PIKILLACTA

THE WARI EMPIRE IN CUZCO

Edited by Gordon F. McEwan

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This volume is dedicated with
respect and affection to
Dr. Luis Barreda Murillo,
with gratitude for his advice and
support over these many years

Contents

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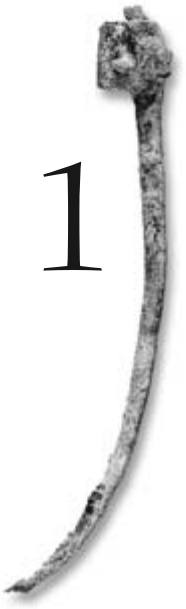


1 Introduction: Pikillacta and the Wari Empire

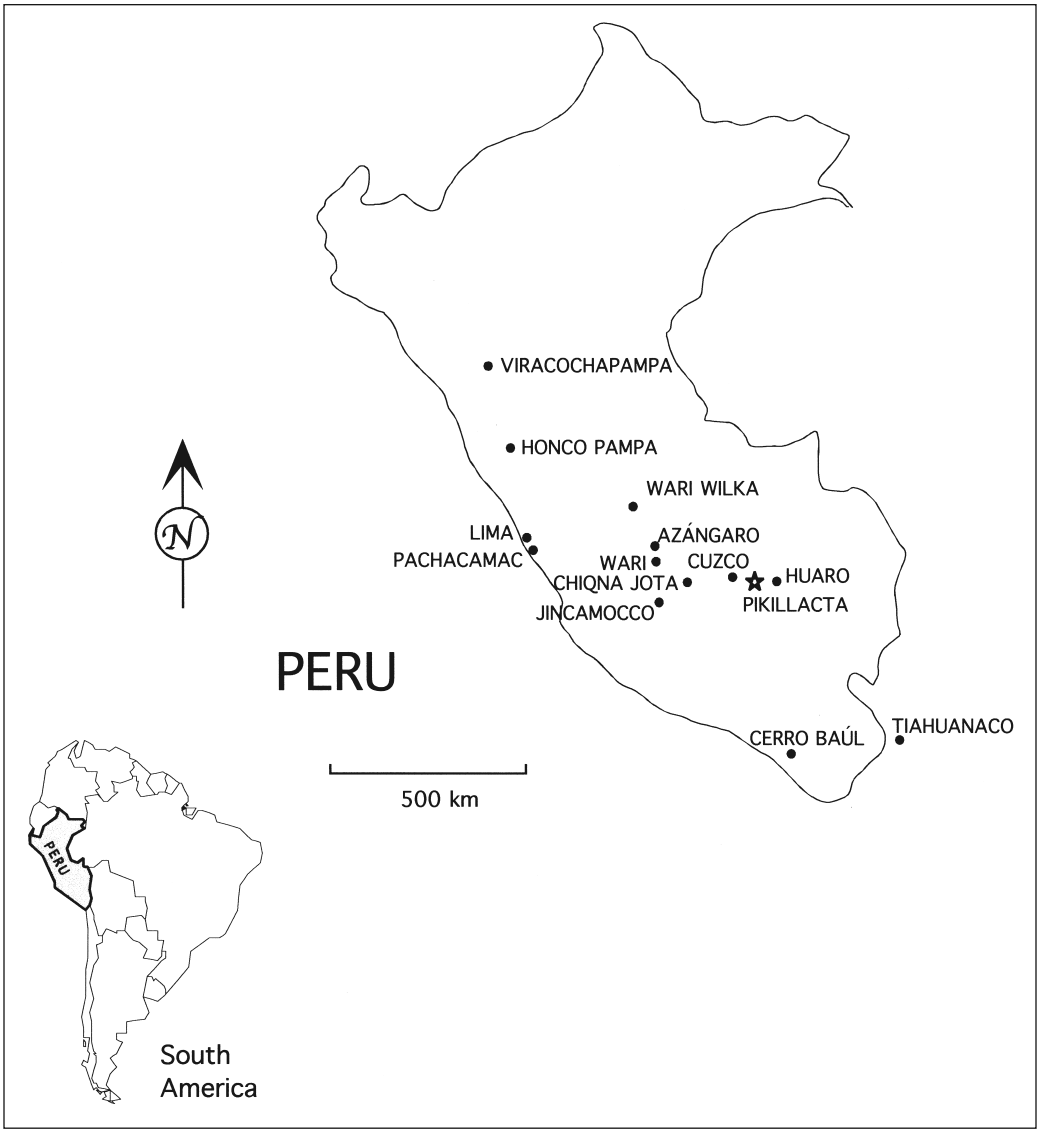
GORDON F. McEWAN

Scholars have long been interested in how, when, and where the first Andean imperial state appeared. Over the past half century research efforts have focused on the Middle Horizon time period (A.D. 540 to 900) and specifically on the remains of the Wari culture, where we find archaeological evidence for the emergence of an expansive empire. Wari style artifacts are found throughout much of what is now modern Peru. Additionally, several extensive architectural complexes have been identified as Wari imperial administrative centers. Most prominent of these are Viracochapampa near Huamachuco in the north Highlands, Honco Pampa in the north Central Highlands, Pikillacta near Cuzco in the south Highlands (and the subject of this volume), Huaro and Batán Orqo southeast of Cuzco, Cerro Baúl in the Moquegua drainage in southern Peru, Jincamocco in the southwest Highlands, and the Central Highland site of Azángaro near the presumed capital of the empire, the site of Wari in Ayacucho (fig. 1.1). These data have been interpreted by many scholars to suggest that the Wari developed the first pan-Peruvian empire.

The Wari State

The Peruvian Middle Horizon appears to have been dominated by two principal polities. One was centered in Bolivia at the archaeological site of Tiahuanaco near Lake Titicaca, and the other apparently centered at the archaeological site of Wari near the modern city of Ayacucho in Peru's Central Highlands. Wari material culture shares a number of artistic attributes with that of Tiahuanaco, and scholars initially thought that there was a single center of diffusion.

Archaeologist Max Uhle (1903) was the first to observe the similarity between the Tiahuanaco art style and artifacts from his excavations at Pachacamac, located on the Central Peruvian Coast. These finds suggested the possibility of a Tiahuanaco stylistic horizon predating the Inca Empire. This



1.1. Peru, showing Pikillacta and other Wari sites discussed in the text.

"Tiahuanaco Horizon" was further confirmed in Peru through ceramic studies by Kroeber and Strong (1924) and O'Neale and Kroeber (1930) and summarized by Bennett (1946). The Peruvian material, although sharing some iconography with the Bolivian Tiahuanaco style, was different enough to prompt Tello (1931, 1939) and Larco (1948) to theorize that there must be a Peruvian Highland center of diffusion. Both of them suggested that the center of diffusion was the large prehistoric urban complex called Wari, located near the modern city of Ayacucho in the Central Peruvian Highlands. A reconnaissance of the ruins of Wari by Rowe, Collier, and Willey (1950) and excavations by Bennett (1953) led to the general recognition that Wari was indeed the Peruvian center of diffusion of what came to be called the Wari style. In the 1960s, Menzel's (1964, 1968) studies of Wari ceramics isolated and seriated several major styles. Her

work suggested that the spread of Wari influence resulted from a cultural expansion based on military conquest directed by a highly centralized authority. In subsequent work she discussed the role that religious ideology may have played in the structure and history of the Wari state (1977). The Wari ceramic sequence has been further refined by work at Wari by Lumbreras (1960a, 1960b, 1975), Benavides (1965, 1984, 1991), Pozzi-Escot (1982, 1991), and Isbell (1985, 1986, 1987; Isbell and Cook 1987) and his students Knobloch (1976, 1983, 1991) and Cook (1979, 1983, 1985, 1987, 1994). Further ceramic studies of Wari affiliated sites have been done by Paulsen (1968, 1983), Ravines (1968, 1977), Thatcher (1974, 1977), Meddens (1985), and Glowacki (1996a, 1996b, and this volume).

In addition to a stylistic horizon of ceramics and other portable artifacts, the Wari Empire has been defined by a widespread, highly uniform architectural style. Shifts in settlement patterns co-occurring with the introduction of this architectural style during the Middle Horizon have also been viewed as a diagnostic trait of the Wari Empire (Lumbreras 1974; McEwan 1979, 1983, 1984a, 1984b, 1985, 1987, 1990a, 1990b, 1991, 1992, 1996, 1998; Rowe 1963; Schaedel 1966; Schreiber 1978, 1983, 1987, 1991, 1992; Willey 1953). Changes in settlement patterns seem to suggest a reorganization of economic and social activities with an emphasis on centralized administrative control and channeling of resources. This suggests the imposition of an imperial organization (Schaedel 1966).

Beyond a widespread architectural and artistic tradition, the archaeological remains of the Wari culture seem to meet many of the criteria used in anthropological definitions of the state. These definitions commonly include concentration of economic and political power, monopoly of force, organization along political and territorial lines, and differential access to resources based on status (Adams 1966; Freid 1967; Service 1962; Wright 1977). Trigger (1974: 98–101) has noted that the distribution of varying sized settlements is likely to be significant in interpreting political organization. In complex societies the size and architectural features of some settlements are likely related to their position within an administrative hierarchy. Wright and Johnson (1975) have defined the early state in Mesopotamia using the criterion of a site-size hierarchy, which they argue would reflect a parallel hierarchy of decision making. Supporting evidence of administrative function such as cylinder seals and stamps which provide information regarding commodity exchange through the levels of hierarchy is considered necessary to confirm the administrative function of the size hierarchy. Wright (1977) has observed that states are internally specialized comprising more than one decision-making level within the centralized administrative hierarchy. Such systems entail a series of regional administrative centers and an efficient communication network for the transfer of information between levels of the administrative hierarchy.

Isbell and Schreiber (1978) have considered the Wari data in the context of these observations and have applied the Wright and Johnson (1975) site-size hierarchy model to the Wari data. They concluded that the distribution of Wari sites tends to conform to this model and thus supports the concept of a state-level political organization. They also cite evidence for a Wari highway network providing the communications link between the various sites. Specific supporting artifactual evidence for administration, such as cylinder seals found in the Middle East, or for a system of writing remains lacking however. The Andean equivalent would perhaps be the knotted cord *quipu* used by the Inca, and probably the Wari, for state record keeping. Unfortunately these cannot be deciphered to the same extent as the Middle Eastern data.

The Structure of the Wari Empire

The Inca imperial state is the model used most often for the reconstruction of the Wari Empire. This model seems appropriate since there are some obvious similarities. Most of the major

provincial Wari sites are located along the Inca highway system, implying an earlier, similar road network in use by the Wari. In addition, the distribution of the major Wari provincial centers geographically parallels many of the late-Inca centers (W. H. Isbell 1978: 373–374). The largest of the Wari provincial centers, the subject of this study, is located in the heart of Inca territory in the valley of Cuzco and may have provided the actual point of transmission of the knowledge of statecraft to the peoples who later formed the Inca state. Finally, the Wari seem to have reorganized parts of their domain for economic purposes in ways that are strikingly similar to Inca methods (Schreiber 1987, 1992).

Using the available data and some elements of the Inca model, William Isbell has formulated a theory of the Wari expansion. He argues for the development of a centralized hierarchical system growing out of hydraulic management requirements in Ayacucho. This system is seen as utilizing a fictitious reciprocal relationship between the citizen and state in order to extract labor revenue (W. H. Isbell and Cook 1987: 90). He also postulates the development of state energy-averaging institutions, including state-sponsored storage and the exploitation of contrastive eco-niches (W. H. Isbell 1978). Selective advantages were thus conferred on the Wari system, enabling it to respond to ecological pressures through territorial expansion. He views the widespread distribution of intrusive state architectural facilities as the archaeological evidence for this model. These facilities include the sites of Viracochapampa, Azángaro, Jincamocco, and especially Pikillacta. In Isbell's model these sites represent centers of state storage and administration. They are the major nodes in the administrative hierarchy of the empire. Schreiber (1987) has supported Isbell's formulation and the utility of the Inca model using the example of the Jincamocco site to demonstrate the argument for an imperial Wari state.

Martha Anders (1986a, 1986b, 1991) viewed the Wari polity as an empire but had a somewhat different view of state structure and the degree of centralization. She strongly argued for a decentralized religiously based empire that relied on relatively autonomous local-level lords and traditional reciprocal networks to maintain integration. Using the coastal Chimu culture as a model, she saw a dual-based authority emphasizing horizontal interdependent relationships over hierarchical ones as characteristic of the Wari imperial structure. Her model is much more strongly based on religious influence, in marked contrast to the majority of Wari scholars, who have argued for a highly secularized Wari state. Her interpretations of Wari architecture are also radically different. She believed that the large rectangular architectural complexes had a highly specialized function as calendrically based ceremonial centers.

An alternative and contrastive view of the Middle Horizon is that held by Carlos Ponce (1976: 60–61, 1980). He essentially argues that what many scholars recognize as the Wari Empire is simply a subsidiary manifestation of an all-embracing Tiahuanaco Empire. The distinctive Wari remains resulted from the partial assimilation of the Tiahuanaco elements by the well-developed conquered cultures in Peru. Alan Kolata (1983: 253) has similarly argued that Wari was a subset of the Tiahuanaco Empire, although he concedes its ultimate independence.

Yet another alternative view of the Middle Horizon holds that there were no empires. Instead it is argued that this time period was characterized by the existence of a large number of independent regional centers. Bawden and Conrad (1982: 31–32) do not believe that the existence of a conquest state centered at Wari is supported by the evidence used in other models, namely the architectural and artistic horizon. They attribute the artistic horizon to religious proselytization from Tiahuanaco. This rejection of the architectural horizon as evidence of empire is a view also held by Shady (1981, 1982: 62, 1988). However, she views the artistic unification as being the result of active trade among independent political entities. One other model of the Middle Horizon as characterized by frag-

mented regional autonomy is presented by Shea (1969). He suggests a model in which a series of independent oracles were linked into a loosely organized religious hierarchy possibly dominated by the Pachacamac oracle on the Central Coast.

Schreiber (1992) has produced the most comprehensive description of the Wari Empire and its form. Arguing for a "mosaic" model of imperial control, she makes a convincing case that the Wari used a multitude of methods for regional domination that varied with the local conditions that they encountered. This flexible approach could be tailored to the requirements of the region with respect to its population density, pre-existing degree of social complexity, resource base, and strategic importance.

In the past twenty years the Wari expansion has been looked at through a number of field studies of the provincial Wari centers. In the Central Highlands, near the capital of Wari, these investigations include the work of Anders (1986a, 1986b, 1991) at Azángaro, as well as work at Conchopata by William Isbell, by Cook, and by Pozzi Escot (1991) and Isbell's work at Jargampata (1977). John and Theresa Topic (1983, 1986, 1991, 1992) studied Viracochapampa in the north Highlands and William Isbell (1989, 1991b) worked at Honco Pampa, also in the north Highlands. Schreiber (1978, 1983, 1987, 1991, 1992) has investigated the site of Jincamocco in the southwest Highlands and has studied the local impact of the Wari expansion on the rural valley in which the site is located. She has also studied the Wari impact on the Nazca drainage. Meddens (1985) has also worked in the southwest Highlands at Chiqna Jota. Moseley, Feldman, Goldstein, and Watanabe (1991) and Moseley's students Williams and Nash (2002, Williams 1997, 2001) have investigated the Cerro Baúl site in the south Coastal valley of Moquegua. In addition to the new work reported here, I have previously worked for a number of years at Pikillacta in the south Highlands as well as at Wari Wilka in the Central Highlands (McEwan 1979, 1983, 1984a, 1984b, 1985, 1987, 1991, 1992, 1996).

In 1985, many of these Wari scholars gathered at Dumbarton Oaks in Washington, D.C., for a roundtable discussion cochaired by William Isbell and myself. The purpose was to air the results of recent archaeological projects investigating presumed Wari provincial centers. Although the participants held diverse points of view in terms of the theories of the Middle Horizon mentioned above, this meeting resulted in general agreement on several issues. It was generally agreed that the Wari architectural and iconographic evidence represents the remains of state-level polity that was an empire. It was also generally accepted that Wari and Tiahuanaco are two separate entities and possibly quite different in terms of political organization.

While most investigators agreed that provincial Wari centers imply some degree of expansionism, many questions remain regarding the formulation and functioning of the empire. Among these are debates regarding the degree of centralization and the amount of control that the Wari achieved in distant territories. Opinions of Wari scholars fall broadly into two groups. One group sees a powerful Wari state heavily dominating provincial areas. The other group sees Wari influence within the context of relatively independent political units. And, of course, there is the possibility that each is correct in certain instances.

Contributing to these arguments is the fact that the functions of the architecture in the imperial provincial centers, and indeed the functioning of the centers themselves, still remains difficult to interpret. We don't really know what the Wari were doing in their provincial centers. While it is assumed that these centers must have had administrative responsibilities, scholars had been unable to clearly distinguish between religious and secular architecture in provincial contexts or define specific functions for any class of structures.

The chronology and timing of the Wari expansion in provincial areas also remain problematic. The traditional view, first expressed by Menzel (1964, 1968), confining the Wari ex-

pansion to the first two epochs of the Middle Horizon, was based on data from the Wari center in Ayacucho as well as the adjacent coastal valleys. Data from the provinces is now becoming available and will occasion adjustments of the basic Wari chronology.

Finally, the nature of the relationship between Wari and Tiahuanaco remains largely unknown. Despite shared iconography, and long periods of coexistence, there is as yet only one poorly known point of cultural interface in the archaeological record, the site of Cerro Baúl in the Moquegua valley. The nature of relations between these two great Middle Horizon powers undoubtedly influenced archaeological patterning of the provincial areas between them.

In order to address some of these questions, this study of the largest and best-preserved Wari provincial center, Pikillacta, was undertaken. Excavations of architectural remains have provided a means to approach the questions of structural functions and, more broadly, the functions of the large provincial complexes as a whole. Architectural function studies also reveal the degree of centralization of the empire and shed some light on the nature of the imperial presence in the provinces.

Chronological studies of the imperial expansion are being carried out through analysis of decorated ceramic artifacts from the provinces augmented by radiocarbon dating. The work of Menzel (1964, 1968), Cook (1979, 1985, 1994), and Knobloch (1976, 1983, 1991) at the imperial center at Wari has provided a detailed ceramic chronology that provides a basis for interpreting the provincial chronology. Glowacki's recent study of the ceramics from Pikillacta (1996 and this volume) makes a major contribution to this effort.

What follows is the result of three principal episodes of study of the Pikillacta site. The first was undertaken in 1978 and 1979 as research for my master's thesis. This was followed in 1981 and 1982 by excavations conducted for my doctoral dissertation. Finally, I directed a two-year excavation project in 1989 and 1990 during which extensive excavations were carried out in selected architectural types and in the site's principal trash midden.

These studies have produced a mass of data that defies simple interpretation. On the one hand, much of the data speaks to the understanding of straightforward processes such as how the site of Pikillacta was built, how long it took to build, when it was built, and how much it cost. The problem of the nature of the hydraulic system used to supply its water also lends itself to basic engineering analysis. These data tell us quite a lot about the sheer power and wealth of the Wari Empire and the intellectual sophistication of the Wari themselves. However, when we get to the question of why was the site built and what it was used for, interpretation becomes much more difficult.

Using the data provided by ceramics and other artifacts, and the characteristics of the architecture, I have developed a hypothesis for the function of Pikillacta which attempts to account for its peculiarities. Using ethnohistoric information about Andean ancestor worship and its manipulation by the Inca as a method of social control, I have developed a model suggesting that the Wari were the innovators of this technique in its use as a means of statecraft. It is argued that one of the functions of Pikillacta was as a device for storing and controlling the ancestral mummies and *huacas* of subject peoples and that these were held as insurance of the good behavior of their descendants. In the same location Wari ancestors were possibly kept as well, whose function was to cement bonds of fictive kinship with local lineages that were adopted into the Wari system. Administration would therefore have been carried out in the presence of and with the implied sanction of lineage ancestors. While one cannot at this point prove or disprove this model of Pikillacta's function, and recognizing the problems inherent in projecting the Inca model backward through time some 500 to 800 years, I would nevertheless argue that this model presents a useful point of departure for the study of these large Wari architectural complexes.

The recent discovery of the Wari site at Huaro by Peruvian archaeologist Julinho Zapata has raised even more questions about the nature of the Wari occupation of Cuzco. This new site, which is at least as large as Pikillacta and only 15 kilometers to the east, seems to have a much more extensive and complex artifactual component, suggesting a more intense occupation by a larger and presumably living Wari population. It is clear that the Wari investment in infrastructure in the Cuzco area is much larger than previously understood. It now seems that an additional major administrative node of the empire was located at Huaro, only 15 kilometers further east from Pikillacta, and this seems to underscore the special function of the Pikillacta complex. Future work at Huaro and other Wari sites in the Cuzco area will eventually allow us to comprehend the structure of the Wari imperial presence. For now this report on the studies at Pikillacta provides a first step toward that larger goal.

This volume is divided into three main sections. The first section explores the site of Pikillacta and its architecture. Nicole Couture and I begin in chapter 2 with a discussion of the typology of the architecture, followed by my report in chapter 3 of the excavations and the investigative strategy used. In chapter 4 I discuss the labor costs of the construction of the site, providing a picture of the level of investment of the Wari Empire in the Cuzco region. Related to this is the discussion by Alfredo Valencia in chapter 5 of the complex hydraulic works, consisting of canals, reservoirs, and aqueducts that the Wari had to erect before they could even begin to build the Pikillacta site.

The second section deals with analysis of the principal data sets recovered from Pikillacta. All of the data sets have not yet been studied. The faunal and lithic collections remain to be analyzed. We present here those analyses that have been completed. These include the studies of ceramics and chronology in chapters 6 and 7 by Mary Glowacki which provide new insight into the timing of the Wari expansion and the duration of the empire, discussion of human remains in chapter 8 by John Verano, and an analysis of metal artifacts and their significance in chapter 9 by Heather Lechtman.

The final section presents my conclusions regarding Pikillacta and its function. From the hard data recovered I develop a hypothetical model of Wari provincial administration in the Cuzco region. I argue that the Wari were innovators of important techniques of statecraft involving ancestor worship that explain the function of and the labor investment in the Pikillacta complex. The long-term Wari occupation of Cuzco had a tremendous cultural impact and set the stage for the development of the later Inca state.

Exploration and Excavation at Pikillacta

2 Pikillacta and Its Architectural Typology

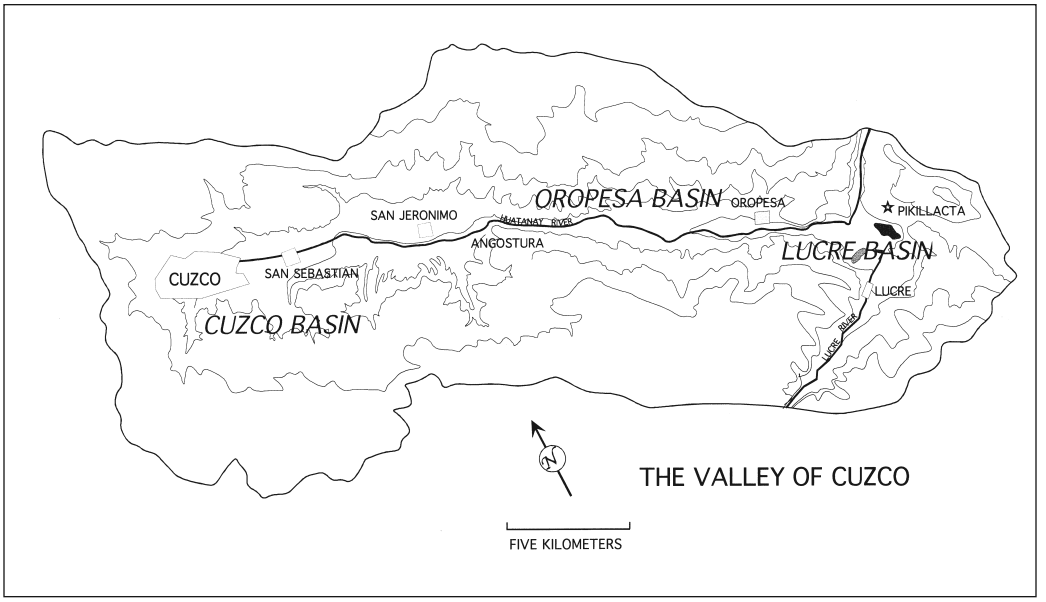
GORDON F. McEWAN
AND NICOLE COUTURE

Pikillacta is an enormous and complex structure. In order to make sense of it and to perform an archaeological analysis it has been necessary to deconstruct it into its component parts. In this chapter we review various attempts at deciphering the structural concepts originally employed by the Wari architects. We propose a systemization that we believe accurately reflects the Wari typology and is therefore broadly applicable throughout the Wari Empire. This typology in turn presents a basis for forming an excavation strategy.

Introduction to Pikillacta and Site Description

The enormous archaeological ruin of Pikillacta, one of the largest and most unusual planned architectural complexes in the ancient Americas, dominates the Lucre Basin at the eastern end of the Valley of Cuzco (see figs. 2.1–2.3). Its name means "flea-town" in Quechua and probably dates from Inca or even Colonial times; the original name is unknown. Located on the north side of the basin, the site lies on a series of low ridges that form the western flank of Cerro Huchuy Balcon (fig. 2.3). The average elevation of the site is approximately 3,250 meters above sea level. The most densely constructed part of the site consists of a very large, rectangular enclosure that contains most of the architecture. This enclosure measures approximately 745 meters northwest to southeast and 630 meters southwest to northeast. On the north and southeast sides of the main architectural block are several large semi-rectangular enclosures that appear to be corrals and are commonly called the *canchones* (fig. 2.4). With these enclosures taken into account, the site measures approximately 1,680 by 1,120 meters, or nearly 2 square kilometers.

In order to facilitate the study and mapping of the ruins, the main architectural block was divided into four sectors that appear to correspond



2.1. The Valley of Cuzco.

2.2. The Lucre Basin of the Valley of Cuzco from the air. Pikillacta is in the upper right quadrant. Courtesy of Servicio Aerofotográfico Nacional, Peru.

to original units employed by the ancient Wari architects (fig. 2.4). Sector 1, the part of the site having the highest elevation, consists of 81 rectangular enclosures averaging 35 to 40 meters on a side. The structures are arranged in a rectangular grid having five rows of fourteen enclosures each and one row of eleven. This row of eleven gives the impression of never having been completed as the last three enclosures appear to be missing, but due to poor preservation in this area it is difficult to determine whether or not this is the case. Of the eleven structures in this row, six contain interior walls and subdivisions forming long narrow rooms arranged around an open patio. These are alternated with five apparently empty enclosures. The lowest row of fourteen enclosures is composed of rectangular compounds, all with narrow perimeter rooms and alternating compounds enclosing a niched hall in its courtyard. All of the remaining fifty-two structures, in the middle rows, are rectangular compounds with narrow rooms arranged on their perimeters. The preservation of the ruins in Sector 1 is very poor. Most walls are destroyed to the surface level and only a few fragments stand higher than 2 or 3 meters. There are no streets or other means of access visible in this area.

Sector 2 is architecturally the most complex part of the main block, with great variety of size and distribution of structural types. The sector contains 124 enclosures or compounds; most appear to be rectangular compounds with narrow rooms arranged around their perimeters, similar to those in Sector 1. There are also five large niched halls located in Sector 2. Additionally there are four very long series of narrow rooms paralleling the southwest side of this sector just above the junction with Sector 3. These are subdivided into sections by cross-walls and gates. Preservation of the northeast half of Sector 2 is very good, with many structures having walls still standing to heights of 10 to 12 meters above the present ground surface. In contrast, many of the structures in the southwest half of Sector 2 are destroyed almost to the surface level or obscured by wall rubble. Three streets pierce this sector and a fourth divides it from Sector 1.

Sector 3 consists of a very large open area, twelve rectangular enclosures, and a large set of terraces constructed in 1934. The structures are arranged at either end of the large open area, with eight located at the west end and four at the east end. There are three large niched halls in Sector 3, two are within enclosures at the west end and one is in an enclosure on the east end.

Just outside of the southwest wall of Sector 3 is Exterior Group 1 that is separated from Sector 3 by the terminus of Avenue 8. This group consists of seven rectangular structures set on an artificial platform. They are destroyed to their foundations.

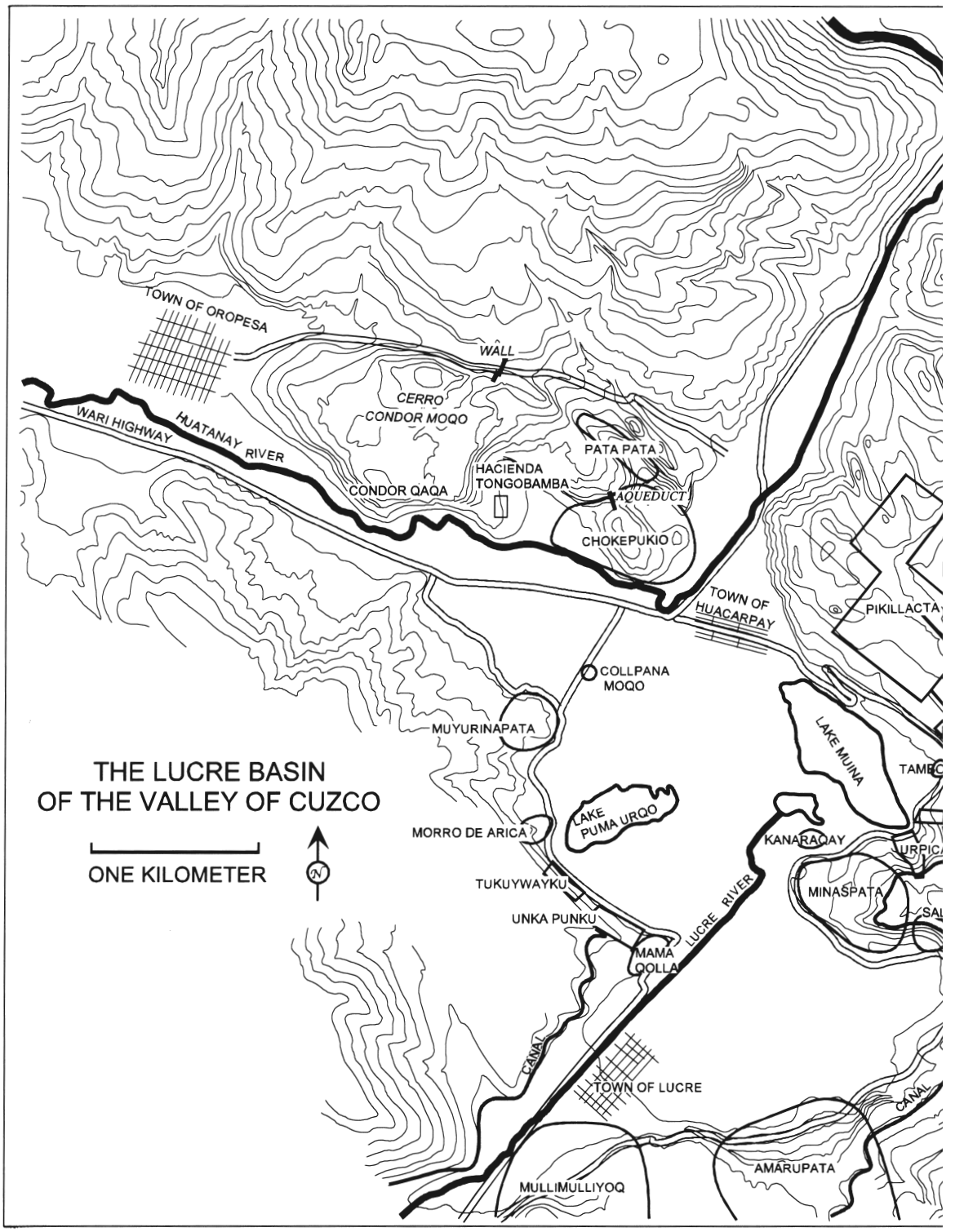
The reconstructed terraces on the northeast side of Sector 3 sit on top of some original foundation walls that cross them at right angles. I suspect that originally there may have been a series of parallel narrow rooms here that would be more in keeping with the organization of the architecture in all other parts of the site.

No original streets penetrate Sector 3. It is separated from Sector 2 by Avenue 9, which may have been an original feature, but it has been reconstructed. The condition of the nonreconstructed walls in Sector 3 is generally poor, with only the peripheral wall standing, about 12 meters high.

Sector 4 consists of 501 small conjoined rooms (see figs. 2.4 and 2.7). These are arranged in neat rows, resembling links in a chain, and are divided into five discrete groups, A through E. Each structure has a doorway and is served by an alley running in front of it, in marked contrast to the seeming lack of access in other sectors of the site.

Group A of Sector 4 consists of 48 small conjoined buildings and has a destroyed rectangular architectural block associated with it. A ravine running through it is probably the result of stone-robbing in Colonial and more recent times.

Group B, consisting of 153 small rooms, does not include a large rectangular structure.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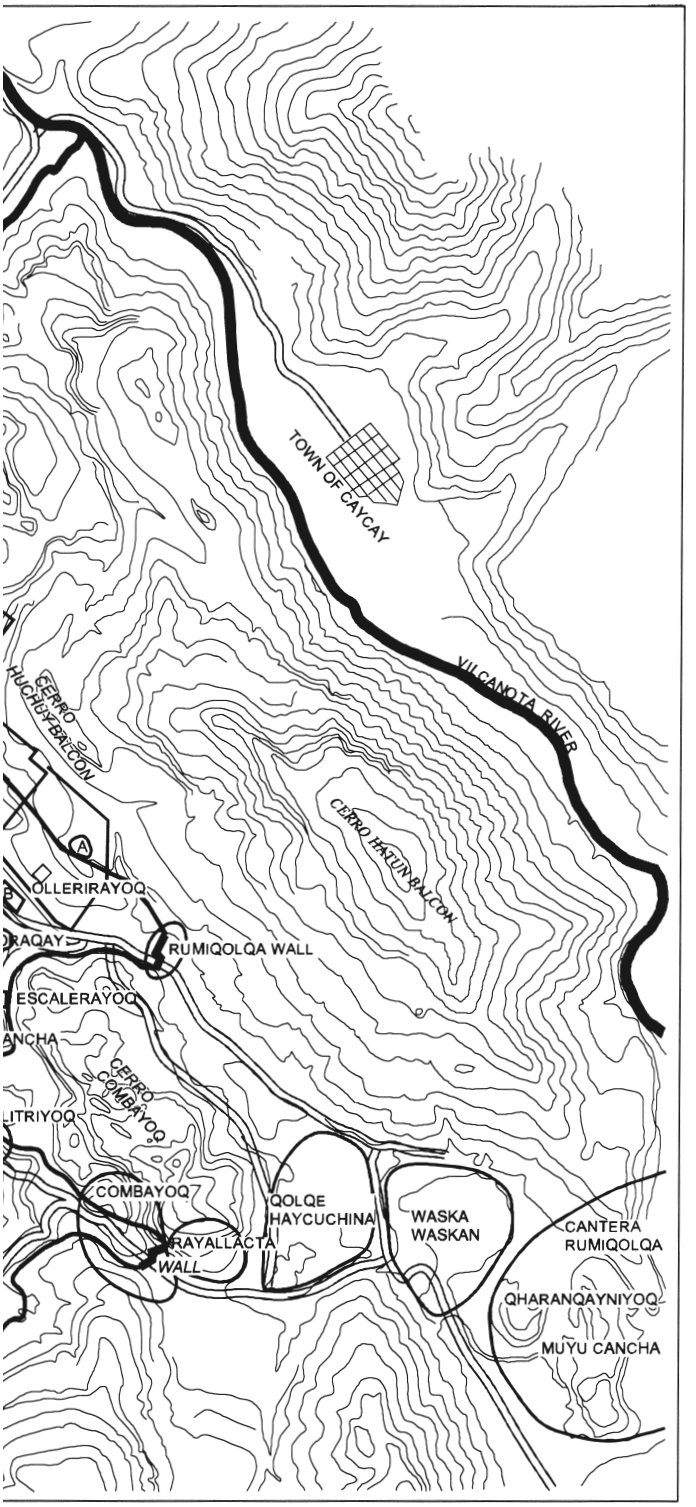
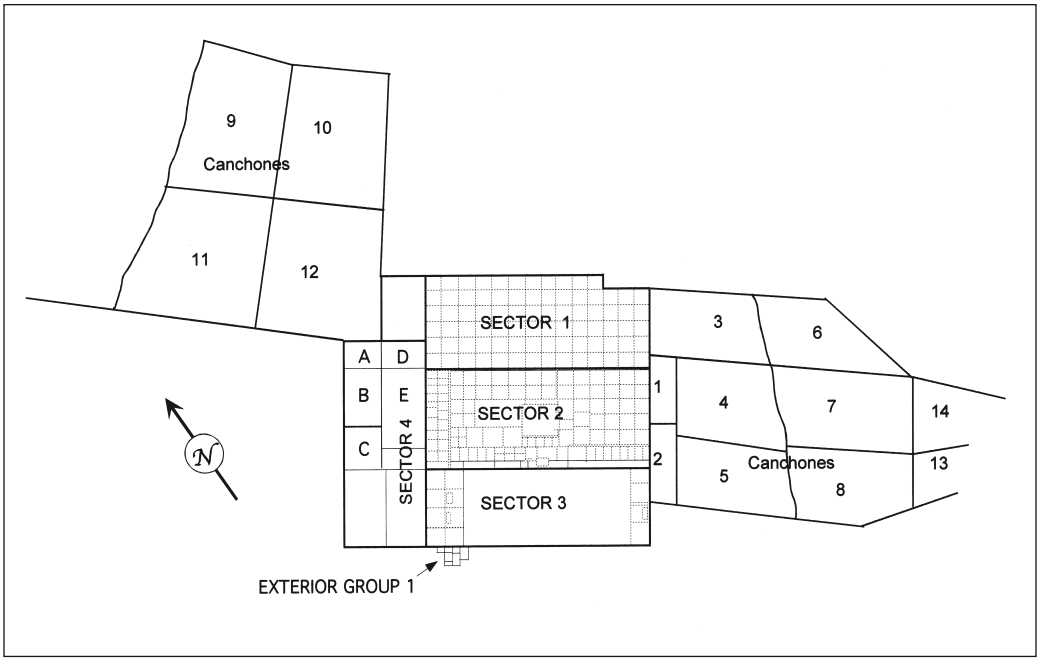


2.3. The Lucre Basin showing the location of Pikillacta and other principal archaeological sites.



2.4. Division of Pikillacta by sectors.

However, this group may have been associated with the rectangular structure in Group C.

Group C differs from the other groups in that the 122 small rooms are divided into subgroups of 4 and 5 each, by walls and gates built across the streets between the rows. Three large rectangular structures are also found within Group C. Two are located in the western corner of the group and another is located in the eastern corner of the group.

Group D consists of 35 small conjoined buildings divided into two blocks and separated from each other by an architectural block containing seven rectangular enclosures. Within these are three small niched halls, and one of the enclosures shows remains of narrow peripheral rooms. Group E consists of 149 small conjoined buildings and also contains a single large rectangular structure in the southern corner. There are also a few cross-walls and gates in the streets of this group.

Approximately half of the space of Sector 4 is taken up by six very large rectangular enclosures. Four of these are located at the southwest end of the sector, one is at the northeast end, and one lies between groups D and E. The one between groups D and E may have some buried structures within it, but excavation will be required in order to prove this. Otherwise all of these large enclosures appear to be empty except for the one at the southwest end of the sector, which contains, in its southwest end, the remains of three rectangular *chullpas* or burial towers. These towers are destroyed to their foundations, which measure approximately 1 × 1 meter. Their identification is based on comparison to better preserved examples which exist elsewhere in the basin. I believe that these *chullpas* are a later intrusion, since they are not typical of the Wari culture, and they probably represent a reuse of this portion of the site in the Late Intermediate Period.

The preservation of the walls in Sector 4 varies greatly, although in general it is quite good. The best preserved is Group E, with parts of B and C also in good condition. Some of the walls in these groups still stand to 6 meters in height.

On the north and southeast sides of the main architectural block are two groups of very large

enclosures commonly called the *canchones*. These may have served as corrals, although their function is not certain.

There are four *canchones* on the north side. They are somewhat less carefully made than the usual construction at Pikillacta and do not form perfect rectangles. This group measures approximately 400 by 600 meters. A very strange feature of these structures is that some surviving fragments of the walls are 8 to 10 meters high. Another unusual feature is a rock formation near the center of this group that contains several small natural caves. Looted burials were observed in these caves but their cultural affiliation could not be determined.

On the southeast side of the main block there are eight *canchones*. These also cover an approximate area of 400 by 600 meters. There may be two more *canchones* (13 and 14 in fig. 2.4) between these and the Rumiqolqa wall (see fig. 2.3). Of the eight, five are empty; however, 5 contains the Inca site of Olleriayoq, 7 contains Site A, and 4 contains some unusual earthworks and a fragment of a walled highway approximately 160 meters in length. There are no definite indications of the cultural provenience of these features, but they may be ceremonial in nature for the reasons given in the discussion of Avenue 8 below.

In addition to the few avenues penetrating the architectural block and the streets or alleys between the rows of small conjoined buildings in Sector 4, there are two main avenues that approach the site from the northwest and from the south.

Avenue 8 terminates at Exterior Group 1 just outside the southwest wall of Sector 3. It is approximately 10 meters wide and is walled on both sides. Fragments of these walls still stand 3 and 4 meters high. This avenue runs around the periphery of the western corner of Pikillacta and heads to the northwest, crossing two high, steep hills and several large rock formations. Approximately 500 meters to the northwest of Pikillacta and just after crossing the second hill, the avenue ends abruptly. There is a wall sealing the end at this point and three other walls cross the avenue before it reaches this point. The western wall of the avenue continues on alone past the end wall for approximately 340 meters more and stops at the top of a high bluff overlooking the Huatanay Quebrada and the neighboring site of Chokepukio.

Due to its peculiarities, this avenue could not have functioned as an access to the site. It goes nowhere and does so over the most difficult route available. In some places the rock outcrops that it crosses completely fill the avenue between the walls, forcing one to go out and around in order to pass. These outcrops are part of an enormous geological feature and were not placed in the avenue after it was built. It seems likely that this avenue had some symbolic or ceremonial function. The rock formations to which it runs look suspiciously similar to Inca *huacas*, or sacred stones.

Avenue 1, on the southeast side of Pikillacta, appears to have been functional, providing access to the site. It also is walled and varies between 4 and 6 meters in width. It runs to the south directly towards the Rumiqolqa gate. Its only features are fifteen step-like terraces where it parallels the southeast side of the main architectural block.

The most unusual characteristics of Pikillacta are its size and format. In size, the area covered by the main architectural block and the attached great enclosures compares favorably with Inca inner Cuzco. The site completely dwarfs modern settlements in the area such as Lucre, Huacarpay, and Caycay and is larger even than the modern center of Oropesa (see fig. 2.3). Even the sizes of the individual structures are on a grand scale, with some of them measuring 40 or 50 meters on a side. Some of their ruined walls (fig. 2.5) still stand to heights of 12 meters!

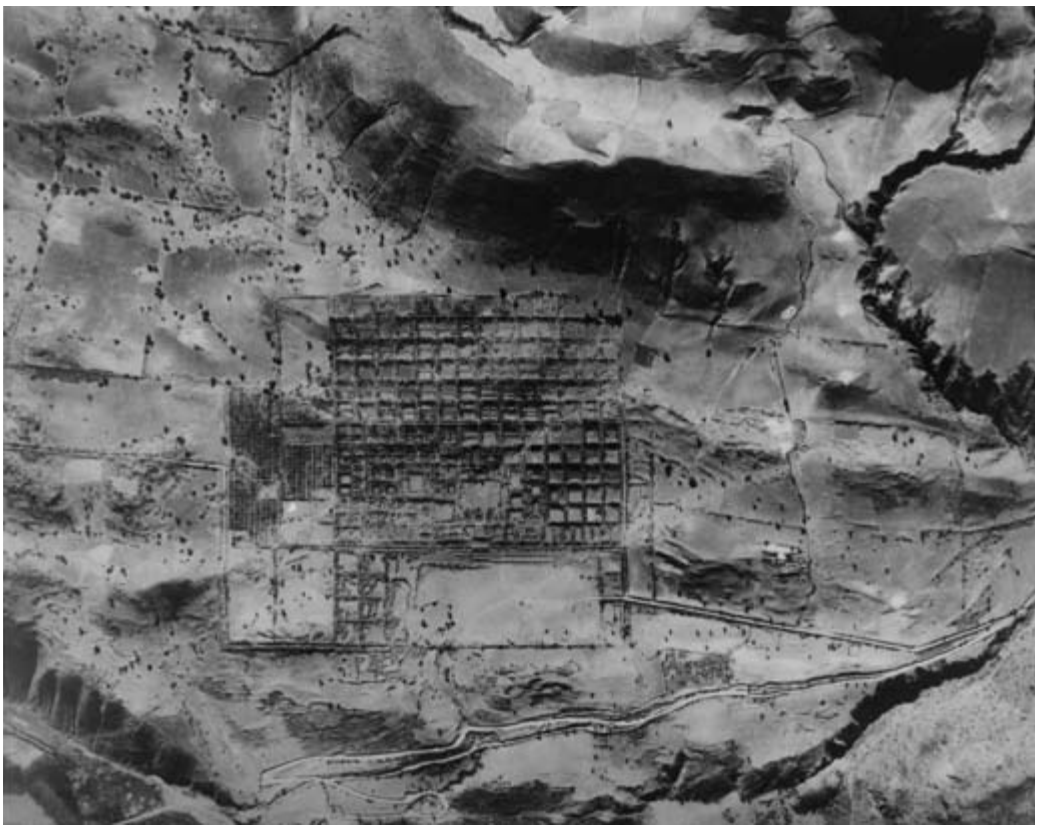
The format of the site is no less impressive: the grid plan of the site forms a nearly perfect rectangle. Viewed from the air (fig. 2.6) the precision of the imposed grid is astonishing; yet it is even more impressive when viewed on the ground. From the air, the precision and symmetry of the architecture tends to fool the eye

2.5. Standing walls in Sector 2 of Pikillacta.

into assuming that the site lies on level ground. First-time visitors are often surprised by the undulating terrain and the steepness of the slope of Cerro Huchuy Balcon. In fact, the top of Sector 1 of Pikillacta is nearly 90 meters higher in elevation than Sector 3.

Beyond its overwhelming size and precise layout, the site of Pikillacta has numerous other peculiarities that have stimulated much comment and speculation over the years. Despite its size and apparent prehistoric importance, there are few if any obvious indications that anyone ever lived there. Aside from architectural remains, there are almost no surface artifacts. Pot sherds in particular are conspicuous by their near total absence. Those few sherds that can be found on the surface tend to be concentrated in the lowest part of the site, Sector 3. Most of these are either nondescript plainware or Inca polychrome sherds brought in by tourists or local children who pick them up at the nearby Inca sites of Chokepukio, Olleriayoq, and Site B (fig. 2.3). A few sherds may also have been contributed by people occasionally transiting the site in Inca times. This situation with regard to sherds stands in marked contrast to nearly all of the other sites in the valley of Cuzco and, for that matter, most ceramic period sites in Peru. Usually on a site of this kind one would expect to encounter thousands of ceramic fragments.

Without the evidence of surface ceramics to assist in assigning cultural provenience, the site's association with the Wari culture was not recognized for many years and was not generally accepted until the late 1950s and early 1960s when Rowe (1956: 149) noted its architectural similarities with the site of Wari in Ayacucho. Sanders' (1973) excavations in the early 1960s revealed Wari style ceramics and confirmed Rowe's observation. Even with the recognition of its cultural provenience, the dating of Pikillacta's construction remained only somewhere within the



2.6. Air photo of Pikillacta. Courtesy of Servicio Aerofotográfico Nacional, Peru.

Middle Horizon, a time span including several hundred years. The actual date of construction remained almost as obscure as the question of whether or not it had been occupied.

A further complication to the occupation question was the problem of determining how the occupants circulated within the complex, and how and for what purpose it was used. There are more than 700 individual structures or cells within the main architectural block yet very few corridors penetrate this dense mass of buildings. Those that do would provide access to only a small percentage of the structures. To complicate the matter, there are very few observable doorways or windows in any of the walls which would permit access. The majority of the doorways encountered in mapping the site were in the interior of structures or enclosures. This apparent absence of doorways in the high walls of Pikillacta has led to speculations such as the theories that it served as an insane asylum or prison, with the absence of entryways necessary for the confinement of the inmates (these are reported in Sanders 1973: 403).

Yet another mystery concerning Pikillacta was its water supply. If it had functioned as a city, a very large amount of water would have been required for the daily needs of the people living there. This problem seems to have mystified even the Incas, who, as Pardo reports (1933, 1937: 199), had a legend about a contest to bring water to Pikillacta, with a beautiful maiden, named Sumac Tica, as the prize. The results of this contest were supposedly the construction of a canal and the Rumiqolqa aqueduct that, it is said, brought water from the Río Lucre across the basin. As I reported in earlier work (McEwan 1984, 1987, 1991), it appears on casual inspection

that the Rumiqolqa wall, on top of which the aqueduct was supposedly built, lies at a lower elevation than Pikillacta, and in order for water to reach Pikillacta it would have had to flow uphill. However, recent work by Alfredo Valencia and Wright Water Engineers, Inc. has conclusively demonstrated that Pikillacta was indeed connected to a canal system via the Rumiqolqa aqueduct. These canals are discussed in detail in chapter 5.

The part of the site that has elicited the most interest and speculation is the group of 501 small conjoined rooms located on the northwest side (see ground plan, fig. 2.7). These relatively small, uniform structures are laid in orderly rows with streets running between each row. Seen from the air, they resemble a giant honeycomb. Inasmuch as the Inca were known to build rows of small storage buildings called *qolqa*, it has been speculated that these numerous small structures also must be storage silos (Harth-Terre 1958, 1959). Since state storage and redistribution systems seem to have been at least a theoretical requirement of imperial administration in pre-Columbian Peru, the notion of Pikillacta as a state storage center became deeply embedded in the literature, despite the lack of an archaeological test for this function or for the function of the site in general.

Previous Studies

Pikillacta seems to have first gained the serious attention of prehistorians as a result of the 1927 discovery of two remarkable sets of carved, green-stone figurines. Each set was comprised of forty figurines dressed in distinctive costumes and headgear. The contents and circumstances of this find were reported by Luis Valcarcel in 1933 and again by Trimborn and Vega in 1935. Although Pikillacta became known for this "turquoise treasure," very little was published regarding the site itself. It was not until the late 1950s and early 1960s that any serious attempt was made to interpret the site as a whole.

The Peruvian architect Emilio Harth-Terre (1959) was the first to publish a detailed examination of the superficial remains of the site and to publish its ground plan, although he did not excavate. He worked originally under Valcarcel, who presided over the committee of the IV Centennial of Cuzco in 1934. Although he drew his ground plan as early as 1934, he did not write his interpretation until 1958.

Under Valcarcel, a general cleanup and restoration of the ruins were attempted, which resulted in some rather unfortunate reconstruction in Sector 3 that apparently had no basis in the archaeological evidence. These reconstructions resulted in the alteration and obscuring of the ruins at the junction of Sectors 2 and 3 by construction of a large set of terraces. Even more unfortunate is the fact that the notes and the excavated materials from the reconstruction work have been lost.

Harth-Terre evidently did not have access to these materials, which eyewitnesses report contained Wari style ceramics, and he apparently made his ground plan after the reconstruction was done. His conclusion, that the site was Inca in origin and could best be interpreted as a state storehouse, was based on the descriptions of storage in the early Spanish chronicles. He also felt that the close association of the Rumiqolqa gate, the name of which he translated from the Quechua to mean "stone granary," reinforced this conclusion (Harth-Terre 1959: 10).

In the early 1960s, William Sanders conducted an examination of the architectural surface remains and made a more detailed plan of parts of the central portion of the site, including Sectors 2, 3, and 4. He also excavated in two buildings in Sector 2 but turned up very few artifacts. Because of the lack of artifacts, Sanders concluded that the site had probably not been occupied after it was constructed. He suggested that the main part of the site had probably served as a frontier garrison or refuge for use in time of emergency and that the rows of small conjoined rooms on the northwest side of the site (Sector 4) had probably served as storage silos for the gar-

rison commissary (Sanders 1973: 404–408). He also assigned the site to the Wari culture rather than the Inca, as have most recent writers on the subject because of the similarity of the architecture (and the few artifacts found) to the remains found at the site of Wari in Ayacucho.

Despite Sanders' conclusion that the site was a military garrison with only limited commissary-type storage, the most popular explanation of the site's function continued to be the state storage facility hypothesis as modified by Rowe (1963: 14) to reflect a Wari rather than Inca origin. It is probably true to say that most scholars had also accepted an administrative function for the central portion of the site. The storage center hypothesis had in fact become so widely accepted that several other sites, notably Viracochapampa in the north Highlands and Pampa de las Llamas in the Casma Valley of the north Central Coast, were almost automatically classified as storage centers because of their presumed Wari origins and superficial resemblance to the architecture at Pikillacta (Rowe 1963: 14; Menzel 1964: 70; Lanning 1967: 135).

