

EXCAVATIONS IN BURIED CAVE DEPOSITS: IMPLICATIONS FOR INTERPRETATION

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As conduits for transporting ground water, caves are frequently wet and may be seasonally flooded. Cultural deposits in Maya caves are often buried under layers of mud that tend to be so plastic they are difficult to excavate and impossible to screen. There has been a tendency for archaeologists to ignore such areas. Yet ethnohistorical sources suggest that wet or watery places were sought in Prehispanic times for rituals directed to rain deities. Since caves are strongly associated with rain, it would not be surprising if these water-logged areas were precisely those selected for the performance of rituals. It is important to assess the extent to which archaeological bias against such areas has skewed data and interpretations.

The Petexbatun Regional Cave Survey, the largest and most intensive cave project mounted in the Maya area, has attempted to develop new field methods to address basic problems in cave archaeology. In 1993-94, several techniques for exploring water-logged contexts were tried, including the use of chemical deflocculants to dissolve cave mud. Field testing of the method in areas where the project had conducted completed surface collection recovered a large amount of ceramic indicating that sherd density was several orders of magnitude greater than previously reported. In addition, the percentage of Preclassic sherds in the test units indicate far more early utilization than suspected. More importantly, there is little overlap between the artifact assemblages recovered by the use of deflocculants with those recovered from surface collection, a fact that has important ramifications for the reconstruction of cave ritual. In general, the new techniques have revealed greater intensity of utilization in water-logged areas, and have produced an array of small artifacts that reflect a broader range of activities than suggested by surface survey alone.

The Petexbatun Regional Cave Survey, a sub-project of the Vanderbilt University Petexbatun Regional Archaeological Project, is the largest and most intensive archaeological investigation of caves that has been undertaken in the Maya area (Fig. 1). During its four years based at the site of Dos Pilas, the project has attempted to develop new field techniques to address some of the problems of cave archaeology. As conduits for transporting water from the surface to the water table, most Maya caves are wet and may be seasonally flooded. This means that cultural deposits are often buried in water-logged conditions. Such conditions have been encountered in a number of caves in southeastern Peten (Brady, 1989; Brady & Fahsen, 1991) as well as in every major cave in the Petexbatun Region (Fig. 2). This is the major problem associated with the cave environment of this region. How does the archaeologist investigate these situations? In the past, such caves or areas of caves have simply been avoided. We feel this has biased data recovery and effected interpretation of cultural use of these areas.

Over the last two years, the Petexbatun Regional Cave Survey has systematically explored methods of investigating wet and water-logged environments. Two very different situations created by water were identified in this region. Where there is running water, artifacts are often buried under a layer

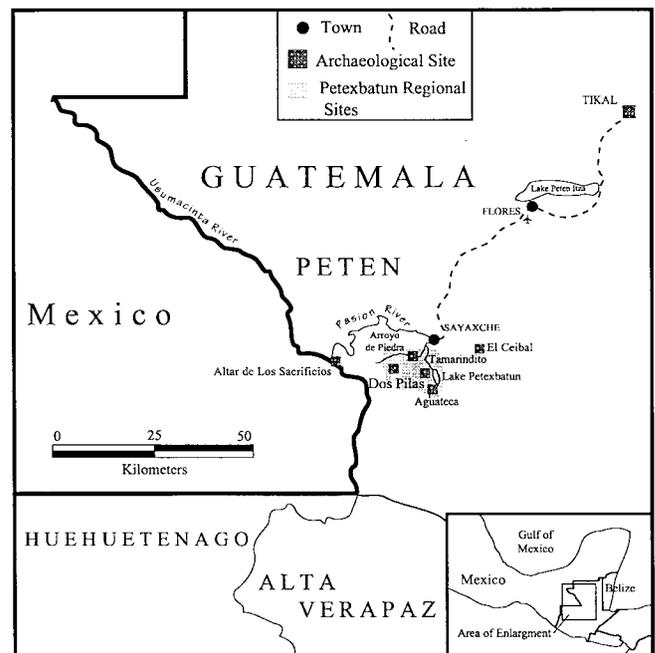


Figure 1. Map of Guatemala Showing the Petexbatun Region.

