El Gigante Rock Shelter: Archaic Mesoamerica and Transitions to Settled Life

Research Year: 2001
Culture: Maya
Chronology: Pre-Classic
Location: Highlands of Southwestern Honduras
Site: El Gigante

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Abstract

The Mesoamerican prehistoric Archaic period is little studied. During this period (between 10,000 and 4,000 years ago) fundamental cultural adjustments were made to the varying physical environments of Mesoamerica. These set the stage for the florescence of complex societies of more recent periods.

The *Proyecto El Gigante* was targeted at the elaboration of the unknown cultural history of the Highlands of Southwestern Honduras. Extensive excavations were carried out in a rock shelter that contained very well preserved archaeological material, especially botanical remains.

Based on the initial analysis of the excavations, we have reached several conclusions. First, there is an undeniable Paleoindian component to the site that dates to 9220-8750 B.C. (2-sigma, calibrated date). Second, there is significant evidence of a generalized hunting and gathering pattern of behavior throughout the Archaic. The suite of plant remains recovered from these levels indicates a heavy reliance on tree fruits, maguey, and both large and small game. Third, the transition from this hunting and gathering mode of subsistence to one of farming apparently occurs very late as compared to other sites described for the period in México (e.g. Coxcatlán and Guila Naquitz). Maize is not adopted until perhaps the mid 1st millennium B.C. Once present, maize morphology exhibits a wide diversity and indicates either significant local manipulation of the crop or experimentation with many imported varieties.

The Proyecto El Gigante has completed the fieldwork phase. There is much laboratory analysis to be completed.

Resumen

El período Arcaico en Mesoamérica es poco conocido. Durante dicho período (que va de los 10.000 a los 4.000 años atrás), se dieron ajustes culturales en los muy variados

entornos físicos de Mesoamérica. Éstos fueron preparando el escenario para el florecimiento de las complejas sociedades de los períodos más recientes.

El Proyecto El Gigante tenía como meta elaborar la desconocida historia cultural de las tierras altas del sudoccidente de Honduras. Se han llevado a cabo extensas excavaciones en un refugio rocoso que contenía material arqueológico muy bien preservado, y en especial en lo que a restos botánicos se refiere.

En base a los análisis iniciales de las excavaciones, hemos llegado a varias conclusiones. En primer lugar, el sitio pone de manifiesto un incuestionable componente Paleoindio fechado para el 9220-8750 a.C. (2-sigma, calibrada). En segundo, hay importantes evidencias de un modelo de conducta generalizado de caza y recolección a lo largo de todo el Arcaico. El juego de restos de plantas que se recuperó en estos niveles indica una fuerte dependencia de los árboles frutales, del maguey, y de la caza de animales grandes y pequeños. En tercer lugar, la transición de este modelo de subsistencia de caza y recolección al modelo agrícola, aparentemente tuvo lugar muy tardíamente, en comparación con otros sitios que se han descrito para ese período en México (por ejemplo, Coaxcatlán y Guila Naquitz). El maíz no fue adoptado tal vez hasta mediados del 1er milenio a.C. Una vez presente, la morfología del maíz mostró una amplia diversidad e indicó, o bien una importante manipulación local de la siembra, o la experimentación con numerosas variedades importadas.

La fase de trabajo de campo del Proyecto El Gigante ya ha sido cumplimentada. Todavía quedan muchos análisis de laboratorio por realizar.

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Introduction

The El Gigante rock shelter is one of very few sites in Mesoamerica with lengthy archaeological sequences appropriate for investigations into long term cultural evolution. As the early culture history for this sub-region of Mesoamerica is largely unexplored, the research strategy was designed to answer broad questions concerning three periods of Mesoamerican prehistory. The first of these was the definition of a Paleoindian horizon at the site of El Gigante. The second concerns how the growing hunter-gatherer populations of the Archaic (>4,000 B.P.) capitalized on the variable

environmental possibilities presented to them through six thousand years of environmental change. The third research question focused on the development of a specific cultigen, Zea *mays*, or domestic corn, and its relationship to the established economies of those hunter-gathers in their transition to the more familiar sedentary village life (Flannery, 1976; Joyce and Henderson, 2001).

In comparison to the flourescent cultures of later prehistory, the Archaic period in Mesoamerica is little studied. This unglamourous period is, however, essential to understand as adaptations and adjustments to the myriad of tropical environments during this time provide the basis for the development of complex economies of later periods. The subsistence systems' preadaptive capacity establishes the potential for cultural evolution and elaboration.

The Archaic life-way in México is sometimes modeled on the "Desert Tradition" of the ethnographically described Great Basin cultures, drawn in large part from Jennings' investigations at Danger Cave in Utah (Jennings, 1957). This direct historical approach is not appropriate for the case of El Gigante. Research into the hunter-gatherer past at the site of El Gigante indicates a similar adaptation to local environmental conditions. However, those conditions are unique to Highland Honduras and very dissimilar to the semi-arid regions to the north.

Sometime in the late-Archaic a full commitment was made in some parts of Mesoamerica to shifting cultivation and farming economies. This transition triggered many other changes in the societies which followed this path. Domesticated plant species evolved and were moving about the continent (via human action) as early as the middle-Archaic, species such as squash (*Curcubita spp*.), avocado (*Persea Americana*.), chili peppers (*Capsicum spp*.), and of course in the late-Archaic, eventually maize (*Zea mays*). The later plant, a uniquely preadapted weed, was incorporated into the existing constellations of subsistence foods of the archaic, and changed human society throughout Mesoamerica forever.

Data recovered from the El Gigante rock shelter sheds light on this radical shift to settled life. Evidence from the investigations at El Gigante seems to indicate that the acceptance of such a change was neither uniform nor rapid across Mesoamerica. Maize based agroeconomies (*sensu* Rindos, 1984) were slow to develop in Highland Honduras.

The Site and Environment

The El Gigante rock shelter lies in the south-west of Honduras, atop the continental divide, close to the town of Marcala, Dept. of La Paz, and near the border with El Salvador (see Figure 1). Elevations there range from 1200 to over 2000 meters; the site is at approximately 1300. The typical, pronounced wet-dry seasonal cycle of rainfall (with rain usually falling between May and October) characterizes the area. It is now the prime coffee producing region of Honduras.

