3. Plant Ecology and Paleoecology

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The study of the modern vegetation of the Amatzinac Valley and the palynological reflection of prehistoric vegetation provide a background for the interpretation of settlement patterns through time. Thus, the valley's plant ecology and paleoecology were analyzed with two goals in mind: discovering the potential ecological determinants of site location, and identifying changes in environmental factors which may have led to cultural adaptations. These data complement other aspects of the physical setting (Chapter 2) and served as major ecological factors in the analysis of the Formative period settlement patterns in the valley (Chapter 21).

An initial hypothesis was that sites were located to maximize access to agricultural land. It was assumed that groups entering the valley during the Formative period were fully agricultural and settled in areas which were optimal. A research strategy was developed to determine the agricultural potential of different areas within the valley. The present distribution of vegetation communities was found to be highly indicative of agricultural potential, since "natural" plant communities respond to the same environmental factors as cultivated crops.

These present vegetation communities, while reflecting the influence of climatic factors, are clearly determined by the distribution of soil types within the valley. Although no formal studies of soils have been made, the two-part classification made by local farmers is adequate to differentiate the factors controlling the distribution of vegetation and agricultural productivity throughout most of the valley (see also Chapter 26).

The soils with the highest recognized agricultural potential and productivity are the *tierra negra* soils, found in the central portion of the northern valley and as streamside alluvial deposits in the southern valley. These soils are fine-grained, organic clays which are slightly acidic. The second and more common are the *tierra amarilla* soils found throughout the southern valley and on the borders of the valley in the north. *Tierra amarilla* soils were used extensively only during the period of maximum agricultural extension of the haciendas in the late nineteenth century and then only with the construction of large-scale irrigation systems.

Eight major vegetation zones were defined for the valley by the Chalcatzingo Project (Fig. 3.1; Bugé 1978:57–69). They are described in the first part of this chapter. These zones were delimited on the basis of indicator species which had restricted distributions. Agricultural production for the different zones was determined through interviews with farmers and, in some cases, by measurements of corn in the fields (see also Chapter 26 for agricultural production at Chalcatzingo).

Once the present vegetation zones were determined, surface pollen samples were collected from each plant community in order to determine their pollen representation. These samples provide reference points for the interpretation of pollen spectra from archaeological deposits. Pollen spectra in fossil samples can be referred to specific plant communities, and, by inference, the determining environmental factors for settlement and adaptation can be identified. Samples of fossil pollen were collected at Chalcatzingo, and the results of their analysis are given in the second part of this chapter.

VEGETATION ZONES

Upland Forest

The Upland Forest Zone, which lies above 1,700 m in elevation (and thus is *tierra fría*) did not fall within our research area. It is significant, however, that wind-borne pollen from this zone appears in the Chalcatzingo pollen record.

In the Amatzinac Valley, the Upland Forest zone extends essentially from Tlacotepec northward. Because this zone occurs on the steep foothill flanks of Popocatepetl, the vegetation is complex. Pine (*Pinus* spp.) and oak (*Quercus* spp.) occur together in the upper elevations, but pine does not appear below 1,800 m. Oak, on the other hand, extends into the lower elevations as well.

In areas of high humidity, the Upland Forest vegetation takes on a tropical aspect (Miranda's Mesophyllic Mountain Forest; see Miranda 1942), dominated by *Meliosma dentata* and *chilacuate* (*Styrax ramirezii*). Other important species are *Ternstroemia pringlei*, *xochilcorona* (*Cornus disciflora*), and *jaboncillo* (*Clethra mexicana*). Temperate trees occurring within the zone are *palo blanco* (*Carpinus caroliana*), *tilo* (basswood, *Tilia* sp.), and *Fresno* (ash, *Fraxinus* sp.).

The Upland Forest was economically important for the Amatzinac Valley, for forest products constitute important exchange items today and probably did in the past as well. We recognize that while our research did not extend into the Upland Forest zone, prehispanic settlements did exist there (e.g., Tolstoy and Fish 1975).

Pithecellobium Woodland

Located in the central section of the northern valley and extending from Tlacotepec southward to Jonacatepec and Chalcatzingo, the Pithecellobium Woodland zone appears to have been the major agricultural area of the valley from the Formative period until the present. It is the most productive zone in both wild plant and agricultural resources. The soil of this zone is uniformly *tierra negra*.

