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INTRODUCTION

Can the nature and type of Huari imperial presence on the south coast of Peru be documented as Lumbreras (1960) and Menzel (1964) suggested many years ago? These scholars considered Huari to be an expansive state that grew rapidly into an empire (A.D. 650-1000), expanding militaristically towards the south coast early in its history as documented in the appearance of Huari ceramic styles at sites in the area between Cañete and Acarí (Menzel 1971; Menzel *et al.* 1964).

Another plausible scenario is that the south coast was part of a greater Ayacucho polity that included contact between coastal Nasca and highland Huarpa peoples of the Early Intermediate Period with movement between distinct altitudinal zones for needed goods, resources, and exotica in an arrangement like those postulated by John V. Murra in his reconstruction of Andean vertical control of the largest possible number of economically productive ecozones (Murra 1975:59-115). The lower portions of the Ica Valley reveal evidence of horizontal contact with areas to the north and south as well, thus adhering more closely to trade networks such as those reconstructed by Rostworowski (1970). Much as Ayacucho populations interacted with the tropical lowlands, they also were in contact with the coastal *yunga* or warm valleys (*sensu* Pulgar Vidal 1946:63-82) where littoral resources could be obtained. Seasonal alternation between the highlands and coast may have provided additional resources.

A drought apparently affected much of the highlands in the late sixth century A.D. Can this climatic perturbation explain settlement pattern shifts on the coast and the appearance of early Huari settlements in the Ica Valley? Though we have yet to determine which model best fits the complex relations between Ayacucho and Ica, we offer evidence that the south coast drought hypothesis is worth further consideration.

Pedestrian surveys of south coast valleys provide one measure of the strength and estimated duration of highland presence or influence in the region. If highland drought conditions affected coastal settlements, then these effects should be detected in settlement pattern changes, as well as in resource availability. In the Ica Valley, the appearance of Huari-related assemblages correlates with a pronounced reduction in the number of sites in the lower valley. Comparison between the botanical remains at sites that pre- and post-date the initial presence of Huari-related assemblages should provide evidence of drought in the region. If Huari presence on the coast was a result of highland environmental disturbances, such as drought, then the settlement reorganization (visible in settlement changes between Nasca Phases 7 and the subsequent Middle Horizon) can in part be explained by people moving to the coast. Such population displacements could have been seasonal or for longer periods, perhaps involving small colonies that may have lasted only a few generations, until the drought had subsided. Our study explores these questions. Prolonged settlement, rather than short visits or seasonal movements, has potential cultural ramifica-

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tions that may help explain the massive changes that brought on the Huari empire. The cultural benefits of these developments merit future discussion but are beyond the scope of this paper.

Cook (1994) conducted a large-scale pedestrian settlement survey in the Lower Ica Valley (Figure 1), followed by small-scale excavations at the late Nasca and early Middle Horizon (Nasca Phases 7, 8, and 9) site of Casa Vieja, a site identified during the survey. The project began in 1988 as a regional survey project with the goal of completing valley-wide site reconnaissance that had been initiated by the Instituto Nacional de Cultura (Williams and Pazos 1975). The goals included tracing evidence of imperial Huari expansion on the coast while simultaneously recording cycles of political and economic complexity in the valley over time (Cook 1989a, 1989b, 1990a, 1990b, 1990c, 1991, 1992a, 1992b, 1994, 1999; De Leonardis 1991, 1997, 2000). The specific objective of this project was to examine the nature and extent of sites dating between the late Early Intermediate Period and the Middle Horizon (ca A.D. 500-750), to clarify whether they were local settlements or potential Huari colonies.

If Huari achieved imperial status and, in fact, colonized or conquered the south coast (*e.g.*, Menzel 1964, 1968), an interpretation shared by those who have worked in the Ayacucho region, when, and under what conditions will material remains document the nature and type of infiltration? What circumstances led highland occupants to mobilize and settle on the south central coast? Based on the results of our settlement survey in the Ica Valley, it is clear that the process took place over several centuries and that conquest may not be the appropriate model. For example, immediately prior to the appearance of Huari-related assemblages there, the south central coast had different patterns of interaction with the Ayacucho area than it did after Huari presence was established.

In the Ica Valley, known archaeological sites increase in frequency just prior to the Huari expansion there. Beginning with Nasca Phase 5 and continuing in Nasca Phase 7, a greater number of large villages and towns appear in the archaeological record, compared with earlier phases. This reorganization of settlement pattern, with larger, architecturally differentiated, sites suggests greater centralization during Late Nasca times (Phases 6 and 7).

To the south, in the Nasca drainage, Silverman (1993a: figure 23-9) initially reported that no Nasca 7 phase habitations existed in the Ingenio River Valley. Recently, Silverman (2002:132) recognized that there were a few Nasca 7 habitation sites included in her Ingenio Valley survey. There is little doubt that there was a sparse Nasca 7 occupation in Ingenio which suggests that people from that area may have migrated north to Ica and to highland areas in what is now the Deprtment of Ayacucho.

Additional evidence is provided by Schreiber and Lancho (2003:17, 146-148) for the southern Nasca drainages (Aja, Tierras Blancas, Taruga, and Las Trancas). There they report settlement reorganization during Nasca 7 characterized by fewer, but larger, sites including villages and towns. In Ica there is a similar trend towards a few larger and more complex sites during Phase 7, but unlike its neighbors to the south, Ica shows a visible increase in site frequency.

Ceramics at some of the larger sites in the lower Ica Valley with early Middle Horizon occupations also contain Nasca 7 materials. This suggests that a number of Late Nasca sites continued to be occupied in the early Middle Horizon. These formed part of a new settlement configuration under Huari influence.

Casa Vieja (D-7 in our settlement survey) is about 50 kms inland from the Pacific Coast. Excavations there were directed toward answering questions regarding activities and length of occupation of a site that dates to this critical time period. We gave special attention to local resource availability and how fluctuating amounts of water would affect such availability. Where would agriculture have been conducted, and what cultigens and industrial plants (*sensu* Moseley 1975:55) were grown or collected by the inhabitants of Casa Vieja? Could recently discussed drought events be identified in the archaeological remains? With these questions in mind, we

carefully designed a bulk soil-sample collection strategy and made every effort to retrieve floral and faunal remains. This paper presents the methodology and results of our archaeobotanical analysis, suggests future work on floral remains, and outlines implications for understanding local settlements during the end of the Early Intermediate Period and the beginning of the Middle Horizon. We will present the ceramic, faunal, and other relevant analyses elsewhere.

HISTORY OF INVESTIGATIONS IN THE ICA VALLEY

Ica has been regarded as a valley snuggled between two important areas: the Paracas Peninsula to its immediate north, where Paracas society has been studied with great intensity; and the Río Grande de Nasca to the south (see Figure 1), where Nasca society flourished. One consequence is that Ica is often regarded as an area that received foreign religious and political influences during its long history, so it has not been studied in its own right. We know the most about Ica chronology during the Early and Late Horizons (900 BC to 200 B.C. and A.D. 1476 to 1533 respectively). The Late Horizon is the protohistoric period when large multi-valley independent polities emerged on the south coast. Political complexity is poorly known for earlier periods in Ica, contributing to the peripheral role previously attributed to the area.

The Inca were the last prehistoric invaders of the Ica Valley, and the history of their conquest reveals insights into the historical trajectory of the valley's population (Menzel 1959, 1976; Morris and Von Hagen 1993:163-169; Rostworowski 1970). About 700 years earlier, the highland Huari state had also expanded to include the Ica Valley and adjacent coastal regions. These foreign conquests contrast with the lesser-known indigenous developments that were of equal, if not greater, importance to our overall understanding of Andean civilization (Kroeber and Strong 1924).

