EARLY OCCUPATIONS AT GRAN PAJATEN, PERU

Warren B. Church
Yale University

Introduction

Since their accidental discovery more than 25 years ago by highland farmers from the rural village of Pataz, the ruins of Gran Pajatén have loomed large in the popular culture of Peru (Figure 1). Its remote montane rainforest setting, distinctive architectural style, and the lack of scientific knowledge regarding the site's antiquity, cultural affiliation, and function, have led many to think of Gran Pajatén as a quintessential "lost city". Several studies (*e.g.,* Bonavia 1968; Kauffmann D. 1983; Pimentel G. 1967; Rojas P. 1967) have attempted to establish the age of Gran Pajatén's constructions and to determine whether the site served as a funerary complex, ceremonial center, administrative center, or imperial colony devoted to intensive agriculture, yet there seem to be insufficient data from initial field investigations to allow a consensus on such issues. Rather than directly addressing problems surrounding Gran Pajatén's prehistoric function, this article advances an interpretation of chronological data recovered during archaeological investigations at Gran Pajatén in 1985 and 1986. Analysis of available evidence for the occupational history at Gran Pajatén constitutes a crucial initial step towards resolving persistent questions of site function.

In 1985, archaeologists of the University of Colorado and the Universidad Nacional de Trujillo, Peru initiated archaeological investigations at Gran Pajatén as part of a multidisciplinary research program in the Río Abiseo National Park. These investigations sought to clarify the dates of human occupation and to study changing economic adaptations and settlement patterns in one portion of the eastern Andean montane cloud-forest of Peru. Field studies in 1985 and 1986 attempted to document the antiquity of occupation in the park through test excavations at four archaeological sites within the Montecristo River Valley. The most useful data consist of ceramics and radiocarbon dates extracted from construction fill in the basal portion of Building Number 1 at Gran Pajatén (Church 1988, 1991). Field work in 1988 and 1990 at the site of Manachaqui Cave at the alpine grassland/montane forest ecotone revealed a longer and more complete occupational sequence (Lennon, Church, and Cornejo 1989; Church 1993), but analysis of the ceramics from these excavations is still in progress. Because the cave sequence will inevitably aid the cross-dating of ceramics from Gran Pajatén, the conclusions offered here should be considered preliminary and subject to revision.

Recent field work at Gran Pajatén was restricted to excavations in and around Buildings Numbers 1 and 2. Stratigraphic and radiocarbon evidence indicates that both were built during the Late Horizon (A.D. 1470-1532), or toward the end of the antecedent Late Intermediate Period (A.D. 900-1470). Excavations in Building Number 2 concentrated on horizontal exposures of the Late Horizon occupation floor, but those data will be reported elsewhere. A test trench dug to sterile soil within Building Number 1 yielded virtually all of the data pertinent to the pre-Inca occupation at Gran Pajatén presented here. Because these data were recovered from secondary deposits (construction fill), little information regarding the nature of the early societies at the site can be gleaned. However, radiocarbon dates and ceramic cross-dates indicate that Gran Pajatén was occupied by the end of the Early Horizon, much earlier in Andean prehistory than most scholars suspected. They also support a hypothesis of early long-distance exchange between the coast, highlands, and upper montane forest. Other lines of evidence suggest that such settlements were permanent.

Gran Pajatén: Geographical and Environmental Contexts

The Río Abiseo National Park was created in 1983, and it protects one of the last

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relatively pristine samples of high elevation Amazon forest, threatened and endangered animal species, and many archaeological sites including Los Pinchudos, La Playa, and Gran Pajatén (Leo L. 1992; Leo L. and Ortiz 1980). The Río Abiseo catchment, which delimits the National Park, contains 274,520 hectares of largely unexplored grasslands and rainforests, which include the Montecristo and Tumac tributaries to the north (Figures 2 and 3). After joining the Abiseo River, the combined waters flow east to join the Huayabamba River and, eventually, the Huallaga River. The Huallaga, and the Marañón River located west of the Park, are both north-flowing tributaries of the Amazon River. At an elevation of 2,850 m above mean sea level, Gran Pajatén crowns a crescent-shaped ridge on the south side of the Montecristo River Valley. Existing topographic maps only partially cover the upper Montecristo Valley where archaeological work has concentrated since 1985.

From their inception, scientific studies within the Río Abiseo watershed have utilized the Holdridge system (Holdridge 1947, 1967) as a basic scheme for approximating biogeographic divisions. Hartshorn provides a succinct introduction to the concept of Holdridge Life Zones:

> "Holdridge's classification system gives first importance to temperature and rainfall and the seasonal variation and distribution of these two climatic parameters as the primary determinants of the world vegetation . . . Each Holdridge Life Zone has a distinctive vegetation physiognomy and structure that occurs wherever similar bioclimatic conditions exist" (Hartshorn 1983:119).

Of course the Holdridge system is much more complex than the simplification offered by Hartshorn. In Peru, the Holdridge system has been employed to create ecological maps and delineate zones of potential land-use (Tosi 1960; Perú, ONERN 1976). Andeanists rarely utilize the Holdridge system (a notable exception is MacNeish *et al.* 1981), opting instead to apply traditional native taxonomies (*e.g.,* Masuda *et al.* 1985), schemes based on crop zones (*e.g.,* Brush 1977) or hybrids of native taxonomy and western terminology (Hastings 1985). Because the Río Abiseo National Park is virtually uninhabited today, information on the locations of prehispanic production zones cannot be inferred from modern land-use analogies. Implementing the Holdridge system as a heuristic device for this study obviates the dubious alternative of imposing native taxonomies utilized elsewhere in the Andes.

According to Ríos *et al.* (1982) and new information provided by Young (1990, 1993; Young and León 1988), at least seven Holdridge life zones situated between 500 and 4,200 m above mean sea level are vertically "stacked" within the estimated 70 kilometers that separate the eastern and western borders of the park. From an economic standpoint, this means that an unusual variety of resources and potential production zones were easily accessible to prehistoric inhabitants, many within a single day's walk. Gran Pajatén lies within the Tropical Montane Wet Forest zone or *Bosque muy Húmedo-Montano Tropical* (Perú, ONERN 1976) which, in the Río Abiseo Park, extends from around 2,600 to 2,900 m (Young, personal communication). Estimates of average annual temperature for this zone range from 6.5 to 10.9 degrees Celsius (ONERN 1976), and Young estimates average annual rainfall between 2,000 to 3,000 mm (Young 1993). While the region experiences an annual three to five month dry season, rain and fog are nearly a daily occurrence on the Huallaga side of the cordillera.

The terms *ceja de montaña* and *ceja de selva* are used synonymously to refer to the high altitude cloud-forests which cover the eastern flanks of the Andean cordillera. However, archaeologists employ both terms loosely to refer not only to the continuous montane forest, but to ecozones on both sides of timberline. For example, Izumi (1971) considers Kotosh in Huánuco a *ceja de montaña* site although it is located within a semi-arid rainshadow (Lower Montane Thorn Steppe zone) rather than in montane forest. The environmental contexts of some *ceja* sites discussed by Bonavia (1967-68), Bonavia and Ravines (1967), Isbell (1968), and Thompson (1976, 1984) might more appro-

priately be termed tropical alpine or subalpine life zones because they are above the continuous tropical montane forest. While Holdridge life zones are western scientific constructs which may not coincide with prehispanic production zones, they do correspond to gross biogeographic characteristics. It is important to distinguish precisely the environmental contexts of sites and site complexes because of the distinctive combinations of obstacles and opportunities for settlement and agriculture posed by conditions within each. For example, the site complexes documented in eastern Ayacucho by Bonavia (1964) and in the Uchucmarca area by Thompson (1976) and Vega O. (1982) lie above 3,400 m in the tropical alpine and subalpine zones[1] where conditions are most propitious for tuber cultivation. In the Río Abiseo Park, crop cultivation in the fog-bound uppermost continuous montane forest between 2,900 and 3,400 m would have been severely hindered by high humidity, frost, low light levels, and acidic soils with high aluminum content (Young, personal communication).[2] Gran Pajatén and other large settlement complexes of the Montecristo Valley all lie below 2,900 m where maize can be cultivated on the level terrain that can be found or created.

The term *ceja de selva* masks the biogeographic diversity encountered on the upper eastern slopes. Lyon (1981) has stressed the importance of recognizing geographical and ecological variability along the eastern slopes, and the adoption of a more discriminating perspective regarding eastern slope biogeography is one of the critical first steps towards understanding settlement histories, resource utilization, and regional interaction. Nonetheless, the term remains useful because archaeologists have demonstrated that prehispanic distributions of culturally-related and economically-linked ethnic groups straddled the tropical alpine-montane forest ecotone (Bonavia 1967-68; Hastings 1985, 1987). Gran Pajatén can be regarded as a *ceja de selva* site, yet it is one of a very small group of sites documented well within the continuous montane forest,[3] and its function and history of occupation probably differed considerably from those of *ceja de selva* sites above the closed forest.

Following the geographic distinctions between northern, central, and southern regions first proposed by Bonavia and Ravines (1967:61-62), this report makes reference to the "northern" *ceja de selva.* The intent is to distinguish the eastern Andean cordillera between Bagua and Tayabamba as a region with distinctive architectural and ceramic stylistic traditions and a developmental trajectory not shared by *ceja de selva* settlements of the central and southern Peruvian Andes. While circular stone buildings are typical of highland Andean settlements following the Middle Horizon (A.D. 700-900), the presence of cornices and stone frieze decorations, among other features, characterizes the architecture of the northern region. Appliqué decoration found on northern *ceja de selva* ceramics is apparently absent to the south. According to Lumbreras, the northern *ceja de selva* "appears to be a new culture area, distinct from the Central and North Andean ones" (Lumbreras 1974:149), and Kauffmann *et al.* (1989:6), refer to the eastern and northern montane forests, or "Andes Amazónicos," as the third central Andean region in addition to the coast and highlands. Whether or not sites such as Gran Pajatén and Kuelap represent a new culture area, the two apparently are historically related and represent geographically-restricted styles easily differentiated from those of better known Andean cultures.

The Gran Pajatén Site Complex

Although the system of stone terraces that surrounds Gran Pajatén covers an estimated 50 hectares (Pimentel G. 1967), the buildings

[1] The lower portion of the Tropical Subalpine Zone has been referred to as "Fragmented Montane Forest" for the purposes of botanical inventory (Young and León 1988).

[2] The forest between 2,900 and 3,400 m in the Río Abiseo Park corresponds to the Tropical Montane Pluvial Forest (*Bosque Pluvial-Montano Tropical*) Holdridge life zone.

[3] Other prehistoric settlements deep within the eastern montane forest include those near Gran Pajatén reported by Lennon, Church, and Cornejo (1989), Pukarumi (Schjellerup 1990), the "lower tier" sites studied by Hastings (1987) in the Tarma Canyon, and the Inca complexes below Cuzco (Savoy 1970).

that comprise the hilltop settlement probably occupy less than two hectares. We counted 26 buildings which include the 18 depicted on the 1966 site map (Figure 4), although additional structures remain hidden beneath the thick vegetation. The buildings are predominantly circular with diameters ranging from 3 to 14 m, and probably had conical straw roofs (Bonavia 1968). Techniques of stone frieze architectural ornamentation like those found at northern *ceja de selva* sites such as Kuelap (Narváez V. 1988; Ruiz E. 1972), Leimebamba (Ruiz E. 1985), and Pueblo Viejo near Uchucmarca (Thompson 1973) are more highly elaborated at Gran Pajatén. Gran Pajatén's builders incorporated tabular slate slabs and sandstone tenoned heads into the masonry during construction to create anthropomorphic, zoomorphic, and geomorphic frieze motifs. Pimentel G. (1967), Rojas P. (1967), Bonavia (1968), and Kauffmann D. (1983) offer the most complete descriptions of Gran Pajatén's architecture.

Because of its elaborate decoration and prominent position above other constructions, Building Number 1 appears to have served as one of the principal buildings at Gran Pajatén (Figure 5). Like many other buildings at the site, Building Number 1 has two levels separated by a ledge or cornice. The lower level is a circular platform or base upon which a slightly smaller circular structure was built to contain the building's activity space. The activity space (the upper level of the construction) measures slightly more than 14 m in diameter. A wide staircase appended to the northwest side of the building exterior divides panels of elaborate stone friezes that decorate both the lower and upper levels of the building and allows direct access to a doorway on the upper level. Bonavia (1968) provides the most detailed description of Building Number 1's architecture and ornamentation.

Previous Research at Gran Pajatén

Before discussing prior investigations at Gran Pajatén, some clarification is necessary to explain the persistence of the name "Gran Pajatén" despite Bonavia's (1968) insistence that the name "Abiseo" is more appropriate until the aboriginal name for the site is determined. Like Bonavia, we believe that the name applied to the site by explorer Gene Savoy (1970:142) is misleading because both the Pajatén River and the ruined Franciscan mission of Jesús de Pajatén are located some distance to the north and east respectively. However, we hesitate to apply the name "Abiseo" because the Abiseo River drainage further south remains unexplored. The name Gran Pajatén remains firmly fixed in the scientific literature (*e.g.,* Kauffmann D. 1987), in the recent popular literature (*e.g., El Comercio* 1989; Manuel V. 1989; Vecco O. 1988) and appears in Peruvian legislation dealing with the site (*e.g.,* Ley No. 23633, June 1, 1983). It is the *only* name by which the local villagers know the site. Based on an historical reference, Espinoza S. (1967:237) has offered the name "Yaro", but there are insufficient published data to determine if the settlement mentioned by Mogrovejo (1921 [1593]) is indeed Gran Pajatén or another of the many ancient settlements in the upper montane forest east of Condormarca. Two recent reviews of the available ethnohistoric literature failed to match the few ancient place names with their probable montane forest locations (Church 1990; Julien 1985). Because of the continued lack of the aboriginal name, the pervasiveness of the name "Gran Pajatén" in the literature, and because of its local usage, we find it most expedient to refer to the site accordingly.