Although millennia of land use have destroyed most of the original woodlands, the long-standing practice of leaving some natural vegetation along field borders, for both shade and resources, allows a reconstruction of original species. Most trees characteristic of this zone have edible products: *guamuchil* (*Pithecellobium dulce*, edible fruit), *ciruela* (hog plum, *Spondias purpurea*, edible fruit), *pochote* (*Ceiba parvifolia*, tree cotton and edible root), gray *amate* (*Ficus padifolia*, bark paper and edible fruit), and *guaje* (*Leucaena esculenta*, edible fruit). Also found within the zone are *ceiba* (*Ceiba pentandra*), *casahuate* (*Ipomoea muricoides*), *venenillo* (*Thevitia ovata*), *chipile* (*Coursetia glandulosa*), *cuaulote* (*Guazuma ulmifolia*), and numerous species of *Bursera*. Field borders are also thick with herbs and grasses. Many of the plants of this zone are recognized by the present rural population as having medicinal properties.

Barranca

Within the deep, narrow barrancas cutting down through the alluvium and pyroclastics in the northern and central regions of the valley are very restricted ecological zones of high humidity which contain distinctive plant communities. The upper slopes of the barrancas are characterized by *Bursera* species, maguey and agave (*Agave* sp.), *nopal* cactus (*Opuntia lasiacantha*), *organo* cactus (*Pachycerus marginatus*), and *guaje*. The humid barranca floors contain *amate*, *guamuchil*, *ciruela*, and *copal* (*Bursera jorullensis*).

The plants from the barranca floor are all of value for their fruits or other products, and their dominance among the barranca vegetation is probably the result of human maintenance over the centuries. This is also true for some areas of other vegetation zones near settlements, where selective cutting of trees of low economic value for firewood has eventually left only species of economic value.

Near settlements the barrancas also include fruit trees such as *guayaba* (guava, *Psidium guajava*), *aguacate* (avocado, *Persea americana*), and *mamey* (*Mammea americana*). Due to the lack of sufficient alluvium, the barrancas have never been important for agricultural activities. Fish from the rivers flowing in the barrancas provide only a very minor protein source today, and no archaeological data suggest any different situation in the past.

Huizache Grassland

Grasses and thorn-bearing bushes dominate the Huizache Grassland zone. The most characteristic plant, which gives the zone its name, is the *huizache* (thorn acacia, *Acacia farnesiana*). Also present are *tehuistle* (*Acacia bilimekii* var. *robusta*), *venenillo*, and *casahuate*. Numerous species of cacti are seen, often marking archaeological sites, where they appear to favor the loosely consolidated rubble of pyramid mounds and other structures. Rarely, *guamuchil* trees occur, marking deeper soil or more subsurface moisture.

The Huizache Grassland zone is associated with *tierra amarilla* soils. These soils are usually shallow, and are underlain by caliche. Although the Huizache Grassland zone in the southern valley was apparently intensively cultivated during the hacienda period and possibly the Classic period as well, it is largely uncultivated today because it requires irrigation for consistent agricultural production.

River Bottomland

This relatively small zone is limited to certain areas of the southern valley where the rivers emerge from the deep, restricted barrancas and have created narrow bands of fertile alluvium within the area of huizache grasslands. The river bottom soil is *tierra negra*. Vegetation today seems to represent the remnants of a gallery forest which included *ceiba*, *pochote*, *guamuchil*, *amate*, *mamey*, *aguacate*, *sapote*, and *annona*. Although some of these species are cultivated, they are also native to this subtropical zone. Small remnant stands of willow (*Salix* sp.), cattail (*Typha latifolia*), and various reeds and rushes indicate that prior to agricultural clearing these species were more widespread.

Interior Valley Cerros

The three massive granodiorite hills in the center of the Amatzinac Valley contain a specialized and highly diversified vegetation zone, selected and modified by several thousand years of alteration by local human populations. This is particularly true of the Cerro Chalcatzingo and Cerro Delgado, the two hills within the Chalcatzingo archaeological zone. The steep slopes of these *cerros* and their close proximity to the barranca of the Río Amatzinac have created a situation in which the other five vegetation zones of the valley, excluding the Upland Forest zone, are compacted into a relatively small area. These hills therefore have a limited number but broad variety of plant species, including useful species.

Chalcatzingo informants mention the *cerros* as a favored area for collecting medicinal plants. The villagers use the *cerros* as their major source of firewood in a way which may replicate prehispanic practices, concentrating on trimming trees of little or no economic value in terms of fruit or other products. One of the first lessons learned by youngsters sent to cut firewood is to distinguish valuable from nonvaluable plants. Social sanctions are brought to bear upon villagers who cut valuable plants for firewood.