The lower Ica Valley received sporadic attention prior to 1960 (Engel 1957a, 1957b; Strong 1957). Next came a period of focused chronological studies that resulted in a temporal framework for the area and placed the Ica Valley on the archaeological map of Peru. These studies included ceramic seriations of several broad time periods in the Ica Valley that provide the chronological backbone of the Central Andean period and horizon scheme still in use today (Lyon 1966; Massey 1986; Menzel 1964, 1968, 1976; Menzel *et al.* 1964; Paulsen 1983; Proulx 1968; Rowe 1956, 1960, 1962; Wallace 1962). Between the 1960s and mid 1980s, the few investigations conducted in the valley (*e.g.*, Pezzia 1969; Rowe 1962) include Williams and Pazos's (1974) valuable site survey of the upper and middle Ica Valley. Although work proceeded on the south coast (Browne 1992; Browne and Baraybar 1988; Carmichael 1991; Massey 1986; Pezzia 1969; Robinson 1957; Silverman 1988, 1992, 1993a, 1993b; Wallace 1971), it was the Shining Path guerrilla action in Ayacucho that was most responsible for drawing scholars to this coastal region (*e.g.*, Anders 1990; Clarkson 1990; De Leonardis 1991, 1997, 2000; Schreiber 1999; Schreiber and Lancho 1995). As a consequence, new avenues of research were initiated including investigation of the vestiges of Huari presence in the area.

Interpretations regarding the expansion of the Huari Empire rely heavily on architectural and ceramic style distributions. The evolution of highland Huari architecture occurred in several phases that culminated in the repeated use of a basic orthogonal unit composed of a patio and lateral galleries. This pattern has come to be recognized as characteristic of highland imperial Huari architecture (Isbell and McEwan 1991; Schreiber 1992). Other recent studies (Isbell *et al.* 1991; Cook 2001; Meddens and Cook 2001; Williams and Pazos 1974) indicate that a round building with a flat side, the D-shaped structure, can be added to the inventory of classic Huari architecture. Neither orthagonal units nor D-shaped structures are found with any frequency on the coast with the exception of the patio and gallery compound at Pataraya, a site in the upper Taruga identified by Schreiber (1999), and the suspiciously round structure situated at the center of Huaca del Loro (Paulsen 1983: figure 2).

Although there is no single interpretation that can account for the standardization in architectural

form, the range of activities carried out at provincial Huari sites, or the precise nature of their relationship to the urban capital of Huari, scholars who have worked at Huari sites present a variety of perspectives that have resulted in two prevailing views. One interpretation, shared by a majority of these scholars, is that Huari functioned as the administrative hub of an expansive state or empire with decision-making policies being handled by a centralized bureaucracy (Isbell and Schreiber 1987; Isbell and McEwan 1991; Schreiber 1992; Williams 2001; Williams and Nash 2002; Williams *et al.* 2000). A few researchers (Anders 1986; Shady 1989; Shea 1969) view the Huari phenomenon as a number of independent polities that were only loosely connected through trade, ceremony, and feasting activities, or as a series of hierarchically organized oracles. Authors of these opposing views have not reconciled their differences. Disagreement is most pronounced in arguments that articulate the nature and kind of control Huari may have exerted over foreign populations and the extent of its territorial domination. Ironically, even those who strongly oppose centralized administration believe that the south coast came under some form of direct Huari control, despite the fact that data to support this view are still largely absent.

Menzel (1964:25-26) offered a formidable analysis of Middle Horizon ceramic phases, and she noted that only a few examples of Nasca Phase 9 (equivalent to Middle Horizon Epoch 1) ceramics are known from the Ica Valley. Cook's (1994) site survey identified sites with Epoch 1 pottery, but their chronological placement is made difficult by the mixture of ceramic styles that co-occur on site surfaces. More sites need to be excavated to resolve some of these issues.

THE SITE OF CASA VIEJA

Surface remains recovered at Casa Vieja (D-7) during settlement survey in 1988 date to the end of the Early Intermediate Period and the beginning of the Middle Horizon. In 1995, Cook directed excavations at this site, located on the eastern bank of the Ica River in the Callango region of the lower Ica valley. Although the site map (Figure 2) includes approximately 21 hectares, the main portion of the site is restricted to a 9-hectare zone. The outlined area near the center of Figure 2 defines the sectors in which we focused our field work.

First we conducted a systematic surface collection and selected five zones for excavation (A, B, C, D, and E; see Figure 2). We have 134 excavated loci from these zones. Zones A and D are excavation units in areas outside of visible surface architecture, where we hoped to locate good stratigraphy, while Zones B and E contain cylindrical pits dug into the bedrock. Such pits are found in several areas of the site. The deposits in Zones B and E were excavated to assess their contents and determine the possible prehistoric function of the pits. We intentionally placed Zone C, the largest open area excavated, in an area with visible surface *quincha* (wattle and daub) architecture.

Zone A, a 2 x 4 m unit, was situated in a natural depression where considerable sand had accumulated. We used this unit as a stratigraphic control, and to examine the use of space where we found few ceramics and no evidence of architecture on the surface. Zone C excavations (4 x 6 m) include part of the exterior and interior of a *quincha* structure and provide information on the form and use of domestic space (see Figure 3). In Zone D, we placed a 2 x 2 m unit at the summit of a low natural mound where we observed the highest surface artifact densities, in order to determine the activities associated with this part of the site. Small circular pits cut into the desert pavement abound at the site, and we excavated three in Zones B and E to assess their function. Both zones are located near the domestic structure in Zone C.

Our research has identified the presence of both ceramic and lithic production at the site and recognized that *quincha* was the principal form of architecture at Casa Vieja. We found only a few loose adobes, in the west profile of Zone A excavations in the lowest portion of the site. Perhaps these had been removed from their original context, or they may be the remains of a building foundation adjacent to our excavations. Excavations in three cylindrical pits were inconclusive. However, the employment of these pits as storage bins is supported

by modern use in Callango of similar, rectangular subterranean pits for keeping seed.

With respect to local plant resources (Table 1), contingent as they are on water availability, the excavations provided some insights into the chronological assignment of the site and the subsistence strategies employed by its residents. For instance, in Zone C excavations we encountered dense, excellently preserved refuse with remains of a wide variety of cultivated plants (see Appendix), large quantities of camelid excrement, but few malacological remains.

ARCHAEOBOTANY AT CASA VIEJA

Methodological Issues

The desert environment of the early Middle Horizon site of Casa Vieja offers excellent preservation conditions and presents an unusual case study. Most archaeobotanical research concentrates on highland or tropical lowland regions and usually focuses on very early time periods. Less information is available for the coast of Peru where organic materials are found in large quantities and in good condition**.** In this paper, we use archaeobotanical analysis at the early Middle Horizon site of Casa Vieja to evaluate the possible impact of highland drought conditions on the south coast at the onset of the Middle Horizon. To accomplish this objective, we collected archaeobotanical samples during the excavations. We examined the identifiable plants, their densities, and the changes that can be detected in distinct cultural contexts. Are there changes that suggest an increase or decrease in the availability of water?

We designed our collection strategy not only to address the botanical material (Hastorf and Popper 1988; Lennstrom and Hastorf 1995; Pearsall 1989) expected to be so well preserved at the site, but also to study the value of flotation at arid coastal sites. Christine Hastorf helped us devise a soil sampling strategy to permit examination of the botanical remains and compare dry screening with flotation results (Cook *et al.* n.d.). In the field at Casa Vieja, we collected a five-liter bulk soil sample from every locus excavated. Of the bulk sample, two liters were carefully dry-screened, two liters were floated, and one liter was retained for future study. Flotation of the two-liter samples was conducted manually using a large barrel of water and a sieve. Botanical remains were skimmed from the surface of the water using a hand sieve covered with a nylon stocking with a mesh size of less than 0.25 mm to ensure collection of even the smallest floating remains. Heavy fractions were turned out onto newspaper and allowed to dry. Once dry, the heavy fraction was passed through nested sieves measuring 6.3 mm, 1.7 mm, 0.42 mm, and 0.25 mm, and placed separately in plastic bags. Light fractions were also allowed to dry overnight and then stored in plastic bags. The combined material recovered from flotation and dry screening of 36 selected loci was carefully sorted for botanical remains, using a low power binocular microscope (6x-40x). Densities were calculated using the total number of seeds (or, in some cases such as cotton, other plant parts) divided by the total number of liters of soil processed.