Many reports have originated from the 1965 and 1966 expeditions to Gran Pajatén. At present, the most complete archaeological report of the site is the product of Bonavia's field work (Bonavia 1968). His monograph provides detailed descriptions of the settlement and architecture as well as an analysis of the cultural materials recovered from the surface and excavations. Bonavia excavated one 2 x 2 m pit along the interior of the south wall of Building No. 1 and a 1 x 1 m pit directly opposite, against the exterior of the same wall. The interior unit was excavated in four arbitrary levels to a depth of 1.88 ms below ground surface. Bonavia excavated the exterior unit, without vertical control, to approximately the same depth (*ibid.*:35-37).

Bonavia (1968) analyzed 1,645 sherds. Four hundred of these were obtained from the excavation within Building Number 1. The exterior excavation yielded 100 sherds. The remainder came from 1965 and 1966 surface collections. Bonavia described two decorative styles manifest in the same coarse, brown local pottery. A local style composed of decorative motifs executed in appliqué clay strips is termed the Abiseo Style, and a classic Inca decorative style is referred to as Inca-derived. He viewed the vessel shapes as typically Inca and used Pardo's (1957) shape categories as a basis for classification. Several other pottery types were identified, but because of the small quantities present, Bonavia made no attempt to interpret them.

Although Bonavia (1968:66, 71-74) considered multiple phases of occupation and construction at Gran Pajatén likely, he concluded that the site was an agricultural village which represented an effort by highland populations to colonize the *ceja de selva* during the Late Horizon with the encouragement, if not the direction, of the Inca state (Bonavia 1968:74-75; Bonavia and Ravines 1967, 1968). Since Bonavia's field work, Isbell (1970) and Ravines (1967-68) have expressed their opinion that Gran Pajatén has greater time depth.

Excavations in Building No. 1: Methodology and Stratigraphy

In order to glean chronological and architectural information from Building Number 1, we initiated an L-shaped trench consisting of eleven 1 x 1 m square units to create two cross-sections of the building stratigraphy roughly north-south and east-west (Figure 6). Large-scale horizontal exposures were not attempted, although we opened some additional squares to expose some architectural elements. Selected squares which did not encounter architecture were dug well into sterile soil, and a 1 x 2 m control unit placed adjacent to the northwest wall also penetrated sterile soil. We attempted to excavate by stratigraphic layers, but because of the lack of easily defined strata, we mostly dug ten centimeter arbitrary levels.

Based on the internal building stratigraphy, supporting radiocarbon evidence, and the ceramic types identified, we have been able to distinguish at least two phases of occupation at Gran Pajatén. Materials assigned to the Abiseo Phase, mostly contained within the upper level of Building Number 1, belong to the Late Horizon cultural complex identified by Bonavia. The pre-Abiseo Phase assemblage of cultural materials occurs primarily in the construction fill found in the lower level and pertains to the end of the Early Horizon (900-200 B.C.) and the Early Intermediate Period (200 B.C.- A.D. 700). Figure 7 shows the relative stratigraphic positions of Abiseo Phase and pre-Abiseo Phase cultural deposits within Building Number 1. Prior to this report, the collection of pre-Abiseo Phase materials had been assigned to the "Montecristo Phase" (Church 1988; Lennon, Church, and Cornejo G. 1989). However, the span of radiocarbon years (uncorrected: 420 B.C. to A.D. 460) and the stylistic diversity of ceramic remains obtained from the same strata suggest that more than one phase of occupation is represented within the construction fill of Building Number 1. Phase designations seem premature and, therefore, the collection of early ceramics will be referred to as the "pre-Abiseo Phase ceramic assemblage" until we achieve finer chronological control over the area.

Excavations within Building Number 1 revealed a complex distribution of at least 12 distinct strata (Figure 8), some of which can be correlated with those identified by Bonavia. Soils from surface to bedrock are all silty clays varying only slightly in degree of color mottling and visibly discernible content. Therefore they are often difficult to distinguish and categorize by stratum.

Analyses of sediment size, pH, and phosphates performed on soil samples from each stratum (Church 1988: Table 2) have been of limited use as interpretive aids. The lack of unequivocal patterning in the distributions of sediment size ratios and phosphate content per stratum tends to support the interpretation that the lowest cultural strata constitute construction fill. The most probable explanation for gradually increasing pH values corresponding to increased depth is that the

Table 1. Radiocarbon measurements and calendar dates from Building 1 at Gran Pajatén (from Church 1988, 1991).

Stratum	*Sample N°*	*Uncorrected date (B.P.)*	*Calendar date corrected (with sigma)*[a]
T3	B-21886	540 ± 60	A.D. 1412 (A.D. 1330-1436)
PC7	B-23078	400 ± 90	A.D. 1457 (A.D. 1432-1638)[b]
T4a	B-23077	1490 ± 70	A.D. 586 (A.D. 537-645)[b]
T5a	B-23074	2370 ± 60	401 B.C. (480-387 B.C.)
T6	B-23076	1930 ± 100	A.D. 75 (39 B.C. - A.D. 227)
T7	B-21887	1910 ± 60	A.D. 102 (A.D. 30-218)[b]
T7	B-23075	2200 ± 120	226 B.C.[b] (391-53 B.C.)[c]
[a] - Following decadal calibration curve of Stuiver and Becker (1993).			
[b] - Intermediate of three possible dates. Sigma combines all three.			
[c] - Intermediate of five possible dates. Sigma combines all five.			

enormous quantity of groundwater moving through these soils for many centuries has restored a "natural" pH gradient (Peter Birkeland, personal communication, 1987).

Nine principal strata appear throughout most of the building, and these can be described in four basic units:

1) Stratum T9, sterile soil, consists of decomposing slate and siltstone in a matrix of yellow-brown clay and contains no cultural materials.

2) Strata T8a, T8b, T7, T6, T5a, and T5b are layers of construction fill consisting of clay mixed with varying amounts of charcoal, ash, ceramics, and disintegrating slate fragments. Coarse brown and fine kaolin ware ceramics comprise the pre-Abiseo Phase assemblage recovered from these strata. Uncorrected radiocarbon dates from lenses of charcoal in Stratum T7 are 2200 ± 120 B.P.: 250 b.c. (Beta-23075) and 1910 ± 60 B.P.: a.d. 40 (Beta-21887). Charcoal from Stratum T6 yielded the date 1930 ± 100 B.P.: a.d. 20 (Beta-23076). The uppermost of these strata, Stratum T5a, produced the earliest date of 2370 ± 60 B.P.: 420 b.c. (Beta-23074). The distribution of these dates confirms that these strata are secondary deposits, typical of construction fill (Table 1 presents radiocarbon dates with calculated corrections).

3) Strata T4b, T4a, and T2 are similar in appearance to those just described. However, all of them contain the local coarse brown ceramics, identified by Bonavia, that characterize the Abiseo Phase. Strata T4a and T4b are construction fill, and a charcoal deposit in Stratum T4a produced the radiocarbon date 1490 ± 70 B.P.: a.d. 460 (Beta-23077).

The greatest concentration of Abiseo Phase materials appears within Stratum T3, which was a carefully prepared floor "paved" with tabular slabs of slate, sandstone, and siltstone, now in various stages of decomposition. It lies ten centimeters above the cornice, within the upper level of the building. Clay with small charcoal lenses and flecks fills the spaces between the slabs. This stratum appears on Bonavia's building interior stratigraphic profiles as the uppermost of three visible layers of "disintegrating slate" (Bonavia 1968:85). Apparently, the small size of his excavation, its location against the south wall, and the lack of finer vertical control prevented him from recognizing it as a floor. The horizontal stone slabs

which Bonavia referred to as "lajas de piso" (floor slabs) appear in Stratum 4a and show no indications of ever having served as a floor.

A charcoal deposit associated with Stratum 3 produced the date 540 ± 60 B.P.: a.d. 1410 (Beta-21886). Stratum T2 may be the remains of a later occupation floor. Potsherds and occasional horizontally-placed, slate slabs appear concentrated on or near the top of this stratum. If Stratum T2 represents an activity surface, then it may have been only briefly used.

4) Stratum T1 consists of *Chusquea* sp.[4] roots and humic horizon vegetation. It contains few cultural materials.

The stratigraphy of the 2 x 1 m control unit placed near the entrance to Building Number 1 correlates generally with that of the trench (Figure 9). Of the ten strata discernible, all but PC8 and PC9 contain Abiseo Phase materials. Strata PC1, PC2, PC3, and PC9 are identical to Strata T1, T2, T3, and T9, respectively, in appearance and content. Only Stratum PC8 contains pre-Abiseo Phase materials. Charcoal from Stratum PC7 yielded a date of 400 ± 90 B.P.: a.d. 1550 (Beta-23078).

Bonavia's excavations penetrated little construction fill; apparently, that fill contained few pre-Abiseo Phase materials. Therefore, based primarily on analysis of his ceramic sample, he concluded that Building Number 1 and other constructions at Gran Pajatén were built and occupied during the Late Horizon. However, the radiocarbon evidence and the ceramic analysis presented below indicate prior human occupation at Gran Pajatén.

Despite the evidence for early human occupation at Gran Pajatén, the most probable interpretation of the stratigraphic and construction sequences is that, as Bonavia concluded, Building Number 1 was built during the Late Horizon. The presence of Early Intermediate Period style ceramics and early radiocarbon dates below the floor level can be explained as a product of fill source selection. On a ridgetop location, easily obtained fill must have been scarce. Loose dirt from earlier trash middens surely made adequate fill, and abandoned buildings were probably cannibalized. The fill in Strata T8 through T5 was likely extracted from such sources.

The Pre-Abiseo Phase Ceramic Assemblage

A total of 3,048 sherds comprises the pre-Abiseo Phase ceramic assemblage. The vast majority of sherds from this collection was recovered from the lowest strata of Building Number 1 (T5a-T8), and these are separated into coarse and fine ware categories for ease of description.

The 2,843 sherds of the coarse, locally-produced culinary ware constitute 93% of the pre-Abiseo Phase ceramic assemblage. Pastes are finer than later Abiseo Phase pastes and, while both contain angular grains of igneous minerals, the early pastes include higher proportions of mica and crystalline quartz. Early vessel shapes include jars, collared bowls, and simple bowls (Figure 10). Jars have round bases, globular bodies, gradually sloping shoulders, constricted necks, and everted flaring rims. Rims may be thickened, unthickened, or modeled (Figure 11). Body sherd interiors often show evidence of haphazard brushing with a bristled tool. Rim diameters range from 12 to 28 cm and average 19 cm (n=20).

Collared bowls have round bases and semi-spherical bodies and show rim thickening at the lip exterior (Figures 12, 13a-g). Rim diameters range from 8 to 22 cm and average 14 cm (n=24). Simple bowls are similar, but show very little or no little rim thickening (Figure 13h-u). Simple bowl rim diameters range from 7 to 18 cm and average 12.5 cm (n=14). Both bowl shapes have restricted and unrestricted orifices.

Pre-Abiseo Phase vessel rims were often painted or slipped red, and traces of white slip are visible on the exterior of several body sherds. Unlike those of the Abiseo Phase, pre-Abiseo Phase vessels lack evidence of appliqué decoration and strap handles. The three sherds which comprised Bonavia's

[4] *Chusquea*, or *caña brava* (Soukup 1970:59) is a large grass similar to sugar cane or maize.

(1968:46) "Type C" probably belong to the pre-Abiseo coarse ware assemblage.

The pre-Abiseo Phase fine ware category contains 218 sherds. The great diversity of pastes probably indicates numerous clay sources, and assorted decorative motifs and design layouts strongly resemble those of pottery from Cajamarca, Huamachuco, the Callejón de Huaylas, and perhaps the Callejón de Conchucos. Because of this diversity, and a corresponding lack of stylistic unity within the collection, the fine wares are believed to be imported from the adjacent highlands west of Gran Pajatén. Bonavia encountered 14 of these fine ware sherds which he grouped as "Type B" (Bonavia 1968:45, 48-49). Nearly 60% (128 sherds) of the fine ware collection consists of white and pink open bowls produced of kaolin-rich clay, some with low pedestal bases. Several vessels appear undecorated, although traces of red and black paint on a few sherds (Figure 14) indicate that the constant percolation of groundwater often washed away these post-firing paints. Other kaolin ware sherds bear simple geometric designs in red (Figure 15) or red and black paints (Figures 16, 17a-d).

Approximately 20% (42 sherds) of the pre-Abiseo Phase fine ware collection consists of fine orange ware open bowls (Figure 17e-h). Coarse-tempered red ware bowls with thin walls comprise 11% (23 sherds) of the fine wares (Figure 18). White paint is visible on the exterior of two red ware sherds. The remaining 9% of the fine ware sherd collection shows a diverse array of pastes and decorative treatments including a second white-on-red style of much finer paste with white curving lines over a red slip (Figure 19a-c), a single fine ware sherd with white and yellow paints on a red slip (Figure 19d), and other decorated fine wares (Figure 20).

Cross-dating the Pre-Abiseo Phase Assemblage

Ceramic cross-dating shows that pre-Abiseo Phase pottery styles are not chronologically inconsistent with the radiocarbon dates from Strata T5-T8. However, the lack of well-dated ceramic sequences from excavated primary deposits in the north highlands hinders cross-dating. Ceramic sequences for important neighboring areas such as Santiago de Chuco, the Callejón de Conchucos, and Cajabamba are badly needed to assess regional stylistic variability through time. The Cajamarca sequence (Terada and Onuki 1982, 1985; Terada and Matsumoto 1985) is the most detailed at present. Most other published sequences are seriations of surface collections or have dating problems for the time periods of interest to this study. Despite these difficulties, attempts to cross-date the pre-Abiseo Phase ceramics are informative.

The pre-Abiseo Phase coarse wares are of limited value for cross-dating. The morphology and decoration of jars and simple bowls seem to reflect the site's participation in a generalized north highland coarse ware tradition in which basic stylistic attributes were widely shared during the Early Intermediate Period. Influenced by Lathrap's view of east slope prehistory (1970), Isbell (1974) refers to this generalized ceramic tradition as the "coarse brown" or CB series and regards it as evidence of an expansion of Quechua speakers from the northeastern Andean slopes of Peru or Ecuador. The modeled rim forms assigned to the Early Intermediate Period Purpucala Phase at Huamachuco (Thatcher 1972:figures 17a-f, 19j, 20j-k) are very similar to modeled rims in the pre-Abiseo Phase collection and are therefore useful for cross-dating. Theresa Topic also notes the similarity and concurs on an Early Intermediate Period date (personal communication, 1987).

