, but the settlement pattern and demographic data from the Ixtapalapa Peninsula region leads me to offer the following two hypotheses: (i) with regard to rural populations, both urban centers were largely extractive (this could help explain the observed declines in population; if significant proportions of the produce of these regions were removed to the dominant center as tribute, fewer people could be supported on what remained) and (ii) the rural populations dominated by these centers were largely excluded from the symbiotic networks focused

on the centers. During the Classic period in the eastern Valley of Mexico, and apparently in the valley as a whole, there was a very lopsided hierarchy of communities. There was one outstandingly large center, Teotihuacan, but there were no other communities that even approached that size and degree of urbanism. The next largest communities, such as the Portezuelo site and Cerro de la Estrella, apparently had fewer than 1000 inhabitants each and were not densely

occupied or architecturally complex. The size and complexity of Azcapotzalco is unknown, but there has never been any mention of architecture there that even approached the scale of Teotihuacan. I suggest that Teotihuacan so dominated the Valley of Mexico that it was the only important focus of craft specialization and exchange. A similar situation may have obtained during the Late Toltec, when Tula was the only dominant center in the vicinity. Rural populations as dis-

tant from the main centers as the population of the Ixtapalapa Peninsula region were not able to participate fully in the symbiotic networks focused at the centers. This could have caused population declines in rural areas, because the symbiosis was adaptive, given the complex environmental mosaic of the Valley of Mexico. Such an interpretation of the Classic contrasts with those of Sanders (16) and Parsons (17). Sanders visualized the Classic as a time when several large,