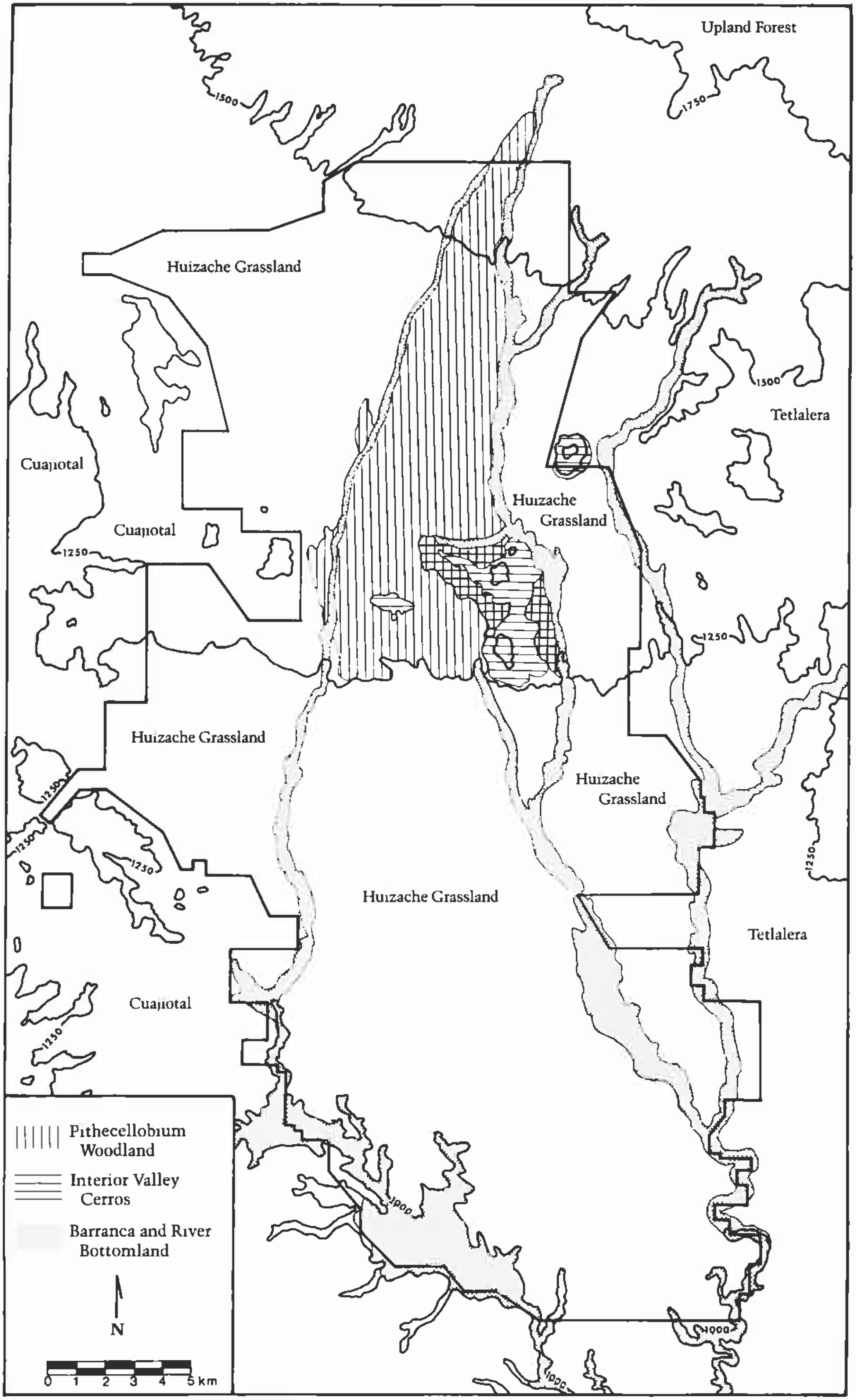
Copal trees are common in this zone, particularly at Chalcatzingo, where even today the resin is collected for use as incense. *Cuajiote amarillo* (*Bursera odorata*), *cuajiote colorado* (*B. morelense*?), and *cuajiote blanco* (*Pseudosmodingium perniciosum*) occur, along with the yellow *amate* (*Ficus petiolaris*), a tree which clings to rock exposures and cliff faces. *Nopal*, *organo*, and *garambullo* (*Myrtillocactus geometrizans*) cacti are also common and are exploited for their fruits. *Casahuate*, *guamuchil*, and *ciruela* can be found on the lower hillslopes, while in humid areas gray *amate*, *pochote*, and *guamuchil* often occur in dense stands. In addition to herbs and grasses, the underbrush on the hillsides includes *huizache*, *cuvata* (*Acacia cochliacantha*), and *uña de gato* (*Mimosa lacerata*), a thorny plant which is hard to forget once you have come into contact with it.