The collared bowl shape is basically the same as Vessel Shape 3A from Mamorco Phase contexts in the Huamachuco area (Thatcher 1979: plate XI, figures 5-8). The Mamorco Phase was created through seriation of surface ceramics and is believed to represent late Initial Period occupation. The Topics (T. Topic, personal communication, 1987), based on re-surveys of Thatcher's sites, have been unable to confirm the existence of this phase. Because Thatcher's phase is not adequately substantiated, we do not propose occupation of Gran Pajatén prior to the Early Horizon.

The fine wares, which stylistically are more regionally and chronologically variable

in the north highlands, serve as more sensitive chronological indicators. The treatment of the kaolin ware vessels illustrated in Figures 14-16 resembles that of vessels belonging to the Cajamarca Black-and-Red Subtype C (Terada and Onuki 1982). Kaolin ware ceramics painted with red, or red and black, paint appear to date to the Initial and Early Cajamarca Phases (Terada and Matsumoto 1985) which fall within the Early Intermediate Period. Although the Cajamarca decorative motifs are not identical to those on Gran Pajatén kaolin wares, design treatment is similar and rim profiles are comparable. Ryozo Matsumoto identified rim profiles of Gran Pajatén kaolin ware vessels analogous to those of the Initial Cajamarca Period (personal communication, 1988). The range of dates for the combined Initial and Early Cajamarca Periods is not clear, but they fall between the Layzón Period and the appearance of cursive style kaolin ware ceramics in Cajamarca (perhaps A.D. 1 to 400), squarely within the Early Intermediate Period.

The sherds with red and black paint illustrated in Figure 17a-c have been independently identified as Recuay style positive-painted kaolin ware by Hernán Amat and Luis Lumbreras (personal communications, 1986). That Grieder's (1978) sequence of Pashash ceramics is the only one published for the Recuay style is unfortunate because of the style's apparent regional diversity, owed in part to regional production centers dispersed throughout the Callejón de Huaylas and the surrounding highlands (Steven Wegner, personal communication, 1987). A comparison of Gran Pajatén ceramics to the few illustrated examples of Recuay style positive-painted pottery in the published literature (*e.g.*, Bennett 1944; Pérez C. 1988; Proulx 1982) yields only general similarities. However, based on his archaeological experience in the Callejón de Huaylas, Wegner notes a strong affinity between the Gran Pajatén fine wares and the Recuay style. He dates Recuay at A.D. 200-600 (personal communication, 1987).

Gran Pajatén orange wares resemble the Tornapampa Period Thin Orange ceramic type from La Pampa (Terada 1979), orange wares of the Purpucala and Sausagocha Phases in the Huamachuco area (Thatcher 1972, 1972-1974), and Cajamarca Kaolin Unpainted Subtype C from Cajamarca sites (Terada and Onuki 1982). These similarities allow cross-dates to the Tornapampa Period at La Pampa (only cross-dated to Thatcher's seriated Purpucala Phase), the Sausagocha and Purpucala Phases (200 B.C. to A.D. 400) at Huamachuco (Topic and Topic 1987), and the Initial and Early Cajamarca Periods at Cajamarca. Based on these cross-dates, Gran Pajatén orange wares can plausibly be assigned to the Early Intermediate Period.

Coarse-tempered red ware bowls and white-on-red bowls with a variety of pastes appear to be stylistically related to red ware bowls and white-on-red bowls of the Huaraz style (Lumbreras 1974) from the Callejón de Huaylas. The diversity of pastes and paints suggests multiple origins for these sherds. Red-on-white ceramics, once considered a horizon marker (Lumbreras 1974; Willey 1971), have been assigned dates ranging from approximately 300 B.C. to the beginning of the first millennium A.D. (Lumbreras 1974:13-18, figure 11a-e). Burger (1981, 1985) suggests that the red-on-white Huaraz style pottery at Chavín de Huántar appears at the end of the Janabarriu Phase, and he cites Amat's (1976) mean radiocarbon date of 150 B.C. from Chavín as a reasonable chronological marker. However, white-on-red decoration may persist into the mid-Early Intermediate Period in the Huamachuco region (Thatcher 1972-74:112).

Several fine ware sherds can be cross-dated to ceramics recovered from coastal contexts. Three Gran Pajatén sherds (Figure 15a-c) are identical to Late Suchimancillo Period pottery (Wilson 1988:419, figure 212i-k) recovered in the lower Santa River Valley. Wilson (*ibid.*: 9) places this phase in the middle Early Intermediate Period between A.D. 200 and 400. One Gran Pajatén sherd, apparently from a bowl (Figure 19d), resembles the distinctive Castillo White, Red, and Orange Type found by Strong and Evans (1952:344-347) in Virú Valley Gallinazo contexts. This style apparently originates in the upper Valley (Santiago de Chuco province) where it is found in larger quanti-

ties (Pérez C. 1988:43, lámina. 4; T. Topic, personal communication, 1987). Its Late Gallinazo context indicates an approximate chronological position between A.D. 100 and 200 (Heidy Fogel, personal communication, 1990).

Despite the early radiocarbon dates (uncorrected) of 420 b.c. and 250 b.c., ceramic evidence most clearly indicates occupation of Gran Pajatén after 200 B.C., at the beginning of the Early Intermediate Period. Conspicuously absent are ceramics comparable to Early Horizon pottery from other highland sites. The Chavín horizon as identified by diagnostic features of the Janabarriu Phase occupation (390-200 B.C.) at Chavín de Huántar (Burger 1988, 1992) left no indications of its presence in our sample. The data may be inadequate, however, to judge whether or not Gran Pajatén and northern *ceja de selva* populations were participating in the Chavín horizon interaction sphere. While the presence of two Early Horizon radiocarbon dates intimates the presence of ceramics and other cultural remains of similar age, these materials cannot be isolated based on available stratigraphic or stylistic evidence. Given the limited information it seems reasonable to propose 200 B.C. as the earliest approximation for the pre-Abiseo Phase assemblage.

Determining the duration of the early occupational phases at Gran Pajatén remains a problem because of the reliance on negative evidence. Notably absent from the pre-Abiseo Phase assemblage are vessels with cursive painted motifs and tripod bases. These features appear by A.D. 400 and A.D. 600 respectively in the Huamachuco area (Topic and Topic 1987). Only two fragments from a single vessel with tri-color decoration (Figure 20d-e) comprise weak evidence for occupation at Gran Pajatén during the Middle Horizon. Taking into account the latest pre-Abiseo Phase radiocarbon date of A.D. 460, we may conclude that there is no irrefutable ceramic evidence for cultural occupation at Gran Pajatén between A.D. 500 and the Late Horizon (A.D. 1470).

In summary, radiocarbon evidence suggests that occupation at Gran Pajatén began by 420 B.C., yet the ceramic evidence most clearly indicates occupation between 200 B.C. and A.D. 500. Whether only one, or multiple, interrupted occupations occurred during the 700 year span represented by the pre-Abiseo Phase ceramic assemblage remains unknown, and it is unclear if the hiatus in the chronological record between A.D. 500 and the Late Horizon Abiseo Phase represents a period of site abandonment. Only a small portion of Gran Pajatén has been sampled, and more field work is required to clarify such problems.

Early Occupations at Gran Pajatén

Because of its lack of a primary depositional context, the pre-Abiseo Phase assemblage offers scant information with which to characterize early societies at Gran Pajatén. Important basic questions remain regarding the origins of the first settlers in the upper montane forest and local paleo-environmental conditions. Whether these populations immigrated from the highlands to the west or from forested environments north, east, or south has been a frequent theme for speculation. Most theories regard montane forest architectural complexes as intrusive from the neighboring highlands (*e.g.*, Bonavia and Ravines 1967, 1968; Raymond 1988:289-291) rather than the product of long-term local cultural development by a relatively stable population base. Apparently there is more sierra than *selva* in both early and late Gran Pajatén ceramic styles, and in styles reported from Kuelap by Ruiz E. (1972), Uchucmarca by Vega O. (1978) and Chuquibamba by Jakobsen *et al.* (1986-87). However, the data from Gran Pajatén and other northern *ceja de selva* sites may lack sufficient time depth to settle issues of origins at present. Ravines' (1978) undated Huayabamba Complex from the lowlands immediately to the northeast of Gran Pajatén resembles later Abiseo Phase ceramics because of shared appliqué decorative techniques. Unlike Huayabamba Complex ceramics, however, the pre-Abiseo Phase coarse wares from Gran Pajatén lack appliqué decoration. Rather than a progenitor of the upper forest styles, the Huayabamba complex seems to be a hybrid combination of *ceja de selva* decorative techniques and lowland tropical forest vessel shapes. A temporal fix on the

Huayabamba complex is necessary to determine its relationships to surrounding pottery styles.

Also difficult to address at present is the problem of paleo-environmental conditions during northern *ceja de selva* settlement. New data collected by geologists, palynologists, and botanists working in the Río Abiseo Park should reveal possible correlations between paleo-environmental conditions and human settlement in the upper forest, or at least clarify whether or not upper Montecristo Valley site locations have been consistently forested since the early Holocene. Analyses of pollen and radiocarbon dates from glacial moraines and lake sediment cores collected at the western edge of the forest indicate that the area was completely ice-free and timberline reached its maximum altitude by 8000 B.C. (Rodbell 1991 and personal communication). It is not yet clear if subsequent minor fluctuations in relative percentages of forest and *páramo* pollen represent significant changes in treeline and, therefore, in conditions facilitating or inhibiting human settlement of the eastern slopes. Based on botanical studies at the forest's edge, Young (1993) believes that the edge of the closed forest reached five hundred meters higher than the present 3,400 m above sea level prior to the practice by local inhabitants of burning the forest edges to create pasturage for cattle. If timberline preceding human incursion into the upper Montecristo Valley approached 3,900 m, then it seems certain that known upper Montecristo Valley settlement locations (found between 2,600 and 2,900 m) have lain far below timberline since the early Holocene. Continued analysis and interpretation of the pollen record will enable more conclusive statements in the near future.

Unfortunately, we also know little about pre-Abiseo Phase architecture, although the architectural tradition presently visible was well-developed by the end of the Late Intermediate Period, and probably developed locally within the northern *ceja de selva*. The early ceramics and radiocarbon dates from Gran Pajatén lack architectural associations. However, data from Kuelap demonstrate that similar architecture existed in the *ceja de selva* by the Middle Horizon (Narváez V. 1988; Ruiz E. 1972).

Similarities between the stone working tradition evident at Gran Pajatén and in the Early Intermediate Period Callejón de Huaylas might be regarded as evidence of great antiquity for the elaborate buildings at Gran Pajatén. The anthropomorphic figures decorating the lower level of Building Number 1 have been compared to figures carved in stone from the Callejón de Conchucos (Kauffmann D. 1983:532, Figures 1 and 3). Kauffmann's observation illustrates why Rojas, a student of Julio C. Tello, assigned Gran Pajatén to the Huaylas Culture of the upper Marañón River Valley (Rojas P. 1967). Although well-dated examples are virtually absent, a stone carving tradition that commonly rendered anthropomorphs and felines apparently persisted into late pre-Columbian times in the northern *ceja de selva* (Kauffmann D. 1983:525). The friezes and carved tenoned heads of Building Number 1 constitute clear and well-dated evidence of this persistence.

Evidence for early economic activities at Gran Pajatén indicates considerable long-distance interaction. Quantities of kaolin-rich fine wares at Gran Pajatén comprise a record of interaction with north highland societies during the Early Intermediate Period. The co-occurrence of two ceramic styles at Gran Pajatén (Figures 15, 19d) and in the lower Santa and Virú River Valleys indicates that this interaction united the coast and the eastern montane forests. Both styles probably originated in the highlands, and their presence affords evidence for direct or indirect contact between Gran Pajatén and coastal societies. Abundant Chimú ceramics in late *ceja de selva* contexts (Deza R. 1975-76; Horkheimer 1959; Langlois 1940; Reichlen and Reichlen 1950; Thompson 1973, 1984; Zubiate Z. 1984) further demonstrate that prehispanic coast-rainforest interaction was not uncommon.

Lithic artifacts and organic remains recovered from the deepest strata provide an intimation of other economic activities. A chipped-stone hoe blade suggests agricultural

activity (Figure 21), and grains of maize[5] from the charcoal deposit which produced the date of A.D. 40 offer some dietary evidence. Bonavia (1968:60) observed that maize is still successfully cultivated at Gran Pajatén, and villagers from Pataz have intermittently grown potatoes, cabbage, and other cultigens at the ruins since 1965. Nevertheless, establishing the degree to which economic activities at Gran Pajatén were dedicated to intensive agriculture requires additional field work.

Final Observations

The process of settling the upper Montecristo River Valley may have begun before the fourth century B.C., although ceramic evidence best substantiates an early Early Intermediate Period occupation. When the first Conquistadors arrived in the Andes, a dense distribution of prehispanic settlements in the upper Montecristo Valley already existed (Lennon, Church, and Cornejo G. 1989), although it is not yet clear how many of these settlements were occupied simultaneously. Stylistic continuities observed in both pre-Abiseo Phase ceramics and those assigned to the Late Horizon by Bonavia (1968), as well as the singular qualities of northern *ceja de selva* architecture, tend to support the suggestion that Gran Pajatén exemplifies a substantial period of cultural development in and around the Montecristo River Valley, rather than Late Horizon migration or colonization originating in the northern highlands.