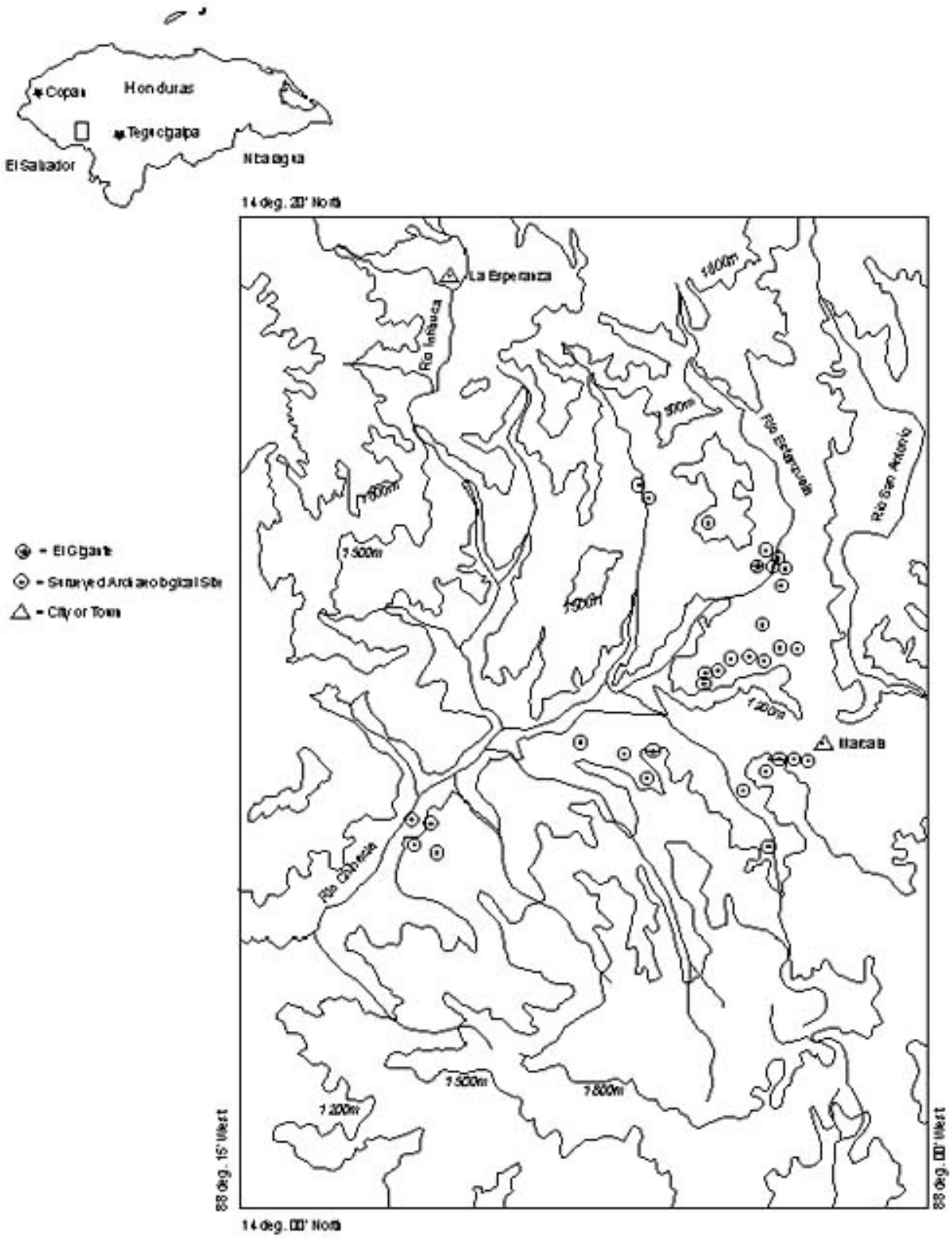

Figure 1. El Gigante Project Study Area: The Highlands of Southwest Honduras.

The environment can be characterized in general as a Pine-Oak forest of the humid sub-tropics (Holdridge, 1962). However, the current predominance of pine may be an artifact of human action. A goal of the project is to evaluate the changes in the ecology of the area around El Gigante through the Holocene. Many of the prehistoric patterns we seek to understand hinge on the changing availability and reliability of resources. What is known about the Archaic period in Mesoamerica has largely been drawn from MacNeish's work in the Tehuacán Valley and from Flannery's work around the Mitla Valley (Guila Naquitz). These two environmental contexts are somewhat similar to one another but not anything like that of the Estanzuela Valley where El Gigante lies. The former areas are arid, broad, flat-bottomed valleys with rocky upper slopes. El Gigante lies atop the narrow continental divide, a highly dissected volcanic plateau with narrow and steep valley topography. Though forming relatively open forest with patchily distributed maguey, the dominant plant form of the region is the pine-oak, not the cardon or saguaro cacti so prominent around Tehuacán and Mitla.

Regional Surveys and Sondage Testing

A regional perspective on rock shelter use is critical to our understanding of cultural adaptation to this area. A much stronger description of the diversity and differentiation arising after the Paleoindian period, and a more solid definition of the Archaic can be made if we incorporate evidence from multiple sites. A total of 33 archaeological sites were identified by the Proyecto El Gigante in 1998 (Figure 1).

We had hoped to find multiple sites with which we could "replicate" a sample drawn from El Gigante. The testing largely resulted in the negative. With the exception of a single site, Cueva Salitre (#33), no other sites were identified as containing intact, archaeological deposits of comparable age or preservation to El Gigante.

Surface collections were made at all sites visited during the survey, however, these materials remain unanalyzed. These included predominantly flaked lithics, and occasionally ceramics. Assemblages from various time periods represented in the excavated sample from El Gigante will eventually be compared with the surface collections of the region.

Based on the survey sample, ten sites were targeted for a testing program in 2000. These sites are highlighted on the Regional Map (Figure 1). The ten sites were selected based on their artifactual constituents and geomorphology. The auger-bored sondages were performed at: Grutas Guanizalez, Site 07 and 09 of the El Gigante complex, Cueva de los Murcielagos, Site 12, La Cueva Pintada, Cueva Salitre, Site 32, and Cueva del Chayo. The tenth site, Cuevas de Quiala, could not be reached because of high water in the river, and remains untested.

All sites were mapped with a tripod-mounted Brunton compass and 30 m tape (see site maps). Site area was calculated from the maps drawn in the field to include the entire

usable space in the cavern out to the drip line across the mouth of the cave. Auger holes were placed randomly in a ratio of 5 to every 100 m-sq. of site area, with an additional 2 per 100 m-sq. of "choice" placements. Sondage materials were examined in 10 centimeter intervals to the depth of bedrock by screening through 1/8 in. hardware cloth.

Most of the randomly placed test cores resulted in <10 cm of depth and were sterile. Test holes that yielded artifacts generally did so in the first 30 cm and consisted of fragmented undiagnostic ceramic sherds. No cultural deposits were found below 50 centimeters in depth in any of the rock shelters with the exception of one (see Appendix I: Cueva El Salitre).

Ethnographic Observations

In the course of surveying for archaeological sites, we were unexpectedly shown several caves that were currently in use, or had only very recently been abandoned. There are several patterns observed in the modern use of caves and rock shelters that are worth noting as they may contribute to the interpretation of the archaeological remains at El Gigante.

Rock shelters are not commonly inhabited these days, however, several very recently abandoned shelters were encountered as well as one that served as a permanent residence. We visited the home of Dona Francesca who allowed us to take photos of her entire residence. The result is a photographic inventory of her material repertoire. This inventory includes built architecture (bajareque walls, barro hornos and bancales, and set wooden posts which divided the space within the cave) many tools (both agricultural and domestic, hoes, machetes, axes) utilitarian ceramics, and a substantial domestic shrine (built of pine boughs, covered with candles and copal, and hung with miniature pots, sea shells, light bulbs, red ribbon, images of Catholic saints, etc.).