Cuajiotal

The Cuajiotal zone is associated with the hills on the west-central margins of the valley: Cerro Colorado, Cerro Coachic, Loma de la Plaza, etc. The zone is dominated by species of *Bursera*, principally *cuajiote* (*B. longipes*), *cuajiote amarillo*, and *copal*. With the exception of *copal* resin and firewood, this zone has little resource value. There is no evidence that this zone was ever utilized for agriculture.

Tetlaleras

Finally, there is a zone of thorn scrub vegetation growing upon stony (*tetlalera*) soil. It is characterized by leguminous species including *huizache*, *tehuistle*, *cuvata*, and *guaje*. Cacti occasionally occur in the heavily rocky areas, and


Upland Forest
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Cuajiotal
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Huizache Grassland
Huizache
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Huizache Grassland
Tetlalera
Cuajiotal
1250
Pithecellobium
Woodland
Interior Valley
Cerros
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Bottomland
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guamuchil in the humid areas.

The zone extends along the eastern border of the valley. Settlements and agriculture within the zone are limited to small areas of alluvial land located where streams emerge into the valley from the low hills to the east.

POLLEN ANALYSIS

Ecology of Pollen Indicators

A major problem in comparing modern and archaeological pollen samples is that few species are represented in the archaeological samples. Thus, paleoecological interpretations are based on the ecology of the species found rather than on complexes of pollen reflecting vegetational communities. Because there are fewer data available from the pollen samples, conclusions of their analysis must be considered tentative. Nevertheless, certain general statements can be made concerning the paleoecology of archaeological sites and the reconstruction of paleoclimates.

Chenopods and amaranths (cheno-ams) are common in archaeological pollen samples. Their ecology is distinctive: they prefer fine-grained alkaline soils and recently disturbed earth (Martin 1963:49). These plants are frequently found growing wild in cultivated agricultural fields, where they may even be encouraged as potherbs and medicinal plants. As soon as fields are abandoned, however, cheno-ams are rapidly out competed by grasses (Graminae) and composites (Compositae).

Composites are aggressive intruders into agricultural land. Their seeds sprout at the first rain of the season, and the seedlings are able to endure several weeks of drought. Composites do equally well in rich or poor soils, the only difference being in their vitality and density. They are found on steep *cerro* slopes, where in pollen production though not in number they are dominant over the arboreal vegetation.

Grass is also an invader of abandoned fields, but it is not as aggressive as the composites. Within ten to fifteen years of abandonment, however, grass is dominant, and composites are found only in continuously disturbed areas. The presence of grass normally indicates dry conditions or thin soils. In deeper soils, grass is present but is not well represented in pollen spectra since other plants produce more pollen.