Unfortunately, evidence of early permanent settlement in the northern *ceja de selva* remains indirect. The lack of architectural associations for the ceramic and radiocarbon evidence for early occupations at Gran Pajatén may lead some scholars to contend that our finds represent transient occupations by highlanders seasonally utilizing agricultural production zones on the eastern slopes. However, Gran Pajatén is situated on a narrow ridge top above the most deeply incised section of the Montecristo River Valley, a locality highly inappropriate for cultivation without significant human efforts to prepare level plots for cultivation. Level river terraces with comparable climatic features, such as those where the Late Horizon sites of La Playa and El Encanto are situated, were available for settlement less than five kilometers upriver. It therefore seems doubtful that access to cultivable land served as the highest priority for settlement location. Instead, access to trade, perhaps of lowland Amazonian products and locally extracted minerals, probably combined with agricultural considerations to determine Gran Pajatén's location.

Settlement at Gran Pajatén was established toward the end of the Early Horizon, probably by 200 B.C. after inter-regional exchange gained increased importance with the spread of the Chavín horizon (Burger 1988, 1992). Gran Pajatén's first settlers built agricultural terraces to remedy the lack of terrain suitable for cultivation, perhaps through systems of communal labor. At present, we can only speculate regarding early socio-political organization and the architecture which may have been mostly destroyed by later construction activities, or perhaps included perishable building materials.

The Gran Pajatén finds do not constitute the only archaeological evidence of early occupations in the northern *ceja de selva*. Ruiz E. (1972) has documented Early Intermediate Period occupation at Kuelap and Cancharín near the modern town of Chachapoyas. On the basis of ceramic cross-dating, he concludes that the archaeological site of Leimebamba was also occupied during the Early Intermediate Period (Ruiz E. 1985). From the site of Huepón in the Chuquibamba area near the headwaters of the Utcubamba River, Jakobsen *et al.* (1986-87:figures 4a-c) report fine kaolin ware ceramics that appear stylistically similar to Early Intermediate Period ceramics of the Initial and Early Cajamarca Periods. These surface finds also resemble undecorated kaolin ware ceramics of the pre-Abiseo Phase assemblage at Gran Pajatén.

Despite the preliminary nature of investigations at Gran Pajatén, it is tempting to speculate on events during the apparent hiatus between A.D. 500 and the Inca conquest. Hastings (1985:529) has noted that archaeological studies in Huánuco similarly failed to

[5] Peter Gleikman of Native Cultural Services, Inc., Boulder, Colorado identified these remains from Stratum T7 in Unit 16 as *Zea mays*.

uncover substantial evidence for cultural occupation from the end of the Kotosh Higueras Period (early Early Intermediate Period) to the terminal Late Intermediate Period, although local events probably differed regionally. In the subalpine zone above Gran Pajatén, test excavations at Chirimachay (Cave) (Lennon, Vásquez S., and Church 1989) rendered a small sample of tri-color Middle Horizon pottery (Figure 22). Also, a previously unreported radiocarbon date of 630 ± 80 B.P.: a.d. 1320 (I-16,822) from Building Number 2 at the montane forest site of Las Papayas (Lennon, Church, and Cornejo G. 1989) corresponds to the Late Intermediate Period. While these data are scattered, and analyses of materials from these sites are still in progress, they do suggest that discussion of an occupational hiatus in the Río Abiseo Park area may be premature. Also, it bears repeating that the occupational histories of sites within the continuous montane forest probably differ from those in the alpine and subalpine zones above.

Gran Pajatén, Kuelap, Cancharín (Ruiz E. 1972), and perhaps Huepón are the only reported northern *ceja de selva* sites to render clear evidence for early occupations, yet few sites have been subjected to intensive subsurface exploration.[6] Archaeological investigation in the *ceja de selva* has consisted largely of clearing and examining architecture and surface collection of ceramics. In the Río Abiseo Park and the Pataz area immediately to the west, we invariably noted an absence of surface pottery unless the sites had been greatly disturbed by cultivation or pothunting. We also learned by experience that attempting excavations for extended periods of time in such a remote region presents daunting logistical difficulties. This particular effort, however, was rewarded with ample evidence for the earliest human occupation yet encountered in the eastern montane forest. Hopefully, sub-surface sampling methods will be increasingly utilized to evaluate issues of *ceja de selva* prehistory adequately.

[6] Schjellerup's (1992) program of excavations farther north at the headwaters of the Utcubamba River constitutes an exception to this observation.

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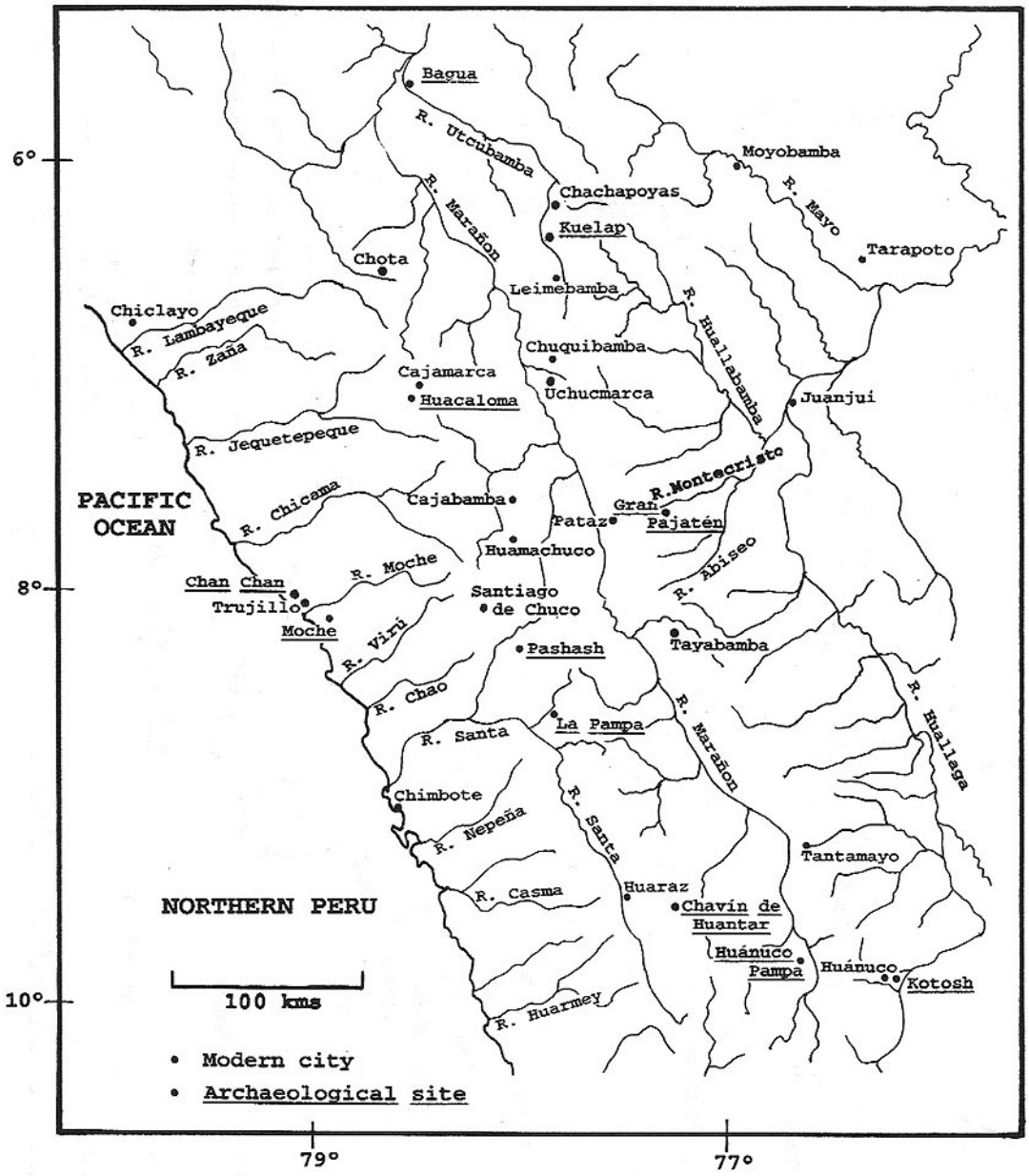


Figure 1. Some archaeological sites and modern cities in northern Peru.

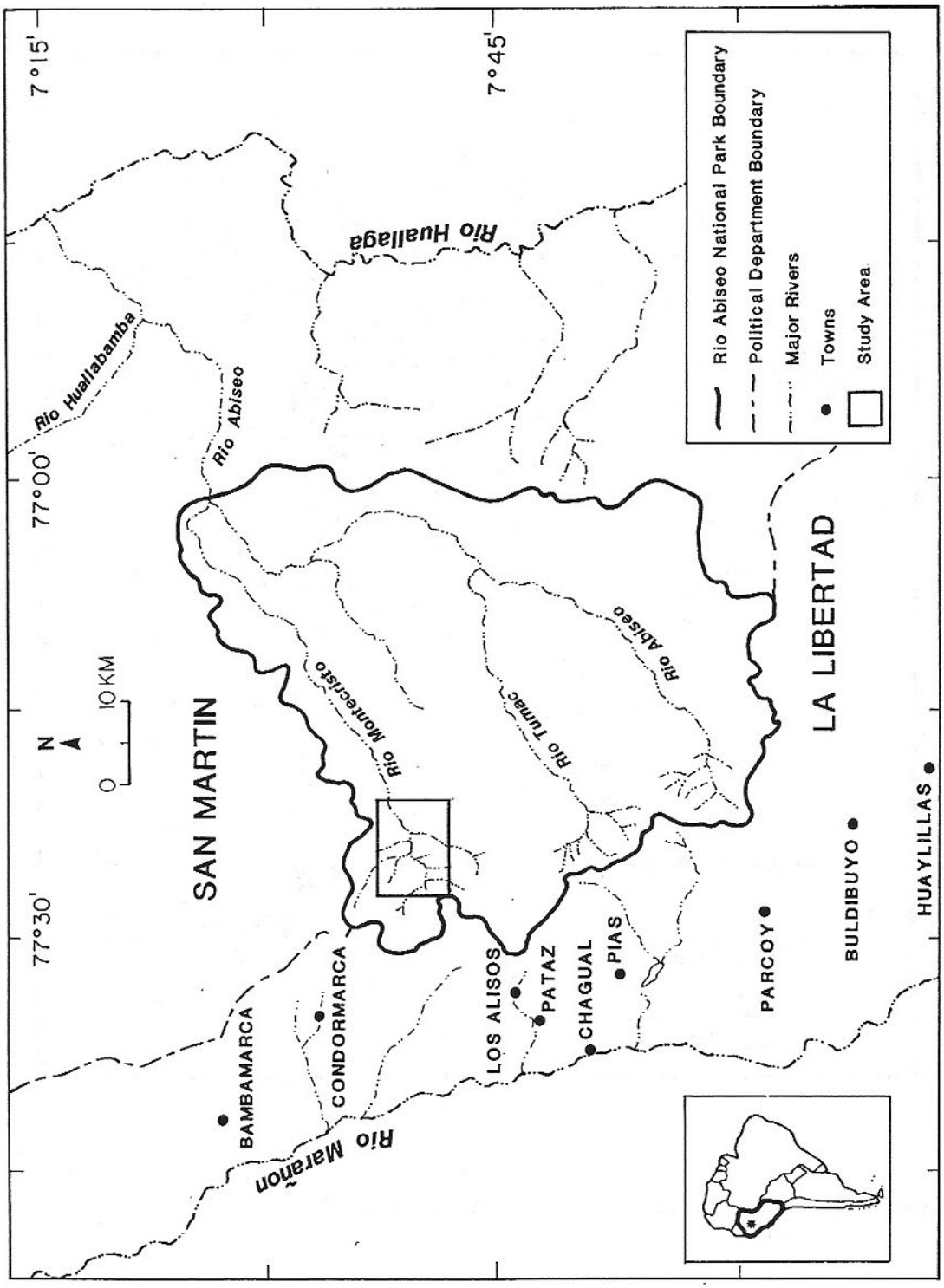


Figure 2. The Río Abiseo National Park.

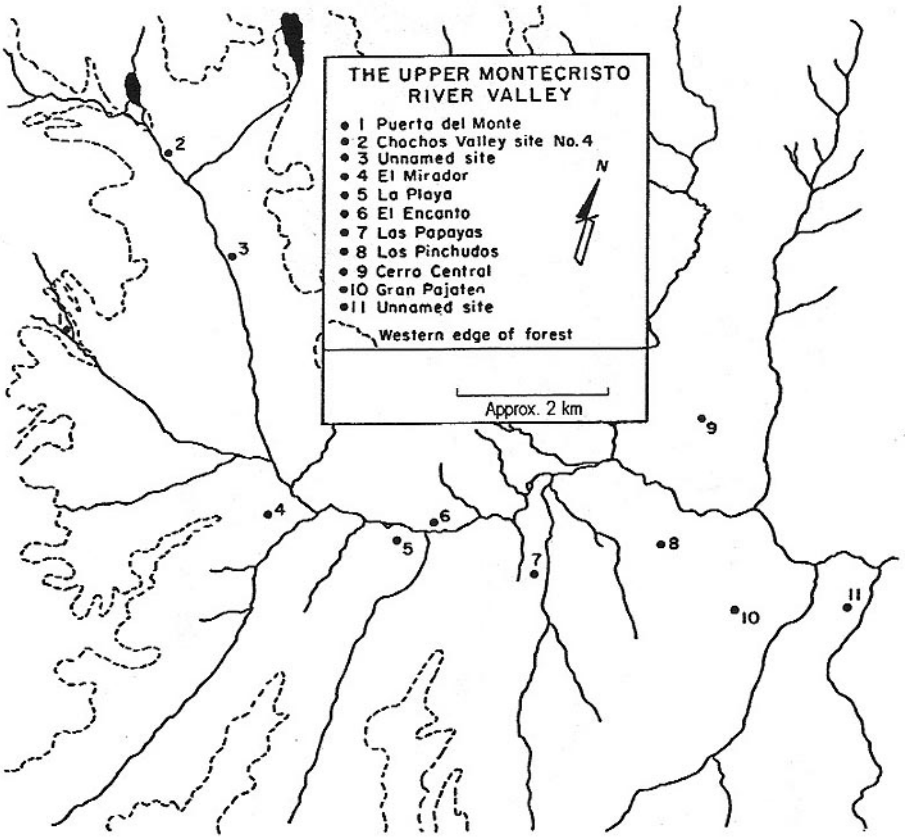


Figure 3. The Upper Montecristo River Valley.