As mentioned previously, most scholars would probably accept an administrative function for Pikillacta, in addition to its serving as a state storage center, and indeed W. H. Isbell (1977, 1978), Lumbreras (1974: 168), and Schreiber (1978) have all presented arguments in this vein. Isbell in particular (1978) has argued for the existence of Wari state storage facilities as a means for temporal energy-averaging, an argument central to his theory of the origin of the Andean state.

During the course of the 1979 fieldwork for my master's thesis, together with Luis Barreda of the University of Cuzco, I excavated four test cuts in the small conjoined rooms in Sector 4, the so-called storage units (see McEwan 1979). The results of these tests seemed inconsistent with the storage center interpretation usually given to these structures and provided the impetus for further studies undertaken in 1982, 1989, and 1990.

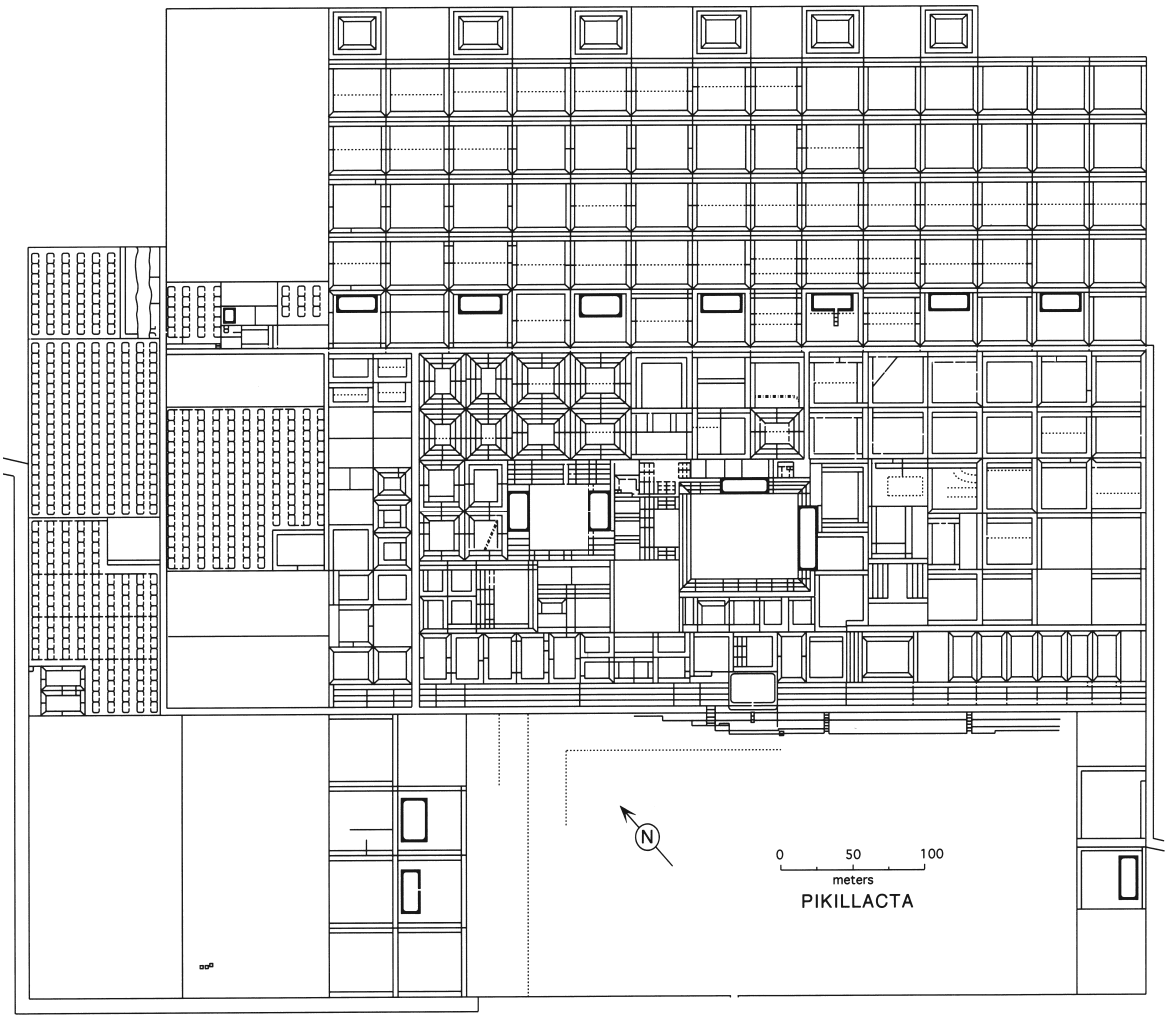
Wari Architecture and the Pikillacta Structural Typology

The Wari architectural style, notable for its rigid geometry based on rectangular ground plans, is widespread throughout the Peruvian Highlands and has been characterized as a distinct architectural horizon (Isbell and McEwan 1991: 35). This architectural style seems to have appeared abruptly in the Middle Horizon Period (A.D. 540–900) and spread with the expansion of the Wari Empire.

Buildings in this tradition take the form of great, rectangular enclosure-compounds believed to have served as the administrative centers and elite residences of the Wari state (Anders 1986a, 1986b, 1991; W. H. Isbell 1977, 1978; McEwan 1979, 1984, 1985, 1987, 1990, 1991a, 1992; Schreiber 1978). These Wari compounds each enclose numerous cells or individual rooms of several distinct types that exhibit a high degree of uniformity from one site to another. In our work at Pikillacta, we have identified several consistently recurring architectural forms that provide a basis for stratifying the site as a whole for the purposes of systematically investigating the function of individual cells or rooms. We note that these forms also consistently occur in other Wari provincial architectural units, including Viracochapampa, Azángaro, Wari Wilka, and Jincamocco. The results of our architectural studies at Pikillacta suggest a typology of room or cell types that can be applied to most Wari provincial architecture.

Previous Typologies Developed at Pikillacta

As the largest and best preserved of the known Wari architectural sites, Pikillacta has inspired several attempts at defining Wari architectural typologies. Working in the 1930s, Harth-Terre (1959) drew a ground plan of the site and assigned functions to the various types of architecture based on his impressionistic interpretations. Convinced that Pikillacta was an Inca state warehouse, Harth-Terre developed a typol-

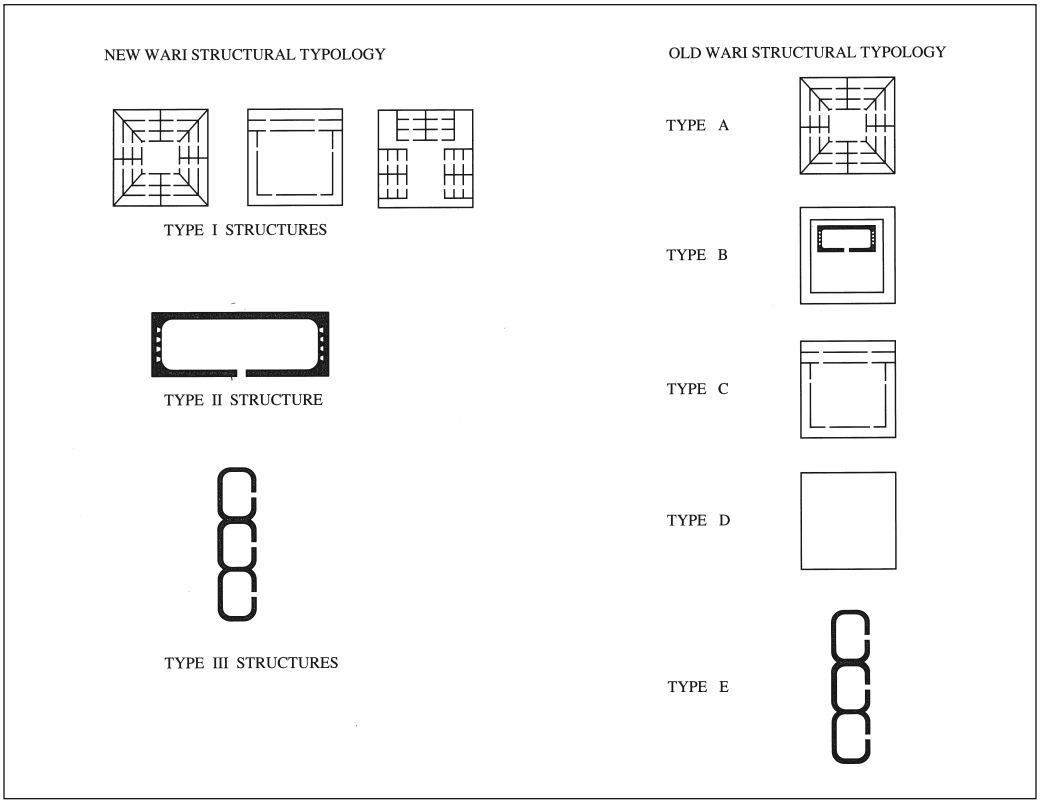


2.7. Sectors 1, 2, 3, and 4 of Pikillacta.

ogy that reflected a processing and storage function for the architecture, including the storage of water in so-called reservoirs. Unfortunately, Harth-Terre's ground plan, and thus his typology, resulted in considerable inaccuracy due to the fact that he did not excavate at Pikillacta and apparently did not inspect the standing remains very carefully.

In the 1960s William Sanders conducted several small excavations and produced a partial ground plan of the architecture. Based on this plan of the architecture he identified seven types of structures in Pikillacta (1973: 393–400). These included the following: communication arteries, great plaza and entrance complex, great enclosures, large rectangular enclosures (Types A and B), small rectangular enclosures (Types A and B), plaza complexes, and small conjoined room complexes. Within this group, only the rectangular enclosures of Types A and B and the small conjoined room complexes are of sufficient specificity to serve as diagnostics of the Wari architectural style.

Sanders believed that Pikillacta had probably been designed to serve as a military garrison. He interpreted his structural Types A and B as



2.8. Left: structural typology for Pikillacta developed by McEwan and Couture. Right: McEwan's 1984 typology for Pikillacta structures.

barracks for units of a military organization and viewed the small conjoined room complexes as a military commissary (1973). When Sanders' excavations yielded little result he concluded that the architecture had probably never been used for its intended function.

In the early 1980s, McEwan mapped Pikillacta and produced the first complete ground plan (fig. 2.7) and created a structural typology (McEwan 1984b). This typology was used to define sampling strata for testing the site during the 1982 project. Twenty-two test excavations made during this field season established several crucial points. First, the site of Pikillacta had definitely been occupied and a considerable amount of cultural material remained in context within the structures and in the main trash midden discovered just outside the main enclosure wall. Second, the site was definitely a Wari construction, with Wari ceremonial ceramics found in clear context with the structures. Third, test excavations in the numerous (501) small, conjoined rooms on the northwest side of the site did not produce evidence of storage as a function for these structures. These excavations failed to support the widely held view (Harth-Terre 1959, Lanning 1967, Menzel 1964, Rowe 1963) that these structures were analogous to Inca storage units and that the entire site functioned as a storage center.

McEwan's 1982 typology (published in McEwan 1984 and 1987) contained five basic structural types (fig. 2.8, right column). Type A structures consist of a rectangular enclosure with peripheral rooms arranged symmetrically with two or more parallel rows on each side. Type B structures consist of a rectangular enclosure with or without peripheral rooms but always containing a niched

hall inside the enclosure. Type C structures consist of a rectangular enclosure with peripheral rooms laid out in an asymmetrical pattern (this asymmetry constituting the principal difference between Types A and C); thus, one or more sides of a Type C structure may have multiple rows of rooms but all four sides never have the same number of rows, except when only a single row is present on each of the four sides. Type D structures consist of an empty rectangular enclosure. Type E structures consist of a small room with rounded corners that is unaccompanied by the other elements.

In 1989 a new excavation project was initiated at Pikillacta that built on the 1982 work. Extensive excavations, designed to address the function of the types identified in the 1982 typology, suggested the need to revise McEwan's typology in light of new data.

Examination of the 1982 data revealed no discernible difference in function between Types A and C, despite differences in overall size and the number of sub-units within each type. Although it is not possible at present to define the specific function of these structures, it is apparent that the pattern of cultural remains in these two types is very similar. Both Types A and C contain a few fire hearths and small amounts of refuse consisting of animal bones, broken pottery, and discarded artifacts of bronze, obsidian, and shell. Many chambers within both structural types are devoid of any artifacts whatsoever. Differences between Types A and C seem to be more a matter of scale and elaboration than function.

Excavations of Type B structures suggest that these structures are both architecturally and functionally different from Types A and C in terms of ground plan and structural features. The majority of artifacts recovered from Type B structures come from offering contexts within the structures. Type B structures are notable for such features as large wall niches and internally rounded corners with deep offering pits. Extensive excavations in 1989 and 1990 also identified examples of Type B structures that were constructed independent of the enclosure compound that had been used in the definition of this type. We feel that this type needs redefinition.

No Type D structures were tested by excavation because the definition proved to be too vague. It was evident that essentially any empty-appearing enclosure could be defined as Type D but, without excavating each of them, it is impossible to have confidence in their equivalence. I feel that Type D was not satisfactorily defined originally and should be abandoned as a typological category.

Excavations of Type E structures produced interesting results. Surprisingly, construction of these structures appears to never have been completed. Artifact distribution in these structures varies dramatically from one to another, ranging from none at all to fairly dense refuse in some examples. Small fire hearths were also occasionally encountered in some of these structures. The archaeological record seems to reflect episodic food preparation by visitors rather than the function intended for these structures, which may never be known.

Other Wari Architectural Typologies

While not explicitly defining the cells within the rectangular architectural unit, Schreiber (1978) developed a general typology of Wari architecture on the basis of comparative attribute studies and an analysis of site planning. This has served to define Wari architecture in the broad sense. Similarly, Spickard (1983) has defined attribute lists that seem to have widespread application as a diagnostic tool for identifying Wari architecture. These definitions aid in the identification of a site as Wari but do not address the analysis of site function beyond the general assertion of imperial administration.

Topic (1991) has proposed a more specific typology for Viracochapampa. He defines a Wari building as "a space enclosed by a single unified facade and roof" and identifies two major types of buildings at Viracochapampa. One is the "niched hall," a large rectangular enclosure with internally rounded corners. The other is

the "gallery," a long, narrow building that is approximately six times longer than its width, has multiple stories, and is arranged around an enclosure perimeter.

I agree with Topic's definition of the "niched hall" as one of the principal types of Wari buildings; it appears frequently at Pikillacta. It is the same as one of our types discussed below. We differ from Topic, however, in the applicability of the term "gallery" as a building type. We would argue that the building is comprised of an enclosure containing galleries *and* an open court; thus the courtyard is an integral part of the building. While these two types suffice to describe the architecture of Viracochapampa, there is an additional important architectural form that occurs in other Wari architectural units that we will describe below.

A New Typology

Fieldwork conducted in 1989 and 1990 indicated that the typology at Pikillacta can be greatly simplified and redefined. We have replaced the previously discussed five-type system with an improved three-type classification. In order to minimize confusion in the literature, the old type names were abandoned at Pikillacta in favor of the new nomenclature. The new typology consists of the following (see fig. 2.8, left column).

TYPE I. PATIO GROUPS. Rectangular compounds with long, narrow chambers surrounding an open court. These may be further subdivided into symmetrical and asymmetrical sub-types, although there does not at present seem to be a functional distinction between the subtypes. We suggest that the differences in the internal layout and the number of long, narrow chambers around the open court may be the result of the structure expanding over time. Since these structures are cellular in nature and embedded with the surrounding structures, the only expansion possible is either upward through the addition of multiple stories or inward through the addition of more parallel narrow chambers.

TYPE II. NICHED HALLS. These chambers appear to have been completely roofed over without an internal open court. They are found both embedded in the surrounding architecture and freestanding in the open court of rectangular enclosures. Their defining characteristics are primarily the presence of internally rounded corners and large wall niches, and secondarily the presence of offering pits in the corners and beneath the door threshold.

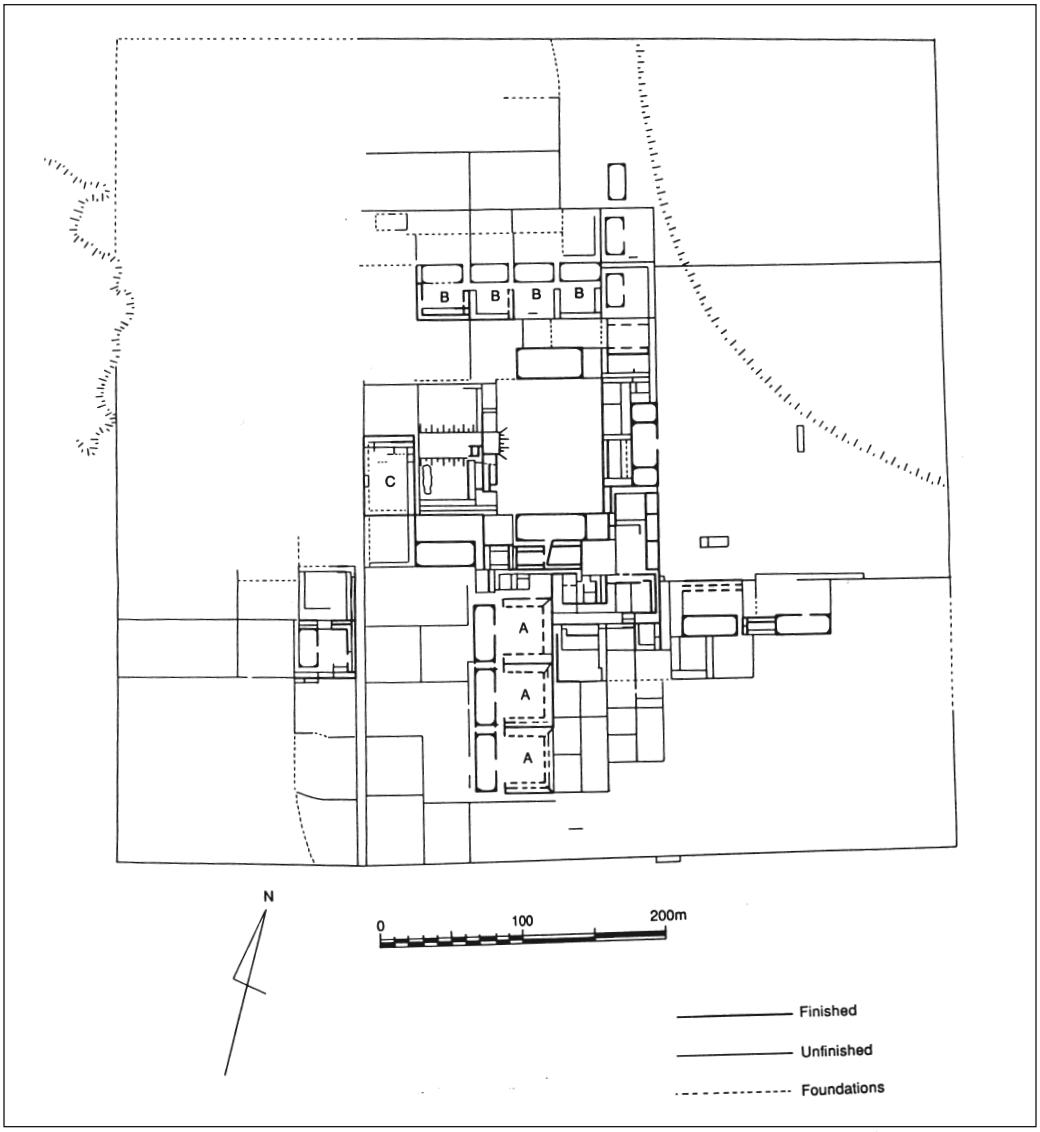
TYPE III. SMALL CONJOINED ROOMS. These structures occur in rows and share end walls with each other. Their size varies but is always considerably smaller than the other types. They have internally rounded corners and sometimes externally rounded corners.

The Pikillacta Typology and Wari Imperial Provincial Architecture

It now remains to examine the utility of the typology derived at Pikillacta in relation to other Wari provincial architectural units.

VIRACOCHAPAMPA. This site, most frequently compared to Pikillacta, is located in the north Highlands near Huamachuco. The architectural block is laid out in the form of a nearly perfect square and measures approximately 560 by 580 meters (Topic and Topic 1983). Like Pikillacta, the Viracochapampa architectural unit has a central focus consisting of a very large rectangular compound with an open court. The majority of the structures within the unit, laid out in an orthogonal grid, are clustered around this central focus (fig. 2.9). There is also a great deal of empty space within the architectural unit, which suggests that construction of the site may never have been finished. Indeed, investigations of the architecture by Topic and Topic (1983: 25) confirmed that many of the structures were only partially completed.

The ground plan of the site made by Topic and Topic (1983: fig. 1) indicates that the archi-



2.9. Viracochapampa. From Topic 1991.

tectural unit of Viracochapampa is comprised of the same basic structural types as Pikillacta. There appear to be at least nineteen niched halls. The remainder of the site consists of various configurations of patio group compounds with long, narrow chambers surrounding open courts. There do not appear to be any small, conjoined rooms at Viracochapampa.

AZÁNGARO. This is a large Wari architectural unit located in Huanta in the Ayacucho Basin of the Central Peruvian Highlands. This site was studied in detail by Anders (1986a, 1986b, 1991), who concluded that it represents a state installation for the purposes of administration. The architectural unit at Azángaro measures 175 by 447 meters and is divided into three major sectors; each of which contains a different architectural arrangement.

The North Sector consists of two probable niched halls; eleven patio group compounds with long, narrow chambers surrounding an open court; and six plain, rectangular enclosures.

The Central Sector consists of 340 Type III small conjoined rooms. These are arranged in twenty rows and are of two basic sizes. There are nineteen rows of 16 rooms, each room measuring approximately 2.5 by 9.5 meters, and one row of 36 rooms, each room measuring 2.5 by 3.75 meters (Anders 1986a).

The South Sector of Azángaro consists of a type of architecture that departs radically from the rigid planning of the rest of the unit (Anders 1991: 168–171). This sector lacks any of the Pikillacta/Wari-style buildings, and Anders (1986a) suggested that this area represents local domestic architecture as opposed to state administrative architecture.

JINCAMOCCO. This site contains a Wari architectural unit located in the Department of Ayacucho in the Central Highlands that has been investigated by Schreiber (1978, 1983, 1991, 1992). The architectural unit at Jincamocco measures approximately 130 by 250 meters but only an area of 130 by 150 meters is well preserved (Schreiber 1978: 7). Wall trenching by Schreiber reveals that some of the standard structural types defined at Pikillacta are also present at Jincamocco. In the area represented on her ground plan, there are perhaps 14 patio group compounds with long, narrow chambers surrounding an open court. Other structures are present but are not sufficiently well preserved to determine their type. There do not appear to be any niched halls or small, conjoined rooms.

WARI WILKA. This is a Wari architectural unit located just south of the modern city of Huancayo in the Central Peruvian Highlands. Very little remains of the original architectural unit. The plan drawn by McEwan (1979) shows a single patio group compound with long, narrow chambers surrounding an open court. There is also some evidence that there once may have been a niched hall in the courtyard.

CERRO BAÚL. This is a Wari center located in the Moquegua Valley of southern Peru. Its unique location on the high mesa of Cerro Baúl is quite different from the situation of all of the other Wari provincial centers. Its architecture is also quite different, lacking the rigid rectilinear plan common to the other Wari sites. There are no niched halls or small conjoined rooms visible on the site plan (Williams 2001: 71), but variations of the standard patio group are present as the most common architectural type.

Conclusion

The demonstrable presence of observed Pikillacta structural types in other major, known Wari architectural units substantiates the utility of this typology for Wari architecture. The typology presented here serves as a baseline and point of departure for the study of Wari structural function. These few, constantly repeated, structural types must have had great importance for the functioning of the Wari polity since they are so widely distributed throughout the empire. They undoubtedly reflect Wari social organization and behavior. The excavations discussed in the following chapter attempt to define the individual functions of the structural types described here. By defining the functions of these structures, it will then be possible to form hypotheses regarding the function of the site as a whole and its place within the Wari Empire.

3 Excavations at Pikillacta

GORDON F. McEWAN

Objectives and Strategy

Prior to the 1982 field season, some preliminary studies of Pikillacta were conducted in 1978 and 1979 (McEwan 1979). In the course of these studies, four test cuts were made in the so-called *qolqas*, the conjoined rooms of Sector 4 (fig. 2.7). Two of these excavations produced remains including fire hearths, animal bones, and ceramic sherds. These results together with observations of other parts of the site and the preliminary survey of the Lucre Basin suggested that the commonly held assumptions regarding Pikillacta and its function should be reexamined.

The 1982 field season and the subsequent 1989 and 1990 campaigns of the Pikillacta Archaeological Project were devoted to investigating Pikillacta in an effort to shed new light on many of the problems and questions raised by the unusual features of the site and the results of the preliminary studies. The ultimate aim of the project was to increase our understanding of the role of the Pikillacta site and the Wari occupation in the culture history of the Valley of Cuzco. Three general concerns guided field research at Pikillacta: the nature and chronology of the occupation, the site's function, and description of the architectural remains.

In order to address the first two research concerns, it was necessary to sample the site systematically and to survey the Lucre Basin that forms the local context for the site. The absence of surface artifacts complicated the selection of locations for excavation. A site constructed on a grid, such as is Pikillacta, seems at first glance ideal for a random statistical testing program. However, the great size of the site and its individual structures, the limited time and resources available to the project, and the variable condition of the ruins made statistically significant random sampling impossible. Instead, the ruins were divided into sampling strata according to formal properties, and judgment sampling was employed in each stratum.

It became apparent early in the project that neither of the existing plans of Pikillacta (Harth-Terre 1959; Sanders 1973) was sufficiently complete or

accurate to be useful. Therefore the first step was to remap the entire site. During the course of the mapping, as discussed in the preceding chapter, several standard structural types were identified. These formed the architectural basis, through repetition, for the elaboration of the huge architectural block that makes up Pikillacta. Each of these structural types formed an architectural stratum to be sampled. Additionally, other features and aspects of the site were investigated as deemed necessary. In each sector of the site, structures of each type present were investigated. This provided a cross-sectorial sample of each structural type, and thereby a reasonably representative sample of the various types of architecture was investigated.

During the 1982 field campaign, the excavation units were numbered sequentially from 10 to 33. Units numbered 1 to 9 include all of the known previous scientific excavations: those of Sanders (1973) were numbered Units 1 and 2; of Barreda (personal communication 1982), Units 3 and 4; of Lumbreras (personal communication 1982), Unit 5; and those done by Barreda and the author in 1979 (McEwan 1979), Units 6, 7, 8, and 9. In 1989 units numbered 34 through 44 were excavated, continuing in this sequence. In the following year, 1990, Units 45, 46, and 47 were excavated. These excavations, including Units 6 through 47, are described below. In order to facilitate discussion, they are organized by sector and structural type rather than numerical order.

Excavations in Sector 1

Sector 1 (fig. 3.1) is comprised of eighty-one relatively undifferentiated, uniformly sized enclosures arranged in a precise grid pattern. No streets appear to penetrate this mass of architecture and there are no obvious differences in preservation or other surface indications suggesting locations for excavations. We decided to investigate structures on the northeast and southwest perimeter of the sector in the belief that they would provide a representative sample of the whole. We sampled a single example of each structural type represented in this sector.

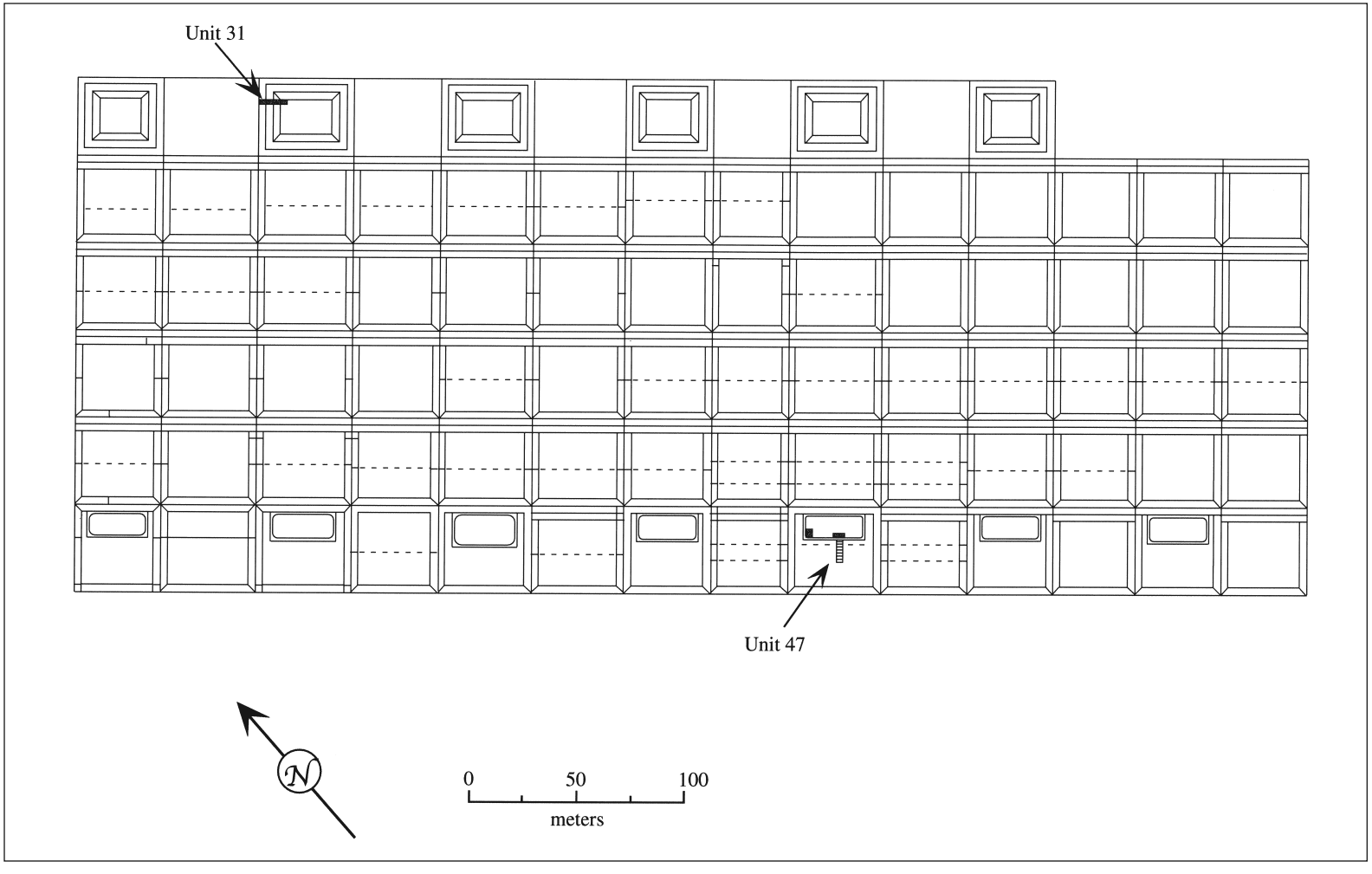
Type I: Patio Group Structures

UNIT 31. A patio group structure, located on the northeast side (top row on the plan) of Sector 1 was chosen for investigation. The test cut in this structure was designated Unit 31. This excavation was designed primarily to provide architectural data, since the interior layout of this structure was initially uncertain due to poor preservation and a heavy overburden obscuring the ground plan. The test cut ran perpendicular to the northwest wall and was designed to intersect all of the potential interior walls on that side of the structure. The test cut formed a trench 1 by 14 meters and was 1 meter deep, having been excavated to sterile. It was subdivided into Sections A, B, C, and D by the walls that it crossed. The only artifacts that we found were in Section D and consisted of 43 small, buff-colored, plain body sherds. A slate knife was also found on the surface. The walls showed no evidence of having been built much higher than their foundations. The quantity of stone rubble in the overburden was insufficient to account for higher walls having collapsed. No floors of any type were encountered. Neither was there any evidence of any plaster having been applied to the walls. This building had clearly never been finished and indeed construction appeared to have only just been started at the time of abandonment.

Type II: Niched Hall Structures

UNIT 47. Two excavations, designated Units 47-A and 47-B, were made in a niched hall located on a steep slope on the southwest perimeter of Sector 1 (fig. 3.1).

Unit 47-A involved clearing an exterior stone staircase of 10 steps that led to the entrance of the building. This entrance had been carefully blocked with stone set in mud mortar in antiquity. The area surrounding and including the threshold of the doorway was excavated, expos-



3.1. Sector 1 of Pikillacta showing excavation units.

ing an offering of camelid bones and *Spondylus princeps* shell, which had been placed under the threshold at the time of construction. More than one animal seems to have been included in this offering, but only two small pieces of *Spondylus* shell were present.

Unit 47-B, located in the western corner of the structure, consisted of a 2 by 4 meter pit that was excavated to sterile at a depth of 3.95 meters. No floor was identified, but an offering pit, measuring approximately 1 meter in diameter, was encountered 1.28 meters below the surface and continued to a depth of 3.95 meters below the surface. At the bottom of this deep pit was an offering of camelid bone and *Spondylus* shell. Again, more than one animal seemed to be included in the offering but only a single piece of *Spondylus* was present.

Both excavations revealed that the interior walls of this structure had not been plastered, as is commonly the case with finished structures at Pikillacta. This building appears to have been abandoned after the placement of dedicatory offerings but before construction was completed. Aside from the offerings, no artifacts were encountered in the fill from the excavations, which suggests that the building had not been used. Although the excavations did not reveal any niches, the architectural characteristics were sufficient to indicate that this structure is a niched hall. The absence of niches is undoubtedly due to the fact that the walls are not preserved to a great enough height to exhibit them.

Both excavation units in Sector 1 indicate that this sector of Pikillacta was never completed. It appears to have been under construction at the moment that the site was abandoned.

Excavations in Sector 2

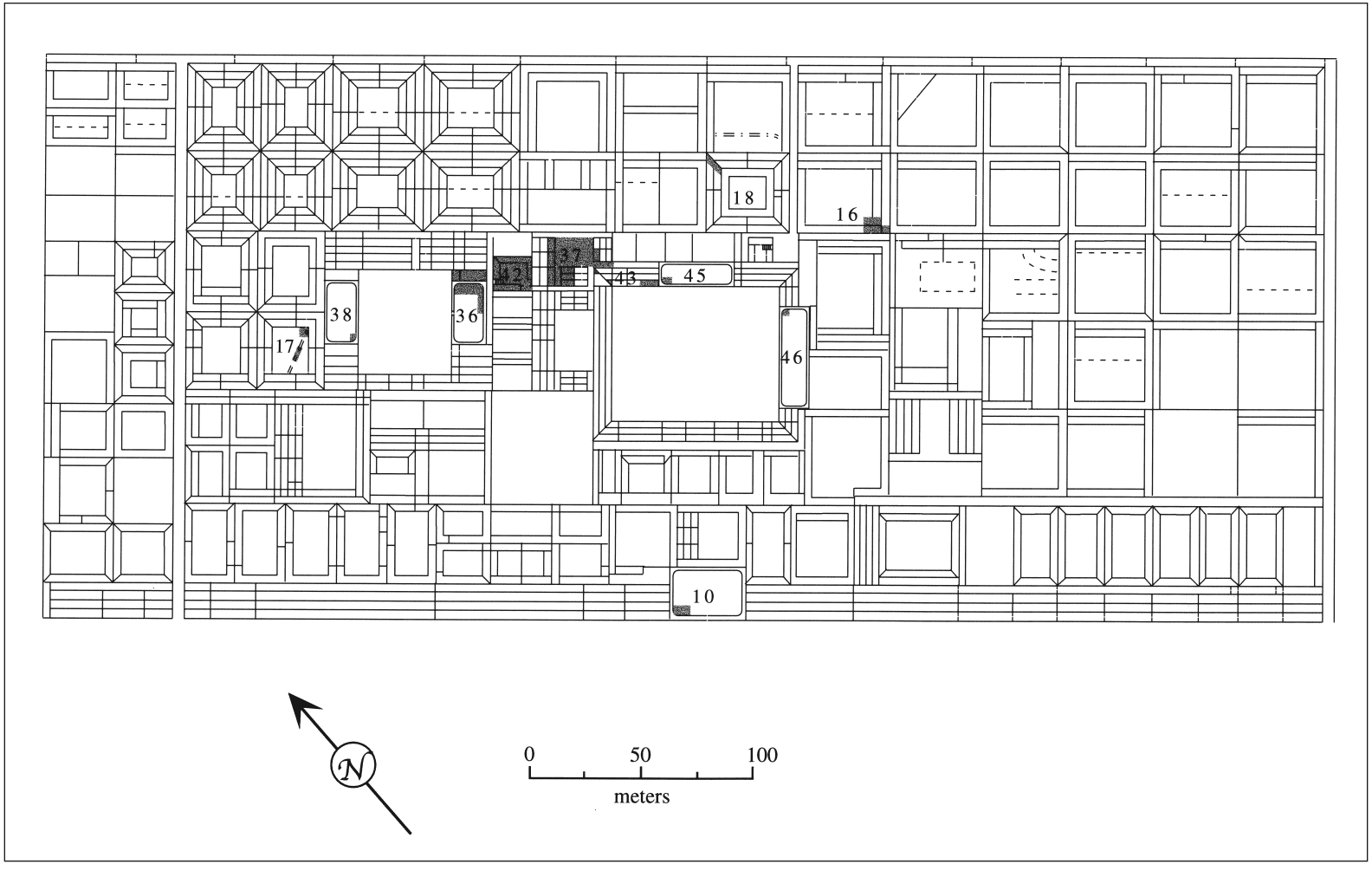
Sector 2 is the most architecturally complex area of Pikillacta (fig. 3.2). In it are found the two largest structures of the site. We assumed that their large size signals their importance and that they represent the main center of activity within the site. In order to explore this idea a series of excavations was made between these structures and in the structures themselves. The objective was to recover evidence of their function and the function of the site as a whole. The related question of circulation within the site was also addressed with the discovery of streets, passages, and doorways. Several other structures within Sector 2 that were located more distant from the large central structures were also investigated in an effort to recover comparative data for use in interpreting site and structural function.

Type I: Patio Group Structures

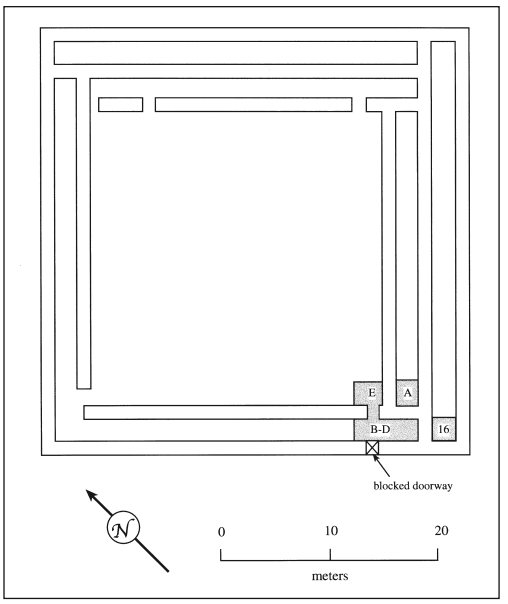
UNIT 16. This patio group is located just above the center of Sector 2 and to the southeast of Avenue 3 (see fig. 3.2). It is on the principal tourist circuit and the present surface of the patio has obviously been leveled, probably during the clean-up activities conducted for the 1933 celebration of the 400th anniversary of the foundation of Spanish Cuzco.

Unit 16 (fig. 3.3) was located in the southern end of the southeast outside perimeter room of the patio group. It measured 2 by 2 meters and was excavated to a depth of 3.69 meters, level with the bottom of the wall foundation. We did not find any artifacts in the fill but a hard floor made of gypsum plaster mixed with clay was found at a depth of 2.10 meters below the surface. This floor was approximately 80 centimeters thick, and cemented into it were about seventy sherds, all belonging to a single large polychrome vessel bearing a typical Wari style motif. This vessel apparently represented a ceramic offering made at the time of the construction of the floor. The vessel appeared to have been ritually killed and then covered with the gypsum and mud plaster mix.

Unit 16A was located in the south end of the inside peripheral room on the southeast side of the structure, which runs parallel to the room in which unit 16 was located. This unit measured 2 by 2 meters and was excavated to a depth of 2.5 meters below the surface. No artifacts were



3.2. Sector 2 of Pikillacta showing excavation units.



3.3. Excavation Unit 16.

found but a hard floor of mixed plaster and clay was encountered at the 2.5 meter level below the surface.

Unit 16B-D was located in the southern end of the long narrow peripheral room on the southwest side of the patio group. It measured 2 by 4.5 meters and we excavated to a depth of 1.9 meters below the present surface. This unit contained a stratified deposit approximately 1.4 meters deep that represented a trash midden. More than a thousand sherds were found, many of which were large fragments of good-quality polychrome vessels. Other artifacts included obsidian flakes, pieces of metal including two miniature *tupu* or shawl pins (all probably bronze), and a very fine miniature carved-bone spoon with a bird effigy handle.

Beneath the midden we found a white plaster floor. This floor was at least 15 centimeters thick, but the thickness was variable since the floor was very uneven and had many depressions and prominences.

The excavation of the midden also exposed two doorways aligned with each other in the northeast and southwest walls of the peripheral room. The doorway in the northwest wall was open to the patio of the structure. The doorway in the southwest wall, however, had been sealed in antiquity with stones set in mud mortar.

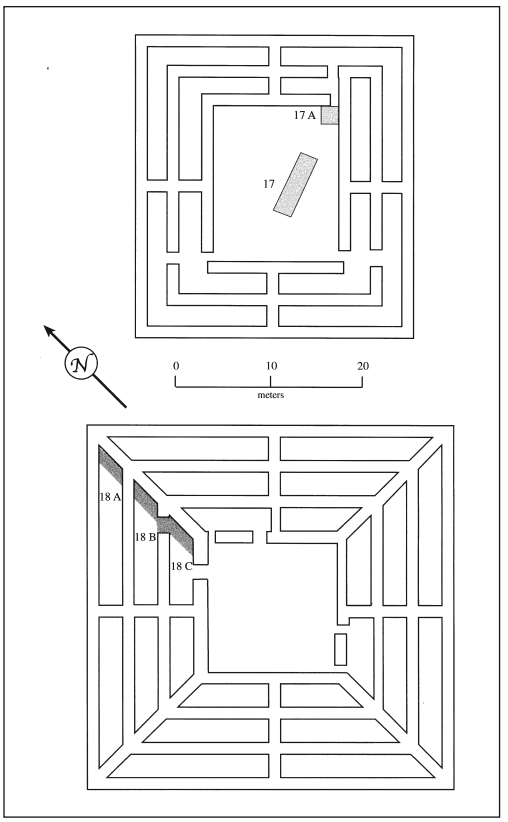
Unit 16E was located in the patio just outside the doorway in the northwest side of the room mentioned above. This unit measured 2 by 2.5 meters and was excavated to a depth of 2 meters below the surface, and the doorway into the gallery was also cleared. About 150 sherds, which seemed to have spilled out of the trash midden in ancient times, were found in this unit. We again found the plaster floor at the bottom of the excavation and traced it through the doorway into the gallery. This find suggests that the entire courtyard, an area of over 900 square meters, was likely to have been originally plastered.

UNIT 17. This patio group is located in the center of the northwest half of Sector 2 (see fig. 3.2). Two test cuts designated Units 17 and 17-A were made in the patio of this structure in order to expose a subterranean canal running diagonally across the patio (fig. 3.4, top). This canal, although subsurface, had been partly exposed by looters.

Unit 17 was a trench 1.5 by 6.5 meters and varied from 50 to 90 centimeters in depth below the surface. The canal exposed by this trench had been carefully made with a rectangular cross section and a lining of flat stones along the bottom and sides. A cap of stones was laid across the top and sealed with clay.

Unit 17-A was a 2 by 2 meter cut in the eastern corner of the patio, and we excavated it to a depth of 2.8 meters below the surface. In this cut the top of the canal was exposed and also the remains of a white plaster floor, which was located .55 meters above it. This suggests that the canal probably originally ran about half a meter below the floor of the structure. A fully plastered patio is again suggested by the fragments encountered, as well as a plaster coating on the walls.

In comparison with Unit 16-E, the plaster floor found in Unit 17-A is much thinner and more finely made. This may indicate that the courtyard was roofed, which would have pro-



3.4. Upper: Excavation Unit 17. Lower: Excavation Unit 18.

tected the floor from the elements and allowed the use of a thinner layer of plaster. Given the relatively small size of the patio group in which Units 17 and 17-A were located, roofing it would not have been terribly difficult.

No ceramic artifacts were found in either Unit 17 or 17-A. The only artifacts were several large pieces of worked slate, some with holes drilled in them. These appeared to be agricultural implements and may have been left by farmers who established fields, or *chacras*, in the patios of many structures at Pikillacta in post–Middle Horizon times.

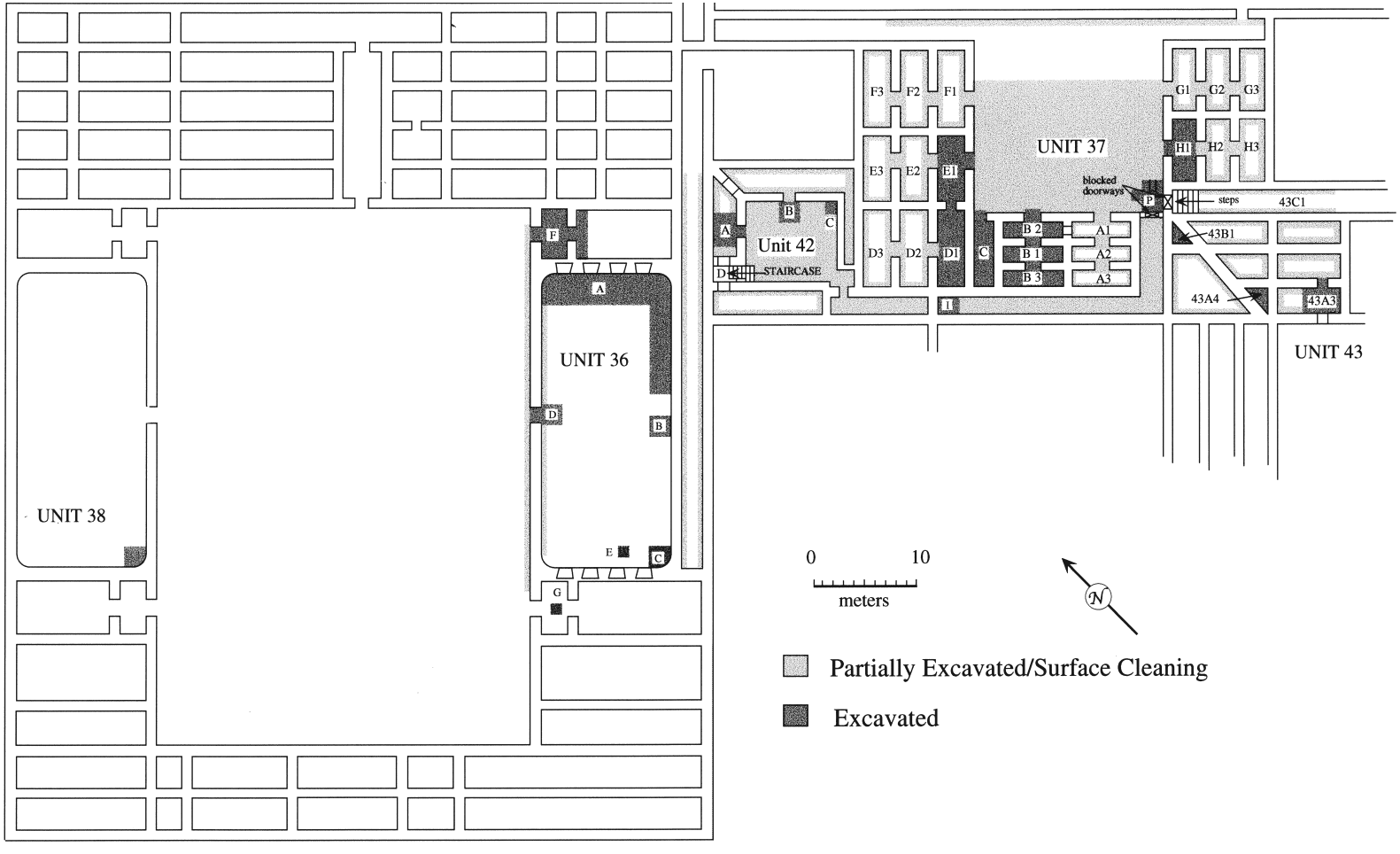
UNIT 18. This unit consisted of trench dug parallel to the northern ends of three parallel peripheral rooms on the northwest side of a patio group (fig. 3.2; fig. 3.4, bottom). The cut formed a trench 2 by 12 meters and was divided into sections A, B, and C by the walls of the rooms. This patio group has a symmetrical internal arrangement of three long narrow rooms parallel to each of its four sides, with the corners joined by walls placed diagonally. Rows of projecting stones and shelf-like setbacks in the walls of the rooms indicate that this was a multiple-story building.

We excavated Section A to a depth of 2.6 meters and found only a few small bone fragments and a small ash lens. One other interesting feature was the presence of a number of prehistoric fingerprints visible in the mud between the stones in the northern corner. The floor appeared to have been made of packed earth over sand, and white staining indicated that it probably was originally covered with gypsum.

Section B was excavated to a depth of 2.2 meters below the surface and produced only a few bone fragments and one worked bone. A large fragment of floor was also found, consisting of an apparent mix of gypsum plaster, gravel, and clay, resting on a bed of sand and gravel. This floor was very rough and uneven due to erosion resulting from its exposure to the rain at some point in the past.

Section C we excavated to a depth of 3.3 meters below the surface and in it found a large pile of fine dark gray ash rising into the north corner of the unit and a large fire hearth along the length of the northeast wall. A number of sherds (232) were recovered from the fire hearth, as well as a large number of bones and burned bone fragments. Many of these bones appeared to be camelid bones. Most of the sherds were plain utilitarian ware, many with soot marks, but fifteen were diagnostic and the majority of these were pieces of a polychrome bowl. No evidence of flooring was found. A doorway connecting sections B and C was also discovered and cleared during the excavation.

UNIT 37. In the area between the two largest structures in Sector 2 of Pikillacta are located a series of smaller structures. One of these, a small patio group with rows of rooms on three sides was designated Unit 37 (figs. 3.2 and 3.5).



3.5. Excavation Units 36, 37, 42, and 43 at Pikillacta.

Investigation of this building began with a program of wall trenching in order to reveal the ground plan. Trenches measuring 20 centimeters wide and 20 centimeters deep were dug along all faces of the walls of the patio group, care being taken to not disturb archaeological deposits. The wall trenching revealed three groups of small cellular rooms arranged around an open patio on its northwest, southwest, and southeast sides. The cell-like rooms were arranged three deep and interconnected by doorways. The group as a whole was accessed by two entrances. One was located at the end of an approaching street on the southeast side of the patio. The other entrance was located in the eastern corner of the complex.

In addition to wall trenching, the central patio was cleared of rubble and vegetation prior to the beginning of excavation. The northeast portion of this space was used to store the loose stones found during the cleaning and excavation operations. Wall trenching outside the northeast wall of room G3 uncovered some fragments of long bones later identified by physical anthropologist John Verano as coming from a very gracile human female. The rest of the body was not present. Because of its proximity to the surface (within 20 centimeters), the remains in this burial probably do not pertain to the Wari occupation of the site.

Sub-units B1, B2, B3, C, D1, E1, and H1 of Unit 37 each consisted of an individual room of the patio group (fig. 3.5). These rooms were all rectangular in shape, their length on average about three times their width. All of them were accessed by doorways which allowed passage between the patio and adjacent rooms or between adjacent rooms. The passages provided through the doorways effectively divided most of the rooms into two smaller usable spaces, one on each side of the central passage. The resulting spaces seem too small for use as activity areas. A doorway was also located between rooms B2 and A1 at the second-story level.

We excavated each of the rooms in arbitrary 20-centimeter levels. These excavations revealed well-preserved evidence of gypsum plastered floors lying under 2 to 3 meters of overburden. Room B3 was an anomaly in that an area of the floor approximately 2 by 2 meters was left unplastered in its southeast end. The walls had all originally been covered with a thick coat consisting of several superimposed layers of clay, which was capped with a thin layer of white gypsum plaster. That the gypsum wall plaster was joined to the plaster floor indicated that it had all been applied at the same time. The floors were massive, measuring about 10 centimeters thick, and were subdivided by numerous seams indicating that the plaster had been laid using basket or bucket loads. The floors of each room appear to have been leveled separately as evidenced by the fact that there is a 10-centimeter difference in levels between the floors of rooms E1 and D1, requiring one to step down when traversing the doorway (fig. 3.6).