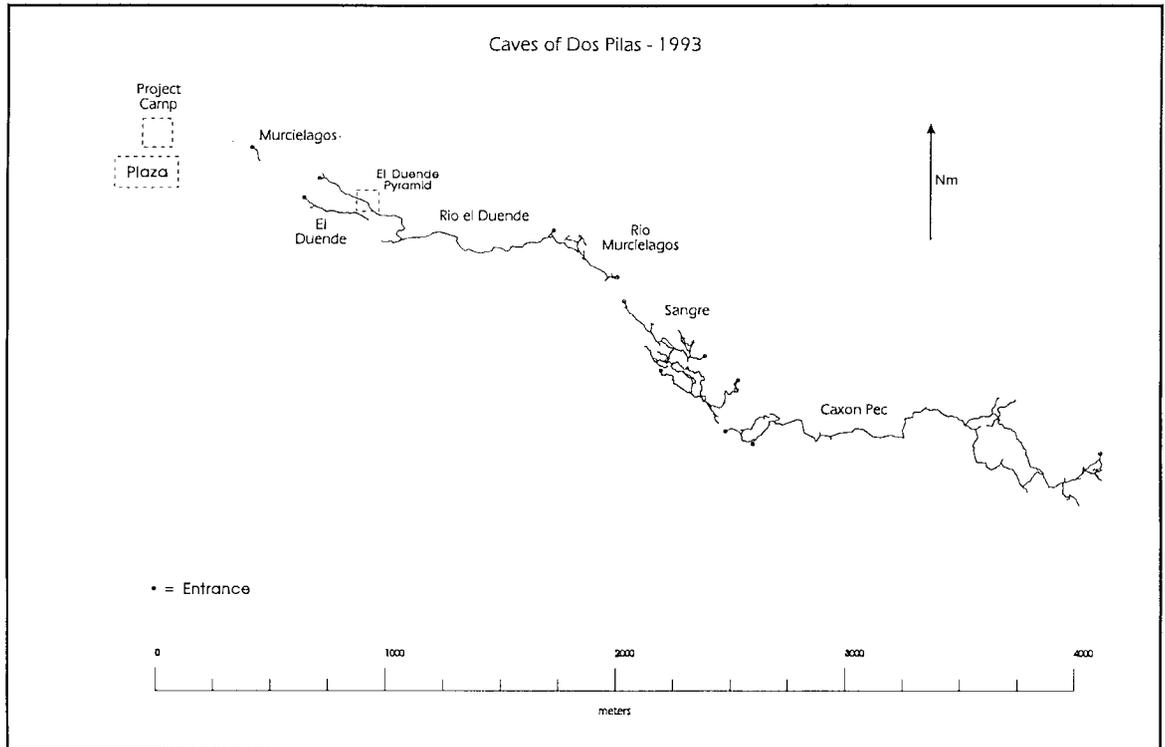


Figure 2. Map of the caves investigated by the Petexbatun Regional Cave Survey.

of sand and gravel. Our concern for this type of environment grew out of the investigation of the Cueva de Río Murciélago where the surface collection of a long section of river passage recovered a number of artifacts. After a heavy rain a project member reported seeing a large bifacially chipped blade on the surface which he marked with flagging tape. We were unable to return to the cave before another heavy rain by which time both the blade and the flagging tape had disappeared but a large jade hacha was found on the surface. With each rain, the water was apparently covering some objects and uncovering others. This raised questions about what percentage of artifacts were being recovered and how representative the surface assemblage was.

In 1993 an investigation of the riverine sands was conducted in the Cueva de Río Murciélago (Fig. 3). Two of four segments of the sandy tunnel were selected where a small stream ran along one side of the passage. In the first of these segments a trench 1 x 3 m was excavated to determine the nature of the deposit. It was found that artifacts were located in a 10 cm thick layer of sand which overlay a sterile base of mud. The trench yielded enough artifacts to suggest that a more controlled excavation was called for. The second segment of passage [CRM3-07] was selected because it contained not only sand and gravel but a large mud bank as well (Fig. 4). The sand from the entire passage, 12 m x 3.5 m, was excavated to the mud base and then washed through 4 mm mesh screen using river water. The mud bank was scrapped without finding a significant quantity of artifacts and was then trenched and profiled (Fig. 5).