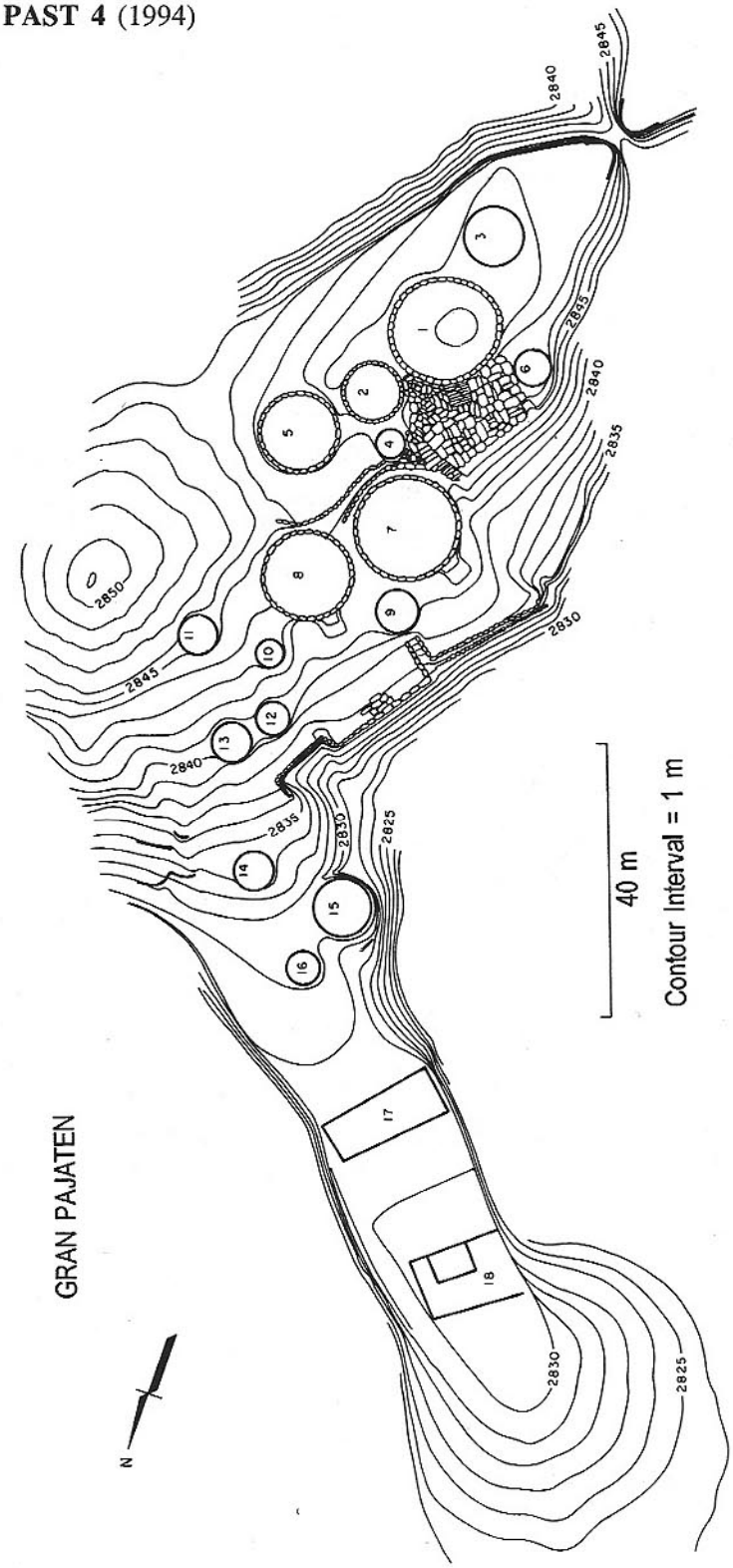


Figure 4. The Gran Pajatén site complex (after Pimentel G. 1967; Lennon, Church, and Cornejo G. 1989.

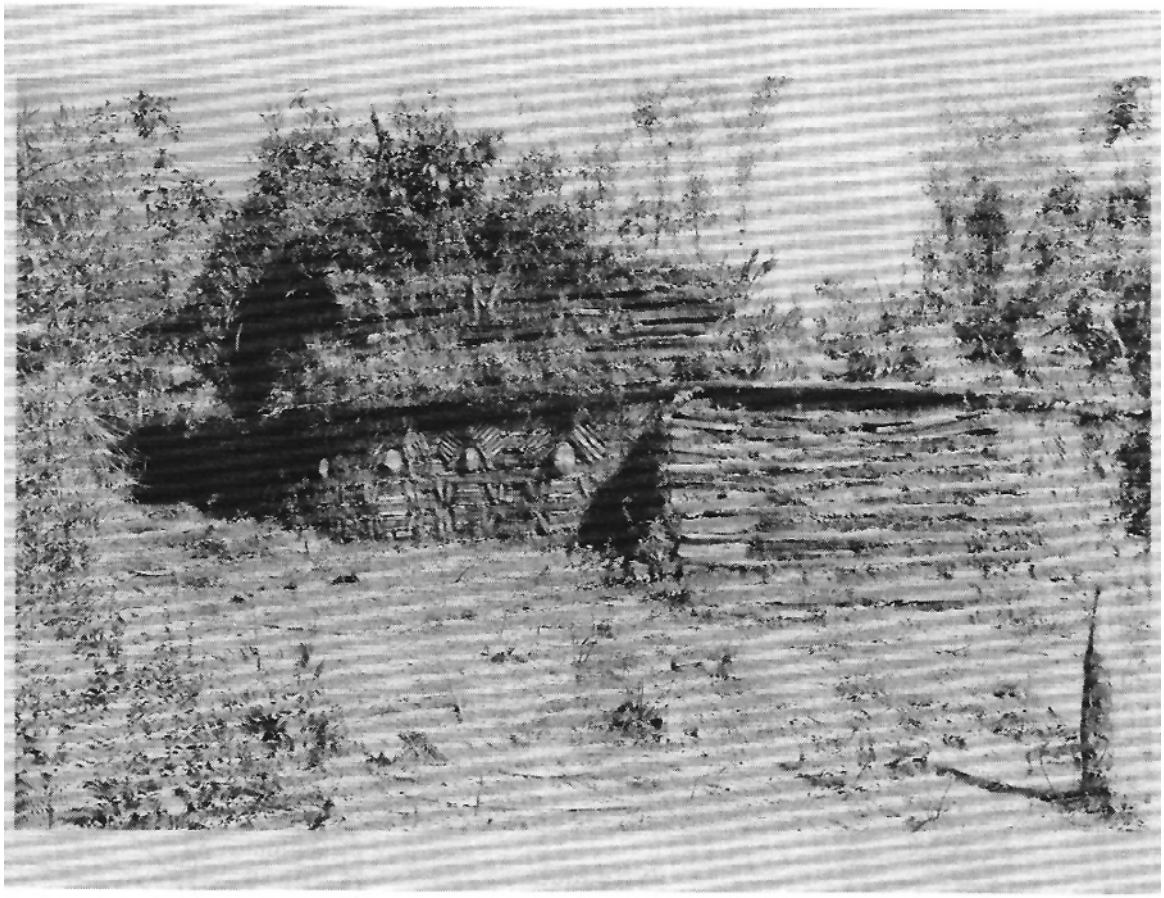


Figure 5. North façade of Building 1, Gran Pajatén.

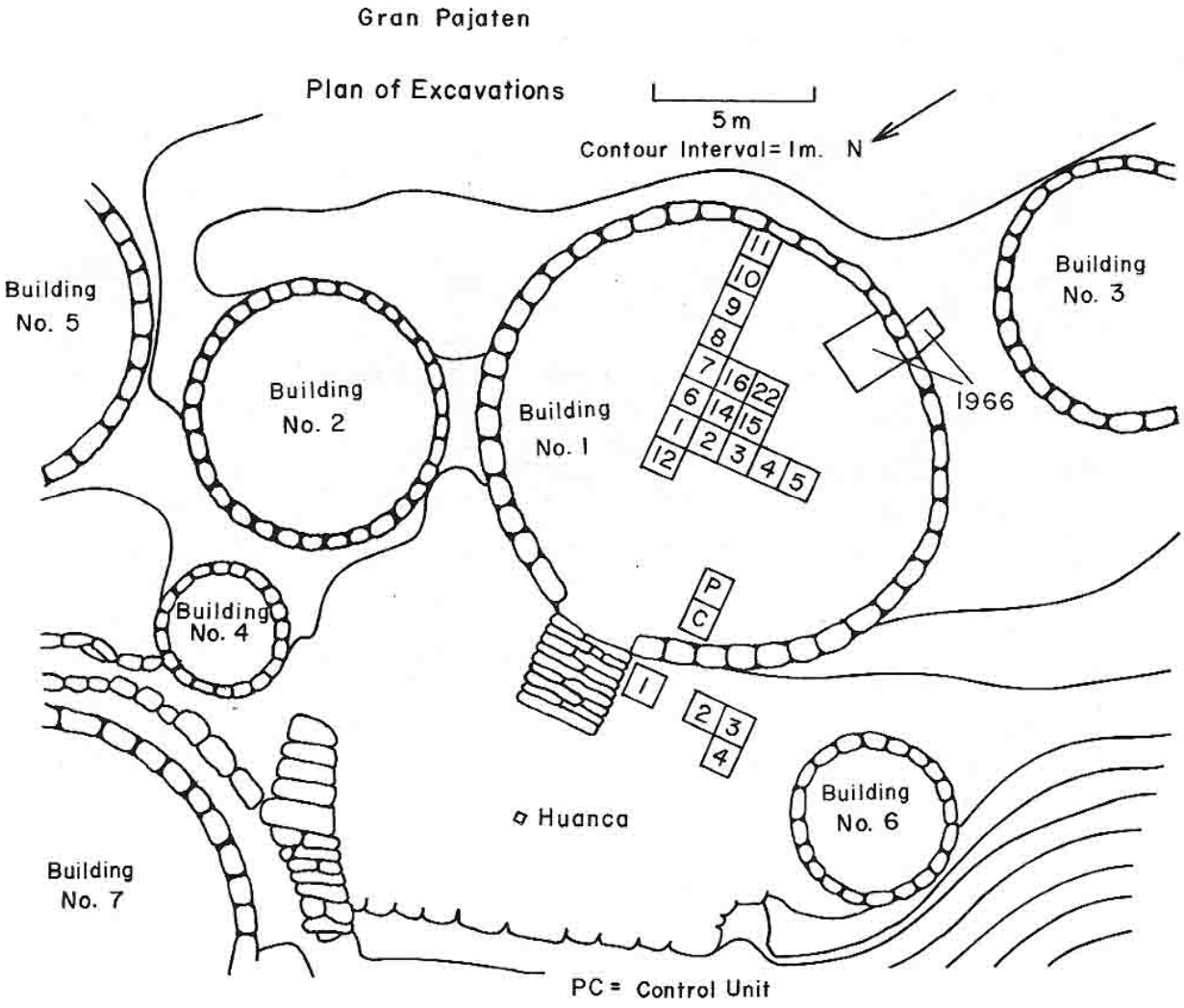


Figure 6. Plan of the 1985-86 excavations at Building 1. Building 2 excavations are not illustrated.

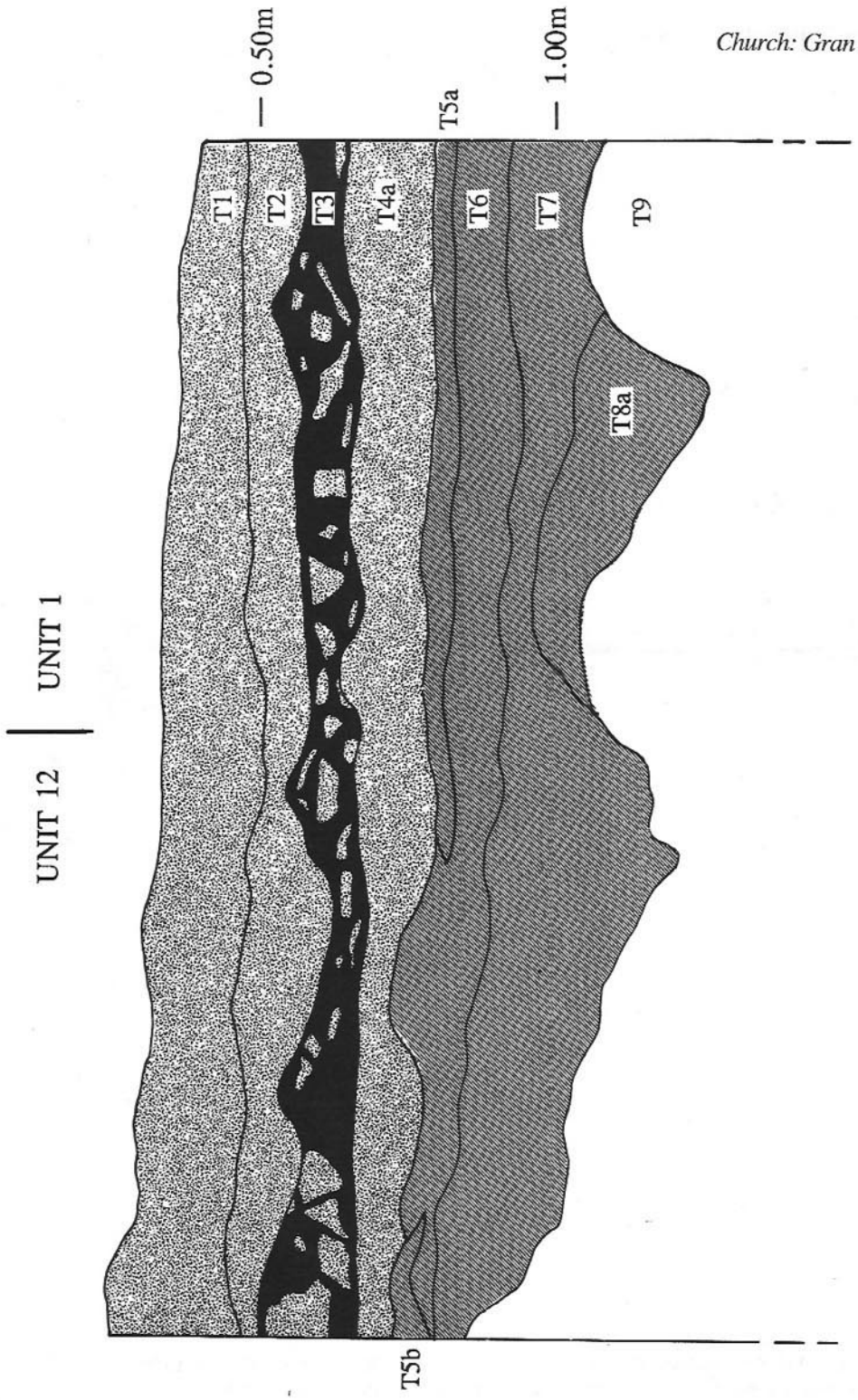


Figure 7. East profile of Units 12 and 1 demonstrating ten of twelve strata (Strata T4b and T8b not shown) observed within Building 1. Stippling represents strata containing Abiseo Phase remains. Diagonal hachure represents strata containing pre-Abiseo Phase assemblage.