The walls of rooms B1, B2, and B3 all held rows of projecting stones on opposing walls, which served apparently to support an upper story or second floor. In room C only the southeast wall contained projecting stone supports and none were found on the opposing wall. However, some post molds found in the fill at the base of northwest wall possibly represent the remains of upright timbers used to support the upper floor on that side. In the remaining rooms, D1, E1, and H1, the walls were not preserved to sufficient height for upper floor supports to have survived. Nevertheless, all of these rooms, including C, contained collapsed upper floors in situ. These were found below the level of the projecting support stones, where such existed, and had broken into fragments where they had fallen. The southwest end of room C as well as the northwest end of B1 and the southeast end of B2 were preserved as witness blocks, with the excavation being stopped at the level of the fallen upper floor.

Artifacts in these rooms were very rare. For the most part they consisted of only a few ceramic sherds, a few bones, and a few pieces of worked obsidian and slate. A large (73 by 45 by 5 centimeters) partially worked stone was found

3.6. Nicole Couture standing on plaster floor in Unit 37-C after excavation.

in the doorway between B2 and the patio, and a second large stone (35 by 55 by 10 centimeters) was found in the doorway between rooms B1 and B3. We found large fragments of two bowls in the doorway between rooms D1 and D2, a nearly complete bowl in the doorway between B1 and B2, and a large fragment of a small face-neck bottle was found in the doorway between H1 and H2.

Other features of interest include evidence of ancient looting in rooms D1 and E1 and evidence for a burning episode in rooms B1, B2, and B3. There appeared to have been looting activity at some point in the past in two of the doorways in rooms E1 and D1. The threshold of the southeast doorway in room E1 had been disturbed by a hole 66 centimeters in diameter cut to a depth of 47 centimeters below the plastered floor. At the bottom of this looters' pit we found fragments of the broken floor and a sherd representing a vessel base. There was no evidence of an original prepared pit or cyst. Either the looters destroyed the pit or else one never existed. The threshold of the northwest doorway in room D1 had also been disturbed by a roughly circular hole 70 centimeters in diameter. This hole was cleaned out to a depth of 90 centimeters, but neither artifacts nor evidence of a prepared pit were encountered. Because of their location beneath 2 to 3 meters of overburden, both of these looters' pits seem to represent looting activity in prehistoric times. In order to test for the existence of offering pits in the thresholds of these rooms, the threshold of the northeast doorway of room A1, which had not been disturbed, was investigated. We excavated this area to a depth of 90 centimeters but found nothing. This result casts doubt on the original existence of offerings in the looted areas of the doorways in rooms E1 and D1.

A thick ash lens (10 to 15 centimeters) containing burned wood and carbon extended through all three doorways of rooms B1, B2, and B3. This ash deposit rested directly above the plastered floor, which suggests that the fire that produced it was set during or shortly after the occupation of this building. The burned wood may represent beams from the underside of the upper floor. Thus the fire may have been responsible for some of the upper floor collapse. Ash and carbon concentrations were also found in the doorway of room C1 and near the surface of excavation Sub-unit I.

Sub-unit I was located in the western end of the L-shaped corridor that wraps around the room block containing rooms A1–3, B1–3, and C. This corridor is entered through a doorway located just inside the main entrance to the structure on its southeast side. The corridor runs between the back wall of room block A, B, C and the southwest perimeter wall of structure 18-2B. Just opposite room D1 it abruptly ends in a blank wall. Sub-unit I was placed at this point to explore this wall and to determine if there was a doorway allowing passage since the corridor appears to continue beyond the point where this wall crosses it.

Sub-unit I measured 1.4 by 2 meters and was

3.7. Sealed entrance to Excavation Unit 37.

excavated in 20 centimeter arbitrary levels. We found very few artifacts, which consisted of four plain potsherds and a few pieces of bone and slate. A collapsed and broken gypsum floor was encountered at a depth of 1.4 meters below the surface. Beneath the collapsed second floor an intact ground floor was encountered at a depth of 1.6 meters. A small cut 50 centimeters square was made through this plaster floor, and we excavated it to a depth of 60 centimeters. No other floors or artifacts were found in this cut.

Excavation Sub-unit P was located in the southern corner of the patio, directly in front of the entrance to the structure. The purpose of this excavation was to investigate the patio and the apparent principal entrance to the structure. The initial size of the excavation was 2 by 3 meters. It was later expanded an additional 12 square meters in order to investigate an architectural feature that was encountered.

In the initial square a gypsum plaster floor was encountered at a depth of 25 centimeters below the surface and extending outward from the front wall of room A1 for a distance of 60 centimeters. The outer wall of room A1 had been treated in the same manner as the interiors of the excavated rooms: the wall was coated with a thick (10 centimeters) coat of clay/mud composed of numerous superimposed layers and covered with a thin layer of gypsum. The gypsum floor was a continuation of this wall finish, being connected at the corner where the wall meets the patio. This plaster appeared to represent the floor of the patio. In contrast to the massive, thick floors that were found in the interior of the rooms, this patio floor was only 3 to 4 centimeters thick. It appeared to have been made up of at least four thin layers of gypsum that were applied sequentially. This sequential layering likely reflects renovation and refurbishing from time to time.

Continuing down in the unplastered area of the unit, a number of features were encountered. Entrance 1 on the southeast side of the enclosure was exposed and found to have been sealed in antiquity with stone set in mud mor-

tar (fig. 3.7). The entrance to the corridor leading to Sub-unit I was also exposed and found to have been sealed with stone and mud. Parallel to the face of rooms A1 and B2 was a bench extending 1.1 meters outward from the wall. This bench crossed in front of the corridor leading to Sub-unit I and also passed below the threshold of Entrance 1. A second bench was discovered parallel to the front walls of rooms G1 and H1. Both benches were constructed of stone retaining walls supporting a packed-earth fill, which was confirmed by a small cut (30 centimeters wide) in the bench in front of room A1. Further investigation revealed that there were several superimposed gypsum floors visible in the walls of this excavation. The most recent floor was the first that had been discovered, at 25 centimeters below the surface. It corresponded to the same level as the tops of the benches and the threshold of Entrance 1. It is apparent that this patio area was extensively remodeled over time. Ultimately the floor level was raised to the point where the benches were completely covered over. Further confirmation of this was found in the excavation of Unit 43-C1.

UNIT 42. A relatively small Type I patio group located to the northeast and across a corridor from Unit 36 was designated as Unit 42 (fig. 3.5). We began by wall-trenching the inside and outside faces of the walls of the building, excavating shallow 20 by 20 centimeter trenches. This trenching exposed the architecture sufficiently to permit a measured drawing to be made. Once the plan of the building had been defined, the interior of the patio was cleared of loose stone and leveled. Four excavation sub-units were established: 42-A opposite a doorway inside a small room on the northwest side of the patio, 42-B in the patio opposite a doorway on the northeast side, 42-C in the eastern corner of the patio, and 42-D in the western corner of the patio.

Sub-unit 42-A was a 2 by 2 meter square that we excavated in the room on the northwest side of the building. The excavation proceeded in arbitrary 20 centimeter levels from the present ground surface to the original plaster floor of the room located 1.80 meters below. We found no artifacts in the fill although all material was screened through ¼-inch mesh. Several large chunks of plaster were found mixed in the fill. These were interpreted as the remains of a destroyed upper floor. No stone floor supports or wooden armatures were found. The floor of this chamber was plastered with gypsum and was still intact in the area exposed. The walls also retained much of their original clay coating and gypsum plaster. The diagonal wall closing the room at the north end had a doorway in it at the level of what would have been the second story.

Sub-unit 42-B was a 2 by 2 meter square excavation located in the patio in front of a doorway in the northeast wall. We made this excavation in 20 centimeter arbitrary levels to confirm the presence of a doorway and to test the patio to see if it had a plastered floor. A doorway 1.80 meters wide was exposed, which gave access to the room on the northeast side of the building. At 40 centimeters below the surface the excavation encountered the remains of a gypsum plaster floor, exposed by removing the loose rock from the patio. Approximately 20 centimeters below this was another floor of gypsum. Both floors had been badly broken and were surprisingly thin compared to the floors encountered in Unit 36. The two superimposed floors were the result of remodeling of the building over time.

Sub-unit 42-C was a 1 by 1 meter square excavation in the east corner of the patio. It was designed to reconfirm the presence of the two superimposed plaster floors found in 42-B. Excavating in arbitrary 20-centimeter levels, we again encountered both floors at approximately the same depths. They were also in a broken condition.

Clearing of the western corner of the patio, we observed a probable doorway and this area was designated Sub-unit 42-D. Excavation revealed a doorway approximately 1.12 meters wide through which rose a staircase to the level of the second floor (fig. 3.8).

The staircase contained six steps, two of these

3.8. Staircase in Excavation Unit 42.

in the patio and the remaining four within the doorway, terminating in an enclosed landing measuring 1.6 meters square. The landing was 1.68 meters above the level of the patio floor. Opening out of the landing alcove in its north and south walls, the thresholds of two doorways were visible. The southern doorway measured 1.36 meters wide with a threshold 30 centimeters above the level of the landing. The northern doorway was 1.11 meters wide with a threshold 31 centimeters above the level of the landing. The walls were preserved only to a height of 60 centimeters above the landing so measurements of the original height of these doorways were not possible.

Excavation revealed that the staircase was constructed of clay and gypsum plaster. The steps were sculpted out of a dirt and clay mixture that hardened into a solid mass. These steps were then coated with a thin layer of gypsum plaster. Periodic maintenance was indicated by numerous plaster patches in the gypsum coating. This staircase appears to have been very similar to the one found by William Sanders in 1963 (Sanders 1973).

Two other remarkable features of the Unit 42 building were noted. The room on the southeast side of the building has no apparent access. It measures slightly less than one meter wide, which has caused much speculation on how it might have been used. It is possible that it was not a room but was perhaps filled with earth and used as a retaining wall.

The other remarkable feature of this building is its main entrance. Located in the south corner, this narrow doorway (80 centimeters wide) opens off of a corridor into a small antechamber measuring 1.6 by 2 meters. From this antechamber, access is available to the patio of the building and thence to the doors of the ground-level rooms and the staircase leading to the upper floor. The corridor leading to this entrance, however, terminates in a blank wall behind Unit 37. We were unable to find any means of access to this corridor from the outside.

UNIT 43. The north corner of Pikillacta's largest structure (see. fig. 3.2) was explored by four small excavation units designated Sub-units 43-A3, 43-A4, 43-B1, and 43-C1 (fig. 3.5). We first defined the architecture by wall-trenching, which exposed the location of the walls and permitted definition of the building's plan (fig. 3.9). Three parallel rows of rooms fronted by a narrow street were revealed.

Sub-unit 43-C1 was a 2 by 2 meter square that we excavated in the street directly in front of the principal entrance (Entrance 1) to the patio of Unit 37. The purpose of this excavation was to confirm that the entrance had been deliberately sealed in antiquity, and also to determine if the bench extending in front of rooms A1 and B2 in Unit 37 continued under the doorway.

We dug in arbitrary 20-centimeter levels and encountered very few artifacts. Only 22 small ceramic sherds, a few fragments of slate, and a few animal bones were found. Also present were numerous small fragments of gypsum, which seem to be bits of fallen wall plaster. The southeast

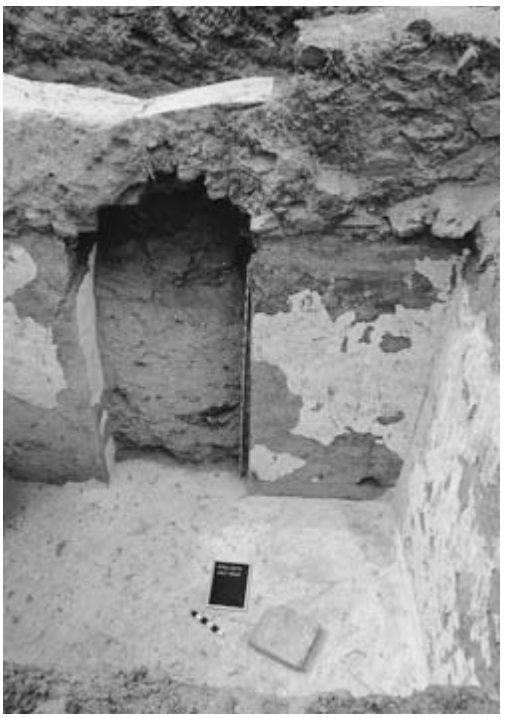
3.9. Overview of Excavation Units 37 and 42.

face of Entrance 1 was exposed and confirmed that it had been carefully filled with stone and mud mortar in antiquity. At 2.2 meters below the surface, the top step of a short staircase was encountered. The soil excavated in the levels above the staircase was a red-brown color and mixed with stones. This apparently represents wall collapse. At the level of the top of the steps and continuing down to the bottom of the unit, the soil changed to a pale gray color and ashy consistency, with some pockets of red-brown.

The staircase consisted of four short steps and rose a total of 55 centimeters above the level of the street. The threshold of Entrance 1 was approximately 28 centimeters above the top step. The construction technique was similar to the staircase found in Unit 42. The steps appeared to be formed out of mud and clay and then coated with a thin cap of white gypsum plaster. There was evidence of refinishing and repair of the surface of the steps over time. These steps confirmed the observations made in the excavation of Unit 37-P with respect to the level of the patio having been raised during a remodeling episode. The steps were placed in front of the door to compensate for the change in levels between the street and the patio.

Excavation Sub-unit 43-A3 was located in the southeast end of room A3 (fig. 3.5), which opened onto the largest patio in the entire complex (see fig. 3.2). This excavation differed from the previous ones in that it produced a much greater variety and abundance of artifacts. It also produced positive evidence of the existence of three-story buildings at Pikillacta.

The first 10 to 20 centimeters below the surface consisted of medium-brown fairly compact soil containing lots of plant roots and no artifacts. Below this was a fine gray ash mixed with carbon and burned wooden beams that continued to the bottom of the excavation, 3.6 meters below the surface. This ash deposit was very soft and loosely compacted. Large concentrations of pieces of broken gypsum floor were encountered



3.10. Unit 43-A3 after excavation. Note carved block resting on plaster floor.

at a depth of 2.6 to 3.3 meters below the surface. Many of these floor fragments were still attached to their clay underlayer and showed the molds of the beams over which they had been laid.

In contrast to the previous excavation units, we found a lot of artifacts in this room. A number of ceramic sherds, both plain and decorated, were recovered from the ash deposit (see the discussion of ceramic artifacts in chapter 6). Additionally, worked pieces of obsidian and slate and some bronze implements and bronze fragments were recovered. The recognizable bronze objects included *tupu* pins, needles, and a small spoon (see the figures and discussion in chapter 9). A fair amount of animal bone, including camelids and cuy, were recovered as well. Much of this bone was burned or charred. Perhaps the most enigmatic object encountered in this room was a finely cut rectangular stone measuring 36 by 39 by 9 centimeters (fig. 3.10). Its surface was covered with tool marks and one corner had been broken. This stone was found lying on the gypsum floor just inside the doorway leading into the patio. It represents the only dressed stone ever encountered in Pikillacta. One other unusual object that was found was a fragment of a modeled clay cylinder, 25 centimeters in diameter and 30 centimeters long that had been coated with gypsum. It appeared to be a piece of a column.

The walls, floor, and doorways were very well preserved in this room and provided a great deal of insight into the structure of the building. As with the other buildings that were excavated, the interior walls were all coated with an adobe-like clay/mud mixture containing grass inclusions. This layer was about 10 centimeters thick and was capped with a thin layer of gypsum plaster. The plaster in this room was much finer and smoother than that of the other rooms. No brush marks, fingerprints, or accidental inclusions could be seen. The corners were sharp and straight, and the walls flat and smooth, leaving the general impression was that a great deal of care had gone into finishing this building.

The ground floor doorway was preserved to its full height. It had originally been spanned by five wooden lintel beams between 10 and 20 centimeters in diameter. These beams, located 2.04 meters above the floor, were set into sockets on opposite sides of the door opening, which was 1.3 meters wide. Large fragments of wood were still in situ in these sockets and we collected these for radiocarbon dating.

Approximately 60 centimeters above the lintel of the first floor doorway is a row of projecting stones that formed the support for the second floor. Directly above the first floor door and 10 centimeters above the row of projecting stones was the threshold of the second-story doorway. It was considerably larger than the first floor, measuring 2 meters wide at the threshold. The doorway was preserved only to a height of 60 centimeters above the threshold so its original height could not be ascertained. Resting 50 centimeters above the threshold, on a layer of gray ash, was a very large slab of gypsum floor measuring 2 meters by 90 centimeters and 10

3.11. Triangular room, Excavation Unit 43-B1. Remains of beans were found on the floor.

centimeters thick. This gypsum slab must have fallen from a collapsed third floor and come to rest in the doorway well above the level of the second floor.

Sub-unit 43-B1 was a small triangular chamber measuring 1.8 meters by 1.8 meters by 2.7 meters. The fill consisted of light brown soil for the first 2.65 meters below the surface. The rest of the fill was light gray ash mixed with burned beams and carbon similar to that found in 43-A3. A few ceramic sherds were found mixed in this fill and a few charred textile fibers. Much of the east wall was blackened and soot covered suggesting that there was a fire in this room. A gypsum floor was encountered at a level of 3.73 meters below the surface. The walls of this room were plastered with a coat of clay/mud but were not covered with gypsum.

Near the floor at the bottom of the room we found a concentration of camelid bones and the dried husks of at least thirty beans. These remains suggest that this chamber may have been used for food storage.

Architectural features included a row of projecting support stones in the northeast wall located 2.6 meters above the floor. In the northwest wall, at the same height above the floor, was a narrow shelf formed by a setback in the wall. These features served to support an upper floor whose fragments were found scattered in the fill. At the bottom of the east wall was a small doorway 55 centimeters wide and 90 centimeters high (fig. 3.11).

We also excavated a second triangular room, Sub-unit 43-A4. This room measured 2.10 by 2.4 by 2.7 meters. At the surface level were rows of projecting stones in the faces of the walls that had supported the upper floor. The ground floor of this chamber was 3 meters below the surface and was made of hard-packed earth but was not gypsum-plastered. The interior walls were also not plastered with gypsum but were coated with the usual clay/mud mixture. In the center of the west wall was a small doorway with a height of 90 centimeters and width of 60 centimeters.

This chamber, like the others in this unit, was

also filled with fine gray ash mixed with burned wood and carbon and occasional lumps of red clay. Mixed into the fill were a few potsherds and bones.

Type II: Niched Hall Structures

UNIT 10. We located Unit 10 in a niched hall on the southwest edge of Sector 2 and just above the reconstructed terraces in Sector 3 (fig. 3.2; see also fig. 2.7). This building measures 17 by 29 meters internally. Attached to the outside southwest wall is a reconstructed narrow room of dubious authenticity which measures approximately 3 by 28 meters (fig. 2.7). The diagnostic features of this structure are the presence of two large niches in the southwest wall and one preserved in the northwest wall. Two of these niches are trapezoidal in the horizontal plane, narrower at the front opening and wider at the back, and the other has been reconstructed in a rectangular form but most likely was originally trapezoidal also. Additionally, internally rounded corners are present.

Excavation Unit 10 was placed in the western corner of structure 12-2B and measured 3 by 4.5 meters (fig. 3.2). We excavated this unit to a depth of 1.4 meters below the surface, where a white plaster floor was found. This floor averaged 10 to 15 centimeters in thickness and was laid on a thin cap of brown clay (1.5 centimeters) which covered a prepared foundation of crushed stone and sand, approximately 1 meter thick. The interior walls of this structure were covered with a thick (10 centimeters) coating of mud and over this a thin (1 centimeter) cap of plaster was placed.

In the west half of this unit we found a large (2 by 1.2 meters) irregular hole in the plaster floor. Tucked up under the floor around the northeast and southeast margins of this hole were found ten human skulls (fig. 3.12).

Leonidas Wilson, the Pikillacta site watchman for the National Institute of Culture (Instituto Nacional de Cultura), told me that seven of these had been exposed in the 1930s by looters. According to Wilson, he had reported the find to the Patronato Departmental de Arqueologia del Cuzco, and they had ordered that the skulls be reburied and the looters' pit backfilled. We found in our excavations several modern sherds and some bones, apparently the remains of the looters' meal, which seemed to confirm Wilson's account. In addition to the seven skulls mentioned by Wilson, we found three more. These three were buried further under the floor than the other seven. Whereas the first seven found were buried in the red soil used to backfill the looters' pit, these three were in the gray sand-and-gravel foundation layer under the floor. This suggests that these three may have been found in the original context. The only other artifact found in this unit was a metal spike (probably of bronze) that measured 10 centimeters in length and approximately one-half centimeter in diameter.

Described in detail by T. W. Bauer and B. S. Bauer (1987; see also chapter 8 this volume), the skulls consisted of four males and six females of a wide variety of ages. One had a frontal suture crossing its forehead, a condition sometimes depicted in Wari ceramics, and another showed evidence of three separate trephinations. No mandibles or other bones were found with the skulls, which suggest that the flesh had already been removed at the time of their burial.

UNITS 36 AND 38. The second largest structure at Pikillacta is located just to the northwest of the building in which Unit 42 was excavated. It contains two niched halls arranged opposite each other on the northwest and southeast sides of an open patio (figs. 3.2 and 3.5). These niched halls are embedded in a complex of small rooms and long narrow rooms surrounding all four sides of the patio. We began by wall-trenching the inside and outside wall faces of the southeast part of the structure, excavating a shallow 20 by 20 centimeter trench. This trenching exposed this part of the building sufficiently to permit a measured drawing to be made. Once the perimeter of the building had been defined, the excavation units

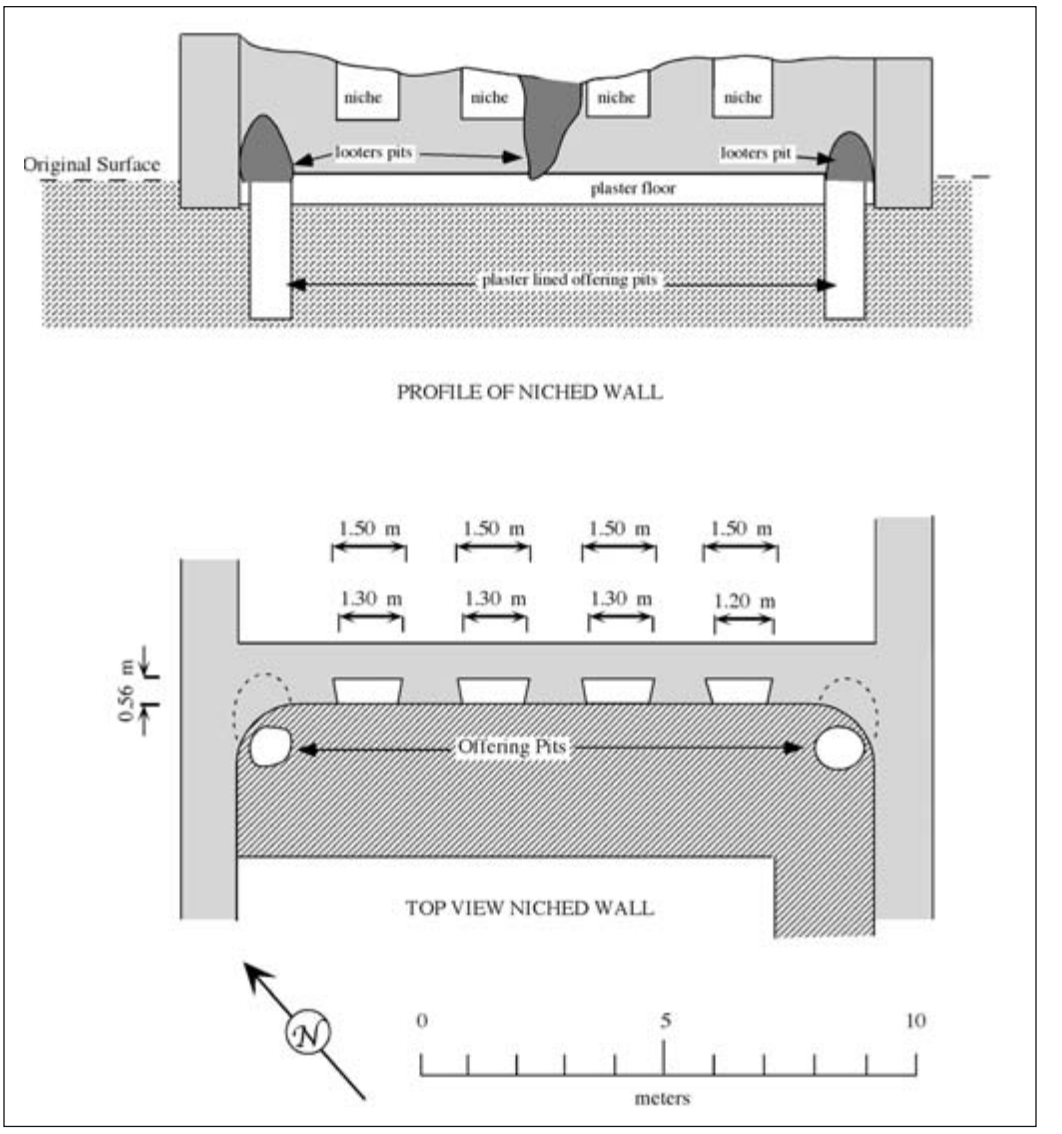
3.12. Excavation Unit 10. Offering pit containing human skulls is to the right.

were established. Unit 36 was comprised of seven excavations (labeled A through G on fig. 3.5).

Sub-unit 36-A, the largest excavation in this structure, exposed about 60 square meters of the northeast end of the building and revealed four large niches that had been partially preserved in the northeast wall (fig. 3.13). The niches are trapezoidal in the horizontal plane, with the narrow end opening into the interior of the building. A large disturbance was evident between the second and third niches where looters had broken a V-shaped opening into the wall. Below the damaged wall was a break in the plaster floor that appeared to result from the same looting activity. We explored this hole in the floor to a depth of 60 centimeters but no artifacts nor evidence of an offering pit was found.

This structure still showed portions of the original wall finishing, composed of as many as six layers of clay and capped with a final, surface coat of white gypsum plaster. Marks preserved in the various layers of clay plaster demonstrated that it had been smoothed with a stiff brush so as to provide tooth for the next layer to adhere to. We also exposed a large section of the massive, gypsum-plastered floor at the northeast end of the building. This was very smooth and had an original thickness of approximately 10 centimeters. The depth of this floor below the surface varied between 2.4 meters at the wall to 1.5 meters at a distance of 3 meters from the wall. Additional excavations confirmed that the floor continued throughout the structure. Seams in the floor apparently represent margins of units of gypsum plaster, perhaps basket or bucket loads that were sequentially added during the construction of the floor.

At three of the four corners of the structure were found a subfloor pit into which offerings had originally been placed. The western corner was so damaged by looting activity that all evidence of an offering pit had been destroyed. All of the other pits had been looted at some point in the past, but those at the north and east corners of the structure were well preserved and still contained some of their original contents



3.13. Excavation Unit 36.

(fig. 3.13). These pits were both cylindrical in shape and were lined with a layer of clay which was in turn covered with a thin layer of gypsum plaster. The pit in the north corner was approximately circular and 85 centimeters in diameter. It had been dug down to bedrock at a depth of 3.2 meters below the floor of the building. The pit in the east corner was also circular and approximately 90 centimeters in diameter. This pit also continued down to bedrock at 3.2 meters below the building's floor.

At a depth of 2.6 meters below the floor in both pits, fragments of gypsum began to appear in the fill together with a small number of camelid bone fragments. Many of these bone fragments were stained green, indicating that they had been buried with copper. No copper objects were found however. Near the bottom of the pit in the north corner we found a *Spondylus princeps* valve that had been broken into two pieces. In the pit in the east corner were found four *Spondylus princeps* valves, each of which had

been broken, rather than cut, into two pieces. The mixture of the shell artifacts together with gypsum floor fragments in the fill indicated that this context had been disturbed by looters.

The five *Spondylus princeps* valves recovered from these two pits all showed evidence of being worked. The hinges had been removed from each of them by cutting. The spines had also been completely removed, and the shells seem to have been polished.

The offering pit located in Sub-unit 36-C at the south corner of the structure was mostly destroyed. Excavation here reached bedrock at a depth of approximately 60 centimeters. We found no artifacts in this excavation.

The west corner of the structure and much of the area in front of the southwest wall had been heavily disturbed by looting activity. It was not possible to determine whether there had been an offering pit at this location. Sub-unit 36-E was an enlargement of one of the looters' pits that exposed a portion of the floor of the building, which confirmed that gypsum plaster was used throughout. There are remains of a single niche visible in the wall near the west corner of the building. Like those in the northeast wall, this niche is trapezoidal in plan with the narrow end opening into the interior of the building. We assume that other niches once existed in this wall, following the same pattern seen in the northeast wall. Destruction by looters, however, has erased any evidence of these.

The entrance to the building, a doorway measuring 1.80 meters wide, was located in the northwest wall. This entrance was not on the centerline of the building but was slightly offset towards the northeast. Sub-unit 36-D, a 2 by 2 meter square, was excavated just inside the doorway. The gypsum plastered floor that had been broken by looters was encountered 40 centimeters below the level of the threshold of the entrance. We explored the looters' pit down to a level of 70 centimeters below the floor. Neither artifacts nor evidence of an offering pit were encountered.

Sub-unit B was opened on the southeast wall of the structure approximately on the centerline of the building. A 2 by 2 meter test pit exposed the wall face to the depth of 1 meter below the surface, which confirmed that there was no doorway present at this location, opposite the entrance on the northwest wall.

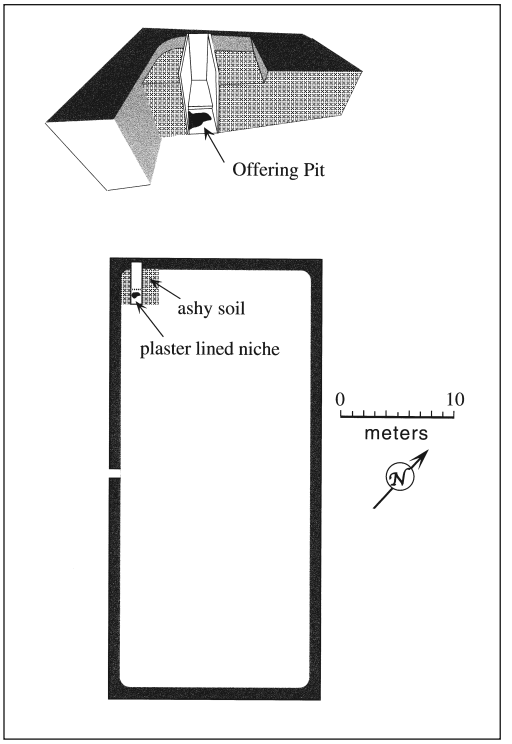
Sub-units 36-F and 36-G were excavated in the small rooms at either end of the niched hall. Sub-unit F was located on the northeast end. Here a compact earthen floor was encountered at 1.6 meters below the surface. There was no evidence of a gypsum floor and no artifacts were encountered.

Sub-unit G, measuring 1 meter square, was an amplification of a looters' pit. In it we found a number of gypsum fragments, but we could not tell whether they represented the broken floor of this structure or perhaps had been deposited as part of the back dirt from the looting of the western corner of the niched hall. No artifacts were found, and because of the massive disturbance of this area by looting, this excavation was not expanded.

Excavation Unit 38 (fig. 3.5) was located in the south corner of the niched hall in the northwest side of structure 33-2B. A 2 by 2 meter excavation was opened and revealed that the corner of this building had been destroyed by looters. The floor had been smashed and the ground beneath it thoroughly disturbed so that it was impossible to tell if there had been an offering pit at this location.

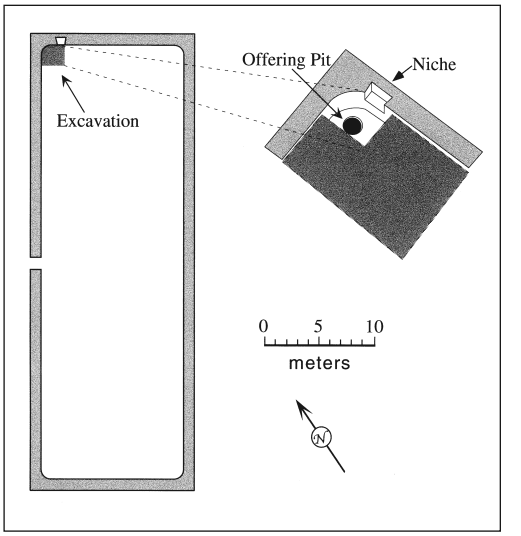
UNITS 45 AND 46. Within the northeast and southeast walls of the huge central structure of Pikillacta sampled by Unit 43 are located two niched halls (fig. 3.2). Unit 45 sampled the niched hall located on the northeast side of the enclosure. This unit was located in the western corner of this hall and revealed a characteristic, internally rounded corner.

Unit 45 also revealed an extraordinary niche (fig. 3.14) that extended from the floor to the top of the ruined wall (1 meter wide by 2.1 meters tall). This niche is very different from others seen at Pikillacta. It is rectangular in horizontal



3.14. Niched hall in Unit 45.

cross section and is much larger in the vertical dimension and much deeper than any others observed. This niche appeared to have been enlarged during a remodeling of the structure. Its original configuration appears to have been more consistent with niches observed in other niched halls except for its height and rectangular cross section. It is possible that its original configuration was more typical of the other niches and was changed during the renovation, but this could not be determined without destroying the plaster lining to expose modifications in the stone work, so this issue was not resolved. The remodeling seems to have involved enlarging the niche by extending it 1.5 meters out from the wall. These extended walls were constructed of stone and coated with mud and gypsum plaster. In the process of constructing this extension to the niche, the rounded western corner of the structure was obscured by dirt fill placed between the extended niche and the southwest wall of the structure.



3.15. Niched hall in Unit 46.

We found the remains of a looted offering pit measuring approximately 90 centimeters in diameter beneath the gypsum-plastered floor. This pit was located immediately in front of the niche. We excavated it to a depth of 40 centimeters but no artifacts were encountered. The pit was lined with fine clay and likely was originally coated with gypsum. We were unable to excavate to the bottom due to lack of time and resources.

The fill within the niche consisted of finely powdered gray ash mixed with burned wood fragments. This seems to reflect the same burning episode observed in nearby Unit 43. The fill excavated outside the niche on either side consisted of sterile earth with a top layer of ash located just below the surface. No artifacts were recovered in Unit 45.

Unit 46 sampled the north corner of the other niched hall embedded within the southeast wall of the large enclosure (fig. 3.15), and a characteristic rounded corner was exposed. Additionally, a large niche with trapezoidal horizontal cross section was exposed. A looted offering pit approximately 90 centimeters in diameter was located beneath the white gypsum-plastered floor in the corner. No artifacts were found within this unit and the fill contained much less ash than the previous excavations.

Excavation results in Sector 2 clearly indicate that construction was completed in this area of the site. Many of the buildings show evidence of occupation and remodeling episodes suggest an occupation of considerable duration.

Excavations in Sector 3

Sector 3 contains the fewest number of structures and these are in the poorest condition of any in Pikillacta (fig. 3.16). We chose a niched hall at the western end of the sector for investigation because it was the best preserved in the sector. Initially investigated in 1982, the artifacts found in this structure led us to further explore this building with more excavations in 1989.

A Type II Niched Hall Structure

The niched hall in the west corner of Sector 3 was first tested by excavation in 1982. A trench cut in this niched hall was designated Unit 11 (fig. 3.17). This unit was located near the western corner so that it would intersect the corner of the niched hall (sections B and C) and the space between it and the back wall of the enclosure (section A) surrounding the hall.

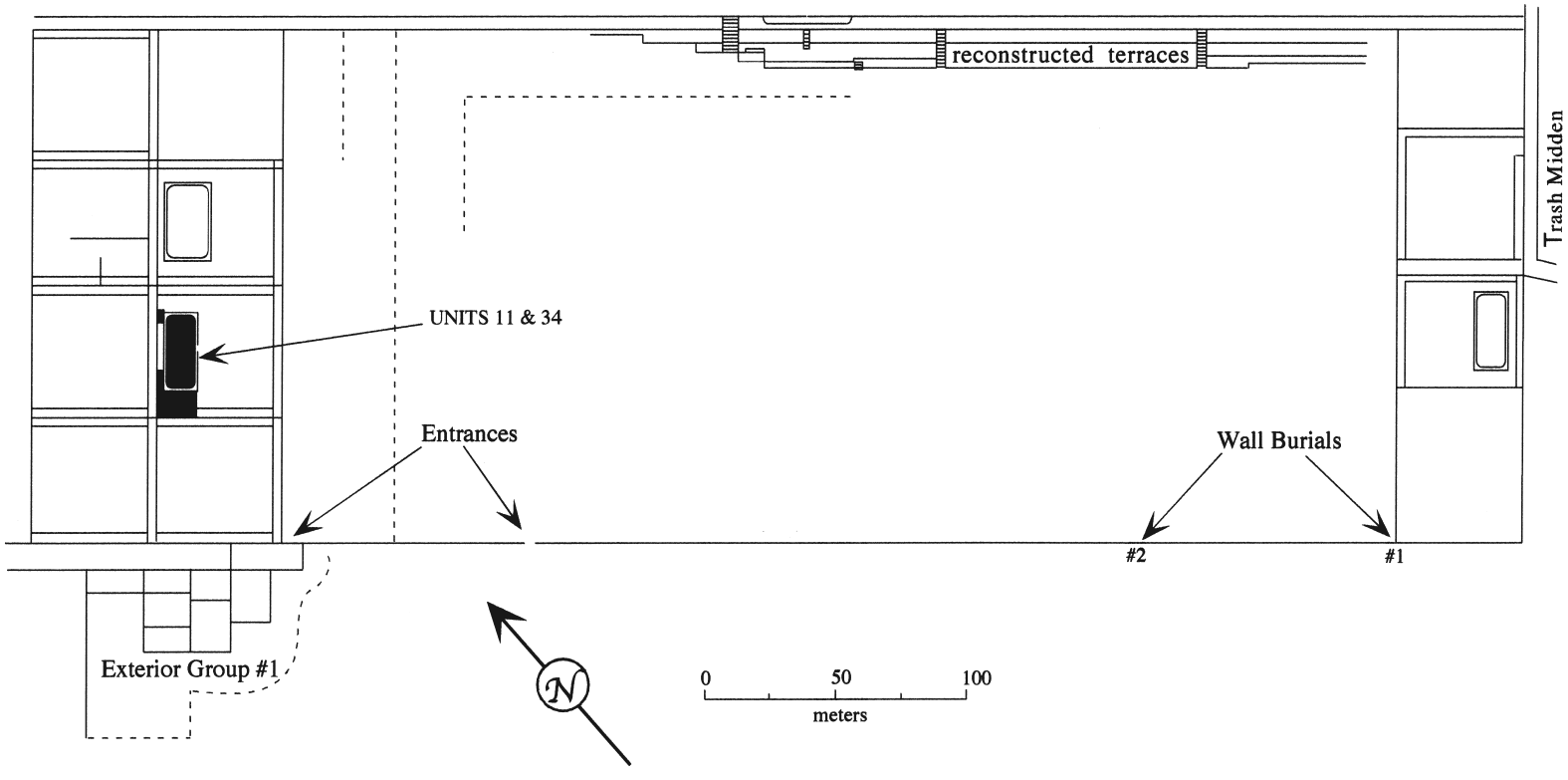
Section A was excavated to sterile at a depth of 2.8 meters below the surface and produced 269 sherds, of which only nine were decorated and the rest were utilitarian body sherds. We noted that there were numerous small pockets of ash mixed in the fill as well as many bones and burned bone fragments.

Section B-C was excavated to sterile at a depth of 2.8 meters below the surface. There were 340 sherds in this unit, of which only 11 were decorated. Most of the decorated sherds belonged to a single large polychrome bowl. We found numerous small pockets of ash and carbon, as in Section A, and some fairly large concentrations as well; one of these appeared to be a fire hearth. Numerous bones and bone fragments, some burned, were also found in the fill. Otherwise the fill consisted of loosely compacted soil, gravel, and gray sand. We didn't find any compact floors, although we excavated to the base of the walls of the structure. At the bottom of the excavation in Section B-C, several very large stones, resting on a level even with the base of the walls, were encountered.

The data recovered in Unit 11 indicate that the niched hall and the space between it and the wall of the enclosure were filled with trash, initially suggesting that these structures may have been residences or perhaps contained the trash resulting from offering activity. The trash, which consisted of ash, burned bone fragments, and fragments of soot-marked pottery, suggests at least that food preparation was taking place in and around this structure. The absence of a compact floor inside the niched hall was puzzling. It is difficult to reconcile the apparent use of the structure as indicated by the accumulation of cultural material with the failure of the floors to have compacted simply from people walking on them.

UNIT 34. In 1989 Unit 34, comprised of a series of excavations, was excavated to further explore this niched hall (fig. 3.17). The niched hall proved to be enclosed within a rectangular compound measuring 50 by 50 meters that has long narrow rooms averaging 2.7 to 3 meters in width paralleling three of its four sides. The exception is the northwest side. Both the niched hall and its surrounding compound appear to have been abandoned in a partially constructed condition. No plastered walls were encountered nor was there evidence of a plastered floor. Excavations revealed that no offerings had yet been placed in the corners of the building or in the threshold of the entrance. The structure's walls do not appear to have been completed to any great height. There was not sufficient stone in the interior or immediately outside the building to suggest the collapse of higher walls.

We sampled the interior of the building by means of a series of small excavations made around the perimeter of the walls and in the center of the structure. Most of the interior of the



3.16. Sector 3 of Pikillacta showing excavation units and location of wall burial and trash midden.

niched hall was filled with a compact, homogenous red-clay soil. This red-clay fill appeared to be artificial and was interpreted as an attempt to seal or bury the building in ancient times. Evidence for this interpretation is the fact that the entrance to the hall, in the southeast wall, had been sealed with stone set in mud mortar. The mortar used to seal the entrance contained both artifacts and animal bones and had ash mixed throughout. This mortar contrasts sharply with the red-clay mixture used in the walls and therefore seems to represent a specific construction effort that is separate from the construction of the building. The red-clay fill in the interior of the building rises well above the threshold of this sealed entrance. Although a few artifacts were encountered, consisting of some plainware sherds and a few camelid bones and obsidian fragments, the red-clay fill was largely devoid of artifacts. The one exception to this generality is the small area of the interior in the western corner represented by Unit 11, excavated in 1982. As discussed above, Unit 11 contained a number of Wari style ceramics and animal bones. The topography of this area of the site and the protective barrier of the surrounding enclosure walls precludes the introduction of this red-clay fill by a natural agency such as a mudslide.

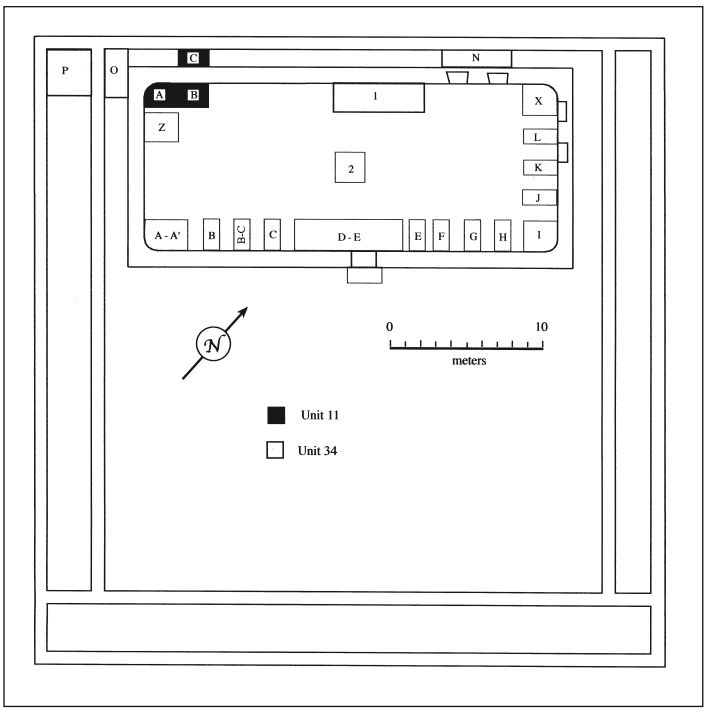
We observed a number of architectural characteristics in this structure. In the north corner were clustered four niches. For the most part, these niches display the typical characteristics of being trapezoidal in the horizontal plane with the narrow end opening into the interior of the structure. These niches, although similar, are not uniform in size and shape. The interior corners of the hall were rounded while exterior corners were not. Three of the four exterior corners were cleared in order to confirm this. The wall foundations appear to have been dug deeply into the ground and rested on bedrock in the areas examined by excavation. In some cases a trench was dug into the bedrock to receive the foundation. The walls appear to have been constructed in two horizontal sections. The lower sections, including the below-ground portions of the wall foundations, were rather carelessly mortared and in some cases little or no mortar was used. In contrast, the upper portions of the walls were well mortared. A possible explanation for the loose construction of the lower portions of the wall may be that the walls were intended to be reopened for the placement of burials at a later time.

Sub-units O, P, and N were excavated in the enclosure surrounding the niched hall. Sub-unit N sampled the narrow space between the back wall of the niched hall and the northwest enclosure wall. Excavation was made to a depth of 1.75 meters below datum. The fill consisted of mixed soil and stone rubble with occasional potsherds mixed in. These remains were interpreted as construction debris.

Sub-unit O was excavated between the southwest wall of the niched hall and the inner wall of the southwest narrow room of the enclosure. Sub-unit P was excavated inside the western end of the southwest room and contiguous with Sub-unit O. These excavations were carried to a depth of 1 meter below the surface. Again no plastered walls or floors were encountered and the walls appeared to have been only partly constructed. Very few artifacts, consisting of only a few plain potsherds, were found. The fill was interpreted as construction debris.

Wall Tombs

The National Institute of Culture was engaged in conserving and rebuilding the walls of Pikillacta in June of 1989 when they came upon two tombs located in the southwest perimeter wall of Pikillacta. Members of the Pikillacta Archaeological Project were asked to assist the archaeologists of the Institute in excavating and recording the burials. Tomb 1 contained the bodies of a man and a woman of about middle age. Associated with the burial were a number of small, turquoise-colored stone beads. The bodies appear to have been placed in the wall at the



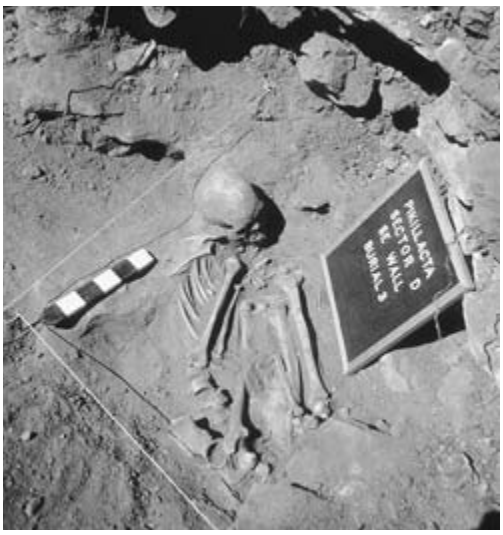
3.17. Niched hall containing Excavation Units 11 and 34.

time of construction. Due to the slumping of the wall, it was difficult to determine the precise original position of the bodies or whether there had been a prepared cyst within the wall; both individuals were in a flexed, seated position. Tomb 2 was also found in a slumped portion of the mud and split-stone wall (fig. 3.18). The body was in a flexed position but had fallen onto its side. The remains were of an adolescent female. These and other human remains from Pikillacta are discussed in detail in chapter 8.

It appears from the results of the excavation that Sector 3 was under construction at the time of abandonment of the site. It was never completed, but some effort was invested in sealing at least one of the buildings, which perhaps suggests the intention of the Wari to return. Superficial inspection of the other structures in this sector indicates that none of them had risen much above their foundations before construction was halted.

Excavations in Sector 4

Sector 4 (fig. 3.19; see also fig. 2.7) is the most unusual part of the Pikillacta site in that it is almost completely composed of small conjoined rooms, with only a few examples of the other structure types. These small conjoined rooms have so far been found at only one other Wari site, Azángaro, near the site of Wari itself in Ayacucho. These numerous rooms have been the catalyst for most of the speculation about state storage as a technique of Wari statecraft (Harth-Terre 1959, Lanning 1967, Menzel 1964, Rowe 1963). As this area of the site has played such an important role in previous interpretations, it was necessary to thoroughly explore and investigate this sector in order to determine its function.



3.18. Tomb 2 containing burial 3 in the perimeter wall of Sector 3.

Type I: Patio Group Structures

Two patio group structures in Sector 4 were sampled.

UNITS 14 AND 15. A patio group located in the western corner of Sector 4 was investigated by two test pits designated Units 14 and 15 (fig. 3.19, group C).

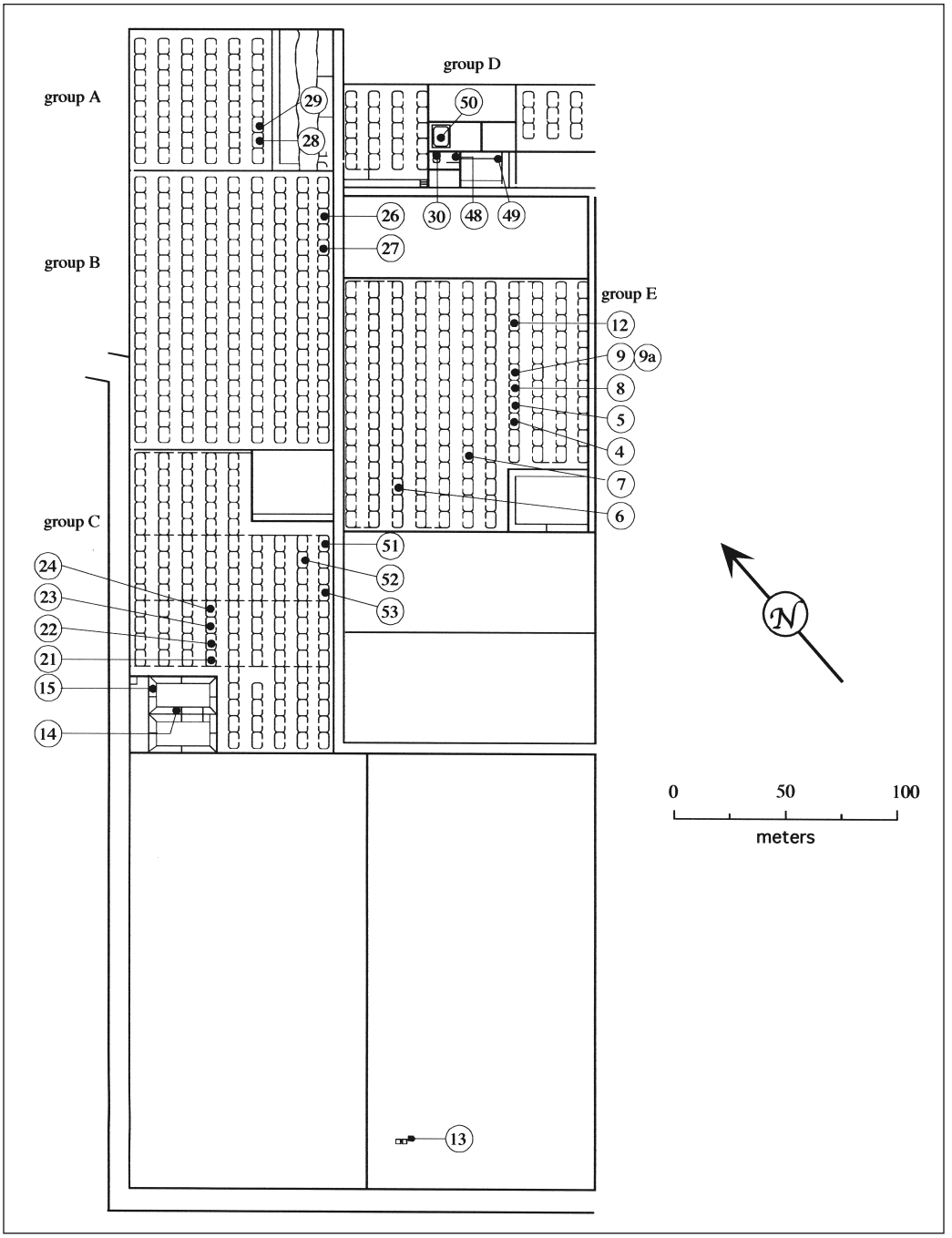
Unit 14 was located on the north side of the median cross-wall in the southwest peripheral room of the patio group and measured 2 by 3.2 meters (fig. 3.20). It was excavated to sterile at a depth of 1.8 meters below the present surface and produced only a few bones and 79 pot sherds, three of which were decorated. We found three separate floors made of packed earth at depths of 1.08, 1.34, and 1.80 meters below the surface. Each of these floors contained a separate fire hearth. On the upper two floors, these hearths were located in the southern corner of the unit while, on the lowest floor, the hearth was located in the eastern corner. The floor in this unit seems to have been periodically remade by the packing of 20 to 40 centimeters of fresh earth. One additional feature was an apparent camelid bone offering, which had been partially burned and buried in the uppermost fire hearth. This offering consisted of leg bones carefully placed in parallel with the skull sitting on top.