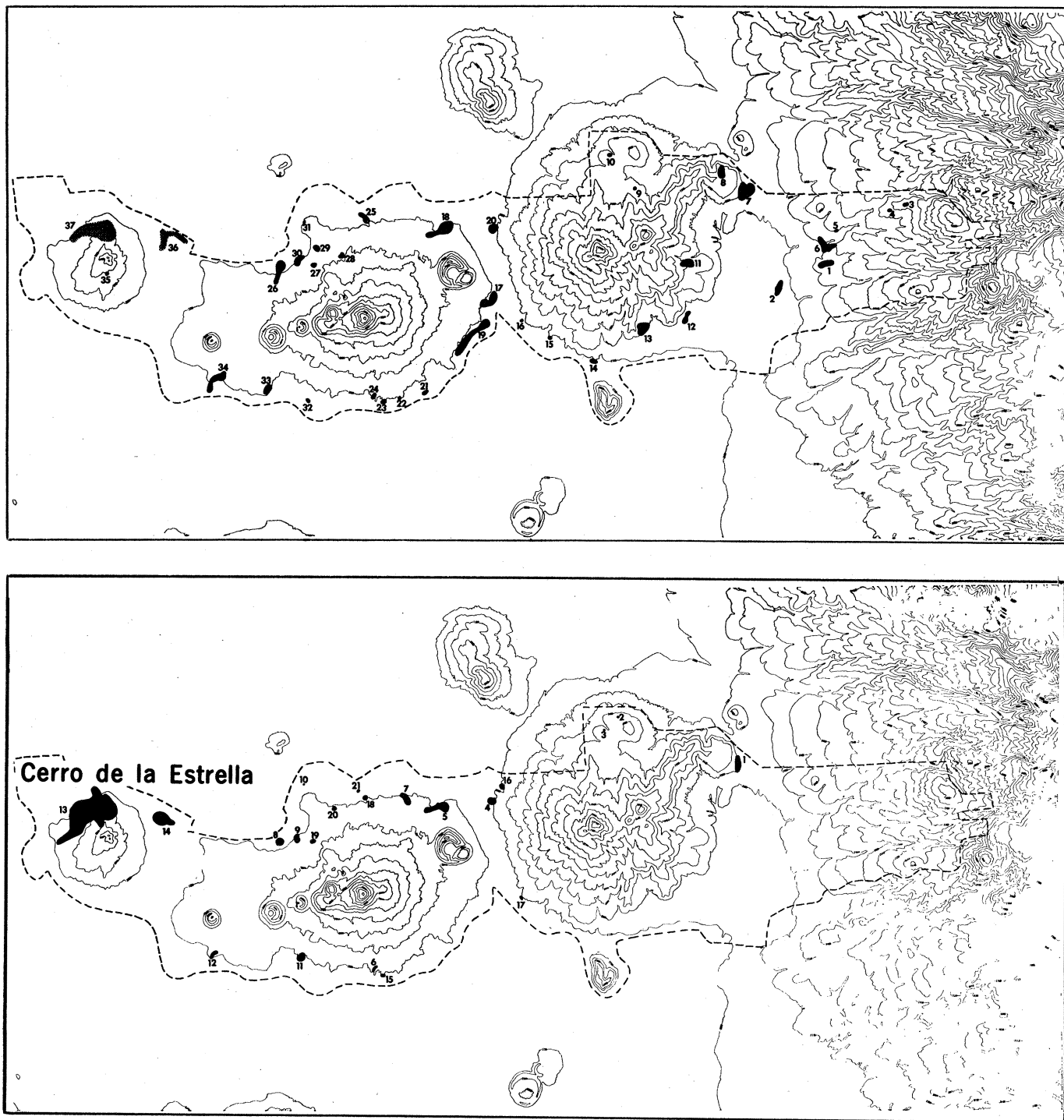


Fig. 10 (top). Settlements of the Classic period. The sites shown have predominantly Miccaotli and Tlamimilolpa ceramics. Fig. 11 (bottom). Settlements of the Early Toltec period.