The analysis presented here is confined to the bulk soil samples that were systematically collected from each of the excavated loci. Given the remarkable preservation at the site, we also have the macrobotanical remains collected from the rest of the screened soil from each excavated locus. José Roque (1999) identified the macrobotanical material recovered in our screens as part of a larger study that included establishing a modern comparative floral collection of the Ica Valley (Roque *et al.* 2003).

Archaeobotanical analysis. One goal of the analysis was to gain insight into the foodways at Casa Vieja (Parrish 2003). Food plants identified include corn, squash/pumpkin, jack beans, lima beans, common beans, *achita* (*Amaranthus spp.*), pacay (*Inga* sp.), chili peppers (*Capsicum sp.* or *ají* in Peruvian Spanish), *tomatillos* or wild tomato (*Lycopersicon sp.*), peanuts (*Arachis hypogaea*) and potato (*Solanum spp.*) (Table 1; Soukup 1970:18; Appendix; see also Roque Gamarra 1999). In addition, some common industrial plants were identified such as *huarango* (*Prosopis sp.*, also called *algarrobo*), present as both seeds and wood, cottonseeds (*Gossypium barbadense*). Textiles were recovered during excavation, as well as maté, or bottle gourd (*Lagenaria sicerraria*), rind and seeds. Coca (*Erythroxylum coca*) was also present in six

samples (Appendix). Finally, several small herbaceous weed seeds including species of purslane, vetch, rush, and members of the grass family were also identified. Figure 4 shows the density of plant remains by use category from the three major contexts sampled. Surprisingly, no fish scales or bones, and only small quantities of bivalve or other shellfish were recovered from the processed bulk soil samples and from excavation. The vertebrate faunal assemblage, which is not yet fully analyzed, is also rather small and consists mostly of llama bones and possible sea birds.

Is this assemblage representative of "normal" food patterns in the Middle Horizon of the south coast? Little is known about the early Middle Horizon foodways from that region, so it is difficult to say if our assemblage provides a complete picture. We do know that Nasca cultures depended much more on cultivated plant foods than on maritime resources. However, sites that date to both the Early Horizon and the Late Intermediate Period have abundant shellfish remains on their surfaces, indicating that these resources were exploited to some degree, and suggesting some other explanation for the paucity of shell at Casa Vieja.

Given the scarcity of littoral remains, we turn to the botanical data recovered in an effort to understand patterns of food consumption. In her often cited work on a Nasca Phase 7 habitation site (PV62-70) in the upper Ica Valley near the San José de Cordero hacienda in the Pampa de Tinguiña, Dorothy Menzel (1971:90) suggests that changes in plant remains over time reflect changes in water supply at the site. In fact, her brief, but important, observations suggest that early Phase 7 must have been a relatively wet period. Nasca Phase 7 sites are situated in alluvial fans where no previous or later occupations are found (*Ibid.*:86-90). New sites were being established during Nasca 7 times even in areas that may have been exposed to flash flood risks. Menzel's Upper Ica Valley excavations led to one of the earliest archaeobotanical statements for the south coast. She worked with botanist Dr. Octavio Velarde Núñez of San Marcos University who identified various species of beans, several varieties of maize, some *ají* specimens, and small amounts of peanuts and squash from the lowest strata at PV62-70. In the upper strata, the amount of maize drops off, *ají*, is absent, and beans virtually disappear. However, squash seeds increase significantly. While maize, beans, and squash all require water in comparable amounts, squash has a much shorter growing period and so requires less total water to reach maturity. Menzel (*Ibid.*) and Velarde interpret the relative decrease in maize and beans, and increase in squash, as the result of lowered water availability during the occupation of the upper levels, towards the end of Nasca Phase 7. Ceramic evidence indicates that these upper levels at PV62-70 most likely immediately predate the occupation of Casa Vieja, so we hoped to find evidence of a similar pattern in water availability at the latter site.

CONTEXTUAL ANALYSIS

The midden excavated as Zone D (see Figure 2) provides a good context for investigating what the occupants of Casa Vieja ate. We only excavated this area to within 50 cm of sterile soil, because time constraints prevented completion of the unit. We analyzed several levels of the midden to look for changes over time. The midden yielded very dense botanical remains, but less taxonomic diversity than anticipated (Figures 4, 5, and 6, Appendix). As mentioned above, only 10 edible taxa were identified, indicating a rather restricted diet consisting mostly of maize, beans, and amaranth (both relatively high in protein), and squash, with little evidence of fruit or meat to supplement these staples.

Changes in the density of the plant food remains indicate some fluctuation in deposition over time (see Figures 5 and 6). Level 1 and Level 9 (the deepest level excavated) had the lowest density of plant remains per liter of soil. Level 9 had 341.75 seeds/liter and is dominated by maize (139/liter). Amaranth and *ají* are among the top food plants recovered from this level, which contained only eight squash seeds and one bean. A surprising amount of *tomatillo* (N=129) was recovered from this layer - the densest concentration of this taxon on the site (32.25/liter). *Huarango* seeds and cottonseeds are also present in notable quantities (*huarango* N=202, cotton N=53).

The change in density of four significant food plants was traced though time in the midden deposits (see Figure 6). These four taxa, squash, maize, *ají*, and beans, were ubiquitous in all of the samples analyzed, but their density per liter changed through time. The list of most abundant taxa in Level 8 mirrors that of Level 9, but the density of seeds per liter increases for all taxa from 341.75/liter in Level 9 to 451.25/liter in Level 8. Most notably, squash and beans increase in density (from 2.0/L and 0.25/L in Level 9 to 7/L and 2/L in Level 8) while maize stays relatively consistent with Level 9. By Level 6 the pattern seems to reverse slightly. Again, squash and beans move together, this time decreasing significantly in density (to 5/L of squash and 0.5/L of beans in Level 6, while maize and *ají*, each more than double (from 143/L and 37/L in Level 8 to 440/L and 114/L in Level 6). Level 5 vacillates back again with a drop in maize and *ají*, (to 215/L and 59/L) and a small increase in squash and beans (to 7/l and 1/L). Level 1, just below the surface, has little botanical material (107.75/L N=4), probably due to exposure and wind erosion. This pattern is not consistent with the plant remains interpreted by Menzel (1971), who noted that the presence, or increase in the presence, of squash and an accompanying decrease in maize and beans may indicate a decrease in water availability. The drought believed by Menzel to have occurred at the end of the sixth century A.D. does not appear to have been as severe a problem for the occupants of Casa Vieja as it was at the site she investigated. At Casa Vieja, squash and beans appear to fluctuate together and in inverse proportion to maize and *ají*,. Enough water was available during the entire occupation of the site to grow the four major food crops continuously, if in varying quantities over the years.

We also studied macrobotanical remains to clarify use of space at Casa Vieja. In addition to Zone D, for this purpose we analyzed excavated materials from Zone A, an open area with a prepared work surface interpreted to be close to a ceramic production/activity area, and from Zone C, an area with architectural features (see Figure 2). Zone A consists of two 2x2-m units. In the southern 2x2-m unit we found a large, hard, prepared surface made mostly of clay. This zone is located in an open low-lying area of the site with no evidence of architecture found during excavation. Unfired sherds and other artifacts associated with ceramic production were recovered from this excavation. Botanical material was widely dispersed across the southern half of the zone and its distribution is likely to be the result of wind activity. We recovered few remains representing a limited number of taxa from this area. Thus, the macrobotanical remains support the interpretation of Zone A as a specialized activity area, and not an area for food storage, preparation, or serving.

Zone C is more complex stratigraphically (Figure 3). We found evidence of at least three *quincha* walls, as well as a prepared hard clay foundation trench for the construction of the walls. Also, we encountered a prepared hard surface or *apisonado* along the southwestern portion of the zone. This surface appears to be enclosed by a curving *quincha* wall. Only 37 seeds were recovered from this southwestern portion, compared to over 150 in any other context in this area, and as many as 1551 in the densest part of the zone. This surface may be clean of food remains for one of several reasons. First, it may have been an interior occupation surface where food production and other plant-related activities did not take place. Conversely, the surface may have been swept clean regularly by the inhabitants of Casa Vieja specifically because it *was* used for food preparation. Finally, it may have been kept clean because other activities carried out on the surface required it to be clean.