Unit 15 was located in the north corner of the patio group in the end of the northwest peripheral room (fig. 3.20). It measured 2.3 meters wide and varied between 1.5 and 3.5 meters in length due to the diagonal wall in the corner of the structure. Unit 15 was excavated to sterile at a depth of 2.3 meters below the surface, but only five sherds and a few bones were found. Of these, only three were decorated sherds. One of them from the upper levels was Lucre style.

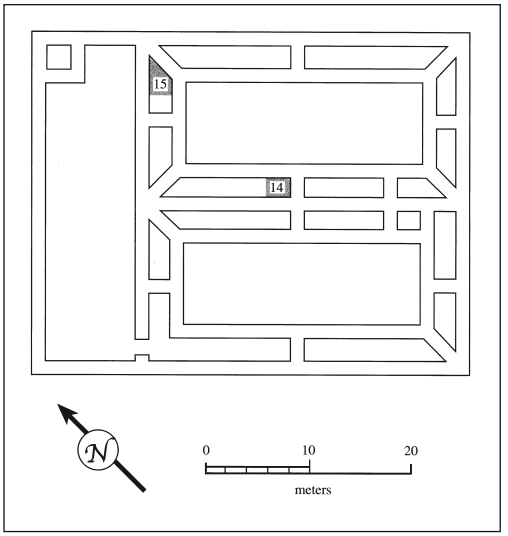
A patio group at the north end of Sector 4 was sampled by Alfredo Valencia during the 1991 field season (fig. 3.21). Four 1-meter squares were excavated in the eastern corner of the group designated Unit 49 (figs. 3.19 and 3.21). Two were located in the patio and the others across the end of a peripheral room. No ceramics or other artifacts were encountered, but a partial human skeleton was found in the squares located inside the patio. The skeleton was that of a male between the ages of 16 and 18 years. The head and the entire left arm were missing. The body lay sprawled in a face down position and did not appear to have been formally buried. Rather it had been covered over by wall collapse. The fact that the body was of a young male and was missing its head and arm suggests that he was a war victim. The taking of heads and sometimes limbs as war trophies was a common practice in ancient Peru. This individual may have met his death during the events surrounding the abandonment of Pikillacta.

Type II: Niched Hall Structures

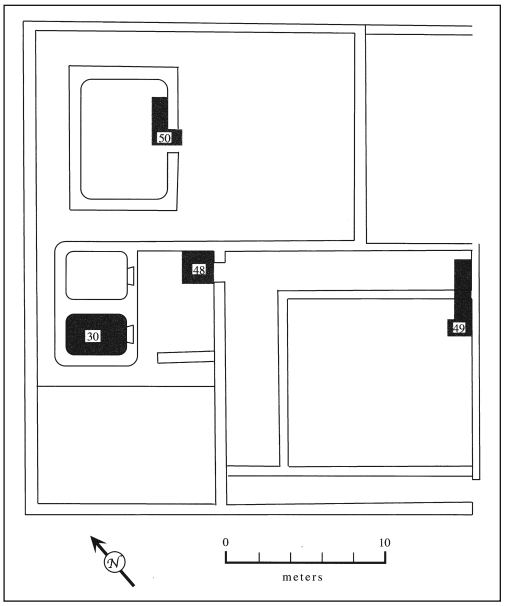
UNIT 30. An unusual niched hall is located near the center of group D in Sector 4 (fig. 3.19). It consists of a relatively small enclosure (8 by 10 meters) containing two small, conjoined Type II niched halls. The corners of the southeast wall, both interior and exterior, are rounded, in a fashion similar to the small conjoined buildings that dominate Sector 4. The excavation was des-



3.19. Sector 4 of Pikillacta showing location of excavation units.



3.20. Excavation Units 14 and 15.



3.21. Excavation Units 30, 48, 49, and 50.

ignated Unit 30 and included the whole of the interior of the niched hall structure on the southwest side (fig. 3.21). This unit measured 3.5 by 4 meters and was excavated to sterile at a depth of 3.2 meters below the surface. This building contained the typical internally rounded corners and a single horizontally trapezoidal niche on its southeast end. The interior proved to be entirely filled with a very large stone which was part of the natural rock outcrop underlying the structure. The rock sloped upward from the southwest side, reaching its maximum elevation on the northeast side of the structure. There were only a few sherds in the fill, including half of a miniature ceramic bottle. One other artifact found was a shell bead which looked like a miniature *Strombus* shell. At the deepest point of the excavation, the western corner, we found a large charcoal deposit.

During the 1991 field season Alfredo Valencia, working with the Pikillacta Project, excavated four additional 1-meter squares in the eastern corner of the of the patio. These excavations, designated Unit 48, produced 30 fragments of camelid bone and only 16 potsherds, one of which was decorated.

At this time he also investigated a small niched hall structure which lies adjacent to the northeast side of Unit 30. Four 1-meter squares, designated Unit 50, were placed in the doorway and running along the inside of the southeast wall (fig. 3.21). Again, very few artifacts were found, consisting of only 6 undecorated sherds and 50 camelid bone fragments.

Type III: Small Conjoined Buildings

During my visit to Cuzco in 1978, Dr. Luis Barreda of the University of Cuzco had mentioned to me that he discounted the storage facility theory as an explanation for the function of the 501 small conjoined buildings in Sector 4. His conclusion was based on the results of his excavations in several of these *qolqas*, or storage units, in which he had found what he believed to be domestic trash. We decided to do some further tests, and in 1979 four additional structures were tested. Two of these test units produced little or no cultural material; but in the other two we encountered what appeared to be domestic trash. These test cuts were approximately 90 centimeters deep and the fill from them contained both

utilitarian and fancy Wari style potsherds, a few Q'otakalli style polychrome sherds, several pieces of obsidian (including a projectile point), a number of bone tools, numerous bones and burned bones, and a fire hearth. These results seemed to confirm Barreda's hypothesis suggesting a domestic-type occupation for these structures rather than storage.

In 1982 I returned with the intention to systematically test the storage hypothesis for these small conjoined buildings. In an effort to obtain a representative sample of the structures, test cuts were made in various structures in groups A, B, C, and E. These were Units 28 and 29 in Group A, Units 26 and 27 in Group B, Units 21–24 and 51–53 in Group C, and Units 9A and 12 in Group E. These units, taken together with the four excavated in 1979 (Units 6, 7, 8, and 9, all in Group E), the two units excavated by Barreda in 1963 (Units 4 and 5), and the single unit excavated by Lumbreras (Unit 1) in 1972 (personal communication, 1982) give a total sample of nineteen of the small conjoined buildings in Sector 4 (figs. 3.19, 3.22, and 3.23).

Of the sixteen structures sampled, six contained small fire hearths (Units 9, 22, 23, 26, 27, and 28). The hearths were all found on the southwest side of the door opening and, with the exception of the hearth in Unit 28 that was found toward the center of the structure, all were located against the wall. The hearths were made by digging a shallow hole in the floor, in which the fire was built. There were no formal boundaries such as a ring of stones or other delimiting features. The contents of the hearths typically consisted of a fine powdery ash, very small amounts of charcoal, burned bones and bone fragments, and soot-marked potsherds. The scarcity of solid carbon or charcoal made it difficult to obtain samples of sufficient size for radiocarbon dating. This was probably due to the nature of the material used as fuel, possibly camelid dung or grass.

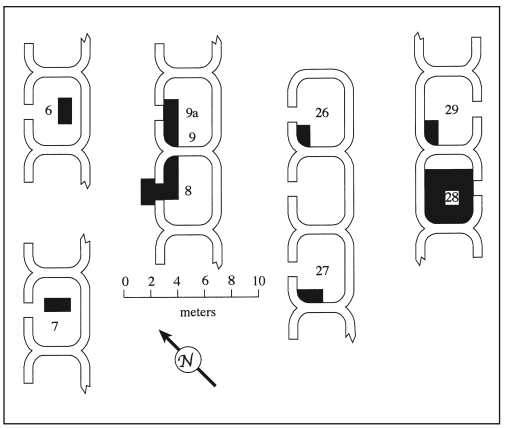
Twelve of the sampled structures (all units except 7, 12, 21, and 29) contained artifacts consisting of pot sherds, burned bones, bones, bone tools, and obsidian flakes. In four of the structures no artifacts were uncovered. The quantity of cultural material found varied considerably from one structure to the next, with some containing almost a meter of fill and others only a few centimeters. The heaviest concentration of material was encountered in Units 8 and 9, just inside the doorways. These concentrations seemed highly localized within the structure since nothing was found in an excavated extension of Unit 9.

One other excavation, Unit 25, was made in the street in front of Unit 24 in Group C. It was situated to expose a cross-wall and gate, which served to divide the structures in Group C into smaller groups of four and five structures each.

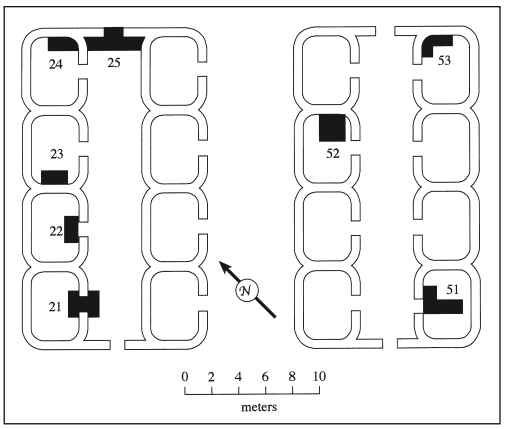
Unit 28 contained parts of a human body—a radius and ulna, several ribs, and several teeth that were located in a fire hearth, perhaps representing a burned mummy. A human thigh bone was also found in Unit 27. Several human teeth were found in Units 8 and 9.

In 1991 three more conjoined rooms were tested by Alfredo Valencia, working in conjunction with the Pikillacta Archaeological Project. These were Unit 51, 52, and 53. The results were very consistent with the tests of previous years. All contained small quantities of camelid bone, a few potsherds (mostly undecorated), and small amounts of carbon and ash scattered in the fill. Interestingly, the excavations in Unit 52 produced five human bones, including a radius and humerus and three fragments of long bones.

The result of these test excavations was enigmatic. Of the total of 19 structures tested over various years, some contained a small amount of human remains and others seem to indicate episodes of food preparation and consumption. One of the small rooms in Sector 4 is almost completely filled by a single large boulder. It is curious that this stone was not removed, a feat that was surely within the technical capability of the Wari engineers. It may be that the stone was a *huaca*, or sacred stone, and was thus retained in place. The Incas were known to build around



3.22. Excavation Units 6, 7, 8, 9, 9a, 26, 27, 28, and 29.



3.23. Excavation Units 21, 22, 23, 24, 25, 51, 52, and 53.

certain stones (there is an excellent example of this at the nearby Inca site of Kañaraqay and others at Pisaq and Machu Picchu), and this example at Pikillacta may indicate that it was a long-standing practice. A similar situation exists in Unit 30 discussed above.

Non-Wari Structures

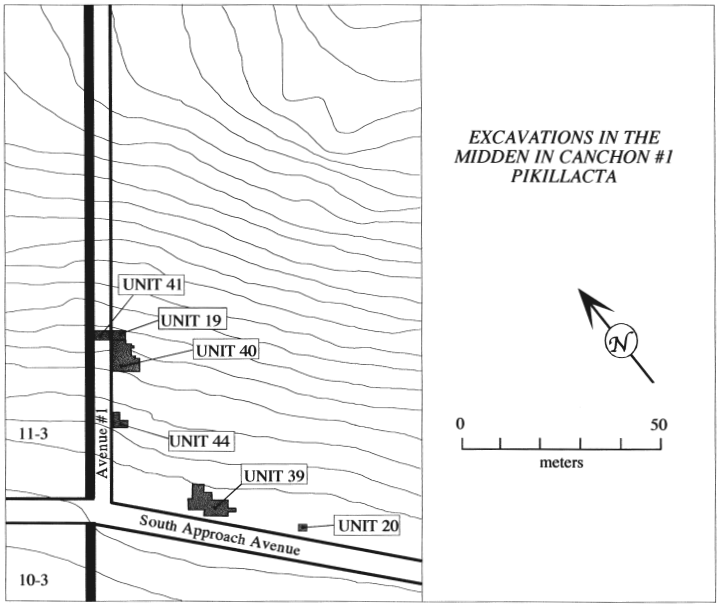
At the extreme southwest end of Sector 4, just above Avenue 8, are three small rectangular foundations. One of these was selected for excavation and was designated Unit 13. This structure proved to be a rectangular *chullpa* or burial tower. It was sampled by means of a 1 by 2 meter trench, 50 centimeters deep, which produced about 25 pot sherds and a few human bones (fig. 3.19). Two of the sherds were decorated in the Wari style, but the rest were plain and all seemed to belong to a single bottle-shaped vessel.

The *chullpa* is almost certainly intrusive and most likely dates to the Late Intermediate Period. *Chullpas* have not been reported as a cultural trait of the Wari but are known in the south Highlands from Inca times and earlier. Isbell (1997) has argued that they are a sign of resistance to the Wari. They are quite common at Late Intermediate Period sites in the Lucre Basin (e.g., Rayallacta and Chokepukio). The presence of the two Wari sherds inside the *chullpa* is most likely accidental since it was constructed in one of the few areas of Pikillacta where Wari sherds occur on the surface, and the *chullpa* had been badly disturbed in the past.

The architecture in Sector 4 is in some cases fairly well preserved. However, it is difficult to determine if the buildings were finished, although some obviously show signs of use. There is no evidence of plastered floors or walls in any of the buildings examined. There appears to have been stone robbing from this area, resulting in considerable destruction, probably done by people from the neighboring haciendas during the Colonial period. There is a depressed pathway leading from the cut adjacent to Group A at the northeast end of the sector and toward the hacienda Huambutio to the north. This cut was likely a natural depression that was enlarged and widened in order to facilitate dragging the stones out. It is likely that this sector was only partially completed at the time of abandonment, and the remains encountered possibly reflect only short-term or temporary use.

Excavations in the Midden

UNITS 19 AND 20. In Canchon 1 on the southeast side of Pikillacta, an erosion channel in a sheep



3.24. Excavation Units 19, 20, 39, 40, 41, and 44.

trail revealed a high concentration of ceramics near the surface. In 1982, a 3 by 3 meter test cut was placed there and designated Unit 19 (fig. 3.24). This unit produced a very high volume of artifacts: 3,600 pot sherds, thousands of bones, several fine carved-bone weaving tools, a number of pieces of metal, including several *tupu* pins, polished stone beads, and many pieces of obsidian, including a very fine large point and several large blades. The fill contained many small pockets of ash and, in general, the excavated remains gave the impression that we had cut into a trash midden.

Unit 19 was located on a very steep hill slope and the excavation revealed that it had originally been terraced. At the bottom of the unit, about 2 meters below the surface, we found a prepared living floor which rested on a level platform. This floor contained many features suggesting that it had been a food preparation area or kitchen. In the north corner there was a large fire hearth which was partially cut back into the terrace wall. There may have been some sort of oven structure here at one time. In the east corner of the unit were two grinding stones set in a foundation of small stones and globs of plaster. One of these grinding stones was rectangular and looked as if it had originally been a dressed block.

In the floor were three specially prepared pits. Two of these were plaster-lined and the third was made to hold a very large ceramic vessel. The vessel was still in place in the third pit, with only the top broken around the shoulders. The pieces had fallen inside the vessel after the break and we were able to recover them so that the vessel could be reconstructed.

To the northwest, the floor continued under the sidewall of Avenue 1. This indicated that the living floor probably predates the construction of Pikillacta's perimeter wall.

One other very interesting find was a fragment of the rim of a polychrome Wari vessel, which proved to be part of one of the rims recovered in Unit 16. This suggests that the trash in structure 12-2A was allowed to accumulate and was periodically disposed of in the area around Unit 19.

In an effort to confirm that Canchon 1 represented a main trash dump for the Pikillacta site, a second test cut, designated Unit 20, was made

on the extreme southwest edge of Canchon 1, just above the south approach avenue. Unit 20 measured 2 by 2 meters and was excavated to sterile at a depth of 2.7 meters below the surface. This unit produced 7,840 potsherds, a large quantity of bone, many pieces of metal including several *tupu* pins, and many fragments of obsidian. The fill also contained numerous pockets of ash and globs of plaster.

The data from Units 19 and 20 suggested that there was an occupation in Canchon 1 during the construction of Pikillacta. The kitchen in Unit 19 probably served to feed workers during construction and was then abandoned after building of this part of the site was completed. This whole area was then used as the main trash dump for the site. The gradual accumulation of trash and the erosion of the hill slope eventually obscured the living floor found in Unit 19.

UNIT 39. In 1989 and 1990 we opened additional units in the midden in order to recover a large ceramic sample for analysis. The largest of these excavations was Unit 39 located at the bottom of the steep slope and just above the northeast wall of the south approach avenue (fig. 3.24). Excavations were continued in arbitrary 20-centimeter levels to sterile soil or bedrock and varied in depth from 1 to 2 meters, becoming shallower in the uphill direction. The upper levels were mixed as a result of material sliding down the slope over time. The lower levels contained numerous small concentrations of artifacts suggesting multiple depositions over time. In addition, there were numerous concentrations of probable building materials including clay and gypsum. Ash lenses were also common, as was a certain amount of ash and carbon distributed throughout the fill.

UNIT 44. Approximately 20 meters uphill from Unit 39, a smaller excavation designated Unit 44 was located adjacent to the northwest wall of Canchon 1 (fig. 3.24). Excavation of 20-centimeter arbitrary levels was continued to sterile soil reached at a depth of 1.6 meters below the surface. This excavation revealed two parallel low walls, spaced 2 meters apart, that extended in a southeast direction perpendicular to the northwest wall of Canchon 1. These two walls appeared to be extensions of the steps that can be seen crossing Avenue 1. This suggests that what appear to be steps in Avenue 1 are actually a series of parallel retaining walls or small terraces that were constructed prior to Avenue 1 and which served to stabilize the steep hill slope.

UNIT 41. This excavation was located 10 meters uphill from Unit 44 and expanded the area excavated in 1982 called Unit 19. This excavation again confirmed that the apparent steps in Avenue 1 are in fact a series of small terraces that extend out into Canchon 1. Two parallel walls extending perpendicular to the southeast wall of Canchon 1 and spaced approximately 2 meters apart were encountered just to the northeast of Unit 19. Each of these walls aligned with an apparent step in Avenue 1.

The purpose of this excavation was to further investigate the apparent occupation level that had been encountered in Unit 19 during the 1982 excavations. The unit was excavated in 20-centimeter arbitrary levels until sterile soil was reached. The depth ranged between .80 and 2 meters. Although the midden deposits continued to be encountered, no evidence of an extension of the living floor was found.

UNIT 40. A test pit placed in Avenue 1 opposite Unit 19 was designated Unit 40. The purpose of this excavation was to determine if the midden extended under the wall of Canchon 1 and under Avenue 1. A 2 by 2 meter test pit was excavated in 20-centimeter arbitrary levels down to sterile soil at a depth of 90 centimeters. We continued to find artifacts in this area, which indicated that the midden extended to the southeast wall of Sector 3 of Pikillacta and that Avenue 1 was built on top of the midden deposits. This means that the construction of Avenue 1 occurred after the midden was established and was a relatively late construction in the history of Pikillacta.

3.25. Carved bone in form of a deer's head found in Excavation Unit 41.

3.26. Nazca style ceramic bowl found in Excavation Unit 39.

3.27. Cajamarca style ceramic sherds found in Excavation Unit 39.

All of the midden excavations produced a great quantity of cultural remains. The density was greatest at the bottom of the slope in Unit 39 because of the tendency for objects to move downhill. Artifacts of ceramic and bone were the most numerous components of the midden, with an estimated quantity of approximately 55,000 sherds and 50,000 bones. (The ceramics are discussed by Mary Glowacki in chapter 6 of this volume.) The bones have not yet been thoroughly analyzed, but cursory inspection reveals that the majority are camelid bones. Bones of a number of guinea pigs and other rodents are also present as well as those of unidentified species. Other classes of artifacts included objects of metal, presumably bronze, taking such forms as *tupu* pins, needles, scrapers, and spoons, as well as fragmentary pieces. (These are further discussed by Heather Lechtman in chapter 9 of this volume.) A considerable number of obsidian flakes were found, along with a number of whole and partial projectile points. Several fine objects of carved bone that were recovered include a spoon, a carved deer head (fig. 3.25), and a serpent. Beads made of bone, colored stone, and shell were found, as were partially worked shell ornaments. One of the more unusual finds was the discovery of a large fragment of a Nazca 4–style bowl (fig. 3.26). Five sherds in the Cajamarca style were also recovered (fig. 3.27).

The excavations in Pikillacta produced a considerable volume of archaeological evidence that permits several approaches to the interpretation of the site and its function. In the following chapters, Pikillacta will be interpreted in terms of architecture, ceramics, and other data that bear on the understanding of its function.

4 Pikillacta Architecture and Construction Requirements

GORDON F. McEWAN

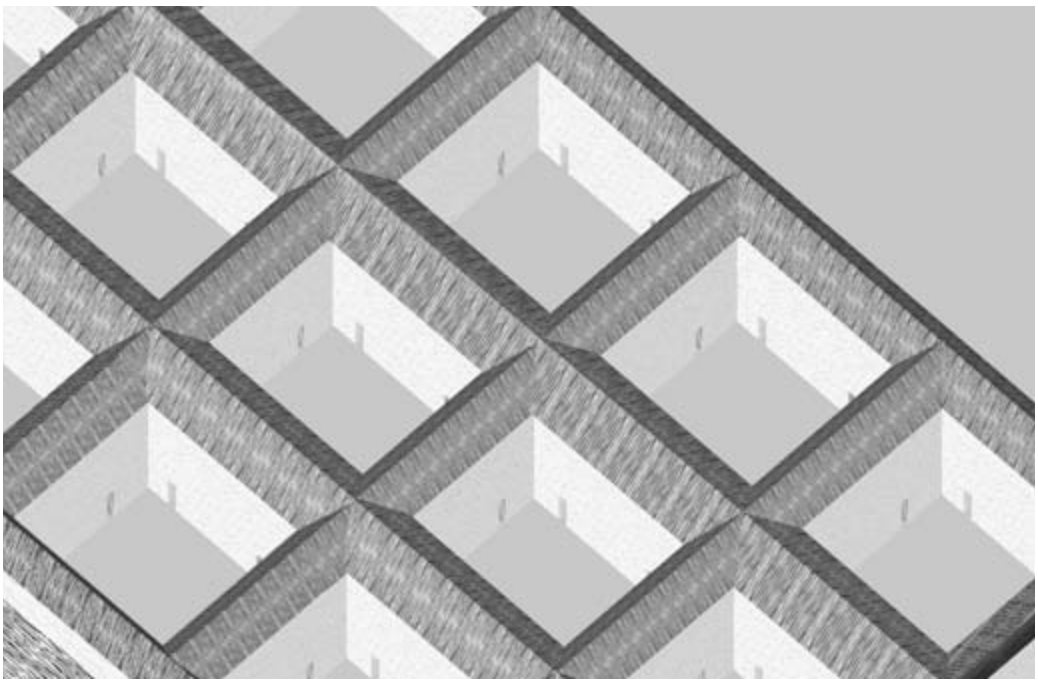
Some of the most intriguing questions about Pikillacta are those revolving around how it was built, how long it took to build, and what it cost to erect such an enormous complex. Nearly everyone who has commented on the site has observed that it is extremely large and well ordered and therefore must have been important. While these are valid and logical observations, they do not shed much light on Pikillacta as a construction project in terms of the scale of human effort. The studies described here are an attempt to translate Pikillacta into more comprehensible human terms.

During the course of the mapping project and excavations, we conducted a systematic investigation of the architecture of Pikillacta on a structure-by-structure basis that provided a great deal of architectural data. This study resulted from an attempt to understand how Pikillacta was built and what information analysis of its construction could provide about the Wari themselves. The uniform Wari architectural style is a testament to the concept of centralized planning and provides some very interesting insights into Wari organizational methods.

Principles of Design and Sequence of Construction

Pikillacta is a classic example of the Wari architectural concept that has been called "cellular orthogonal" by William Isbell (1991). At Pikillacta a structure or space is defined by its interior layout, while the exteriors are uniform and featureless or in some cases nonexistent because of the sharing of walls between structures. In the vast majority of structures in Pikillacta, there simply is no exterior perspective as there are no free-standing exterior walls (fig. 4.1).

Spaces are defined from within by the various arrangements of basic architectural elements. These elements almost invariably produce arrangements that can be defined within the three basic structural types in the



4.1. Reconstruction drawing of structures in Sector 1.

Wari typology. Although there are a few unique structures, they are generally variations on the theme of the three basic types. In many respects the structures at Pikillacta are analogous to the rooms in a large house or, perhaps more accurately, the rooms of a large palace, and in this sense the entire complex may be viewed as a single enormous building.

The structural survey, made in conjunction with the mapping project, indicated that within each sector of Pikillacta, all of the shared walls, the walls serving as boundaries between structures, the walls serving as boundaries between structures and avenues, and the walls serving as the perimeter of the site were built first. This provided the basic structural shell since all of these walls appear to be bonded together. All of the major areas of the site were thus laid out in the preliminary stage of construction and must have been conceived as one master plan. This plan would have been extraordinarily detailed since the location of all major rooms must have been known in advance in order to construct such features as subterranean canals that would have to be built first.

After the basic shell had been put up, or at least laid out, the interiors of each structure were then put together. The construction of the interiors allowed for a limited amount of flexibility since the interior walls are generally unbonded. It was therefore theoretically possible to modify the interior design of a structure by moving or adding a wall without the risk of disturbing neighboring structures. In her study of Wari architecture, Schreiber (1978: 148) has identified a four-step sequence of construction: (1) pre-construction layout, (2) foundations, (3) wall construction, and (4) finishing of interiors. Pikillacta conforms to this sequence, and data from other major Wari sites such as Viracochapampa (Topic and Topic 1983: 20–21) and Wari itself (Spickard 1983: 148) suggest that they also follow Schreiber's sequence, confirming its validity for Wari architecture in general.

Construction Process and Materials

The actual process of construction involved first surveying and laying out the lines of the walls over undulating ground. We did not find any evidence of how this was accomplished, but it is clear that it was done with great precision. A glance at the ground plan or air photo of Pikillacta confirms that the Wari were masters of the art of surveying large areas. A standardized system of measurement must have been employed in order to achieve the precision required for the Pikillacta plan. Exactly what the unit of measure was is difficult to say precisely because of the erosion of the original surfaces of the buildings precludes precision reconstruction of their dimensions. The consistent reoccurrence of certain dimensions that fall within the approximate modern measurement ranges of 1 meter, 2 meters, 3 meters, 10 meters, 30 meters, 40 meters, and 50 meters suggest that the Wari were using a standardized linear measure not too different from the modern meter. Lee (1996: 4) in discussing the basis for measurement in Inca architecture has observed that many cultures (including our own) use units of measure based on body parts. I believe it is reasonable to assume that the Wari would do this as well and that their unit, approaching a modern meter in length, was probably something like a double arm span.

At the same time as the surveying for foundations was done, topographic studies would have been made for the purpose of placing the elaborate subterranean canal system that provided both water supply and drainage to the site. The provision of water was essential not only for daily consumption of the population but also for construction of the mud mortar and the gypsum plaster.

Equally important would be the management of rainwater runoff shed by the roofs into the patios of the cellular structures and the disposal of sewage and wastewater. With the large areas of plastered patios surrounded by high walls, structures at Pikillacta form natural cisterns that could quickly become filled and flooded with water if adequate drainage were not available. Standing water has a very destructive effect on the gypsum and mud used in these buildings, as we witnessed when it rained during our excavations. Gypsum floors are especially vulnerable to water damage and erosion if not properly drained. We found no direct evidence of sewage and wastewater disposal but suppose that it would have been removed, in part, through the drainage system.

Wall Construction

Surveying and canal construction were followed by the digging of foundation trenches averaging 2 meters deep. The bases of the walls were laid in these trenches and the walls then built in both vertical and horizontal sections (fig. 4.2). Curiously, the vertical sections are not bonded at their edges, although they are bonded internally within each section since the stones are not laid in courses but rather at random with small stones used to fill the chinks between larger stones. This failure to bond the sections has resulted in the wall-collapse pattern that accounts for the present sawtooth appearance of the walls. Evidently some sections were stronger than others. It is very puzzling that the architects, after taking care to bond all of the wall intersections in the basic shell, would leave the vertical sections unbonded.

The horizontal sections are also unusual in that the sizes of the stones used within a section are fairly uniform. However, the size of the stones differs from section to section, with some sections consisting of large stones and others of small stones. The stones are generally not laid in regular courses but seemingly at random, with the exception of the margins of a section, where relatively straight courses will occur. One wall in particular is remarkable because a section of large stones is laid over a section containing rather small ones.

4.2. Standing wall fragment showing both horizontal and vertical seam.

I believe that it is likely that these wall sections are an artifact of a *corvée* labor system. Undertaking a construction project as large as Pikillacta would require a very large work force. The Wari probably recruited workers by relying on the Andean custom of extracting taxes in labor. Each wall section may mark the extent of the construction service of a particular working group.

Wall thickness is variable and difficult to gauge accurately due to erosion of the original plastered surfaces. The boundary walls of enclosures, that is, the shared walls that form the four walls of the enclosure or cell, were on average 90 centimeters thick; the interior walls, those forming peripheral rooms and cross-walls, 70 centimeters. The thickness of the walls forming the boundary of the main architectural block averaged 1.5 meters, as did the walls of the niched halls, which needed more width to accommodate deep niches. Because of the poor condition of the wall surfaces, it was not possible to accurately gauge whether the walls tapered toward the top. It seems unlikely that they would taper significantly due to the fact that almost all walls in Pikillacta are shared with each face belonging to a separate room or structure. Setbacks built into some walls do cause them to narrow with height, but nothing resembling deliberate battered construction, typical of the Inca, was observed.

Wall Features

As the walls were constructed, various features were incorporated into them. These features included rows of projecting stone corbels, setback shelves, rows of small niches, large niches, windows, rosettes, and vine cores. The excavations provided data that help define functions for most of these.

The rows of corbels, rows of small niches, and setbacks appear in most cases to be part of the support system for multiple-story structures. The rows of corbels consist simply of stones set into the wall in a row in such fashion that they

project 15 to 30 centimeters horizontally from the wall. The spacing between individual stones varies greatly, with some set so close to each other that they almost form a shelf, whereas in other cases they are set widely apart. It has been generally assumed that the function of the corbels was to support the upper floors of buildings (Sanders 1973: 388; Schreiber 1978: 138), and our excavations demonstrated that this was in fact the case.

There are, however, several cases where the floor support function does not seem to make sense. In the patio group where Unit 16 was excavated the row of corbels in the wall of the outside southeast peripheral room zigzags at 3-meter intervals, with an approximate shift in height of 50 centimeters at each interval. In a neighboring patio group, the row of corbels in the southwest standing wall has a pronounced curve that cannot be attributed to wall subsidence. Another curious fact is that several structures exhibit vertical rows of corbels in addition to horizontal rows. Further, the site perimeter wall near the modern entrance to Sector 3 presents a row of corbels just below the top of the wall. These are located approximately 12 meters above the present ground surface and seem much too high for a second story.

It seems likely that the corbels had several different functions. Some clearly functioned as floor supports for two-story and three-story structures, while others may simply have been decorative. One additional possible function is that they helped support the mud and gypsum plaster on the walls. Surviving fragments of the plaster indicate that it was at least 10 centimeters thick. If so, by the time that a wall 40 meters long and 10 to 12 meters high had been covered, literally tons of plaster would have to be supported. Doubtless some of these anomalies can also be attributed to construction errors, which are to be expected in a project of this magnitude.

Setbacks are formed by narrowing the width of a wall so that a shelf or ledge 10 to 15 centimeters wide is formed. Setbacks are commonly found in walls opposite another wall containing a row of corbels and rarely opposite another setback. Their function is presumably identical to that of the corbels in supporting a wooden framework on which a floor is laid. As noted, setbacks occur opposite corbels but never in the same wall face as corbels.

The rows of niches consist of a series of small, irregular, roughly rectangular niches which average 20 by 25 centimeters in size. As with the corbels, the spacing and placement of the niches varies considerably. Niches are frequently found in conjunction with setbacks or rows of corbels. They are sometimes set flush with the corbels or setbacks, or can be located from 10 centimeters to 1 meter above or below them. If the setbacks and corbels are in fact floor supports, then the niches would seem redundant as an additional floor support system. Sanders (1973: 402) reports that the Peruvian archaeologists Luis Lumbreras told him that he believes that certain of the small niches at the site of Wari in Ayacucho may have served to support tenoned stone heads, yet Sanders notes that no stone sculpture has been found at Pikillacta. Spickard (1983: 157) suggests that the niches, or "square holes" as she calls them, served to support scaffolding during construction and were later plastered over when the wall was finished. One other possible function of some small niches in certain cases may have been for a door-fastening system similar to that used by the Incas. Sanders' excavation of Unit A in Structure 33-2B at Pikillacta uncovered niches so positioned, which I also observed. J. and T. Topic (1983: 14) also report niches used for this function at Viracochapampa, a large Wari site similar to Pikillacta, located in the north Highlands. It seems probable that, like the corbels, the niches served a variety of functions, all of which are not readily apparent to the modern observer.

Large niches are contrasted with the niches in the previous discussion principally on the basis of size. Two distinct types of large niches occur in the buildings of Pikillacta. The first type has been found only in a single building excavated by Sanders and Barreda in 1964 (Sanders 1973:

385). Four of these niches are located in the building near the center of the site in which Sanders' Unit I was located (Sanders mentions only three niches, but we observed four). These four niches each measure approximately 90 centimeters wide by 40 centimeters deep, but due to the fact that the wall is destroyed it is impossible to determine their original height. The other type of large niche is that which occurs in niched halls. These are distinguished by their distinctive trapezoidal shape in horizontal cross section. They are generally narrower at the opening into the room and wider at their back wall. The openings average between 100 and 120 centimeters wide, and their back walls are as much as 150 centimeters wide. The front-to-back depth averages about 50 centimeters. None of the examples of these niches we encountered was preserved to its original height, so that dimension remains unknown. The Topics (1983: 14–15) report very similar trapezoidal niches occurring in niched halls at Viracochapampa in the north Highlands. The function of these niches was probably ceremonial.

Windows are relatively small and narrow and quite irregular in shape, rarely exceeding 20 by 40 centimeters. They are constructed in a fashion similar to that of the small niches and differ mainly in being slightly larger and completely piercing the wall. It is curious that all of the windows encountered at Pikillacta occur in only nine structures, located in the southern corner of Sector 2. It may be that windows in other structures are either buried or were in sections of walls now destroyed. We did not find any windows during our excavations.

The structures containing surviving windows are designed with only limited use of peripheral rooms so that nearly all of the windows open to the light rather than to the interior of the adjacent structure sharing the wall. Almost everywhere else in the site, shared walls are paralleled on both sides by one or more peripheral rooms that would make windows useless for admitting light.

Rosettes are peculiar wall features, apparently unique to Pikillacta, whose function remains unknown. They consist of a circular pattern in a wall surface formed by fairly large stones with the interior of the circle filled with small stones. Rosettes are fairly common in the walls at Pikillacta, but only one was discovered completely intact. It had been preserved by the overburden and was only discovered by excavation in Unit 14. Local informants told me that all of the other examples of rosettes were destroyed because the people of the Lucre Basin believe that rosettes mark the location of wall tombs and so have broken holes in the walls searching for treasure wherever they have found a rosette.

Wall tombs are common at Chokepukio, and two were found in the perimeter of Sector 3 at Pikillacta. However, we found no evidence of wall tombs in the broken rosettes that were examined at Pikillacta. There does not seem to be a correlation between wall tombs and rosettes. Instead, I believe that they represent ancient repairs made to walls. Typically, the pattern of the rosette is circular with increasingly smaller stones as one moves towards the center. This pattern probably reflects the way that the hole was filled when making a patch.

The walls of the small, conjoined rooms in Sector 4 contain a core element of braided vines of the *pispita* plant that still grows abundantly on the site. This braid is relatively flat, measuring about 8 by 2 centimeters in cross section, and was unquestionably a deliberate inclusion in the wall at the time of construction (fig. 4.3). There appeared to be only one of these vine braids per structure, and they are small enough that it seems unlikely that they make any significant contribution to structural strength. The function of these vine cores remains obscure. One possibility is that they represent part of a template that served as a guide for constructing these odd-shaped rooms.

After the walls of a room had been erected, they were finished by the application of a thick coat of mud and were then plastered with gypsum. Surviving fragments discovered in situ in various excavations indicate a 10-centimeter cap

4.3. Looters' hole through wall in Sector 4 showing braided vine inclusion.

of mud built up of as many as seven thin coats sequentially applied and covered in turn by a thin frosting of plaster approximately 1 centimeter thick (fig. 4.4). The mud layers often have a great deal of straw or grass mixed in to add strength. There is also evidence that each layer was brushed with a coarse brush in order to provide tooth for the next coat to adhere to.

Construction Materials

The materials used in construction of Pikillacta are all found relatively close to the site, with the exception of the vast quantity of wood used. In his study of the nearby Rumiqolqa quarries, Protzen (1985: 3) has remarked that these quarries probably provided the stone for Pikillacta. The bulk of the actual stone used is red sandstone and lava. The sandstone predominates, giving the ruins a distinctive reddish cast that is echoed by the red color of the soil used to make the mud mortar. Several very large borrow pits are still visible on the northeast and northwest sides of the site, just outside of Sectors 1 and 4, and these surely provided a large part of the mud used in construction. The gypsum for making plaster is abundant on nearby Cerro Hatun Balcon and is still mined there today.

Roofs

Roofs were probably made of thatch and steeply pitched with double shed in order to handle the high rainfall of the Highlands. The illustration of Wari buildings on the pots from the Pacheco offering suggest very steeply pitched roofs. In 1989, I experimented with making roofs of *totora* reeds, which grow abundantly in the lakes of the Lucre Basin. Since this material is convenient and close at hand, it would seem a logical choice. While we were able to make passable roofs of *totora*, it proved to be not as watertight as roofs made of *ichu* grass. The chemical analysis of the ash found to fill several of the exca-

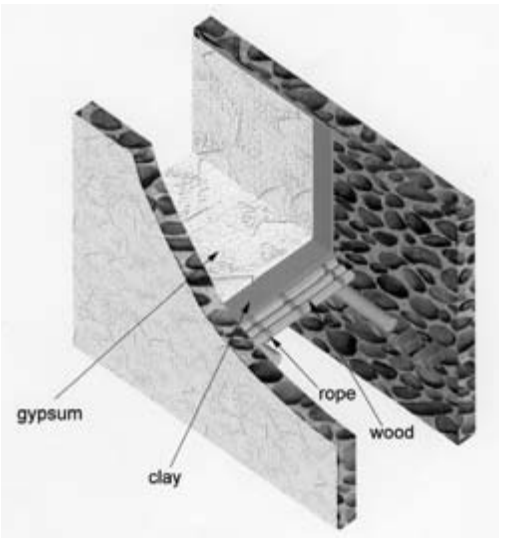
4.4. Clay and gypsum plaster layers on wall in Excavation Unit 36.

vated rooms, most notably Unit 43, suggests that it is the remains of burned roofs made of *ichu* grass. Because of this, I suspect that most, if not all, roofs at Pikillacta were thatched with grass rather than *totora*. It is interesting to note that *totora* makes excellent mattresses, and these are sold by the people of the village of Huacarpay just below Pikillacta. It seems likely that the Wari would have exploited the *totora* but used it for purposes other than roofing.

Sanders (1973: 389–390) has argued for flat roofs constructed of a layer of earth and gravel over a network of wooden beams and poles and capped with a thick layer of gypsum plaster. Having worked archaeologically in the Central Mexico area where prehistoric flat roofs were apparently common, he seems to have identified the remains of upper-story floors, which do contain flat gypsum slabs, as fallen fragments of flat roofs. Topic and Topic (1983: 18), on the other hand, have suggested that comparable Wari structures at Viracochapampa were roofed with clay stone used as shingle. I believe that both of these methods were unlikely due to their impracticality in a high rainfall environment. Thatched roofs would have been simpler to construct, with less weight to support, and would have been much cheaper in terms of labor expended in procuring and preparing materials and in the manufacture of the roofs.

Floors

Floors were constructed of thick applications of gypsum plaster laid on several types of foundations, depending on the location of the floor within a structure. Patio floors and the ground floors of rooms were laid over a prepared level foundation of coarse sand. Between the gypsum layer and the sand a thin layer of clay was placed, perhaps to help create a seal against moisture from the ground. Floors of upper stories were laid over a framework of wooden poles. Impressions of these poles were visible on the underside of



4.5. Drawing showing technique of upper-floor construction used at Pikillacta.

many large floor fragments recovered in excavation. The poles averaged about 8 centimeters in diameter and were lashed together with rope. The framework, resembling a fence, was placed so that it spanned the space between two parallel walls and was supported by a row of corbels or a setback in the wall face. These corbels may also have been lined with wood beams in order to level them and fill the gaps between. The whole framework was then coated with a layer of clay or mud, which filled in the gaps between the poles. On top of this was placed a 10-centimeters-thick layer of gypsum, which provided a smooth hard surface for the floor (fig. 4.5). Floors constructed in this fashion are also reported by Spickard (1983: 142) from the Moraduchayuq Sector of the site of Wari in Ayacucho.

Doorways and Lintels

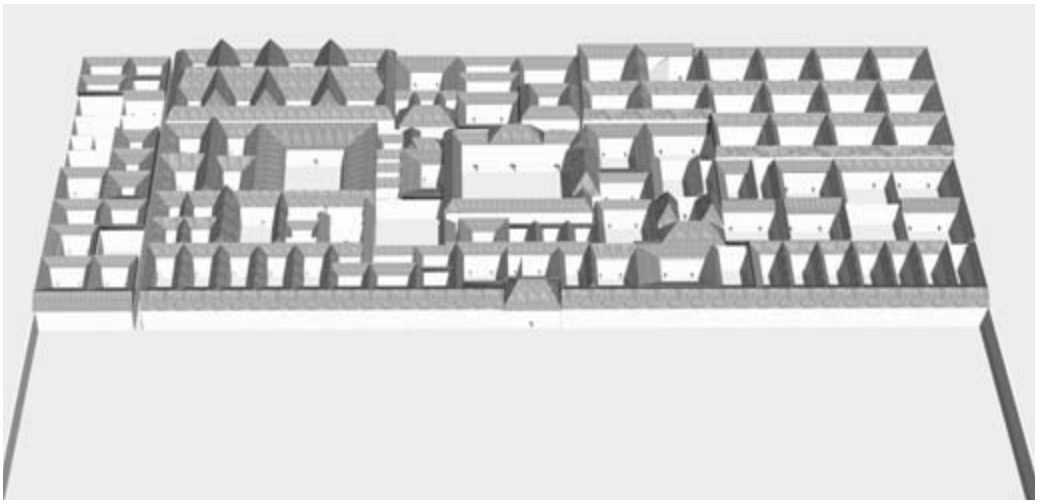
Another construction feature requiring special techniques is the door openings allowing passage through walls. Only three relatively intact doorways were found in the excavations. The largest and most typical was located on the ground floor in Sub-unit 43-A3. Here we found evidence demonstrating that the lintels were made of wooden poles treated in similar fashion to the floor support framework. The lintel in this unit was not intact, but fragments of the wooden poles were found in the sockets at the top of both sides of the opening. This lintel had consisted of five poles and spanned a width of 1.3 meters. Impressions from fallen plaster inside the doorway suggested that the poles had been lashed together and plastered over with clay and gypsum.

The doorway for the second story was located immediately above the first-floor doorway but was considerably wider, spanning a distance of 2 meters. Although we found clear evidence of a third floor having been present in this building, it was not preserved sufficiently to indicate whether or not there had been a third door in the wall directly above the second-floor doorway. If there had been, we would expect it to be again wider than the lower two openings. These doorways would have been stacked in the form of an inverted pyramid so that the smallest opening would bear the most weight from above and none would have to support large expanses of solid wall.

Smaller doorways were discovered in the adjacent excavation Sub-units 43-A4 and 43-B1. These had lintels made of single stones that spanned distances of 60 centimeters and 55 centimeters respectively. The lintels of these small doorways support the massive walls rising almost three stories above them. Where greater weights must be borne, the Wari architects chose stone and kept the door openings as small as possible.

The Cost of Constructing Pikillacta

Without benefit of preserved records it is impossible to exactly reconstruct what it cost in absolute terms to build a complex like Pikillacta and how long it might have taken. It is possible, however, to gain a general idea of what was involved through estimations based on what can be observed in the archaeological record. We can



4.6. Reconstruction drawing of Sector 2 showing how Pikillacta might have appeared ca. A.D. 700.

achieve a rough approximation of the quantities of materials required, the man-days necessary to obtain and transport these materials, and the man-days required to turn these materials into buildings. We can then estimate the amount of food necessary to fuel these efforts. In a state whose wealth was based on labor and agricultural output, this will yield a fair idea of the cost of this project.

Because the construction of Pikillacta was never finished, it is important to make the distinction between what was actually invested in the site's construction and what the Wari were prepared to invest. The simplest way to do this is to divide the construction of Pikillacta into two separate projects. The excavations and architectural studies have shown that Sector 2 was the first part of the site to be constructed. It appears to have been completely built and occupied for a considerable time before the Wari embarked on the construction of Sectors 1, 3, and 4 (fig. 4.6). The sequence of construction, based on degree of completeness, seems to have been Sectors 2, 1, 4, and 3, or possibly 2, 4, 1, and 3. Sectors 1, 3, and 4 all seem to have been underway at the same time and were all abandoned in an incomplete state. It is therefore useful to group them as a single construction effort. We have, then, two major construction efforts. One, Sector 2, was completed and represents more or less the total investment for that project. The other project, comprised of Sectors 1, 3, and 4, was not completed but represents a major investment on the part of the Wari, and its remains indicate the scale of the intended investment.

Procurement of Construction Materials Required for Sector 2

An examination of the ruins of Sector 2 permits a rough estimate of the quantities of building materials necessary for its construction. Linear measurements of the walls indicate approximately 30,773 running meters. There are undoubtedly some walls that do not appear on the surface and have been left out, but I feel that this figure includes the vast majority of the walls. The preserved height of the walls is quite variable. Excavation and observation of wall features has shown that at least half of Sector 2 was comprised of three-story buildings. With the foundations included, these walls would probably measure 14 meters in height. The remaining structures would have been two stories in height and with their foundations would have measured approximately 10 meters high. This yields an average

wall height of 12 meters for Sector 2. Wall width varies between 1.5 meters, 90 centimeters, and 70 centimeters. I have chosen to use an average width of 1 meter to keep the calculations simple. Based on these figures, the volume of the walls of Sector 2 is 369,276 cubic meters. The following discussion examines the necessary quantities of construction materials and the required effort for their procurement.

EARTH. First, after the site was surveyed, the foundations would have been excavated. This represents a combined construction and procurement project. The foundations average 2 meters deep, and although we found no direct evidence of how wide a trench was excavated, John Topic (1991: 160–161) states that the foundation trenches for similar buildings at Viracochapampa were 2 meters wide. This seems reasonable for Pikillacta, where the average width of the walls is calculated at 1 meter. Using these figures, 30,773 linear meters of trench 2 meters wide by 2 meters deep would have been excavated. The excavation would have produced 123,092 cubic meters of earth. Half of this volume of earth would have been placed back into the trench, with the wall foundation taking up the remaining space. A total of 61,546 cubic meters of earth would have been left over and available for use in wall construction or plastering.

Observations suggest that 10 percent of the volume of the walls is composed of earth and the remaining 90 percent of stone. This figure was also observed by John Topic for the walls of the Wari site of Viracochapampa (1991: 160–161). This amounts to 36,927 cubic meters of earth needed for mortar and 332,348 cubic meters of stone. The walls were coated on each face with 10 centimeters of mud plaster, except for the foundations. The foundations average about 2 meters in depth, so 2 meters of face height can be deducted from the average wall height. Approximately 61,546 cubic meters of earth are needed to plaster the walls, which corresponds to the amount left over from foundation excavations. Therefore only the earth needed to make mortar for the walls (36,927 cubic meters) and earth needed to underline the plaster floors would have to be excavated and brought in from outside the site. The amount of earth needed for upper-floor construction can be estimated by multiplying the square meters of flooring (46,833 square meters) by the thickness of the mud plaster (10 centimeters) and then by 1.5 to account for the fact that only about half of the buildings are three stories and the other half are two stories in height. This yields an additional requirement of 7,025 cubic meters of earth. Thus the total amount of earth to be excavated and brought into the site for construction purposes (in addition to the leftover back dirt from the foundation excavation) was 43,952 cubic meters.

Man-days required to excavate this earth can be calculated using a figure of 3 cubic meters per man-day. Erasmus (1965: 285) through experimentation concluded that a man wielding a digging stick could excavate 2.6 cubic meters of earth per day of five hours. Topic (1991: 160) calculated that a man-day at the Wari site of Viracochapampa would produce only 1 cubic meter because of the hard soil. I believe that these figures are a bit too conservative. There is good evidence for the availability of arsenic bronze at Pikillacta (see chapter 11) that would have provided tools almost as efficient as modern ones. Based on observations of my workers who use steel picks, I estimate that a man-day of excavation could produce 3 cubic meters of earth. The work force would be, after all, composed of men who were farmers and accustomed to hard digging. The man-day would also likely be longer than Erasmus' five hours, probably more like eight hours. At a rate of 3 cubic meters per man-day, the excavation of foundations for Sector 2 would have required 41,031 man-days.

Excavation of the additional earth would take 14,651 man-days. Carrying it into the site from the borrow pits would take an additional 65,928 man-days. This figure is derived from Erasmus' (1965: 287) experiments which found that a man could carry 1.76 cubic meters over a distance of 100 meters in one man-day. I calculate that in

an eight-hour day 2 cubic meters could be carried over a distance of 100 meters. The average distance to carry the earth at Pikillacta was 300 meters. The total man-day requirements for excavating the foundations and providing sufficient earth to build the walls of Sector 2 would be 121,466 man-days.

STONE. By far the most burdensome task was the procurement of stone for constructing the walls. The total volume of stone needed for Sector 2 was 332,348 cubic meters. Jean-Pierre Protzen (1985) has indicated that the stone for Pikillacta came from the nearby Rumiqolqa quarry about 2 kilometers away to the southeast. Topic (1991: 160) has used a figure of 1 cubic meter per three hours of effort for quarrying similar stone at Viracochapampa. Adopting this figure, a man-day of effort yields 2.67 cubic meters of quarried stone. This represents the investment of 124,475 man-days for quarrying stone.

Hauling the stone can be calculated using Erasmus' (1965: 287) figures. His experiments suggest that 500 kilograms of stone can be moved 750 meters in one five-hour man-day. At Pikillacta the man-day is estimated to be eight hours long, so it is estimated that 500 kilograms of stone can be moved 1,000 meters in one day. Topic (1991: 160) gives the weight of sandstone used at Viracochapampa as 2,300 kilograms per cubic meter. This works out to 764,400,400 kilograms of stone to be moved, for a volume of 332,348 cubic meters. To move this stone over a distance of 2 kilometers would require 3,057,602 man-days. The total effort to mine and move the stone to the site would be 3,182,077 man-days.

GYPSUM. Gypsum procurement presents similar problems although the amount of the material required is considerably less. The amount of gypsum needed can be roughly calculated. The walls of Sector 2 are coated on each side with a 1-centimeter cap of gypsum. The average height, excluding the foundations, is 12 meters. Thus 2 centimeters of gypsum thickness multiplied by 12 meters of height and by 30,773 linear meters of wall yields 7,386 cubic meters. The amount of gypsum needed for the ground floor and patios can be estimated by subtracting the total wall footprint from the gross square measurements of the Sector. In this case, that yields 10,860 square meters of area. The upper floors are estimated by observing that the upper floors cover about 35 percent of the area of the patio and ground floors combined. In the case of two-story structures, of which only about half the sector is comprised, an additional half of the 35 percent of ground-floor/patio figure is added. This yields a total figure of 16,561 cubic meters of gypsum needed for the floors. Added to the total required for the walls, the gross amount of gypsum necessary to build Sector 2 is 23,947 cubic meters.

The man-days to mine the gypsum can be determined using the same formula that was used for excavation of foundations. Carrying the gypsum for the distance of one kilometer from the mine to the work site can be calculated using the same formula for carrying earth. The mining would require an investment of 7,982 man-days and carrying would require 136,063 man-days. Obtaining the 23,947 cubic meters needed to construct the floors and plaster the walls of Sector 2 would require a total of 144,045 man-days.

WOOD. The amount of wood required to build the upper floors, door lintels, and roofs at Pikillacta is more difficult to estimate. Impressions of poles left in the bottoms of the mud and gypsum floors indicate that the average diameter of the poles used was relatively small, about 8 centimeters, and that the average length was 2.5 meters. We can arrive at a rough estimate of the number of poles used in upper-floor construction by dividing two-thirds of the linear wall length (this rough figure is calculated on the basis of two walls to support one pole, but in nested rooms one of the walls supports two poles) by the average diameter of the poles. The result is multiplied by 1.5 because I estimate only

about half of the buildings had three stories. This yields 256,442 poles multiplied by 1.5, for a total of 384,663 poles. The average length of the poles is 2.5 meters each, which makes a total of 961,657 linear meters. Support poles laid parallel to the wall on top of the corbels would account for an additional 46,160 linear meters. A total of 1,007,818 linear meters of wood were used to construct the upper floors.