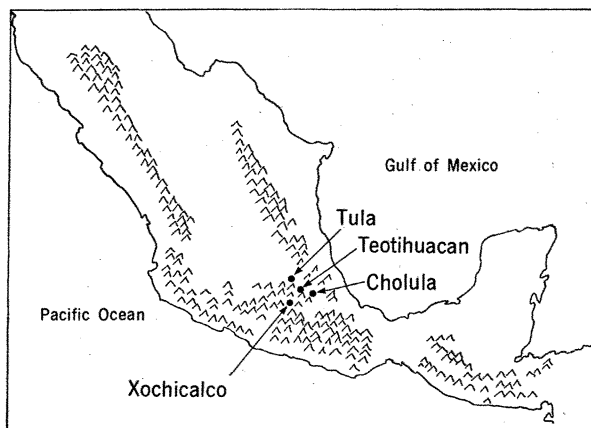
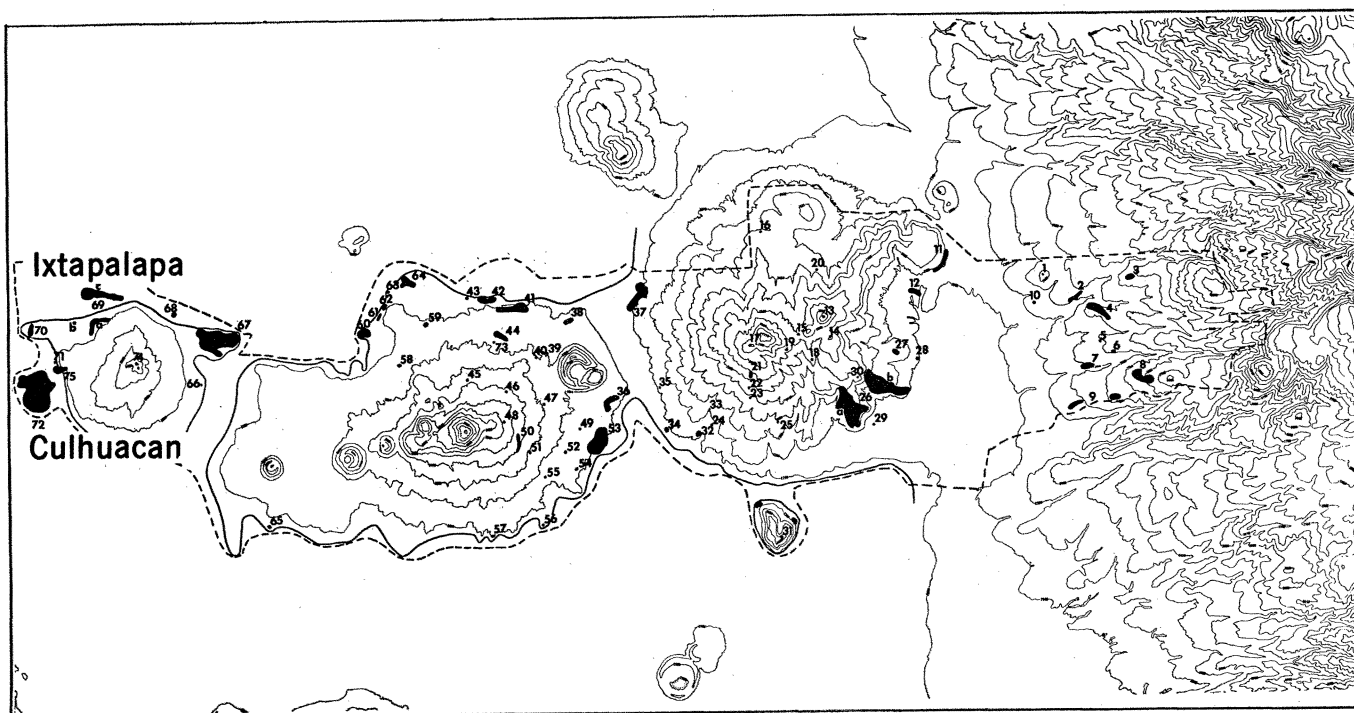
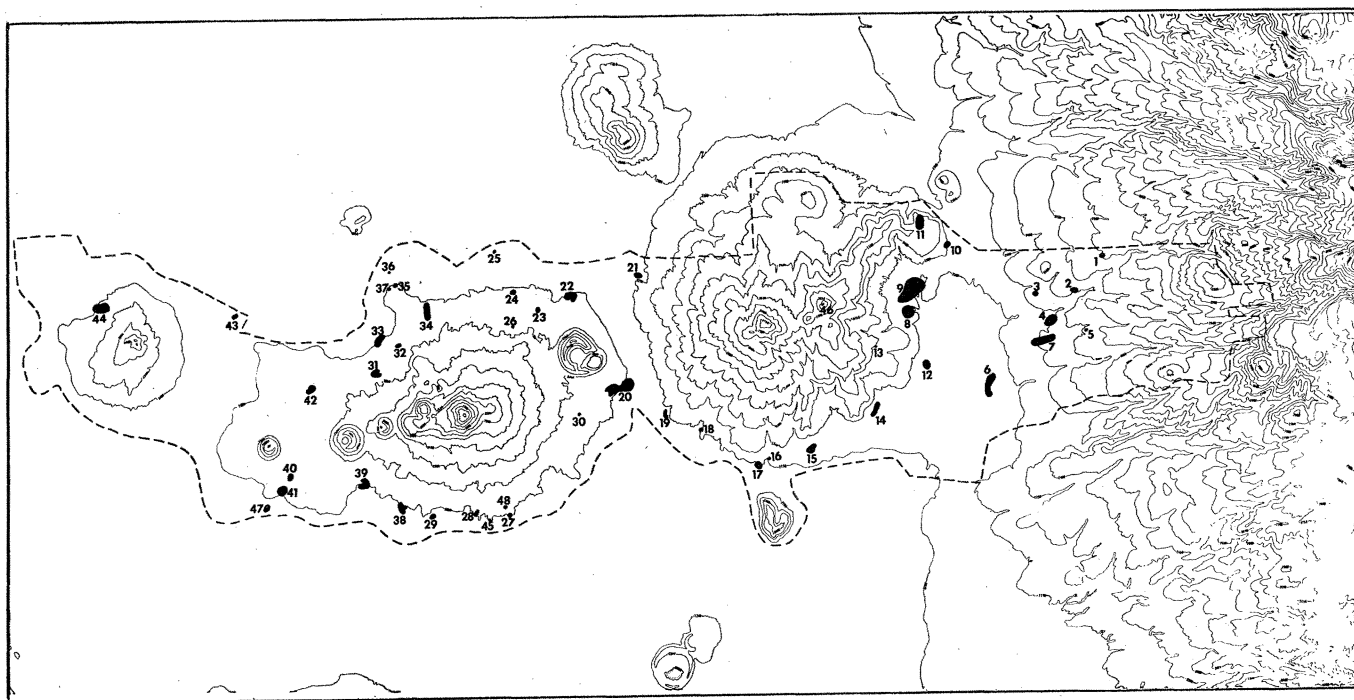