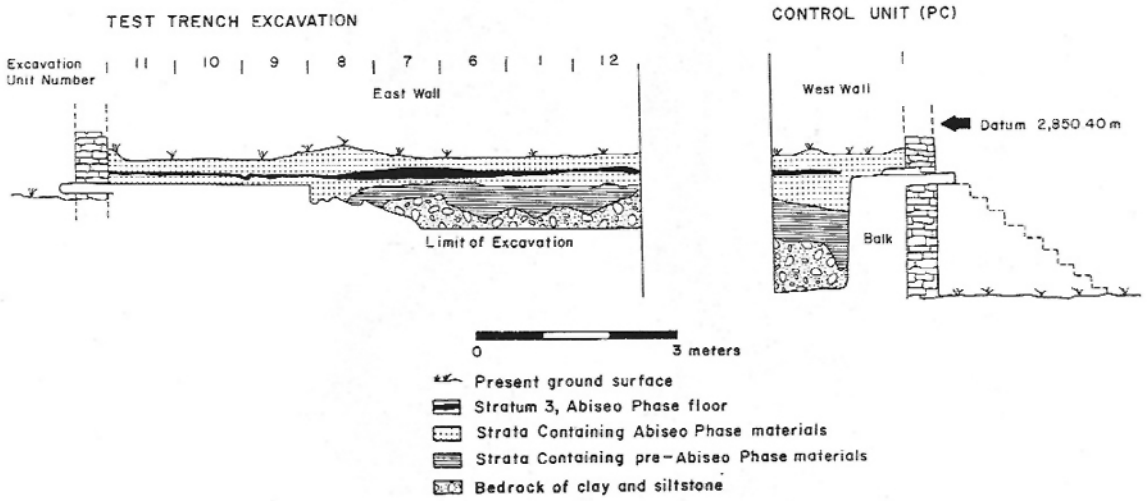


Figure 8. Approximation of cross-section of Building 1. Section is approximated by employing the east wall of the test trench and the west wall of the control unit. Note: a reversed portrayal of the east wall profile of Units 12 and 1 illustrated in Figure 7 has been substituted for the badly disturbed west wall profile for clarity.

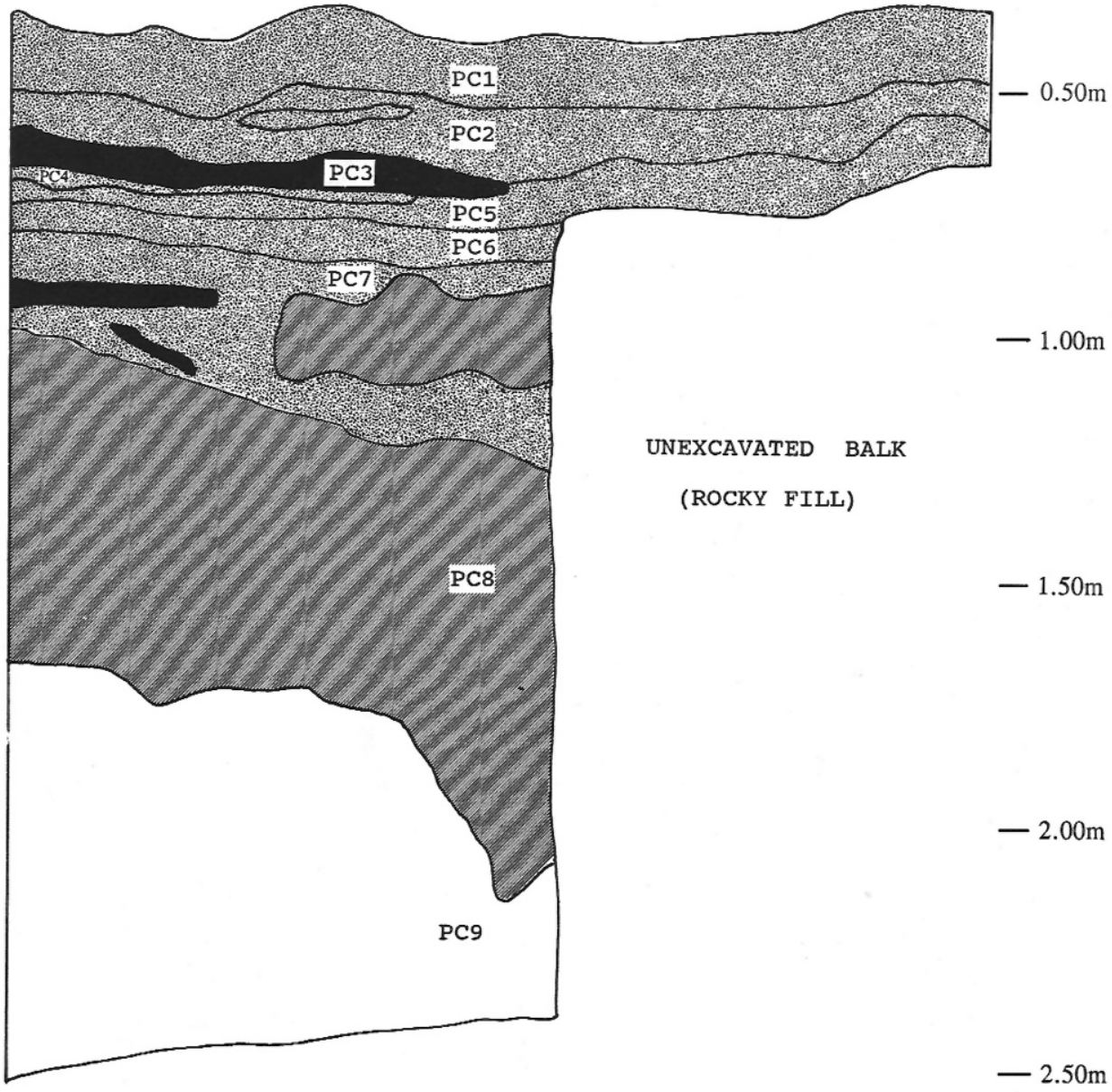


Figure 9. West profile of control unit. Stippling represents strata containing Abiseo Phase remains. Diagonal hachure represents strata containing pre-Abiseo Phase assemblage.

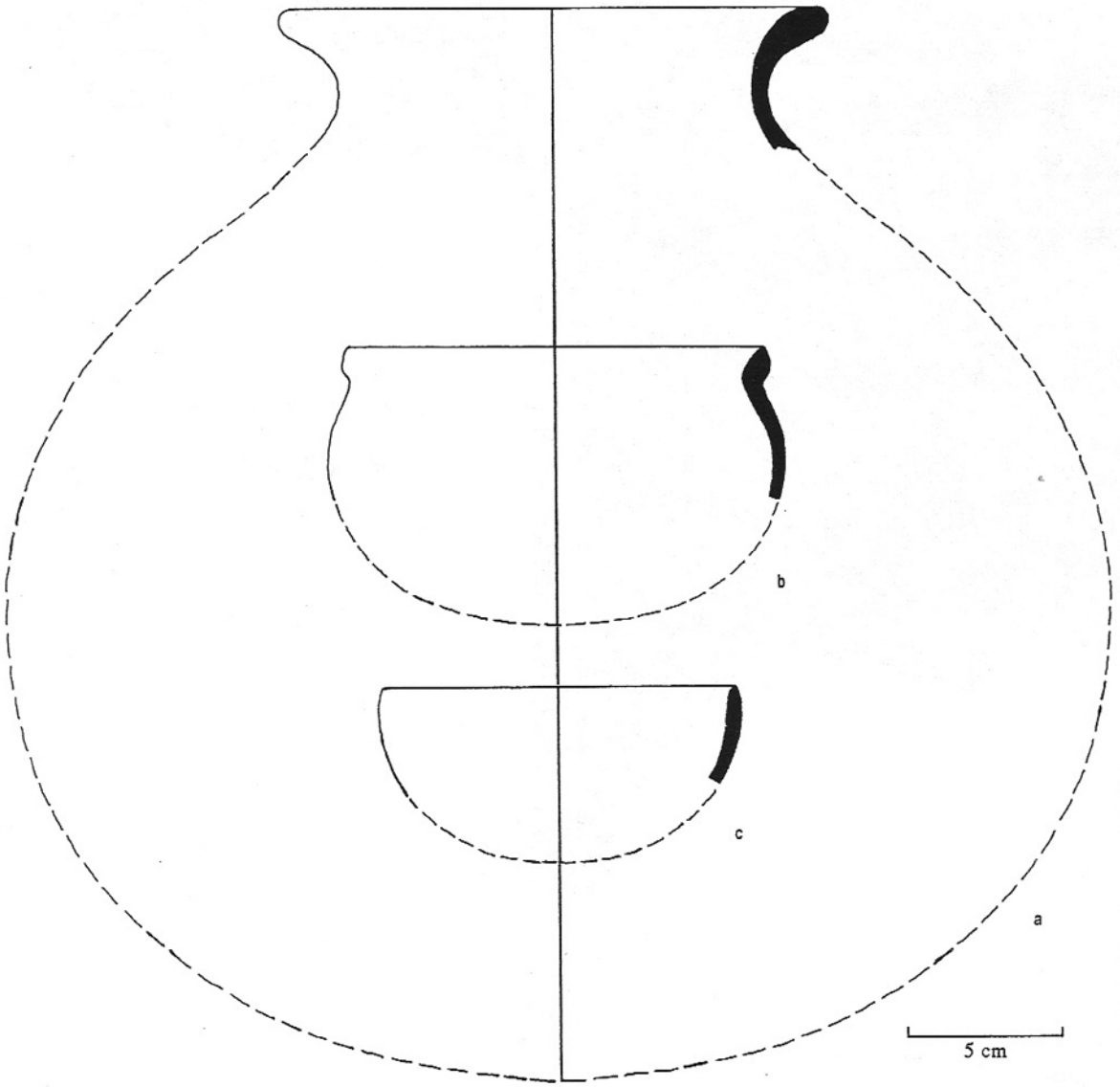


Figure 10. Vessel shapes of pre-Abiseo Phase assemblage. a: jars, b: collared bowls, c: simple bowls.

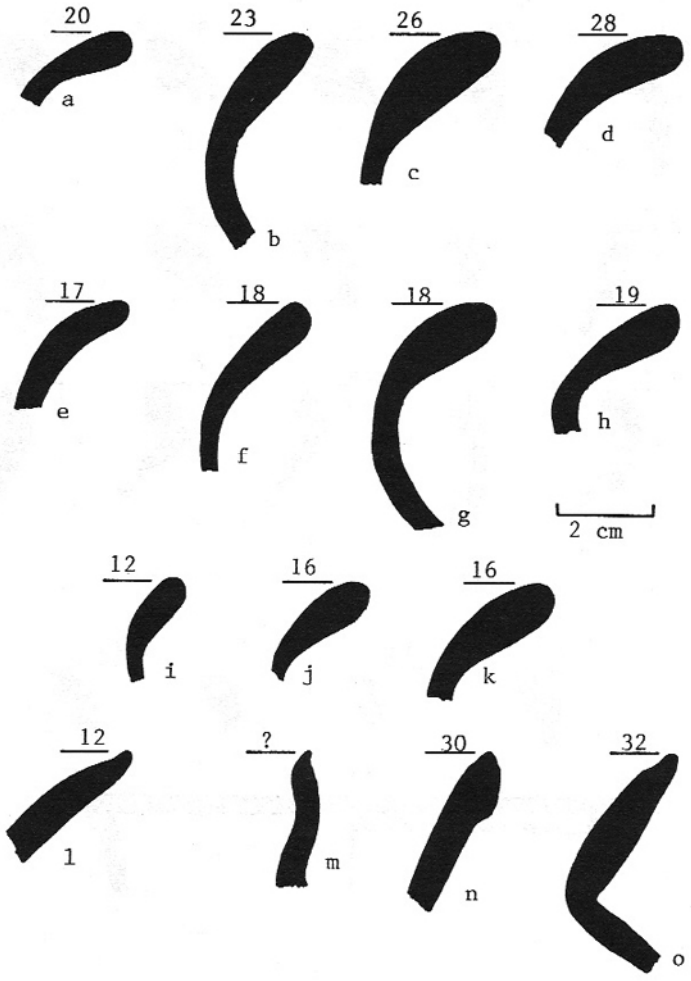


Figure 11. Rim profiles of short-necked jars. Numbers represent rim diameters in centimeters.