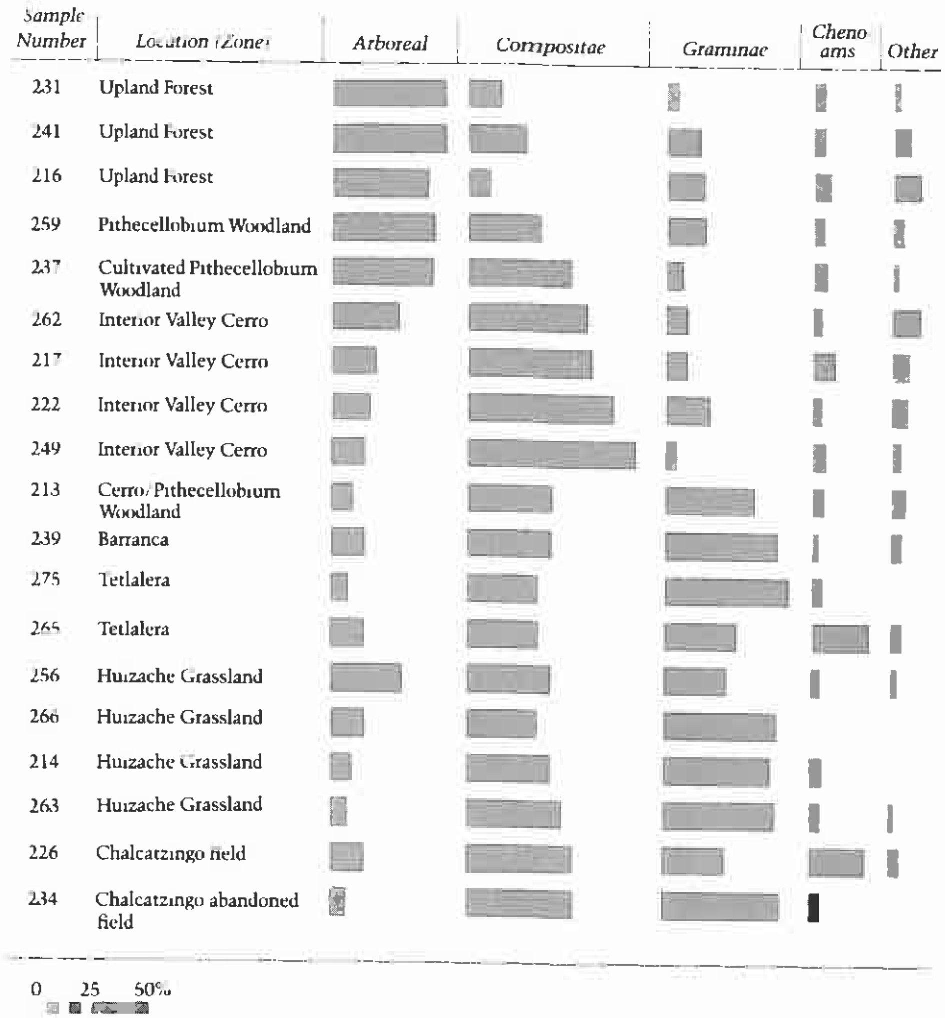

Figure 3.2. Surface pollen spectra from various locations in the Amatzinac Valley.

From our surface transect samples (see below), it is obvious that both grasses and composites are indicators, in this valley, of dry conditions. Comparing pollen spectra for only these plants, high percentages of composites indicate slightly more mesic conditions, while high percentages of grass indicate the driest situation. Cheno-ams, which are found in low numbers throughout our surface samples, seem to be definitive indicators of disturbance.

Surface Pollen Samples

I collected nineteen surface pollen samples from the Amatzinac Valley. The spectra from these samples are shown in Figure 3.2, which shows the vegetation zone from which each sample was taken. With the exception of sample numbers 226 and 234, the spectra represent a north to south transect of the valley through *tierra negra* soils from Hueyapan, in the far north, to Tenango, a few miles southeast of Chalcatzingo. Since the samples were taken from the same soil type, variability in the spectra largely reflects differences in precipitation and temperature. The pollen was classified as arboreal (AP in Fig. 3.2), Compositae, Graminae, Chenopod-Amaranth, and Other, this last category including species which occurred in numbers too small to be of value in distinguishing vegetation zones.

The Upland Forest vegetation zone is characterized by high percentages of arboreal pollen, primarily pine and oak. The zone is clearly differentiated in the

Figure 3.1. Vegetation zones of the Amatzinac Valley.

record from the Pithecellobium Woodland zone (also relatively high in AP) by the presence of pine.

The pollen of the Interior Valley Cerros zone is distinguished by low AP values. Although trees dominate this zone's vegetation, they are almost all insect-pollinated and thus are not well represented in the pollen counts. As should be expected, AP values decrease concurrently with the distance from the Upland Forest and Pithecellobium Woodland zones.

The Barranca and Tetlaleras zones have variable samples which show relatively high percentages of grasses, indicating that they are undisturbed and fairly xeric (arid). Although the margins of the barrancas are moist locations, they also support primarily insect-pollinated species and thus appear drier in the pollen record than they actually are.

Huizache Grassland shows high counts of grasses and composites. Since both plants invade fields within a few years of their abandonment, abandoned fields frequently show pollen profiles similar to that of this zone.

Fossil Pollen

A stratigraphic sequence of pollen samples was collected at Chalcatzingo from the main cross trench in the Plaza Central. Of the nineteen samples in the series, only seven samples (from five levels) produced statistically reliable counts. Other samples were not productive due in part to the depositional environment, which was not conducive to the preservation of pollen, and to the probable high percentage of insect-pollinated species.

In all of these samples, 100-grain counts were made. They were compared with reliable samples from other site areas and with samples with little pollen and thus of dubious reliability. In all cases the counts were in agreement, indicating that a 100-grain count was apparently an adequate representation of the pollen spectrum.

The pollen curves for the sequence are shown in Figure 3.3. Except for sample 131, the sequence has insignificant amounts of arboreal pollen, so only composites, cheno-ams, and grasses are included in this figure. The shaded bar running vertically down the diagram is the 0.95 confidence interval (Maher 1972) calculated from the surface sample, which is indicated at the top of the column. Pollen percentages which fall inside the bar are not considered to show statistically significant differences from the modern vegetation, implying a vegetation assemblage similar to that on the site today. Percentages which fall outside the bar represent significant deviations from the present conditions.

The pollen samples come from good stratigraphic contexts and have been dated by their associated ceramics. The earliest sample is no. 124, which is Late Barranca subphase and shows drier conditions than found on the site today. Composite percentages in the sample are low, while grasses and cheno-ams are high. In addition to greater aridity, the low percentage of composites and high cheno-ams indicate some disturbance as well.