The controlled excavation of the second tunnel segment using the same boundaries as the surface collection allows us to compare the two artifact assemblages and draw conclusions about the adequacy of our surface survey (Table 1). First, in considering ceramics, it should be noted that the surface survey found few ceramics in areas where there was flowing

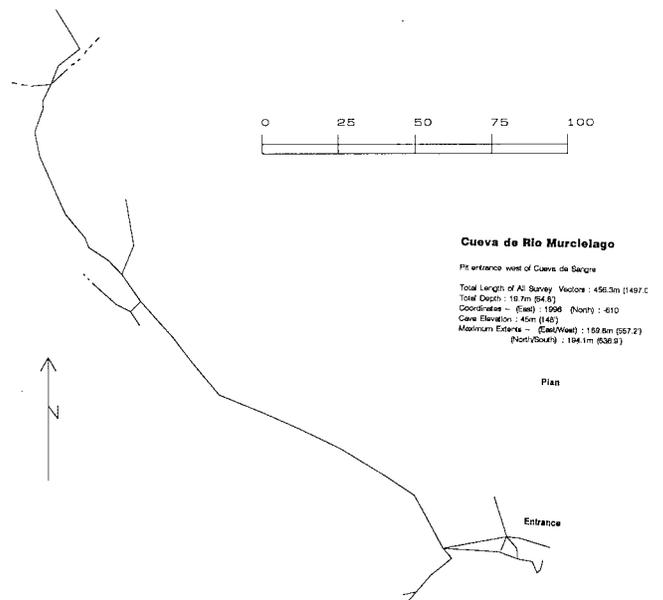


Figure 3. Computer line plot of the Cueva de Río Murciélago.

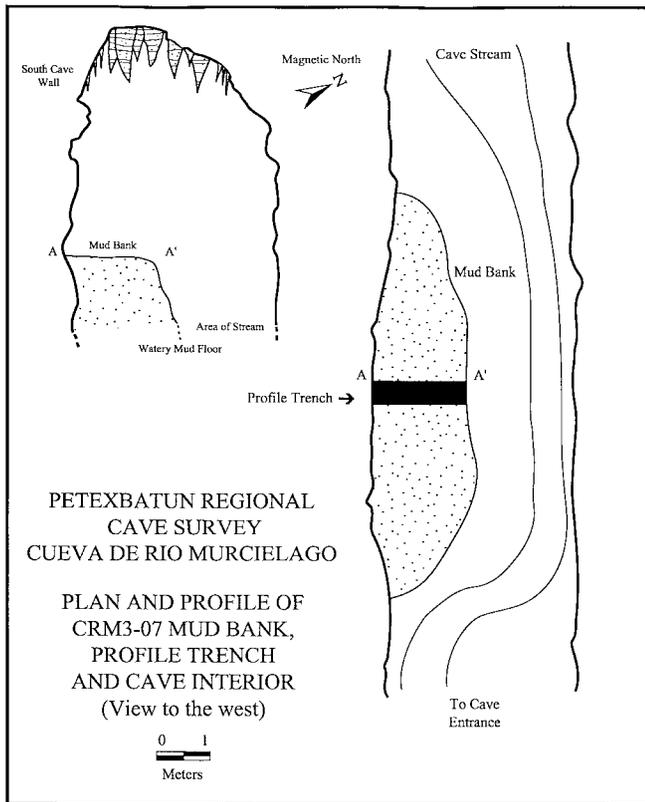


Figure 4. Plan and Profile of lot CRM3 -07.

water. Since the interpretation of the intensity of utilization of a particular area is, in some way, related to the quantity of artifacts recovered and since ceramics are the most common type of artifact, the lack of ceramics in these areas led one member of our team to argue that such areas were not heavily utilized. The systematic excavation of this section recovered over 1000 sherds where only two had been found on the surface. It must be recognized that these sherds tend to be small and the overwhelming number (932 of 1011) are too eroded to be identified. Nevertheless, the large quantity indicates higher levels of utilization than we would have been willing to suggest based on surface finds alone. It should also be noted that the ceramics recovered from excavation differed in an important respect from those on the surface. One Preclassic and 2 Early Classic sherds were identified where the surface produced only Late Classic material.

