Dating Results From Excavations in Quarry Tunnels Behind the Pyramid of the Sun at Teotihuacan

Linda Manzanilla, Claudia López and AnnCorinne Freter

Ancient Mesoamerica / Volume 7 / Issue 02 / September 1996, pp 245 - 266
DOI: 10.1017/S0956536100001450, Published online: 10 October 2008

Ancient Mesoamerica, 7 (1996), 245–266

DATING RESULTS FROM EXCAVATIONS IN QUARRY TUNNELS BEHIND THE PYRAMID OF THE SUN AT TEOTIHUACAN

Linda Manzanilla,[a] Claudia López,[a] and AnnCorinne Freter[b]

[a]Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México, Ciudad Universitaria, 04510 México, D.F.

[b]Department of Sociology and Anthropology, Ohio University, Athens, OH 45701, USA

Abstract

In this article we summarize the results of an ongoing project designed to study the tunnels and caves of Teotihuacan, emphasizing those findings derived from the excavation of four extraction tunnels located immediately to the east of the Pyramid of the Sun. In particular, we present radiocarbon and obsidian-hydration dates from the Cueva de las Varillas, where 13 Mazapan-phase burials were found and which has substantial evidence for a post-Teotihuacan occupation. In addition, the Cueva del Pirul has produced evidence of another 14 human burials, which were predominantly children, as well as complete dog skeletons, in a context clearly related to underworld symbolism. After the fall of Teotihuacan, these underground cavities excavated into *tezontle* continued to provide space for the practitioners of Tlaloc and fertility cult activities. In Aztec times, they were living spaces, and given the lack of space on the surface, this was a function that they served well into the twentieth century.

This paper reviews some of the results of an ongoing project, begun in 1987, in the Teotihuacan Valley (Arzate et al. 1990; Barba et al. 1990; Chávez et al. 1994; Manzanilla 1994a, 1994b; Manzanilla et al. 1989, 1994). The study deals with a system of tunnels under the northern part of the ancient city, a system originally created for the extraction of porous volcanic materials used to build the ancient city of Teotihuacan (Figure 1). Barba Pingarrón (1995) has demonstrated that 670,000 cubic meters of volcanic scoria were removed from the large depressions in the northern half of the valley. After the extractive activities, the tunnels were used as dwelling, ritual, and burial sites for post-Teotihuacan occupations.

THE TEOTIHUACAN SYSTEM OF TUNNELS

The existence of underground passages in Teotihuacan is well known. Heyden (1981) reproduces the glyph of Teotihuacan from the *Codex Xólotl* (Dibble 1951), which depicts two large pyramids overlying a cave with a person inside (Figure 2). It is likely that this figure represents the oracles mentioned in the *Relación de Teotihuacan* (Soruco Saenz 1985:107) that were frequently located in caves. In addition, toponyms such as Oztoyahualco and Oztotícpac make reference to caves.

Archaeological research conducted in these tunnels includes Linné's (1934) excavations at San Francisco Mazapa; De Terra and Bastien's (Armillas 1950) exploration of the Calaveras Pit, where 35 human skulls were found; Carmen Cook de Leonard's (1952: 49; Millon 1957) work at Oztoyahualco; and Michael and Elizabeth Goodliffe's (1963) excavations in four interconnected tunnels in Purificación, containing Teotihuacan, Mazapan, and Aztec II and III ceramics. Other projects of note are Obermeyer's (1963) excavation of the Huexóctoc Cave in Oxtotícpac; Heyden's (1973, 1975; Baker et al. 1974) study of the tunnel below the Pyramid of the Sun, excavated by Acosta and used during Teotihuacan II times (first to third centuries A.D.) for ritual purposes; Basante Gutiérrez's (1982, 1986) explorations in several tunnels and holes in the valley; and finally Soruco Saenz's (1985, 1991) exploration of a cavity probably for solar observations, located to the southeast of the Pyramid of the Sun, where a basalt stela on an altar displayed a ray of light in its center at the beginning of the summer solstice.

In August 1992, we began the extensive excavation of four tunnels to the east of the Pyramid of the Sun (Manzanilla 1994a, 1994b; Manzanilla et al. 1994). In 1994, two other cavities were tested by the Instituto Nacional de Antropología e Historia's (INAH) Proyecto Especial 92-94. One was found to be a smaller replica of Soruco Saenz's solar observatory (Moragas Segura 1994). The general objective of our project consisted of locating and defining tunnels and cavities of archaeological interest based on their potential ritual or economic use. These include: the original extractive activities related to porous pyroclastic volcanic materials, large-scale storage, burials, offerings related to fertility rites, and domestic and manufacturing activities. Storage and funerary loci found in two of the four tunnels excavated behind the Pyramid of the Sun (Cueva de las Varillas and Cueva del Pirul) informed on all of these topics, and numerous activity areas related to post-Teotihuacan occupational levels (hearths, hide- and textile-working areas, bifacial obsidian-production loci, etc.) also were located.

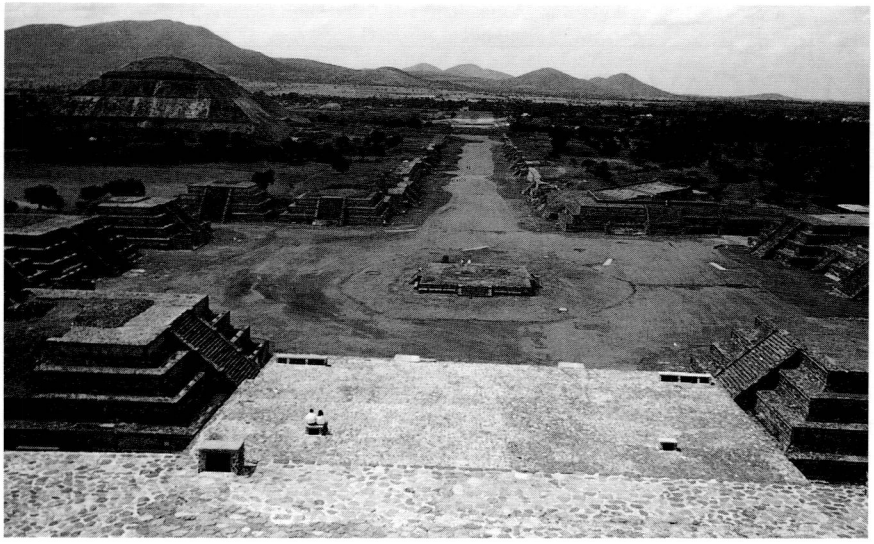

Figure 1. View of Teotihuacan from the Pyramid of the Moon to the south.

Since 1987, we surveyed the northern part of the Teotihuacan Valley from a geological perspective, in order to assess the distinct types of volcanic phenomena present in the region. The location of visible holes and depressions were registered along with their coordinates, azimuths, and lithological contexts (Arzate et al. 1990; Barba Pingarrón 1995; Barba et al. 1990; Chávez et al. 1994; Manzanilla 1994a, 1994b; Manzanilla et al. 1989, 1994). Magnetometry, electrical resistivity, gravimetry, and ground-penetrating radar were used in the intermediate sectors between depressions to detect anomalies associated with the presence of cavities and to trace the tunnels. In order to confirm the magnetic results and locate the tunnels precisely, several electrical profiles were measured on top of the magnetic profiles. In addition, exploratory drillings were made to obtain cores of the subsoil associated with certain anomalies (Arzate et al. 1990; Barba et al. 1990; Chávez et al. 1988, 1994; Manzanilla et al. 1994).

Finally, extensive archaeological excavations were carried out to reconstruct activities that took place in the tunnels. Radiocarbon and obsidian-hydration dates have been obtained from primary contexts. Chemical, phytolith, pollen, botanical, and faunal-macrofossil analyses have been undertaken alongside archaeological analyses.

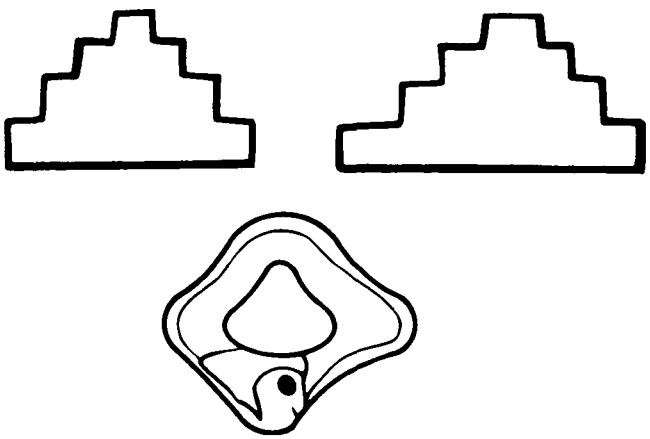

Figure 2. Glyph of Teotihuacan from the *Codex Xólotl*.

Quarry tunnels are common in the northern part of the Teotihuacan Valley. At the time of the initial settlement of the valley, the area was probably characterized by a substrate of volcanic emission zones submerged in volcanic tuff. That is the reason why large volcanic bombs are observed inside tunnels. The emissions zones are characterized by linear basaltic flows surrounded by pyroclasts (porous volcanic scoria). To build the city, the Teotihuacanos extracted the pyroclasts by tunneling under the overlying tuff. Where many chambers coalesced, large depressions were formed when the ceilings collapsed.

In some cases the scoria was excavated in areas already weakened as a result of contact between tuff and pyroclasts with the slopes of the emission zones, as is the case with the tunnel associated with the Pyramid of the Sun. Perhaps the Teotihuacanos were looking for a preferred size and color of pyroclasts; because of its lightness, this material was easily extracted, transported, and made suitable for construction use.

In summary, the system of tunnels, or man-made holes, in the Teotihuacan Valley was the result of quarrying porous volcanic materials under the volcanic tuff (*tepetate*) for building enterprises, during the Patlachique or Tzacualli periods (150 B.C.–A.D. 150). We wish to correct, therefore, the idea, derived from Heyden (1975) and Millon (1973), that they are natural. No natural processes in volcanic contexts produce large or long passages, except lava tubes, and these are certainly not lava tubes. These cavities have been excavated by extracting pyroclasts that were once ejected into the air, and then fell still hot enough to fuse with the former materials.

The original settlement of the valley consisted of three-temple plazas surrounded by dwelling sites, and not the very dense urban site originally proposed by Millon (1973). The quarry mouths were found very near these pyramid complexes, due to the quantity of construction material needed for the raising of the pyramids themselves. The plazas of these complexes seemed to be deliberately located on top of the tunnels. We do not yet know whether there is a physical connection between the tunnels and the plazas.

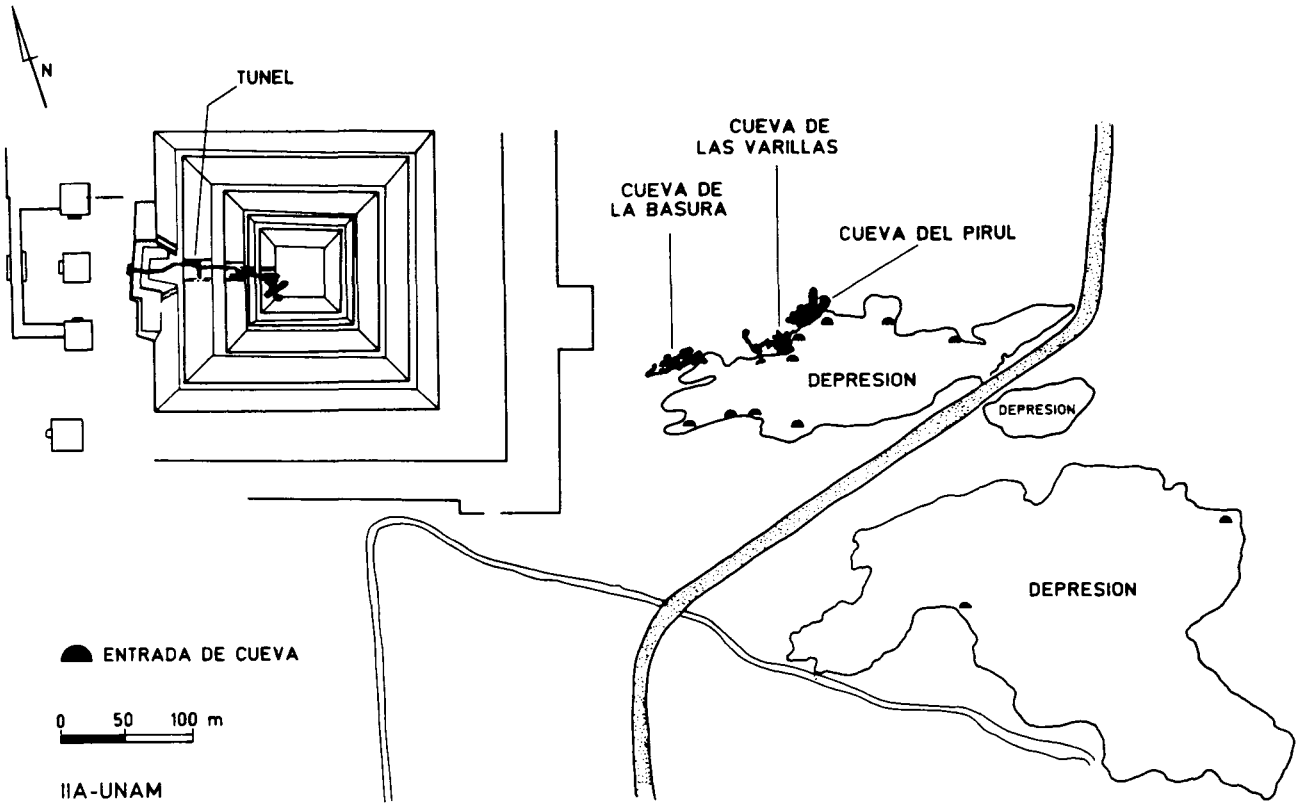

Figure 3. Three of the tunnels excavated, inside the protected archaeological zone [Cueva de la Basura, Cueva de las Varillas, and Cueva del Pirul].

OCCUPATIONAL HISTORY AND CHRONOLOGY

Four tunnels, located 200–270 m to the east of the Pyramid of the Sun, were excavated. Three (Cueva de la Basura, Cueva de las Varillas, and Cueva del Pirul) lie inside the protected archaeological zone (Figure 3). The fourth (Cueva del Camino) is located under the road near the La Gruta Restaurant.

In general, the four have the same general stratigraphic sequence: a series of modern and Postclassic occupational levels within a loose, grayish-brown matrix, approximately 1 m deep. This material overlies a fill of yellowish-brown disintegrated tuff. On its surface we found either Coyotlatelco activity areas or Mazapan funerary remains. Within it we found painted Teotihuacan pottery sherds, painted slate, and human bones, including cut skulls. This fill was cultural because it was also present in tunnels with no tuff (*tepetate*) overlying the volcanic scoria (*tezontle*) where the tunnels were excavated. Originally it may have had Teotihuacan burials or ritual activity areas, probably looted during Coyotlatelco times.