Early in the Cantera phase (samples 129 and 131) the frequency of cheno-ams increases and grass decreases. Taken alone, the percentages for grass suggest a gradual increase in moisture by 700 BC. However, since the curves are proportional, the decrease in the grass percentage is influenced by the large increase in the percentage of cheno-ams. Clearly the pollen is reflecting both increasingly moist climatic conditions and extensive disturbance of the site.

Additional evidence for this disturbance is the higher than normal percentage of AP in sample 131, the majority of which was pine, indicative of long distance wind transport. Apparently the destruction of the vegetation at that time was so complete that only cheno-ams, adventitious composites, and pine are well represented. Continuous clearing of the Plaza Central, the settlement's public area (Chapter 7), maintained the high percentages of cheno-ams through time.

Also during the Cantera phase the pollen spectra of sample 132 indicate a major event which cannot be interpreted simply by comparison to the surface pollen samples collected throughout the valley. Grass and composites should not both show high values, since they indicate opposite climatic conditions. A possible interpretation is that disturbance of the settlement's vegetation continued to be so intense that it effectively masked climatic conditions. The increased percentage of grass may also indicate a drier climate, while the percentage of composites reflects intermittent disturbance.

After the event reflected in sample 132, a gradual decline of grass seems to continue along with the decline in cheno-ams (no. 133). The vegetation again indicates drier than present conditions, with greater than modern percentages of cheno-ams.

Considering the total counts of the samples, a diverse vegetational community is indicated by sample 124, with pine, oak, legumes, cactus, acacia, and agave all occurring in the sample. This diversity indicates a relatively unmodified vegetational community. Succeeding samples become increasingly less diverse, as would be expected with disturbance and agricultural activity. The latter is evidenced by grains of *Zea mays* in samples 131 and 138. Samples from other areas of the site which date from the same time period confirm the Plaza Central sequence, including the period of disturbance and the occurrence of agricultural pollen types.

Comparison of Chalcatzingo and Oaxaca

A comparison of pollen sequences from Chalcatzingo and Oaxaca is shown in Figure 3.4. At 800 BC the two sequences seem to show opposite climatic conditions, while by 700 BC both areas had conditions similar to the present. At Chalcatzingo, the period of construction which occurred about 600 BC produced a vegetation community which seems to indicate dry conditions, but in fact is representative only of human activity. The underlying climatic situation is difficult to determine, as it is effectively masked by the large quantities of pollen which indicate disturbance. The period of building activity is followed by a return in the pollen spectra to indications of climatic conditions like those today at the site and in Oaxaca.

As Kent Flannery and James Schoenwetter (1970) argue, their Oaxacan pollen sequence seems little affected by human disturbance and clearly shows the influence of climate on the vegetation. The case is different, however, at Chalcatzingo, where there is little evidence of stable conditions or more gradual transitions between plant communities. Each sequence needs to be interpreted in terms of its own ecology, rather than assuming that both indicate climatic conditions or effects of human disturbance.

As vegetation was cleared for the construction of terraces, houses, and monuments at Chalcatzingo, the vegetation became less diverse and more characteristic of early successional stages which tend to fluctuate rapidly in character. The return to like-normal conditions at 550 BC may indicate a xeric vegetation