This modern pattern of rock shelter use has led us to question the use of rock shelters in the Formative. Caves are known to have been used as ritual loci or as temporary camps after the advent of agriculture and village life (Flannery, 1986). We have documented that it is possible for small family groups to inhabit shelters on a permanent basis, subsisting by farming and gathering in the local region away from permanently settled villages. Also, we have observed that the two spheres of activity, the sacred and the mundane, are not mutually exclusive, and can coexist in the same space at the same time.

Another elementary and commonly observed contemporary use of rock shelters is for storage. Appropriately dry and accessible rock shelters are used to store lumber, and corn for example. Storage figures prominently in theories for the rise of agriculture (Smith, 1995; Testart, 1982) and is a significant component of domestic strategies conditioning changes in the subsistence economy through time.

The common physiographic location of most rock shelters, perched on a valley slope with deeper talus soils below makes them unique spots on the landscape. These soils may have been some of the only arable land available in this highly dissected terrain with few broad vegas or valley bottoms. The talus below shelters, with deeper soils than most exposed and eroding slopes of the highlands is often cultivated (e.g. sites #09, #32, #20). This makes some rock shelters perfect "out-field" camp sites, convenient temporary or permanent shelter for tending crops.

Pictographs

El Gigante's walls are covered with numerous pictographs, and several other rock art sites were encountered during the survey. At El Gigante there are only two types of image: hands, and a form which resembles a goose, or swan. Both hands and the "cisnes" are represented at other sites (e.g. La Cueva Pinada, Cueva Salitre, Cueva de las Siete Manos and at Las Golondrinas).

The hand is a common icon, found distributed from South America through Central America and into the North American continent. It is a common theme in Australia and Europe too. The cisnes however, present an interesting local symbolic manifestation. The iconography may in fact be related to their settlement-subsistence pattern. Much like Paleolithic cave painting in France, at places such as Lascaux, Chauvet and Altamira, these hunters drew their familiar and revered prey. Migratory fowl are known to fly through Honduras; one of the advantages to occupy this region may have been the presence at certain times of year of significant waterfowl. We will be evaluating the faunal material recovered from the excavations to evaluate this hypothesis.

Vegetation Surveys

To get a better idea of the changing environmental context of the area we needed to establish a baseline description of the modern ecological setting. Against this baseline we will be able to better evaluate the ecological indicators recovered from the excavation, items such as seeds from trees that no longer exist in the valley. To accomplish this we completed a systematic survey of modern trees and shrubs. Seven 200 m transects were completed, perpendicular to the Estanzuela River. The presence or absence of all trees and shrubs was noted every five meters. Botanical specimens were collected for identification by Dr. George Pilz at the Zamorano Agricultural University near Tegucigalpa. In this manner a statistically accurate figure for the percent of land covered by each species can be calculated and an inventory of available plants generated. These identifications and analyses are ongoing.

Excavations at the Site of El Gigante

In 2000, two adjacent 1x1 meter test units were dug, units 1 and 2. The second season of excavations was carried out between October and December of 2001 and was far more extensive, adding another 17 units and bringing the total to 19 (see Figure 2).

The original units were placed in an area with as little apparent surface disturbance as possible and as near a 1994 unit (Lara-Hasemann, 2000; Hasemann, 1996) as possible. This placement gave us some idea as to the general stratigraphy we were to encounter, allowing us to dig non-arbitrary stratigraphic levels, and maintain strict control on provenience. Within each lithostratigraphic *stratum*, arbitrary 5 cm archaeostratigraphic levels were dug. All sediments were dry screened in the field with 1/8 in. hardware cloth to recover all possible macro remains. The attempt was made in the excavations to never excavate a level from more than one stratum. The complexity of the stratigraphy made this a challenge, but I believe we were largely successful. We proceeded with the excavations in much in the same way as described by Flannery in his description of the excavation of Guila Naquitz (1986). This method was crucial, as the stratigraphy of the site was composed of a complex palimpsest of natural and anthropogenic sediments (as with many rock shelters, see Strauss, 1990). The method is summarized as follows:

The units were not dug simultaneously. For example, unit 1 was brought to depth first, exposing what would be the south wall unit 2. Levels from unit 2 were then "peeled back" in an attempt to keep all levels within discrete strata. Unit 2 therefore has somewhat better control of stratigraphic provenience. Unit 1 is the only unit in which not at least one wall was exposed upon excavation. All further units in the main block were excavated in this sequential manner with at least one wall exposed to guide the excavator. Two units (18 and 19) were excavated with three walls initially exposed and thus, have the best archaeological control.

The main block of one-by-one meter excavation squares was dug extending off of the previous years pilot units (units 1 and 2). This main block now consists of 12 square meters of excavated floor area (units 1, 2, 3, 4, 6, 7, 9, 13, 16, 17, 18, and 19) (see Figure 2).

Two other areas of the rock shelter were investigated as well, the first near the rear wall, in the deepest portion of the shelter, where looting had been noted (units 5, 8, 10, and 14). The second area was a sample of the large natural pot-hole depressions in the Northern portion of the cave (units 11 and 12). These seemed like likely places for the focus of human action. Both of these areas turned out to have been highly disturbed. Extensive reworking and mixing of these sediments left no discernable stratigraphy intact, all the way down to bedrock.

Another consideration in the placement of the units was the attempt to transect the shelter perpendicular to the orientation of the mouth. This was done because the stratigraphy in this dimension can show best the physical evolution of the geologic structure.