The number of poles used to make the roofs at Pikillacta can be roughly estimated. Our roof building experiments suggest that the amount of wood needed is approximately 25 percent of what is needed to span the floors but does not include the corbel liners, which come to 240,414 linear meters.

The number of poles needed to make the lintels for the doorways in Pikillacta cannot be calculated exactly because we cannot tell, without excavation, how many doorways there were. There undoubtedly were a great many, and our wood requirement estimates are therefore too low. We can provide a rough estimate based on the following. In Sector 2 there are at least six doorways per enclosure and 124 enclosures. Each lintel made up of 5 poles one meter in length = 5 poles × 1 meter × 6 lintels per enclosure × 124 enclosures = 3,720 linear meters. The total estimated wood requirements for Sector 2 are 1,251,952 linear meters.

There is an additional requirement for wood that was needed as fuel for processing the gypsum, which must be heated in an oven before it can be used to make plaster. The gypsum mines are still being exploited in the vicinity of Pikillacta. In order to process the gypsum, modern miners use a ratio of 1 to 10 of firewood to raw gypsum in their ovens. Adopting this figure, it appears that the builders of Pikillacta would have needed 2,395 cubic meters of wood to process the gypsum for Sector 2.

It is not possible to determine where the wood was acquired. In order to avoid totally denuding the Valley of Cuzco, the wood must have been brought in from some distance away. It is also probable that the valley did not contain sufficient trees to meet these huge requirements. The heavily forested *montaña* region is the most likely source but would require moving the wood over a distance of 50 kilometers and more. Wood procurement alone would have been a formidable undertaking. Wood is heavy, although not as heavy as stone, and had to be transported over a very great distance, although transport may have been aided by use of llamas as pack animals.

The labor involved in procuring and hauling the wood to the work site can be estimated. Based on the actual weight of a piece of a wooden beam found in an archaeological context at Pikillacta that weighed 1.36 kilograms per meter, the total weight of the wood required for construction can be calculated to be 1,702,655 kilograms. At 270 kilograms per cubic meter, the weight of the firewood for processing gypsum would equal 646,650 kilograms. For the total wood requirements of 2,349,305 kilograms, the cost of cutting and hauling would be:

Cutting at the rate of 160 kg per man-day (Erasmus 1965: 291)	14,683 man-days
Hauling at the rate of 500 kg over a distance of 1 kilometer per man-day for total distance of 50 kilometers	234,930 man-days
Total	249,613 man-days

A related problem would have been the procurement of the thatch for roofing the site. I know of no reliable way to estimate the amount of grass required. We don't have any way to know how thick the roofs were. Inca roofs are reported to have been very thickly thatched, but how that translates into hectares of grass needs to be determined by experiment.

Labor Requirements for Constructing Sector 2

Once the building materials had been procured, they then needed to be transformed into buildings. As discussed above, the digging of the foundations would have taken 41,031 man-days. Following this, the walls must be built and plastered, the floors laid, and finally the roofs put on.

Wall construction is estimated to have progressed at a rate of 2 cubic meters per man-day. This figure is derived from observation of the efforts of the workmen of the Peruvian National Institute of Culture who were making repairs to the southwest wall of Sector 3 during our 1989 field season. At this rate of advance, it would have taken 184,638 man-days to construct the 369,276 cubic meters of wall in Sector 2.

Plastering these walls with 10 centimeters of mud would have taken a minimum of 30,773 man-days. I estimate that a similar physical effort was employed on plastering as was necessary to haul the earth a distance of 100 meters. Since the mud plaster was first mixed with straw and water and then applied in sequential layers, its application may have been even more labor-intensive than this estimate.

The labor investment in roof construction was estimated by observing my own crew building roofs over the excavated units. The rate of construction observed was about 10 square meters per man-day. The amount of roofing necessary for Pikillacta was calculated by doubling the floor area of the ground floors, excepting the patio spaces, to account for a double-shed roof and adding 20 percent to account for roof overhang. This gives a figure of 112,400 square meters of roof that requires 11,240 man-days to construct.

The wooden framework of the upper floor supports was made of wood poles lashed together with rope. The square meters of floor framework are calculated by multiplying the area of the first floor (46,833 square meters) by 1.5 to account for the fact that about half of the buildings have three stories. I estimate that their construction would require about the same effort per man-day as roofing. Both involve manipulation of wood poles held together with rope. I estimate that the 70,249 square meters of floor support would have taken 7,025 man-days to build.

The final step of the construction process would have been the application of the gypsum coverings to the walls and floors. I have used the same formula for calculating the effort in applying the final coating of gypsum plaster as was used for the mud plaster. These figures are undoubtedly rough since the gypsum needs to be processed through several steps, including conversion by fire and mixing the result with water before it can be applied. I have not attempted to account precisely for this process, which would have involved breaking up the mined gypsum, hauling in fuel for the fire, and several other manipulations of the material. The total amount of gypsum needed for both floors and walls is 22,715 cubic meters. This could be accomplished in 11,087 man-days of effort.

The table below indicates that procurement of the raw materials necessary to build Pikillacta and transporting them to the site would require 3,697,202 man-days.

Material	Man-days
Earth	121,466
Stone	3,182,077
Gypsum	144,045
Wood	249,614
Total	3,697,202

Building the site's architecture would require an additional 244,763 man-days.

Construction	Man-days
Walls	184,638
Mud plastering	30,773
Roofing	11,240
2nd floor wood frame	7,025
Gypsum plastering	11,087
Total	244,763

The total investment in man-days in terms of labor is a staggering 3,941,965. Additionally, an unknown number of supervisors, engineers, and architects would have been required. Clearly, the most difficult part of the project is getting the raw materials, especially the stone, to the building site.

Construction of Sectors 1, 3, and 4

The construction of the remaining sectors of Pikillacta was undertaken in what can be considered a single effort some time after completion of Sector 2. How much time separates the completion of Sector 2 and the initiation of work on the remaining three sectors is difficult to determine. Although these sectors were never completed, enough progress was made on them to indicate the scope of the project to which the Wari had committed themselves. Assuming an average height of 10 meters for the walls in Sectors 1 and 2 and an average height of 6 meters for the walls in Sector 4, the linear and cubic measurements of the walls in each sector are:

Sector	Meters	Cubic Meters
1	26,103	261,030
3	4,024	40,240
4	13,630	81,780
Total	43,757	383,050

Procurement of Construction Materials for Sectors 1, 3, and 4

Excavation of the foundation trench 2 meters deep by 2 meters wide, applying the same rationale used in the discussion of Sector 2, would yield the following results in terms of cubic meters of earth produced and man-days invested at the rate of 3 cubic meters per man-day.

Foundation Excavation

Sector	Cubic Meters of Earth Produced	Man-days
1	104,412	34,804
3	16,096	5,365
4	54,520	18,173
Total	175,028	58,342

EARTH PROCUREMENT. The total amount of earth required to build walls where 10 percent of the volume is earth and 90 percent is stone follows.

Walls

Sector	Cubic Meters of Earth Required
1	26,103
3	4,024
4	8,178
Total	38,305

The amount of earth required to plaster both faces of the walls to a thickness of 10 centimeters where walls in Sectors 1 and 2 are plastered to a height of 8 meters and walls of Sector 4 are plastered to a height of 4 meters, follows.

Wall Plaster

Sector	Cubic Meters of Earth Required
1	41,764
3	6,438
4	10,904
Total	59,106

The amount of earth required to construct upper floors to a thickness of 10 centimeters and assuming all structures in Sectors 1 and 2 are two stories and only 3 structures in Sector 4 are two stories, follows.

Upper Floors

Sector	Square Meters of Surface Area	Cubic Meters of Earth Required
1	45,233	4,523
3	6,300	630
4	1,155	116
Total	52,688	5,269

The total amount of earth needed to construct Sectors 1, 3, and 4 is:

Material	Cubic Meters of Earth Required
Walls	38,305
Wall plaster	59,106
Upper floors	5,269
Total	102,680

The total amount of earth available is one-half of the earth excavated for foundations since the stone wall of the foundation replaces it.

Total amount of earth required for construction	102,680 cubic meters
Total amount of earth available from foundations	-87,514 cubic meters
Total amount of earth to be procured	15,166 cubic meters

The labor investment in excavating the earth and carrying it to the work site is calculated as follows: Excavation proceeds at 3 cubic meters per man-day, requiring 5,055 man-days to excavate 15,166 cubic meters. Carrying proceeds at a rate of 2 cubic meters per man-day per 100 meters over a distance of 300 meters for a total of 22,749 man-days. The total cost of procuring earth for construction would be 27,804 man-days.

STONE PROCUREMENT. The amount of stone required to build Sectors 1 and 3 to an assumed height of 10 meters and Sector 4 to an assumed height of 6 meters is:

Sector	Cubic Meters of Stone Required
1	234,927
3	36,216
4	73,602
Total	344,745

The labor investment to quarry the stone and carry it to the work site is calculated as follows:

Stone is quarried at a rate of 1 cubic meter every three hours over an eight-hour day, which yields 2.67 cubic meters per man-day. This requires 128,118 man-days to quarry 344,745 cubic meters. Hauling the stone to the work site is done at a rate of 500 kilograms per man-day over a distance of 1 kilometer. The total weight of 344,745 cubic meters at 2,300 kilograms per cubic meter is 792,913,500 kilograms. This total weight can be moved over a distance of 2 kilometers in 3,171,654 man-days. The total cost of procuring stone would be 3,299,772 man-days.

GYPSUM PROCUREMENT. The amount of gypsum required to face walls 1 centimeter thick on each side assuming that the walls of Sectors 1 and 3 are to be plastered 8 meters high and that the walls of Sector 4 are to be plastered 4 meters high is:

Sector	Linear Meters of Wall	Cubic Meters of Gypsum Required
1	26,103	4,176
3	4,024	644
4	13,630	1,090
Total	43,757	5,910

Amount of gypsum required to build floors, assuming that the second story represents only 35 percent of the requirements for the ground floor and patio:

Sector	Floor	Cubic Meters of Gypsum Required
1	Ground floor and patio	10,960
1	Second story	3,836
3	Ground floor and patio	2,720
3	Second story	952
4	Ground floor and patio	1,118
Total		19,586

Total amount of gypsum required for both walls and floors is:

Total amount of gypsum required to plaster walls	5,910 cubic meters
Total amount of gypsum needed for floors	19,586 cubic meters
Total	25,496 cubic meters

The labor investment to mine the gypsum and carry it to the work site is calculated as follows:

Gypsum is calculated to be mined at the same rate as earth is excavated, which is 3 cubic meters per man-day. Therefore 8,499 man-days would be required to mine 25,496 cubic meters. To carry the gypsum at a rate of 2 cubic meters per man-day over the 1-kilometer distance to the work site would require 12,748 man-days. The total cost in man-days to procure the gypsum required for Sectors 1, 3, and 4 would be 21,247 man-days.

WOOD PROCUREMENT. The amount of wood required to build the floor framework assuming poles are an average of .08 meter in diameter and 2.5 meters in length and are laid side by side is calculated as follows:

Sector 1 (⅔ of the linear wall distance because it takes 3 walls to support 2 poles): 26,103/3 × 2 = 17,402/.08 = 217,525 poles × 2.5 meters = 543,812 linear meters. Support poles laid parallel to the wall on top of the corbels would account for an additional 26,103 linear meters, for a total of 569,915 linear meters of wood.

Sector 3: 4,024/3 × 2 = 2,683/.08 = 33,533 poles × 2.5 meters = 83,833 linear meters plus the support poles for a total of 87,857 linear meters.

Sector 4: three multiple-story buildings; 300/3 × 2 = 200/.08= 2,500 poles × 2.5 = 6,250 linear meters plus an additional 300 meters of support poles for a total of 6,550 linear meters.

Total linear meters of wood poles required for flooring Sectors 1, 3, and 4 = 664,322. The exact quantity of wood for lintels is unknown since the number of doorways is unknown. We can provide a rough estimate based on the following:

Sector 1: At least six doorways per enclosure and 81 enclosures. Each lintel is made up of 5 poles 1 meter in length = 5 poles × 1 meter × 6 lintels per enclosure × 81 enclosures = 2,430 linear meters.

Sector 3: At least 6 doorways per enclosure and 12 enclosures. Each lintel is made up of 5 poles one meter in length = 5 poles × 1 meter × 6 lintels per enclosure × 12 enclosures = 360 linear meters.

Sector 4: 501 rooms with 1 doorway each plus an additional 49 doorways in rooms with multiple entrances. Each lintel is made up of 5 poles one meter in length = 5 poles × 1 meter × 550 rooms = 2,750 linear meters.

Total estimated length of wood required for lintels in Sectors 1, 3, and 4 = 5,540 linear meters.

The number of wooden poles required for roofs in Sectors 1 and 3 is estimated at 25 percent of the amount required for floors = 653,748 linear meters × 25 percent = 163,437 linear meters.

The number of poles required for roofing Sector 4 can be estimated at 13 poles 5 meters long per room with 501 Type III rooms = 32,565 linear meters. An additional amount for the Type I patio group structures of 6,550 linear meters × 25 per cent = 1,638 linear meters. The total amount of wood necessary to roof Sector 4 is 34,203 linear meters.

Total poles required for roofing in Sectors 1, 3, and 4 = 197,640 linear meters.

Total wood required in all construction of Sectors 1, 3, and 4:

Total wood used in floors	664,332 linear meters
Total wood used in lintels	5,540 linear meters
Total wood used in roofing	197,640 linear meters
Total	867,512 linear meters

The labor involved in procuring and hauling the wood to the work site can be estimated. Based on the actual weight of a piece of a wooden beam found in archaeological context that weighed 1.36 kilograms per meter, the total weight of the wood required for construction can be calculated to be 1,171,141 kilograms. A large amount of wood is also required for processing the gypsum. Using the same premise as for Sector 2, the amount of firewood required would be 2,550 cubic meters. At 270 kilograms per cubic meter, the weight of the firewood equaled 688,500 kilograms. The total weight of wood required is 1,859,641 kilograms.

Using the same premise as for Sector 2, the cost of cutting and hauling would be:

Cutting at the rate of 160 kg per man-day (Erasmus 1965: 291)	11,623 man-days
Hauling at the rate of 500 kg over a distance of 1 kilometer per man-day for total distance of 50 kilometers	185,964 man-days
Total	197,587 man-days

Construction Effort for Sectors 1, 3, and 4

The cost of transformation of the various construction materials into finished buildings again can be roughly estimated using the same premises discussed for the construction of Sector 2. As discussed above, the total cost of digging the foundation trenches would be 58,342 man-days.

WALL CONSTRUCTION. Wall construction at a rate of advance of 2 cubic meters per man-day, and assuming a constructed height of 10 meters for Sectors 1 and 3 and a height of 6 meters for Sector 4, would require the following:

Sector	Cubic Meters of Wall	Man-days
1	261,030	130,515
3	40,240	20,120
4	81,780	40,890
Total	383,050	191,525

MUD PLASTERING OF WALLS. Mud plastering of these walls, assuming the same effort as earth hauling, would cost 29,553 man-days.

ROOFING. The labor investment in building the roofs is as follows:

Sector	Square Meters of Roof	Man-days
1	111,624	11,162
3	3,513	351
4	26,121	2,612
Total	141,258	14,125

FRAMING OF UPPER FLOORS. Building of the wood framework for the upper floors would require labor as follows:

Sector	Square Meters of Upper Floors	Man-days
1	46,980	4,698
3	1,464	146
4	10,884	1,088
Total	59,328	5,932

GYPSUM PLASTERING OF FLOORS. Finally, the application of 25,496 cubic meters gypsum plaster to both floors and walls at the rate of 2 cubic meters per man-day would require 12,748 man-days.

The total labor investment for procurement of construction materials is:

Material	Man-days
Earth	86,147
Stone	3,299,772
Gypsum	21,247
Wood	197,587
Total	3,604,753

The total labor cost for construction of Sectors 1, 3, and 4 is:

Construction	Man-days
Walls	191,525
Mud plastering	29,553
Roofing	14,125
2nd floor wood frame	5,932
Gypsum plastering	12,748
Total	253,883

Total projected costs for Sectors 1, 3, and 4:

Activity	Man-days
Procurement	3,604,753
Construction	253,883
Total	3,858,636

Total effort invested in construction at the time of abandonment, assuming construction was only 50 percent complete and that activities had been comprised of only the following: foundation excavation, wall construction, and procurement of stone.

Activity	Man-days
Procurement	1,708,228
Construction	95,763
Total	1,803,991

Conclusion

From the foregoing it appears that the Wari had invested a grand total of 5,773,761 man-days in construction at Pikillacta. They were also prepared to invest an additional 2,026,840 man-days to complete the project. The total cost to complete the project would have been 7,800,601 man-days. These figures, although staggering, are minimal. We have no way to calculate the additional numbers of supervisory and support personnel required for such an immense project. The hydraulic engineering of the site as well as the construction of the water supply system of canals and aqueducts described in chapter 3 constitute an additional project of enormous proportions.

Feeding and supplying food for the labor force represents another large-scale effort. D'Altroy's (1992: 88) calculations for the food consumption of Inca porters can be used to form an idea of food consumption by the labor force. His figures suggest that a person engaged in heavy labor would probably consume about 1.7 kilograms per day of typical Andean staples of maize, potatoes, and the freeze-dried potatoes known as *chuño*. This works out to 13,261,022 kilograms of food that would be required to accomplish the project.

In attempting, then, to calculate how long it took to build Pikillacta, other practical problems must be considered as well. A number of factors would govern the ideal size of the work force. Among these would be available labor and, more importantly, the resources to house and feed them. The Wari must have had a well-developed understanding of the principle of diminishing returns. What I mean is that while they may have had the power politically to draft a labor force of any size they cared to, they must have known that there are practical limits on the size of the construction crews. The natural environment surrounding Pikillacta would impose limits on the number of people who could be brought together in terms of space available for camp sites, availability of fuel for cooking, and arrangements for disposal of human wastes. This would have to have been carefully considered and coordinated in order to avoid serious degradation to the environment of the Lucre Basin. The nature of the tasks involved, as well as the size of the work site itself and the sizes

of the various quarries for stone and gypsum, would also restrict the number of people working at one time.

For the sake of illustration, if we assume that the Wari mustered a work force of 5,000 able-bodied workers, the construction of Sector 2 could be carried out in 788 days, or a little over 2 years, of sustained effort. It is very unlikely, however, that the work crew was employed every day of the year. Most probably the Wari relied on drafted workers, as did the Inca, and would have used them primarily during the agricultural dead season. If we estimate a work year of only 3 months duration, the length of the project expands considerably to encompass a span of 8.7 years. Similarly, the construction of Sectors 1, 3, and 4 would have required an additional 4 years.

As has been shown, Pikillacta is a very complex structure based on the recombination of basic and simple architectural elements into three standardized structural types. The key to its construction is the movement from simple to complex. In constructing Pikillacta, the basic framework of shared bonded walls was first laid out. This provided the structural shell into which the more complex and elaborate interiors of the individual structures were built (but not bonded to shared walls). In this rigidly planned site, the only flexibility was in the actual combination of the elements in the interiors of the structures. Essentially, the master plan dictated the size and location of each structure but not necessarily the type of structure, since all types are found in all sectors of the site and in a wide variety of positions.

The principles of design and construction applied at Pikillacta are remarkably adapted for a preliterate complex society and offer some possible insights into the functions of a preliterate bureaucracy. In reducing the complex Pikillacta plan to its simplest forms, the designers of the site were able to transmit the plan with minimum risk of its being garbled. Vincent Lee (1996) has suggested that, in the absence of writing or any evidence of drawn plans, the Incas may have recorded and transmitted architectural data using the knotted-cord recording system called the *quipu*. The rigid standardization of Wari architecture would lend itself very well to this system. The number of rooms, their orthogonal positioning, as well as their features and dimensions, could be conveniently recorded by this device. As Spickard (1983: 141) has suggested, it was probably important to the Wari, from a political point of view, that they be able to "insure that the installation could be erected relatively quickly and appear to be invincible and bureaucratically efficient." The construction crew must have consisted of a few trained architects supervising large crews of unskilled labor drafted from the local peasantry. In the case of Pikillacta this would entail the additional difficulty of using a local, culturally different labor force that was completely unfamiliar with the type of structure being erected and who would thus be unable to visualize the desired end product. By breaking down the plan into three basic elements, work crews could be rapidly trained to construct any of the three basic structural types. Supervision requirements would be fewer than if numerous unique structures were to be erected. Further simplifying the task would be the use of typical local material: mud, stone, and gypsum plaster, which are all readily available and would have been familiar to the work force. Thus a few highly trained architects, together with a cadre of skilled engineers, could manipulate a very large body of unskilled labor (which probably had the additional complication of serving on a rotational basis) to produce a spectacular complex like Pikillacta.

Many unanswered questions remain regarding the architectural mysteries of the site. The excavations provide clues to both the problems of traffic circulation and water supply. The discovery of buried doorways suggests that many of the deeply buried structures must also have them. This does not shed any light, however, on how a person could actually find his way through the site when it was occupied. Even if all of the structures interconnected with doorways, they

still present the problem of all looking very much alike. With their walls 10 to 12 meters high, it would be impossible to see out of any given structure. How, for example, could one navigate from a structure in the middle of Sector 1 to one in the middle of Sector 2?

Illumination within these massive buildings also remains a mystery. The extensive expanses of white gypsum plaster revealed no evidence of smoke smudging or soot that would have indicated the use of lamps or candles. The scarcity of windows contributes to this mystery.

The subterranean canal discovered in Unit 17 and the surface canals discovered by Alfredo Valencia (see chapter 5) show at least that complex arrangements were made for transport of water. Whether all of these canals served for water supply or some were for drainage is unknown, but it is certain that both functions were required in the site. Spickard's tabulation of the features of Wari administrative architecture suggests that subterranean canal systems are a common feature of many Wari sites (Spickard 1983: 146).

Obviously these calculations cannot render an exact account of the costs involved but they do serve to concretely reinforce some observations and assumptions about the nature of the Wari Empire. First, it is clear that, although Pikillacta was an enormous effort, the Wari were simultaneously mounting other projects of similar scale: Viracochapampa, Azángaro, and construction at the capital of Wari, the imperial road system, and major hydraulic works, just to name a few. More interesting is the recent discovery of the huge Wari complex at Huaro and its many outlying sites. This was a project perhaps even larger than Pikillacta and located a mere 17 kilometers further east. This tells us in very human terms that Wari political and economic power was enormous. This level of investment also tells us that when the Wari came to Cuzco, they came to stay, fully integrating the area into the Wari sphere under direct rule. Although perhaps not as geographically extensive as the Inca imperial domain, the Wari Empire was every bit as powerful both economically and politically within its own sphere.

In the following chapter, Alfredo Valencia describes the amazing infrastructure of canals, aqueducts, reservoirs, and field systems built by the Wari in support of the Pikillacta complex. This system required almost as great an investment as the construction of the main architecture of the Pikillacta site.

5 Wari Hydraulic Works in the Lucre Basin

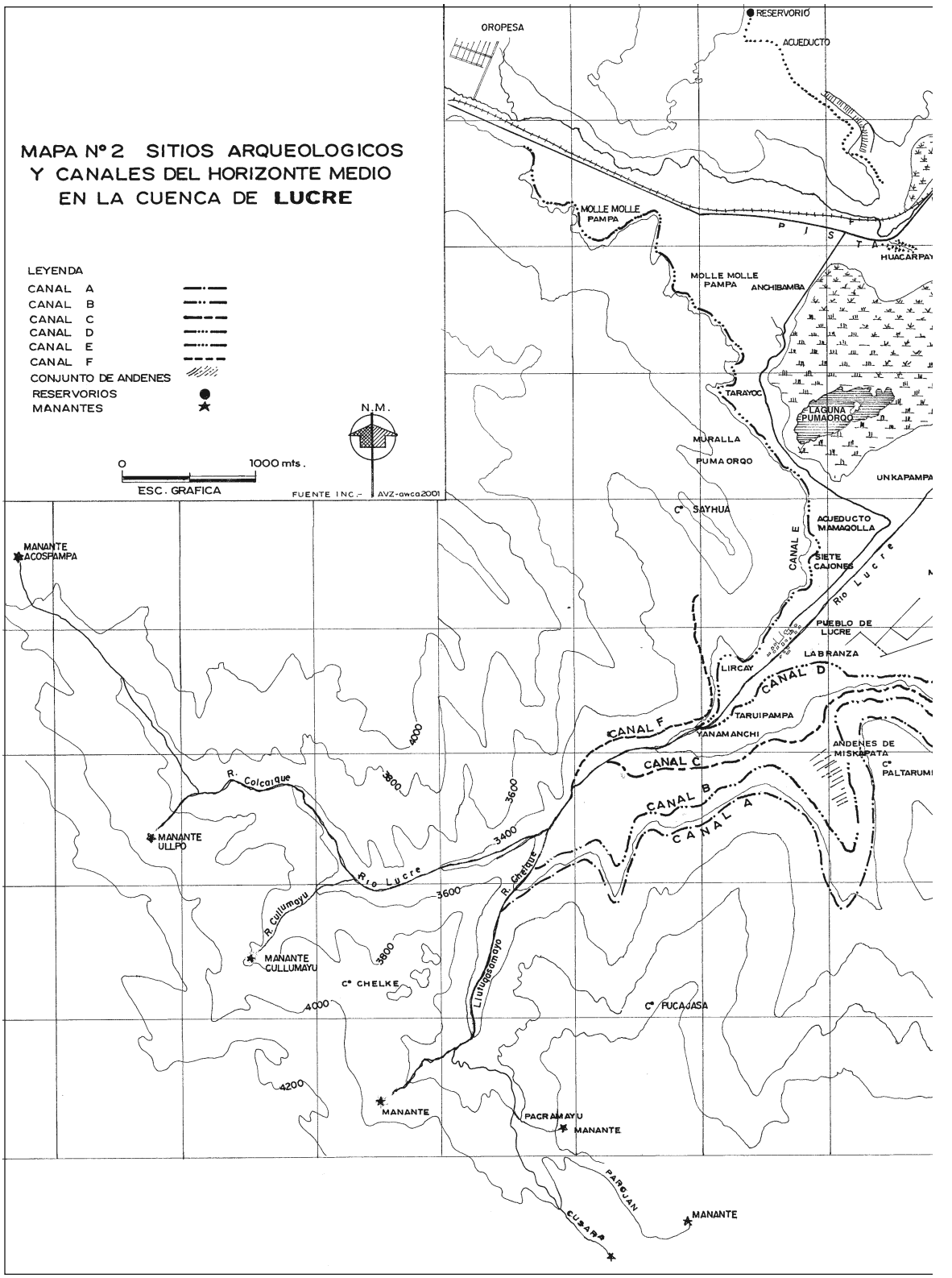
ALFREDO VALENCIA ZEGARRA

The principal hydraulic works of the Lucre Basin (canals, reservoirs, aqueducts, and so forth; see fig. 5.1) are associated with the site of Pikillacta itself as well as with the vast terraces and cultivable fields of the basin, which reveals that the agricultural production that supported the valley economically was controlled administratively from Pikillacta during the Middle Horizon. The hydrographical network is comprised of the Lucre River (fig. 5.1, Río Lucre), which is formed by the streams called Chelke (R. Chelque) and Colcaique (R. Colcaique), and the lagoons of Pumaorqo and Muyna. The river is fed by more than fifteen springs, of which four — Parojan, Pacramayu, Cusara, and Llutuqasamayo — run permanently at a rate of 87 liters per second, with periodic increases in this volume during the rainy season. A part of this flow of water was captured by the residents of Pikillacta and led through two canals to their agricultural fields on the south and east sides of the Lucre Basin (see fig. 5.1 and chapter 2, fig. 2.3), as well as to the main center of Pikillacta by means of a magnificently conceived and executed hydraulic system.

The annual rainfall average in Lucre is 619.95 millimeters per year. Sufficient water for irrigation during the Middle Horizon was made possible only by means of hydraulic technology. Although there is well-defined seasonality, with the year divided into distinct wet and dry seasons, there is not enough rainfall to permit the growing of maize without supplementary water provided by artificial irrigation.

In the planting season (August to September), rain is scarce and the water deficit was made up with artificial irrigation. When the plants were in full growth (December to January) and the rainfall abundant, artificial irrigation was reduced. Nearing harvest season (May to June), water was again used for irrigation as necessary.

All of the canals have their intakes in the headwaters of the Lucre River and the Chelke stream (R. Chelque), whose waters come from the springs mentioned above. They are built of stone and follow the level curves of the


MAPA Nº 2 SITIOS ARQUEOLOGICOS Y CANALES DEL HORIZONTE MEDIO EN LA CUENCA DE LUCRE
LEYENDA
CANAL A
CANAL B
CANAL C
CANAL D
CANAL E
CANAL F
CONJUNTO DE ANDENES
RESERVORIOS
MANANTES
N.M.
0
1000 mts.
ESC. GRAFICA
FUENTE INC.- AVZ-awca2001
RESERVORIO
OROPESA
ACUEDUCTO
MOLLE MOLLE PAMPA
P I S T A
HUACARPAY
MOLLE MOLLE PAMPA
ANCHIBAMBA
TARAYOC
LAGUNA PUMAORQO
MURALLA
PUMA ORQO
UNKAPAMPA
Cª SAYHUA
ACUEDUCTO MAMAQOLLA
CANAL E
SIETE CAJONES
Rio Lucre
PUEBLO DE LUCRE
LABRANZA
LIRCAY
CANAL D
TARUIPAMPA
CANAL F
YANAMANCHI
ANDENES DE MISKAPATA
Cª PALTARUMI
CANAL C
CANAL B
CANAL A
MANANTE ACOSPAMPA
R. Colcaique
MANANTE ULLPO
Rio Lucre
R. Cullumayu
MANANTE CULLUMAYU
Cª CHELKE
R. Chelque
Liuluqaqmayo
Cª PUCAJASA
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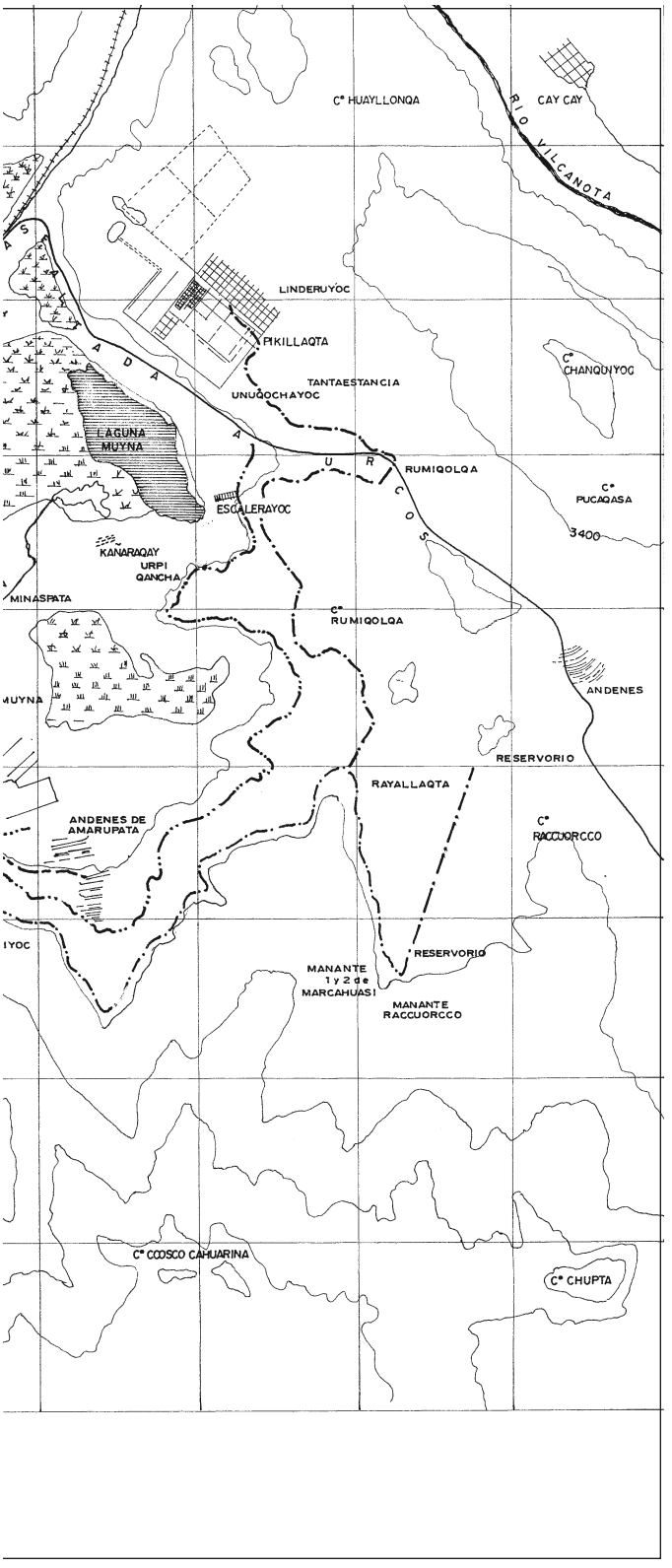


5.1. The hydraulic system of the Lucre Basin.

western hills of the basin along a gentle slope, where they provide water for human consumption and agricultural needs. The entire system was conceived and calculated in advance of the construction of Pikillacta so as to provide sufficient flow at the correct speed in order to deliver the required water without damaging the hydraulic works.

The system consists of the following canals, each of varying length:

Canal	Length in Meters
A (Pikillacta upper)	16,000
B (Pikillacta lower)	11,200
C (Amarupata)	3,825
D (Huascar)	3,110
E (Mamaqollapata)	8,489
F (Lircay)	2,500
G (Rayallacta)	3,000
Total	48,124

The total extension of the entire canal system in the entire Lucre Basin and the adjacent alluvial fan of Rayallacta is more than 48 kilometers. This calculation is the minimum, since it does not take into account other canals that have been observed but remain to be studied. These include Canal H of Choquepukio (fig. 2.3, Chokepukio), Canal G of Rayallacta (see discussion below); the extension of Canal E to the front of the town of Oropeza (fig. 5.1, Orepesa), and other smaller extension canals that apparently are fed off both margins of the Lucre River, from its confluence with the Chelke stream down to the lagoons in the basin bottom.

Canal A

The study of Canal A, was conducted by means of three excavation campaigns I carried out in Pikillacta, under the patronage of Gordon McEwan and Kenneth Wright. The first campaign, in October of 1990, encompassed the urban center of Pikillacta, part of its interior canal, and Canal B. The second campaign, in June 1995, followed Canal A from the interior of Pikillacta through the aqueduct of Rumiqolqa (figs. 5.1 and 2.3) to the tunnel of Urpituyoc. The third campaign, in September 1995, followed the canal from the tunnel to the aqueduct of Combayoc (fig. 5.1; fig. 2.3, Combayoq). In total, sixty 1-meter squares were excavated along a 5.22-kilometer extension of the canal.

Canal A terminates in the central part of Pikillacta. It has 16,000 meters of total length from its intake on the Chelke stream to the center of Pikillacta. The slope of the canal between the aqueduct of Combayoc (elevation, 3,235.06 meters above sea level) and the center of Pikillacta (3,200.688 meters above sea level) for the final 5,2018.08 meters of its run is 34.37 meters.

The topography of the ground where Pikillacta was erected is gently undulant, with the higher elevation to the east (3,250 meters above sea level) and the lower elevation to the west (3,160 meters above sea level). There is a difference of 90 meters in elevation over a horizontal distance of 800 meters measured across the east-west diagonal of the urban center. There is a slight southeast (3,210 meters) to northwest (3,190 meters) gradient, with a difference of 20 meters in elevation. The level of the central square is 3,188.10 meters above sea level.

These differences in elevation permit the flow of water through Canal A toward the most important buildings in center of the site and also make possible drainage to the west and into Laguna Muyna. Today the greatest erosion of the archaeological site is seen from east to west, in which direction the greatest destruction of its architecture also can be observed.

In plan, the canal takes a sinuous path into the interior of the site (figs. 5.1 and 2.1). Following the natural elevations, it goes through the middle part of enclosure 2A-16, and then continues north through enclosures 2A-15 and 2A-14 on a low platform especially built as a base for the canal. The canal crosses enclosure 2A-13 in such way that it could have been possible to have

had water available on its second floor because of the differences in elevation of the adjacent structures. The canal continues underground, crossing diagonally under enclosures 2A-13 and 2A-11, until penetrating into 2A-1 through an access channel in the wall. From there the canal is again without a top and exposed to open air. It continues through additional wall openings into enclosures 2A-1, 2C-7, and 2C-6.

Undoubtedly this water system continues beneath the enclosures that are found in the central part of Pikillacta. Gordon McEwan (1984b: 27) found portions of this canal, or a branch of it, in the excavations of enclosure 2C-18. The entire system would have drained to the west, crossing out of Pikillacta and emptying into the lagoon of Muyna.

We found three drainage outlets for excess water in levels further below the main canal. Two of these are found in enclosures 2C-14 and 2A-12. In the lower part of a doorway to Area 1, a canal exiting the space that measured 32 centimeters wide and 31 centimeters deep was observed. This branch canal, after circulating through a small internal platform, empties into a rectangular depression in the center of enclosure 2C-7. In the perimeter of this rectangular depression was found a staircase of projecting stones anchored in a wall that gave access to the upper part of the enclosure. These steps are unique in Pikillacta but later occur with great frequency in Inca terraces.

In enclosure 2A-12 is another canal section, which has a rectangular cross section (28 by 29 centimeters) and is connected to the principal canal that goes through the middle of enclosure 2A-1. A drain in 2E-17 carried rainwater out of this area.

The excavations of the part of Canal A outside of Pikillacta proper included excavation squares number 11 near Pikillacta through number 60 at Combayoc (fig. 2.3). Good evidence of the canal was found in excavation square 19 on the north side of the aqueduct of Rumiqolqa. Stratigraphic information from this square is as follows: (level I) a superficial semi-compact cap, with clear light-brown color; (II) ash, contemporary carbon, and modern gypsum plaster from the nearby gypsum quarries still in use, (III) brown to chestnut-colored clay, (IV) extremely compact earth, (V) a compact layer within the canal, (VI) sandy reddish earth with evidence of pluvial drag, (VII) a thin loose and very fine brown sand, (VIII) a very compact reddish sandy layer, and (IX) fine gravel that corresponds to the lining of the canal. Caps VII and VIII are evidence of water overflowing the canal.

The canal presents a trapezoidal cross section 80 centimeters in height, 62 centimeters wide at the top, and 47 centimeters wide at its base. The sides are constructed of stones sealed together with clay mortar, while the base is made of flat stones coated with fine clay.

Between the aqueduct of Rumiqolqa and the tunnel of Urpituyoc, Canal A is better preserved, its most outstanding characteristic being its steep inclination. Over a distance of 1,117 meters it has a slope of 24.08 meters, dropping from 3,338.03 meters above sea level at excavation square 25 to 3,203.95 meters above sea level at excavation square 19. The path of the canal going over the rocky slope of Cerro Combayoc (fig. 2.3, Cerro Combayoq) required the construction of a containment wall and platform along almost all its course. Here Canal A was supplying water for irrigation to terraces 1, 2, 3, and 4, before arriving at the aqueduct of Rumiqolqa.

Between the tunnel of Urpituyuc and the aqueduct of Combayoc on the rocky hill of Cerro Combayoc, the topography is very irregular and covered with xerophytic vegetation and prickly plants. The presence of great quantities of loose stones forced the builders to erect containment walls along most of the canal route in heights varying between 1 and 8 meters. This required a tremendous investment of labor and skill. The tunnel of Urpituyuc is a large excavation through solid rock of 5 meters in length. This permitted the path of the canal to avoid the vertical heights of Cerro Combayoc.

Morphology of Canal A

Canal A within Pikillacta presents two different forms in cross section; one is rectangular and the other semicircular. The first form occurs when the canal goes through or under walls and when it is subterranean, as in the interior of enclosure 2C-6. The second, semicircular form is seen where the canal surface is uncovered and runs on the ground surface. This shape in cross section permits easy access to the water within the canal.

Between the exterior part of Pikillacta and the aqueduct of Rumiqolqa little evidence of the canal can be seen due to its destruction by modern stone-robbing. Lines of small stones seem to correspond to the foundation of the canal in a few places, but it is very difficult to find its original path. Only occasional, widely spaced sections remain. Near the aqueduct the canal presents a trapezoidal cross section of finely worked stone and is exceptionally well preserved.

Construction of Canal A

The materials used in constructing the canal include stones of andesite, volcanic tuff, and other types of stones cemented with a clay and mud mortar. The base throughout almost all of the canal's extension consists of a retaining wall varying in height from 1 to 12 meters depending on the irregularity of the terrain and the need to maintain a gentle gradient. In the lower part, the wall structure is broader and tapers to a reduced thickness moving toward the top. The stones in these walls average 20 by 25 centimeters and are joined with semi-compacted earth mixed with gravel in a proportion of 3 to 1 that was used to fill the voids between the stones.

Throughout all of the section of the canal extending to Rumiqolqa, the support wall leans against the rocky hill on its right side (facing with the flow of the water) and is wider at its base and narrower at its top. The surface of the wall presents an average inclination of 7 percent. On the upper part of this wall was built the canal, which was made of flat stones that were used to form the sides and base. Where the wall joins the hillside, advantage was taken of stone outcrops to form one side of the canal. In some places an access path was also built along the top of the wall, permitting maintenance of the canal.

The canal was found to be in a very bad state of preservation between Pikillacta and the aqueduct of Rumiqolqa, in poor condition between Rumiqolqa and the tunnel of Urpituyoc, and in a fair state of preservation between this tunnel and the aqueduct of Combayoc.

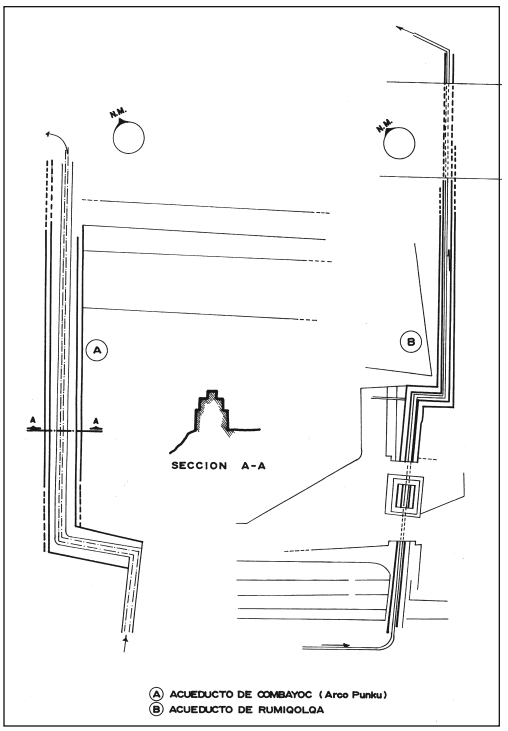
The Function of Canal A

The canal was used to provide water to the inhabitants of Pikillacta as well as to the residents of its surrounding communities and for irrigation of the agricultural terraces.

Hydraulic engineers Kenneth R. Wright and Robert J. Houghtalen calculate that the maximum flow capacity of Canal A was between 850 liters per minute and 1,700 liters per minute. Its construction anticipated that the flow speed of the water will not be so fast as to erode the structure of the canal or so slow as to permit filtration out through the bottom. This was achieved by maintaining a regular slope. Undoubtedly such work demanded a series of engineering calculations, including slope, abundance of water, flow speed, wet perimeter, and rate of evaporation.

Undoubtedly, too, the construction of Pikillacta required previous planning, considering several aspects such as the morphology, structure, and function of the sectors and of the enclosures, squares, streets, and so forth. The fact that this canal is found underneath the structures in some sections of Pikillacta clearly shows that canal construction was done prior to the erection of the walls of some of the enclosures and in other instances it was done simultaneously, as noted by McEwan (1984b: 20).

The existence of this complex system of water provision through Canal A, which flowed both through the interior and outside of Pikillacta, demonstrates that in the planning stage of the



5.2. The aqueducts of Combayoc and Rumiqolqa.

urban center, establishment of the water supply was considered a prerequisite for the construction of the architecture. Further, it demonstrates that there existed a political power that guaranteed and made possible this water supply through administrative control of the Lucre Basin. The construction of these magnificent works reveals the high degree of technological knowledge of water management possessed by those who built and managed the system.

The Aqueduct of Rumiqolqa

The Rumiqolqa aqueduct is zigzag in plan (fig. 5.2, B), similar to the aqueduct at Combayoc. It has a total length of 239 meters, with an average height of 7 meters. This aqueduct consists basically of three superimposed rectangular bodies forming a pyramidal shape in cross section (fig. 5.2, section A-A). The base is the broadest of these bodies, the narrowest being the one at the top that contains the canal. In the south, central, and north parts are some containment platforms for greater stability of this huge stone structure.

Water entered the aqueduct at its south end by means of a gently sloping stone canal. A sharp turn of 90 degrees in the canal serves to reduce the speed of the water, and then it flows through a long and rectilinear section to the north end of the aqueduct. From there it enters the canal directed toward the urban center of Pikillacta.

The Aqueduct of Combayoc

In plan, the aqueduct of Combayoc (fig. 5.2, A; fig. 2.3) is similar in form to that of Rumiqolqa. It has a maximum length of 86.95 meters and a preserved height of 7 meters but must have been higher originally in order to connect to the canals at either end. There is also a 90-degree turn in this aqueduct for the purpose of slowing down the water flow and reducing its force as it descended from the Ñawpa Estanque reservoir that is found on the slope of the hill.

Its cross section shows a pyramidal form like that of Rumiqolqa, with three bodies that reduce in size as they increase in height (fig. 5.2, Section A-A). The base has a breadth of 5.2 meters, and on it rests the next section, with a breadth of 4.6 meters, and on this rests the third section, with a breadth of 1.8 meters. The canal ran along the top of the highest section. This top section also shows evidence of at least two windows and the base section appears to have a narrow doorway or passage through it. This aqueduct was built entirely of stones held together with clay mortar and shows a careful construction technique throughout.

The Ñawpa Estanque Reservoir

Three reservoirs were located in the Lucre Basin: Ñawpa Estanque with a capacity of 235,000 liters of water; Rayallacta, with a 332,000-liter capacity; and Cochapata, with a capacity of 240,000 liters. These provide a total of 807,000 liters of water storage. There are also other reservoirs to the north of the basin, on Cerro Racchi.

The Ñawpa Estanque reservoir (also called Tarayoc) is located in the lower middle part of the Cerro Qosqoqahuarina (fig. 5.1, Coosco Cahuarina) in the sector called Tarayoc and received water from the principal Canal A. It was found in a good state of conservation. Its plan adopts a slightly ovoid form and is delimited by a double wall. This reservoir has a capacity of 235 cubic meters, and the accumulated water continued flowing through the principal canal, in the direction of the aqueduct of Combayoc and Pikillacta.

Canal B

Canal B has a length of 11,200 meters and runs parallel at a lower level, about 30 meters below canal A. The intake point of Canal B is in the lower part of the Chelke stream (R. Chelque), near the right bank of the Lucre River. The canal flows to the upper parts of the terraces of Miskapata (fig. 5.1, Andenes de Miskapata) and from there it continues to the top of the terraces of Amarupata (fig. 5.1, Andenes de Amarupata), continues on through the small pass of Cerro Qosqoqahuarina, extends (see also fig. 2.3) along the rocky skirt west of Cerro Combayoc, passing through the upper parts of Urpiqancha (fig. 2.3, Urpicancha) and Minaspata, and ends at the top of the terraces of Escalerayoc (fig. 2.3, Escalerayoq). From there, through a short fork, it arrives at the lower terraces of Tamboraqay (see fig. 2.3), in the vicinity of Pikillacta, and the other branch of the fork descends toward the agricultural fields of the eastern border of the Muyna lagoon. Here the stone canal descends with a strong gradient and exhibits a greater narrowness and depth to contain the increased water flow. It passes underground before entering the lake so as to avoid eroding a road that crossed its path.

Canal C

Canal C is named Amarupata because it empties into the center part of this set of terraces (fig. 5.1, Andenes de Amarupata). It has its intake point on the right bank of the Lucre River, 1,500 meters above the community of Yanamanchi. It passes through the lower part of the terraces of Miskapata, watering the lands of the south side of the community of Yanamanchi, and continues to the central part of the terraces of Amarupata. This canal flows for a distance of 3,825 meters. It possibly joins Canal D, and the water is carried through the lowlands of Muyna, finally to drain into the swamps of Huascar.

Canal D

The intake point of Canal D is found on the right bank of the Lucre River in the central part of the community of Yanamanchi. It is located at a lower level with respect to the canal going through the lower part of the agricultural complex of Amarupata to the swamps of Huascar. Canal D is still in use and has been substantially modified. It has a total length of 3,110 meters and waters the lands called Labranza (fig. 5.1), then passes through the cooperative La Perla and through the low lands of the alluvial fan of Lucre, irrigating the nearby lands up to the zone called Huascar.

Canal E

This canal has a total length of 8,489 meters. It originates on the left bank of the Lucre River in the area of the lower end of the *quebrada* of Yanamanchi and, following the topography of the ground, it arrives at Momaqollapata (fig. 5.1 and fig. 2.3, Mamaqolla), at which point it branches into two parts.

The branch of Mamacollapata is still in use, while that of Mollemollepampa and Anchibamba

is in ruins. Fragments of its containment wall between Tucuyuchuayqo (fig. 2.3, Tukuwayku) and a knob of the hill Pumaorqo have been found. Here we have measured two of the sections of the containment wall of the canal that have a current height of 1.50 meters and a length of 1.70 meters with an indeterminate width. The other preserved section is 1.20 meters high by 1.30 meters long with a width of 60 centimeters.

In the lower part, northeast of the Mamaqollapata hill, modern construction of a road cut has revealed an underground canal or stone duct whose trapezoidal cross section has a width of 23 centimeters in its upper part and 30 centimeters in its lower part and a height of 35 centimeters. It is possible to appreciate the great care in its construction, which used flat stones as its base and slabs of stone with a thickness of 18 centimeters as lids. What is notable about this duct is that it was found at great depth, below some 5 meters of landfill, and slopes west toward the lands near the lagoon of Pumaorqo.

The Aqueduct of Mamaqolla

The aqueduct of Mamaqolla (fig. 5.1) is 85 meters in length and is built of three superimposed sections stacked in a pyramidal form similar to those of Rumiqolqa and Rayallacta. It has a total height of 3.70 meters at its west end, 4.20 meters in its east end, and a base width of approximately 7 meters. On the upper part runs a section of canal with a width of 40 centimeters and a depth of 30 centimeters that is currently still in use. It was noted that there have been some modifications to its structure. Even though its base and overall form are original, it has lost the lateral walls of the base and the original slope of the canal. We have calculated its original gradient of the aqueduct as 1.4 percent.

In fact, on the east end, after going through the aqueduct, the canal is split into two branches, one that is geared toward the north of Mamaqollapata and waters the lands known by the names of Santa Rosa del Norte and Nisperinnioyoq, among others, up to the vicinity of Unkapampa (fig. 5.1). The other branch irrigates the lands called Santa Rosa del Sur and part of the lands of the left bank of the Lucre River.

Canal F

In the upper part of the Lercayhuayqo canal we observed evidence of the existence of Canal F, which runs at a higher elevation than Canal E. It is in a bad state of conservation and therefore it is not possible to determine its entire course. This canal in its first part, up to the lands of Lercay (fig. 5.1, Lircay), has a length of 2,500 meters and irrigated the lands of Maltumollepampa and other areas.

The Canals of Rayallacta

The canals of Rayallacta are split into two: the upper canal and the lower canal. The upper canal of Rayallacta has 1,500 meters of length and runs from the spring of Raqunorqo (fig. 5.1, Manante Raccuoco) at the apex of the alluvial fan of Rayallacta to the reservoir of Qosqoqahuarina, where it joins with Canal A.

The lower canal of Rayallacta empties into Ñawpa Estanque reservoir, and it must have functioned to supplement the water provided by Canal A when the normal volume was reduced in the dry season during the winter. It also functioned as a backup when the waters were reduced by droughts or leaking due to maintenance problems. Another function of the two concurrent canals (Canal A and the upper canal of Rayallacta) was to provide redundancy so that canal cleaning projects and other maintenance could be carried out without interrupting the flow of water.

From the Marcahuasa reservoir in Rayallacta, there extends a canal that runs straight north-south, descending from a level of 3,287 meters above sea level to a small plain that is found at

3,215 meters above sea level. That means that it descends in elevation 72 meters over a horizontal distance of 1,000 meters. This canal continues another 500 meters for a total length of 1,500 meters running from the Marcahuasa reservoir to the Cochapata reservoir that is found at the base of the alluvial fan of Rayallacta. It has a width of 60 centimeters and its depth is 65 centimeters. Off both sides of this canal at regular intervals are fed lateral canals for the direct irrigation of the various cultivation fields of Rayallacta. Near the central portion of this canal and on its west side, we observed a great Wari structure that has a rectangular form, with a length of 40 meters and a width of 20 meters, whose function is difficult to establish.