The surface collection from this area of the cave was notable for the recovery of a number of important non-ceramic artifacts including a slate mirror back with six pieces of hematite, a spindle whorl and two large bifacially chipped blades. The excavations recovered three additional pieces of hematite, four more spindle whorls, another blade and a jade hacha. In addition, the excavations recovered a number of artifacts not previously found including a worked bone spatula, a bone tube, a quantity of chert debitage and faunal remains. Even the smaller trench dug in the first passage segment

Table 1. Ceramic Counts from Lot CRM3-07.

Context	Lot #	Sherd Count	Preclassic Slipped Ware
Surface	CRM3-07-1	2	0
Excavation	CRM3-07-2	1011	1

recorded impressive finds as compared to the surface survey. The surface collection recovered a jade bead, a jade hacha, and four bifacially chipped blades while the trench uncovered a second jade bead, a second jade hacha, 2 spindle whorls, 4 more bifacial blades and a worked bone spatula. Thus, the two excavations showed that high densities of artifacts were buried in areas where there were few surface indications of cultural activity. Even among the larger artifacts, the surface collection recovered no more than half the material and completely missed smaller items.

In situations which lack quickly flowing water layers of thick, impermeable mud form which are so plastic that they are difficult to excavate and impossible to screen. Several hundred pounds of the mud were brought to Guatemala City for laboratory testing. The initial experiments combined soaking the mud in water to soften it with various methods of wet screening. The mud's plastic consistency is a result of ion bonding between clay platelets making it impermeable to water (Van Horn & Murray, 1982) so these attempts were a resounding failure. It was concluded that it would be necessary to employ a chemical deflocculant to break the ion bond and dissolve the mud. Tests of an array of detergents and other reagents were carried out on the mud by chemical engineer Luis Greñas. Factors considered in the experiments were:

1. effectiveness of the agent,
2. time required for the reaction,
3. effects on the environment and artifacts,

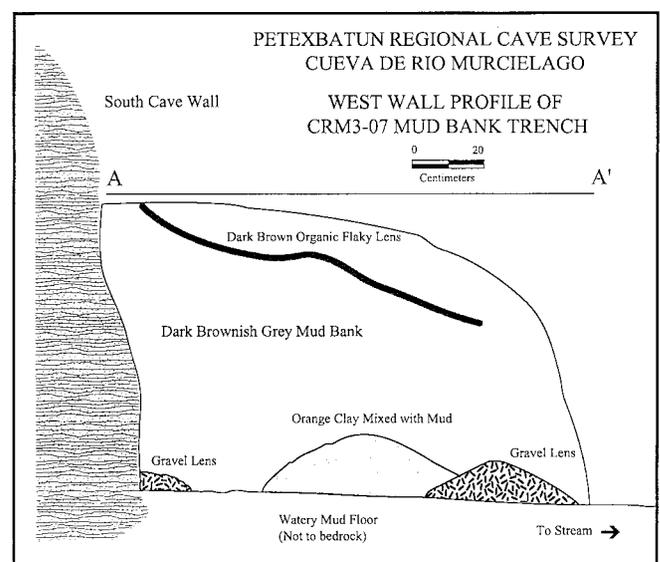


Figure 5. Profile of mud bank trenched in lot CRM3-07.