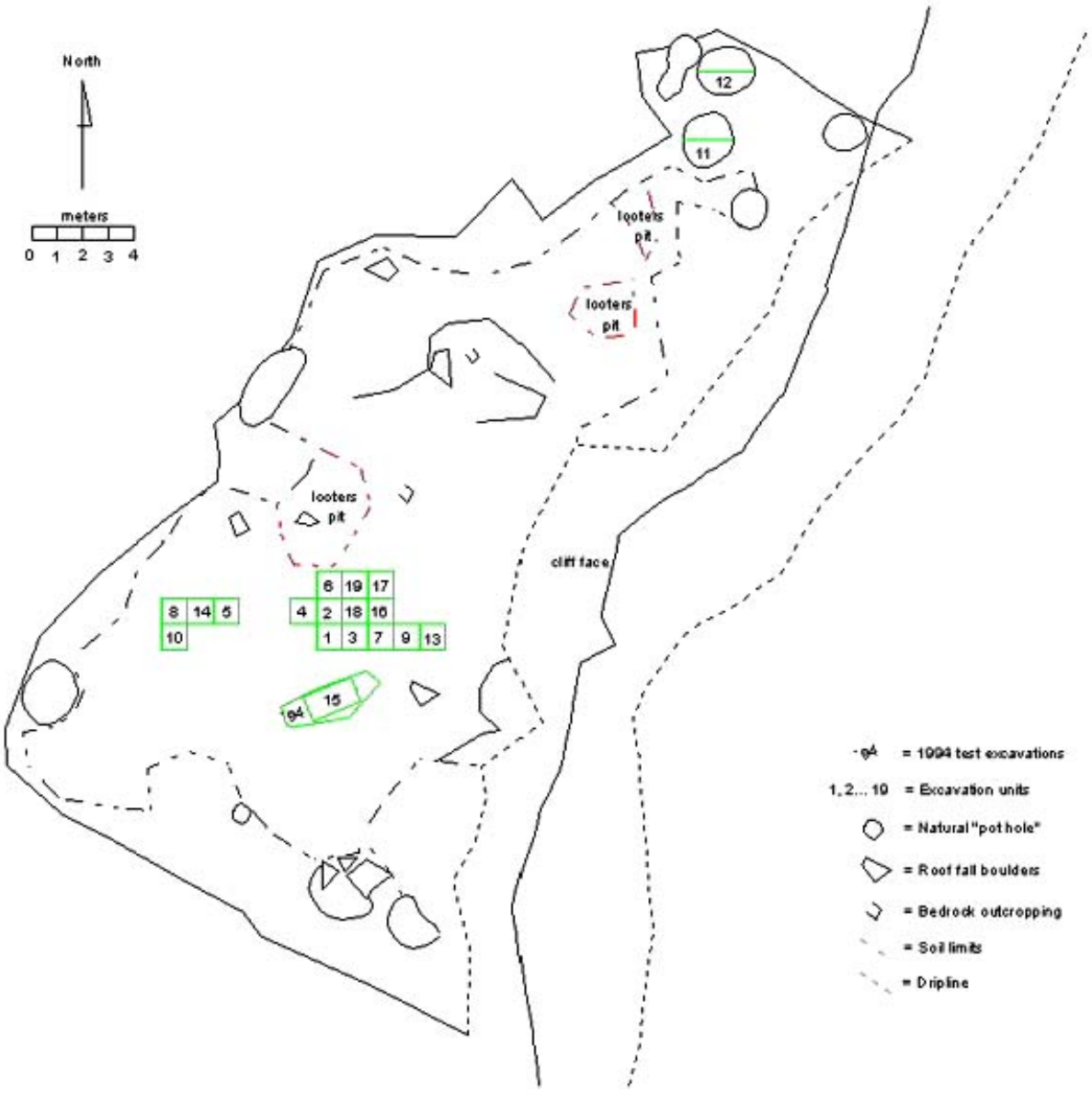

Figure 2. Plan of the El Gigante Rock Shelter; La Paz, Honduras.

Lastly, to follow-up on previous investigators claims of very early human settlement, it was decided to enlarge our sample of what we believed to be non-cultural strata. We did this by excavating an additional single 1.5 by 2 meter unit (unit 15) all the way down to bedrock. This did not produce any cultural material. The claim of very early occupation is discussed below.

Stratigraphy and Chronology

The strata can be described as nine lithostratigraphic units (I-IX). Each of these units is divided into several sub-strata and described individually. In 2000 we determined that no incontrovertible evidence existed for habitation remains below stratum V. In 2001 a series of six radiocarbon assays were performed on material from the 2000 excavations (see Table 1 and Figure 3). The following general description of the site stratigraphy was consistent across the main block of our excavations. Unless otherwise stated, dates mentioned in the text are 2-sigma calibrated results.

Table 1. Radiocarbon Determinations

			Uncalibrated	**Calibrated (2-sigma)**
Lab Identifier	**Comment**	**Stratum**	**C14 years B.C.**	**B.C. to and B.C. to**
?	Hasemann's "zone I"	I?	?	
ISGS 2965 2	?	VI?	9450 +/- 70	8934 8273
ISGS 2966 3	?	VI?	9970 +/- 70	9904 9044
?	Hasemann's "zone XVII" (C7)	IX?	39,820 +/- 1100	
Beta-156242	upper level (C1)	I	1970 +/- 70	160 -220
Beta-156243	lower level (C2)	I	3040 +/- 220	1760 800
Beta-156247	Feature "F3" (C3)	II	6630 +/- 60	5650 5480
Beta-156244	lower level (C4)	III	7140 +/- 200	6410 5640
Beta-156246	(C5)	V	9600 +/- 60	9220 8760
Beta-156245	Feature "F5" (C6)	IV	9610 +/- 60	9220 8750
Beta-159055	Corn cob (2-14a)		2280 +/- 40	400 350 and 310 210

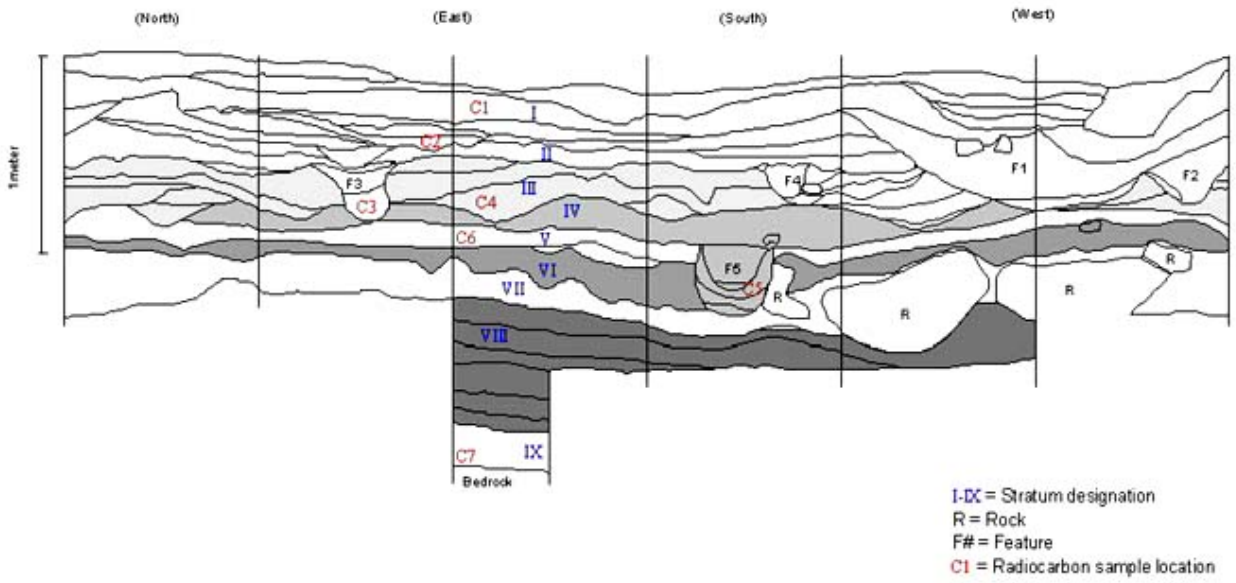

Figure 3. Stratigraphic Profile of El Gigante Rock Shelter, units 1 and 2.

The most recent of the dates pertain to stratum I, which we believe spans the Formative (1760 B.C. to 220 A.D.) in age. Its upper portions are patchily but seriously disturbed by looting and modern activity. This stratum consists of densely packed mostly unburned organic material, including petates, matted grass, wood, leaves and reeds, floral material and bone. It contains sparse amounts of lithics and ceramics as well.

Stratum II begins around 30 cm depth though much deeper in areas. The organics are significantly less in this stratum, and it is much thinner. The intensity of occupation seems to be less, and the stratum's character is dominated by pit features, as opposed to the upper grass strewn floors of stratum I. It is composed mainly of interspersed fine ashes, charcoal and limited bone fragments. A single date from the base of this stratum placed it in the Middle Archaic (5650-5480 B.C.).