From the area of the spring sources, there is another irrigation canal, in a bad state of conservation, which runs by the west side of Rayallacta to the agricultural fields in the vicinity of the aqueduct of Combayoc.

The Reservoir of Cochapata

The Cochapata reservoir is found in the vicinity of the modern hacienda house of Rayallacta. It has a slightly ovoid plan that has a greater axis of 25 meters, and a minor axis of 22 meters. It has a stone paved floor and a depth of 60 centimeters. It is currently filled with water coming from the central canal of Rayallacta. This reservoir has 400 square meters of area, 240 cubic meters of volume that permitted the storage of approximately 240,000 liters of water. Cochapata, because of its location and structural treatment, would have been originally built by the Wari and have been designed for the irrigation of the terraces that are found at the exit of the dry *quebrada* in Piñipampa.

The springs of Raqunorqo (fig. 5.1, Manate Raccuocco) and those of Marcahuasa (Manate Marcahuasi) emerge in the upper part of the alluvial fan of Rayallacta, in the highest point of the cultivation zone. Raqunorqo spring has a greater volume of water than the two springs of Marcahuasa that rise in the north skirt of the hill.

The Reservoir of Rayallacta

This reservoir is located in the apex of the small alluvial fan of Rayallacta and receives part of the water of Marcahuasa spring that then pours into a short canal system to irrigate the cultivation fields of Rayallacta. This reservoir has an ovoid form in plan, with a maximum diameter of 18 meters, a minimum diameter of 10 meters, and a maximum depth of 3.50 meters. Its containment wall has a thickness of 2.60 meters and has the same characteristics as the reservoir of Ñawpa Estanque. It has 166 square meters of surface and 2 meters of average depth, with 332 cubic meters of volume that could store approximately 332,000 liters of water. Its outlet has a quadrilateral form of 30 by 30 centimeters and it is the final part of a duct of the same dimensions that crosses through the thickness of the wall and which controls the exit of the water. This reservoir is being used currently and is covered with lime and cement.

Other Canals

We have observed other canals located in the basin, which we are just beginning to study. There are three that leave the upper right bank of the Lucre River, have apparent short paths, and were used to irrigate the nearby lowlands. The evidence can be seen mainly in the Wari road that goes from Yanamanchi to the *quebrada* of Chelke creek (R. Chelque). These canals are of smaller dimensions and occasionally it is possible to observe their stone structures, although the majority show only as a simple ditch dug into the land.

In addition to these narrow canals, there are other canals located in the lower part of the town of Lucre (fig. 2.3; fig. 5.1, Pueblo de Lucre). These have intakes on the right bank of the Lucre River and run in a straight line, passing by the *chacras* or fields of the Muyna community at right angles.

The canal of Tongobamba (see fig. 2.3, Haci-

enda Tongobamba) is interesting because it shows evidence of having been of large dimensions, even though its total extent and origin in the upper part of Oropesa have not yet been determined.

Agricultural Terraces

Terraces are present in the basin in an assortment of forms with parallel containment walls made of irregular stones. These were filled with fertile soil brought from the alluvial fans of the valley. Unlike Inca style terraces, these generally lack stone steps for access between them. All have been strongly affected by the erosion of rainwater run-off and the very frequent seismic movements in the basin.

The Terraces of Miskapata

These are an extraordinary set of platforms or terraces within the *quebrada* of Sihuaran that were found in a very bad state of conservation, having been affected by pluvial erosion. They were watered by Canals B and C. In the upper middle part of the group of low terraces is located the "tendal" of Uma Era. This is a large artificially constructed floor delimited by a wall and which has an area of 873 square meters. It was specially made for the purpose of drying maize. Its form is rectangular in form with the interior of the southeast and southwest corners being rounded. It also has an access ramp to facilitate moving the maize.

The Terraces of Amarupata

This extraordinary group of platforms is located 3.5 kilometers due south of Pikillacta and on the opposite side of the Lucre basin. It is bounded on the north by the swamp of Huascar Grande and in the south by Cerro Qosqoqahuarina (fig. 5.1, Cerro Coosco Cahuarina); on the east by Cerro Combayoc and in the west by Cerro Paltarumiyoc. This set of platforms measures 800 meters on its longer side and 420 meters on its shorter side and forms a triangular shape with a total of 16.30 hectares of surface. Water was supplied by Canals A and B. In the middle part of these platforms can be found a maize drying floor with the modern name of Loza Era. This floor is covered with flat stones and has an area of 1,786 square meters.

We have identified two drying floors: that of Uma Era in Miskapata, having an area of 875 square meters and with a capacity of 16,887.5 kilos of maize, and that of Loza Era in Amarupata, with a surface of 1,786 square meters for drying 34,469.8 kilos of maize. Together they have 2,661 square meters, for drying 51,257.3 kilos of maize.

Agricultural Fields

In addition to the sets of terraces, there are other agricultural fields in the alluvial fan of the Lucre River. The alluvial fan has the form of a lengthened isosceles triangle, with its apex found 4.5 kilometers upstream and broadening toward the lagoons. It has a total surface of 316.91 hectares, of which 91 percent are cultivable with irrigation. This alluvial fan was irrigated by a series of short tapping canals off the Canals B, C, and D that captured their water from the Lucre River.

The cultivation fields of the north zone, including those named Mamaqolla, Tarayoc, Mollemollepampa A and B, Accopata, and Anchibamba, were irrigated by Canal E of Mamaqolla; the terracing of Rayallacta was irrigated by its own central canal.

Dry farming is carried out on the lower hillsides and slopes surrounding the Lucre Basin, and this was also done in pre-Hispanic times.

Calculating Cultivation Areas of the Lucre Basin

The Lucre Basin has an area of 10,538 hectares and its perimeter is 47.82 kilometers; it is considered a narrow and elongated basin (Ihue 1992). The alluvial fan that is within the basin comprises

an irrigated cultivable area of approximately 572 hectares. These hectares are distributed in the following way. The alluvial fan of Lucre (including the modern towns of Lucre, Siete Cajones, south Mamaqolla, Muyna, and Unkuapampa) covers 316.91 hectares; the terraces of Miskapata (Sihuaran) come to 30 hectares; the terraces of Amarupata have 16.30 hectares; the north zone (north Mamaqolla, Tarayoc, Mollemollepampa A and B, Accopata, and Anchibamba) comprises 89.32 hectares; the fields of Rayallacta have a surface of 63.45 hectares; the terraces of Combayoc and Rumiqolqa (22 groups of platforms) encompass an area of 30.24 hectares; the fields of Tongobamba add 12 hectares and those of Markhupampa, 14 hectares.

The approximately 572 hectares of irrigable land in the Lucre Basin during the Middle Horizon were probably dedicated to the cultivation of maize, potatoes, and other crops. This constitutes only 5.42 percent of the basin's areal extent. This calculation, however, only approximates the lands available to support Pikilllacta, considering that there are many irrigated fields located just outside of the basin but at a close distance. It also does not take into account the unknown amount of land that might have been devoted to dry farming.

The small amount of usable land for farming provided good incentive to build artificial fields and terraces in order to increase the agricultural surface. Further, cultivation with irrigation increased the productivity of the lands and was made possible by access to and management of a sufficiently complex hydraulic technology.

The construction of these vast systems of canals, reservoirs, aqueducts, containment walls, roads, causeways, settlements, ceremonial centers, and the like demanded arduous and coordinated labor under a centralized and strong administration, clearly guided by the concrete objective of achieving the optimization of agricultural production through irrigation.

Maize Cultivation in the Lucre Basin

Archaeological evidence for maize cultivation in the Lucre Basin was found by Dwyer (1971) in level F of Excavation Unit 1 at Minaspata, which apparently corresponded to the Early Intermediate Period. Years afterwards, McEwan found maize in one of his Pikillacta excavations (personal communication, 1998), and in the interior of a triangular room in his Excavation Unit 43 of Pikillacta he found 20 beans (*poroto*) in a good state of conservation (McEwan 1989: 11). At Chokepukio, maize has been found in strata corresponding to several different periods, including the Early Intermediate, Middle Horizon, Late Intermediate, and Late Horizon periods.

What type of corn was preferentially cultivated in the Lucre Basin? Currently in the *chacras* (farm fields) of Rayallacta the preferred type is *amarillo oro* maize, which requires irrigation using the ancient canals. In the dry-farming fields, growing corn is possible only in years of normal rain and the product grain is of inferior quality, smaller and of little nutritional value.

In the Lucre Basin I have collected the following varieties of maize: *chili* (requiring irrigation and a growing period of 9 months and eaten toasted); *chullpi* (eaten toasted); *chaminco* (both irrigated and non-irrigated, eaten as boiled maize or mote); *cusihuallpa* (requiring irrigation and eaten toasted and as mote); *saqsa* (7-month growing season and eaten as mote); *pescoruntu* or *hanqa* (eaten toasted); *jora* (used for *chicha*, 7-month growing season); *kulli* or white ear (8-month growing season and used for *chicha*); *paraqay*, white *urubamba* (eaten as mote and toasted); and *uwina* (requiring irrigation and eaten as mote; flour used to make *chicha* and used for animal feed).

The Importance of Maize to the Wari

In Wari iconography, mainly found on pottery, it is relatively common to observe ears of maize as-

sociated with images of deities or supernaturals. This association seems to signal the social, economic, and religious importance that this plant had within Wari society. This fact has been noted previously by several specialists, including Dorothy Menzel, who observed that in Roblesmoqo-style pottery from the Pacheco offering it is possible to distinguish feminine deity figures frequently associated with maize ears (Menzel 1968: 82).

González Carré considers a principal divinity of the Wari Empire to be a personage represented in pottery whose image is related to the image occupying the central part of the sun gate of Tiwanaku. In one variation, this image is represented as an anthropomorphic personage with two rods in each hand. One of the rods terminates in a corn ear. From the head of this personage six condors, two fish, and two maize ears are all arranged in a radial pattern. Three ears of this valuable plant are also depicted on the dress of this figure (González Carré 1982: 106).

Rogger Ravines found an offering context of the Middle Horizon during his excavations in Ayapata, Huancavelica, in 1967. Among the images he recovered are depictions of a personage exhibiting a maize ear in his headdress and a mythological animal holding a bent rod, on the end of which is another ear of maize (Ravines 1977: 105, pl. 26, figs. 32 and 33). Dorothy Menzel has published images of some ceramics of Middle Horizon epoch 2A. One of these ceramics is an anthropomorphic jar, on the cheek of which is represented a maize ear in the form of a teardrop. In another figure, we see a head from which radiate several forms, including three ears of different colored corn (Menzel 1968: pl. 32, fig. 19a, and pl. 38, fig. 45). Drawings published by Mario Benavides include several images of the anthropomorphic deity with staffs. This sacred personage appears with maize ears that radiate from his head, and in another image he carries in his left hand a staff with a maize ear on the end of it. A maize ear can be observed near a winged figure in one of her drawings (Benavides 1984: pl. 13, figs. b, e, and h).

These are just a few of numerous representations of maize in association with Wari deities. They say much about the value of maize and the esteem in which it was held by the Wari culture. In addition, we must consider that the vast labor investment in hydrological works was in large part motivated by the desire of the Wari to make possible large-scale maize agriculture. Maize was not only a source of nutrition but obviously ritually important. We know that in Inca times maize, in the form of the beer called *chicha*, was an essential ingredient in all religious and ceremonial undertakings. Even today, maize in several forms is an important ritual, as documented by Abram Valencia (1979: 82–83).

Data Analysis

6 Pottery from Pikillacta

MARY GLOWACKI

Unlike many archaeological sites, which possess dense surface scatters of pottery and other artifactual remains, Pikillacta is virtually devoid of these. The only potsherds one may find are generally clustered at the entrance of Sector 2, where visitors begin their tours. These are brought by tourists from nearby Late Intermediate Period and Inca sites on their circuit of the valley. Upon reaching Pikillacta and observing its steep and extensive terrain, they lighten their loads by emptying their pockets of fragments collected from these earlier visited sites (site formation is continuous!).

Until recently, the lack of ceramic and other surface remains at Pikillacta had baffled archaeologists. Initial excavations shed little light on this problem. William Sanders's (1973) exploratory excavations of the site, which produced few artifacts, led him to propose that Pikillacta had never been occupied. However, more recent and extensive excavations by Gordon McEwan (1979, 1984b) and the Pikillacta Project directed by him (1991a) have demonstrated otherwise. This research has generated a substantial quantity of pottery, the analysis of which has provided many insights into the Wari occupation of Pikillacta and the surrounding region (see Glowacki 1996a, 1996b). The following offers an overview of the site's ceramic collection and the results of its multidimensional analysis.

The Ceramic Collection and Analysis

The Pikillacta ceramic collection comprises approximately 55,000 sherds excavated in 1982, 1989, and 1990 field seasons. The author formally analyzed 3,820 of these (approximately 7 percent), which constituted the collection's diagnostics. This figure does not include sherds of the same vessels, which were recorded, per vessel, as single entries. Counting these additional fragments, the total diagnostic sherd count was 4,308.

Seven attribute classes were recorded for the analysis and used to define

typologies of ceramic style and vessel morphology and size. These attribute classes were vessel part, surface treatment, decorative design, sherd measurement, presence or absence of carbonization from burning, paste character, and vessel form. Surface treatment and decorative design were used to establish a typology of ceramic styles following Dorothy Menzel's (1964) classification and analysis of Wari pottery from Ayacucho and the Peruvian southern and central coasts, with paste type added to these. Vessel part, sherd measurement, and vessel form were used to create a formal typology with size variants. Christine Brewster-Wray's (1990) formal and size typology of pottery from the Wari, Ayacucho complex of Moraduchayuq served as a model for a morphological classification of Pikillacta's collection. The results of this classificatory work and analysis were used to infer pottery use and pottery-related activities at Pikillacta and to help refine the site's chronology. These data and interpretations are summarized in the succeeding pages.

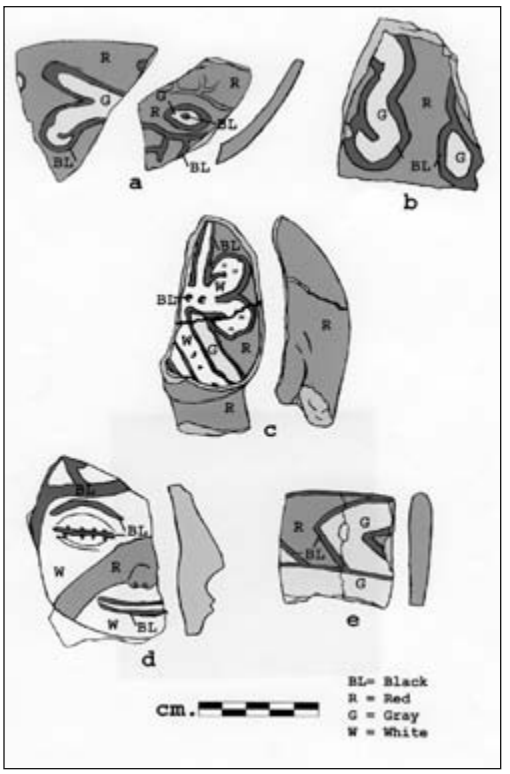
Instrumental Neutron Activation Analysis (INAA) was carried out on a select sample of pottery (200 sherds) from Pikillacta and other related Wari-period sites in order to determine, in general terms, the provenience of principal ceramic styles of Pikillacta (Glowacki 1996b). This work was conducted at the Smithsonian Institution's Conservation Analytical Laboratory (CAL) and the nuclear reactor center of the National Institute of Standards and Technology (NIST), under the supervision of Ronald L. Bishop, Senior Research Archaeologist. For experimental procedures and parameters followed for this research, see Bishop (1990). A summary of the results of this study is also included here.

Ceramic Styles and Their Associated Vessel Forms

Nine Wari and Wari contemporary ceramic styles were identified in the Pikillacta collection. These included Chakipampa style pottery, Okros style pottery, Robles Moqo style pottery, Black Decorated style pottery, Viñaque style pottery, Wamanga style pottery, Q'otakalli pottery, Plainware style pottery, and Blackware style pottery. "Style" was included as part of the name of those pottery styles for which the majority of examples are believed to have been local imitations of original styles. For example, Okros style pottery from Pikillacta is thought to have been made in the "style" of original Okros pottery from Ayacucho. Other pottery styles that originated outside the Cuzco region, with the exception of Ayacucho, the Wari heartland, were classified as imported pottery. Examples of local ceramic styles recovered in very small quantity at Pikillacta and elsewhere in Cuzco, or which have been insufficiently reported or published, were classified separately as local miscellaneous pottery.

While Menzel (1964: 4, 67–68) considered Chakipampa pottery to have been the principal ceramic style of Wari, Ayacucho, during the first epoch of the Middle Horizon and to be a mark the first wave of Wari expansion from the heartland, it is represented at Pikillacta in relatively small quantity (7.2 percent; note that this and other percentages of ceramic styles discussed here represent all collection diagnostics). It is found in two paste types, orange- and cream-ware (less than 20 percent of examples) and is generally above average to fine in quality. The majority of examples appear to be of the Fancy Chakipampa variety, characterized by a red slip and medium-to-fine burnish, although a number of examples (approximately 8.3 percent) are believed to represent the Less Fancy variety, with a thin and streaky, opaque, red-orange slip.

Many Chakipampa examples from Pikillacta are from thin-walled vessels which had broken into numerous fragments, making reconstruction difficult. Open bowls with straight and convex diverging sides, closed bowls, and jars with straight and diverging necks, some of which were face neck jars, are the principal Chakipampa vessel forms. Versions of the symmetrical and recurved ray and chevron are the most common



6.1. Chakipampa pottery: (a) rim sherd of cup or small bowl, 12-centimeter diameter, decorated on the exterior with the radial ray design; (b) body sherd, exterior decorated with the recurved ray design; (c) spoon fragment, bowl decorated with radial ray design; (d) portion of face from human figurine; (e) jar rim sherd, 9-centimeter diameter, exterior decorated with chevron design.

designs associated with this style, in addition to the circle with dot, which was generally a secondary design. One noteworthy example is a large globular jar decorated with a two-headed feline serpent figure. It was excavated from the corner of a Type I patio group, where it had been broken and buried (McEwan 1984: 96, 98, figs. 3–19; 1991a: 105), apparently as an offering, perhaps in dedication to the structure (for examples of Chakipampa style pottery from Pikillacta, see fig. 6.1a–e).

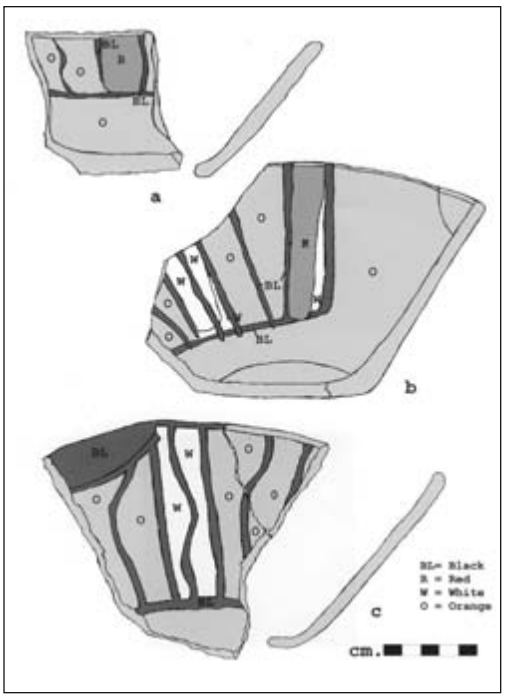
In addition to Chakipampa style pottery, two other Wari secular ceramic styles are associated with Epoch 1 of the Middle Horizon in Ayacucho: Okros and Black Decorated pottery (Menzel 1964: 4). While Menzel (1964: 3) classified Wari ceramic styles of Epoch 1 as either secular or ceremonial, more recent evidence suggests that these functional categorizations may not be so clear-cut. As will be discussed in the succeeding pages, activities inferred for Pikillacta "secular" pottery (as defined by Menzel), point to administrative ceremonialism, which likely included both secular and sacred elements. (For further discussion of this subject, see Glowacki 1996a: 382–388.)

Unlike Chakipampa, the Okros and Black Decorated ceramic styles make up a relatively small percentage of the surface and excavated ceramic collections from Wari and previously were not considered to have been widely distributed during the Wari expansion (Menzel 1964: 4). Okros is by far the principal ceramic style of Pikillacta, comprising almost 60 percent of the collection.

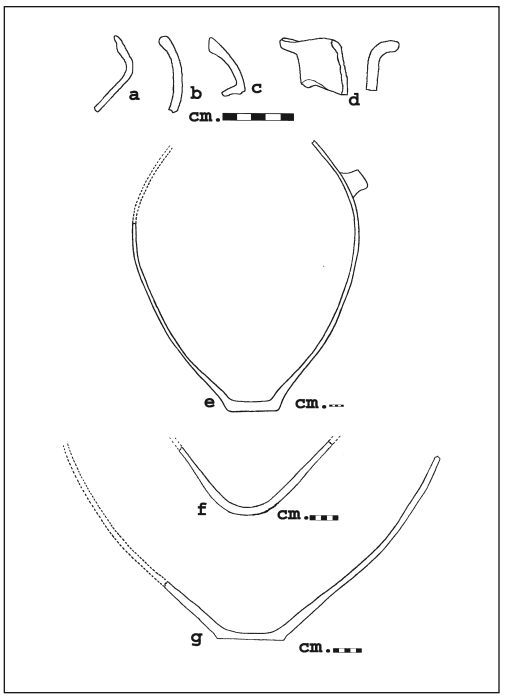
Overall, Okros is a coarser, less compact ware than Chakipampa. Decorated examples range from average to above-average in quality, while plainware examples tend to be less-than-average to coarse in quality. Both decorated and undecorated examples are made of an orange paste and are generally slipped on the interior and/or exterior. While Okros pottery from Ayacucho is characterized by a distinct, bright light-orange slip (Menzel 1964: 17–18), Okros pottery from Pikillacta is typically slipped medium orange. This difference may be due to access to different clay resources in Cuzco versus Ayacucho, as well as the effect of different firing conditions and techniques utilized by the respective potters.

There is a wide range of Okros style vessel forms found at Pikillacta. These include bowls, necked and neckless jars, face neck jars, tumblers, small cuplike bowls, and assorted odd pieces, such as a single flask and pots with basket handles. Other Okros pottery includes spoons, figurines, spindle whorls, and disks. I think that the disks could have served as counting or playing pieces.

Bowls with straight and convex diverging sides are the most common Okros style deco-



6.2. Okros bowls decorated on the interior with the rectangular pendent design: (a) rim sherd, 18-centimeter diameter; (b) rim sherd, 18-centimeter diameter; (c) rim sherd, 26-centimeter diameter.

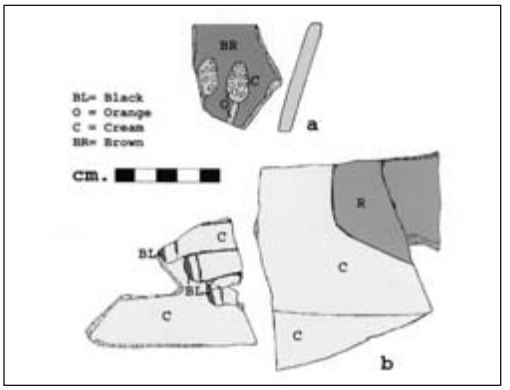


6.3. *Chicha* jars. Possible Okros jar rims: (a) 14-centimeter diameter sherd; (b) 26-centimeter diameter sherd; (c) 29-centimeter diameter sherd; (d) 11-centimeter diameter sherd. Body and base of jars: (e) partially reconstructed Plainware jar, 7-centimeter base diameter; (f) Okros conical base; (g) partially reconstructed Q'otakalli jar, 9-centimeter base diameter.

rated vessel form. They are typically decorated on the interior with a version of the rectangle pendent motif in white, black, and occasionally red and gray (fig. 6.2a–c), the typical color pattern of decorated Okros pottery. Most were classified as "regular size," which approximately equates to an average individual serving. This assessment is derived from figures calculated by Brewster-Wray (1990: 228, 231, 239–240) for similar size bowls from Moraduchayuq. Some Okros style bowls are decorated on their exteriors with a wide variety of designs, which generally are represented by only a single or a small number of examples.

Okros jars typically have necks, some of which are decorated with painting and/or modeling. Many decorated jars have straight or slightly inward-inclined necks with thickened or flange rims, sometimes painted with a crossband or chevron. Some of these are face neck jars, whose necks are painted and/or modeled with human facial features. Straight and flaring diverging neck jars are the most common undecorated Okros style vessel form, and like most undecorated vessels of this style, are generally less-than-average to coarse in quality. Large jars with elongated bodies and conical or raised bases with textured exteriors are represented in the Okros style. They are formally comparable to contemporary jars used for fermenting and storing *chicha*, a brewed beverage, typically made of corn.

Tumblers are also associated with the Okros style. A number with straight or slightly convex sides are decorated with a design scheme I refer



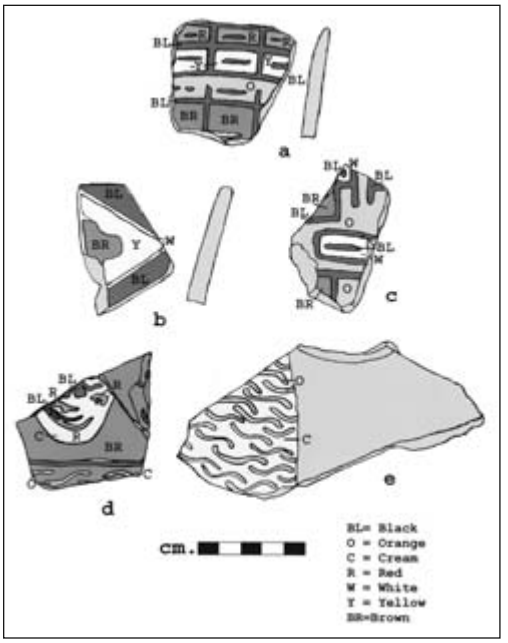
6.4. Robles Moqo pottery: (a) rim sherd decorated on the exterior with maize design, 10-centimeter diameter; (b) body sherd of hand from oversize human-face neck jar.

to as the "paneled elaborated-triangles motif." Examples of this category of tumbler have been identified at other sites in the Cuzco region (see Chávez 1985, San Roman 1979). Julinho Zapata and I also recovered some during 1997 excavations of Wari sites in the Huaro Valley south of the Cuzco Valley. Other Okros style tumblers have a raised band characteristic of *keros*, tall drinking cups with straight or slightly flaring convex sides. In addition, small cuplike bowls, miniature versions of regular-size Okros bowls with convex and sometimes straight sides, are represented in the Okros style and may likewise have served as drinking vessels, although they may have served other uses.

Robles Moqo style and Black Decorated style pottery, respectively ceremonial and secular ceramic styles of Ayacucho dating to Middle Horizon Epoch 1 and Epochs 1–2, are represented at Pikillacta by only a handful of fragments. Examples of Robles Moqo pottery include what appears to have been a regular-size vessel, perhaps a tumbler of a double vessel with a bridge spout, and an over-size face neck jar (fig. 6.4a and b). Both have a red-orange paste. The former is slipped a streaky black and decorated with a maize motif in cream, black, and an unslipped background color of orange-red; the latter is slipped orange and painted cream, dark red, white, and black. The single fragment of Black Decorated pottery (not illustrated) is part of a necked jar. It is slipped black and decorated with vertical stripes in opaque black and red, which had possibly been executed utilizing a resist technique. While Robles Moqo and Black Decorated pottery are represented in meager quantity at Pikillacta, there is evidence that these ceramic styles were used elsewhere in the Cuzco region (see Wallace 1957: 209, 211, fig. 13b, 212, 220; Zapata 1993; also, examples were recovered from recent Huaro Valley excavations by Glowacki and Zapata).

During Epoch 2 of the Middle Horizon, Viñaque became the predominant Wari ceramic style of Ayacucho, spreading to various other regions as part of the postulated second wave of the Wari expansion (Menzel 1964: 36). At Pikillacta, which dates well into Epoch 2 (see chapter 7 for discussion of radiocarbon samples and site chronology), Viñaque comprises less than 1 percent of the collection. This pottery is characterized by an orange paste, which sometimes appears reddish in color. The interior is generally slipped orange, orange-brown, brown, or occasionally red and is well burnished, while the exterior is either slipped dark brown or black and given a matte finish or is lightly burnished. Both vessel forms and decorative designs of these pieces conform to what is considered "classic" Viñaque pottery as opposed to certain of its lesser-known substyles. These examples are all above-average to fine in quality.

Two Viñaque vessels, represented by a handful of sherds, are decorated with a sideways-S design in dark brown (fig. 6.5, d and e). One of these is a bowl with convex sides (d), which is also decorated with a repeated human skull design in red, white, and black. The other vessel is a jar (e), which may likewise have been decorated with a skull design. Another Viñaque convex-sided bowl (b) is decorated below its rim with a diamond and cross design in yellow, white, and dark brown. Lida Wagner (1981: 171, 312, fig. A26, a–e) refers to pottery with this design and other variations as Local Viñaque, the common



6.5. Viñaque pottery: (a) rim sherd, exterior depicts rows of boxes with dashes, 9-centimeter diameter; (b) rim sherd, exterior depicts cross and diamond design, 9-centimeter diameter; (c) body sherd, exterior depicts headdress/appendage design; (d) body sherd, exterior depicts human skull and repeated sideways S design; (e) body sherd, exterior depicts repeated sideways S design.

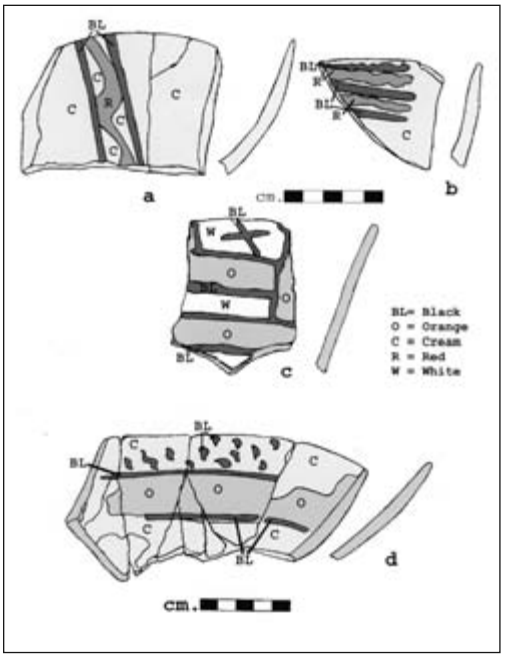
secular class of Viñaque pottery. A sherd from an open vessel, perhaps a tumbler (c), is decorated with an abstract headdress motif painted in orange, white, and black against a dark brown background. There is also a rim sherd of the Viñaque style (a) decorated with rows of articulated boxes which form a series of concentric rectangular frames painted in red, yellow, medium orange, and brown. This design is associated with a class of Viñaque tumblers that depicts a bodiless front-face deity reminiscent of oversize Robles Moqo tumblers, described by Menzel (1964: 27). It is often used to frame the deity figure.

Finally, two Viñaque sherds (not illustrated) are decorated with a fret design. These sherds probably represent open vessels, one painted in black, white, and yellow on a background of red, the other similarly rendered but with no visible presence of yellow. The color and design scheme of these sherds fits Wendell Bennett's (1953: 47–65) description of polychrome style pottery of the Wari series, namely, his Black and White on Red, which is also recognized by Luis Lumbreras (1974: 175). This category of pottery appears to represent one of the various Viñaque substyles.

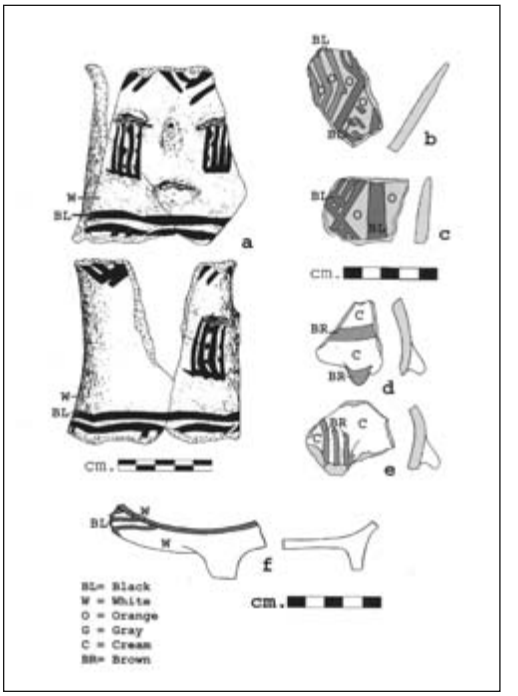
The local ceramic style, Araway, which I believe was influenced by one of the Viñaque substyles known as Wamanga (hence, my nomenclature "Wamanga style pottery"), represents 5.5 percent of the Pikillacta ceramic collection. I previously referred to this ceramic style as "Araway/Wamanga" pottery (see Glowacki 1996a). This ware varies in color from light orange-red to orange-red. Most is slipped cream or occasionally orange-brown or brown, although some examples are unslipped. Decorative designs are painted in black, red (sometimes appearing brownish or orangish), and occasionally white and gray. Vessel forms identified at Pikillacta include bowls with straight and convex diverging sides, large globular jars, some with flange rims, and possible tumblers. These vessels tend to be average in quality (fig. 6.6).

Like Okros decorated style pottery, bowls make up the largest category of Wamanga style vessel forms. Most bowls are likewise decorated on the interior with versions of the rectangle pendent or alternating vertical and horizontal straight and undulating lines/bands. Other Wamanga style vessels are also decorated with variations of these designs in addition to other curvilinear and geometric patterns. Reconstruction of many Wamanga style designs and vessel forms was impossible due to the small quantity and size of the majority of the associated sherds (for examples of Wamanga style pottery recovered at Pikillacta, see fig. 6.6a–d).

Another local ceramic style, called Q'otakalli, comprises 4.5 percent of the Pikillacta ceramic collection. Examples recovered at Pikillacta are primarily from coarse wares, which range in color from cream to light orange-red to medium orange, which in many cases may be the con-



6.6. Wamanga pottery: (a) rim sherd of bowl, decorated on the interior with the banded wave design, 17-centimeter diameter; (b) rim sherd of bowl, decorated on the exterior with horizontal alternating straight and undulating lines, 14-centimeter diameter; (c) rim sherd of tumbler or bowl, decorated on the exterior with pendents with blocks design, 14-centimeter diameter; (d) rim sherd of bowl, decorated on the interior with the repeated hooks and band design, 17-centimeter diameter.

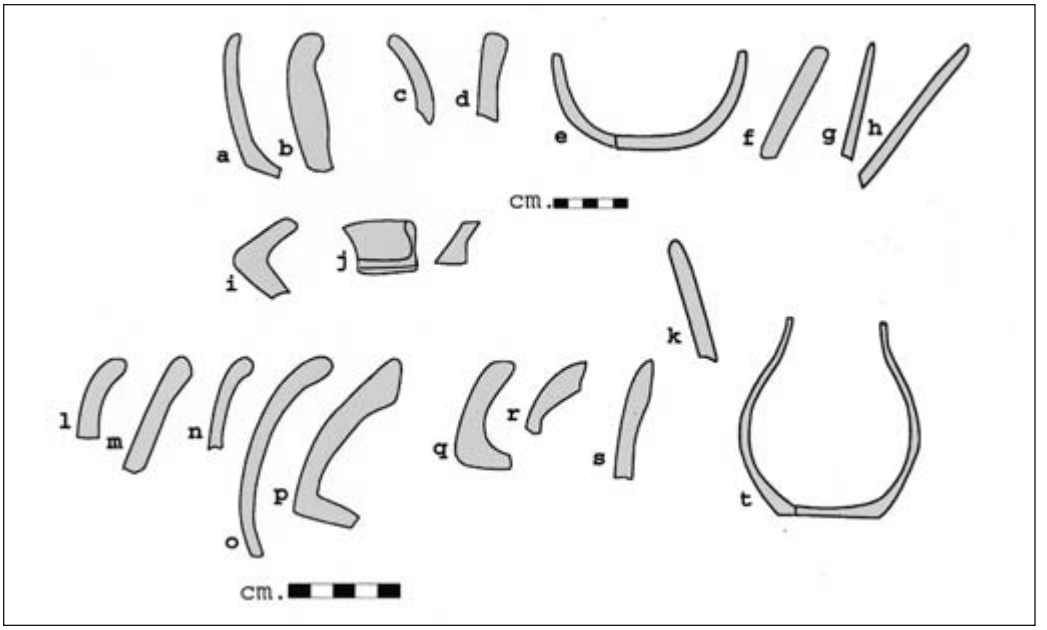


6.7. Q'otakalli pottery: (a) partially reconstructed neck of human-face neck jar, 6.5-centimeter rim diameter; (b, c) decorated body sherds; (d, e) tripod vessel feet; (f) foot and portion of base of vessel with exterior geometric decoration.

sequence of clay mixing. Vessels are generally slipped cream, sometimes opaque orange or orange-brown, and are usually unburnished. Most designs are painted in black or opaque black but occasionally are dark brown, which likely was intended to be red but discolored during firing.

The small number and size of many Q'otakalli sherds made reconstruction of vessel forms and decorative motifs difficult. Vessel forms which were identified include bowls with straight and convex diverging sides, closed convex-sided bowls, footed and possibly flat-based tumblers, vessels (probably jars) with gourd-shaped bases, jars with diverging and inward-inclined necks, including face neck forms, and neckless jars. Large "*chicha*" jars, similar in form to those represented in the Okros style, are another Pikillacta Q'otakalli vessel form. Q'otakalli vessels are decorated with geometric designs entailing patterns of vertical, horizontal, and diagonal lines sometimes accentuated with dots; nested angular designs; cross-hatching; and curvilinear designs. Many designs appear to have been carelessly or rapidly executed (fig. 6.7).

Two Wari plainware ceramic styles, Plainware and Blackware, respectively make up 9.5 percent and 3.2 percent of the Pikillacta collection. Plainware style pottery is a relatively coarse brownware. Whereas Ayacucho Plainware is primarily a reddish brown, at Pikillacta it tends to be dark brown or orange-brown. Jars represent three-quarters of the Pikillacta Plainware vessel forms. Most have flaring necks. Others include inward-inclined, convex, and vertical necked jars, some of which are face neck forms, short necked jars, and neckless jars. *Chicha*



6.8. Plainware pottery: (a) rim sherd of jar, 12-centimeter diameter; (b) rim sherd of jar, 12-centimeter diameter; (c) rim sherd of jar, 10-centimeter diameter; (d) rim sherd of jar, 12-centimeter diameter; (e) bowl, 12-centimeter rim diameter; (f) rim sherd of bowl, 17-centimeter diameter; (g) rim sherd of bowl, 17-centimeter diameter; (h) rim sherd of bowl, 18-centimeter diameter; (I) rim sherd of jar, 11-centimeter diameter; (j) rim sherd of jar, 9-centimeter diameter; (k) rim sherd of closed bowl, 12-centimeter diameter; (l) rim sherd of jar, 18-centimeter diameter; (m) rim sherd of jar, 18-centimeter diameter; (n) rim sherd of jar, 10-centimeter diameter, (o) rim sherd of jar, 18-centimeter diameter; (p) rim sherd of jar, 17-centimeter diameter; (q) rim sherd of jar, 17-centimeter diameter; (r) rim sherd of jar, 26-centimeter diameter; (s) rim sherd of jar, 14-centimeter diameter; (t) portion of reconstructed jar, 6.5-centimeter base diameter.

jars with fabric-impressed bases are also represented in the Plainware ceramic style. There are also Plainware bowls of various forms and a few worked disks that were possibly playing or counting pieces. Examples of Wari Plainware recovered from Pikillacta are shown in fig. 6.8.

Blackware ranges from coarse to fine in quality. Most Blackware examples have a black-colored paste due to the effects of firing in an oxygen-reduced atmosphere. However, there are examples with orange-colored cores that are slipped black. The most common Blackware vessel form represented at Pikillacta is the open, convex-sided bowl associated with a rounded or concave base. Other forms include bowls with vertical and straight diverging sides, jars with straight and flaring diverging necks, a single-banded kero, and a jar with a narrow spout.

Examples of imported and also miscellaneous local ceramic styles were identified in the Pikillacta collection. "Foreign" pottery includes fragments of a portion of a possible Nazca 4 gambreled bowl and Cajamarca Cursive style and Cajamarca imitation pottery. There is also a pottery fragment decorated with a split-eye motif thought to be Tiwanaku-influenced. Local ceramic styles represented in the collection, which as yet have received little scholarly attention, include fragments of two convex bowls of the Waru style and a single fragment of Incised Blackware, a class of pottery described by Brian Bauer (1999: chap. 3).

Inferred Pottery Uses and Pottery-Related Site Activities

Based on various lines of data, which include ceramic style and vessel percentage, site context, and distribution (focusing on room types defined by McEwan), ethnographic and ethnohistoric accounts of vessel use, vessel morphological qualities, and other archaeological evidence, Pikillacta pottery was assessed in terms of its uses and the implications of these uses for inferring site activities. Pottery-related activities inferred for Pikillacta point to activities principally associated with political administration entailing suprahousehold feasting and drinking and ancestor and *huaca* worship.

Evidence for large-scale feasting activities was associated with Type I patio groups, which are believed to have served as "offices" of Pikillacta administrators. Five of eight excavated Type I patio groups contained pottery recovered from hearths located in the corners of the elongated chambers of these structures. The pottery was represented by a high percentage of regular-size bowls, greater than would be associated with ordinary domestic use, and undecorated jars with narrow or constricted necks. Fragments of burned animal bone, mostly camelid, were likewise recovered from the hearths. Excavations of comparable architecture (i.e., plazas with narrow flanking chambers) at the Inca provincial administrative center of Húanuco Pampa, interpreted to have been used for state-sponsored feasts (Morris and Thompson 1985: 59, 79, 90), and ethnographic accounts of Inca ceremonial feasting in plazas hosted by state officials (see, for example, Garcilaso de la Vega 1987: 185; Molina 1943 [1573]: 35–37) suggest that Wari Type I patio groups served a similar function.

The patios of Type I structures are thought to have been the site of official gatherings organized by administrators, central to which was eating and drinking. As is the custom among many traditional Peruvian Highland communities, as was also the custom among the Inca, meals accompanying formal ceremonies would have been consumed first, utilizing bowls (or deep plates). Afterward, *chicha* was drunk (see Cummins 1988: 143; W. H. Isbell 1978: 168–170). Bowls are posited to have also been used as drinking receptacles. The high percentage of regular-size bowls and very low percentage of tumblers represented in the collection support this. The remains of a few tumblers found in the hearths are believed to have been used by administrators to make official toasts, as was the practice among the Inca (Cummins 1985; Guaman Poma de Ayala 1987 [1613]: 220, 224, 262). The remainder of the guests, perhaps laborers offered food and beverage for their services to the state, would have drunk from simple bowls. Narrow- or constrictive-neck jars would have been used to store, transport, and serve beverages consumed on these occasions.

The narrow peripheral rooms of the patio groups are believed to have been reserved for food preparation, storage, and service. Trash generated from feasts appears to have been thrown into the hearths or nearby and allowed to collect in the chambers. It was later removed for permanent disposal. Fragments of the same vessels recovered both from these chambers and the principal trash midden located outside the perimeter of the complex supports this theory. Also excavated from this midden was a high percentage of fragments of wide-mouth or diverging-neck jars of undecorated, mostly Plainware pottery. Various ethnographic and ethnohistoric sources (see, for example, Chávez 1984–85: 165; Morris 1979: 22, 25) indicate that this category of jar has been used by many ancient and contemporary Andean societies for the preparation of *chicha*.

Evidence for similar patterns of room use, particularly high percentages of serving vessels, has been identified with Wari Type I patio groups at the site of Jargampata and the Moraduchayuq compound, both likewise posited to be the focuses of administrative activities (Brewster-Wray 1983, 1990: 392–395; W. H. Isbell 1988: 170–171). These data, in addition to those from Pikillacta,

suggest that Wari Type I patio groups were designed for a specific function entailing administrative ceremonial feasting.

Pottery remains associated with Type II niched halls support McEwan's (1994: 16) view that these structures served a ceremonial function. I believe such activity was intimately associated with ancestor and *huaca* worship. Among other features, these structures are characterized by offerings in corner pits and beneath doorways (see chapter 2, this volume) of *Spondylus* shell, camelid bone, and copper (recent analysis of metal site artifacts formerly believed to be copper have been identified as arsenical bronze; see chapter 9, this volume). However, copper stains and residue discovered during excavations suggest that copper also existed at Pikillacta. Other offerings believed to have come from Type II niched halls include two caches of 40 green-stone human figurines (see Cook 1992; McEwan 1998: 11). The number and prominence of Type II niched halls at both Pikillacta and Viracochapampa, the two largest Wari planned architectural complexes, also suggest that these rooms were designed to be the hub of key activities (McEwan 1998: 16). A tradition for the ceremonial use of morphologically comparable structures among certain pre-Columbian societies which pre- and postdate the Wari supports this argument.

Of the seven Type II niched halls excavated at Pikillacta, only two contained pottery. This lack of ceramic as well as other archaeological remains may be due, in part, to looting, possibly having occurred in pre-Columbian times, presumably because of the wealth known to have been placed in these structures (i.e., corner offerings and objects displayed in niches). It may also be attributed to the fact that these rooms may never have been used after they were completed and even after they were dedicated. However, Andean societies have traditionally maintained the sacredness of religious space, such as temples and churches, by keeping floors neatly swept (see, for example, Silverman 1994: 9–10). Consequently, little debris may have been left in Type II niched halls, despite their ceremonial use. They may simply have been cleaned after each ceremony.

One of the two Type II niched halls in which pottery was recovered, Structure 6-3, had never been completed. Its walls were unfinished and its floor never laid. Excavations indicated that the structure had been completely filled with sterile clay and its entrance carefully closed off, as though being sealed for future use. Prior to this, an offering of pottery and burned animal bone were placed in the western corner of the structure in a deeply dug hole, which penetrated the clay from top to bottom (McEwan personal communication, 1998). This is a recent reinterpretation by McEwan of this structure. (For a description of the structure's excavation and its earlier interpretation, see McEwan 1984: 89, 90–93; 1991a: 104; 1994: 12; and 1996: 8).

Unlike excavations of Type I patio groups, Structure 6-3 contained a high percentage of Wamanga style pottery (43.1 percent), in addition to Okros style pottery (30.7 percent), Plainware style pottery (14.1 percent), Blackware style pottery (5.1 percent), Q'otakalli pottery (4.5 percent), and Chakipampa style pottery (2.2 percent). Wamanga style pottery was represented by twice as many bowl as jar fragments. In contrast, jar fragments of Okros and Plainware and of Blackware were respectively double and triple that of bowls. Bowls were predominantly open forms with convex and straight sides, classified as average in size. Jars were represented by distinct formal types, which corresponded to different ceramic styles. Wamanga style jars had principally narrow vertical necks. Okros style pottery was equally represented by jars with narrow and wide mouths with vertical or slightly inward-inclined necks. Plainware style jars had predominantly wide mouths with diverging necks.

The pottery and bone offering from this structure mark its abandonment. The ceramic remains, largely serving vessels, point to their use in activities centered on feasting and drinking. They may have been generated all at one

time or possibly during multiple episodes, and then ritually discarded. It is possible that drinking and feasting bouts required intentionally breaking vessels after their use, which also would have produced this same debris. In light of the Wari offering tradition entailing breaking and interring pottery, as is evidenced at sites such as Conchopata (Isbell and Cook 1987), this interpretation of activities associated with Structure 6-3 is not unreasonable.

The second Type II niched hall with pottery remains, 24-4D, supports the view that this building type was associated with ceremonialism, in particular ancestor and *huaca* worship. This structure contained a portion of a great rock outcrop that underlies part of Sector 4. The rock almost completely fills the room. The Wari may have considered it a stone *huaca*, an Andean sacred object or place (Rowe 1946: 295–297). In Inca times, certain types of *huacas*, such as large rocks, bodies of water, and caves, were closely tied to ancestor worship as representations of ancestors or conduits to the ancestral underworld. Corporate groups known as *ayllus* were responsible for caring for the *huacas*, honoring them with offerings (Cobo 1890–95: vol. 4, bk. 13, chaps. 10, 13–17, pp. 9–47).

In the western corner of Structure 24-4D, a charcoal deposit believed to represent a burned offering was discovered. It contained approximately a dozen Okros style sherds. These included fragments of three regular-size bowls, three jars with narrow necks, and a portion of a miniature bottle with a vertical neck. The only other artifact recovered from this structure was a shell bead carved in the form of a *Strombus* shell (McEwan 1984: 111, 118, 119, fig. 3–33; 1991a: 109–111, fig. 26; 1994: 9).

Decorated bowl and jar fragments and the only miniature vessel found at Pikillacta may be the vestiges of ritual in which offerings of food, drink, and various items of special value were made to the posited stone *huaca* in Structure 24-4D. Food and drink (i.e., llama and guinea pig and *chicha*) were common Inca offerings made to the *huacas*. The remains of sacrificed animals were burned while the *chicha* was poured onto the ground (Garcilaso de la Vega 1987: 185; Rowe 1946). Since charred bone was absent from this deposit, another substance may have been burned instead. Miniature objects, such as those recovered from Structure 24-4D, were also used by the Inca as religious offerings (Reinhard 1984; Rowe 1946: 296). Shells were likewise common Inca offerings which were made to *huacas* to induce rain (Murra 1975: 257 citing Cobo 1956, Libro XIII, Capitulo xxii; see also Rowe 1946: 249).

While only two Pikillacta Type II niched halls were found to contain pottery, the use of comparable architecture postdating the Wari, in addition to other artifactual data associated with these rooms, suggests that they served as feasting halls of lineages or other group affiliations to honor the ancestors.

Chronological Inferences

Analysis of the Pikillacta ceramic collection permitted the examination of chronological questions pertaining to the occupation of the site and surrounding region. In general, ceramic data corroborated radiocarbon dates for Pikillacta (McEwan 1984: 227, app. 1; personal communication 1993; see also table 7.1, this volume). They indicate that the site was under construction by Middle Horizon 1B, ca. A.D. 600–700, and continued to be occupied into Middle Horizon 2, ca. A.D. 700–800, and possibly much later. For a more detailed discussion of the dating of Pikillacta and its implications for the greater Wari Cuzco region, see chapter 7.

Patterns of Pottery Production and Distribution

The results of the chemical analysis of a select sample (200 sherds) of Pikillacta and other Wari-period pottery using Instrumental Neutron Activation Analysis have provided general insights into the patterns of production and

distribution of pottery of Pikillacta and the surrounding region. Interpretations were based on the compositional characterizations of certain pottery styles represented at the site and comparison of them with those of different intra- and interregional proveniences.

Okros, the principal ceramic style of Pikillacta, is believed to have been locally manufactured at various centers in the vicinity of Pikillacta. One production center is thought to have been located west of Pikillacta toward the region of Paruro. This tentative conclusion was based on similar compositional results of Okros style pottery samples from Pikillacta and samples of various pottery styles, including Okros, from Paruro. No evidence was identified for its importation. In contrast, Chakipampa pottery appears to have been both locally manufactured and imported from the Wari heartland. A generally finer ware than Pikillacta Okros, Chakipampa pottery may have been closely associated with administrative authority of Ayacucho and occasionally brought to Pikillacta on official visits, though other mechanisms could have been employed.

The local ceramic style Q'otakalli was produced separately from Wari pottery, with at least one possible center of production in the western end of the Cuzco Valley, where the type site of Q'otakalli is located. The other local ceramic style, Araway, was found to be compositionally distinct from Q'otakalli but shared some characteristics, suggesting that it may likewise have been manufactured in the western basin area. Compositional data also indicated that Araway pottery was in fact a local imitation of Wari Wamanga pottery, with actual examples of Wamanga pottery brought to Cuzco to serve as models. One Araway potsherd from this analysis, and another from a more recent compositional study I made, were found to chemically group with sherds sampled from the Ayacucho region. This suggested that actual Wamanga pottery was introduced to Cuzco, where it was locally copied.

Finally, no examples of blackware or redware pottery, posited to have been brought from the *altiplano* and associated with the Tiwanaku culture, were identified in the collection. Most of these examples appear to have been locally manufactured. Wari and Tiwanaku culture utilized undecorated styles of blackware. While their vessel forms are essentially distinct, in fragmented form they can be difficult to visually differentiate. Decorated redware recovered from various parts of Cuzco and dating to the Middle Horizon (see Bauer 1989, Espinosa 1983, Lyon 1978, Torres 1989, and Zapata 1993 for examples) has likewise been difficult to identify stylistically. This is partly because Wari redware dating to Epoch 2 and later is still poorly defined and, consequently, cannot be easily used to classify lesser-known related examples. It is also due to the fact that some of these Cuzco finds exhibit characteristics of Tiwanaku redware, which dates to the same general period. Consequently, blackware and redware examples displaying evidence for possible *altiplano* origin were included in this study. INAA results supported stylistic interpretations that blackware and probably also redware were respectively Wari and Wari-related ceramics styles.