A third stratum (clearly represented in the Cueva de la Basura) was represented by a reddish-brown volcanic scoria fill with small basalt fragments, bone, mica, obsidian, ceramics, and carbonized materials.

Below a modern occupational level, Cueva del Camino—deprived of natural light—yielded a vast amount of Aztec III material, with food-preparation and cooking-activity areas, particularly hearths with *comales*, dated between A.D. 1280 and 1450 (Beta-65547, 560 ± 80 B.P.) (see Appendix) (Figure 4). In addition, there were complete plates and jars, projectile points, grinding instru-

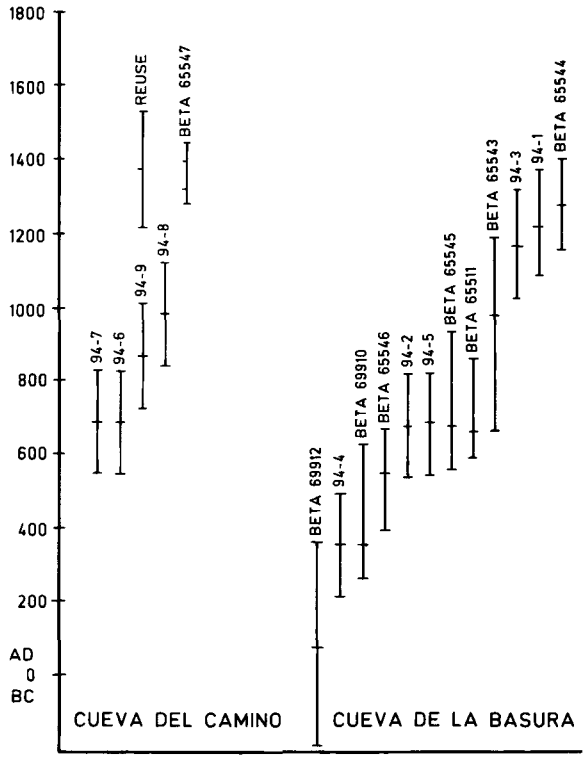

Figure 4. Calibrated radiocarbon dates at two sigma [Beta Analytic Inc.] and obsidian-hydration dates [Ohio University] from the Cueva del Camino and Cueva de la Basura.

ments, figurines, maize remains, bone, and carbonized wood. Specifically Teotihuacan materials, such as stucco polishers, portrait figurines, and *candeleros*, were present as if the Aztec were selecting and treasuring these objects.

Under this Aztec occupation, many green-obsidian fragments were recovered. Obsidian-hydration dates averaged A.D. 699–865, perhaps related to a disturbed Epiclassic occupation (represented clearly by Coyotlatelco and some Mazapan ceramics).

The Cueva de la Basura is located 88 m to the east of the Platform of the Sun. Below a modern occupation level, and in many sectors of the tunnel—some near the entrance, and others in the dark parts—some Mazapan ceramics were located, presenting clear evidence of Coyotlatelco activity areas (around A.D. 700) and ritual activity areas with *omechicahuaztle* objects (engraved objects made from animal long bones or deer antler, frequently found also in the next tunnel mentioned). In the disintegrated tuff stratum we recovered mica, carbonized materials, potter (particularly broken Teotihuacan polychrome pottery), lithics, cut and rounded human skulls, onyx pendants, needles, pounders, *Prunus capuli* seeds, etc. (with radiocarbon dates between A.D. 350 and 550). There is also one date (Beta-69912, average calibrated date ca. A.D. 80) that could be related to the original extractive activities in the tunnels.

Besides the early ^{14}C date from this cave (Beta-69912), there are others from the lower tunnel of the Pyramid of the Sun (M-1283; Millon et al. 1965:33) and the Temple of the Feathered Serpent (Rattray 1991:12) that date to ca. A.D. 80. This could be evidence of major construction enterprises involving the tunnels and the main pyramids.

The Cueva de las Varillas was 50 m in length; it had a vast entrance chamber, 18 m in diameter, with seven small niches, and a tunnel that crosses three small chambers. Its southern side is connected to another chamber that had well-preserved funerary and storage contexts, which will be discussed below.

Except for the funerary chamber (Chamber 2), the rest of the cavity contained modern, Colonial, Aztec, Mazapan, and Coyotlatelco domestic contexts, as well as disturbed ritual materials from the Teotihucan era. Many different activities are represented by the Epiclassic and Postclassic living floors (dated from A.D. 650 to 1500) (Figures 5–7): spinning, sewing and weaving, painting and sealing, wood and bone working, food preparation and consumption, domestic ritual, and perhaps hide preparation. Living floors were detected by the presence of compacted clay surfaces, hearths, traditional food resources (Manzanilla and McClung de Tapia 1996), many types of artifacts, and refuse areas. Figurines from Preclassic to Colonial times were found, as well as a basalt human

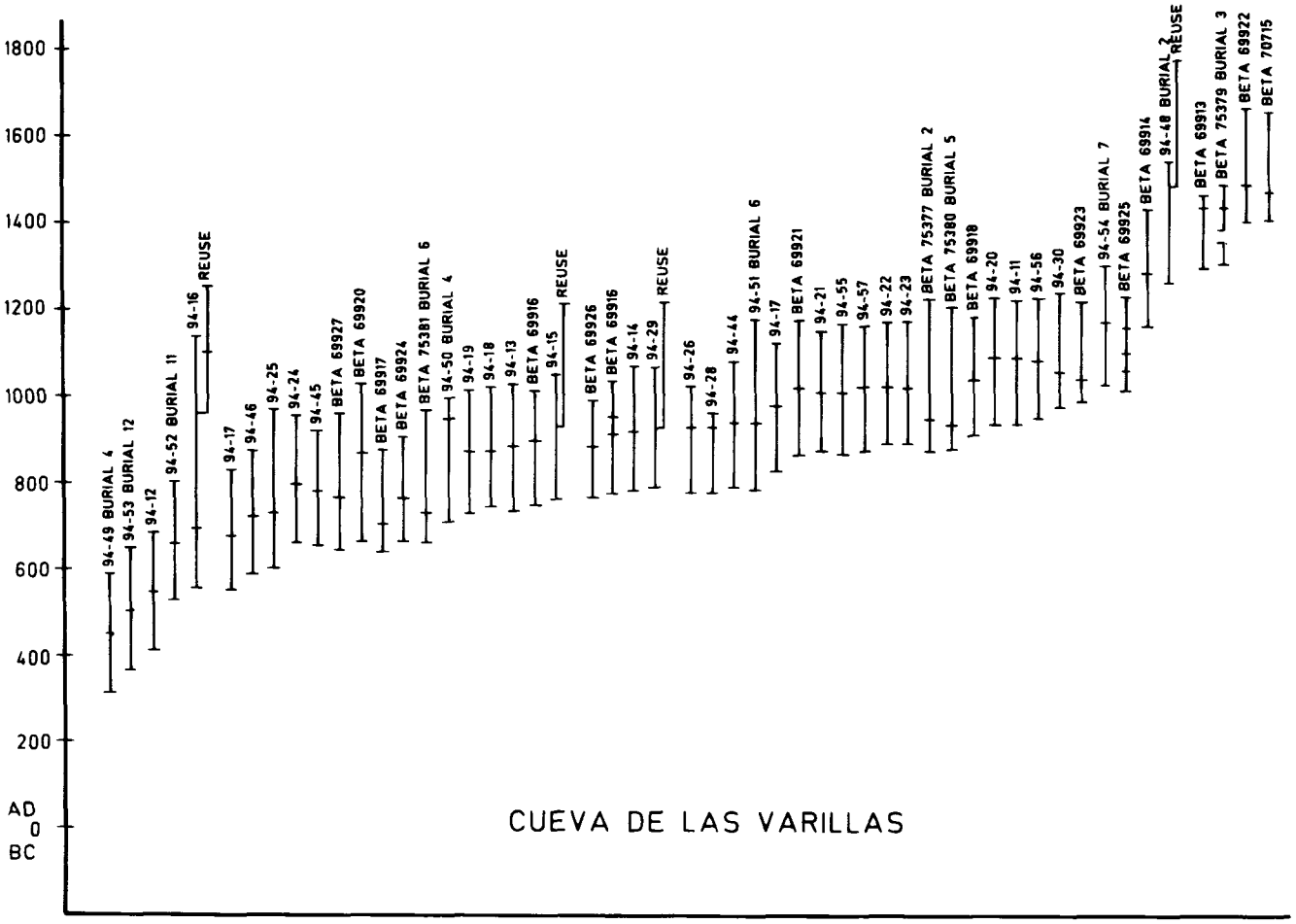

Figure 5. Calibrated radiocarbon dates at two sigma (Beta Analytic Inc.) and obsidian-hydration dates (Ohio University) from the Cueva de las Varillas.

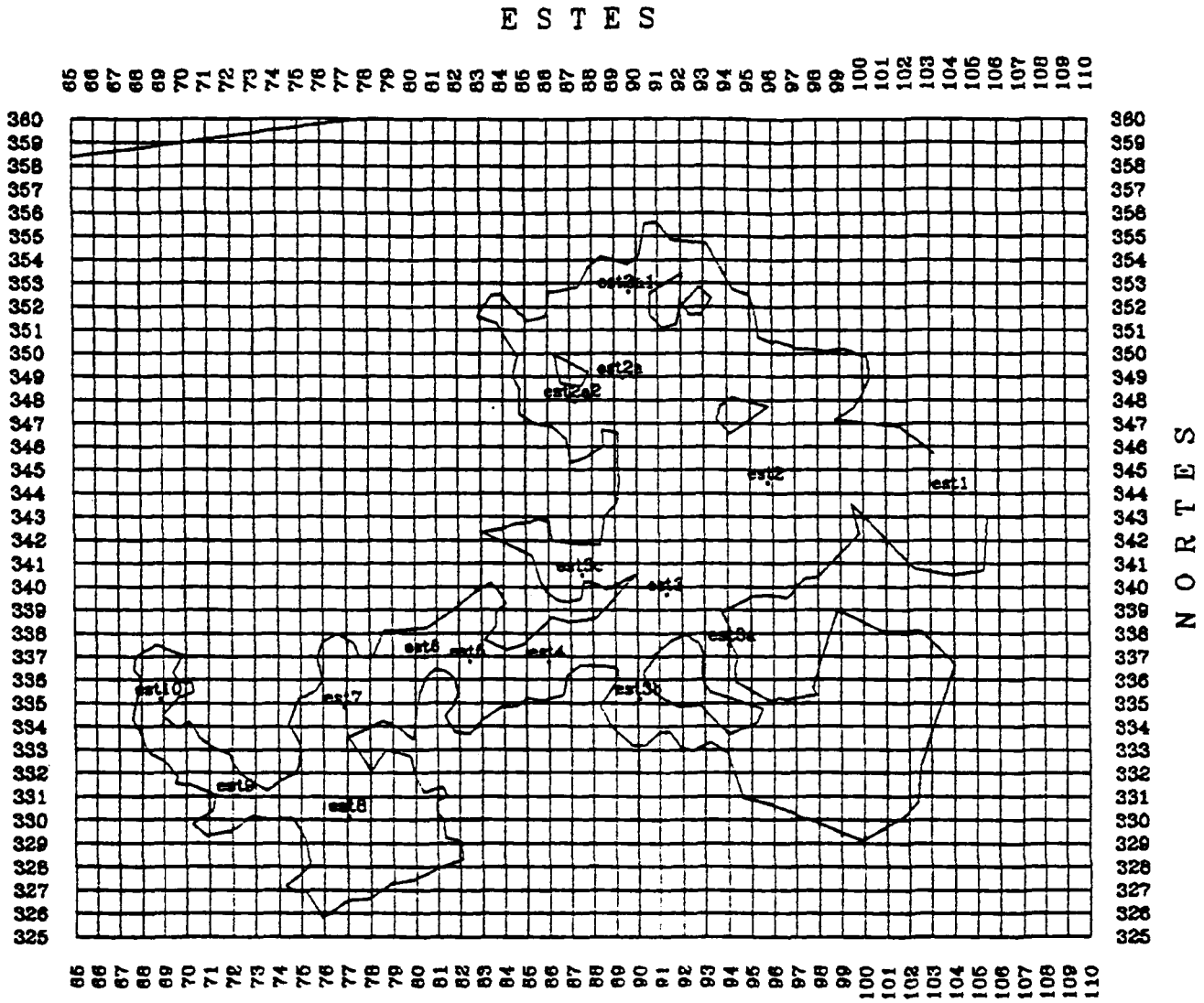

Figure 6. Map of the Cueva de las Varillas.

Figure 7. View from the Cueva de las Varillas.

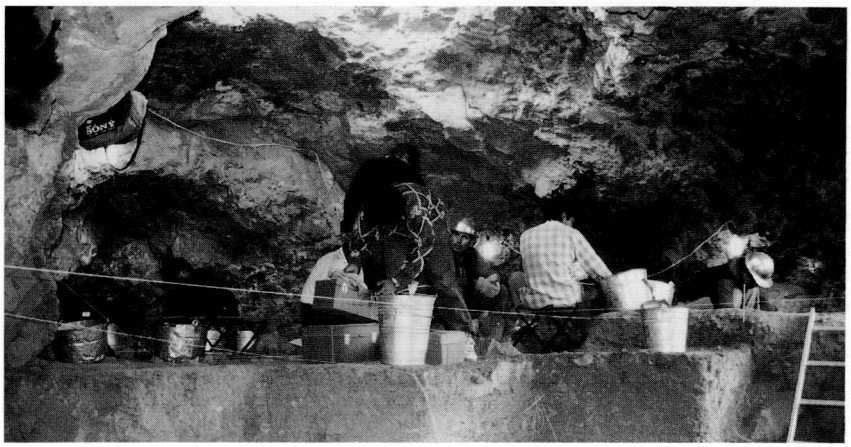

Figure 8. View of the excavation process of the funerary chamber of the Cueva de las Varillas.

head covered partially with stucco and the half face of an old man. Many of the vessels seem to be ritually killed; we have been able to reconstruct them by piecing together sherds coming from different squares of the grid, and in some cases, from different chambers, as if they were intentionally smashed and scattered.

There are also some hints of a cult that involved marine elements, such as different types of mother-of-pearl shells, a caudal spine from a sting ray, and fragments of marine turtle shells. We can also cite some examples of foreign pottery from the Gulf Coast and the Maya area (particularly polychrome sherds).

Underneath these occupation levels, there are 3 m of disintegrated tuff, a material that naturally overlies, in a compact way, the pyroclastic fill in which the cavities were excavated. This loose fill had some fragments of painted slate and cut human skulls with polished rims to allow drinking. These resemble the ones De Terra and Bastien found in the Calaveras pit associated with Miccaotli ceramics (Armillas 1950).