Fig. 12 (top left). Mesoamerica, showing the locations of major sites mentioned in the text. Fig. 13 (middle). Settlements of the Late Toltec period. Fig. 14 (bottom). Settlements of the Late Aztec period. During the Early Aztec period, not shown here, some of the Late Aztec sites were occupied, for example Culhuacan, but the population density was much lower. The continuous line just inside the dashed line is the estimated Aztec period shore line. Aztec Ixtapalapa was an urban center of larger size than is indicated on the map; its full extent cannot be determined today because it is largely obscured by the modern town of Ixtapalapa.



autonomous or semiautonomous centers, each with an associated dependent population, dominated the valley, a situation similar to that of the Late Aztec period. The apparent absence of large centers other than Teotihuacan, however, suggests that Sanders' interpretation is not correct. Parsons suggested that the apparently rural, small communities he discovered in the Texcoco region were fully dependent on the main center and were tightly integrated into the economic system focused there. These alternative hypotheses should be readily amenable to archaeological testing.

We know from descriptions of the Aztecs made by the early Spanish explorers and from the histories written by hispanicized Aztec nobility that Aztec society was characterized by intensive local specialization and ex-

change. Urban centers were widely scattered over the valley and served as the focuses of local and valley-wide exchange and specialization. This factor may help to explain the relatively high population levels of the Aztec period. Perhaps a similar situation, with respect to intensity of exchange and specialization, obtained during the Early Toltec period, a time when large urban centers were widely scattered over the valley. These centers could have been the focuses of an Early Toltec symbiotic network analogous to that of the Aztec.

One other factor deserves mentioning. The Aztec period was the only time in the Prehispanic sequence when the lake system was occupied. This may reflect the importance of the exploitation of the lakes by means of chinampas. Unfortunately, the date of

earliest construction and use of these gardens has not been established archaeologically, but in my survey of ancient chinampas around the modern communities of Culhuacan and Ixtapalapa, I found almost exclusively Aztec ceramic debris, and only Aztec residences were noted. The introduction of such a productive agricultural system could account for a substantial part of the increase in population during the Aztec period.

Summary

Data accumulated during an intensive survey of Prehispanic settlements in the Ixtapalapa Peninsula region enables me to formulate hypotheses regarding the nature of sociocultural change and adaptation during the Pre-



Fig. 15. Air photo of the modern town of Ixtapalapa and surrounding area. The scale is roughly 1 : 50,000. The area north of the town is covered with numerous small chinampa plots, separated by canals. The larger canals are visible in the photograph as dark lines. Today the chinampas are irrigated with water from the Rio Churubusco, which is the thick black line in the upper left.

hispanic period. A summary of these hypotheses follows. The Early and Middle Formative period was a time of low population, when most communities were located on or near the agriculturally productive lakeshore plain zone. During the subsequent period, attendant upon the development in the central highlands of more productive varieties of maize, population increased, and for the first time the agriculturally marginal piedmont zone was colonized. This process may have resulted in the enhancement of status differentiation in these societies because some communities maintained access to the preferred land along the lakeshore plain zone. Also, occupation of a variety of environmental zones may have encouraged symbiosis, which could have further enhanced status differentiation as some individuals or groups became the focuses of exchange networks. During the Late Formative period, developments along this line proceeded throughout the Valley of Mexico, but later, during the Terminal Formative period, some groups prospered more than others because they were favorably situated for the construction of large-scale irrigation systems. The foremost example of the latter is Teotihuacan, which eventually dominated the population of the Ixtapalapa Peninsula region, as well as the remainder of the Valley of Mexico and probably adjacent groups in the central highlands.

From A.D. 0 to A.D. 700, the region was dominated by Teotihuacan. This was a period of low population and apparently rural settlement patterns. A similar situation existed during the Late Toltec period as Tula dominated the region. I suggest that Teotihuacan and Tula had similar relationships with their rural peripheries; specifically, they were largely extractive and so dominated rural populations that they were the only important focuses of exchange and craft specialization. Population declined in the rural areas, in part because they were too far from the urban centers to participate effectively in the exchange networks. In contrast, the Aztec period was characterized by the presence of a number of urban centers scattered widely over the valley; these centers served as the focuses of exchange and specialization. A similar situation may have characterized the Early Toltec period. During the Aztec period, the combination of intensive local and valleywide symbiosis plus the introduction of chinampas allowed the population to reach the greatest density of the Prehispanic period.

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