Although preliminary, these results suggest that the southern province of the Wari, at the center of which was Pikillacta, operated self-sufficiently, manufacturing its own pottery. However, the adherence to designs and forms of pottery, architecture, and other material culture by the Pikillacta Wari indicates that a strong degree of control was imposed from the capital. Moreover, local cultures, such as the Q'otakalli, seemed to have maintained a level of economic independence, limiting access to certain clay sources and preserving many pottery production methods and style traditions, despite the formidable presence of the Wari.

Finally, evidence at Pikillacta for foreign influence in the Cuzco region during its Wari occupation, namely, the presence of Tiwanaku or Tiwanaku-related cultures, was not found. However, recent excavations elsewhere in Cuzco suggest otherwise. Exploratory excava-

tions Julinho Zapata and I carried out in 1996 at the site of Kanincunca in the Huaro Valley have revealed the existence of a pyramidal temple, which exhibits strong Tiwanaku influence. Its construction and form are reminiscent of the Akapana and other civil monuments that comprise the ceremonial precinct of Tiwanaku (Kolata 1993: 104–106; Manzanilla 1992: 23). While no pottery was recovered during excavations, reports of Tiwanaku style pottery have been made in its vicinity, intimating a more extensive *altiplano* Middle Horizon (or immediately prior) interaction in Cuzco than is currently realized. However, Early Tiwanaku style pottery, predating the Middle Horizon, has been identified at many sites in the Cuzco region, the majority concentrated in the Lucre Basin (Chávez 1984–85; also, reports from more recent excavations by McEwan at Chokepukio and Zapata at Batán Urqu).

Conclusion

The analysis of pottery from Pikillacta offers new perspectives on the Wari occupation of Pikillacta and surrounding region. The principal ones are as follows.

First, the Wari occupation of Cuzco, as interpreted from the site of Pikillacta, fits the expansion model proposed by Menzel (1964: 66–73), although Okros instead of Chakipampa was used as the principal ceramic style in the south Highlands. Okros served as the official "china" of the Pikillacta Wari. It was locally manufactured and utilized primarily for administrative activities entailing feasting and ceremonies surrounding ancestor and *huaca* worship.

Second, Wamanga style pottery, known to Cuzco archaeologists as Araway, may have been intended to be a new ceramic style introduced by the Wari of Ayacucho during Epoch 2 to replace Okros. However, ceramic and other evidence indicates that sometime during Epoch 2 activities at Pikillacta began to wane until the site was eventually abandoned. Consequently, Wamanga style pottery never became the leading ceramic style at Pikillacta.

Third, local pottery, namely the Q'otakalli ceramic style, does not seem to have played a major role at Pikillacta, nor was its manufacture greatly affected by the Wari. The apparent independence maintained by local culture during the Wari occupation may have resulted from earlier (pre-Wari expansion) contact, perhaps trade relations, with Ayacucho communities. Such favorable relations may have allowed the Wari to occupy Cuzco with little resistance from local groups.

Lastly, while no evidence exists for Wari-Tiwanaku interaction at the site of Pikillacta, recent excavations south of the Lucre Basin may prove otherwise. Insights into this relationship await future investigation.

7 Dating Pikillacta

MARY GLOWACKI

Despite the fact that Pikillacta is a single component site, dating its construction and occupation has proved to be somewhat problematic. Absolute and relative dating methods have generated inconsistent data sets, making it difficult to assess the site's temporal parameters. This chapter presents these data, attempts to reconcile them, and concludes by proposing a site chronology of the Wari expansion into the larger south Highland region.

Absolute Dating: Radiocarbon Samples from Pikillacta

A total of ten radiocarbon samples were collected by Gordon McEwan and the Pikillacta Project (McEwan 1984b: 227, Appendix I; personal communication 1993). Nine samples were recovered from Sectors 2 and 4 and one from the site's trash midden (table 7.1). Sector 2 was the most heavily occupied area of the site, having generated the most artifacts (primarily pottery) from room excavations. Sector 2 excavations revealed the remains of fully completed structures with plastered walls and floors and thatched roofs. A number of its structures had also been refurbished several times (McEwan 1991a: 7–12), the best example being the chambers and patio of Structure 17-2B (McEwan, this volume and 1996: 9). Four of the six Sector 2 radiocarbon samples were wood or carbonized wood associated with the construction of two structures, Structures 39-2B and 37-1C. A fifth sample, also wood, was found on the floor of Structure 12-2A; it had likely been associated with Wari activity carried out there. The sixth, a sample of charcoal, was recovered from the floor of Structure 33-2B, likewise having been associated with Wari activities there.

Excavations of various Type III small conjoined buildings, which comprise the majority of Sector 4, revealed that while construction was far along, many rooms, specifically the floors, were unfinished (chapter 3, this volume). Nonetheless, a number exhibited evidence of use, such as fire hearths

Table 7.1. Radiocarbon Dates from Pikillacta

Laboratory Number	Uncalibrated Date	Calibrated Date (95% Probability)	Date Sample Collected	Type of Material	Context
Tx 3996	1100 ± 60 B.P. A.D. 850 ± 60	A.D. 880–1045 and A.D. 1105–1115 Curve intercept A.D. 995	1979	Pispita vine	Interior of wall of Unit 12, Sector 4
Tx 4247	1140 ± 60 B.P. A.D. 810 ± 60	A.D. 800–1030 Curve intercept A.D. 975	1979	Pispita vine	Interior of wall of Unit 12, Sector 4
Tx 4747	1430 ± 370 B.P. A.D. 520 ± 370	A.D. 165–1305 Curve intercept A.D. 665	1982	Charcoal	Structure 24-4D, hearth at bottom of Unit 30, Sector 4
Tx 4750	1350 ± 60 B.P. A.D. 600 ± 60	A.D. 640–875 Curve intercept A.D. 690	1982	Charcoal	Midden in Canchon 2
Tx 4751	1430 ± 90 B.P. A.D. 520 ± 90	A.D. 530–825 and A.D. 825–855 Curve intercept A.D. 655	1982	Wood	Associated with plaster floor in Unit 16B–D, Sector 2
Beta 43230	1150 ± 80 B.P. A.D. 800 ± 80	A.D. 770–1040 Curve intercept A.D. 970	1989	Charcoal	Associated with surface of plaster floor in Unit 36, Sector 2
Beta 43231	1290 ± 60 B.P. A.D. 660 ± 60	A.D. 665–905 and A.D. 920–950 Curve intercept A.D. 780	1989	Wood	Fragment of lintel beam found in situ in doorway of Unit 43A3, Sector 2
Beta 43232	1180 ± 60 B.P. A.D. 770 ± 60	A.D. 775–1015 Curve intercept A.D. 895	1989	Charcoal	Burned upper floor support from Unit 37B2, Sector 2
Beta 43233	1060 ± 50 B.P. A.D. 890 ± 50	A.D. 960–1065 and A.D. 1075–1155 Curve intercept A.D. 1015	1989	Carbonized wood	Burned upper floor support found in Unit 43A3, Sector 2
Beta 43234	1330 ± 60 B.P. A.D. 620 ± 60	A.D. 650–885 Curve intercept A.D. 705	1989	Wood	Upper floor support found in collapsed floor of Unit 37B2, Sector 2

for cooking (McEwan 1984b: 104, 111–113). Two radiocarbon samples of braided vine cord were recovered from a wall of a Type III structure, Structure 104-4B. Another sample, of charcoal, was collected from the floor of Structure 24-4D, found in association with a hearth and broken fragments of Wari pottery. This structure, initially classified by McEwan as a Type III structure (at one time referred to as a Type "E" structure, see McEwan 1984b: 104–113, 118–121 and fig. 2.8, this volume), was later reclassified by him using his current typology as a Type II structure (see McEwan and Couture, chapter 7, this volume).

Finally, one radiocarbon sample, charcoal, was taken from the bottom of the site's principal trash midden, a nonstratified midden containing only Wari contents. The midden was eroded due to its location on a steep slope, which created a mixed deposit. It is believed to be the remains of debris produced within the complex walls but later discarded outside for permanent disposal.

The analysis and calibration of these radiocarbon samples indicate that Pikillacta could have already been under construction by roughly A.D. 530 (Middle Horizon Epoch 1A) and was possibly still in use by the Wari as late as approximately A.D. 1155 (Late Intermediate Period). This time span is based on the 2 sigma, 95 percent probability, standard deviation calibration range for each sample, as calculated by Beta Analytical Radiocarbon Dating Laboratory (see table 7.1). Sample Tx4747 was excluded since both its earliest and latest possible dates create a time period spanning well beyond the parameters of the Middle Horizon.

The overall patterning of the dates point to an occupation which more likely began during Middle Horizon Epoch 1B (ca. A.D. 600–700) and continued through Epochs 2 to 4 (ca. A.D. 700–1000) until approximately, A.D. 1100. This is in accord with dates for the Middle Horizon published by Isbell (1983).

Relative Dating: The Ceramic Data from Pikillacta

Analysis of the Pikillacta ceramic collection provided an alternative set of data to help both assess and refine the site's chronology. Ceramic data corroborated radiocarbon dates for Pikillacta (McEwan 1984: 227, app. I, personal communication 1993; see also table 7.1), which indicate that the site was under construction by Epoch 1B of the Middle Horizon and continued to be occupied into Epoch 2. This is based on the following lines of evidence: (1) minimal if any Epoch 1A pottery, (2) the predominance of Okros Epoch 1B style pottery and the presence of a lesser quantity of Chakipampa Epoch 1B style pottery, and (3) the virtual absence of Viñaque pottery and the presence of a small quantity of Wamanga style pottery that dates to Epoch 2 and possibly later (see Glowacki 1996a: 142–153, 156–181, 191–207 for a more detailed discussion of these ceramic styles from Pikillacta). As described and illustrated by Luis Lumbreras (1974: 175, 1975: 1, 167, 181), and later defined by Martha Anders (1986a, see pp. 269–603), Wamanga pottery is considered to be the local or domestic class of Wari pottery for Ayacucho during Middle Horizon Epochs 2 and 3. Elsewhere (Glowacki, this volume and 1996a: 206–207), I have discussed that Cuzco Araway pottery is likely a local imitation of Wamanga pottery, hence the use of the term "Araway/Wamanga" pottery. I have recently replaced this term with simply "Wamanga *style*" pottery, which I utilize here.

While a few examples of possible Epoch 1A pottery have been found at Pikillacta, they can not be clearly assigned to this period. Examples include streaky orange slipped pottery, which may represent the Okros 1A style but alternatively may be the blending of Okros and Chakipampa pottery styles, for which other evidence exists. A handful of examples of Okros pottery decorated with an Epoch 1A–derived design were also identified (see Glowacki 1996a: 178-179). A few examples with Chakipampa designs were found, which likewise had possible Epoch

1A affiliations but were concluded to be Epoch 1B pottery (Glowacki 1996a: 147–152). These sparse data, and the fact that little evidence has been recovered elsewhere in the Cuzco region for Wari Epoch 1A activity, support the view that the construction and occupation of Pikillacta probably did not begin until Epoch 1B.

At Pikillacta, in light of the site's radiocarbon dates, the large quantity of Okros pottery (approximately 60 percent) in conjunction with the relatively small quantity of Epoch 2 pottery (Viñaque, less than 1 percent, and Wamanga style, approximately 5.5 percent) suggest that Okros pottery was in continual use into Epoch 2. This could reflect relatively light Wari activity at Pikillacta for a sustained period of time, from Epoch 1B to sometime during Epoch 2, or intense sporadic periods of activity during this same time frame. Either of these explanations make sense, since the site was under construction during its entire occupation, which suggests that it was never fully operational. Research at the Wari site of Jincamocco in Carhuarazo Valley also supports a longer temporal assignment to Okros. According to Katharina Schreiber (1992: 229), Okros pottery from the site is believed to date to no earlier than Epoch 1B and to have persisted in use into Epoch 2.

Another possible explanation for the seemingly incommensurate quantity of Epoch 2 pottery at Pikillacta is political upheaval in the Wari capital, which negatively affected its southern province and ultimately its ceramic manufacture, access, and utilization. According to Menzel (1964: 69–72), Epoch 2A brought significant and abrupt change throughout the Wari Empire. At Pikillacta, the Wari may have needed to scale down operations, resulting in fewer site activities and thus a lesser need for pottery. Consequently, while new Epoch 2 styles were introduced, the demand for them did not merit mass production. This interpretation is supported by the fact that the construction of Sectors 1, 3, and 4 was terminated prior to completion and a number of principal doorways were intentionally sealed, as if to limit site activities to designated areas. As discussed elsewhere, the closing off of one Type II niched hall is posited to have been a ritual act entailing a ceramic offering, with many vessels represented by Wamanga style pottery. The distribution of Wamanga style ceramics at Pikillacta is essentially limited to this structure. Since Wamanga appears to have been *the* Epoch 2 ceramic style at the site, with the exception of Okros, the events surrounding its deposition may signify the site's pending abandonment during Epoch 2.

One view, then, is that sometime in Epoch 2 Wari activity at Pikillacta began to wane until it finally came to a halt. Dorothy Menzel (1964: 72) argues that the Wari Empire collapsed by the end of Epoch 2B. During this tumultuous period, a contingent of Wari, perhaps those sent from the capital to conclude operations at Pikillacta, settled elsewhere in Cuzco, having already lost the infrastructure necessary to run the huge complex and its supporting basin nodes. One candidate for their new base of operations is the type site for Wamanga style pottery, Araway, located northwest of Pikillacta in the Cuzco Basin. Prior to abandoning Pikillacta, these Wari may have sealed off what is believed to have been a temple, making an offering of ceramic vessels and probably also *chicha* as their final gesture to the Wari ancestors.

Of course, the abandonment of Pikillacta does not necessarily signal the end of the Wari occupation of the Cuzco region. It may simply reflect a change in policy in which the Wari government decided to no longer use Pikillacta and to concentrate its efforts in other settlements, such as those to the northwest and southeast. These would have been important to maintain because they would have provided them with both a southwest and northwest access to the Apurimac River, the major artery connecting them to Ayacucho.

The calibrated dates for Pikillacta do not support the interpretation that Pikillacta was deserted by the end of Epoch 2. Rather, they suggest that it occurred somewhat later, during the last epoch of the Middle Horizon or subse-

quent to it. Assessing an occupation of Pikillacta for Epochs 3 and 4 on the basis of pottery is difficult. Menzel (1964), who established the Middle Horizon ceramic sequence, was unable to adequately discuss these two final epochs in terms of pottery styles, due to the lack of available data. According to her (Menzel 1964: 72), Ayacucho apparently did not introduce any new ceramic styles into the provinces after Epoch 2B; however, local derivations were developed all along the coast. In the case of the sierra territories such as Cuzco, these later epochs are virtually unstudied. In short, we do not know what Epoch 3 and Epoch 4 pottery looks like in Cuzco, let alone how long its other Wari ceramic styles endured, to be able to definitively say that Pikillacta was or was not occupied into these later phases. It is even quite possible that events revolving around Wari activity in Cuzco continued into the Late Intermediate Period, which requires us to rethink this period of the Cuzco sequence.

Okros pottery may have continued to be used into Epochs 3 and 4 of the Middle Horizon, although there are no other examples of Epoch 1 ceramic styles having been used through the entire Middle Horizon sequence. Wamanga style pottery may be the more likely Epochs 3 and 4 ceramic style. Menzel only briefly mentioned it in her discussion of Wari ceramic styles, referring to it as "less fancy Viñaque . . . that Bennett" [who also studied Wari Ayacucho pottery] "illustrates under his 'Wari Polychrome Cursive' heading" (Menzel 1964: 45). Neither scholar provided sufficient information with which to properly compare other data sets. (For Bennett's references to this class of pottery from Wari, see Bennett 1953: 50, 52, and 54 fig. 13.)

Later, Anders (1986a: 269–603; 1991: 185), drawing on the work of Lumbreras (1959, 1960b, 1974, 1975, 1981), extensively described this style, calling it "Wamanga." She found Wamanga to be the principal pottery style of Azángaro and dated it to Epochs 2 and 3. Recent excavations Julinho Zapata and I carried out at the Wari site complex of Huaro, southeast of Cuzco, have generated Epoch 2 Viñaque style pottery, found in the same contexts as Wamanga style pottery and suggesting that the two styles were contemporaneous. Whether this means that both were utilized during only Epoch 2 or up through the later epochs is uncertain. Radiocarbon dating of these sites will, no doubt, help clarify this issue.

Thus, to reconcile radiocarbon dates and pottery data, one might see Pikillacta as having been occupied until the end of the Middle Horizon, as radiocarbon dates would indicate. Whereas other Wari provincial centers, such as Pachacamac, emerged during Epoch 2A, Pikillacta ceased its growth, receiving barely any new ceramic styles from the heartland.

Comparative analysis of Wari-influenced pottery from other Cuzco sites suggests a complicated Cuzco panorama during Middle Horizon Epoch 2 and possibly later, further adding to the difficulty of dating the abandonment of Pikillacta. One example of this is a polychrome redware or related substyles. Characterized by cups, tumblers, and bowls, some with annular bases, this pottery is decorated with geometric designs identified by Menzel (1964: 40–45) as commonly associated with Epoch 2 Viñaque pottery. Recovered in the Cuzco Basin (see Espinosa 1983; Lyon 1978; Torres 1989), the site of Batán Orqo (Zapata 1993), and in Paruro (Bauer 1989, 1992), it was not found at Pikillacta. Incised blackware and a polychrome orangeware, first reported by Brian Bauer (1993: chap. 3) from Paruro, are other examples. These tentative styles are represented by drinking vessels likewise decorated with designs associated with Epoch 2 Viñaque pottery. One Incised blackware sherd, but no examples of the polychrome orangeware, were discovered at Pikillacta. These three types of pottery may have been associated with activities that were not practiced at Pikillacta, accounting for their absence at the site. They may also represent activities of non-Pikillacta Wari or Wari-influenced groups during and/or following the decline of Pikillacta.

Operations were scaled back and construction was eventually terminated, the Pikillacta

Wari likely having been cut off from Ayacucho for political or economic reasons. For whatever aim or cause, the site never reached its full potential; three of its four sectors were left unfinished, having been only minimally occupied. It is speculative how long Pikillacta endured before becoming uninhabited, though radiocarbon dates tell us activities could have persisted into the twelfth century.

Ceramics of the Surrounding Cuzco Region

Middle Horizon pottery observed by McEwan (personal communication, 1992) during his survey of the Lucre Basin, which I identified as mainly Okros and Plainware pottery, points to contemporaneity of sites within this zone. Wari Plainware, a dark brown utilitarian ware, was identified at Pikillacta and shares contexts similar to those of Okros, which suggests the two ceramic styles were contemporaneous (for a more detailed discussion of this ceramic style represented at Pikillacta, see Glowacki 1996a: 219–224). They corroborate McEwan's (1984: 167, 206–208) view of a Greater Pikillacta entailing a constellation of Wari sites which supported the operation of Pikillacta.

In Andahuaylillas, located immediately southeast of the Lucre Basin, three Wari sites, Escalerayoc, Patachancha, and Wamanqaqa, were discovered a few years ago as a consequence of looting. The National Institute of Culture eventually recovered a number of artifacts from the sites, but no subsequent field research followed to help date these sites.

Recent excavations Julinho Zapata and I conducted immediately southeast of Andahuaylillas in the Huaro Valley have revealed a complex of Wari sites, which in spatial coverage exceed that of Pikillacta. Exploratory excavations of three of its numerous components have produced considerable pottery dating from Epoch 1A to possibly Epochs 3 and 4. These and other data suggest that Huaro was established prior to Pikillacta and may have served as the principal Wari center of the Cuzco region prior to and during the construction of Pikillacta. Epoch 1B and Epoch 2 pottery, that is Okros, Chakipampa, Viñaque, and Wamanga, was recovered from Qoripata and Hatun Ccotuyoc, interpreted to be, respectively, the administrative and domestic components of Huaro. The considerable quantity of classic Viñaque pottery at Qoripata suggests that this class of pottery was closely associated with political administration, in accordance with Menzel's (1964: 66–73) theory of Wari expansion. This, however, brings into question the lack of such pottery at Pikillacta, if the site functioned in an administrative capacity and was occupied well into Epochs 3 and 4.

From the Huaro site of Ccotocotuyoc we recovered ceramic evidence for a Wari presence in Cuzco following the abandonment of Pikillacta. Exploratory excavation of the site generated Wari style pottery from crude architecture stylistically similar to McEwan's Wari Type I room. Both Chakipampa and Okros pottery were found, as well as a new family of ceramic styles, which we refer to as Ccotocotuyoc. This style family exhibits Wari influence but also reflects characteristics of local ceramic styles, particularly the Late Intermediate Period pottery style Lucre. Since Pikillacta does not possess a Late Intermediate Period component, this intermingling of Wari Middle Horizon and local Late Intermediate Period pottery styles points to a Wari presence, or at least influence, in Cuzco that postdates Pikillacta's occupation.

Evidence for Wari activity dating to the first and second epoch of the Middle Horizon has been identified in Pomacanchi, located some 50 kilometers southeast of Pikillacta. There, at the site of K'ullupata, exploratory excavations by Wilbert San Roman (1979) revealed the presence of Wari and Wari-influenced pottery dating from Epoch 1A/1B to Epoch 2. Some of it appears to have comprised an offering cache which may have been deposited in stages, perhaps beginning in the first epoch, or made with the inclusion of heirlooms sometime during or after Epoch 2.

A Wari burial from this same region reported by Sergio Chávez (1985) dates roughly to a comparable period. While this site was not professionally excavated, Chávez's access to its contents permitted their formal analysis. The numerous metal ornaments, which represent the majority of grave goods from this burial, are decorated with imagery possibly dating from Epoch 1A to Epoch 3 (Chávez 1985: 180–185). The range of these dates suggests a similar deposition pattern as I suggest for the K'ullupata offering cache. The grave was either replenished at intervals with offerings or had been laid late in the Middle Horizon along with heirlooms reserved for the death of this special individual.

Evidence for Wari activity, contemporary with or possibly even postdating the occupation of Pikillacta, exists further southeast of Pomacanchi near Sicuani, located approximately 100 kilometers southeast of the Lucre Basin. At the site of Yanamancha, John Rowe (1956: 144) reported ceramic surface scatter of Wari "type" pottery, apparently relating to the Viñaque style. More recent inspections suggest an extensive Wari occupation (McEwan, personal communication 1996). This is not surprising in light of the fact that Sicuani is located along an old trade route, which connects Cuzco to the *altiplano*, the home of the Tiwanaku, a culture contemporaneous with the Wari. Evidence from Cuzco suggests that interaction took place between Wari and Tiwanaku society in the south Highlands, although this relationship remains unclear. Just west of Sicuani, Wari-related pottery has also been recovered at the site of Suyu (Nancy Roman and Piedad Zoriada, personal communication 1993; Rowe 1956: 144). Further research is needed to determine the exact nature of this southern Cuzco Wari presence.

Approximately 20 kilometers west and southwest of the Lucre Valley and Pikillacta is the Province of Paruro. Brian Bauer (1990, 1999: chaps. 1, 3), who has surveyed much of the region, recorded nine sites with Wari style pottery, although the percentage from each is extremely small. Much of Bauer's pottery, which I have examined, appears to be Okros or Okros-related, in common with Pikillacta pottery and suggesting the contemporaneity of these two sites.

One site, known as Muyu Roqo and also as site 432, stands out in Bauer's Paruro survey. Bauer's test excavations of the site revealed an unstratified deposition of pottery, particularly a high percentage of drinking vessels, mixed with a large quantity of camelid bone. These remains may be the result of ceremonial activity, which involved feasting and drinking. Bauer also recovered various classes of Wari-influenced and other Middle Horizon pottery not found at Pikillacta. Some examples exhibit Epoch 2 Viñaque designs, but a solid dating of this pottery is not possible at this time.

Other Wari sites, likewise thought to date to the occupation of Pikillacta, are believed to exist in the Oropesa Basin and probably also in the Cuzco Basin immediately northwest of the Lucre Basin. A few Wari sites have been reported in the Oropesa Basin, but there has been no formal research carried out to date. McEwan (1984: 189) has reported that architecture, possibly of Wari construction, can be seen above the Inca site of Tipón, located on the eastern edge of the basin, roughly midway to the Lucre Basin. Moreover, Ruben Orellana has reported finding fragments of Wuamanga style pottery in front of the town of Quispicanchis, located on the opposite side of the north-south highway from Tipón (McEwan, personal communication 1994).

At the valley's northwestern end, in the Basin of Cuzco, where the city of Cuzco is situated, evidence for Wari presence has been documented at a handful of sites. Subsequent construction, dating at least as early as Inca times, has likely destroyed or buried other such sites. The site of Aqomoqo possesses a Middle Horizon Wari component with uniquely good stratigraphy. According to its investigator, Hector Espinosa (1983), this component contains a ceramic style he refers to as "Wari Cusqueño," which is similar to Wari pottery recovered from the Province of Apurimac, west of Cuzco. And, as earlier discussed, the site of Araway (see Lyon 1978; Torres

1989) in the Cuzco Basin may have endured even after Pikillacta's demise.

No other sites with Middle Horizon components in the Cuzco Basin have been formally studied. Zapata (personal communication 1992) has recently identified a Wari-component site in the community of San Sebastian, located less than two kilometers southeast of the city of Cuzco, where local construction work revealed its presence. It is curious that the site of Coricancha, the former Inca Temple of the Sun, located in what is now downtown Cuzco, has as yet produced no Wari or Wari style pottery. Extensive excavation by the National Institute of Culture, headed by archaeologist Raymundo Bejar, revealed that this site was occupied during every phase of prehistory since the Early Horizon and even contains Middle Horizon Q'otakalli (non-Wari) pottery (Julinho Zapata, personal communication 1992). The Coricancha site seems to be an advantageous location, situated on high ground and bordered on one side by the river Tullumayo and on the other by the Saphi. Perhaps future excavations will reveal that Wari activity did, in fact, take place at this site. While continuous urbanization of the upper Cuzco Valley since the time of the Inca has limited the extent to which earlier phases of its occupation can be investigated, future research may shed light on this issue.

Northwest of the Cuzco Basin is the province of Anta, where sites with Wari components have been reported but no formal investigations have been realized. On the Pampa de Anta, two sites, one of which is called Fiero Wasi, were located by Cuzco archaeologist Italo Oberti and are said to contain Wari style pottery. North and northeast of Anta are the respective provinces of Urubamba and Calca, through which the Urubamba River runs. A lack of Wari sites in this area suggests that the Wari did not occupy it to any great extent. Ann Kendall (1976), who has done extensive work in the lower Urubamba river valley, particularly in the Cusichaca Valley, just north of Ollantaytambo (in the Province of Urubamba), has noted an almost complete absence of Wari style pottery but has identified crude-quality Q'otakalli pottery, which points to a Middle Horizon occupational phase.

Further northwest of Cuzco, following the Urubamba past the Inca site of Machu Picchu, begins Peru's southeastern jungle, which during pre-Columbian times was a likely source of trade for many Andean peoples. Whether the Wari penetrated this region with the intent of settling has not been explored. Poor preservation due to the moist climate of the tropical lowlands limits the extent to which such questions can be realistically addressed. In 1989, ethnohistorian Robert Randall reported evidence for the presence of prehistoric sites east and south of Machu Picchu. Wari style artifacts, including woven sashes with multicolor geometric designs, a metal *tupu* and another style of metal stick pin, various carved-bone implements and pan pipes, and two ceramic vessels (one lyre-shaped), had been recovered from a cave at an undisclosed location. Randall intended to identify the actual whereabouts of these sites but had not yet done so before his untimely death. Other members of the Pikillacta Project and I had been shown these objects by Randall at his home in Ollantaytambo.

Virtually no Middle Horizon research has been conducted north and east of Cuzco. Crosscutting this northeastern portion of the region is the stretch of the Urubamba, roughly between the towns of Pisac and Ollantaytambo, which is referred to as "el Valle Sagrado de los Incas" (the Sacred Valley of the Incas). It held great importance during the Late Horizon, especially to the Inca nobility who retreated there to escape the colder climate of Cuzco (Gade 1975: 19). The combination of soil, climate, and water has made this segment of the Urubamba/Vilcanota ideal for growing maize and, in terms of this cultigen, it is today considered the most agriculturally productive part of the valley (Gade 1975: 124). Considering how close this temperate zone is to the Lucre Basin, it would not be surprising

to find Wari sites located there, likely to have been established to help support the Greater Pikillacta population through farming efforts. Arminda Gibaja, archaeologist for the National Institute of Culture, has conducted excavations at the site of Pisac. She has revealed evidence for a possible Middle Horizon component in the form of Q'otakalli-like pottery (personal communication 1992).

The Temporal Parameters of Pikillacta and Cuzco in Summary

Drawing on Pikillacta radiocarbon dates and relative dating based on ceramic data from Pikillacta and other Wari and Wari-contemporary sites, the temporal parameters of Pikillacta and the Greater Wari Cuzco occupation have been assessed. A chronological scheme summarizing these results follows.

1. While some ceramic evidence exists in Cuzco for Wari activity during Epoch 1A (ca. A.D. 500–600), extensive Wari presence did not occur until Epoch 1B (ca. A.D. 600–700). At this time, the Wari began building Pikillacta, occupying it during its construction. This is supported by radiocarbon dates and a high percentage of Okros 1B style pottery from Pikillacta and the surrounding area.

2. During Epoch 1B until sometime in Epoch 2 (ca. A.D. 700–800), Pikillacta continued to be built and occupied. Its occupation probably was not intensive, or if it was, this occurred on a periodic basis. Sites supporting the operation of Pikillacta were established in the Lucre Basin, forming what McEwan refers to as "Greater Pikillacta."

3. While Pikillacta grew, other parts of Cuzco felt the impact of the Wari, marked by the presence of various Wari and Wari-influenced ceramic styles: Chakipampa, Okros, Plainware, Viñaque, Wamanga, blackwares, and decorated orange- and redware. Seventeen kilometers southeast of Cuzco in the Huaro Valley, the Wari had established what appears to have been their primary base of operation, from where the elites may have executed the construction of Pikillacta. Another major key center of Wari activity may have been Yanamancha near Sicuani, which may have served as a buffer against *altiplano* intruders or even as a trading post where the Wari and Tiwanaku interacted. In Pomacanchi, ceremonial caches and burials suggest that the Wari perpetuated their offering tradition in their Cuzco southern province. Although evidence for Wari activities northwest of Pikillacta has been obscured by urbanization of the Cuzco Basin and surrounding area, the Wari probably also occupied parts of this zone, likely at the height of activity at Huaro and Pikillacta.

4. Sometime during Epoch 2, but perhaps somewhat later, Wari activity at Pikillacta began to decrease. Construction of the site ceased and numerous doorways were sealed to prevent access to areas which had either fallen into disuse or were being reserved for later use. One unfinished structure appears to have been ceremonially sealed with a ceramic offering, perhaps signifying the final days of Pikillacta. This interpretation is based on the generally small quantity and isolated context of Wamanga style pottery, associated primarily with this structure, and the virtual absence at the site of Viñaque pottery.

5. Pikillacta was finally abandoned, although Wari activity in the Cuzco region may have persisted. The Cuzco Basin, northwest of Pikillacta, may have been inhabited by the Wari at this time. This is posited on the basis of the site of Araway, the type site of Wamanga style pottery. The Wari site of Azángaro, where Wamanga pottery is prevalent, is believed to have been built in Epoch 2 and to have endured into the third epoch (Anders 1991: 185, 194). This could be interpreted to suggest that Wamanga style pottery began being produced in Cuzco sometime during Epoch 2 with the introduction of Wamanga from Ayacucho. It may have continued in use

at various sites during the decline of Pikillacta and, perhaps, after its abandonment. The site of Ccotocotuyoc in the Huaro Valley may likewise represent a post-Pikillacta Wari occupation. Ccotocotuyoc pottery, which shares characteristics with Late Intermediate Cuzco ceramic styles, supports this view.

Conclusion

While the dating of Pikillacta can still only be broadly determined, chronological data reviewed and assessed in this chapter have offered some new perspectives on the occupation of the site and greater Wari Cuzco. Future research will surely bring us to a better understanding of the Wari southern province and its impressive administrative complex, Pikillacta.

8 Human Skeletal Remains from Pikillacta

JOHN W. VERANO

Human skeletal remains recovered from excavations at Pikillacta include four complete or partial skeletons and a cache of ten crania, as well as isolated skeletal elements recovered from various excavation units. The crania from the cache pit, excavated during the 1982 field season, have been described previously by Thomas and Brian Bauer (Bauer and Bauer 1987). During visits to Cuzco in 1989 and 1992, I was able to study four skeletons found during subsequent field seasons and examine three of the crania from the cache.

Tombs in the Southwest Perimeter Wall

Wall Tomb 1

Tomb 1 contained the skeletons of an adult male (Skeleton 1) and adult female (Skeleton 2). Skeleton 1 is an adult male, mostly complete except for some hand and foot bones. Age at death was estimated at 35 to 45 years based on the morphology of the pubic symphysis, sternal end of the fourth rib, dental attrition, cranial suture closure, and degenerative changes on the joints and vertebral bodies. Sex was determined on the basis of pelvic and cranial morphology. Maximum length of the left femur (405 millimeters) yielded an estimated living stature of approximately 158 centimeters, or 5 feet 2 inches, using Genovés's (1967) stature formulae.

Skeletal pathologies include degenerative changes on the left acromioclavicular joint (porosities and joint surface breakdown) and slight marginal lipping on the proximal ulnae and glenoid fossae of the scapulae. The third and fourth lumbar vertebral bodies have pronounced osteophytes; other vertebrae do not show degenerative changes. A large semicircular depression is present on the left maxilla below the orbital margin (fig. 8.1). It appears to be a well-healed depressed fracture from a blow to the face. The

8.1. Cranium of Tomb 1, Skeleton 1. A semicircular depression (arrow) is present on the body of the left maxilla.

cranium shows artificial cranial deformation in the form of angular flattening of the frontal and occipital squama (fig. 8.2).

Dental attrition is moderate, limited to patches of dentine exposure on the occlusal surfaces of the first molars and cusp-blunting of the second molars. The upper third molars appear to have been congenitally absent. Three teeth were lost antemortem and carious lesions are present on the distal interproximal surfaces of both lower second molars. There is pronounced alveolar resorption around the roots of the left first and second lower molars, suggesting periodontal disease.

Skeleton 2 is complete, although some vertebrae are poorly preserved and long bones were not complete enough to be used to calculate living stature. Age at death is estimated at approximately 35 to 50 years, based on morphology of the pubic symphysis and degenerative changes in the postcranial skeleton. Sex was determined by the presence of a well-defined preauricular sulcus and a wide greater sciatic notch.

Degenerative changes are present on the proximal and distal ends of the left radius, on the proximal end of the left ulna and capitulum of the left humerus. Lipping is present on the bodies of the tenth and twelfth thoracic and fifth lumbar vertebrae. The fifth lumbar vertebra also shows pronounced degenerative changes on the superior and inferior surfaces of the body. Dental pathology is limited to two carious lesions—an occlusal carie on the left upper second molar and a large cervical carie on the lower left third molar. Tooth wear is slightly more pronounced than in Skeleton 1, with more dentine exposure on the occlusal surfaces of the molar teeth. The cranium shows frontal flattening similar to that seen in Skeleton 1. The mandibular body of Skeleton 2 appears unusually thick and mas-

8.2. Left lateral view of the cranium of Tomb 1, Skeleton 1.

sive, but is otherwise normal in appearance. No other pathological conditions or anomalies were noted.

Wall Tomb 2

Tomb 2 contained the complete skeleton of a female, estimated between 17 and 20 years of age based on degree of epiphyseal closure. The following epiphyses showed incomplete union: the iliac crests and ischial tuberosities, distal femora, proximal tibiae and fibulae, the acromion processes of the scapulae, proximal humeri, and distal radii and ulnae. The basilar suture (sphenooccipital synchondrosis) is fully united, and the third molars had erupted and were in occlusion. Maximum length of the left femur (398 millimeters) yielded a living stature estimate of approximately 153 centimeters, or 5 feet. No dental pathology is present. Skeletal pathology includes deposits of unremodeled periosteal bone on the body and rami of the mandible — most pronounced on the medial surface of the left ascending ramus (fig. 8.3) — as well as on the body of the left maxilla. The cause of this periosteal reaction is unclear, although it may have resulted from an infection with a focus near the recently erupted left third molar. The left maxilla is noticeably swollen in comparison to the right maxilla (fig. 8.4). While this swelling could be associated with the inflammatory process, its appearance is more consistent with some form of long-term developmental asymmetry in the growth of the facial skeleton.

Partial Skeleton from Unit 49

In 1991 a partial skeleton was discovered in Unit 49. I was able to examine the remains in Cuzco

8.3 Individual from Wall Tomb 2, left ascending ramus of mandible with periosteal reaction (arrow).

in 1992. Present was the partial skeleton of an adolescent male approximately 16 to 18 years of age. Sex was determined by pelvic morphology; age on the basis of epiphyseal closure. The following epiphyses were united: distal femur, proximal tibia and fibula, distal radius and ulna, iliac crest, and ischial tuberosity. Epiphyses of the phalanges and metacarpals of the right hand and phalanges and metatarsals of the feet showed partial union. Bones missing include the cranium and mandible, the cervical vertebrae, and all of the bones of the left upper limb and shoulder girdle, including the scapula, humerus, radius, ulna, and hand bones. Curiously, examination of the remains did not reveal cut marks, fractures, or other indications of trauma to the skeleton that would be consistent with decapitation or dismemberment. It is difficult, therefore, to explain the absence of the left arm, skull, and neck vertebrae. Perhaps the remains are those of a partially decomposed body that was brought to this location for burial.

Crania from the Skull Cache

In 1992 I was able to examine three of the crania (Skulls 1, 2, and 3) from the skull cache that had previously been described by Bauer and Bauer. (A search for the other crania in the National Institute of Culture's storage facility was unsuccessful.) The results of my examination agree largely with the observations of Bauer and Bauer. Skull 1 shows slight cranial deformation, as noted by Bauer and Bauer. My age estimate for Skull 2—approximately 14 to 17 years—differs from their estimate of young adult. I based my assessment on calcification of the third molars rather than tooth eruption, and the teeth in question have complete crowns but no root development. I also noted a high frequency of lambdoid ossicles (sutural bones), some quite large, in the three skulls I examined. Bauer and Bauer classified all of these as "Inca bones." None that I observed would qualify, in my opinion, as a classic Inca bone, which is generally defined as a single

8.4. Individual from Wall Tomb 2, anterior view of the face showing swollen left maxilla (arrow).

large, roughly triangular ossicle whose terminal points are defined by Lambda and the left and right Asterion (Hauser and De Stefano 1989). In other details, however, we are in agreement, and Bauer and Bauer should be consulted for additional data, including skull measurements and observations on one skull that shows three healed trephinations.

Discussion

The human skeletal sample from Pikillacta is very small, but not atypical of highland Wari sites. Relatively few intact Wari burials have been excavated by archaeologists, and very little of this material has been studied and described beyond the level of assessment of age and sex. Even the most basic information on the physical characteristics and health of Wari populations is lacking, due to the small samples available and the lack of physical anthropological studies on material that has been excavated. From what is currently known, Wari mortuary behavior was complex—including primary and secondary interments of complete individuals and offerings of isolated skeletal elements, most commonly skulls. The significance of these different mortuary behaviors is unknown; interpretation is hampered by a small number of samples scattered across numerous sites, both in the highlands and on the coast. Highland Wari cemeteries are particularly elusive, and coastal Wari cemeteries have suffered intense looting and destruction.

Some general observations can be made on the skeletal remains recovered from Pikillacta. Examples of both deformed and undeformed crania are present in burials and in the skull cache. The presence of cranial deformation in some individuals but not others suggests either ethnic diversity or social differentiation in the skeletal sample at Pikillacta. The fact that both females and males are deformed suggests that this differentiation was not along gender lines,

but more likely a marker of group identity. Cranial deformation appears to have served as an important social identifier in Andean South America, differentiating groups along multiple axes (Hoshower et al. 1995). Unfortunately, given the small sample at Pikillacta, it is not possible to link cranial deformation with form of burial, associated grave goods, or inferred social status. At present one can only note that there is diversity in the practice of cranial deformation as evidenced by human remains from the site.

The pattern of dental pathology seen at Pikillacta — which is characterized by moderate dental wear and frequent caries — is what would be expected in an agriculturally based population consuming relatively soft and carbohydrate-rich foods such as corn and potatoes. The sample is too small to attempt generalizations about work or activity patterns on the basis of degenerative changes in the joints and vertebrae. The living stature estimate for the male burial in Tomb 1 (158 centimeters) is similar to mean statures reported for modern highland Peruvian Quechua males by Hurtado (1932) (N = 478, Mean = 159 centimeters) and Frisancho and Baker (1970) (N = 50, Mean = 160 centimeters). The stature estimate for the adolescent female in Tomb 2 (153 centimeters), however, is higher than mean statures for Quechua women (ranging from 146 to 150 centimeters) reported in other surveys (Stinson 1990: Table 1).

Clearly, more Middle Horizon skeletal remains need to be excavated and studied before any generalizations can be made about the physical characteristics and skeletal biology of the Wari people. The limited remains recovered from Pikillacta are nevertheless important in documenting, albeit in a limited way, mortuary and ritual practices and the physical remains they left behind.

9 Arsenic Bronze at Pikillacta

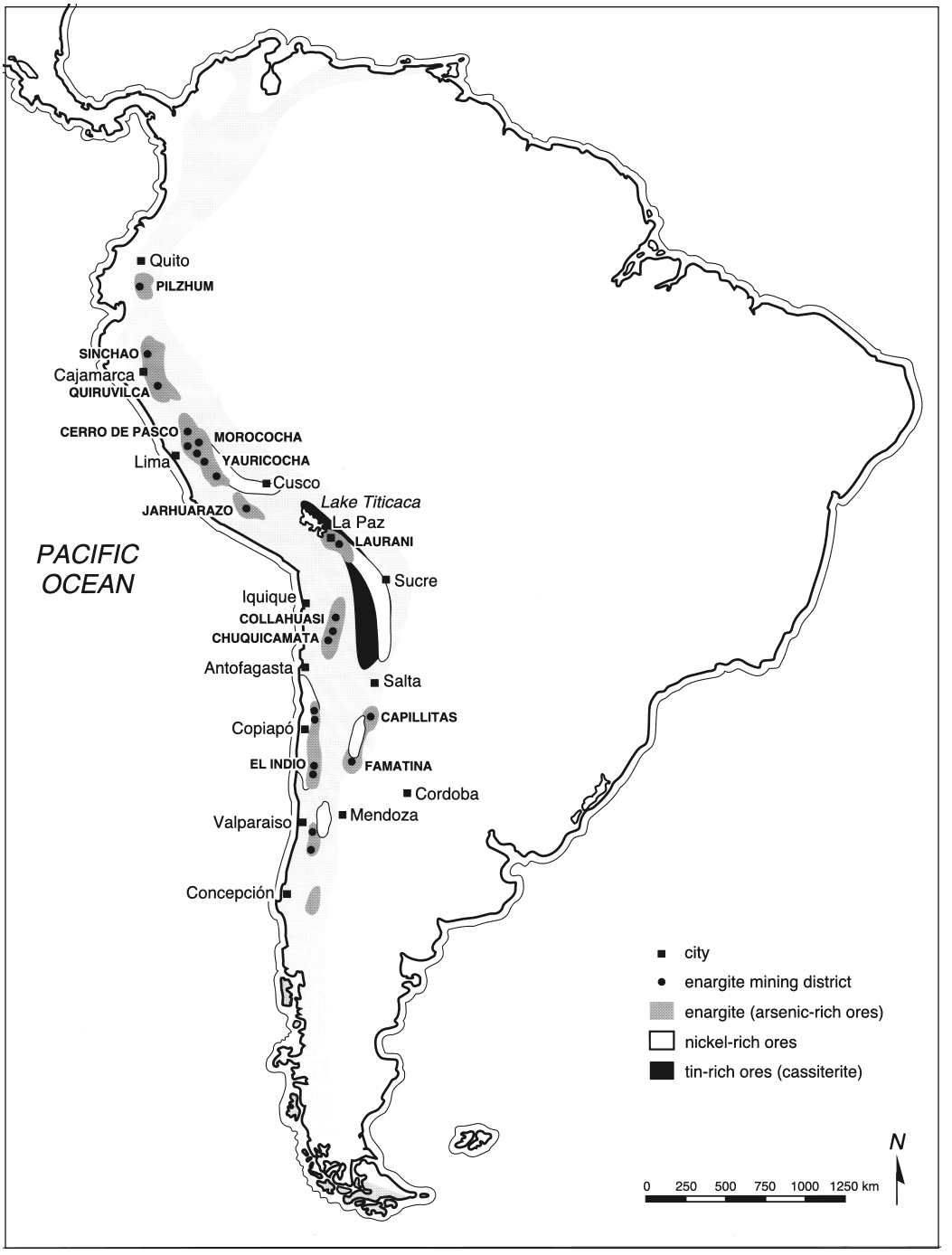
HEATHER LECHTMAN

Bronze and the Middle Horizon

Bronze in the Andean culture area was a Middle Horizon phenomenon (Lechtman 1997, 1999). Between about A.D. 600 and 1000, several bronze alloys were developed and used in the extensive region covering present-day Ecuador, in the north, to northern Chile and northwest Argentina, in the south. Thus far we have identified three types of Andean bronze alloy in objects produced during this period: arsenic bronze (the binary alloy of copper and arsenic), tin bronze (the binary alloy of copper and tin), and a ternary bronze alloy containing copper, arsenic, and nickel. I define arsenic bronze as an alloy of copper containing 0.5 weight-percent or more of arsenic. For a full discussion of the terms arsenical copper, low arsenic copper-arsenic alloy, and arsenic bronze, see Hosler, Lechtman, and Holm (1990).

Each variety of bronze was made and used within a circumscribed geographic area. Artifacts of arsenic bronze occur primarily in the central and north-central Andes, from Ecuador to southern Peru. Tin bronze objects appear in Bolivia and northwest Argentina but are not found north of the southern limit of Lake Titicaca. Objects made from the unusual ternary bronze alloy appear to be confined to a limited zone, bounded on the north by the site Tiwanaku (Lake Titicaca) and on the south by the site San Pedro de Atacama (northern Chile) (Lechtman 1997, 1999).

During the Middle Horizon, the kind of bronze alloy produced within a given region bore close relation to the ore mineralogy of the region. The map in figure 9.1 locates the major deposits of arsenic-rich, tin-rich, and nickel-rich ores in the territory dominated by the Andes mountain chain. Figure 9.1 also identifies the major mining districts along the belt of dense enargite (Cu_3AsS_4) deposits that stretches from Pilzhum in Ecuador to the southern borders of Peru. This belt contains massive and some of the richest deposits of copper sulfarsenide ore mineral found anywhere in the world. The most southerly, major deposit of enargite occurs at Laurani, just south of Tiwanaku and La Paz, in Bolivia. Enargite deposits in Chile and Argentina



9.1. The major zones of arsenic-rich, nickel-rich, and tin-rich mineralization in the northern, central, and southern Andes; the principal enargite mining districts are identified (after Petersen 1989).

are much smaller and occur sporadically. Since enargite is a sulfarsenide of copper, containing both copper and arsenic in the mineral structure, smelting enargite ore or its weathered products yields copper-arsenic alloys directly and automatically in the furnace (Lechtman and Klein 1999). The mineral may have been mixed with copper ore and the mixture charged into the smelting furnace (see Merkel et al. 1994; Lechtman and Klein 1999). Middle Horizon metalworkers, from Moquegua to Quito, had abundant and accessible supplies of this ore. Thus Middle Horizon bronze from the central Andean zone is arsenic bronze (Lechtman 1999, 2003a). Arsenopyrite (FeAsS) ores may also have provided a source of arsenic in the production of arsenic bronze.

People living on the Bolivian *altiplano* and in the high sierra of northwest Argentina during the Middle Horizon exploited the rich cassiterite (SnO_2) deposits found in the far south of Peru (along the southwestern shores of Lake Titicaca), in northern Bolivia, and in northwest Argentina. The Bolivian tin fields shown on the map in figure 9.1 are the only significant source of tin in the Andean region and constitute one of the world's richest cassiterite deposits. They supplied the tin used in the production of tin bronze during the Middle Horizon and in the periods that followed, the Late Intermediate Period and the Late Horizon (Inca hegemony). Middle Horizon tin bronze artifacts have not been found north of Lake Titicaca. They cluster in the region where tin ores were readily available and where the alloy was produced.

The ore sources that provided nickel for the Middle Horizon ternary bronzes remain a puzzle. The central Andes do not provide a favorable geological setting for nickel deposits, and nickel minerals are extremely rare throughout the Andean area. The Peruvian deposits shown in figure 9.1 occur on the eastern slopes of the mountain range. They are small in scale and tend to be located at altitudes below 3,000 meters, in zones of dense vegetation. They are unlikely to have been discernible or easily accessible to early miners. Figure 9.1 suggests that nickel ores are far more plentiful in the Bolvian highlands, in northwest Argentina, and on the Chilean coast. The map plots the general location and extent of ore deposits but does not indicate their size, depth, or richness. In fact, the nickel deposits are extremely small in size and are distributed sporadically.

Nevertheless, approximately 80 percent of the copper and copper alloy artifacts excavated at Tiwanaku from Late Tiwanaku IV contexts (ca. A.D. 400–800) are made of the ternary bronze, and 50 percent of those that date to Late IV–Early V (ca. A.D. 600–900) are also made of the alloy (Lechtman 1999, 2003b). A considerable number of ternary bronze artifacts has been uncovered at San Pedro de Atacama, the oasis site in the high Atacama desert of northern Chile (Lechtman 1997, 2003c), and a few have been excavated at sites in the Moquegua Valley, on the far south coast of Peru, that were distant colonies established by Tiwanaku and Wari (Lechtman 2003a).

Although we still do not know what types of ore contributed nickel-bearing minerals to the ternary bronzes, nor do we know where such ores originated, the map in figure 9.1 suggests that the minerals probably derived from the region between La Paz in Bolivia and Taltal (south of Antofagasta) in Chile. The map makes plain that the geological occurrences of nickel ores in the Andean region coincide with the distribution of artifacts made from the ternary copper-arsenic-nickel alloy. Thus far, such artifacts have not been found outside this zone, except for a single example at Pikillacta, discussed subsequently.

The three types of bronze produced during the Middle Horizon are highly correlated with the geological occurrence of specific ore minerals and, consequently, with specific geographic regions. Bronze artifacts of any particular alloy type are rarely if ever found outside the primary region of production for that alloy.

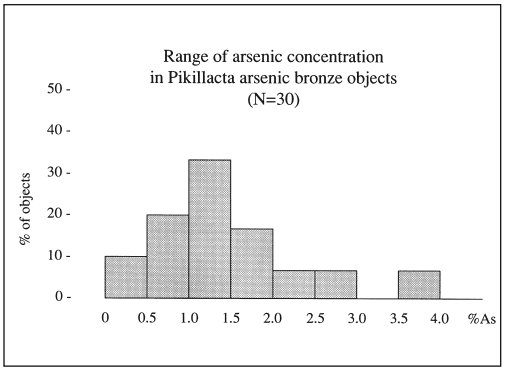
The 1989 Metal Corpus at Pikillacta

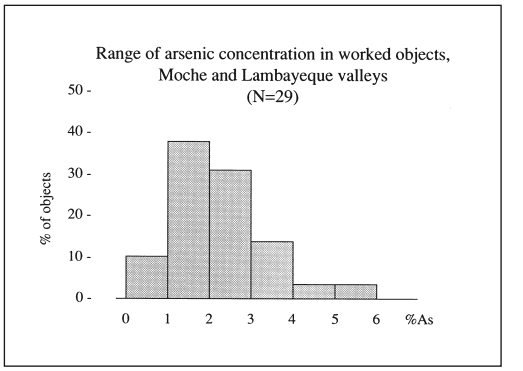
All the metal artifacts excavated in 1989 come from Sectors 2 and 3 at Pikillacta and include Excavation Units 34, 37, 39, 40, 43, and 44. These objects date to Middle Horizon Epoch 1B-3, corresponding roughly to A.D. 600–1000. According to Gordon McEwan, the construction sequence of the architecture indicates that Sector 2 was built considerably before the others; it was followed by Sectors 1, 4, and 3, in that order. In terms of the metal artifacts considered here, Units 37 and 43 are likely the earliest, and the material from Unit 34 is probably the latest.

The total inventory of metal artifacts excavated at Pikillacta during the 1989 field season consists of approximately 50 items. The total number of artifacts is approximate, since some are small fragments of metal. Thirty (60 percent of the total) were studied in the laboratory. Of these, all but one are made from impure copper, from a low arsenic copper-arsenic alloy, or from arsenic bronze; the one exception is an item made from the ternary (Cu-As-Ni) bronze alloy. Of the 30 artifacts whose chemical composition is given in the accompanying table, 26 of them (86.7 percent) are made from arsenic bronze. The arsenic concentration in these artifacts ranges from 0.57 to 3.51 weight-percent of the alloy. Two Type 1 needles (MIT 3932, 3948) and one Type 1 *tupu* (a woman's shawl pin; MIT 3946) contain less than 0.5 percent arsenic: MIT 3946 and 3948 are low arsenic copper-arsenic alloys; MIT 3932 is an impure copper. The pointed stem or shaft from what appears to have been a pin, perhaps a *tupu* (MIT 3945), is the single artifact in the study collection made from a ternary bronze; it contains 3.90 percent arsenic and 3.44 percent nickel. None of the Pikillacta objects is made of tin bronze.