In the funerary chamber of this cave (Figure 8), beneath the modern occupation and the Aztec floors, there were funerary and storage contexts (these last probably to store *Amaranthus* for the deads' masks, but also for "incubating" maize or *Chenopodium*) of late Coyotlatelco and early Mazapan date, with complete vessels. Thirteen burials in all were found. A group of three seated adults facing south (one with a bilobulated skull) were placed around a pillar in the chamber (Figures 9 and 10), and two infants were placed near the adults at the level of their heads. This first group appears to be placed on the northeastern fringe of the chamber. All of the burials had complete (Figures 11 and 12) and ritually killed pottery vessels, as well as some projectile points as offerings. The complete vessels associated with the adults are mostly Macana Red-on-brown tripod *molcajetes* that may date to the transition of the Terminal Corral/Tollan phases (Cobean 1990). These vessels are associated with two radiocarbon dates (Beta-75377, with an average around A.D. 930, and Beta-75381, with an average date of A.D. 730), and two obsidian-hydration dates, one of which (94-51) averaged around A.D. 930 (the other is related to an Aztec intrusion near Burial 2). Some of the infants near the three adults had associated Mazapan Red-on-brown painted bowls, which Cobean (1990:46) dates to the Terminal Corral phase. Two obsidian-hydration dates (94-49 and 94-50) from this context average around A.D. 950. The association of this type of bowl with human burials at Teotihuacan has been documented by Linné (1934:75) and Armillas (1950:56).

In the central sector of the chamber and at a somewhat higher topographical level, seven newborn infants were found, some in a seated position, and others in the fetal position. They were placed in and east-west band in the central part of the chamber beneath a large hole cut in the ceiling. In the eastern half of the chamber the Late Coyotlatelco contexts are higher than in the western half, as if a large excavation in the disgreggated tuff was made for placement of the adult and child burials. Offerings consisted of triangles or rectangles of cut mica as well as some hearths with

Figure 9. View of Burial 2 from the Cueva de las Varillas: a seated female facing south.

Figure 10. View of Burials 5 and 6, also seated adults.

Teotihuacan *candeleros* and projectile points. They were dated to the seventh century A.D.

In this chamber we also found seven circular storage-bin bases (Figure 13) distributed in different sectors and depths of the level corresponding to the adult burials. In an inner chamber (Chamber 3), 50 m inside the cave, we had already found six of these storage contexts (Figure 14), one with a vast amount of stored *Chenopodium* (*verdolaga*), but with no apparent association to burials (Manzanilla 1994a).

The Cueva del Pirul was the last excavated (Figures 15 and 16). We encountered Aztec structures and activity areas with calibrated radiocarbon dates between A.D. 1410 and 1435. In different chambers near the entrance for the tunnel, we have found another 14 burials under the Aztec material that date between the sixth and ninth centuries A.D. These included two seated adults (one with bilobulated skull, and the other dated to the sixth century A.D.), Two young adults in fetal positions, and sets of child (four) (Figure 17) and perinatal burials (six). A group of six burials, mainly infants, was placed around a killed hemispherical monochrome bowl with seal-like designs of a type named "Jiménez Sealed Brown" (Cobean 1990:194–198; Good and Obermeyer 1986:258, Plate 7; Nichols and McCullough 1986:Plates 8 and 9). This type has been assigned by Cobean to the Coyotlatelco sphere and to the Corral complex. He suggests that these bowls were used to drink chocolate. Our excavations have uncovered numerous examples of this type, with different kinds of seal motifs. Another type frequently found in contact with the disintegrated tuff is a negative painted bowl (Good and Obermeyer 1986:Plate 11).

Three complete, articulated dog skeletons (Figure 18), two adults and a puppy, one with skeletal deformities, were found near two of the children and one of the newborn infants. They may have been conceived of as guides to the underworld. In another sector, a newborn infant was placed inside a bowl (Figure 19) near one of the seated adults (with a calibrated radiocarbon average date of A.D. 550) and an eight-month-old baby in fetal position covered with another bowl.

These two tunnels (Cueva de las Varillas and Cueva del Pirul) gave us elements to confirm three of the functions predicted by the project: storage areas associated with Tlaloc and fertility rituals in the womb of the earth, burials as part of the underworld

Figure 11. Mazapan Red-on-brown bowl associated with Burial 4 in the Cueva de las Varillas.

Figure 12. Red-on-orange and Red-on-brown tripod Macana *molcajetes* associated with Burials 2 and 6 in the Cueva de las Varillas.

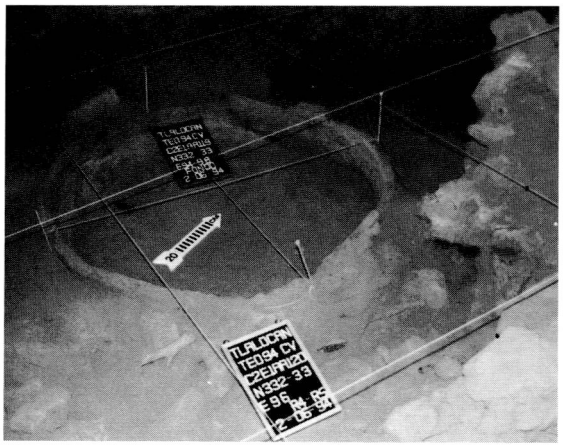

Figure 13. Circular storage-bin base (AA 119) found in the funerary chamber of the Cueva de las Varillas.

concept, and baby burials as part of the Tlalocan idea. Virtually all the underground cavities in the Teotihuacan Valley were originally extraction places excavated around A.D. 80 to obtain pyroclastic construction materials under the volcanic tuff. In later periods, these underground passages were used either ritually or domestically. Thus, the tunnel underneath the Pyramid of the Sun could be conceived of as one of the many tunnels that ran under the ancient city (and under the volcanic tuff), in the northern part of the Valley, and not as a natural cave.

From the Guatemalan highlands, Brady and Veni (1992) have documented Mayan examples of "man-made caves" excavated into volcanic or volcanically derived rocks. Some of these are associated with sites of ritual importance and with intermittent springs. In Teotihuacan, the tunnels are also excavated in rather loose consolidated volcanic materials, using perhaps pointed basalt or andesite picks, or even just loosening them by hand. Instead of housing springs, as Heyden (1975) originally proposed for the Pyramid of the Sun (that would be a very improbable phenomenon in this type of porous material), there are perhaps small water courses that derive from vertical seepage in the northeastern sector of the valley. These courses have been mentioned in various interviews with local people. The real springs emerge in the alluvial plain in the southwestern part of the ancient city.

In Xochicalco, a system of more than 19 man-made tunnels, of which the Observatory is just a part, is also a quarry from which one of the two types of limestone for building was extracted. Recent geophysical work undertaken inside and on top of the Cueva de los Jabalíes and Cueva de los Amates (better known as the "Observatory"), has produced evidence of interconnections between these systems, as well as a grid-like plan (Manzanilla 1993). The eastern sectors of both systems run beneath the western part of the Acropolis, suggesting that they continued to the main plaza. The tunnels were excavated in different levels of the mountain, suggesting either stratification of the systems, or stair-like ascensions.

RITUAL USE OF THE TUNNELS

Caves had multiple functions and meanings for pre-Hispanic peoples. Some of these include shelters, living sites, ritual places associated with lineages and rites of passage, solar observatories, quarries, dwellings of the gods of water and those of death, mouth or womb of the earth, underworld, fantastic space, etc. Creation myths relate caves to the sun, the moon, food, and human group emergences (Taube 1986). Caves are entrances to the underworld (and, therefore, funerary chambers), but also accesses to the womb of the earth (and thus, a place where fertility rites also take place). Water petition ceremonies for good harvests take place in caves, where water spirits dwell (Weitlaner and Leonard 1959).

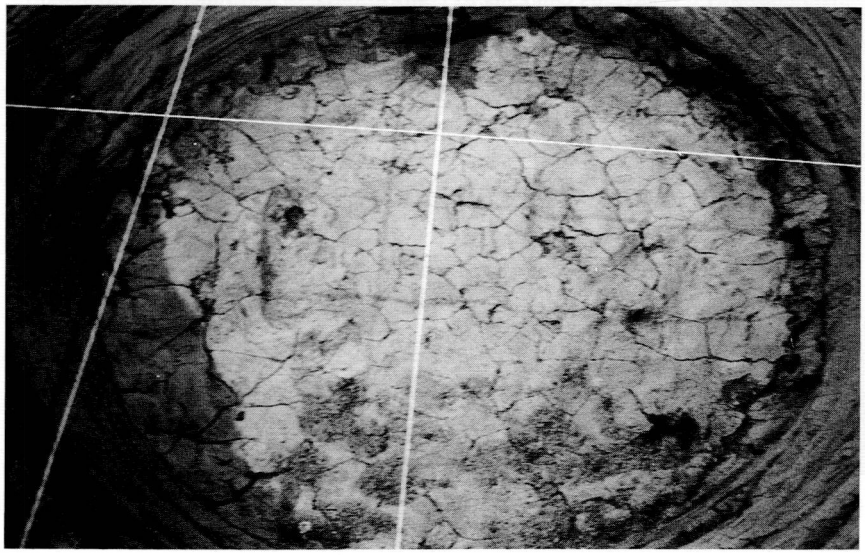

Figure 14. Circular storage-bin base (AA 100) found in an inner chamber (Chamber 3) of the Cueva de las Varillas. Impressions of sandals, bare feet, and hands had been left in the process of leveling the earthen floor.

Figure 15. View of the Cueva del Pirul before extensive excavation took place.

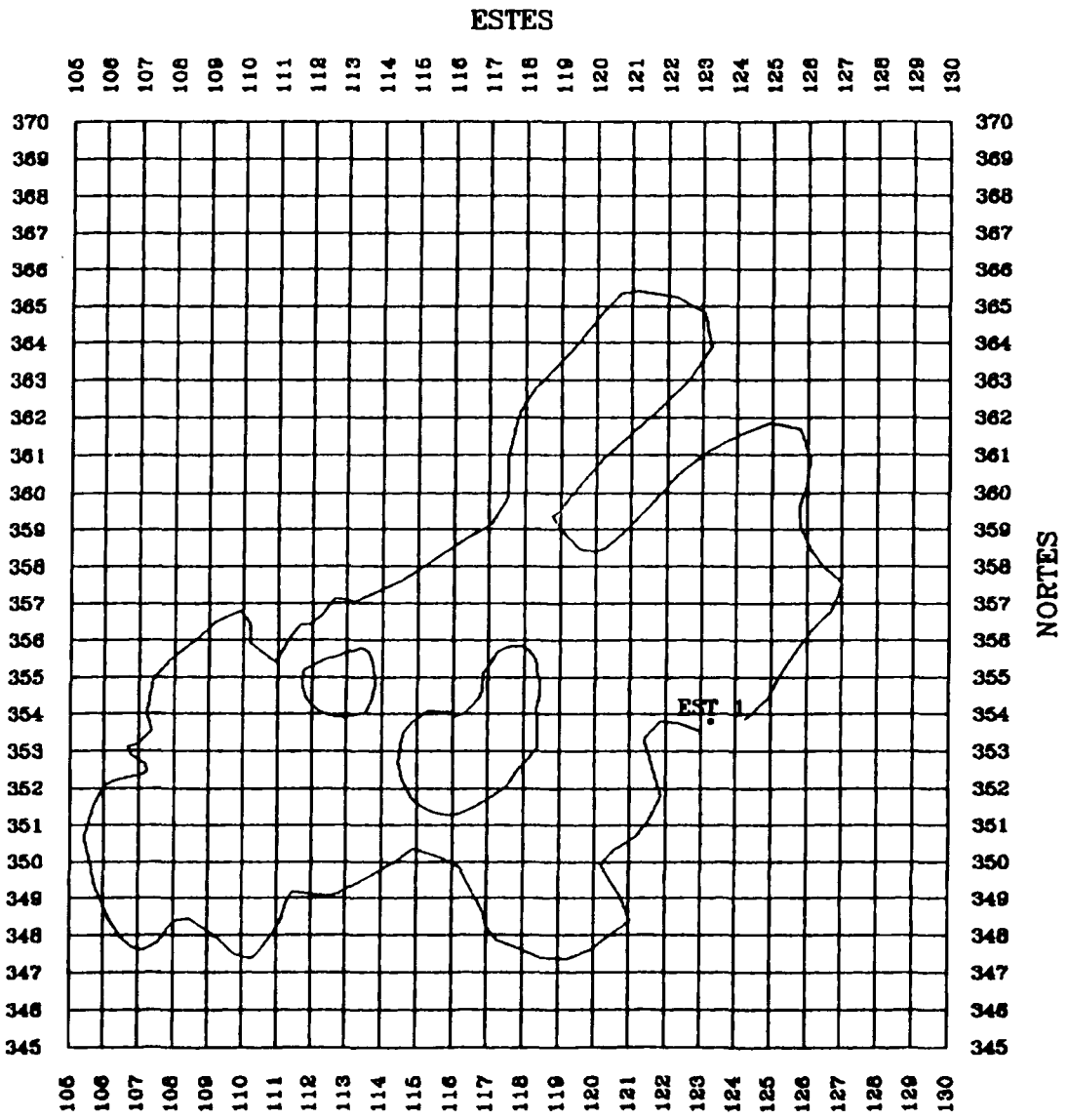

Figure 16. Map of the Cueva del Pirul.

Figure 17. Two child burials (± 6 years of age) from Chamber 1 of the Cueva del Pirul.

There is evidence of cult activities in caves from the Formative period, related to ancestor and underworld worship (Townsend 1993:41), but also to frog/water deities (Spranz 1973:63). In Postclassic times, we also have examples of caves related either to the assumption of power or to foundation rites, as well as to the Tlaloc cult, together with numerous cases of underground dwelling sites.

The Nahua associated three locations with the underworld: Mictlan, Tlillan, and Tlalocan. Mictlan was located to the north, and was guarded by the gods of death (Mendoza 1962). The Nahua believed that the sun entered Mictlan during the first month of its zenith passage, that is Tóxcatl (in May), in the prelude to the rainy season (Broda 1982:94); thus, solar observatories, such as the "Astronomical Caves" at Teotihuacan, were used to observe these zenith passages.

According to Anderson (1988:153–154), Tlalocan was conceptualized in many ways among the Nahua of central Mexico: a place of great wealth, where there was no suffering, where maize, as well as squash, amaranth, chile, and flowers were abundant; a place of beauty, where birds with lovely feathers sang on top of pyramids of jade; a four-room construction with four water containers, as well as an underground space filled with water, which connected the mountains with the sea. It also was a place where rivers originated.

Sullivan's (1965:55) translation of the *Florentine Codex* "Prayer to Tlaloc" states the following, referring to the gods of rain: "And you who inhabit the four quarters of the universe, you the Lords of Verdure, you the Providers, you the Lords of the Mountain heights, you the Lords of the Cavernous Depths."

It is possible that the underground cavities created by the extraction process were conceived of as the underworld of Tlaloc, the Tlalocan, in its invocation of Tonacatecuhtli, god of sustenance and fertility. The burials, particularly those of infants, related to rain water pouring from the ceiling of the tunnel, the storage loci, and the marine elements found in the Cueva de las Varillas reinforce this interpretation. The underworld issue is stated by the adult seated burials as well as by the complete dog skeletons.