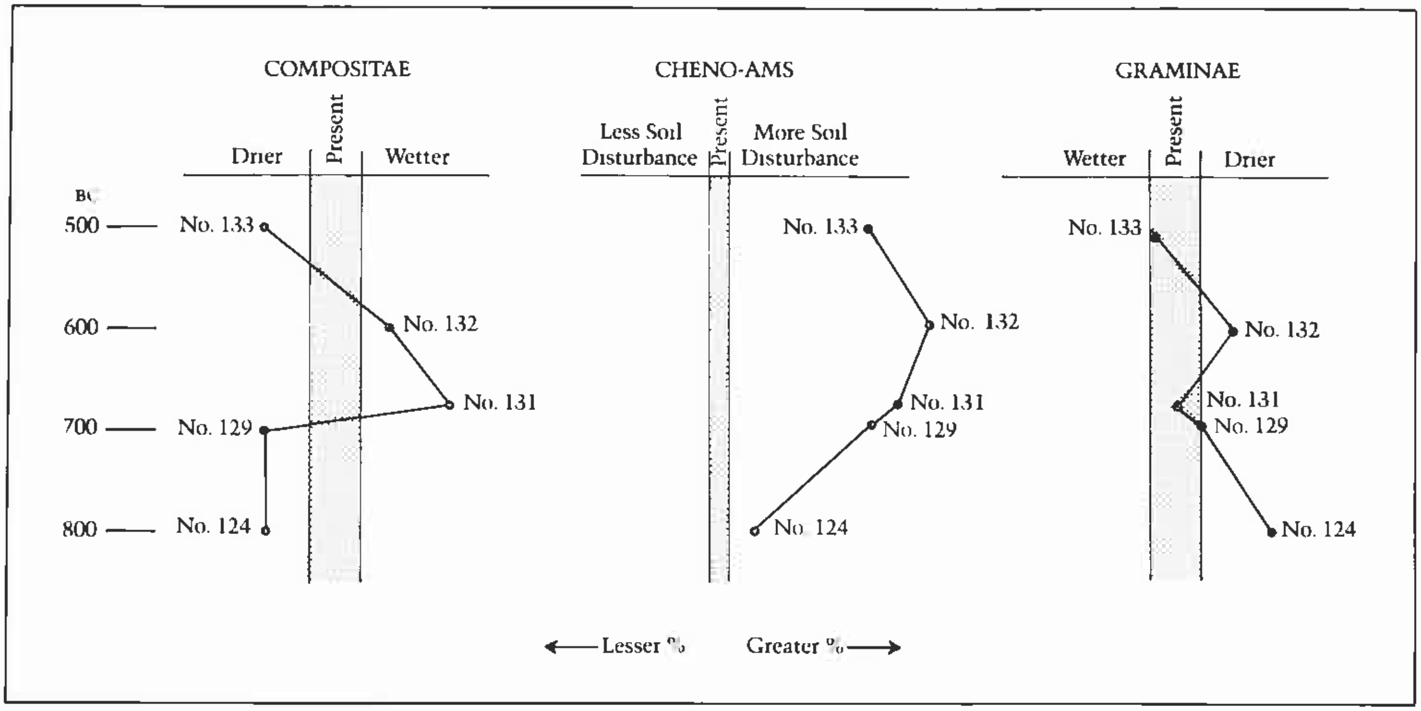

Figure 3.3. Pollen spectra from the Plaza Central transect trench.

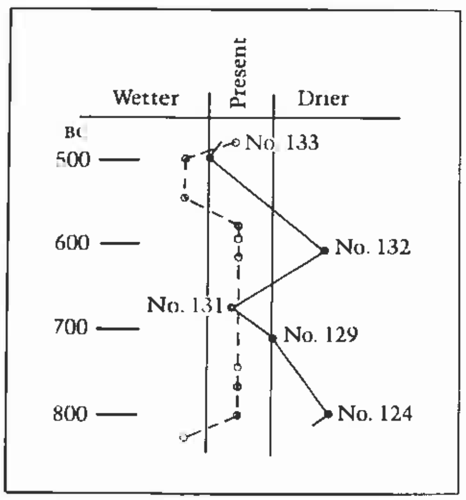

Figure 3.4. Comparison of moisture fluctuations, Oaxaca (*dashed line*) versus Chalcatzingo (*solid line*).

resulting from disturbance rather than climatic change. Construction activities would have produced a situation favoring increased erosion, greater solar radiation inputs, and increased evaporation, all of which would have put more moisture stress on the vegetation—including crops.

Tierra negra soils would have been less affected by clearance compared to the thin soils of the hillslopes. Terrace construction, using soil brought from the valley floor, would have preserved the productivity of the land while easing the problems of erosion.

PLANT MACROFOSSILS

Another form of evidence aiding the understanding of the prehistoric ecology of Chalcatzingo is plant macrofossils. Although no good macrofossil samples were recovered from the major excavation units, even though flotation samples were processed, two dry caves on the Cerro Delgado did yield interesting collections. The collection from Cave 8 was derived from project excavations, while the abundant Cave 2 sample came primarily from screening a backdirt pile left by looters. The Cave 8 sample is probably Middle Postclassic in date, while that from Cave 2 seems to date from the Middle Postclassic to perhaps the recent period.

The plant data are detailed in Appendix A. Plant names were provided by informants, and botanical names are given where the specimens could be identified. Wood and fiber artifacts recovered from Cave 2 are described in Chapter 16.

The plant remains represent a broad spectrum of the vegetation of the area. Most specimens were from plants which are edible or have specific uses. *Jicamilla, chupandilla* seeds, *ciruela* pits, *guajes, cacachis*, avocados, and squash were all found in quantity. Today these are preferred supplementary foods. No large quantities of any one species were found that would indicate storage or intensive consumption. The material indicates that a considerable range of wild foods were eaten and used prehistorically, but none in great quantities. This compares favorably with modern practices and statements by farmers that agricultural production is never so low that families have to rely on gathered food. Wild plant products are eaten today in the fields and may provide significant amounts of calories, but only as supplements or "snacks."