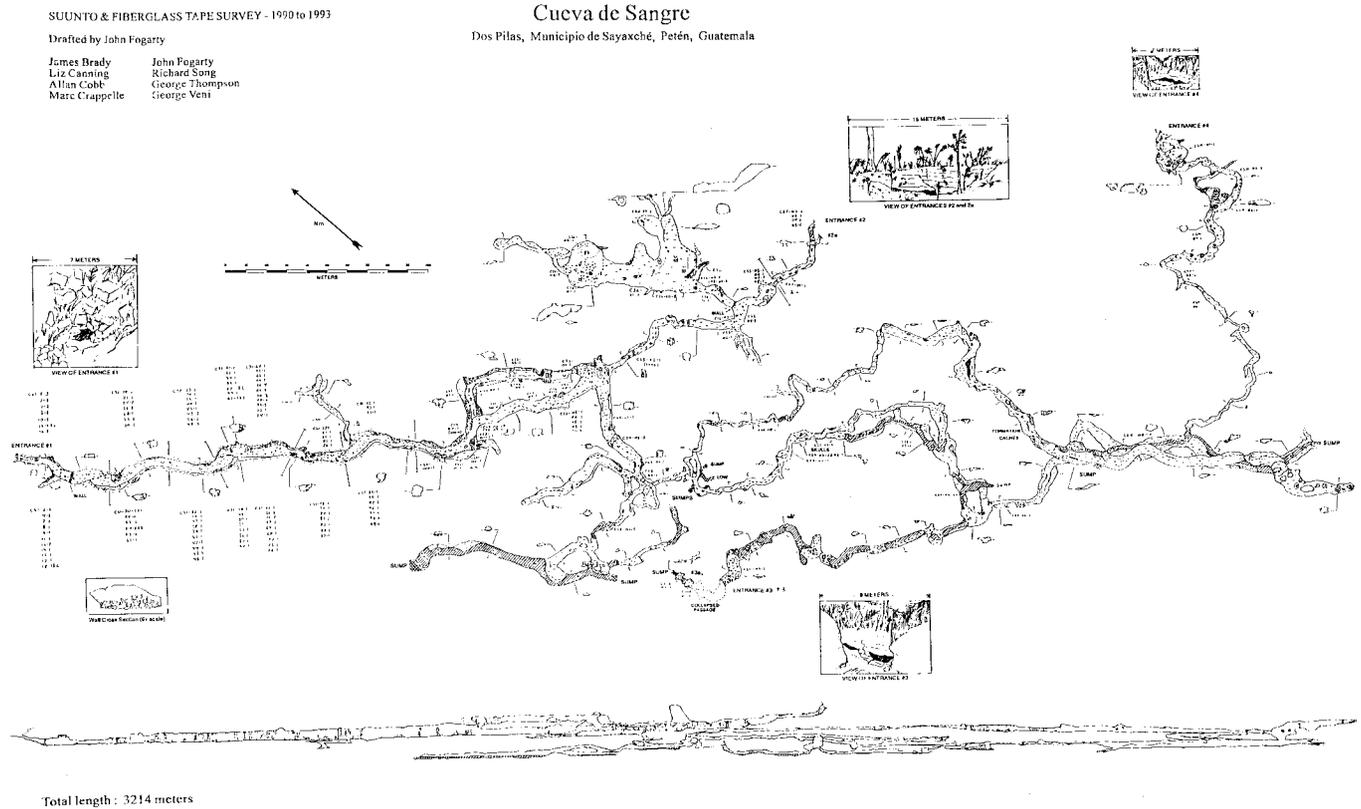


Figure 6. Map of the Cueva de Sangre.

4. cost, and
5. ease of transport.

In weighing all factors, we concluded, as did Van Horn and Murray (1982), that industrial bicarbonate of soda would offer the best results. During the 1993 season field testing of the method was attempted. Problems were encountered because large amounts of water were needed when processing mud in quantity. After trying several arrangements, a workable system was developed. An entire level, 10-20 cm thick, of an excavation unit was removed, packaged in plastic bags and carried to the spring at the camp. The mud was then broken into smaller pieces, placed in plastic screens, and soaked in a tub containing a solution of bicarbonate of soda and water. After 20-30 minutes, the screen was removed from the solution, washed thoroughly in running water and returned to the tub. Three or four soakings were generally required to completely break down the mud. By rotating eight screens between five tubs, large amounts of mud could be processed, although the method is slow and time consuming in comparison to other forms of excavation.

While working out the details of the method, mud was excavated from a 1 x 1 m test pits in the cave closest to the camp, the Cueva de El Duende. Once the method was functioning, actual testing was carried out on the Cueva de Sangre where our most intensive investigation had occurred (Fig. 6). Over the first 400 m of the cave, huge quantities of artifacts

had been mapped and collected giving us good control over the density and distribution of surface artifacts in this area (Brady, 1990). There was a concern, however, over the inability to investigate the thin layer of mud which covered this entire section of passage.