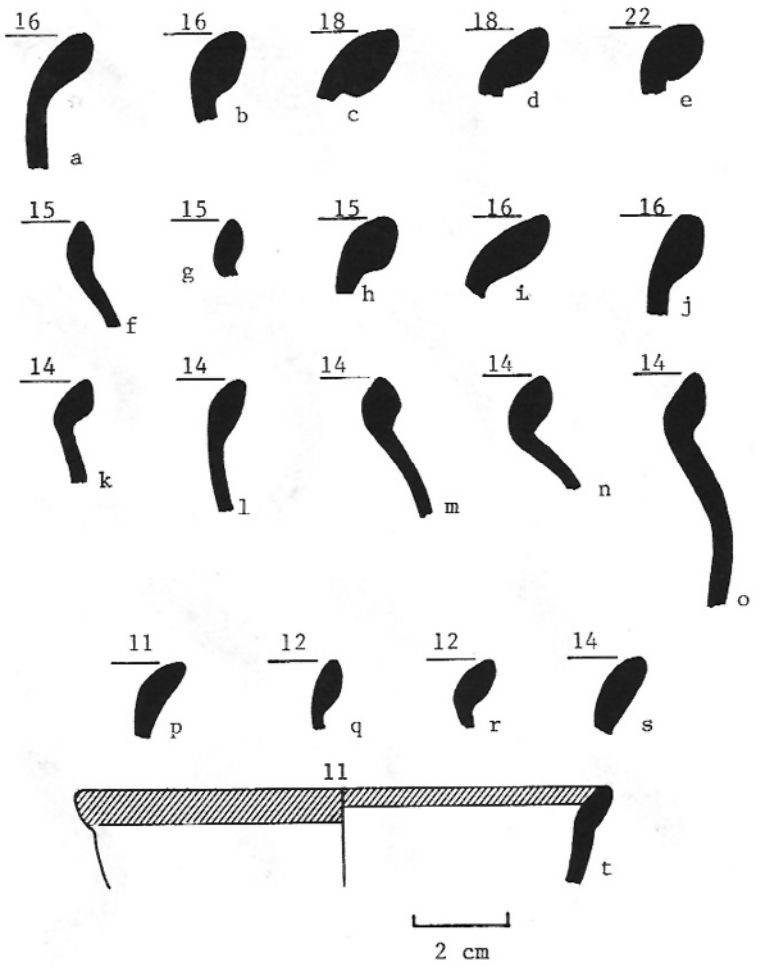


Figure 12. Rim profiles of collared bowls. Rim *t* shows red paint. Numbers represent rim diameters in centimeters.

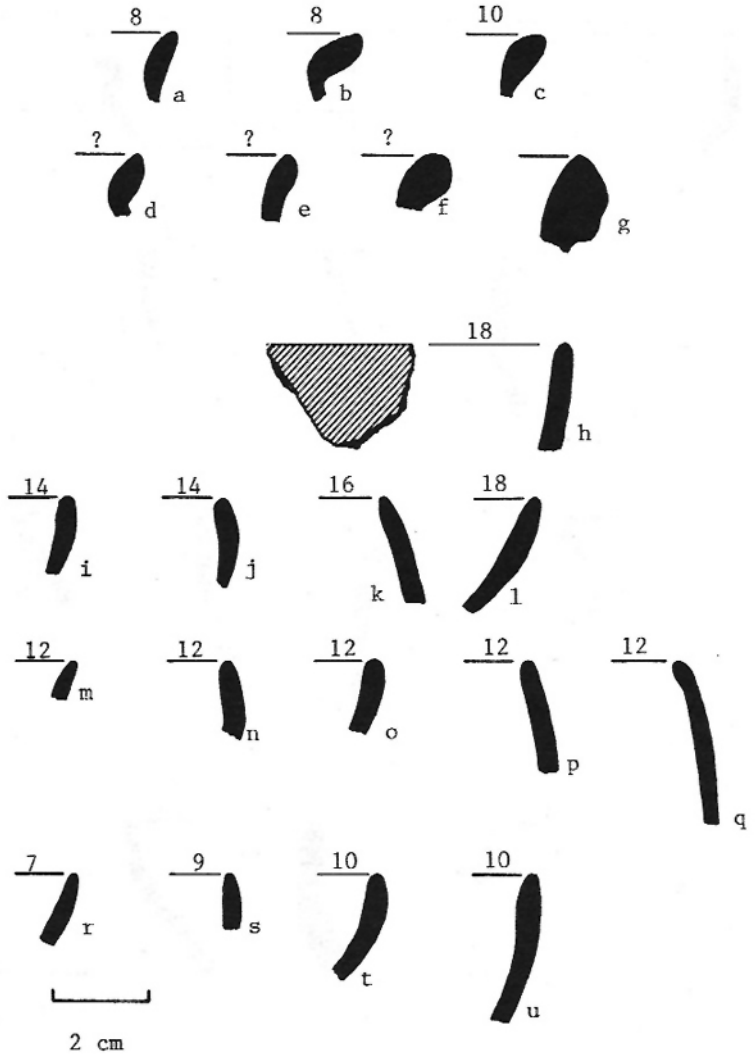


Figure 13. Rim profiles. Rims a-g from collared bowls. Rims *h-u* from simple bowls. Rim *h* shows red paint. Numbers represent rim diameters in centimeters.

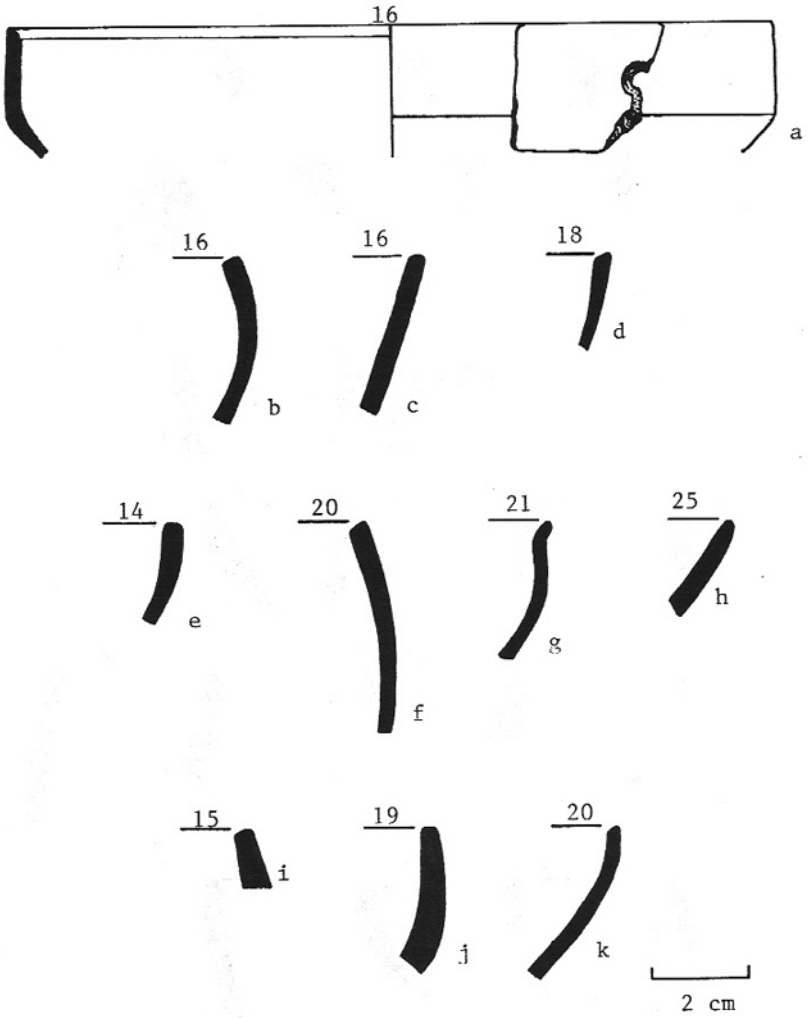


Figure 14. Rim profiles of kaolin ware. Rims *a-d* are undecorated. Rims *e-h* show traces of red paint. Rims *i-k* show a thin red painted line on the top of the lip. Numbers represent rim diameters in centimeters.

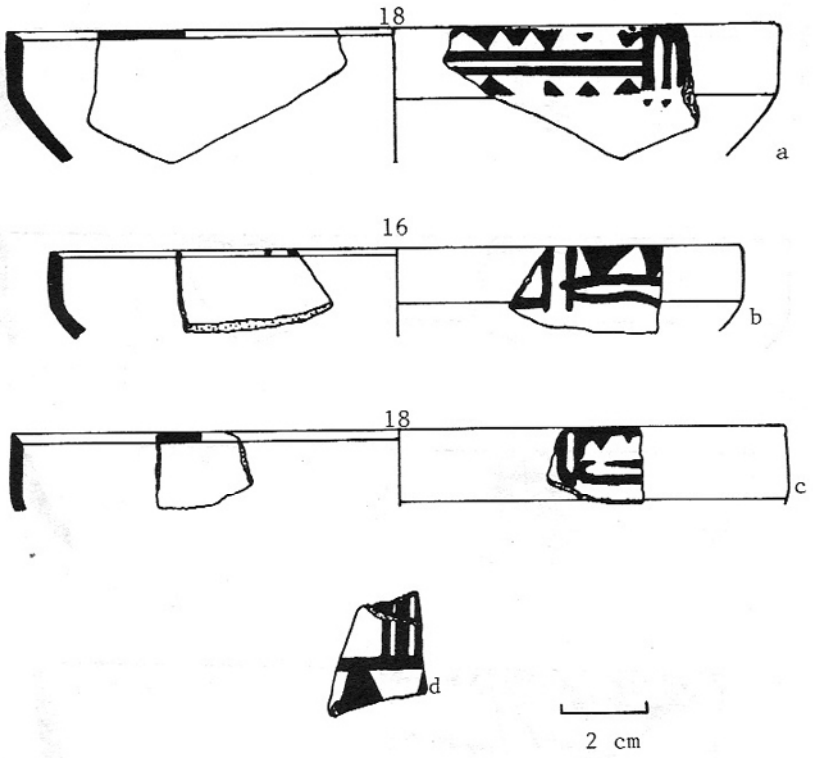


Figure 15. Fragments of kaolin ceramics with geometric designs rendered in red paint. Numbers represent rim diameters in centimeters.

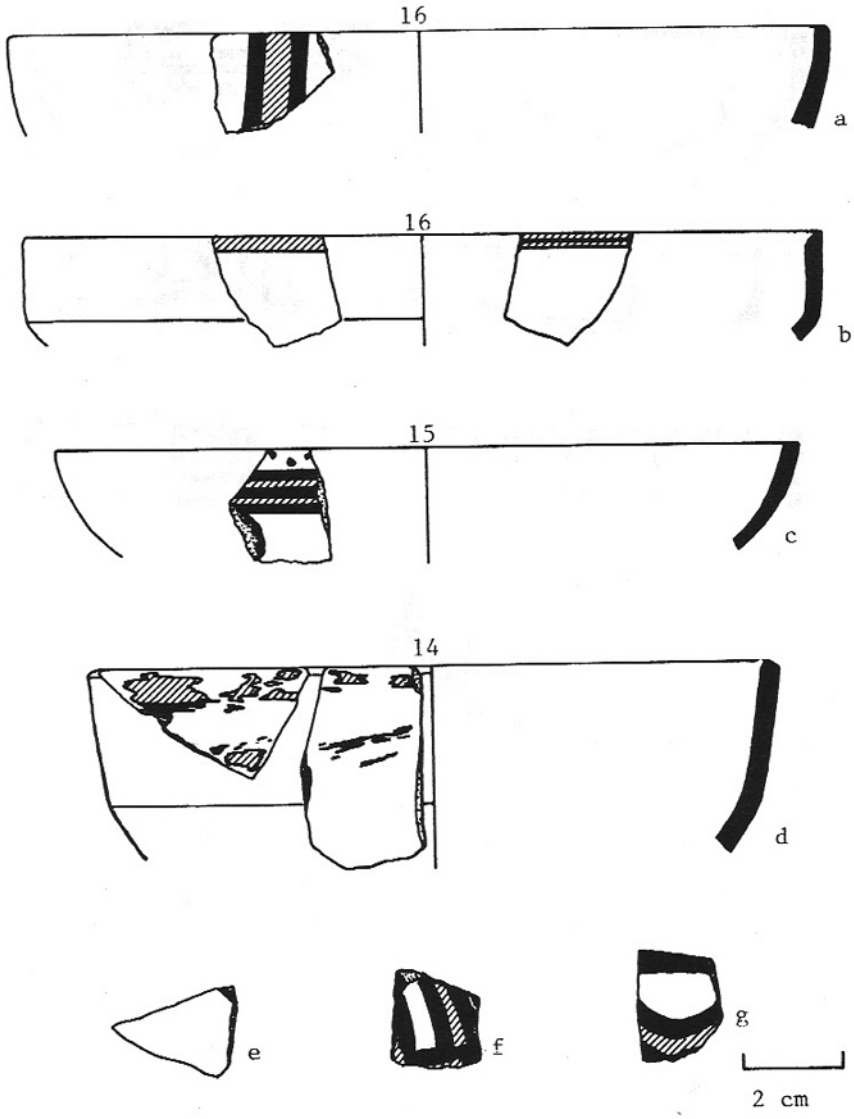


Figure 16. Fragments of kaolin ceramics with red and black painted designs. Numbers represent rim diameters in centimeters.