Stratum III is somewhat thicker, ranging in depth from 40 or 50 cm down to 70 cm. This stratum is much more homogenous than the upper ones. We suspected that the bright yellow fine ash originated from volcanic sources, but pedological investigations have since ruled this out and we now think that the layers are composed of anthropogenic wood ash. These yellow layers are interbedded with more gravelly grey ash and very fine sediment, perhaps eroded from the walls and roof of the cave. Stratum IV is very similar in character to III though slightly darker and browner in color. This stratum also contained bone, charcoal and lithics in more dense quantities. We suspect strata III to represent Archaic period occupations as old as 6410 B.C. Stratum IV returned a date of 9220-8750 B.C.

Stratum III is often pinched out of the sequence due to intrusions from above. Similar intrusions or other as yet unknown taphonomic processes may be responsible for the

large gap in the dating sequence between I and II, amounting to 3720 years of missing time. However, we have as yet only these six dates and future radiocarbon determinations may resolve the issue.

The last of the cultural material bearing sediments are represented by strata V. This stratum consists of abundant angular gravel, ash and coarse charcoal, organic material, flaked lithics and large mammal bone. This stratum's date is very close to that of IV, revealing that a large portion of the terminal cultural remains is from this ancient period. The discontinuous boundary between stratum V and the following strata is where the oldest signs of first human occupation lie. The multiple 9000 B.C. dates confirm a human presence at this time and materials found below these stratigraphic contexts will be referred to as Paleoindian.

The remaining, non-cultural strata in the series begin as a sequence of alternating white, indurated and pumicy tephras (VI and VIII) and very carbonaceous loose black soils (VII and IX). A single radiocarbon date reported by the previous investigators is available for the dark soil that overlies the bedrock (which we assumed to match our strata IX). This revealed an uncalibrated date of 39,820 +/- 1100 years B.P. However, the artifacts said to be associated with this very early date were never reported and appear to be lost. It may be that some cultural remains date to occupations preceding to our earliest date, however, the excavations and reprobing of the original 1994 trench, combined with a knowledge of the volcanic history of the region (see below) bear out the conclusion that Paleoindian remains are to be found above the white tephras.

Volcanoes were the source of these tephras. The highly organic laden sediments sandwiched between them contain paleoecological information seldom preserved in the New World Tropics. As the single radiocarbon date available for these lowest soils is essentially infinite (i.e. at the limit of Radiocarbon dating) it must be viewed with a great deal of suspicion and it is my guess that the age is actually much older. I would place the age of these tephras in the Pliocene or early Pleistocene. The character of strata VI and VIII (their pumicy texture, angular gravels and lapilli) suggest they are the result of pyroclastic flow. Pyroclastic flows are fast moving extremely hot mixtures of gas and ash. These deposits are capable of extreme destruction over sometimes long distances, but no active volcanoes near enough to be their source have been active since those distant epochs (Williams and McBirney, 1969).

Material Cultural Remains

The analysis of the artifact assemblage is ongoing. Some initial impressions and observations can be made:

Ceramics

The ceramics have not been evaluated. There were a total of 1,521 sherds collected. These are mostly undiagnostic utilitarian wares. However, a few bichrome specimens were found and some incised as well as appliquéd pieces make up a small proportion of the collection. No figurines were found.

One artifact type of note is the ubiquitous clay marbles found. These were encountered in the Formative strata of many units. One suggestion for their function has been that they are hunting projectiles, however, given their light weight this seems unlikely. Perhaps they relate to recreational activities of children. A third and most provocative alternative, is that they are the internal parts of hollow mammiform ceramic supports sometimes used in ceremonial vessles as rattles. This would indicate some support for the ritual use of the cave in Formative times.

Floral Material

In almost all cultural strata some amount of preserved macro-floral material is present (29,096 specimens in all). A very fine sequence of maize was recovered (see below). Organic remains were recovered in lower strata but, were considerably less common. These items include a predominance of *ciruela* (*Sponidas sp*.) and avocado (*Persea americana*) rinds and pits, maguey quids and fibers (*Agave spp*.) as well as many unidentified seeds (*Sapotaceae*?). In addition, unidentified beans (*Leguminosae spp*.), squash and gourd (*Curcurbitaceae*) remnants and grasses (*Poaceae*) and leaves (mostly *Quercus spp*.), which may have been used to line storage pits, have been identified. These remains have been preliminarily sorted into some fifty-plus morphological types and await species-level identification by Dr. Lee Newsom at the Pennsylvania State University.

Maize Macrofossils

The corn cobs mentioned above are a tantalizing set of archaeological remains. Rarely do archaeologists get the chance to evaluate organic material dating to more than 2000 years ago. This paucity of data has been the major stumbling block to resolving the debates surrounding the origins of maize agriculture in Mesoamerica. 1,290 cobs or cob fragments were found in units 1 and 2 alone, projecting this figure for the entire excavation means that a sample of somewhere on the order of 10,000 cobs will make up the entire collection.

Two aspects of the Zea assemblage are striking: First, the size of the cobs increases from the tiny <2.5 cm specimens of the lowest levels to cobs comparable in length to those harvested today in the region. Second, in the more dense accumulations of cobs, the diversity of forms is incredible. Some assemblages from the same excavated horizontal level contain small, four rank *mazorquitas* as well as larger six rank, multiple-

row cobs. The shapes of the cobs range from long and narrow, to stout and cone-like, to fat and cylindrical. The interpretation is that many varieties (or races) of corn were already being planted by the early to mid-Formative.

We rule out at this point the possibility of *in situ* maize domestication here in Highland Honduras, though teosinte was wild in this area in prehistoric times. The location is right for encountering *Zea luxurians* and/or *Zea nicaraguensis* (Benz, pers. comm.). This is an initial conclusion based on the direct dating of a single fully domesticated cob, thought to have been the earliest specimen from unit 2 (400-350 B.C. and 310-210 B.C.) and on the lack of any teosinte-like hybrids or teosinte such as those found, described and directly dated at Guila Naquitz (Benz, 2001).

We do not know from where the original maize plant was brought in to the area, likewise, later varietals could represent locally derived hybrid species or may also be imported. Racial classification of the sample assemblage remains a major task that can establish the extent of connections to other parts of Mesoamerica. Racial classification and timing of the arrival of certain varieties has great potential for establishing connections between distant geographic areas (Benz, 1994).