Our test began with a 1x1 m test unit placed just behind a Maya dam (Fig. 7) where only a light scatter of sherds had been found in our surface collection [lot CS1-09-1]. The location was selected because it was close to the entrance but, at the same time, within the area where the carpet of artifacts had been encountered. The excavation quickly disclosed that the damming of the passage had resulted in larger quantities of silt being deposited here than elsewhere so arbitrary 10 cm levels were utilized [lots CS1-09-2 through CS1-09-6]. While remembering that the surface collection had covered a large area, it is instructive to compare the surface material with that recovered from excavation. Using raw ceramic counts, it is apparent that the deposition of silt had buried much of the cultural material obscuring most of the evidence of utilization (Table 2). It could be argued that this is not significant if the composition of the excavated assemblage does not differ radically from that recovered by surface collection. However, this is not the case. Three hundred twenty-one sherds, or over 40%, of the ceramics recovered in excavation consisted of Late Preclassic slipped ceramics, an important point considering that the surface collection for the entire cave produced only

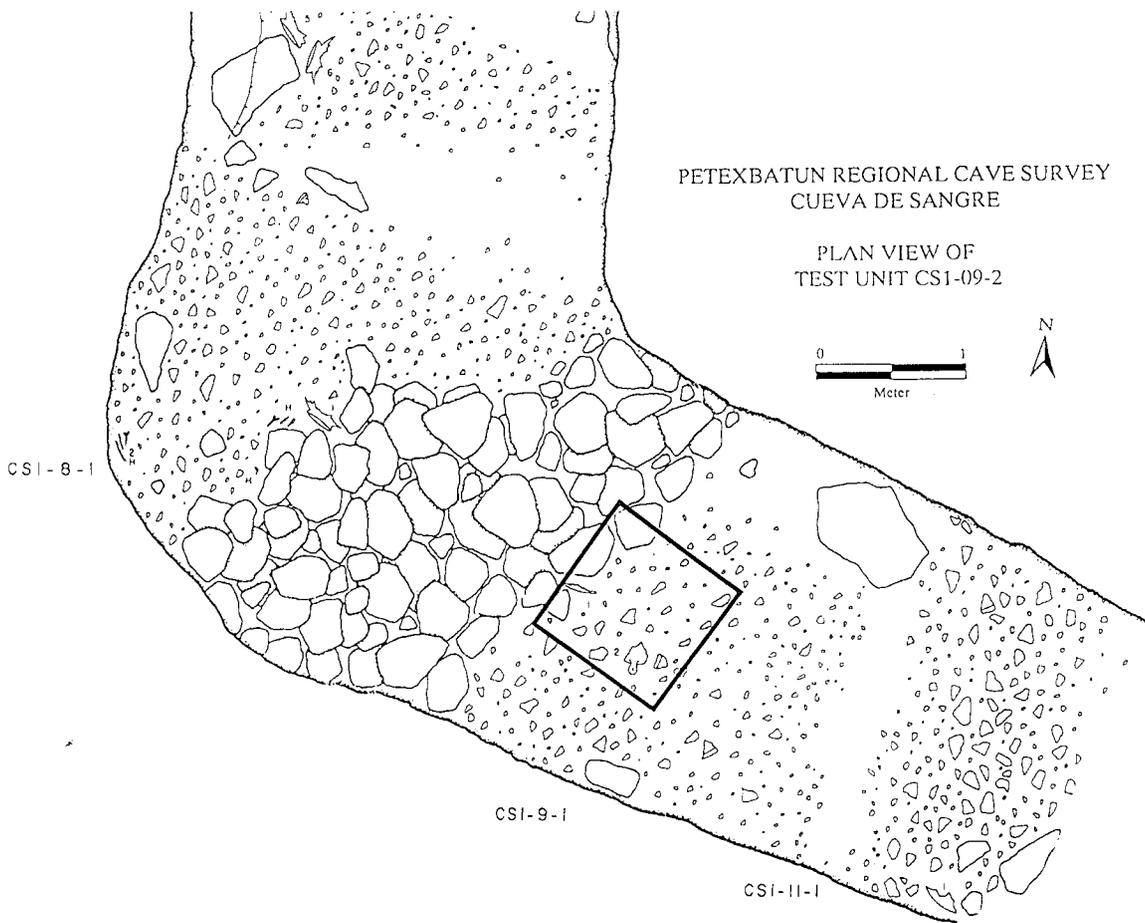


Figure 7. Location of test unit CS1-09-2 in relation to the Maya dam.

105 Preclassic sherds, or less than 1%, in an assemblage of over 25,000. Thus, the results suggest that the mud buried a substantial early utilization of the cave which the surface collection failed to indicate.

Table 2. Ceramic Counts from Lot CS1-09.

Context	Lot #	Sherd Count	Preclassic Slipped Ware
Surface	CS1-09-1	30	0
Excavation	CS1-09-2	142	43
Excavation	CS1-09-3	77	32
Excavation	CS1-09-4	382	159
Excavation	CS1-09-5	121	77
Excavation	CS1-09-6	15	10
TOTAL FROM EXCAVATION		737	321

Since the first test unit was placed near the entrance to the cave, a second unit [CS1-78-2] was excavated further down the passage close to the end of the area containing a high density of surface artifacts. This location was selected because it is within an enclosed chamber. This chamber is blocked on both ends by fallen formations which prevented artifactual material from entering or leaving due to water movement. The unit, 2.5