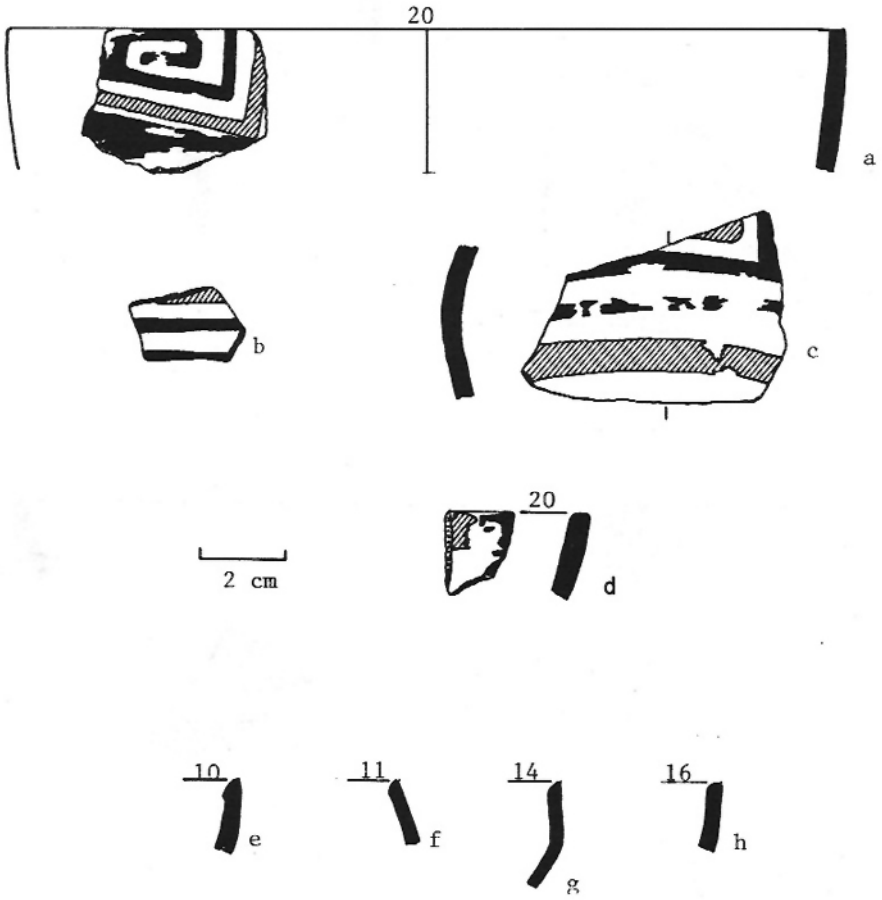


Figure 17. Fragments of fine ware ceramics. Sherds *a-d* are kaolin with red and black painted designs. Rims *e-h* are fine orange ware. Numbers are rim diameters in centimeters.

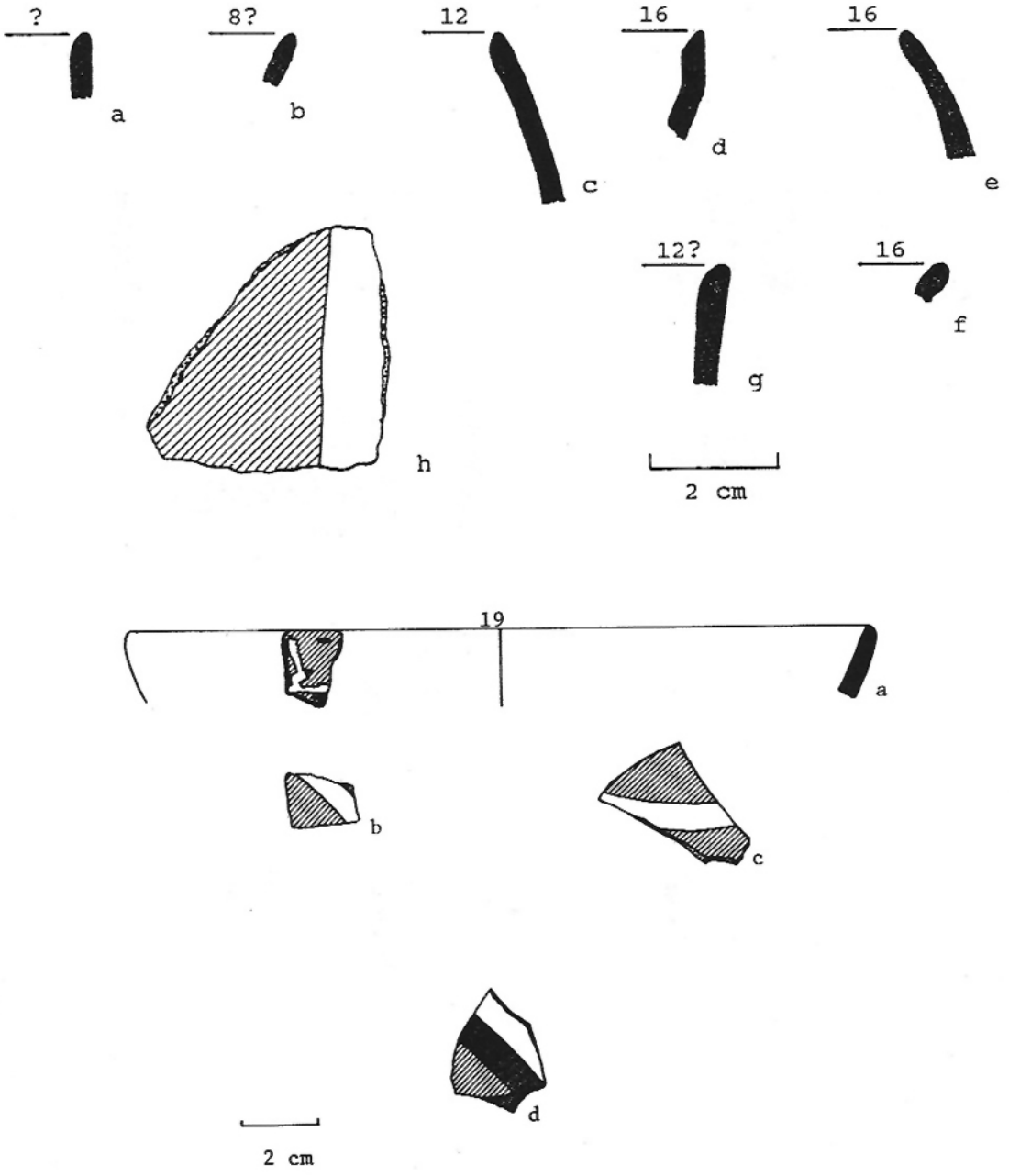


Figure 18. (*above*) Fragments of coarse-tempered red ware bowls. Sherd h shows white paint. Numbers represent rim diameters in centimeters.

Figure 19. (*below*) Fragments of fine ware ceramics. Sherds *a-c* show white-on-red paint. Sherd *d* shows white, red, and orange paints. Numbers represent rim diameters in centimeters.

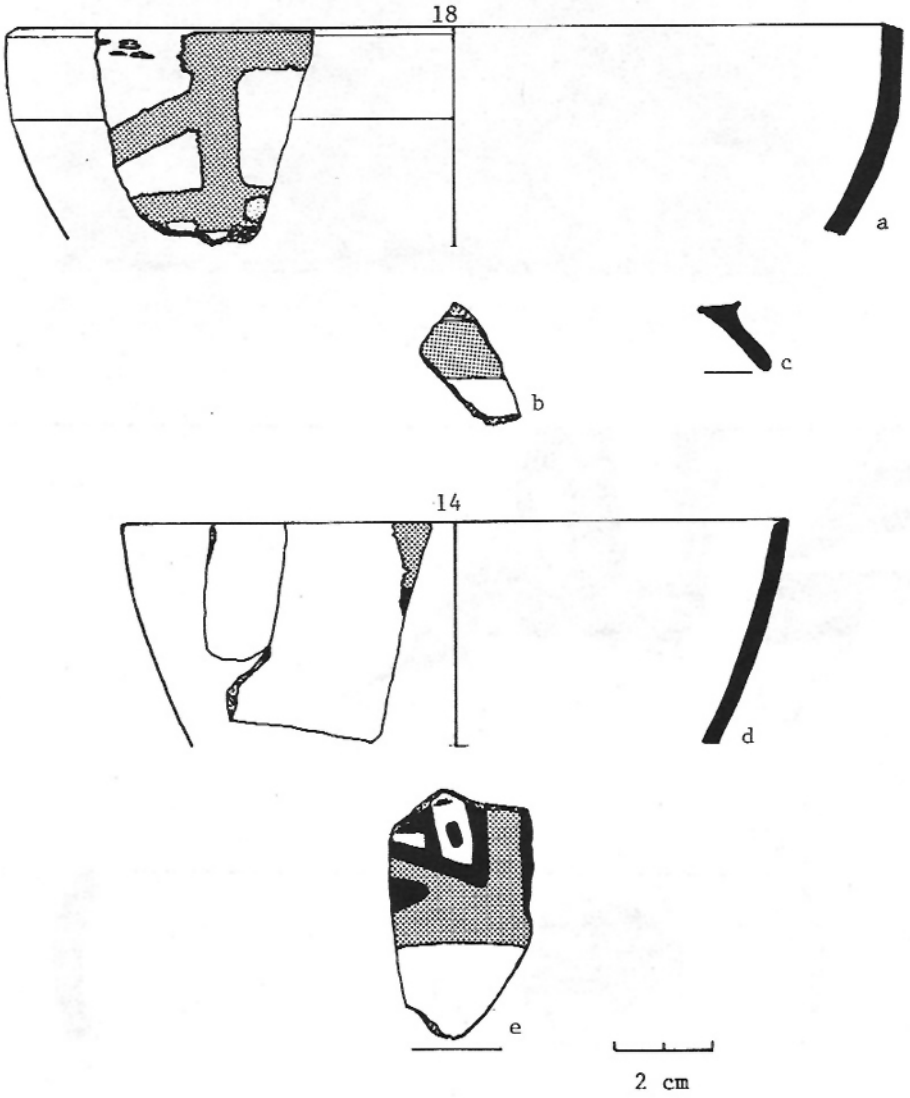
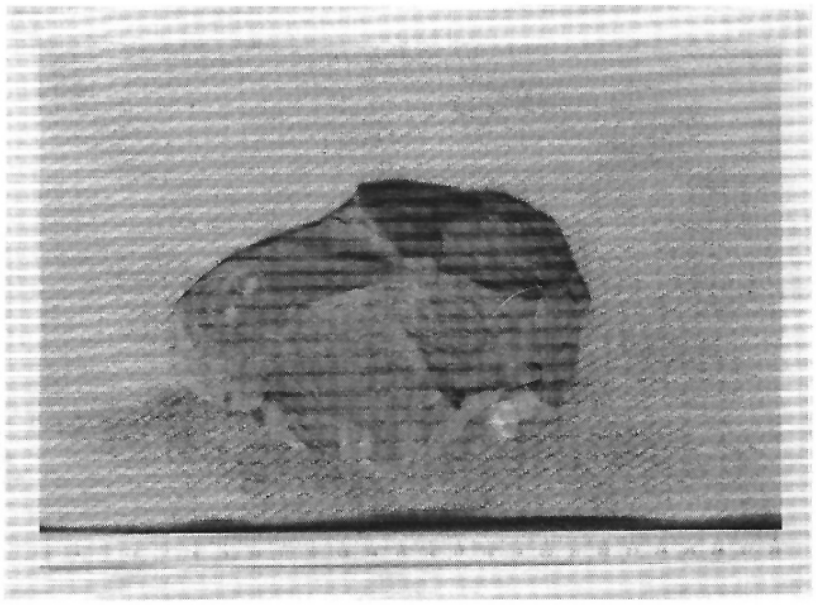


Figure 20. Fragments of fine ware ceramics. Sherds *a-c*, probably from the same vessel, show orange paint on pink kaolin. Sherds *d* and *e*, also pertaining to the same vessel, show orange and black paint on gray kaolin. Numbers represent rim diameters in centimeters.



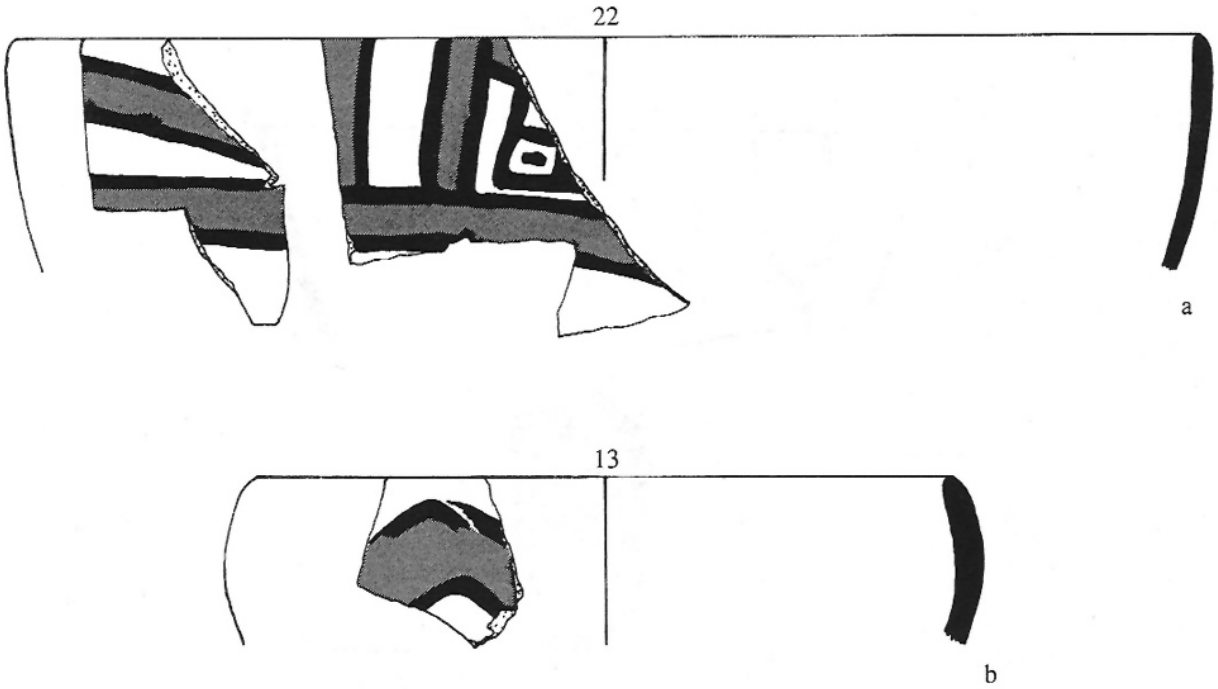


Figure 21. (*above*) Hoe blade recovered from construction fill in base of Building 1, Gran Pajatén.

Figure 22. (*below*) Sherds of probable Middle Horizon age with black and red paint on buff-colored kaolin paste from Chirimachay (Cave) near Pataz. Numbers represent rim diameters in centimeters.