Likewise, the northern third of the unit, which is separated from the rest of the unit by an E/W wall, and the loci on the east side of the main N/S wall have very little botanical material. These areas may have less botanical material than other loci because of the prehistoric use of the space, or because of post-occupational exposure to wind and elements, which may have "swept" these areas clean. One exception is locus 68, which comes from the area identified as a prepared foundation trench for the E/W wall and contains unusually large amounts of botanical material relative to most of the other loci in the unit. These materials are associated with the *quincha* wall and wall debris. It is probable that the botanical materials were caught and preserved in the

quincha as a result of wind blowing across the land surface.

The main activity area identified in Zone C is in the west central portion of the zone, outside of the curved wall enclosing the occupation surface, and west of the main N/S wall (see Figure 3). This activity area consists of a pit, and an ashy layer adjacent to it, as well as the space around these two features. It is not surprising that relatively large amounts of charred and uncharred dung and *huarango* seeds were recovered from this burnt area because they are all common fuel sources. Food remains were found only in very small amounts, although six of the 10 edible taxa identified site-wide were found here, including (in order of abundance) *ají*,, squash, amaranth, *tomatillo*, maize, and lima beans. Most of the food remains were recovered from the area surrounding a narrow cylindrical pit and from the ash layer. While the pit may have been in use during the site's occupation, evidence for rodent activity discovered during excavation suggests these densities may result from post-depositional processes.

CONCLUSIONS

The archaeobotanical evidence from the large village site of Casa Vieja offers two important insights into archaeology and life on the coast at the end of the Early Intermediate Period or Late Nasca (ca. A.D. 500 to 650, Nasca Phases 6 and 7) and Middle Horizon 1 (ca. A.D. 650 to 800, Nasca Phases 8 and 9): 1) archaeobotanical studies support site use interpretations and help define activity areas as well as indicate what foods were being consumed; and 2) the residents of Casa Vieja depended for food on a few locally grown crops which they were able to cultivate in their desert gardens.

The Casa Vieja archaeobotanical remains suggest that the major crops consumed at the site and by extension cultivated in the vicinity, most likely in the river bed adjacent to the site, were maize, *ají*,, beans, squash, and cotton. Additional collected plants growing in the area were amaranth, *tomatillo,* pacay, *huarango*, and gourds. Plant food remains were found only in negligible amounts in Zone A, supporting the interpretation of this area as an outdoor activity area. Likewise, the botanical remains from Zone C help to determine indoor and outdoor areas defined by the *quincha* walls in that zone. Finally, the plant distributions in the Zone D midden are our best measure of changes at the site over time. The clearest patterns are that maize and *ají*, change together through time, with an inverse relationship to beans and squash, and that all four of these major food crops are present in all levels examined from the midden.

Increases and decreases in the midden densities of maize/*ají*, and beans/squash are intriguing. The continued presence of these crops indicates that they were grown and consumed throughout the history of the site. Are the changes in density a result of changes in consumption and deposition patterns in this midden and consequently reflect behavior, are they the result of post-depositional processes, or do they suggest climatic fluctuations over time related to changes in water availability? The analysis is still in progress but there are some interesting comparisons that are worth noting.

The *quincha* architecture provided a calibrated date of A.D. 560-760 (1440±60 ^{14}C yrs B.P.). The calibrated dates for the site range between A.D. 550 and 885. Thus, the *quincha* architecture was constructed early in the site's history and the midden was used throughout the occupation of the site. The Quelccaya ice core record suggests that a severe drought occurred in the south central Andean highlands between A.D. 563 and 594 and again around 950 (Thompson *et al.* 1994:317-318; Shimada *et al.* 1991). The droughts clearly affected the coast, but have not been carefully studied there, in part for want of relevant data. Can the botanical results of our excavations from Casa Vieja shed any light on this problem? Can the data be used to compare and contrast the botanical records of the late Early Intermediate Period site of PV62-70 near San José de Cordero in the upper Ica Valley with the Middle Horizon 1 (A.D. 650-900) site of Casa Vieja? How do the observations Menzel made regarding increased drought conditions at PV62-70 correspond to local conditions in the lower Ica Valley a century or so later?

The scarcity of water interpreted from the botanical record in the upper levels at PV62-70 predates Casa Vieja by a short time. The presence of maize, *ají*, beans, and squash at Casa Vieja indicates there was sufficient water in the lower valley to carry out agriculture. If the drought postulated by Menzel affected the lower Ica Valley then the initial occupation of Casa Vieja coincides with a post-drought period. Cook's settlement survey found a drastic drop in the number and distribution of sites immediately after Nasca Phase 7, suggesting that settlement reorganization was a response to both the arrival of new highland migrants and improved subsistence opportunities as the drought subsided.

Finally, we compare Casa Vieja to other south coast sites from which archaeobotanical evidence has been recovered. Work at Cahuachi (Silverman 1993a; Valdez 1994a) in Nasca, and at Gentilar (Valdez 1994b) in the lower Acarí Valley, provides such evidence. Cahuachi dates to the Early, classic Nasca Phase 3, while Gentilar (Nasca Phases 6, 7, and 8 with most of the occupation falling in Nasca 7) and Casa Vieja (Nasca 7, 8, and 9) overlap in time, with Casa Vieja demonstrating a stronger Nasca Phase 8/9 presence than Gentilar. Gentilar lies a mere 17 km from the seashore and is described as a *conchal* or shell midden. In contrast, Casa Vieja is over 50 km from the mouth of the Ica river and has very low shell densities. Valdez indicates that peanut remains are more common than corncobs and all other vegetal remains at Gentilar. At Casa Vieja, peanut remains occur, but in low frequencies.

Casa Vieja and Gentilar have almost identical botanical profiles, but Gentilar lacks fruit altogether, while Casa Vieja has pacay. Frequency distributions for Gentilar plant remains have not been published but it is clear that subsistence at the site was more heavily dependent on marine resources than at Casa Vieja. Cahuachi has at least four fruit taxa so these were clearly available through exchange mechanisms in early Nasca times. Could climate have played a role in their decrease in late Nasca and in the early Middle Horizon? Here again further study is needed on the habitats and water needs of these fruits and the proximity of appropriate habitats to the sites mentioned above.

Valdez (1994b) argues that a drought in the Acarí Valley favored Gentilar's location close to the ocean. Casa Vieja, occupied just a short time later, was far less dependent on ocean resources. Overall, the available archaeobotanical data paint a similar picture for sites in arid coastal zones. The similarity of their agricultural bases suggests that drought conditions may have impacted this coastal region prior to the establishment of large villages at the onset of the Middle Horizon, with populations responding to climatic stress somewhat differently from valley to valley. The reorganization in settlements evident in the lower Ica Valley at the onset of the Middle Horizon supports the idea that even in the dry lower valley the inhabitants of large villages could successfully farm their desert gardens, and that drought was no longer a barrier to the establishment of new communities.

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Table 1: List of taxa recovered from flotation and dry screening, and relative presence of each taxon

Latin name	*Common name* English	Spanish	*Food*	*Industrial*	*Medicinal*	*Total raw count*[1]	*# loci where taxon present (n=34)*
Zea mays	Corn	Maíz	X			5,445	20
Prosopis sp.	Mesquite	Huarango, algarrobo		X		4,747	33
Capsicum spp.	Chili	Ají	X		X	1,917	30
Gossypium barbadense	Cotton	Algodón		X		1,471	27
Amaranthus spp.	Amaranthus	Kiwicha[2]	X			1,448	28
Astragalus spp.	Vetch	Garboncillo		X	X	277	23
Cucurbita maxima	Squash	Calabasa	X			218	25
Lycopersicon sp.	Wild tomato	Tomatillo selvático	X			121	15
Portulaca sp.	Purslane	Verdolaga				82	5
Scirpus spp.	Rush	Totora		X		55	16
Gynerium sagittatum	Cane	Caña brava		X		157 gm[3]	18
Lagearia siceraria	Bottle gourd	Mate		X		29	13
Erythroxylum coca	Coca	Coca			X	20	6
Inga Feuillei	Pacay	Pacay	X			11	3
Phaseolus vulgaris	Common bean	Frejól	X			10	9
Phaseolus lunatus	Lima bean	Pallar	X			10	9
Canavalia spp.	Jack bean	Pallar de los gentiles	X			10	9
Graminaceae	Grass family	Gramínea	X	X		10	5
Arachis hypogaea	Peanut	Maní	X			4	2
Solanum spp.	Potato	Papa	X			2	2

1. Total raw count of seeds and/or plants.
2. *Achita, cuipa* and *ataco* are other common Andean names for *Amaranthus* (Soukup 1970).
3. Recorded weight only.