m long, spanned the width of the tunnel, about 4.0 m of which was covered with mud (Fig. 8). Since the maximum depth of the mud was about 10 cm, approximately 1 m³ of mud was removed from the cave. Once again a comparison of the results of the excavation with that of the surface collection indicates that the soda process recovered far more sherds (Table 3). This is somewhat misleading because the ceramics from the surface were much larger and probably represent a similar sherd weight. Nevertheless, since so much was recovered from the surface, it was surprising to find the quantity that was hidden by the mud. The major difference between the two collections is in the quantity of Preclassic material recovered. A fair amount of Preclassic material was once again found by the soda process after the surface collection failed to recover a single sherd.

More interesting is a comparison of non-ceramic artifacts. Other than two large, bifacially chipped chert blades, the surface collection reported a near absence of non-ceramic material. Forty-two pieces of worked shell representing a variety of beads and decorative items were recovered by the soda process from an area where none had been previously reported. Thirty-seven pieces of worked bone, mostly needles, picks, spatulas and perforated animal teeth, came from an area which had produced only one piece of worked bone from the surface. Ten

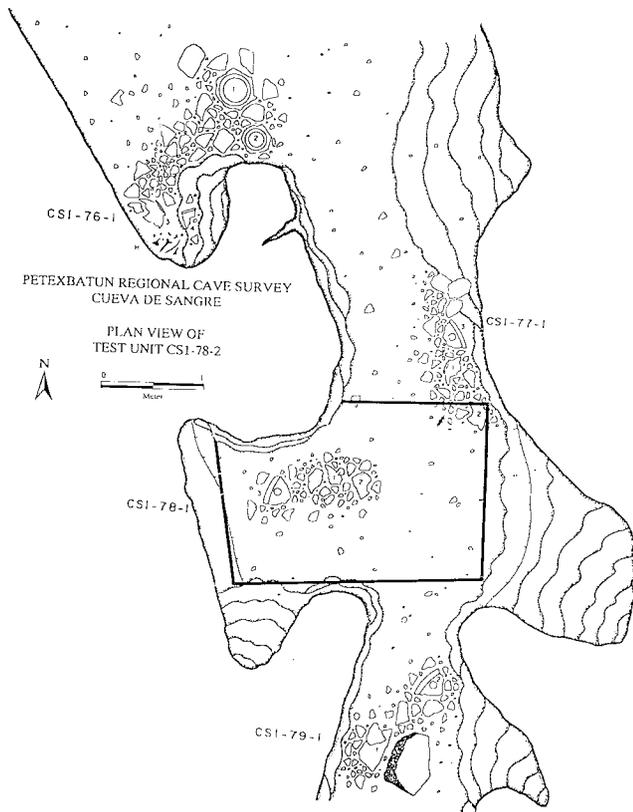


Figure 8. Location of test unit CS1-78-2.

obsidian blades and two spindle whorls were also encountered in the mud. Human bone representing one or more individuals is another class of artifact reported for the first time from this lot. The soda process also accounted for 496 animal bones and unmodified fresh water shells. This is particularly impressive because only one bone had been recovered from this area previously, and the entire Cueva de Sangre surface faunal assemblage numbered only 440.