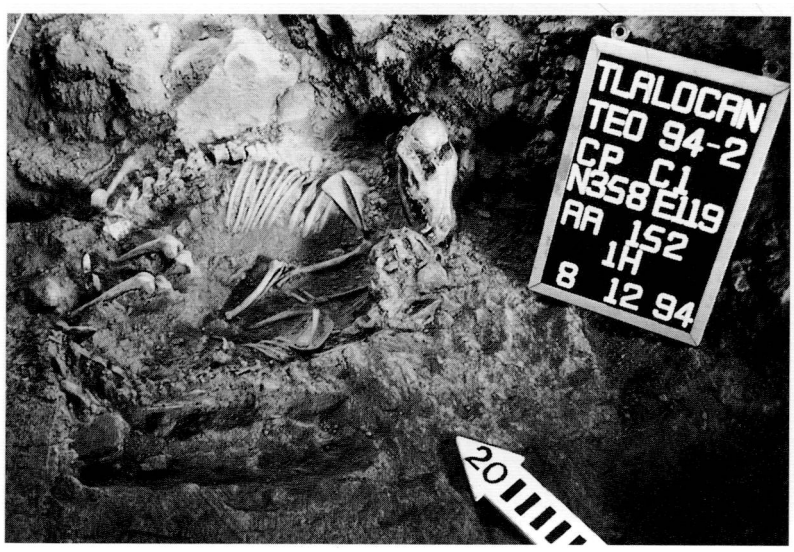

Figure 18. Two dog skeletons a meter to the west of the child burials in Figure 17.

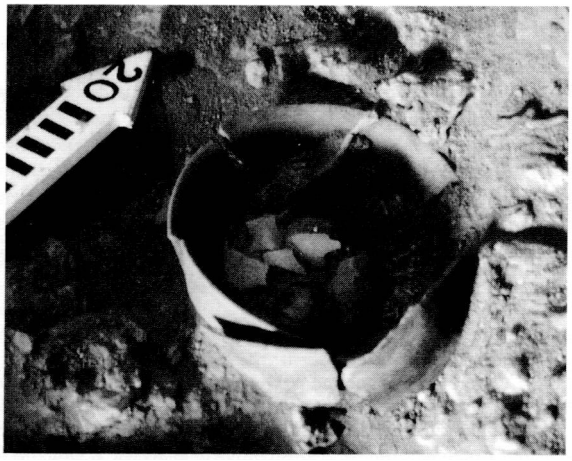

Figure 19. A newborn infant (Burial 16) inside of a bowl, found in Chamber 1 of the Cueva del Pirul.

In a recent study of a Nahuat-speaking group in the Sierra de Puebla region of Mexico, Knab (1991) described a myth that mentions the geography of the underworld or Talocan, as conceived by the inhabitants of San Miguel Tzinacapan. Caves are considered to be entrances to the underworld. In particular, the eastern and western entrances of the myth are toponyms related to the Teotihuacan Valley, and the northern and southern entrances are geomorphological features of the same valley. It is probable that the myth of the Nahuat-speakers in the Sierra de Puebla is derived from a version based on the sacred geography of the Teotihuacan Valley, but it is also quite possible that both have their source in an archetypical Mesoamerican conception of the underworld.

In thinking about ritual use of the underground cavities, different rites could have been practiced inside the tunnels. Brady and Stone (1986:19) proposed that Naj Tunich cave in Guatemala could have been a burial place for members of Maya royalty. There is a high probability that this is also true for many caves and tunnels ritually used during the Classic period in central Mexico.

We have entertained the hypothesis that the principal bureaucrats of the ancient city of Teotihuacan were buried in this underworld, a Tlalocan, or underworld of the state god. Many of the polished stone funerary masks, found mainly in private collections, but also from pre-Hispanic looting, could have come from these burials. In fact, we have evidence that people using Coyotlatelco, Mazapan, and Aztec ceramics dwelt in these caves, and looted them. Yet we believe that there could be some primary contexts left undisturbed by these and modern looters.

In the funerary chamber of the Cueva de las Varillas, Epiclassic–Early Postclassic peoples constructed a shrine for the *tlaloques* or Tlaloc assistants, represented by the seven babies deposited in the central part of the chamber, precisely underneath a hole in the cavity's roof, a hole that may have allowed the pouring of water on top of the shrine during the rainy season. The adult burials were seated facing south, with their backs to a pillar (a sustaining element left by the Teotihuacanos in their extraction activities, to prevent the cavity from collapsing).

Other types of rites practiced inside the tunnels could have been related to fertility ceremonies in the womb of the earth. In fact, Armillas (Navarrete, personal communication 1992) mentioned the fact that hundreds of storage-vessel fragments were thrown out when the La Gruta Restaurant was enlarged. Large-scale ritualized storage would be one of the main aspects we are interested in.

In the Cueva de las Varillas, we recovered 13 storage-bin bases, of which 7 surround the burial area, and 6 are in an inner chamber, located 50 m from the entrance, which is too far inside to be practical for economic use. Some only contain *Chenopodium* (*huauhzontle*); others, only *Amaranthus* (sixteenth-century historical sources mention the placing of amaranth pastes over the faces of Tlaloc sacrificial victims), and still others contain the remains of maize and other plants (Manzanilla and McClung de Tapia 1996). We believe that some of these form part of fertility propitiation rites, serving as loci for "incubating" seeds for future agricultural cycles.

It is interesting to that the Pyramid of the Sun is the only structure not constructed from the porous volcanic material known as *tezontle*, which comes from the tunnels. Instead it was built mainly with earth and small fragments of tuff (Rattray 1975), a material that generally overlies the volcanic scoria. It seems that this monumental construction is the only one built with organic soil coming either from Formative agricultural fields in the northern half of the valley (nearly all the main constructions in the city are founded on the volcanic tuff) or from the alluvial plain, perhaps from the Acolman area.

In 1989, we interviewed elderly members of the local communities regarding the "caves" at Teotihuacan. Different persons mentioned a myth that states that in the past, in February, a man was seen coming from under the Pyramid of the Sun, carrying maize, amaranth, green beans, and squash in his hands. Many added that under the Pyramid of the Sun there were also *chinampa*-like fields where all this foodstuff was collected.

The concept of a mountain of sustenance—the Tonacatepetl of the Nahua tradition—is frequent in Mesoamerica. Also common is the sacred mountain with a cave from which water emerged (Freidel et al. 1993:430). We propose then that the Pyramid of the Sun was conceived of as a Tonacatepetl or "mountain of sustenance"; this is reinforced by the mention made in the *Relación de Teotihuacan* (Paso y Troncoso 1979:222) in which the idol in the summit of the pyramid was Tonacateuctli. Other "mountains of sustenance" were built in rain-producing mountains such as Tetzcotzingo and Mount Tlaloc, according to Townsend (1993:38). Finally, the Templo Mayor of Tenochtitlan would have been a continuation of this tradition (Broda 1987).

The Pyramid of the Sun could have synthesized three intimately related concepts: the Tonacatépetl, the main temple for the state-god Tlaloc, and the sacred mountain (the center of the universe, represented as the center of the four-petal flower, as López Austin [1989] has suggested).

Teotihuacan was built as a sacred copy of the cosmos. Its terrestrial plane is divided into the four corners of the universe; it has a celestial plane with the sky itself and the summits of the temples, but also an underworld represented by the system of tunnels under the northern half of the city. Its main avenue connected the natural sacred mountain of Cerro Gordo—where Tobriner (1972) detected a cave of special significance—with the Pyramid of the Sun (the artificial "mountain of sustenance"), and the spring area to the south (Townsend 1993:41). The east–west avenue traces the path of the Pleiades in the summer solstice (Townsend 1993).

RESUMEN

Este artículo expone resultados recientes del proyecto "Estudio de túneles y cuevas en Teotihuacan," particularmente aquellos derivados de la excavación de cuatro túneles de extracción ubicados inmediatamente al este de la Pirámide del Sol. En particular, se pone énfasis en los fechamientos de radiocarbono y de hidratación de obsidiana de la Cueva de las Varillas, en la que se hallaron 13 entierros de tiempos Mazapan, y en la cual se tiene evidencia de ocupación intensiva post-teotihuacana. Asimismo, el cuarto túnel—la Cueva del Pirul—ha proporcionado evidencia de otros 14 entierros, predominando niños, además de esqueletos completos de perros, en un contexto claramente alusivo al concepto del inframundo. Después de la caída de Teotihuacan, las cavidades subterráneas—alguna vez canteras de *tezontle*—fueron lugares de culto a Tláloc y a la fertilidad. En tiempos mexicas, fueron lugares de vivienda, dada la escasez de espacio en la superficie, función que conservaron hasta la primera mitad de este siglo.

ACKNOWLEDGMENTS

This interdisciplinary research was funded by the Instituto de Investigaciones Antropológicos (IIA) and by Grant DGAPA-UNAM IN214694 of the Universidad Nacional Autónoma de México (UNAM); by Grants P218CC00892832, H9106-0060, and 400358-5-5412-S of the Consejo Nacional de Ciencia y Tecnología de México (CONACYT); and by Grant FAMSI 95007 of the Foundation for the Advancement of Mesoamerican Studies, Inc., and it was undertaken with permission of the Consejo de Arqueología of INAH. The geophysical work was also partially supported by a UNAM internal grant IGF-02-9102. Funding for the hydration dates was provided through two grants to AnnCorinne Freter (1990–1993 Ohio University Research Committee grant and a 1994 Ohio University Provost's Teaching Recognition Award). Laboratory assistance in processing the hydration dates was provided by William C. Ciesielczyk.

We thank the following people for their participation in particular studies: Luis Barba and Agustín Ortiz for the geophysical and geochemical prospection; Claudia Trejo for the chemical studies; Raúl Valadez for the paleofaunal analysis; Emily McClung de Tapia, Diana Martínez, Rebeca Rodríguez, and Cristina Adriano for the paleobotanical data; Emilio Ibarra, Ruth Castañeda, and Oanna del Castillo, for the pollen information; Judith Zurita and Gabriela Silva for the phytolith analysis; Cynthia Hernández and Marcela Zapata for the lithic analyses; Miguel Angel Jiménez and Claudia López for the ceramic distributional maps; Claudia López for the ceramic study; Rocío Arrellín for the osteological analysis; T. Douglas Price and William H. Middleton from the University of Wisconsin–Madison for the strontium-isotope study; Edith Ortiz for the hemoglobin study; Rocío Vargas for the fossil DNA study; Edith Ortiz, Cynthia Hernández, Miguel Angel Jiménez, Mauricio Garduño, Rocío Arrellín, Claudia López, Marcela Zapata, Beatriz Maldonado, Rossana Enríquez, and Alfredo Feria for their assistance in the exploration of the tunnels, and the Graphic Department of IIA (UNAM) for their invaluable help.

We would also like to thank Doctors Zoltán de Cserna and Gerardo Sánchez Rubio of the Instituto de Geología (UNAM); José Lugo Hubp, also of the Instituto de Geografía; and Jaime Urrutia and Dante Morán of the Instituto de Geofísica (UNAM), for their advice and suggestions at different stages of the geological research at Teotihuacan. We also thank the students of the Facultad de Ingeniería (UNAM) and of the Escuela National de Antropología e Historia for their participation. The radiocarbon dates were obtained from Beta Analytic, Inc.

REFERENCES

Anderson, Arthur J.O.
1988 A Look into Tlalocan. In *Smoke and Mist: Mesoamerican Studies in Memory of Thelma D. Sullivan*, edited by J.K. Josserand and K. Dakin, pp. 151–159. BAR International Series 402i. British Archaeological Reports, Oxford.

Armillas, Pedro
1950 Teotihuacán, Tula y los toltecas. Las culturas post-arcaicas y preaztecas del centro de México. Excavaciones y estudios, 1922–1950. *Runa* III:37–70. Instituto de Antropología, Universidad de Buenos Aires, Buenos Aires.

Arzate, J.A., L. Flores, R.E. Chávez, L. Barba, and L. Manzanilla
1990 Magnetic Prospecting for Tunnels and Caves in Teotihuacan, México. In *Geotechnical*, edited by S.H. Ward, pp. 155–162. Geotechnical and Environmental Geophysics, vol. III. Investigations in Geophysics 5. Society for Exploration Geophysicists, Tulsa.

Baker, George T. III, Hugh Harleston, Jr., Alfonso Rangel, Matthew Wallrath, Manuel Gaitán, and Alfonso Morales
1974 The Subterranean System of the Sun Pyramid at Teotihuacan: A Physical Description and Hypothetical Reconstruction. Paper presented at the XLI International Congress of Americanists, Mexico City.

Barba Pingarrón, Luis Alberto
1995 *Impacto humano en la paleogeografía de Teotihuacan.* Ph.D. dissertation in Anthropology, Facultad de Filosofía y Letras, Universidad Nacional Autónoma de México, Mexico.

Barba, L.A., L. Manzanilla, R. Chávez, L. Flores, and A.J. Arzate
1990 Caves and Tunnels at Teotihuacan, México: A Geological Phenomenon of Archaeological Interest. In *Archaeological Geology of North America*, edited by N.P. Lasca and J. Donahue, pp. 431–438. Centennial Special 4. Geological Society of America, Boulder, CO.

Basante Gutiérrez, O.R.
1982 Algunas cuevas en Teotihuacan. In *Memoria del Proyecto Arqueológico Teotihuacan 80–82*, edited by R. Cabrera Castro, I. Rodriguez, and N. Morelos, pp. 341–354. Colección Científica, Arquelogía 132. Instituto Nacional de Antropología e Historia, Mexico.
1986 *Ocupación en cuevas en Teotihuacan.* Tesis de licenciatura en Arqueología, Escuela Nacional de Antropología e Historia, Mexico.

Brady, James E., and Andrea Stone
1986 Naj Tunich: Entrance to the Maya Underworld. *Archaeology* 39(6):18–25.

Brady, James E., and George Veni
1992 Man-Made and Pseudo-Karst Caves: The Implication of Subsurface Features Within Maya Centers. *Geoarchaeology: An International Journal* 7:149–167.

Broda, Johanna
1982 Astronomy, *Cosmovisión*, and Ideology in Pre-Hispanic Mesoamerica. In *Ethnoastronomy and Archaeo-astronomy in the American Tropics*, edited by A.F. Aveni and G. Urton, pp. 81–110. Annals of the New York Academy of Science 385. New York.
1987 Templo Mayor as Ritual Space. In *the Great Temple of Tenochtitlan: Center and Periphery in the Aztec World*, edited by J. Broda, D. Carrasco, and E. Matos Moctezuma, pp. 61–123. University of California Press, Berkeley.

Chávez, R., J. Arzate, L. Flores, L. Manzanilla, and L. Barba
1988 *Estudio geofísico de las cuevas y túneles de Teotihuacan.* Serie Investigación No. 78. Instituto de Geofísica, Universidad Nacional Autónoma de México, Mexico.