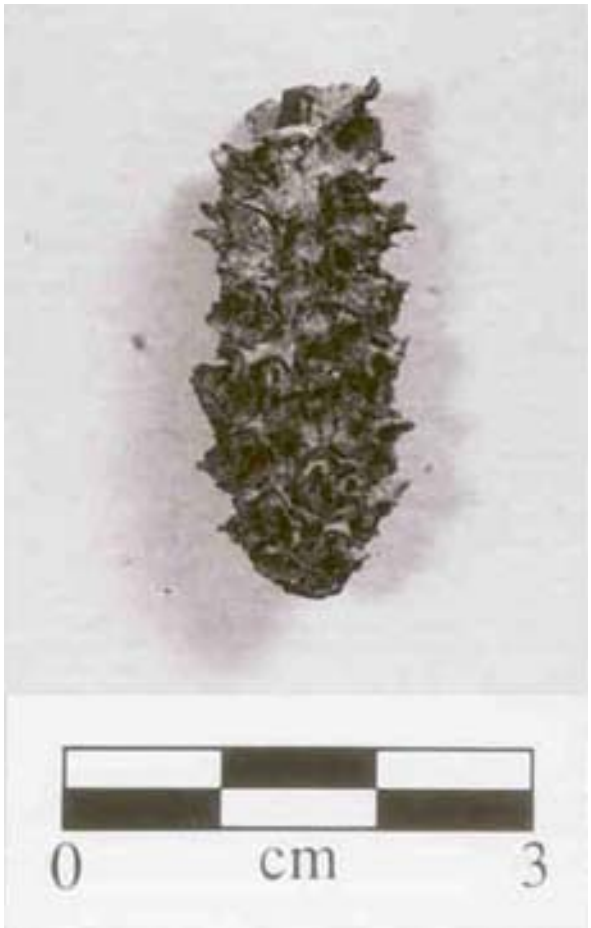

Figure 4. Cob 2-14b, 400-350 B.C. and 310-210 B.C. (2-sigma calibrated AMS date).

Microfossil Studies

In distinguishing periods of forest succession and anthropogenic forest disturbance indicative of more intensive agricultural practices, palynology is often employed. Rock shelters are not the ideal locations from which to derive samples for paleo-climate reconstruction. Better records for climate studies are available for Lago de Yojoa (Rue, 1989). Single grains of maize pollen were first found by Rue (*ibid*.) as early as 4770 +/- 375 B.P. at Lago de Yojoa. This pollen record will be valuable in the future analysis of the El Gigante paleoenvironment in combination with the macro-fossil remains.

The location and timing of maize origins are still hotly debated (MacNeish, 2000). Most recent support for a Lowland origin of *Zea mays* has been based on the identification of single pollen grains, phytoliths or starch grains (Pope *et al*., 2001; Piperno *et al*., 2000; Pearsall, 1995; Jones, 1994; Pohl, 1996) in archaeological sites, often rock shelters. In an attempt to wrest more ecological and plant-use data from the site, samples were collected (in EG2000) for pollen studies as well. The extraction of the pollen from the soil was undertaken under the direction of Dr. Andrew Sluyter, previously of PSU Geography Department. We were unable to identify any pollen in any of the samples. As an independent test, we sent samples to Dr. John Jones of Texas A&M. He too was unable to find any pollen. This is most likely due to chemical conditions within the site. A test on soil from stratum III showed alkaline conditions of pH 9. In addition, much of the sediment may be accumulated ash from repeated fires, the heat of which would destroy pollen microfossils.

In a last attempt to extract information from the soil several samples of ground stone artifacts have been forwarded to Dr. Dolores Piperno at the Smithsonian Tropical Research Institute for examination. We hope that her efforts to recover either phytoliths or starch grains from these artifacts will be more fruitful than our palynological attempts.

Faunal Material

50,481 fragments of bone and other faunal remains were excavated. Bone remains are relatively sparse in the upper layers. There is a marked increase in sheer volume with depth, and large mammal bone increase as a proportion of the assemblage. Most of the assemblage is heavily fragmented, perhaps pointing to intensive processing, and many (55% based on the analysis of units 1 and 2) are burned or calcined. Many of the fragments from the lower levels are unquestionably deer. Additional species identified include armadillo, fresh water crab and turtle; bird bone of unknown species has also been counted. The bone recovered below strata V changes abruptly, and is made up almost exclusively of small rodent remains. This, in addition to the lack of lithic artifacts below the same level, supports the conclusion (see above) that these strata (VI through IX) were deposited before human occupation. However, two Pleistocene age horse

teeth were found in lower levels of the excavation, one of which is associated with unquestionable cultural material (lithic flakes of obsidian). These findings further solidify our case for the Paleoindian occupation of the rock shelter.

We are currently seeking collaboration with a faunal specialist who can evaluate the assemblage in more detail.

Flaked Lithic Material

14,803 flakes were collected. The quantity of flaked stone recovered was significant even below the stratigraphic position of the unpublished 9,000 B.C. dates (strata V). There are some dense clusters of lithic material that will be grouped together temporally to form diagnostic assemblages for each archaeological component. The raw material employed varies from tabular chert, to fine grained volcanic andesites and rhyolites, to cobble obsidian. The technological character of the flakes ranged from initial stages of bifacial and unifacial reduction forms, to finished bifacial and unifacial tools. However, it seems on cursory examination that expedient utilized flakes dominate the assemblage and formal tools are relatively few. Basic bifacial reduction sequences seem to have been relatively stable with respect to time. This pattern of simple, yet extremely flexible and versatile lithic technology fits a model of a generalized foragers toolkit.

The pattern of use seems to differ by raw material type as well. Most of the obsidian seems to exhibit characteristics such as cortex that indicate the initial stages of tool manufacture, while the chert and other flaked material waste seem to be the later stages of unifacial traditions, flake-based technologies, and more expedient forms. Not a single prismatic blade belonging to the typical later Mesoamerican core-blade reduction tradition was found.

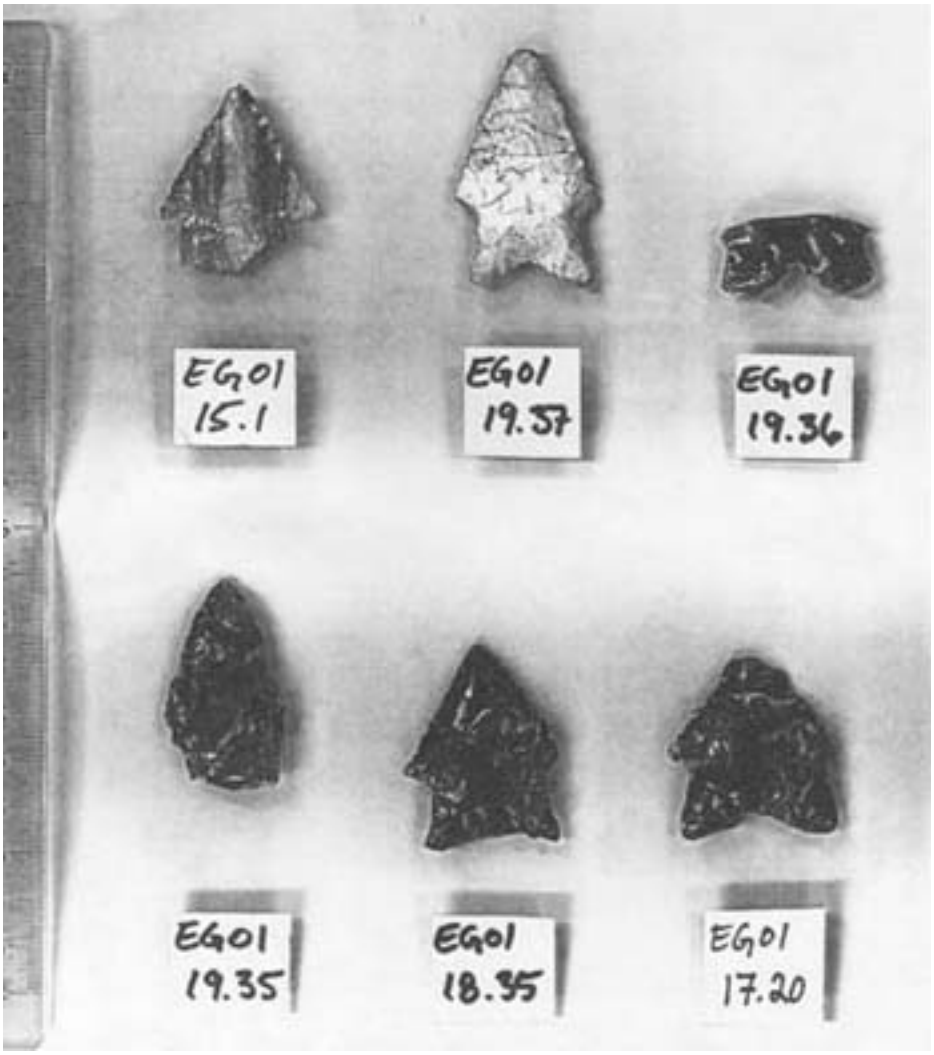

Figure 5. Projectile points recovered from secure contexts.