The use of chemical deflocculants and wet screening on cave mud has yielded important insights for our interpretation of cave material. In both excavation units, the method recovered large numbers of sherds from areas which had previously been collected. These results indicate that sherd density was several orders of magnitude greater than had been suspected. In sampling, most archaeologists would agree that 100% recovery of artifacts is not necessary as long as the sample is a faithful reflection of the whole. Our test excavations indicate that the surface collections do not closely reflect the entire sample. Furthermore, the excavations show the dynamic, almost imperfect relationship that can occur between surface and sub-surface regions and the problems of interpreting data (Sharer & Ashmore, 1987). Results indicate that preclassic sherds were seriously under-represented in surface collections and thus the early use of the caves was more intensive than suspected. These findings mirror those reported for our investigation of riverine sands.

Table 3. Ceramic Counts from Lot CS1-78.

Context	Lot #	Sherd Count	Preclassic Slipped Ware
Surface	CS1-78-1	261	0
Excavation	CS1-78-2	1323	28

More importantly there is little overlap between the artifact assemblages recovered by the two methods. This point has important ramifications for the reconstruction of cave ritual. Obsidian blades and bone needles are generally believed to have been used in rites of auto-sacrifice. If the results of the soda process are correct in indicating that these artifacts are under-represented by a factor of 10 or more, then the importance of auto-sacrifice in cave ritual grows enormously. It has been proposed (Brady et al., 1992) that the presence of a weaving kit in caves, represented by the presence of spindle whorls, bone picks, and perhaps needles, is related to rites directed at Ixchel, the patroness of weaving. The soda process recovered several spindle whorls, once again suggesting that this ritual was more important than previously suspected. The human osteological analysis of the cave material indicates that six times as many individuals were recovered as reported from surface excavation project. It is likely that this figure may be on the low side. The ritual context suggests that the individuals may have been sacrificial victims so the importance of human sacrifice in Maya society may need to be re-evaluated. The soda process has certainly produced far more evidence for animal sacrifice than our previous work. In general, this new technique of investigation has revealed a greater intensity of utilization in buried areas. Additionally, it has produced an array of small artifacts that reflect a much broader range of activities than suggested by surface survey alone. Once again these results follow the general pattern established in the riverine sands.

While the discoveries made in these previously ignored deposits are important for our reconstruction of Maya ritual, the methods have larger implications. In a recent paper (Brady, 1994) the cave artifact assemblage at Dos Pilas was compared with the assemblage recovered from surface excavation at the same site. Despite the fact that the cave project is far smaller and has worked fewer seasons, the cave artifacts make up between 20% to more than 50% in many categories of the overall assemblage. Yet interestingly, the initial application of these methods in the Cueva de Río Murciélago and the Cueva de Sangre suggests that the quantities of bone, shell, obsidian and other artifacts in the cave are staggering and that these items are grossly under-represented in the cave artifact assemblage. This suggests that a significant portion of Maya economy was being expended on these rituals. Thus, our data is providing the first quantitative data on the size of Maya society's allocation for its ritual fund.

Maya cave archaeology is in its infancy. As a specialized subfield it is still struggling to develop its field methodology and to determine the scope of an adequate study. Until our

experiments last season there was little awareness of the possible shortcomings imposed by archaeology's inability to deal with buried, water-logged deposits. As we continue to apply this method we hope to collect data on area to area and cave to cave variation and to offer a more systematic assessment of the nature of these buried deposits. Finally, our preliminary results already suggest that the methods will change our interpretation of site history and function.

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