Table 2. Chronology of proposed events

Central Highland and Coastal time periods	*Relative chronology* *Coastal Nasca*	*Highland Huarpa & Huari*	*Quelccaya Drought proxy record*	*Taxa densities upper Ica valley (Menzel 1971)*	*Taxa densities, lower Ica valley Casa Vieja lower Ica valley*	*Average radiocarbon dates, Casa Vieja*
Early Intermediate Period	Late Nasca Phases 6 and 7	Late - Huarpa	A.D. 563-594	*Wetter period, lower levels*: Beans, maize, *ají* and some squash		
Middle Horizon	Nasca 8	Huari Epoch 1		*Drier period, upper levels:* *Ají* and beans absent Maize drops off Squash seeds increase	*Lower levels:* Squash and beans increase in density, maize stays constant	Average radiocarbon dates for Casa Vieja: A.D. 550-885
	Nasca 9				*Middle levels:* Squash and beans decrease in density, and maize and beans double in density	
					Upper levels: Drop in maize and *ají* and small increase in squash and beans	

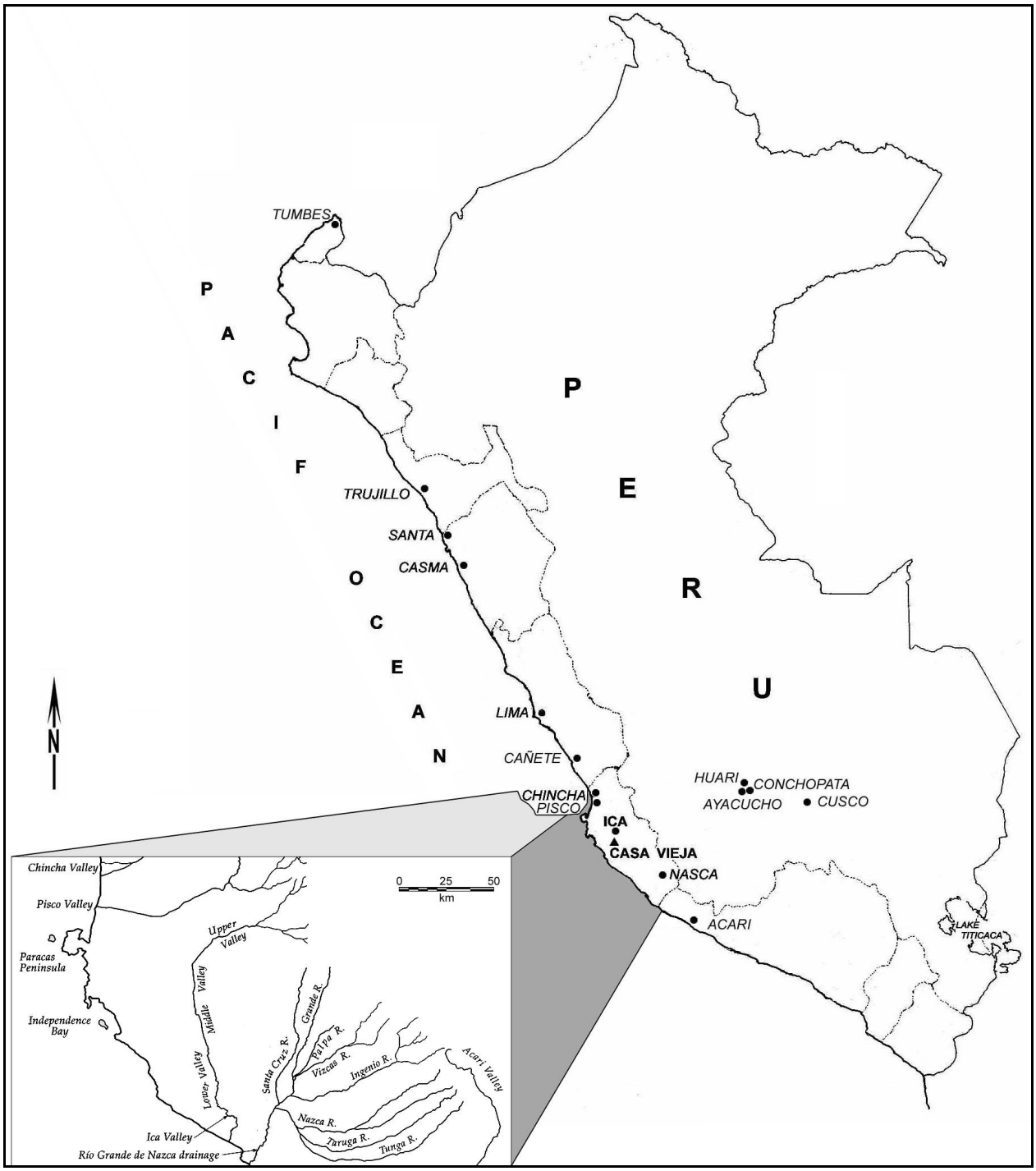

Figure 1. Map of Peru indicating the Ica Valley and Casa Vieja

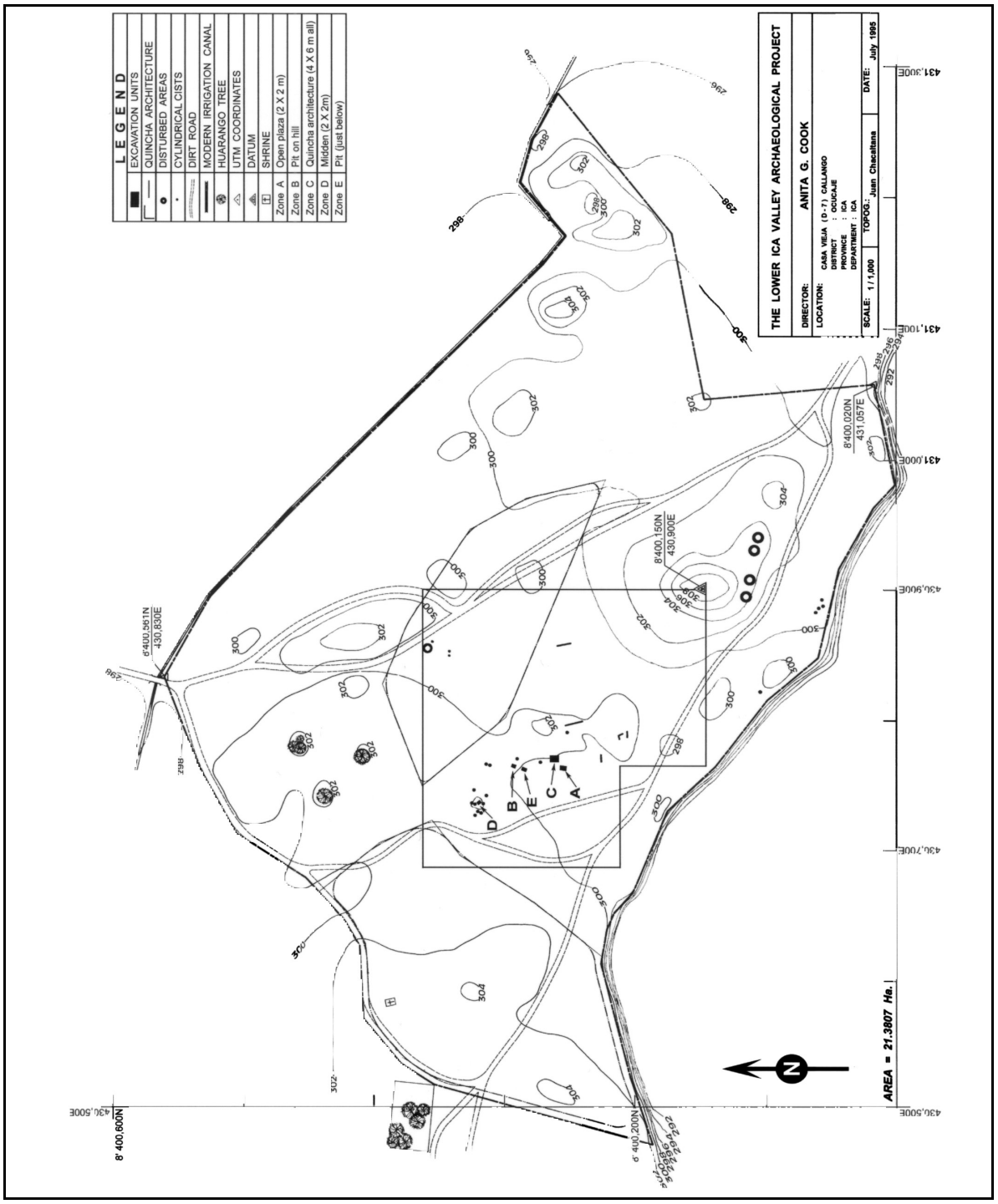

Figure 2. Map of excavation zones at Casa Vieja.

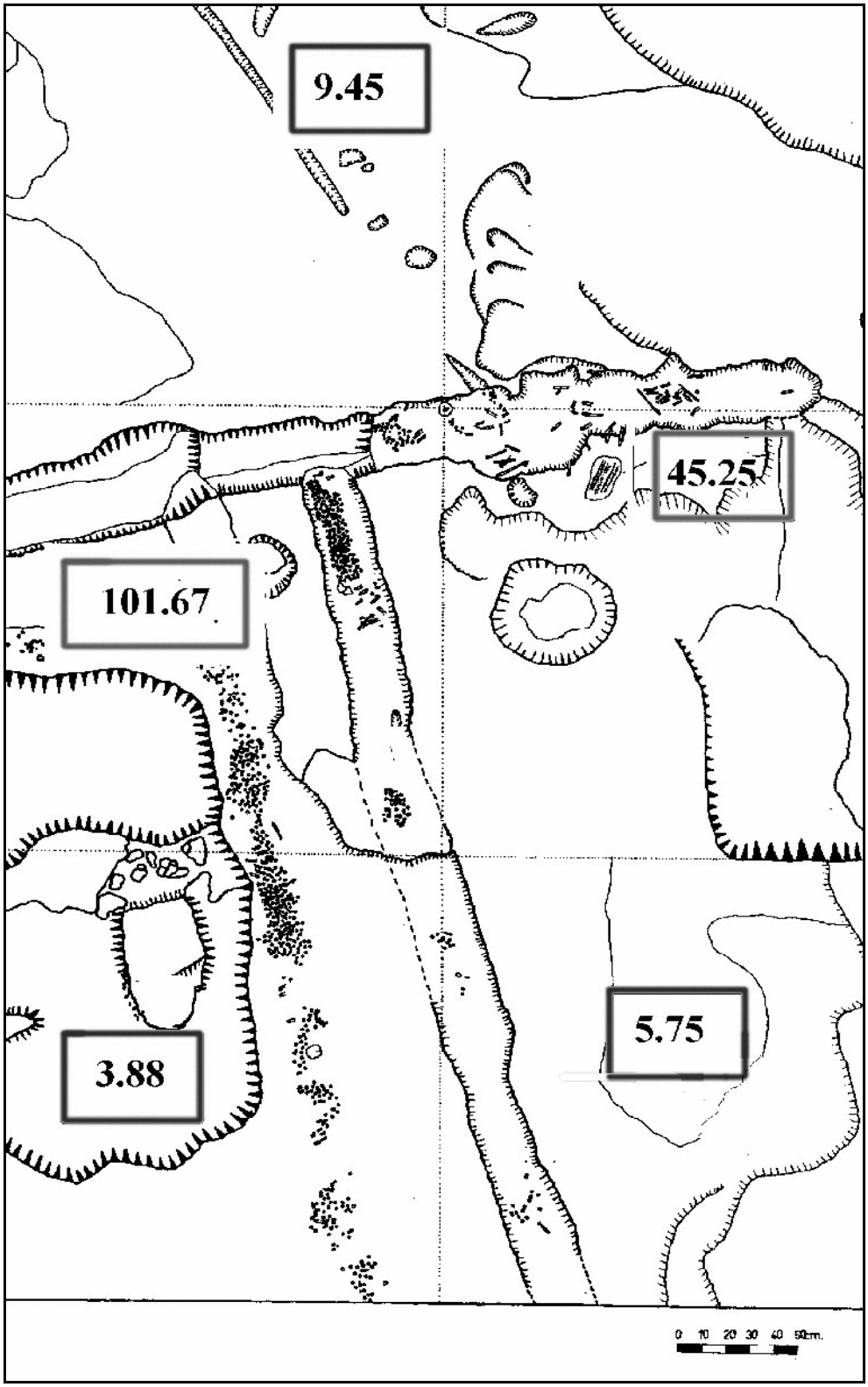

Figure 3. Map of Quincha architectural area in Zone C, indicating density of seeds per liter recovered in various localities. Dots and dashes represent individual quincha fragments. Map drawn by Guillermo Morón.

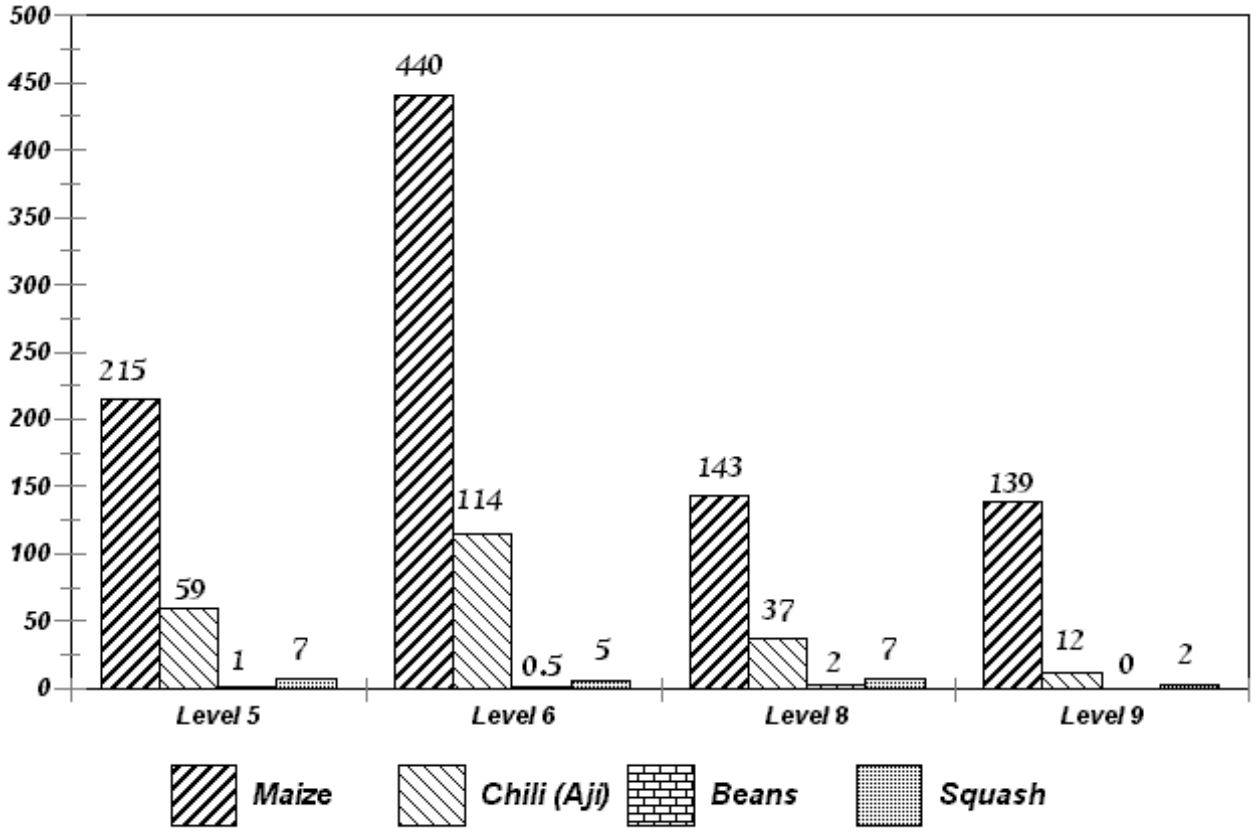

Figure 4. Density of seeds per liter of soil recovered from midden contexts in Zone D, displayed by level.