Chávez, René E., Linda Manzanilla, Nayeli Peralta, Andrés Tejero, Gerardo Cifuentes, and Luis Barba
1994 Estudio magnético y de resistividad en los alrededores de la Pirámide del Sol, Teotihuacan, Mexico. *Geofísica Internacional* 33:243–255. Universidad Nacional Autónoma de México, Mexico.

Cobean, Robert H.
1990 *La cerámica de Tula, Hidalgo.* Colección Científica No. 215. Instituto Nacional de Antropología e Historia, Mexico.

Cook de Leonard, Carmen
1952 Notas del interior. Teotihuacan. *Tlatoani* I(3-4):49. Instituto Nacional de Antropología e Historia, Mexico.

Dibble, Charles E.
1951 *Códice Xólotl.* Publicaciones del Instituto de Historia, primera serie No. 22. Universidad Nacional Autónoma de México, Mexico.

Freidel, David, Linda Schele, and Joy Parker
1993 *Maya Cosmos: Three Thousand Years on the Shaman's Path.* William Morrow, New York.

Freter, AnnCorinne
1993 Obsidian-Hydration Dating: Its Past, Present, and Future Application in Mesoamerica. *Ancient Mesoamerica* 4:285–303.
Good, Kenneth, and Gerald Obermeyer
1986 Excavations at Oxtotipac (TT82). In *The Toltec Period Occupation of the Valley. Part 1. Excavations and Ceramics*, edited by William T. Sanders, pp. 195–265. The Teotihuacan Valley Project Final Report No. 4, Occasional Papers in Anthropology No. 13. Department of Anthropology, Pennsylvania State University, University Park.
Goodliffe, Michael, and Elizabeth Goodliffe
1963 *Informe manuscrito.* Departamento de Prehistoria, Instituto Nacional de Antropología e Historia, Mexico.
Heyden, Doris
1973 Un Chicomóstoc en Teotihuacan? La cueva bajo la Pirámide del Sol. *Boletín* 6(época II):3–18. Instituto Nacional de Antropología e Historia, Mexico.
1975 An Interpretation of the Cave Underneath the Pyramid of the Sun in Teotihuacan, Mexico. *American Antiquity* 40:131–147.
1981 Caves, Gods, and Myths: World Views and Planning in Teotihuacan. In *Mesoamerican Sites and World Views*, edited by Elizabeth P. Benson, pp. 1–39. Dumbarton Oaks Research Library and Collection, Washington, DC.
Knab, Timothy J.
1991 Geografía del inframundo. *Estudios de Cultura Náhuatl* 21:31–57. Universidad Nacional Autónoma de México, Mexico.
Koehler, Thomas H.
1986 Excavations at Maquixco Bajo (TT25A). In *The Toltec Period Occupation of the Valley. Part 1. Excavations and Ceramics*, edited by William T. Sanders, pp. 7–51. The Teotihuacan Valley Project Final Report No. 4, Occasional Papers in Anthropology No. 13. Department of Anthropology, Pennsylvania State University, University Park.
Linné, Sigvald
1934 *Archaeological Researches at Teotihuacan, Mexico.* New Series, Publication No. 1. Victor Pettersons Bokindustriaktiebolag, Ethnographical Museum of Sweden, Stockholm.
López Austin, Alfredo
1989 1. La historia de Teotihuacan. *Teotihuacan*, pp. 13–35. Citicorp/Citibank, Mexico City.
Manzanilla, Linda
1993 *Macro Proyecto Xochicalco: Subproyecto Estudio de los túneles y cuevas de Xochicalco.* Technical report. Instituto Nacional de Antropología e Historia, Mexico.
1994a Geografía sagrada e inframundo en Teotihuacan. *Antropológicas* 11:53–65. Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México, Mexico.
1994b Las cuevas en el mundo mesoamericano. *Ciencias* 36:59–66. Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico.
Manzanilla, Linda, and Emily McClung de Tapia
1996 Patterns of Resource Utilization in Post-Teotihuacan Tunnel Occupations. Paper presented at the 61st Annual Meeting of the Society for American Archaeology, New Orleans.
Manzanilla, L., L. Barba, R. Chávez, J. Arzate, and L. Flores
1989 El inframundo de Teotihuacan. Geofísica y Arqueología. *Ciencia y Desarrollo* XV(85):21–35. Consejo Nacional de Ciencia y Tecnología, Mexico.
Manzanilla, L., L. Barba, R. Chávez, A. Tejero, G. Cifuentes, and N. Peralta
1994 Caves and Geophysics: An Approximation to the Underworld of Teotihuacan, Mexico. *Archaeometry* 36:141–157.
Mendoza, Vicente T.
1962 El plano o mundo inferior, Mictlan, Xibalbá, Nith y Hel. *Estudios de Cultura Náhuatl* III:75–99. Instituto de Historia, Universidad Nacional Autónoma de México, Mexico.
Michels, Joseph
1986 *Hydration Rate Constants for Cerro de Las Navajas Obsidian, Hidalgo, Mexico.* MOHLAB Technical Report No. 6. State College, PA.
Millon, René
1957 Teotihuacan. *Scientific American* 216(6):38–48.
1973 *The Teotihuacan Map. Text.* Urbanization at Teotihuacan, Mexico, pt. 1. University of Texas Press, Austin.
Millon, René, Bruce Drewitt, and James A. Bennyhoff
1965 *The Pyramid of the Sun at Teotihuacán: 1959 Investigations.* Transactions (n.s.) 55(6). American Philosophical Society, Philadelphia.
Moragas Segura, Natalia
1994 *Salvamento arqueológico en la Puerta 5: Cueva II–Cueva III–Cala II. Marzo 1993–Octubre 1993.* Informe técnico, Proyecto Especial 1992–1994. Instituto Nacional de Antropología e Historia, Mexico.
Nichols, Deborah, and John McCullough
1986 Excavations at Xometla (TT21). In *The Toltec Period Occupation of the Valley. Part 1. Excavations and Ceramics*, edited by William T. Sanders, pp. 53–193. The Teotihuacan Valley Project Final Report No. 4, Occasional Papers in Anthropology No. 13. Department of Anthropology, Pennsylvania State University, University Park.
Obermayer, Gerald
1963 *A Stratigraphic Trench and Settlement Pattern Survey at Oxtotípac, Mexico.* Unpublished Master's thesis, Department of Sociology and Anthropology, Pennsylvania State University, University Park.
Paso y Troncoso, Francisco del
1979 *Papeles de Nueva España. Segunda Serie: Geografía y Estadística, Relaciones Geográficas de la Diócesis de México.* Editorial Cosmos, Mexico.
Rattray, Evelyn Childs
1975 Some Clarifications on the Early Teotihuacan Ceramic Sequence. In Actas del XLI Congreso Internacional de Americanistas, vol. 1, pp. 364–368. Instituto Nacional de Antropología e Historia, Mexico.
1981 The Teotihuacan Ceramic Chronology. Early Tzacualli to Metepec Phases. Manuscript on file, Instituto de Investigaciones Antropológicas de la UNAM, Mexico.
1991 Fechamientos por radiocarbono en Teotihuacan. *Arqueología* 6:3–18. Instituto Nacional de Antropología e Historia, Mexico.
Soruco Saenz, E.
1985 *Una cueva ceremonial en Teotihuacan.* Unpublished Master's thesis, Escuela Nacional de Antropología e Historia, Mexico.
1991 Una cueva ceremonial en Teotihuacan y sus implicaciones astronómicas religiosas. In *Arqueoastronomía y etnoastronomía en Mesoamérica*, edited by J. Broda, S. Iwaniszewski, and L. Maupomé, pp. 291–296. Universidad Nacional de Autónoma de México, Mexico.
Spranz, Bodo
1973 El Preclásico en la arqueología del proyecto Puebla-Tlaxcala. *Comunicaciones* 7:63–64. (Primer Simposio 29 enero–2 febrero 1973), Fundación Alemana para la Investigación Científica, Puebla, Mexico.
Sullivan, Thelma D.
1965 A Prayer to Tláloc. *Estudios de Cultura Náhuatl* V:39–55. Universidad Nacional Autónoma de México, Mexico.
Taube, Karl A.
1986 The Teotihuacan Cave of Origin. *Res* 12:51–82.
Tobriner, Stephen
1972 The Fertile Mountain: An Investigation of Cerro Gordo's Importance to the Town Plan and Iconography of Teotihuacan. In *Teotihuacan. XI Mesa Redonda*, pp. 103–115. Sociedad Mexicana de Antropología, Mexico.
Townsend, Richard F.
1993 Paisaje y símbolo. In *La antigua América. El arte de los parajes sagrados*, edited by R.F. Townsend, pp. 29–47. Grupo Azabache (Art Institute of Chicago), Mexico.
Weitlaner, Roberto, and Juan Leonard
1959 De la cueva al palacio. In *Esplendor del México antiguo*, pp. 933–956. Centro de Investigaciones Antropológicas de México, Mexico.

APPENDIX: CALIBRATED RADIOCARBON AND OBSIDIAN-HYDRATION DATES

OBSIDIAN-HYDRATION ANALYSIS

Like amino-acid racemization and fluorine diffusion, obsidian hydration is a chemical process, therefore, physical environmental factors affect the rate of rim formation. These environmental factors have been divided into primary variables (those that directly affect the time function—the obsidian source, the effective hydration temperature [EHT], soil RH and pH) and secondary variables

(those that affect the rim formation but are independent of the time function—artifact burning, surface weathering, artifact reuse and spalling off of thick hydration rims due to mechanical strain). The hydration-dating analysis for the tunnels at Teotihuacan was conducted in 1994, at which time the primary and secondary variables affecting the hydration process of the site were defined or estimated insofar as possible.

Primary Variables

EHT estimate. Based on air-temperature data recorded over a seven-month period, the average temperature in the tunnels was estimated at 288.54°K or °C (6°F), which translates into an EHT of 289.35°K.

This EHT of 289.35 °K, when placed into Michels's (1986) induction equation for Pachuca obsidian, produced a hydration-rate estimate of 6.95 microns/1,000 years (see Freter [1993] for a complete summary of this method).

Obsidian source, soil RH and pH Estimates. The obsidian source (chemical composition) in this hydration analysis was held constant; all artifacts analyzed were from the Pachuca green obsidian source (Cerro de Las Navajas, Hidalgo).

Soil RH in this study was estimated to be 100%—the same as the conditions under which the induction experiment (Michels 1986) was performed. Given the current data available (see Freter 1993:288–289), this estimate appears to be a reasonable one.

Soil pH was also estimated to range between 4 and 10, a range that in previous studies (summarized in Freter [1993]), appears to have no effect on the hydration process.

Secondary Variables

Secondary hydration variables were also considered in this analysis. It did not appear, based on both excavation context data and microscopic examination, that any of the dated artifacts were subjected to fire or burning after their manufacture. In addition, given the enclosed nature of the tunnels, there was no apparent surface weathering of the hydration rims. Given the relatively recent time period under investigation, mechanical strain limitation of the hydration rims, which usually appears after a rim has a depth of 50 microns or more, was not a factor with this set of artifacts. The last secondary variable, artifact reuse, through either reworking or edge wear, was investigated by measuring between 15 and 20 (the exact number depended upon the clarity of the slide and hydration rim) separate places along all exposed edges of the artifact slide. If great variations in rim widths were present on a single artifact, and they clustered on one side of the artifact, then it was identified as artifact reuse, and a different hydration-date estimate was produced for each side of the artifact. The artifact reuse encountered in the tunnels sample is very consistent with the occupation history of the site, and clearly demonstrates that reutilization of the tunnels occurred over a relatively long time span.

Error Range of the Hydration Dates

All hydration dates in this analysis were assigned a two-sigma standard deviation of ± 140 years. This error range is based on two error sources: first, the EHT estimate and, second, the hydration-rim measurement. The ± 140 year error range is an extremely conservative one, based on the temperature data having a ± 1°C in its estimate, and the hydration-rim measurement error having a variation of ± .1 micron.

DESCRIPTION OF CONTEXTS AND CERAMIC TYPES

In the following section, dates are presented for each of the contexts sampled in the different tunnels. In most cases, this information is accompanied by a descriptive summary of the context. Note, however, that all samples are not included in the descriptive summary; Appendix Table 1 summarizes data from all samples. (Note: in the case of this appendix, AA = Activity area, Fl. = Floor, Str. = Stratum.)

Cueva de las Varillas

Obsidian-hydration Sample 94–53. This sample came from Burial 12, Str. 2a, C2. The date range for the sample is A.D. 371–651, the hydration rim measured 3.21 microns, and the average date is A.D. 511.

Burial 12

In CV C2 N337 E101 2a Z = 2287.75 m.o.s.l., at a depth of .13–.50 m, there was a Coyotlatelco neonate burial, in a flexed position, associated with carbonized wood, ceramics, lithics, mica, animal bone, and two bowls to the north (RT 2666, 2267). Apparently, the burial had been placed in a hole in the tuff. To the west there was a hearth. Pottery fragments consisted of flat-bottomed and orange bowl fragments, a Coyotlatelco decorated hemispherical-bowl fragment, and a complete bowl made from a recycled cut jar. To the north of this activity area there was a bowl with a flat bottom, decorated on the interior with a white slip with orange stains, and on the exterior with a red band.

Obsidian-hydration Sample 94–37. This sample came from AA66, Str. 1H. The date range for the sample is A.D. 381–651, the hydration rim measured 3.21 microns, and the average date is A.D. 511.

AA66, Str. 1H

In Sector 1, CV C1 N350–351 E86–87 1H Z = 2286.983–2286.878 m.o.s.l., there was a Coyotlatelco activity area, represented by a concentration of large jar fragments, one-half of a *candelero* (RT 1107), lithics, mica, bone, and ash. To the southeast we found Floors 3 and 4. With respect to pottery fragments, there was a half of a short-necked jar similar to the Metepec types (Rattray 1981), also present in Oxtotipac (Good and Obermeyer 1986); fragments of large, dark brown and buff-colored storage jars, Damajuana red jar fragments, Xico bowl fragments (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), crater fragments, Coyotlatelco censer fragments, negative-decorated bowls, and a fragment of textile-impressed pottery.

Obsidian-hydration Sample 94–38. This sample came from under AA67, Str. 1j. The date range for the sample is A.D. 550–830, the hydration rim measured 3.01 microns, and the average date is A.D. 690.