Six complete or nearly complete projectile points were recovered from secure contexts in the 2001 investigations. These points have bifurcate and notched stems, they are 4-5 cm in length and are all about 3.5 cm at their broadest point (at the tip of the barbs). Most seem to have been extensively retouched and while not obtuse in tip angle, quite stubby. These points are consistently from contexts pre-dating 5-6,000 B.C. radiocarbon determinations and in strata of the 9,000 B.C. age or earlier, but are not fluted.

Bullen and Plowden (1965) have reported on possible Paleoindian era lithics collected on the surface from rock shelter sites on the Highland Plateau to the north of our study area. These tools have not been seen by the author other than in photographs presented in the article, however, the projectile point types differ markedly from those recovered in the current excavations.

Other Lithic Material (ground stone)

Twenty-three pieces of ground stone artifacts were recovered in the excavations, both in ceramic and preceramic contexts. Several specimens were recovered that point to the processing of plant foods early in the Archaic sequence. Early pieces are merely river cobbles with evidence of ground edges and battering on the ends. However, later pieces are true one-handed *manos*, or *machucadores*, purposely shaped river cobbles (square or aspirin-tablet shaped), with ground surfaces around the entire circumference and on either or both faces. This change in technology indicates a development of the plant processing industry through time.

Miscellaneous Material

Fiber remains including cordage and examples of textile and basketry were recovered from Formative strata. Preservation is such that we also found fragments of double-twinned cordage in strata dating to Paleoindian times.

Another interesting item from early Formative strata was a small (9 mm diameter) shell bead, made from the top spiral of a marine cone snail. Perhaps as early as the Archaic-Formative transition people in the area were trading obsidian for wealth items derived from the coast?

Bone implements have been recovered from Archaic strata as well. These point to a bone tool industry that is little described for the Archaic period. It has been suggested that the bone awls recovered from levels 17a and b in unit 1, were used for basketry. However, local informants, unbiased in their assessment, suggested they were *tapizcadores*, or corn huskers that they used every year. They brought and showed me one the next day that looked very similar to the archaeological specimens. If these items are indeed harvesting tools, it would indicate an even richer plant processing economy than we now suspect.

Figure 6. View of El Gigante project study area.

Features

In 2000 only one major feature was recognized during excavation. This was the large (over two meter diameter) charcoal pit which extended into both units from the west wall (see Figure 3, F1). The soils were so finely textured that distinction of features less than 25 square centimeters (as viewed in a level floor, for example) was very difficult, even with a profile wall exposed. In 2001 this problem was minimized with better excavation techniques.

Some of these features represent storage pits, perhaps grass-lined as the type found at Guila Naquitz (Flannery, 1986), if so, it is a strong indication that the inhabitants were staying at the cave for an extended time. It is noteworthy that the majority cluster in stratum II, occupations we hypothesize are heavily influenced by the transition to agriculture. However, two of the reported radiocarbon dates came from features and relate them to Archaic times.

This kind of evidence combined with the data available that indicates a heavy reliance on arboreal resources in the Archaic lend circumstantial evidence to the idea that El Gigante was used as a central place for seasonal collecting forays. It is possible that Archaic people used the shelter as an extended base camp during regularly scheduled collection of wild foods in the area, fitting at the Collector end of Binford's Forager-Collector continuum model for hunter-gatherer settlement systems (1980). If an abundance of wild foods available only at certain times of year could be stored,

surpluses could be relied on for lengthier periods. Storage, as a risk buffering strategy or not, is central to many (e.g. Smith, 1995; Flannery, 1986; and Testart, 1982) hypothesis regarding subsistence adaptation and social complexity. Storage economies are prerequisite to the efficient adoption of agriculture. "Collectors" (Binford, 1980) would be predisposed (preadapted) to the adoption of agricultural practices, while foragers would not.

Disturbances

The post-holes, storage or trash pits from the Formative and Archaic can complicate the chronological placement of artifacts and ecofacts. Formative era pits extend into Archaic strata and Early Archaic features (e.g. F5 on Figure 3) extend down into pre-cultural depths. The constant reworking of the sediments by the inhabitants mixes materials through strata. Other sources of mixing include bioturbation by rats and other small animals including insects burrowing in the soil. Major disturbances such as those of burrowing rodents were not noted. In addition, modern looting has taken its toll on the site.

The later is especially evident in the west block (5, 8, 10, 14) and pothole (11, 12) units. These excavations showed that the sediments against the back wall of the shelter had been recently turned over. Cigarette butts, recently imported botanical remains (mango pits and banana skin) and other trash was found throughout even the deepest levels. It seems the cave was looted as recently as the early 90's evidenced by a cigarette butt of a brand which went out of business around that time.

Discussion and Conclusion

We now know that Archaic period occupation is a large part of the available sequence at the El Gigante site. We also know that, for the most part, it is intact and that looting has mainly damaged the upper (Formative) remains.

Up until this point, foraging peoples' behavior in the Highlands of Mesoamerica has been assumed to parallel that of Highland México and the Great Basin of North America. Filling in gaps concerning the specifics and subtle differences in material culture and development between El Gigante and other early Highland sites in Mesoamerica paints a more vibrant and dynamic picture of this a large region. This is not a trivial accomplishment, as there are so few sites that speak to this remote past.

The results from the combined field seasons are overwhelmingly positive. Reported preliminary finds and claims regarding "the oldest site in Central America" (Hasemann, 1996) have not been disproved. The single 39,000 B.P. date has been refuted. We confirmed the presence of stratified, unquestionably cultural material below the dated 9,000 B.C. strata. A more complete radiocarbon series clarified the chronology of the site. Though initial exuberance over potentially early maize has faded, the reality of the

late arrival of corn and the full-blown tripartite agro-economy to this area presents new questions.

We have yet to determine if changes in subsistence through the Archaic and Formative correlate with changes in environment. Correlating changes in ecology with changes in subsistence seems a straightforward task. However, a good independent paleoenvironmental record does not exist for the area. We plan to make the most of what we can piece together from Rue's (1989) pollen core (which unfortunately only extends back to about 5000 B.C.) and other available climatological data.