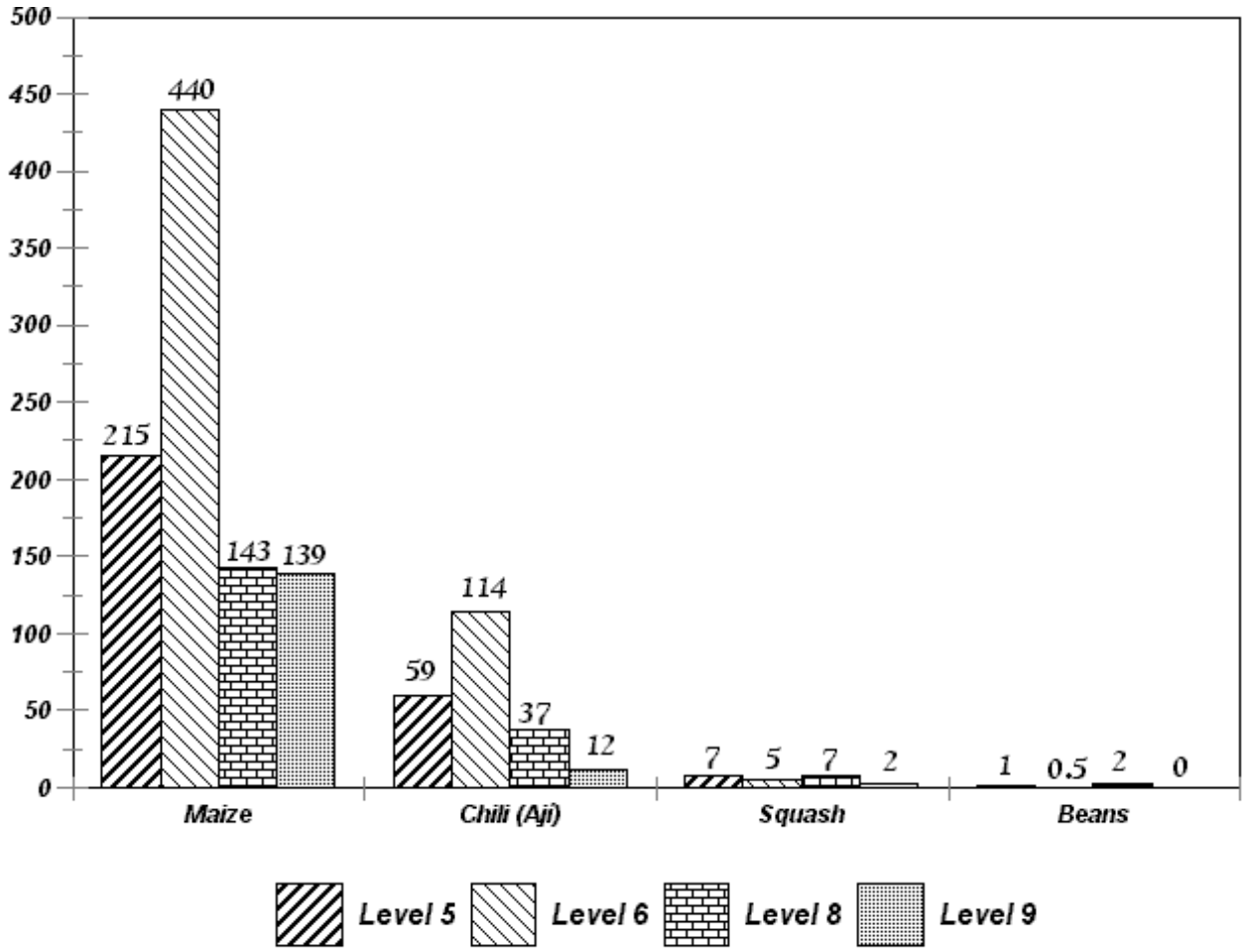

Figure 5. Density of seeds per liter recovered from midden contexts in Zone D, displayed by taxa.

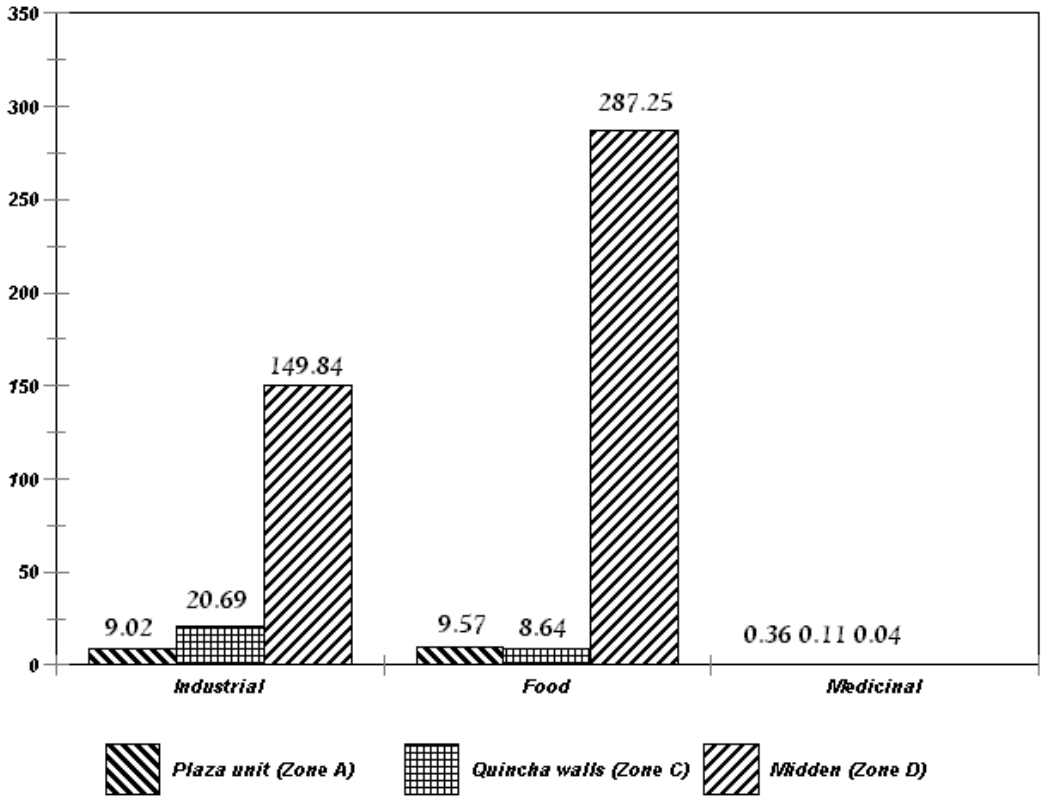

Figure 6. Density of plant types recovered from each excavation unit sampled.

Appendix: Raw counts of data collected from screen and flotation samples.