AA67, Str. 1j

In Sector 4, southern niche, CV C1 N344–46 E87–88 1j Z = 2286.608–2286.498 m.o.s.l., there was a Coyotlatelco-phase activity area consisting of ceramic fragments, a large jar neck (RT 1102), a prismatic core (RT 1105), rodent bones, a worked scoria

Appendix Table 1. Summary data for ^{14}C and obsidian-hydration samples

Sample Number	Context	Radiocarbon Age (B.P.)	Date Range (A.D.)	Hydration Rim (microns)	Average Date (A.D.)/ Intercept(s) (A.D.)
Cueva del Camino					
^{14}C					
Beta-65547	AA7 under Fl.	1560 ± 80	1280–1450		1334, 1338, 1403
Obsidian hydration					
94-6	under Fl. 1		559–839	3.0	699
94-6 (reuse)	under Fl. 1		1237–1517	2.07	1377
94-7	under Fl. 1		550–830	3.01	690
94-8	Str. 2a		843–1123	2.65	983
94-9	Str. 2f		725–1005	2.80	865
Cueva de la Basura					
^{14}C					
Beta-65543	Str. 1b	1090 ± 110	670–1190		979
Beta-65544	Str. 1b	690 ± 90	1162–1420		1281
Beta-65545	under Fl. 4/2a	1300 ± 90	570–944		682
Beta-69910	Str. 2a	1600 ± 80	260–630		440
Beta-65546	Str. 3e	1490 ± 80	410–670		564
Beta-69911	Str. 3e	1330 ± 80	600–880		680
Beta-69912	Str. 3f	1930 ± 110	180 B.C.–A.D. 370		80
Obsidian hydration					
94-1	under Fl. 4		1092–1372	2.30	1232
94-3	under Fl. 2		1032–1312	2.39	1172
94-2	Str. 2a		542–822	3.02	682
94-4	Str. 3b		219–499	3.37	359
94-5	Str. 3c		550–830	3.01	690
Cueva de las Varillas: Chamber 1					
^{14}C					
Beta-69913	Str. 1c	570 ± 70	1290–1450		1410
Beta-69917	Str. 1c	1300 ± 60	640–880		700
AMS Beta-69916	Str. 1C	1130 ± 707	70–1030		910, 920, 950
Beta-69914	Str. 1C	690 ± 100	1170–1430		1290
Beta-69916	Str. 1D	1140 ± 70	760–1020		900
Beta-70715 (ETH 12206)	Str. 1D/1d	370 ± 60	1420–1650		1460
Beta-69918	AA46, Str. 1e	1020 ± 60	900–1170		1020
Beta-69922	AA55, Str. 1e	370 ± 80	1420–1670		1500
Beta-69919	near AA52, Str. 1e	500 ± 70	1310–1360, 1380–1510, 1600–1620		1430
Beta-69921	AA51, Str. 1e/2a	1060 ± 70	870–1160		1000
Beta-69920	outside AA35, Str. 1E	1190 ± 100	660–1030		870
Beta-69924	AA60, Str. 1g	1270 ± 60	660–900		770
Beta-69923	AA60, Str. 1g	970 ± 60	980–1212		1030
Beta-69926	Str. 1i	930 ± 50, 1170 ± 50	770–990		880
AMS Beta-69925	on Fl. 4	930 ± 50	1010–1230		1050, 1090, 1150
Beta-69927	Str. 2a	1260 ± 80	640–970		770
Obsidian hydration					
94-11	AA24, Str. 1B		171–651	3.42	311
94-11 (reuse)	AA24, Str. 1B		933–1213	2.53	1073
94-14	AA36, Str. 1c		781–1061	2.73	921
94-15	AA37, Str. 1c		765–1045	2.75	905
94-15 (reuse)	AA37, Str. 1c		933–1213	2.53	1073
94-16	AA37, Str. 1c		567–1147	2.99	707
94-16 (reuse)	AA37, Str. 1c		976–1256	2.47	1116
94-17	AA38, Str. 1c		828–1108	2.67	968
94-18	AA38, Str. 1c		749–1029	2.77	889
94-20	AA39, Str. 1c		933–1213	2.53	1073
94-29	AA47, Str. 1c		781–1061	2.73	921
94-29 (reuse)	AA47, Str. 1c		925–1205	2.54	1065
94-30	AA47, Str. 1c		954–1234	2.55	1094
94-12	AA34, Str. 1C		408–688	3.17	548
94-12 (reuse)	AA34, Str. 1C		849–1129	2.65	989

continued

Appendix Table 1. *Continued*

Sample Number	Context	Radiocarbon Age (B.P.)	Date Range (A.D.)	Hydration Rim (microns)	Average Date (A.D.)/ Intercept(s) (A.D.)
94-21	AA49, Str. 1c		858–1138	2.63	998
94-22	AA41, Str. 1c		888–1168	2.59	1028
94-23	AA42, Str. 1c		881–1161	2.60	1021
94-19	Str. 1D/1d		733–1013	2.79	873
94-24	AA43c, Str. 1D		677–957	2.86	817
94-25	AA43, Str. 1d/1e		601–981	2.95	741
94-13	AA35, Str. 1d/1e		749–1029	2.77	889
94-26	AA46, Str. 1e		773–1053	2.74	913
94-27	AA46, Str. 1e		940–1220	2.52	1080
94-28	AA46, Str. 1e		765–1045	2.75	905
94-31	AA52, Str. 1e		933–1213	2.53	1073
94-34	AA46, Str. 1E		773–1053	2.74	913
94-35	AA61, Str. 1f		725–1005	2.80	865
94-36	AA61, Str. 1f		533–813	3.03	673
94-36 (reuse)	AA61. Str. 1f		851–1131	2.64	991
94-37	AA66, Str. 1H		506–786	3.06	646
94-38	under AA67, 1j		550–830	3.01	690
94-43	AA72, 1j		693–973	2.84	833
94-40	AA69/Fl. 4		685–965	2.85	825
94-41	AA69/Fl. 4		828–1108	2.67	968
94-42	Fl. 4		765–1045	2.75	905
94-32	AA53, Str. 1e/2a		858–1138	2.63	998
94-33	AA53, Str. 1e/2a		773–1053	2.74	913
94-44	Str. 2a		789–1069	2.72	929
94-45	Str. 2a		652–932	2.89	792
94-46	Str. 2b		593–873	2.96	733
97-47	Str. 2b		550–830	3.01	690
Cueva de las Varillas: Chamber 2					
^{14}C					
Beta-75377	Burial 2, Str. 1k	1020 ± 90	865–1220		930
Beta-75379	Burial 3, Str. 1k	520 ± 601	310–1360, 1380–1470		1430
Beta-75380	Burial 5, Str. 1k	1030 ± 80	875–1195		920
Beta-75381	Burial 6, Str. 1k	1220 ± 60	670–970		730
Obsidian hydration					
94-48	Burial 2, Str. 1k		1261–1541	2.03	1401
94-48 (reuse)	Burial 2, Str. 1k		1485–1765	1.60	1625
94-49	Burial 4, Str. 1k		315–595	3.27	455
94-49 (reuse)			805–1085	2.70	945
94-50	Burial 4, Str. 1k		725–1005	2.80	865
94-51	Burial 6, Str. 1k		790–1070	2.72	930
94-54	Burial 7, Str. 1f		1018–1298	2.41	1158
94-52	Burial 11, under Fl. 2		541–821	3.02	681
94-53	Burial 12, Str. 2a		371–651	3.21	511
94-56	AA103, Str. 1j		940–1220	2.52	1080
94-57	AA122, Str. 1j/2a		882–1162	2.60	1022
Cueva de Las Varillas: Chamber 3					
^{14}C					
Beta-75378	AA100	6670 ± 50	630–780		650
Obsidian hydration					
94-55	AA100, Str. 1e/2a		858–1138	2.63	998

Note: The date range column presents calibrated ^{14}C dates (from charcoal wood samples) at two sigma; obsidian-hydration average dates are ± 140 years; AA = Activity area, Fl. = Floor, Str. = Stratum.

fragment (RT 1104), a pounder (RT 1103), and a probable metallic sheet (RT 1108) near a hearth. Under the ashes, a projectile-point fragment (RT 1110) and a metate fragment (RT 1111) were found, as well as lithics and charcoal in N345 E87. Ceramics included large jar fragments, Damajuana jars, composite-silhouette bowl fragments, hemispherical-bowl fragments, and grater fragments.

Obsidian-hydration Sample 94–52. This sample came from Burial 11, F12/, C2. The date range for the sample is A.D. 541–821, the

hydration rim measured 3.02 microns, and the average date is A.D. 681.

Burial 11

In CV C2 N335 E98 R1.R2 (bajo P2) Z = 2287.7–2287.6 m.o.s.l., at a depth of 1.138 m, there was a Coyotlatelco neonate burial, in a flexed lateral position, without lower limbs. It was associated with pottery, lithics, and two fragments of marine shell (RT 2702). Associated with this burial were Burials 9 and 10, also neonates. Near Burial 9, fragments of light brown jars, Coyotlatelco Red-on-buff plate fragments, a grater fragment, a censer's tube, a fragment of a Coyotlatelco censer, a hemispherical interior negative-decorated bowl fragment, a Cañones Red-on-brown jar fragment (Cobean 1990), and a fragment of Thin Orange were found.

Obsidian-hydration Sample 94-25. This sample came from AA43, Str. 1d/1e. The date range for the sample is A.D. 601–981, the hydration rim measured 2.95 microns, and the average date is A.D. 741.

AA43, Str. 1d/1e

In Sector 1, CV C1 N350–351 E89–90 1D/2a Z = 2287.42 m.o.s.l., at a depth of .34 cm, a Coyotlatelco hearth and activity area associated with mica, lithics, and domestic ceramics appeared. Within the hearth, we found Damajuana jar fragments, high-necked jar fragments with sealed decoration, large storage-vessel fragments, straight divergent brown bowls, Portezuelo flat-bottomed bowls with hollow cylindrical supports (monochrome basal break bowls with flat base, following Good and Obermeyer [1986:243]), hemispherical brown with inner white slip bowls, Xico bowls (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), a jar recycled into a hemispherical bowl, basin fragments, a fragment of a Granular Ware jar, a fragment of Thin Orange, a fragment of a Coarse Matte censer, and a rim of a large (48 cm in diameter) Xolalpan buff-colored plate (Rattray 1981).

^{14}C Sample Beta-69920 and obsidian-hydration Sample 94-13. Beta-69920 came from outside of AA35, Str. 1E. The radiocarbon age for the sample is 1190 ± 100 B.P., the calibrated date range is A.D. 660–1030, and the intercept is A.D. 870. Obsidian-hydration Sample 94-13 came from AA35, Str. 1d/1e. The date range for the sample is A.D. 749–1029, the hydration rim measured 2.77 microns, and the average date is A.D. 741.

AA35

In N347–50 E88–90 1d/2a Z = 2287.36–2287.28 m.o.s.l., from .42 to .50 m in depth, we discovered a Coyotlatelco activity area consisting of a large hearth (1.82 × 2.53 m) with lithics, slabs, shell, a miniature jar (RT 656), a sherd disk (RT 657), polished lithics (RT 658), a fragment of a jar with carbonized material (RT 659), and many domestic pottery fragments. The latter included Coyotlatelco short-necked jars; a medium-sized jar with lateral handles; dark brown jar fragments; red Damajuana jars; flat-bottomed everted bowls, similar to Portezuelo bowls but without supports (monochrome basal break bowls with flat base, following good and Obermeyer [1986:243]); Coyotlatelco hemispherical, interior white-slipped and exterior orange-banded bowls; red-banded hemispherical-bowl rims; Coyotlatelco sealed bowls; a nearly complete Xico bowl (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]); Coyotlatelco censer fragments, red polished basins with lateral handles, miniature orange jars, a fragment of textile-impressed pottery (which may have begun earlier than the Aztec phases), a fragment of Thin Orange, and a fragment of coarse Matte Ware.

Obsidian-hydration Sample 94-12. This sample came from AA34, Str. 1C. The date range for the sample is A.D. 408–688, the hydration rim measured 3.17 microns, and the average date is A.D. 548; reuse values for the sample include a date range of A.D. 849–1129, a hydration-rim measurement of 2.65 microns, and an average date of A.D. 989.

AA34, Str. 1C

In Sector 2, CV C1 N338 E90 1c Z = 2287.67–2287.58 m.o.s.l., from .18 to .27 m in depth, we located a probable Coyotlatelco hearth with pottery and matting rests. A domestic context is suggested by fragments of a short-necked Coyotlatelco jar, but a Coyotlatelco censer rim was also recovered. Under it, a large olla with soot in its bottom was found.

^{14}C Samples Beta-69924 and Beta-69923. Both samples came from AA60, Str. 1g. The radiocarbon age for Beta-69924 is 1270 ± 60 B.P., the calibrated date range is A.D. 660–900, and the intercept is A.D. 7870. For Beta-69923, the radiocarbon age is 970 ± 60 B.P., the calibrated date range is A.D. 980–1212, and the intercept is A.D. 1030.

AA60, Str. 1g

In Sector 4, CV C1 N347–348 E88–89 1g Z = 2287.033–2286.925 m.o.s.l., at a depth of .743 m, we found a Coyotlatelco activity area consisting of a ceramic concentration with a greenstone bead (RT 480), a pottery disk (RT 841), lithics, mica, one-half of a bowl, a fragment of a Copa Ware vase with negative decoration (RT 845), a figurine body, and a stone ball (RT 839). Associated with this activity area were a Mezcala-type small figurine (RT 842), an eccentric fragment (RT 843), a fragment of a flint core (RT 844), and an obsidian chip (RT 846). We primarily found domestic pottery, particularly large jar fragments: Damajuana jar fragments, Coyotlatelco jar fragments, orange jar fragments, brown hemispherical-bowl fragments, white interior red-banded bowl fragments, grater fragments, and a Xolalpan plate rim.

Obsidian-hydration Sample 94-14. This sample came from AA36, Str. 1c. The date range for the sample is A.D. 781–1061, the hydration rim measured 2.73 microns, and the average date is A.D. 921.

AA36, Str. 1c

In Sector 1, CV C1 N352–353 E87 1c Z = 2287.47–2287.42 m.o.s.l., at a depth of .379–.428 m, we located a hearth with late Coyotlatelco domestic ceramics and carbonized wood, against the wall of the cave. Ceramics included large jars with lateral handles, dark brown bowls with beveled rims, large, red-slipped bowls, as well as a Coyotlatelco censer handle, a fragment of a red-on-buff Coyotlatelco plate, and a rim of probable San Juan Plumbate. The activity area may be late Coyotlatelco in date.

^{14}C Sample Beta-75380. Beta-75380 came from Burial 5, Str. 1k, C2. The radiocarbon age for the sample is 1030 ± 80 B.P., the calibrated date range is A.D. 875–1195, and the intercept is A.D. 920.

Burial 5

In CV C2 E1 N334–335 E96 1k/11 (R1–R3) Z = 2287.53–2287.11 m.o.s.l., at a depth of 1.348 m, a seated adult burial with deformed skull was found, facing south. The burial is transitional Coyotlatelco/Mazapan. It was associated with Mazapan ceramics (RT 2755,

2754, 2746, 2747): long-necked jar fragments, orange and light brown jar fragments, Damajuana Red jar fragments, Coyotlatelco short-necked jar fragments, cooking-olla fragments, buff-colored bowl fragments, brown bowl fragments, Xico bowl fragments (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), hemispherical orange, white, and red red-banded bowl fragments, sealed brown bowl fragments, two grater fragments, a *comal* fragment, a Coyotlatelco Red-on-brown decorated bowl fragment, negative-decorated bowl fragments, a censer fragment, a Mazapan decorated bowl fragment, a Cañones Red-on-brown jar fragment, a Macana Red-on-brown hemispherical-bowl rim, a white-on-orange bowl fragment (which Cobean [1990] assigns to the transition between the Terminal Corral and Tollan phases), a Thin Orange fragment, an orange miniature-bowl fragment, a complete dark brown flat-bottomed bowl, and a complete Mazapan decorated interior plate with a potter's mark.