We conclude that morphological changes in corn leading to its domestication were not effected in Highland Honduras. However, this peripheral region of Mesoamerica may have played a part in succeeding regional differentiation of corn varieties. We hope to explore in the future the rate of change and direction of selection that is evident in the large assemblage of cobs that we have. Even if no direct selective forces can be distinguished in the assemblage, we will be able to pinpoint when certain varieties came into common usage there, and in this manner establish cultural connections to other parts of Mesoamerica.

The landscape surrounding El Gigante is a cultivated one today, and we believe it was one in the past. Though perhaps grain and legume crops were not adopted early on, it seems clear that certain useful trees (ciruela, avocado, and zapote at least) and perhaps succulent plants (maguey) were, though most were never domesticated. Naturally occurring fauna plus ciruela, maguey, tree fruits and avocado sustained populations for millennia. Subsistence in the Estanzuela Valley, previous to the adoption of agriculture can be called an "era of incipient cultivation" (Smith, 1997) though as chance may have it the cultivated plants were not destined to be domesticated and thus did not propel the populations to further levels of sociocultural integration until the arrival from outside of those agricultural forces.

The adoption of the tripartite subsistence formula (corn, beans, squash) in the peripheries was comparatively late in this region. We hypothesize that population levels were low enough that its efficient integration into existing hunting-collecting economies was not feasible until pressure (in terms of expanding peoples) was exerted from exterior sources. One such source could have been the Comayagua Valley to the north, where complex formative chiefdoms existed and grew, such as those that built the site of Yarumela.

Lastly, Paleoindian occupation of El Gigante is evident on multiple grounds. These first Hondurans were not clovis-toting mammoth hunters. Instead, based on our preliminary studies, it is more likely that they hunted available game (deer, mostly) and gathered extensively from the local environment, a more generalized than specialized mode of life. It is this mode of adaptation that I believe enabled the peopling of the New World in the first place.

The Proyecto El Gigante is still in its infancy as far as the research that has to be done. Many more specialist collaborators are necessary to pursue all the available lines of evidence that was left behind.

Appendix I: Cueva El Salitre

Some rock shelters are mined for fertilizer, so called "salitre." Sediments from one cave, named for such activity, are so valuable that people will walk the nine-hour round-trip walk to procure them. Though no chemical tests were performed, we assume that they are rich in Potassium (and probably a suite of micro-nutrients), derived from the volcanic sediments. Our informants indicated that the white precipitate that formed on the cave walls and in the soils was "*salitre*." Many small box screens for sifting out the gravel and rock fragments were found stashed in crevices, and discrete work areas around the mining pits were evident. Our informant left with a bag of about 3.5 liters, a significant weight to carry out and up (8 kilometers and 1300 meter elevation change) back to the truck.

Cueva Salitre was visited for more intensive excavations and has a high potential to add to our sample of sites occupied during the Archaic. The single one-by-one meter test unit yielded cultural material to great depth (180 centimeters) and the bedrock was not reached due to time constraints. Money was not available for any dates from this rock shelter. However, in the future it may prove to be an interesting counterpoint to the El Gigante remains as it is located at a much lower elevation and out of easy reach of any arable land.

Cueva Salitre, showed evidence of lengthy pre-historic deposits. This cave was quite unique in-and-of itself. Sondages were not placed in the shelter because the mining pits showed the stratigraphy quite clearly. The profiles exposed in the mine pits showed multiple lenses of charcoal and ash including lithic and botanical remains. These anthropogenic strata were interspersed in coarser sediments, presumably eroding from cave walls and roof, interestingly the base of these deposits revealed a pumicy white tephra, much like the terminal strata in El Gigante.

Appendix II: Pre-human Site Formation and Geology

El Gigante was formed in an ignimbrite cliff by running water scouring the welded tuff. This bedrock consists of rock belonging to the Grupo Padre Miguel a geological formation of volcanic tephras lain in the Miocene and Oligocene that blankets the entire south-western portion of Honduras (Kozuch, 1991).

Based on the survey results and the observations made in the field, it can be said that most of the rock shelters and caves of the La Paz Highlands are geomorphologically similar. Many are in a stage of "active formation" due to the action of water. Unlike El Gigante, the majority of rock shelters which exist in the bedrock tuffs of the region have

water percolating through planes of weakness and fractures in the bedrock, thus scouring the ignimbrite from the inside out. Though dry and habitable during the months of October through May (the approximate dry season), they become flooded when rains arrive. El Gigante is a unique instance in this regard, as it remains dry all year round regardless of rainfall.

El Gigante was only to become a sediment "sink" more recently in its evolution. Water has long since stopped flowing through El Gigante. The abundant "potholes" still visible in parts of the floor are geological features. These were previously identified as looters pits. While it is true that the sediments that had accumulated in them has been disturbed, their recognition as geological features is key to our interpretation. Perhaps as long ago as the Pliocene, two watercourses directly adjacent to the cave that may have been responsible for carving out the original form of the shelter, have since split or changed course. At this time exogenous volcanic inputs (the white tephras discussed above) became the dominant force in the evolution of the shelters sediments, until the Middle to Late Pleistocene. Throughout the Holocene the shelters formation was influenced by anthropomorphic inputs and very slow colluvial erosion from the roof and walls of the shelter itself.

A grain size distribution analysis may be able to wrest paleoenvironmental information from these colluvial processes. In the Perigord of France, Henri LaVille (1980) has shown that glacial and interglacial times can be reconstructed on the basis of a quantification of clast size and frequency. If we assume that the erosion is correlated to periods of higher humidity a similar analysis may be possible at El Gigante. Initial evaluation of the grain size histograms do not reveal any patterns that we feel comfortable interpreting as due to changes in climate. However, some of the sedimentary particle distributions may be indicative of the intensity of human use of the shelter. More work is needed to sort out various confounding variables with column sample variations (volume and time-span).

Appendix III: Notes on Archaeological Conservation

A further aim of the Proyecto El Gigante was to assess and address the continued destruction of the irreplaceable archaeological resources of the La Estanzuela Valley. Addressing this issue proved to be difficult, the site remains vulnerable to the actions of looting and vandalism.

Cuevas have a strong presence in the minds of most local people. Conversations with many local residents invariably turned to my business in the area and that I worked in the caves of the area. Many responded with stories of Spanish *plata* associated with mysterious circumstances or dreams, and wondered whether I was scared to spend so much time in them. The cave’s place in folk myth (as a source of hidden treasure) unfortunately contributes to the difficulty in protecting the archaeological resources of El Gigante and other sites.

The continuance of this research depends on the education of the community of La Estanzuela and the citizens of Marcala. Stewardship of this world-class archaeological resource can not be imposed from the outside, and is currently lacking. The information that we scientists derive from archaeological sites must be disseminated to the public, and its value made clear if we are to hope that these resources will be preserved. If a proposed "Parque Nacional de El Gigante" is to become a reality, a workable "management plan" for the valley must be implemented. There is significant local interest in seeing this dream come true, including support from the Marcala Rotary Club and U.S. Peace Corps volunteers stationed in Marcala. Toward this end future field work should include village meetings to discuss "the plan" and perhaps lectures at the high-schools in Marcala.

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Figure 5. Projectile points recovered from secure contexts.

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