Locus Nº	Level	Zone - Area	Charred Wood (gm)	Uncharred Wood (gm)	Cane (gm)	Dung	Huarango Seeds	Huarango Pods	Chili (ají)	Cotton Seeds	Cotton Fluff
19	3	A - Plaza	3.6	0.3	7.6	4	38	-	78	37	2
12	2	A - Plaza	2.2	-	-	2	9	-	-	1	-
11	2	A - Plaza	8.0	0.6	-	3	34	-	17	3	-
30	3	A - Plaza	2.3	-	-	3	27	-	21	12	-
38	4	A - Plaza	0.1	-	0.1	1	2	-	5	10	-
10	2	A - Plaza	2.3	0.3	-	1	11	-	1	-	-
41	3	A - Plaza	1.8	-	-	-	24	2	16	27	-
101	3	C - Quincha	0.8	-	-	3	4	-	7	4	-
73	3	C - Quincha	18.3	1.7	4.4	88	161	1	82	44	-
75	3	C - Quincha	8.1	2.9	8.2	45	406	10	103	30	1
76	3	C - Quincha	9.8	56.7	3.0	78	127	-	50	26	1
83	5	C - Quincha	1.2	0.2	1.0	-	6	1	3	-	-
104	4	C - Quincha	3.5	0.1	-	22	25	-	26	7	-
93	4	C - Quincha	0.1	0.1	-	-	-	-	-	-	-
59	2	C - Quincha	3.5	0.4	0.7	2	13	-	3	-	-
63	2	C - Quincha	8.0	1.0	0.5	18	40	-	21	8	-
57	2	C - Quincha	0.6	2.4	-	5	13	-	4	14	1
58	3	C - Quincha	0.2	-	0.3	1	2	1	2	6	2
78	2	C - Quincha	0.2	-	0.2	-	1	-	-	-	-
55	2	C - Quincha	5.6	1.2	-	24	14	-	22	5	-
61	3	C - Quincha	0.7	-	-	6	3	-	1	-	-
68	2	C - Quincha	7.9	1.5	81.2	13	180	3	22	5	1
68	2	C - Quincha	4.5	0.7	2.8	5	54	-	27	11	-
118	4	C - Quincha	-	-	-	-	-	-	-	-	-
42	2	C - Quincha	1.3	0.2	-	13	8	-	8	2	-
52	2	C - Quincha	5.4	-	0.6	13	18	-	41	20	-
149	4	C - Quincha	0.8	1.0	0.1	10	17	-	20	4	1
72	1	D - Midden	34.6	12.2	-	235	190	20	68	69	2
103	5	D - Midden	35.5	24.3	13.8	146	565	30	331	304	4
119	5	D - Midden	35.5	24.3	13.8	120	197	30	142	116	3
123	6	D - Midden	83.4	38	18.2	107	673	57	454	361	3
132	8	D - Midden	38.2	8.8	0.8	17	206	33	247	157	1
131	9	D - Midden	10.6	5.5	-	42	1152	49	47	53	2
133	8	D - Midden	4.3	7.3	-	1	261	29	48	110	1

/....continued

Appendix: Raw counts of data collected from screen and flotation samples, continued.

Locus Nº	Level	Zone - Area	Maize Kernels/ Cupules	Maize Cobs	Amaran-thus	Potato	Vetch	Wild Tomato	Peanuts	Portulaca	Rush	Grass Family
19	3	A - Plaza	19	2	23	-	5	1	-	5	1	-
12	2	A - Plaza	-	-	-	-	-	-	-	-	1	-
11	2	A - Plaza	-	-	-	-	3	-	-	-	-	-
30	3	A - Plaza	24	1	5	-	-	-	-	-	1	-
38	4	A - Plaza	4	5	2	-	1	-	-	-	-	-
10	2	A - Plaza	-	-	9	-	-	-	-	-	-	-
41	3	A - Plaza	21	1	14	-	2	-	-	-	-	-
101	3	C - Quincha	5	1	3	-	-	1	-	-	-	-
73	3	C - Quincha	68	3	2	-	16	-	-	-	5	1
75	3	C - Quincha	-	-	13	-	14	4	-	1	2	-
76	3	C - Quincha	-	-	5	-	17	7	-	-	-	-
83	5	C - Quincha	1	-	3	-	-	-	-	-	-	-
104	4	C - Quincha	-	-	1	-	2	1	-	-	-	-
93	4	C - Quincha	-	-	-	-	-	-	-	-	2	-
59	2	C - Quincha	2	-	1	-	3	-	-	-	-	-
63	2	C - Quincha	18	-	4	-	5	1	-	-	-	3
57	2	C - Quincha	-	-	-	-	-	-	-	1	-	-
58	3	C - Quincha	-	-	2	-	-	-	-	-	-	-
78	2	C - Quincha	-	-	-	-	-	-	-	-	-	-
55	2	C - Quincha	13	-	14	-	8	-	-	-	2	-
61	3	C - Quincha	-	-	1	-	-	1	-	-	-	-
68	2	C - Quincha	7	-	8	-	1	6	-	-	2	-
68	2	C - Quincha	-	-	7	-	6	4	-	-	2	-
118	4	C - Quincha	-	-	-	-	-	-	-	-	-	-
42	2	C - Quincha	-	-	2	-	1	2	-	-	-	-
52	2	C - Quincha	1	2	19	-	1	3	-	-	-	-
149	4	C - Quincha	27	-	26	-	2	3	-	-	-	1
72	1	D - Midden	38	1	16	-	2	2	-	-	4	-
103	5	D - Midden	1155	4	134	-	19	-	1	-	4	-
119	5	D - Midden	561	2	92	1	9	-	-	-	2	-
123	6	D - Midden	1750	10	221	-	60	-	-	-	2	4
132	8	D - Midden	912	7	418	-	41	1	-	33	4	-
131	9	D - Midden	550	5	207	1	47	84	3	42	1	1
133	8	D - Midden	223	2	196	-	12	-	-	-	20	-

/... continued

Appendix: Raw counts of data collected from screen and flotation samples, continued.

Locus Nº	Level	Zone - Area	Coca	Squash	Gourd	Beans	Pacay	Unidentifiable	Unknown
19	3	A - Plaza	9	2	-	1	-	9	-
12	2	A - Plaza	-	-	-	-	-	-	-
11	2	A - Plaza	-	-	-	-	-	2	-
30	3	A - Plaza	-	6	3	-	-	2	1
38	4	A - Plaza	-	1	-	-	-	-	-
10	2	A - Plaza	-	-	-	-	-	-	-
41	3	A - Plaza	1	6	1	1	-	-	6
101	3	C - Quincha	-	7	-	-	-	2	-
73	3	C - Quincha	-	2	-	1	-	45	9
75	3	C - Quincha	2	11	1	-	-	4	-
76	3	C - Quincha	-	11	-	1	-	4	2
83	5	C - Quincha	-	1	-	-	-	-	-
104	4	C - Quincha	4	3	-	-	-	3	-
93	4	C - Quincha	-	-	-	-	-	-	-
59	2	C - Quincha	-	-	-	-	-	1	2
63	2	C - Quincha	-	4	-	-	-	5	3
57	2	C - Quincha	-	1	-	-	-	-	19
58	3	C - Quincha	-	-	1	-	-	-	-
78	2	C - Quincha	-	-	-	-	-	-	-
55	2	C - Quincha	-	2	-	-	-	-	1
61	3	C - Quincha	-	3	-	-	-	-	-
68	2	C - Quincha	3	6	3	-	-	2	6
68	2	C - Quincha	-	1	-	-	-	2	7
118	4	C - Quincha	-	-	-	-	-	-	-
42	2	C - Quincha	-	-	-	-	-	-	-
52	2	C - Quincha	-	1	1	-	-	2	3
149	4	C - Quincha	-	1	2	-	-	1	1
72	1	D - Midden	1	9	2	-	-	-	8
103	5	D - Midden	-	12	2	7	-	9	40
119	5	D - Midden	-	44	-	4	6	36	14
123	6	D - Midden	-	21	2	2	-	30	18
132	8	D - Midden	-	42	5	6	4	25	8
131	9	D - Midden	-	8	3	-	1	7	17
133	8	D - Midden	-	13	3	7	-	28	-