^{14}C Sample Beta-75381 and obsidian-hydration Sample 94-51. Both samples come from Burial 6, Str. 1k, C2. The radiocarbon age for Beta-75381 is 1220 ± 60 B.P., the calibrated date range is A.D. 670–970, and the intercept is A.D. 730. The date range for obsidian-hydration Sample 94-51 is A.D. 790–1070, the hydration-rim measurement is 2.72 microns, and the average date is A.D. 930.

Burial 6

In CV C2 E1 N335 E96 R1–R3 Z = 2287.56–2287.26 m.o.s.l., at a depth of 1.318 m, we found a flexed and seated burial of an adult (transitional Coyotlatelco/Mazapan in date), probably masculine, with a loss of teeth before death. The burial was associated with carbonized wood, mica, bowls (RT 2301, 2753, 2754, 2746, 2747), a projectile point (RT 2748), shell (RT 2749), and a pottery disk (RT 2750). To the east and north of the burial there was a cylindrical-necked, negative-decorated jar with vertical handles. We found fragments of buff-colored jars, dark brown jars, orange jars, Damajuana jars, Coyotlatelco Xico bowls (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), orange-and-white hemispherical bowls, dark brown banded-on-buff bowls, a Portezuelo bowl support (monochrome basal break bowls with flat base, following Good and Obermeyer [1986:243]), a Coyotlatelco tripod bowl, a grater, a Coyotlatelco *comal*, a Coyotlatelco censer, a Coyotlatelco Red-on-buff decorated plate, a negative-decorated bowl, a Mazapan decorated plate, a Marfil-type Gulf Coast *tecomate*, Thin Orange, a pottery disk, and miniature spoons. We also found a complete Macana Red-on-brown negative-decorated miniature bowl with festooned rim (which Cobean [1990] assigns to the transition of the Terminal Corral to the Tollan phase), another Macana Red-on-brown tripod *molcajete*, and a nearly complete Jara Orange tripod bowl with hemispherical hollow supports.

Obsidian-hydration Samples 94-17 and 94-18. Both samples came from AA38, Str. 1c. The date range for the first sample is A.D. 828–1108, the hydration rim measured 2.67 microns, and the average date is A.D. 968. For the second sample, the date range is A.D. 749–1029, the hydration rim measured 2.77 microns, and the average date is A.D. 889.

AA38, Str. 1c

In Sector 2, CV C1 N337 E93 1c/2a Z = 2287.7–2287.65 m.o.s.l., from .20 to .26 m in depth, a concentration of large fragments of Damajuana Coyotlatelco jars, carbonized wood, mica, and lithics was found near a projection of the southern wall of the cave (the entrance of the southern niche). Under it we found domestic jar fragments, brown hemispherical-bowl fragments, a rim of a Portezuelo straight divergent bowl (monochrome basal break bowls with flat base, following Good and Obermeyer [1986:243]), a bottom of a Xico bowl (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), and rims of red-on-white bowls, as well as a Xolalpan *candelero* fragment. Near the activity area, there were fragments of sealed brown Coyotlatelco hemispherical bowls, as well as Coyotlatelco censers, buff-colored graters, a rim of a Mazapan bowl with a red band, and Corral phase *comales* (Cobean 1990). This activity area may be considered as transitional between Coyotlatelco and Mazapan.

Obsidian-hydration Sample 94-55. This sample came from AA100, Str. 1e/2a, C3. The date range for the sample is A.D. 858–1138, the hydration rim measured 2.63 microns, and the average date is A.D. 998.

AA100, Str. 1e/2a

In CV C3 N330–331 E76–77 1f/2a Z = 2287.91–2287.70 m.o.s.l., at a depth of .675 m, there was a 1-m-diameter clay circle with twined pole impressions, with a stamped earth floor with hand and feet impressions. Associated with this transitional Coyotlatelco/Mazapan activity area were a broken bowl (RT 2004), jar fragments (RT 2005), a figurine fragment (RT 2006), lithics, carbonized wood, ash, a worked stone (RT 2021), and a metate fragment (RT 2099). Also present were numerous fragments of large jars (long and short necked), Damajuana jars, hemispherical dark brown bowls, red bowls, orange bowls, white interior red-banded bowls, Portezuelo bowls without supports (monochrome basal-break bowls with flat base, following Good and Obermeyer [1986:243]), Coyotlatelco annular-support bowl fragments, buff-colored hemispherical-bowl fragments with a translucent red band, brown and red grater fragments, Coyotlatelco censer fragments, Coyotlatelco Red-on-buff bowl sherds, and white-on-orange bowl fragments.

Obsidian-hydration Samples 94-49 and 94-50. Both of these samples come from Burial 4, Str. 1k, C2. The date range for Sample 94-49 is 315–595, the hydration rim measured 3.27 microns, and the average date is A.D. 455. Reuse values for the sample include a date range of A.D. 805–1085, a hydration-rim measurement of 2.70 microns, and an average date of A.D. 945. The date range for Sample 9450 is A.D. 725–1005, the hydration-rim measurement is 2.80 microns, and the average date is A.D. 865.

Burial 4

In CV C2 E1 N333 E94–95 1j/1k Z = 2287.668–2287.588 m.o.s.l., at a depth of 1.076 m, two newborn infant skeletons were found, arranged in a perpendicular fashion. The first one (RT 2194) was oriented east–west, and was located to the south of the second individual, under a stone alignment. In association were a slate fragment (RT 2208), mica, and a small shell (RT 2193). The second interment (RT 2211) has been disturbed, but was oriented north–south (Z = 2287.748–2287.518 m.o.s.l.). In association was a bowl (RT 2206) containing organic material. Near the infants, incised pottery (with swastika motifs), a perforated sherd, and animal bone were found. The pottery fragments include a fragment of an orange jar neck, fragments of Damajuana jars, a fragment of a Portezuelo bowl (monochrome basal-break bowls with flat bases, following Good and Obermeyer [1986:243]), a fragment of a globular Tula Watercolored jar (Koehler 1986), a fragment of a Coyotlatelco censer, a Thin Orange bowl rim, and a complete Mazapan decorated bowl. These burials date to Mazapan times.

Obsidian-hydration Sample 94-21. This sample came from AA49, Str. 1c. The date range for the sample is A.D. 858–1138, the hydration-rim thickness is 2.63 microns, and the average date is A.D. 998.

AA49, Str. 1

In Sector 3, CV C1 N339 E93 1d Z = 2287.42–2287.36 m.o.s.l., at a depth of .48 m, a hearth was found with pottery, carbonized wood, and a polished bone (RT 559) in association. It also had large basin and jar monochrome fragments.

^{14}C Sample Beta-75377 and obsidian-hydration Sample 94-48. Beta-75377 comes from Burial 2, Str. 1k, C2, whereas Sample 94-48 is listed simply as coming from Burial 2, Str. 1k. The radiocarbon age for Beta-75377 is 1020 ± 90 B.P., the calibrated date range is A.D. 865–1220, and the intercept is A.D. 930. The date range for obsidian-hydration Sample 94-48 is A.D. 1261–1541, the hydration-rim measurement is 2.03 microns, and the average date is A.D. 1401.

Burial 2

CV C2 E1 N338 E95 1jj Z = 2287.796–2287.26 m.o.s.l., at a depth of .104 m, we found a seated young woman (>22 years of age), with slight cranial deformation, under Floor 2. The burial was associated with mica powder, ceramics (some clearly Mazapan), charcoal, obsidian, three child skull fragments (RT 1333, 1388), greenstone (RT 1332), a jadeite point (RT 1349), a shell fragment (RT 1377), a figurine fragment (RT 1376), figurine heads (RT 1378, 1456), a portrait figurine head (RT 1387), a "Xolalpan princess" figurine head (RT 1389), a ceramic tube, a grinding stone (mano, RT 1431), a tripod bowl with red festooned rim (RT 1467), a small red bowl (RT 2339), another red-on-buff tripod *molcajete* (RT 2337), and a stone Huehueteotl brazier fragment (RT 2338). Under the feet there was a large bowl (RT 2353). Near the head, there was a large basalt stud, in whose upper face there was a stuccoed *chalchihuitl* (RT 1374), which apparently fell from a wall that lies immediately to the west. There were orange jar fragments, dark brown jar fragments, light brown jar fragments, Damajuana jar fragments, light brown bowl fragments, dark brown bowl fragments, Thin Orange fragments, Coyotlatelco grid-banded bowl fragments, Coyotlatelco sealed bowl fragments (Quetzalcoatl type), Coyotlatelco sealed red-banded bowl fragments, grater fragments, Coyotlatelco double-handled censer fragments, a Mazapan orange-on-buff wavy-line decorated plate, Mazapan wavy-line bowl fragments, Macana Red banded-on-buff bowl fragment and supports (which Cobean [1990] assigns to the transition of the Terminal Corral to the Tollan phase), and an orange-banded *comal* rim. There was an Aztec intrusion with: Aztec III *comal* rims, textile-impressed pottery, Aztec II composite-silhouette bowl rims, Aztec polychrome bowl rims, Aztec orange supports, Aztec miniature bowls, and Gulf Coast whitewares. Complete vessels included a Macana Red-on-brown negative-decorated bowl, another Macana Red-on-brown tripod festooned-rim bowl, a Mazapan Red-on-buff decorated bowl, and a Mazapan Red-on-brown decorated plate. Although there is a persistence of Coyotlatelco pottery, this burial may have been Mazapan in date, but was later disturbed during Aztec times.

^{14}C Sample Beta-69918 and obsidian-hydration Samples 94-26, 94-27, 94-28, and 94-34. All samples come from AA46, Str. 1e. The radiocarbon age for Beta-69918 is 1020 ± 60 B.P., the calibrated date range is A.D. 900–1170, and the intercept is A.D. 1020. The date range for obsidian-hydration Sample 94-26 is A.D. 773–1053, the hydration-rim measurement is 2.74 microns, and the average date is A.D. 913. For Sample 94-27, the date range is A.D. 940–1220, the hydration-rim measurement is 2.52 microns, and the average date is A.D. 1080. For Sample 94-28 the date range is A.D. 765–1045, the hydration-rim measurement is 2.75 microns, and the average date is A.D. 905. Finally, for Sample 94-34 the date range is A.D. 733–1053, the hydration-rim measurement is 2.74 microns, and the average date is A.D. 913.

AA46, Str. 1e

In Sector 4, CV C1 N344–346 E89–91 1e Z = 2287.24 m.o.s.l., at a depth of .547 m, there was a transitional Coyotlatelco/Mazapan domestic ceramic concentration consisting of *comal* fragments, with lithics (two end scrapers, one projectile point, debitage), animal bones, etc. lying on a hearth 45 cm in diameter. The pottery fragments belong to Damajuana jars, Portezuelo bowl fragments (monochrome basal-break bowls with flat base, following Good and Obermeyer [1986:243]), brown hemispherical bowls, a grater fragment with lateral handles, a fragment of a Coyotlatelco censer, a beveled-rim *comal*, a Mazapan wavy-line decorated bowl fragment, and a ceramic disk in Fine Matte ware.

Obsidian-hydration Samples 94-29 and 94-30. Both samples come from AA47, Str. 1c. For the first sample, the date range is A.D. 781–1061, the hydration-rim measurement is 2.73 microns, and the average date is A.D. 921; reuse values for the sample include a date range of A.D. 925–1205, a hydration-rim measurement of 2.54 microns, and an average date of A.D. 1065. For the second, the date range is A.D. 954–1234, the hydration-rim measurement is 2.55 microns, and the average date is A.D. 1094.

AA47, Str. 1c

In Sector 2, CV C1 N336 E93–94 1c Z = 2287.54 m.o.s.l., at a depth of .09 m, we found a Mazapan-phase hearth with lithics (projectile point, blades, and debitage), bone, a slate pendant (RT 699), a sling projectile, charcoal, twig impressions, pottery disks, and pottery fragments (a large jar neck, a hemispherical brown bowl rim, flat-bottomed bowls, a white-slipped bowl fragment, a *comal* fragment, a Tula Watercolored globular-jar fragment, and a plate made of a cut, recycled jar bottom).

Obsidian-hydration Samples 94-15 and 94-16. Both samples come from AA37, Str. 1c. For 94-15, the date range is A.D. 765–1045, the hydration-rim measurement is 2.75 microns, and the average date is A.D. 905; reuse values for the sample include a date range of A.D. 933–1213, a hydration-rim measurement of 2.53 microns, and an average date of A.D. 1073. For 94-16, the date range is 567–1147, the hydration rim measures 2.99 microns, and the average age is A.D. 707; reuse values include a date range of A.D. 976–1256, a hydration-rim measurement of 2.47 microns, and an average date of A.D. 1116.

AA37, Str. 1c

In Sector 5, CV C1 N348–349 E95 1c Z = 2287.732–2287.561 m.o.s.l., from .119 to .289 m in depth, we located a concentration of figurines, mica, carbonized wood, unfired pottery, bone, carbonized corn cobs, spindle whorls, many fragments of domestic pottery (more than 400 sherds, mainly Aztec and Mendrugo *comales* [Cobean 1990], orange globular-jar fragments, as well as Mazapan wavy-line bowl fragments, black-on-orange Aztec III decorated dishes and bowls), and lithics under a hearth (*tlecuil* AA 22). There is also one-half of a bowl (RT 504) with Aztec III Black-on-orange exterior decoration.

^{14}C Sample Beta-69921. This sample comes from AA51, Str. 1e/2a. The radiocarbon age for Beta-69921 is 1060 ± 70 B.P., the calibrated date range is A.D. 870–1160, and the intercept is A.D. 1000.

AA51, Str. 1e/2a
In Sector 4, CV C1 N344 E88–89 1e/2a Z = 2287.20 m.o.s.l., at a depth of .593 m, there was a Mazapan-phase activity area, consisting of a 1.40-×-.80-m hearth with pottery, a figurine head, a slab, bone, and ash. It was set against the west wall. There were jar fragments, brown bowl fragments of the Portezuelo type with hollow supports (monochrome basal break bowls with flat base, following Good and Obermeyer [1986:243]), orange bowl fragments, Mazapan wavy-line composite-silhouette bowl fragments, and a pottery disk.

Obsidian-hydration Sample 94-20. This sample comes from AA39, Str. 1c. For 94-20, the date range is 933–1213, the hydration rim measures 2.53 microns, and the average age is A.D. 1073.

AA39, Str. 1c
In Sector 3, CV C1 N340 E95 1c/1C Z = 2287.5–2287.46 m.o.s.l., from .35 to .39 m in depth, we discovered a Mazapan-phase hearth with large fragments of volcanic tuff over it; pottery fragments, a prismatic core (RT 428), an anthropomorphic eccentric (RT 427), a "Xolalpan Princess"-type figurine (RT 426), carbonized wood, lithics, bone, and mother-of-pearl. There was a concentration of large vessel fragments: basins, Damajuana jars, storage vessels, brown bowls with straight rims, orange hemispherical bowls, and a fragment of white Tula Watercolored jar (Koehler 1986).