Stability of the agricultural system is indicated by the lack of wild plant use. If agriculture were risky and production variable, more reliance on gathered foods would be expected among agricultural peoples. The macrofossils, therefore, indicate that agriculture has probably been consistently able to satisfy the needs of the community and that there was little reason for intensive gathering.

Also of interest is the large quantity of cotton from Cave 2. Cotton is no longer grown in the vicinity of Chalcatzingo, due apparently to problems with disease. Most local farmers have had some experience with cotton and stated that the rainy season was too wet for it to be successful. They did indicate that the southern part of the valley, with its higher temperatures and lower rainfall, was more favorable. However, no cotton was seen growing anywhere in the valley.

It is likely that cotton was an important crop in the past (Classic or Postclassic), but that economic conditions now prevent it from being profitable. Cotton may have been a major factor in the Classic period reorientation of settlement patterns in the valley under the conditions of Teotihuacan contact, but whether or not the valley was a major cotton-producing center remains to be proven.

CONCLUSIONS

Based on the analysis of modern vegetation and prehistoric pollen samples, the Formative period ecology of the Amatzinac Valley can be tentatively reconstructed, providing necessary data for the interpretation of settlement patterns. Initial settlement of the valley during the Amate phase occurred during a time of dry climatic conditions. This explains, in part, the location of sites near permanent water sources and the attempt by the early inhabitants to maximize their access to *tierra negra* soils (Chapter 21). With the increased population of the Barranca phase and the increased rainfall indicated by the pollen sequence, settlement spread to less than optimal areas. At Chalcatzingo, the increase in rainfall may have stimulated the terracing of the hillside in order to prevent erosion and to protect the fields below the central portion of the site from damaging runoff. Decreasing moisture during the succeeding Cantera phase would have made agriculture more risky, but crop losses in one area may have been buffered within the hierarchical settlement system.

Throughout the past, vegetation in the valley was much as it is today and there is no evidence for drastic change. Prior to settlement, the central part of the northern valley was probably heavily forested. This zone would have been favorable for both agriculture and plant gathering. On both margins of the central zone, the grassland was much the same as now, possibly with more acacia and other thorny trees. The *cerros* and barrancas were characterized by a diverse community of plants, many of which provided gatherable products.

Comparison of the Chalcatzingo and Oaxacan pollen sequences reveals two conclusions. First, the pollen sequence at Chalcatzingo reflects local disturbances of the vegetation more clearly than does the Oaxacan sequence. This is probably due to the fact that the Chalcatzingo sequence was collected in the center of the site, where disturbance had maximum effect. Second, the Chalcatzingo pollen sequence indicates the damping effect which the rich soils of the central valley have on climatic variation. This is, of course, of critical importance for farmers seeking to minimize the risks of agriculture within a variable environment.

RESUMEN DEL CAPÍTULO 3

La vegetación comprendida en el valle del Río Amatzinac está determinada claramente por la distribución que presentan los tipos de suelo llamados tierra negra, el cual es un barro rico en materiales orgánicos que se encuentra fundamentalmente en la porción central de la parte norte del valle, y de los llamados tierra amarilla, el cual es un suelo común en la parte sur del valle y de contenido más pobre.

Dentro del valle existen ocho zonas mayores de vegetación: Bosque de Tierra Alta, Bosque Pithecellobium, Barranca, Pastizal de Huizache, Tierras Bajas de Río, Cerros del Interior del Valle, Cuajiotal, y Tetlaleras. La zona más productiva se encuentra en el Bosque Pithecellobium. Ahí, el suelo está compuesto uniformemente de tierra negra. Esta es la zona que ha tenido la actividad agrícola mayor en el valle desde el período Formativo hasta el presente.

Chalcatzingo, el cual se encuentra en el centro del valle y en el área de transición entre el Bosque Pithecellobium y las zonas de Pastizal de Huizache, tiene vegetación de tipo Cerros del Interior del Valle. Sin embargo, la ubicación del sitio permite que desde ahí se tenga acceso a todas las otras zonas de vegetación, excepto a la de Bosque de Tierra Alta.

Se tomaron muestras de polen en estas zonas de vegetación modernas y se compararon con el polen arqueológico proveniente del sitio. Esto permitió la reconstrucción de los paleoclimas y también produjo importantes testimonios que sirvieron para determinar los acontecimientos mayores de perturbación de suelo en la prehistoria de Chalcatzingo.

Los datos de polen sugieren que durante la fase Barranca tardía, el área era más seca que ahora. El polen de la fase Cantera temprana reveló dos cambios mayores: aumento de humedad (lluvia) y extensa perturbación de la ladera. El polen de la fase Cantera tardía indica un retorno a las condiciones secas.