Obsidian-hydration Sample 94-22. This sample comes from AA41, Str. 1c. The sample date range is 888–1168, the hydration rim measures 2.59 microns, and the average age is A.D. 1028.

AA41, Str. 1c
In Sector 3, CV C1 N339 E93 1c/2a Z = 2287.58–2287.54 m.o.s.l., at a depth of .29 to .33 m, we discovered a hearth with lithics, a dog-bone grinding tool (RT 421), a deer antler (RT 430), and monochrome pottery fragments (short-necked Coyotlatelco jar fragments, basins, a cut red-on-brown vessel recycled into a hemispherical bowl). This activity area may represent the continuation of the Coyotlatelco pottery tradition into the Mazapan phase.

Obsidian-hydration Sample 94-23. This sample comes from AA42, Str. 1c. the sample date range is 881–1161, the hydration rim measures 2.60 microns, and the average age is A.D. 1021.

AA42, Str. 1c
In Sector 2, CV C1 N338–339 E89–90 1c Z = 2287.68–2287.53 m.o.s.l., at a depth of .17 to .32 m, a hearth with ceramics, a projectile point (RT 478), a sherd disk (RT 541), lithics, and bone was discovered adjacent to the access wall to the tunnel. The pottery fragments belonged to large forms: Damajuana jar fragments, a neck of a cylindrical jar with vertical handle, Portezuelo bowls (monochrome basal-break bowls with flat base, following Good and Obermeyer [1986:243]), dark brown hemispherical bowls with concave bottoms (as in Xico style; monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), a cut small jar recycled into a bowl bottom, an orange basin, Coyotlatelco red-on-buff bowl (red circles and lines) with a red band on the inner rim, a red-on-brown Late Xolalpan plate rim, a *comal* fragment, Coyotlatelco tripod censer fragments, a negative- decorated red-slipped bowl, and a spoon fragment. This activity area shows the persistence of the Coyotlatelco pottery tradition into the Mazapan phase.

Obsidian-hydration Sample 94-57. This sample comes from AA122, Str. 1j/2a. The sample date range is A.D. 882–1162, the hydration-rim measurement is 2.60 microns, and the average date is A.D. 1022.

AA122, Str. 1j/2a
In CV C2 N334–335 E101 1j/2a Z = 2287.92–2287.87 m.o.s.l., at an approximate depth of .85 m, there was another clay circle associated with ash, carbonized wood, slabs (RT 2528), a figurine fragment (RT 2529), a *mano* fragment (RT 2624), worked stones (RT 2625, 2627), pottery, lithics, mica, bone, and a carbonized corn cob. There were fragments of long-necked jars, a Damajuana jar fragment, buff-colored bowl fragments, a basin rim that Cobean (1990) assigns to the Tollan phase; an Aztec orange bowl fragment, a possible Aztec II *comal* rim, two fragments of textile-impressed pottery, a Mazapan decorated hemispherical-bowl fragment, a Tula Watercolored globular jar fragment (Koehler 1986), and a fragment of a Thin Orange anular support. This activity area may be Mazapan with Aztec II intrusion or coexistence a distinct possibility.

Obsidian-hydration Sample 94-56. This sample comes from AA103, Str. 1j, C2. The sample date range is A.D. 940–1220, the hydration-rim measurement is 2.52 microns, and the average date is A.D. 1080.

AA103, Str. 1j, C2
In CV C2 N331 E94–95 1j Z = 2287.798–2287.708 m.o.s.l., at a depth of .926 m, there was a 1-m-diameter clay circle with Mazapan ceramics, a slab (RT 2186), a polisher (RT 2188), a pounder (RT 2187), a figurine head (RT 2192), a half-processed head (RT 2195), and a ceramic tube (RT 2196), associated with two hearths. There was a large quantity of domestic pottery, particularly fragments of large jars: Damajuana jars, buff-colored bowls, red-banded bowls, Xico bowls (monochrome composite-silhouette bowl, following Good and Obermeyer [1986:244]), sealed bowls, orange incised bowls, Mazapan Red-on-brown decorated bowls, an orange *comal* rim similar to one reported by Cobean (1990) for the Terminal Corral phase, a textile-impressed pottery fragment, a Thin Orange bowl rim, and polychrome hemispherical-bowl fragments. This is an activity area that shows the persistence of the Coyotlatelco pottery tradition into the Mazapan phase. We suspect that textile-impressed pottery for salt production also belongs to the Mazapan phase, if not to the Coyotlatelco phase. Maybe some of the lacustrine phytoliths (Judith Zurita, personal communication 1995) found in some activity areas may account for the transportation of salty materials from the Texcoco region to the tunnels.

Obsidian-hydration Sample 94-54. This sample comes from Burial 7, Str. 1f, C2. the sample date range is A.D. 1018–1298, the hydration-rim measurement is 2.41, and the average date is A.D. 1158.

Burial 7
In CV C2 N337 E97 1f under Ap. 0, Z = 2288.26 to 2288.21 m.o.s.l., at a depth of .775 m, there was a partial child burial, with the head to the south, facing northeast. It had been placed on its back. Neither the lower limbs nor the pelvis were present. The fifth and sixth vertebrae were fused. It was disturbed and associated with a neonatal cranial fragment, mica, ceramics, lithics, and a ceramic cone. There were dark brown, light brown, and Dama-

juana red jar fragments, *comal* fragments, grater fragments, Coyotlatelco Red-on-buff plate and bowl fragments, Mazapan Red-on-buff decorated bowls, Tula Watercolored jar fragments (Koehler 1986), and Coarse Matte fragments. This burial may date to the Coyotlatelco/Mazapan transition.

^{14}C Sample Beta-75379. This sample comes from Burial 3, Str. 1k, C2. The radiocarbon age for this sample is 520 ± 60 B.P., the calibrated date ranges are A.D. 1310–1160 and 1380–1470, and the intercept is A.D. 1000.

Burial 3

In CV C2 E1 N334 E96 1j/1k Z = 2287.758–2287.618 m.o.s.l., at a depth of 1.091 m, there was a child burial (RT 2200) in a left flexed lateral position. It was placed to the east of Burial 2 and 30 cm from AA104. The burial was covered with a clayish material with tuff fragments, and it lay on stones. It was associated with a flower-like ceramic application (RT 2197), a perforated sherd (RT 2199), a bone tool (RT 2201), and it seemed to be also associated with another child's femur. We found orange, dark brown, and light brown jar fragments, Damajuana jar fragments, dark brown and red bowl fragments, red-on-buff bowls, Mazapan wavy-line red-on-buff bowl fragments, an Abra Coarse Brown censer support (Cobean 1990), a Macana Red-on-buff bowl fragment (that Cobean [1990] assigns to the Tollan phase), a fragment of a hematite red bowl, negative-decorated bowl fragments, and Thin Orange fragments. This may be a Mazapan burial with an Aztec intrusion.

Obsidian-hydration Sample 94–11. This sample comes from AA24, Str. 1B. The date range for the sample is A.D. 171–651, the hydration-rim measurement is 3.42 microns, and the average date is A.D. 311; reuse values for the sample include a date range of 933–1213, a hydration-rim measurement of 2.53 microns, and an average date of A.D. 1073.

AA24, Str. 1B

In CV Sector 5 N346–347 E95 1B Z = 2287.66–2287.78 m.o.s.l., from .072–.192 m in depth, there was a hole that began in 1a/1b but was filled in with carboniferous loose soil, 10YR 4/1 (dark gray, in dry earth) 10YR 2/1 (black, in damp earth), pH 7. *Comal* fragments, a carbonized cob (RT 341), a carbonized seed (RT 342), figurines and figurine heads (RT 343, 344, 345, 346), mica, lithics, and bone were recovered. Near it lay an obsidian core (RT 347). This probable Aztec-period feature most likely was a trash pit. It had Aztec domestic orange ceramics, and textile-impressed pottery probably used in the salt-production process. Under it (Z = 2287.50–2287.60 m.o.s.l.) we discovered a large concentration of pottery, figurines, a zoomorphic figurine head (RT 519), lithics, incised spindle whorls for *ixtle* processing, carbonized corn cobs (RT 516), unburnt clay (RT 517), and a dog jawbone (RT 518).

^{14}C Sample Beta-69919 and obsidian-hydration Sample 94–31. Beta-69919 came from near AA52, Str. 1e, and Sample 94-31 came from within the structure proper. The radiocarbon age for Beta-69919 is 500 ± 70 B.P., the calibrated date range is A.D. 1310–1360, and the intercept is A.D. 1430. The date range for obsidian-hydration Sample 94-31 is A.D. 933–1213, the hydration-rim measurement is 2.53 microns, and the average date is A.D. 1073.

AA52, Str. 1e

In Sector 3, CV C1 N343 E94 1e Z = 2287.28–2287.21 m.o.s.l., at a depth of .532 m, there was an Aztec-period activity area consisting of a semicircular hearth, 42 cm in diameter, with stones surrounding the ashes, together with pottery, lithics, a greenstone pendant (RT 671), a fragment of a pottery ear plug (RT 677), carbonized wood, mica, animal bones (RT 678), a seed (RT 568), a *candelero* fragment (RT 670), and a carbonized corn cob (RT 679). We primarily found domestic pottery: orange jar fragments, dark brown bowl sherds, Texcoco Red bowl fragments, Aztec II *comal* forms, textile-impressed pottery fragments, Mazapan wavy-line bowl fragments, and a fragment of a Teotihuacan Matte censer.

^{14}C Sample Beta-69922. This sample came from from near AA55, Str. 1e. The radiocarbon age for this sample is 370 ± 80 B.P., the calibrated date range is A.D. 1420–1670, and the intercept is A.D. 1500.

AA55, Str. 1e

In Sector 3, CV C1 N343 E95 1e Z = 2287.35–2287.29 m.o.s.l., at a depth of .467 m, there was an Aztec III activity area consisting of two fragmented vessels, a stone with clay (RT 700), and an Aztec miniature tripod *molcajete* (RT 701). Near it there was intrusion of modern material. The pottery fragments were monochrome: an orange jar rim (with lime on the exterior), olla fragments, Texcoco Red bowl fragments, Aztec II *comal* fragments, textile-impressed pottery for salt production, and Tollan-phase basin fragments.

^{14}C Samples Beta-66913 and Beta-66917. Both of these samples come from Str. 1c. The radiocarbon age for Beta-69913 is 570 ± 70 B.P., the calibrated date range is A.D. 1290–1450, and the intercept is A.D. 1410. For Beta-69917, the radiocarbon age is 1300 ± 60 B.P., the calibrated date range is A.D. 640–880, and the intercept is A.D. 700.

^{14}C Samples AMS Beta-69916 and Beta-69914. Both samples comes from Str. 1C. The radiocarbon age for AMS Beta-69916 is 1130 ± 70 B.P., the calibrated date range is A.D. 770–1030, and the intercepts are 910, 920, and 950. For Beta-69914, the radiocarbon age is 690 ± 100 B.P., the calibrated date range is A.D. 1170–1430, and the intercept is A.D. 1290.

^{14}C Sample Beta-70715 (ETH 12206) and obsidian-hydration Sample 94–19. Both samples come from Str. 1D/1d. Beta-70715 has a date range of 370 ± 60 B.P., a calibrated date range of A.D. 1420–1650, and an intercept of 1460. Sample 94-19 has a date range of A.D. 733–1013, a hydration-rim measurement of 2.79 microns, and an average date of A.D. 873.

Obsidian-hydration Samples 94–35 and 94–36. These samples comes from AA61, Str. 1f. The date range for Sample 94-35 is A.D. 725–1005, the hydration-rim measurement is 2.80 microns, and the average age is A.D. 865. For Sample 94-36, the date range is A.D. 533–813, the hydration-rim measurement is 3.03 microns, and the average date is A.D. 673; reuse values for this sample include a date range of A.D. 851–1131, a hydration-rim measurement of 2.64 microns, and an average date of A.D. 991.

^{14}C Sample Beta-69926. This sample comes from Str. 1i. Two radiocarbon ages are given for the sample: 930 ± 50 B.P. and 1170 ± 50 B.P., its calibrated date range is A.D. 770–990, and the intercept is A.D. 880.

Obsidian-hydration Sample 94-43. This sample comes from AA72, Str. 1j. The date range for the sample is A.D. 693–973, the hydration-rim measurement is 2.84 microns, and the average date is A.D. 833.

^{14}C Sample AMS Beta-69925 and obsidian-hydration Samples 94-40, 94-41, and 94-42. AMS Beta-69925 and Sample 94-42 are from Fl. 4, and Samples 94-40 and 94-41 come from AA69, Fl. 4. For Beta-69925, the radiocarbon age is 930 ± 50 B.P., its calibrated age is A.D. 1010–1230, and the three intercepts are A.D. 1050, 1090, and 1150. The date range for Sample 94-40 is A.D. 685–965, the hydration-rim measurement is 2.85 microns, and the average date is A.D. 825. For Sample 94-41, the date range is A.D. 828–1108, the hydration-rim measurement is 2.55 microns, and the average date is A.D. 968. The date range for Sample 94-42 is A.D. 765–1045, the hydration-rim measurement is 2.75 microns, and the average date is A.D. 905.

Floor 4

In CV C1 N350–351 E87–89 2a, we found Fl. 4, which was associated with pottery, bone, carbonized wood, lithics, fibers (RT 1113), an end scraper (RT 1114), a bone needle (RT 1116), earplug fragments (RT 1118), and a shell (RT 1119).

^{14}C Sample Beta-69927 and obsidian-hydration Samples 94-32, 94-33, 94-44, and 94-45. Beta-69927 comes from Str. 2a, Samples 94-32 and 94-33 come from AA53, Str. 1e/2a, and 94-44 and 94-45 comes from Str. 2a. For Beta-69927, the radiocarbon age is 1260 ± 80 B.P., the calibrated age is A.D. 640–970, and the intercept is A.D. 770. The date range for Sample 94-32 is A.D. 858–1138, the hydration-rim measurement is 2.63 microns, and the average date is A.D. 998. For Sample 94-33, the date range is A.D. 773–1053, the hydration-rim measurement is 2.74 microns, and the average date is A.D. 913. The date range for Sample 94-44 is A.D. 789–1069, the hydration-rim measurement is 2.72 microns, and the average date is A.D. 929. For Sample 94-45, the date range is A.D. 652–932, the hydration-rim measurement is 2.89 microns, and the average date is A.D. 792.

Obsidian-hydration Samples 94-46 and 94-47. Both samples come from Str. 2b. The date range for Sample 94-46 is A.D. 593–873, the hydration-rim measurement is 2.96 microns, and the average date is A.D. 733. For Sample 94-47, the date range is A.D. 550–830, the hydration-rim measurement is 3.01 microns, and the average date is A.D. 690.