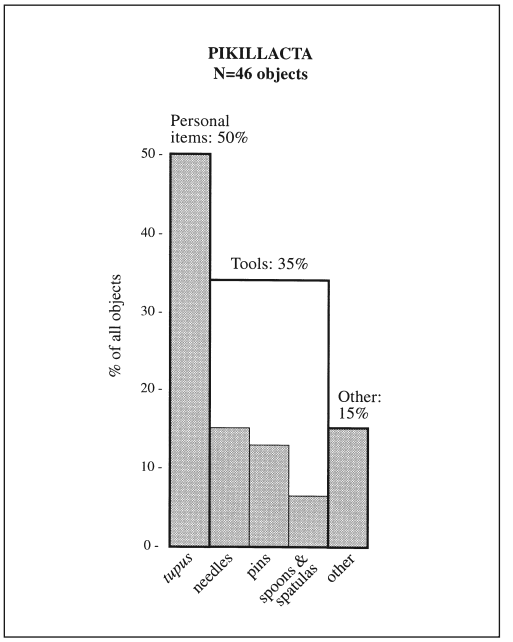
The histogram at the left in figure 9.2 illustrates the frequency with which the arsenic bronze artifacts occur throughout the total range of alloys encountered. One-third of the bronzes fall within the 1–1.5 percent arsenic range; close to one-fourth (23.4 percent) contain between 1.5 and 2.5 percent arsenic, and one-fifth (20 percent) are at the low end, with between 0.5 and 1.0% arsenic. That 86.7 percent of all metal artifacts are made from arsenic bronze is not surprising, as both Wari and Pikillacta lie along the major highland enargite belt of the central *cordillera* (see fig. 9.1). The site of Wari is located just east of the large and rich enargite deposit at Julcani (Petersen 1989; Lechtman 1991). In addition, at arsenic concentration levels between about 1 and 3 weight-percent — the alloy range represented by the majority of central Andean, including Pikillacta, artifacts — measurement of the hardness and tensile strength of the bronzes shows a considerable increase in these properties over those of unalloyed copper (Lechtman 1996). The arsenic bronzes are highly ductile and easily hammered into thin sheet and rod, the preferred forms of stock material from which most central Andean objects in metal were fashioned.

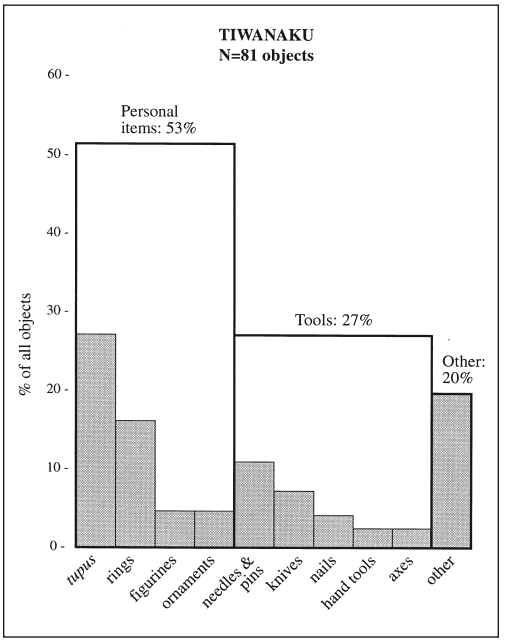
The concentration of arsenic in the Pikillacta bronzes and the frequency distribution of the alloys, as shown in the left histogram of figure 9.2, closely match compositional data obtained from artifacts produced at Batán Grande and other north coast Peruvian sites, as represented by the histogram at the right in figure 9.2 (Lechtman 1991; Vetter et al. 1997). In the latter, the shift in arsenic concentration toward higher values of arsenic, particularly in the composition range between 2 and 3 weight-percent, occurs primarily because the histogram of north coast Peruvian artifacts includes a large number of agricultural points from the site of Batán Grande (Lechtman 1981; Vetter et al. 1997). These items, products of the large-scale arsenic bronze smelting industry at Batán Grande, are made from alloys that tend to contain between 2 and 3 weight-percent arsenic. The right figure 9.2 histogram also includes some late Middle Horizon and early Early Intermediate Period artifacts. The Pikillacta arsenic composition profile presented in the left histogram of figure 9.2 typifies central Andean arsenic bronze manufactured during the Middle Horizon and may be considered a representative prototype of the range of alloys commonly produced.





9.2. Histograms showing (left) the range of arsenic concentration determined upon analysis of 30 bronze artifacts from Pikillacta, and (right) the range of arsenic concentration determined upon analysis of 29 bronze artifacts from Peruvian north coast sites during the Middle Horizon and Late Intermediate Period (after Lechtman 1981; Vetter et al. 1997).





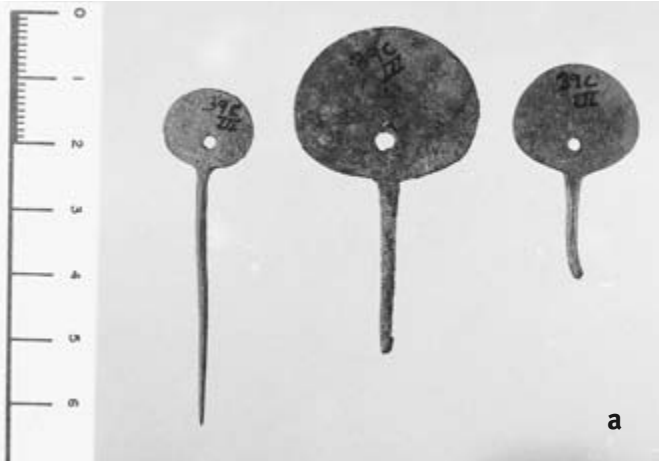
9.3. Histograms showing the relative proportions of personal items and tools in the metal (copper and copper alloy) inventories from Pikillacta and Tiwanaku.

The Artifacts

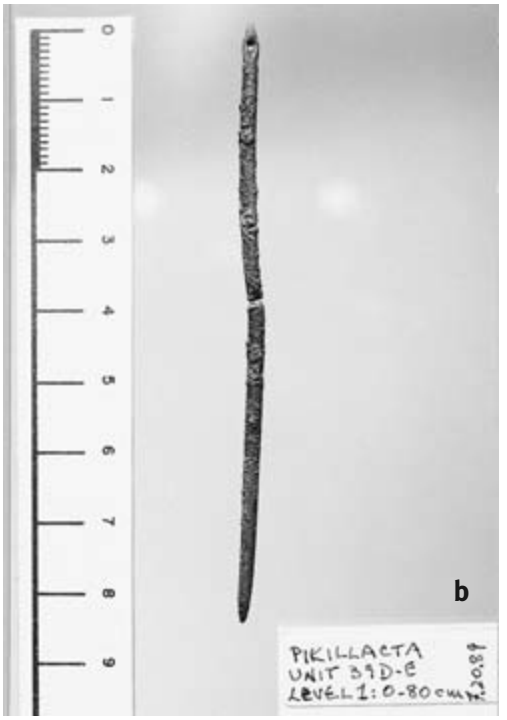
The Pikillacta metal inventory presents a narrow range of object types, recorded in figure 9.3 (Lechtman 2003a). Half of these are personal items, primarily *tupus*. Small tools, such as needles and spatulas, constitute 35 percent of the corpus, and 15 percent represent assorted fragmentary items that are unidentified as to function. Figures 9.4 and 9.5a illustrate *tupu* Types 1 and 2, distinguished by their characteristic head shape; needle Types 1 and 2, with different eye-and-eyehole configurations, appear in figures 9.5b and 9.5c; and several spatula- and spoon-like items are shown in figures 9.5c, 9.5d, and 9.5e.

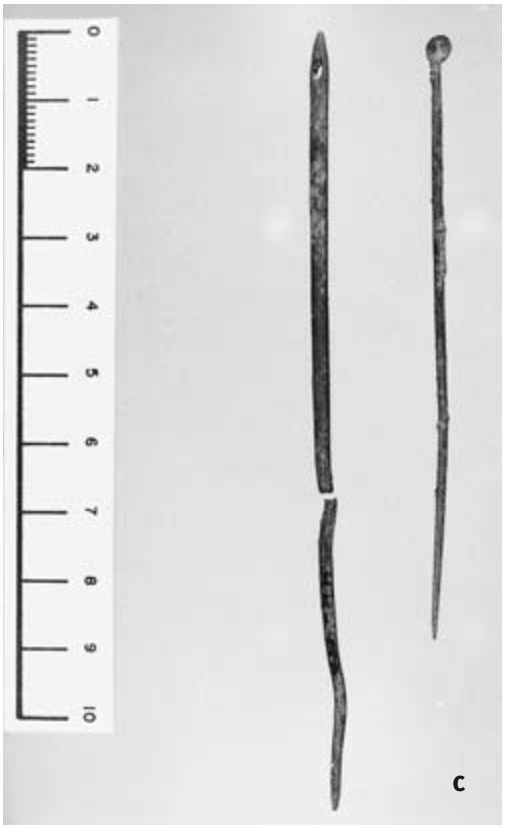
Comparison of the Pikillacta metal collec-

9.4. Pikillacta Type 1 *tupus*: left, MIT 3943; right: intact, unsampled *tupu*.

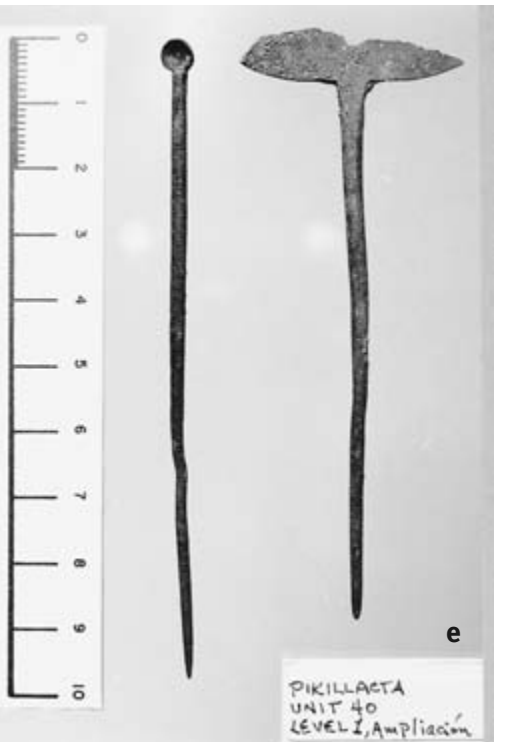


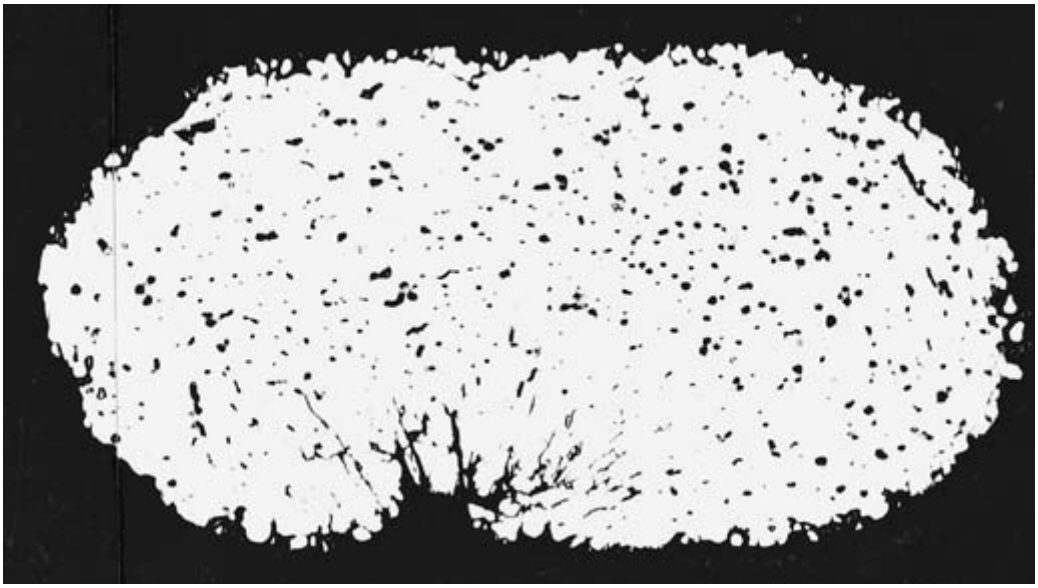
9.5. (a, above) Pikillacta Type 2 *tupus*: left, intact and unsampled *tupu*; middle, MIT 3926; right, MIT 3927; (b, facing page) Pikillacta Type 1 pierced-eye needle (MIT 3932); (c, facing page) Pikillacta Type 2 pierced-eye needle (MIT 3950), at left; spoon-like object, at right; (d, facing page) Pikillacta spatula; (e, facing page) spoon-like object, at left; broken Type 2 *tupu* (MIT 3937), at right.


b
PIKILLACTA
UNIT 39D-E
LEVEL 1: 0-80cm
2089


c


d
PIKILLACTA
UNIT 44 8.7.89
LEVEL 2: 30-60 cm


e
PIKILLACTA
UNIT 40
LEVEL I, Ampliación



9.6. Photomicrograph of a transverse section through the stem of a Type 2 *tupu* (MIT 3933) at the location where the stem meets the head. The direction of metal flow, as the round stem was flattened to an oblong section, is indicated by the slightly elongated and oriented pores and inclusions. The surface cavity at the center of one long side of the section formed as the metal from the short sides was hammered in towards the center. Mag.: 50; as polished.

tion with the larger but roughly coeval group of bronze objects excavated at Tiwanaku (see fig. 9.3) reveals a remarkable similarity in the distribution, by function, of the bronze objects that people in these two centers used regularly (Lechtman 2003a, 2003b). This is so in spite of the differences in bronze alloy represented at each city: arsenic bronze at Pikillacta, the ternary bronze alloy and tin bronze at Tiwanaku. In both cities personal items account for half of all the bronzes in the collections studied; small tools represent about 30 percent of the bronze inventory. The much wider variety of artifact types, both personal items and tools, is to be expected at Tiwanaku, the capital city. In general, objects at both centers are small in size, most are worked to shape (a few of the Tiwanaku items are cast; see Lechtman 2003b), and the overall volume of metal entailed in their production is modest.

In view of the small number of spatulate and spoon-like objects in the Pikillacta collection and their intact condition, they were not sampled for chemical or metallographic analysis. Study of the manufacturing technology characteristic of Pikillacta metal items focuses on the *tupus* and needles, the two most abundant artifact classes in the corpus.

TUPUS. Type 2 *tupus*, with circular or oval heads and a small hole for fastening (figure 9.5a), are typical of Wari style women's shawl pins. This variety of *tupu*, found throughout the central Andean area during the Middle Horizon (Owen 1987), continued in common use there by the Inca, who made the decorative pins in silver and gold in addition to copper and copper alloys (Bingham 1979; Reinhard 1992, 1996).

The nine examples of Type 2 *tupus* whose chemical compositions are reported in the table on page 146 are all arsenic bronzes. Arsenic concentration ranges from 0.82 to 3.51 weight-percent, with an average value of 1.74 percent arsenic in the alloy. Each *tupu* is made from a single piece of metal. In keeping with central Andean metalworking practice, the pointed stem or shaft was hammered from a solid bar, to assume a

circular cross section. The photomicrograph in figure 9.6 represents a transverse cross section cut through the flattened upper end of a Type 2 *tupu* stem, where the stem grades into the thin, flat head. The presence of equiaxed grains and annealing twins in the metallic microstructure at this location indicates that the metal was left in a fully annealed condition after the stem had been hammered to shape.

The thin, flat heads of Type 2 *tupus* are outfitted with a small hole at the base of the head to facilitate fastening the pin to cloth or joining it to a matching pin (*tupu* fasteners were often designed to function as a pair). Metallographic examination of the microstructure of a transverse section cut through the head and hole of *tupu* MIT 3936 revealed bending or dragging of the metal along the edge of the hole; the presence at the edge of equiaxed grains with annealing twins, considerably smaller in size than the grains in the body of the section; and the presence of deformation lines within the tiny edge grains. These features indicate that the hole was punched (not cut or drilled) through the thin metal, from one side. Later the hole was reamed out from the opposite side to remove the burr left by the punch.

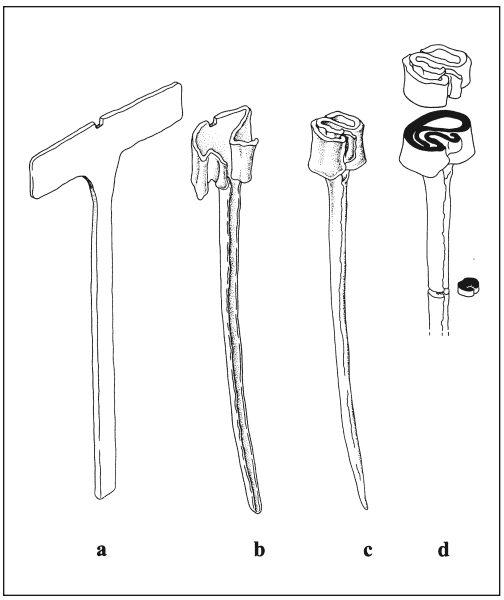
Type 1 *tupus* may not be decorative shawl pins. I designate them *tupus* because they have a round, pointed stem or shaft and a fancy head (fig. 9.4). These objects do not appear to be small hand tools. None of them shows signs of having been hafted, and the head is not designed mechanically for hafting. The diagram in figure 9.7 reconstructs the process used to fashion Type 1 *tupus* and is based on transverse metallographic sections removed from the head and shaft (see fig. 9.8) of *tupu* MIT 3943, illustrated in figure 9.4.

The average alloy composition of the five Type 1 *tupus* analyzed and reported in the table contains 1.04 weight-percent arsenic (the compositions range from 0.42 to 1.80 percent As), far lower than the average of 1.74% arsenic for the Type 2 *tupus*. Not only is the Type 1 arsenic bronze inherently softer than the Type 2 bronze, but metallographic examination indicates that the shafts of the Type 1 objects were left in an annealed condition. They were not deliberately work-hardened, which they presumably would have been had these objects been destined for use as awls or similar piercing or punch-like instruments. Neither the form nor the material properties of these items suggests that they are hand tools.

The unusual Type 1 *tupu* form has also been reported from Conchopata (Ayacucho), near Wari (Rios 1987). At Pikillacta, Type 1 *tupus* have been excavated in Sectors 2 and 3, in some of the earliest and in the latest levels. One Type 1 *tupu* was found in association with a Type 2 variety (Sector 2, Unit 43-A3). Type 1 *tupus* exhibit a narrow range of sizes. They tend to be short; six Type 1 pins range in length from 4.79 to 7.35 centimeters, with an average of 6.2 centimeters. By contrast, the Type 2 *tupus* fall into two size groups: miniatures (4 items; length range, 3.21–4.09 centimeters) and normals (7 items; length range, 5.20–≈11.2 centimeters). Both Pikillacta *tupu* types are different and readily distinguished from Middle Horizon *tupus* excavated at Tiwanaku (Lechtman 1997, 2003b).

NEEDLES. Needles constitute the most abundant class of Middle Horizon tools excavated at Pikillacta and Tiwanaku (see figs. 9.5b and 9.5c). Used presumably in cloth production, needles merit close examination. Their form may indicate a specific function in cloth manufacture. In addition, the shape of and technique for producing the eye and eyehole can suggest the geographic distribution of particular ways of handling fibers and thread, as Hosler (1988, 1994) has shown for a loop-eye needle type introduced from the northern Andes to west Mexico. The Tiwanaku metal artifacts I have studied derive from excavations carried out at the site between 1986 and 1991 (Lechtman 2003b). The excavations were co-directed by Oswaldo Rivera S. and Alan Kolata.

Pikillacta Type 1 pierced-eye needles (fig. 9.5b) are common at the site but have not been found at Tiwanaku. Pikillacta Type 2 pierced-eye needles (fig. 9.5c) are rare at the site but common at

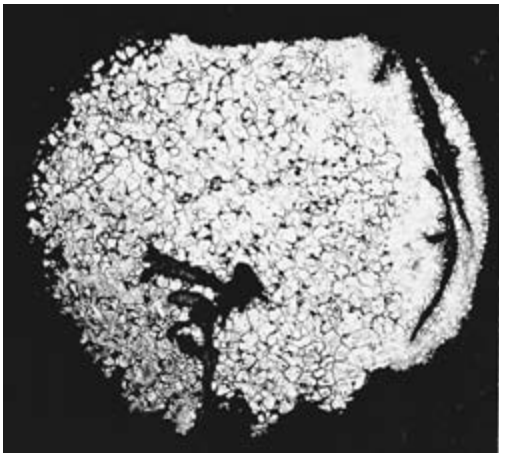


9.7. Diagram indicating the sequence of smithing steps in the fabrication of Pikillacta Type 1 *tupus* such as those illustrated in figure 9.4: (a) the general form is hammered from a thin metal bar; the metal reserved for the head is hammered thinner than that for the stem; (b) the round stem is formed by hammering the two edges of the bar in towards the central stem axis, rotating the stem during hammering to produce a rounded contour; the head takes shape by bending the thin metal sheet; (c) the stem is hammered closed, its walls encircling a long, central fissure; the head is completed; (d) the drawing indicates the location of the transverse cross sections cut through the stem and head of Pikillacta Type 1 *tupu* MIT 3943, illustrated in figure 9.4. A photomicrograph of the entire stem section is reproduced in figure 9.8. Drawing by S. Whitney Powell.

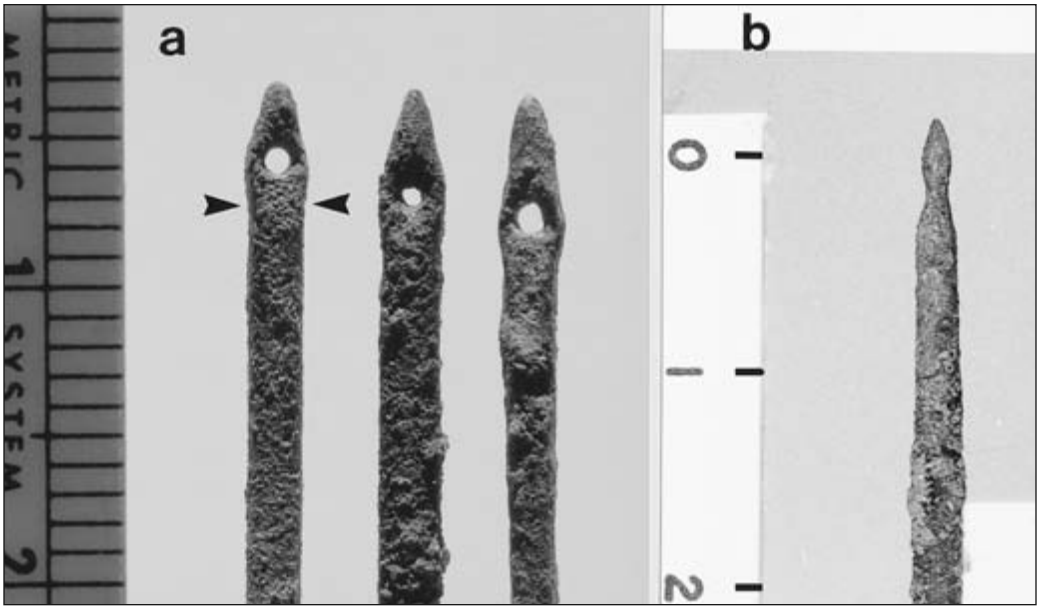
Tiwanaku. Type 1 needles range in length from 5.1 to 8.8 centimeters, with an average of 7.5 centimeters. Several are curved. The arsenic concentration in the four Pikillacta Type 1 needles analyzed and reported in the table ranges from 0.08 to 1.61 weight-percent; the single Type 2 needle alloy contains 0.82 percent arsenic. There appears to have been little discrimination with respect to the alloy chosen for needle manufacture. Since metallographic examination of both needle types indicates the needles were left in an annealed condition, we can assume that these Pikillacta needles did not have to be strong or rigid to serve their function. The enhanced mechanical properties conferred by arsenic bronze over those of unalloyed copper (see Lechtman 1996) were not utilized for these tools.

The Type 1 needle eye is characterized by a long, pointed end and a markedly flattened head (fig. 9.9a, b). A transverse section cut through needle MIT 3931, at the transition zone between the round stem and the flattened eye (see fig. 9.9a), is illustrated in the photomicrograph of figure 9.10. The large, equiaxed grains and annealing twins present in the microstructure at this location indicate that the needle eye was not worked (hammered) subsequent to the anneal that took place as the final operation in shaping the needle. Once the eye region had been hammered flat, the eyehole was punched out with a sharp tool, from one side only. The microstructure shows no indication that the eyehole was cut with a drill. Rather, the presence of small, equiaxed grains along the edges of the eyehole and in the metal remaining in front of the advancing tool provides strong evidence that a sharp punch was forced through the metal from the front side of the eye. Figure 9.12b illustrates a section through the completed eyehole.

The single Type 2 needle examined in the laboratory (MIT 3950, fig. 9.5c, left) is made from arsenic bronze; it measures 11.1 centimeters in length. The eye and eyehole configuration (fig. 9.11a) closely resemble those of a needle made from the ternary bronze alloy and excavated in the Putuni sector at Tiwanku (fig. 9.11b) (see Lechtman 2003b: MIT 3971). In both examples, the eye end of the round needle shaft was flattened. A sharp punch pierced the flattened eye from one side only, to form the eyehole. At the same time, an area just below the eyehole was gouged out, providing a shallow groove or channel that communicates between eyehole and shaft. Finally, the two lateral sides of the flat-



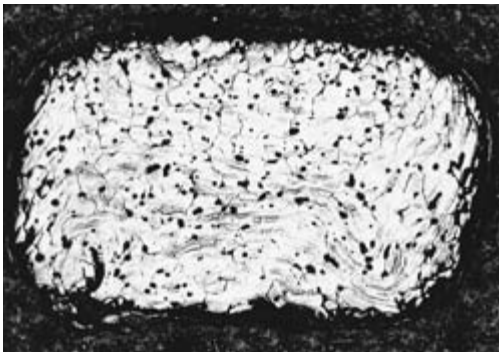
9.8. Photomicrograph of a transverse section through the stem of *tupu* MIT 3943 at the location shown in figure 9.7d. The etched section exhibits a prominent centerline fissure and large, equiaxed grains. The microstructure near the central fissure is characterized by large, equiaxed grains with annealing twins. Mag.: 40; Etchant: $K_2Cr_2O_7 + HCl + FeCl_3$.



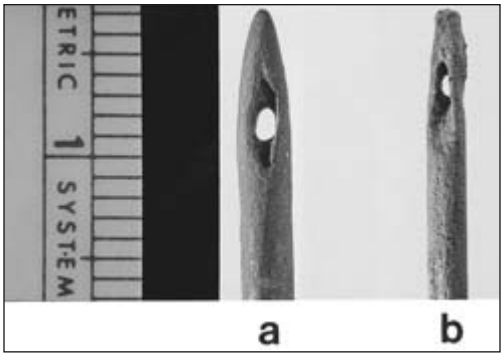
9.9. (a) Front view of the eye end of three Pikillacta Type 1 pierced-eye needles: left, MIT 3931; middle, MIT 3932; right, MIT 3944. Arrows indicate the location of a transverse section cut through the eye of needle MIT 3931. MIT 3944 is a curved needle. (b) Side view of the middle needle, MIT 3932, at a slightly lower magnification. Note the flatness and thinness of the eye in comparison with the shaft of the needle.

tened eye were hammered in toward the central axis of the needle, to produce an eye with an oval cross section. The groove undoubtedly served to guide the thread as it passed into the eyehole, just as such channels do in modern, factory-made steel needles.

The photomicrograph in figure 9.12a shows a cross section through the eyehole of the Pikillacta Type 2 needle. The gouged-out area in front of the eyehole is considerably wider than the diameter of the hole itself. Flow lines indicate the direction of movement of the metal as the side walls were hammered in toward the axis of the shaft to narrow and enclose the cavity at the front of the needle. In a more highly magnified examination of the right-hand edge of the eyehole, the etched microstructure along the edge was found to exhibit a dense zone of small,



9.10. Photomicrograph of a transverse section through the eye of Type 1 needle, MIT 3931 at the location indicated in figure 9.9a. The round needle stem has been flattened to fashion the eye; the resultant section is almost rectangular. The microstructure exhibits large, equiaxed grains with annealing twins. Mag.: 50; Etchant: $K_2Cr_2O_7 + HCl + Fe(NO_3)_3 \cdot 9H_2O$.



9.11. Details of the eye end of two pierced-eye needles: (a) Pikillacta Type 2 pierced-eye needle MIT 3950; (b) needle excavated at the Putuni sector at Tiwanaku, MIT 3971. The eyehole was made in the same way in both needles.

equiaxed grains with annealing twins. The much smaller size of these edge grains in comparison with those in the interior of the metal are evidence that the metal bordering the hole was deformed by the tool that pierced the eye. A drill or a hard and sharp-bladed tool would have cut through the metal without deforming it.

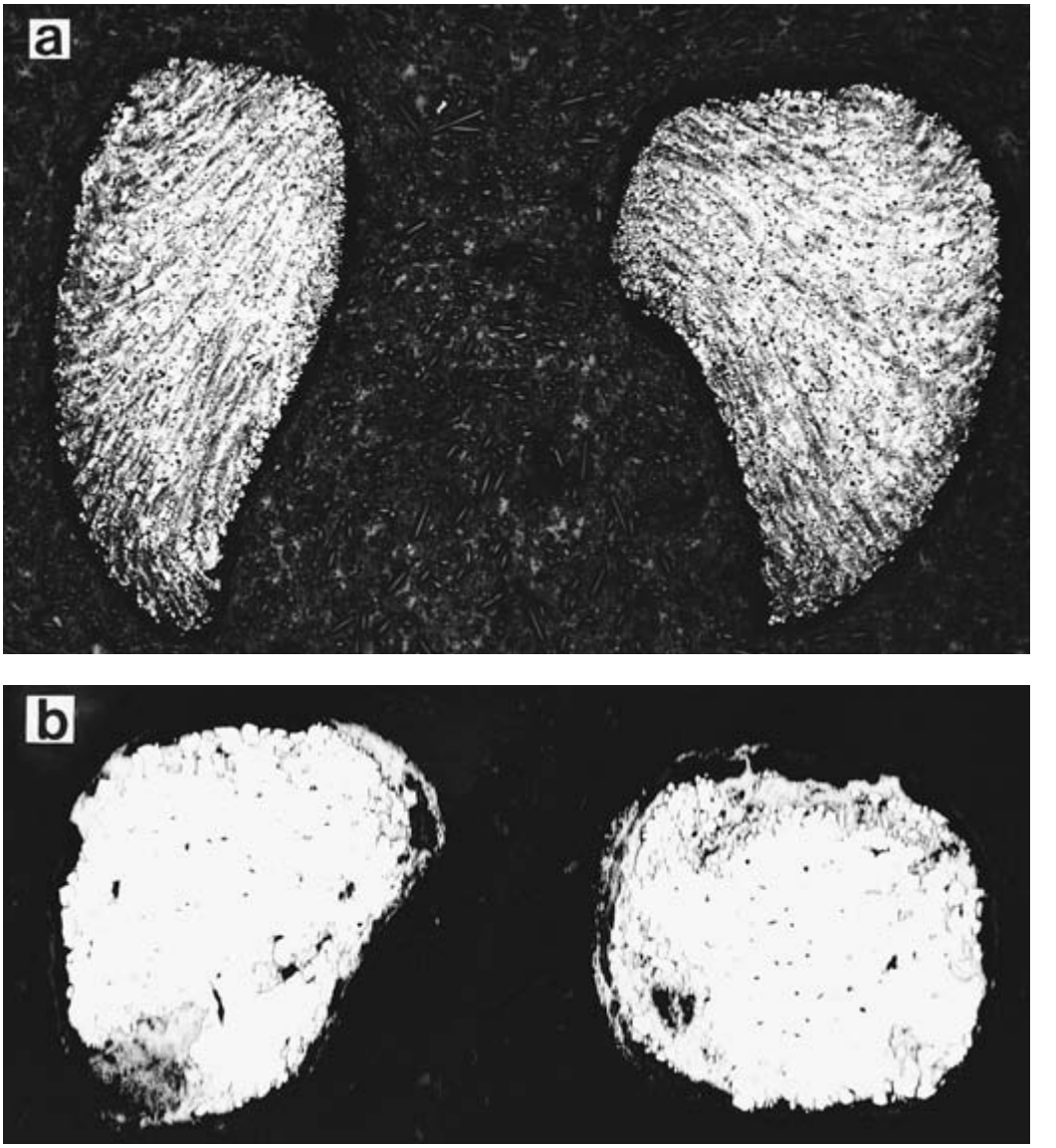
Tupus, though items of personal adornment, can also be considered tools. They fasten the overlapping edges of women's shawls. *Tupus* and needles are stemmed tools. At Pikillacta, excepting the *tupu* head and needle eye, these objects share similarities of form and manufacture. They are fashioned from copper-arsenic alloys, hammered to shape from thin bars of metal, and left in the annealed condition. They were not hard, strong tools but would have exhibited considerable resiliency, a useful property for a straight pin or a straight or curved needle.

Pikillacta and Moquegua Valley Colonies

The table of artifact compositions indicates that a single item in the Pikillacta metal inventory, the pointed shaft from what appears to have been a *tupu* (MIT 3945), is made from the ternary bronze alloy, with high concentrations of arsenic (3.90 percent) and nickel (3.44 percent). It is highly unlikely that this object was the product of central Andean metallurgy. It was undoubtedly made somewhere south of Lake Titicaca, in that region of Tiwanaku influence from which all other ternary bronze objects known so far derived. The object was brought to Pikillacta, perhaps via the distant Wari colony at Cerro Baúl, a mid-valley site in the Osmore drainage (Moquegua Valley), near the southern border of present-day Peru.

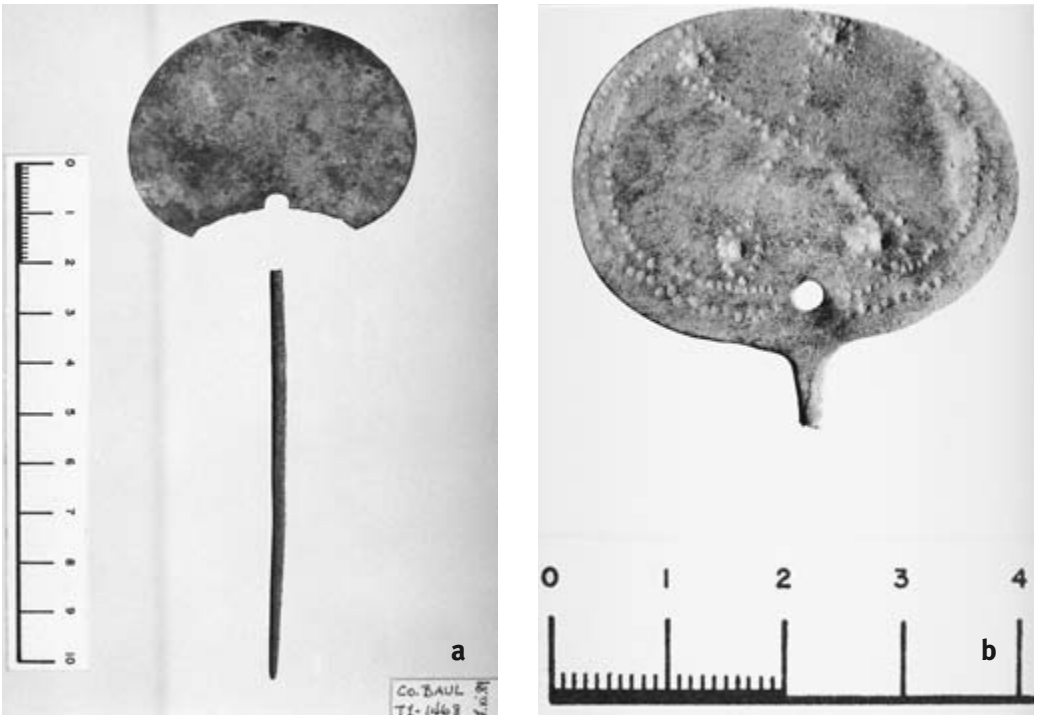
Approximately 20 kilometers downstream from Cerro Baúl lay the Omo site complex, a Tiwanaku colony of *altiplano* settlers which, by about A.D. 750, had developed into something akin to a Tiwanaku imperial province, under the direct control of the capital (Goldstein 1989; Moseley 1992; Moseley et al. 1991). Cerro Baúl, by contrast, was an elaborately fortified, intrusive Wari colony, situated deep within Tiwanaku territory.

The metal assemblages at the two colonized Moquegua Valley sites generally fit the patterns established for objects from Pikillacta and Tiwanaku, the large Middle Horizon centers within whose spheres of influence the colo-



9.12. (a) Photomicrograph of a transverse section through the eyehole of Pikillacta Type 2 pierced-eye needle MIT 3950 (fig. 9.11a). [Mag.: 41; Etchant: $FeCl_3$]. A comparison of this cross section with (b) the eyehole section of Type 1 needle MIT 3931 (fig. 9.9a) [Mag: 50; as polished], shows the difference between a hole located deep inside a prepared, internal cavity (Type 2) and a hole punched directly through a flattened eye (Type 1).

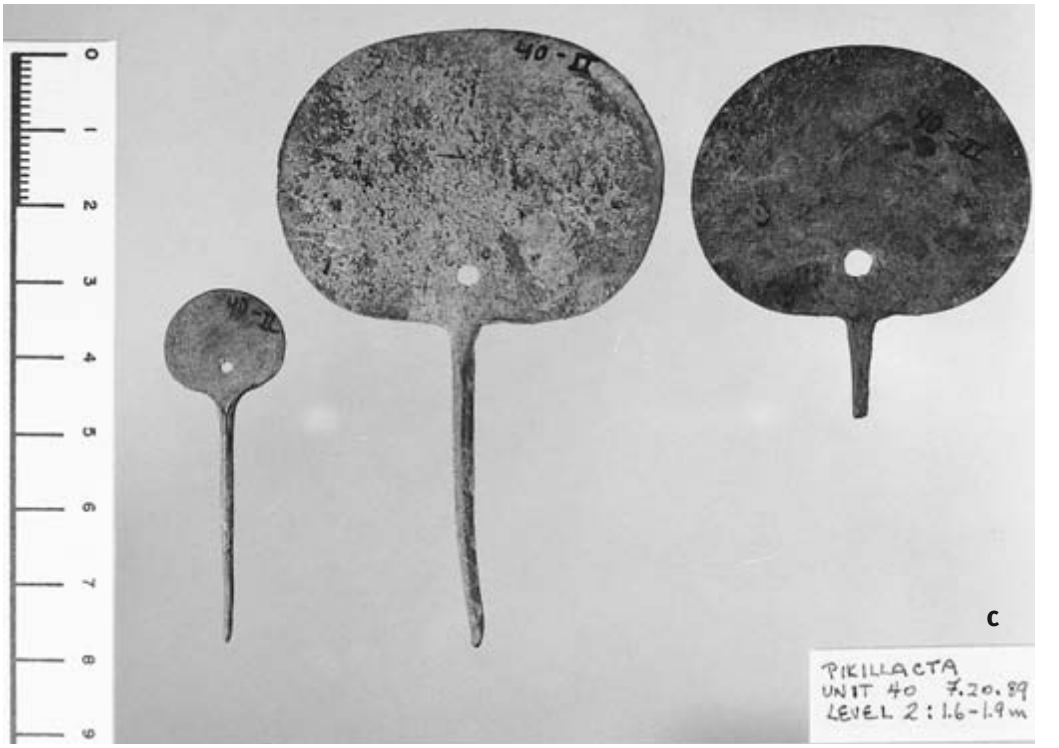
nies operated (see Lechtman 2003a, 2003b). The artifacts, excavated by Robert Feldman at Cerro Baúl and by Paul Goldstein at Omo, are housed in the Museo Contisuyo in the town of Moquegua, Peru. The metal inventory excavated at Cerro Baúl comprises twelve objects. Of six examined in the laboratory, four are arsenic bronzes. Two others—a small piece of folded sheet metal and the pointed end of a *tupu* or tool—are made of the ternary bronze alloy and are almost certainly imports from neighboring mid-valley sites within the Tiwanaku fold (Lechtman



9.13. (a) Cerro Baúl *tupu*, similar to Pikillacta Type 2 *tupus*. Collection Museo Contisuyo, Moquegua, Peru; (b) Cerro Baúl, decorated *tupu* head. Collection Museo Contisuyo, Moquegua, Peru; (c, facing page) group of Type 2 *tupus*, excavated at Pikillacta; (d, facing page) Pikillacta Type 2 *tupu* head. Note that the break is in the same general location as in the Cerro Baúl *tupu* illustrated in figure 9.13a.

2003a). The Omo corpus comprises eighteen objects, including several fragments of sheet metal and two items of silver. The Omo material is close in analytical profile to the compositions of copper and bronze artifacts from the site of Tiwanaku itself (Lechtman 1997: cuadro 2, cuadro 4). Of four artifacts studied, one is an arsenic bronze; two are made from the ternary copper-arsenic-nickel bronze alloy; and one is a tin bronze (Lechtman 2003a).

Of the twelve Cerro Baúl metal artifacts, seven are *tupu* head fragments or the stems of *tupus*, straight pins, or perhaps needles. The type inventory at Cerro Baúl thus mirrors that at Pikillacta (see fig. 9.3). Figure 9.13a illustrates a Baúl *tupu* with head and stem fairly intact; in figure 9.13b only the head of an unusual Baúl decorated *tupu* is preserved. Both are close in form to Middle Horizon Wari style *tupus*, such as the Pikillacta group illustrated in figure 9.13c and the Pikillacta *tupu* head fragment shown in figure 9.13d (see also Lechtman 2003a). The Type 2 *tupus* from Pikillacta and from Cerro Baúl were often broken deliberately; the break almost always occurs at the same location (see figs. 9.5e, 9.13a, 9.13d; Owen 1987). The two Cerro Baúl artifacts made from the ternary bronze alloy are too fragmentary to identify as to type. Both are almost certainly Tiwanaku items introduced to Cerro Baúl.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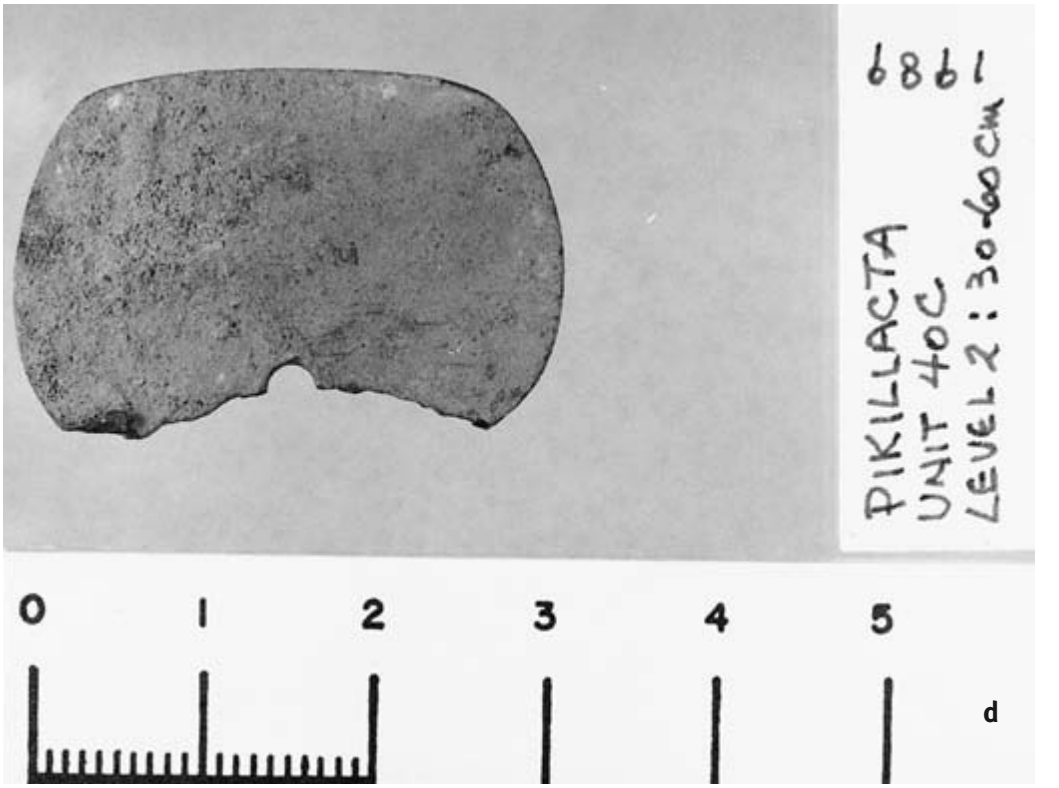
6861
PIKILLACTA
UNIT 40C
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d

COMPOSITION OF COPPER AND COPPER ALLOY ARTIFACTS FROM PIKILLACTA

SECTOR, UNIT	CHRONOLOGY		ARTIFACT		COMPOSITION [weight %]											
	Cultural Phase	Date Range in Years [A.D.]	Type	MIT No.	Ag	As	Au	Bi	Co	Fe	Mn	Ni	Pb	Sb	Sn	Zn
PIKILLACTA	Wari 1B-3	600–850														
S2, U37D1			Fragment	3921	0.075	0.986	0.013	n.d.	< 0.001	0.022	0.009	0.112	0.016	0.007	0.022	0.012
S2, U43A3			Needle (1)	3944	0.053	1.61	< 0.001	n.d.	< 0.001	0.015	n.d.	n.d.	0.016	< 0.001	n.d.	n.d.
S2, U43A3			Fragment, *tupu* ?	3945	< 0.001	3.90	0.001	n.d.	0.001	0.006	n.d.	3.440	n.d.	0.100	0.009	n.d.
S2, U43A3			*Tupu* (1)	3946	0.049	0.424	0.003	n.d.	< 0.001	0.014	n.d.	0.103	0.017	0.005	0.005	n.d.
S3, U34			Fragment	3920	0.031	2.94	0.003	n.d.	0.003	0.036	0.008	0.047	0.032	0.008	0.065	0.023
S3, U39			*Tupu* (1)	3922	0.084	0.573	< 0.001	n.d.	< 0.001	0.011	n.d.	0.005	0.017	< 0.001	0.004	n.d.
S3, U39B			*Tupu* (2)	3923	0.070	1.33	0.001	n.d.	< 0.001	0.006	n.d.	n.d.	0.017	< 0.001	n.d.	n.d.
S3, U39B			*Tupu* (2)	3924	0.070	0.817	0.009	n.d.	< 0.001	0.013	n.d.	0.053	0.031	0.006	0.005	n.d.
S3, U39C			*Tupu* (1)	3925	0.061	1.25	< 0.001	n.d.	< 0.001	0.007	n.d.	0.007	n.d.	0.001	0.005	n.d.
S3, U39C			*Tupu* (2)	3926	0.022	2.16	< 0.001	n.d.	0.001	0.115	n.d.	n.d.	0.016	0.003	0.005	n.d.
S3, U39C			*Tupu* (2)	3927	0.061	1.15	< 0.001	n.d.	< 0.001	0.006	n.d.	0.006	0.017	< 0.001	0.005	n.d.
S3, U39C			Fragment, *tupu* ?	3928	0.037	1.45	< 0.001	n.d.	< 0.001	0.007	n.d.	0.007	n.d.	< 0.001	n.d.	n.d.
S3, U39C			Fragment, *tupu* ?	3929	0.043	1.10	< 0.001	n.d.	< 0.001	0.006	n.d.	n.d.	n.d.	< 0.001	n.d.	n.d.
S3, U39C			Fragment, *tupu* ?	3930	0.025	1.80	< 0.001	n.d.	< 0.001	0.007	n.d.	0.006	0.017	0.011	0.005	n.d.
S3, U39D–E			Needle (1)	3931	0.057	1.13	< 0.001	0.02	< 0.001	0.029	n.d.	n.d.	0.017	< 0.001	0.005	n.d.
S3, U39D–E			Needle (1)	3932	0.009	0.078	< 0.001	n.d.	< 0.001	0.015	n.d.	0.035	0.017	< 0.001	n.d.	n.d.
S3, U39E			*Tupu* (2)	3933	n.a.	3.51	n.a.	n.d.	n.a.	n.a.	n.a.	n.d.	n.a.	n.a.	n.a.	n.a.
S3, U40			*Tupu* (1)	3934	0.021	1.80	< 0.001	n.d.	< 0.001	0.023	n.d.	0.011	0.030	0.003	0.009	n.d.
S3, U40			Fragment	3935	0.062	2.00	< 0.001	n.d.	< 0.001	0.007	n.d.	n.d.	0.016	< 0.001	0.005	n.d.
S3, U40			*Tupu* (2)	3936	0.082	2.50	0.001	n.d.	< 0.001	0.006	n.d.	n.d.	n.d.	< 0.001	0.005	n.d.
S3, U40			*Tupu* (2)	3937	0.077	1.70	0.001	n.d.	< 0.001	0.022	n.d.	n.d.	0.016	0.002	0.005	n.d.
S3, U40B			Fragment	3938	5.80	1.00	0.001	n.d.	< 0.001	0.014	n.d.	0.007	0.047	< 0.001	0.011	n.d.
S3, U40C			Fragment, *tupu* ?	3939	0.067	1.21	< 0.001	n.d.	< 0.001	0.006	n.d.	n.d.	0.017	< 0.001	n.d.	n.d.
S3, U40C			Fragment	3940	0.082	1.42	0.009	n.d.	< 0.001	0.007	n.d.	0.021	0.017	0.018	n.d.	n.d.
S3, U40C			*Tupu* (2)	3941	0.015	1.79	< 0.001	n.d.	< 0.001	0.007	n.d.	0.006	n.d.	0.002	0.016	n.d.
S3, U40C			*Tupu* (2)	3942	0.053	0.685	< 0.001	n.d.	< 0.001	0.021	n.d.	n.d.	0.017	< 0.001	n.d.	n.d.
S3, U44			Needle (1)	3948	0.027	0.330	0.011	n.d.	< 0.001	0.007	n.d.	0.040	0.017	0.005	n.d.	n.d.
S3, U44			Fragment	3949	0.056	0.864	< 0.001	n.d.	< 0.001	0.007	n.d.	0.006	0.032	< 0.001	0.010	n.d.
S3, U44			Needle (2)	3950	n.a.	0.818	n.a.	n.d.	n.a.	n.a.	n.a.	n.d.	n.a.	n.a.	n.a.	n.a.
S2, U43A3			*Tupu* (1)	3943	n.a.	1.17	n.a.	n.a.	n.a.	n.a.	n.a.	n.d.	n.a.	n.d.	n.d.	n.a.

Legend

n.a. not analyzed

n.d. not detected

Elements Ag, As, Au, Co, Mn, Sb were determined by neutron activation analysis (INAA)

Elements Bi, Fe, Ni, Pb, Sn, Zn were determined by inductively coupled plasma emission spectrometry (ICP-ES) or mass spectrometry (ICP-MS)

MIT 3933, 3943, 3950 were analyzed with an electron microbeam probe

10 Conclusion: The Functions of Pikillacta

GORDON F. McEWAN

The preceding chapters have described the present state of knowledge concerning the Pikillacta site and its function. Despite intensive investigation carried out over many years, this site in many ways remains an enigma. Just what were the Wari doing at Pikillacta and how did this site's function articulate with the imperial state structure? The excavations and architectural studies have provided many clues but no definitive answers. The curious lack of artifacts in context, which normally comprise the basic data for archaeological interpretation, prevents me from taking a standard interpretive approach. We have learned a great deal about Pikillacta but most of our data is tangential to the major questions this site poses. Having acknowledged the limitations of the data base, I attempt here to assemble a basic interpretation of the site from the factual data and analogy with other Wari studies. My interpretation is admittedly speculative and not necessarily the only one possible, but we have to start somewhere.

The basic questions of who built Pikillacta, when it was built, the sequence of construction, and how much it cost can be pretty accurately answered. These answers don't rely so much on opinion as on observable facts. It is clear that Pikillacta was built at the command of the Wari state. It stylistically matches other examples of Wari architecture from both the provinces and the Wari heartland of Ayacucho. The overwhelming majority of the artifacts recovered from Pikillacta are stylistically Wari. All of the radiocarbon dates collected at the site encompass the Middle Horizon. These dates indicate that initial construction began around A.D. 600 and that a second and possibly third construction phase was underway about A.D. 800–850. At the extreme range of these dates Pikillacta may have been occupied from A.D. 550 to A.D. 1100.

The sequence of construction, based on degree of completeness and wall bonding, is undoubtedly Sectors 2, 1, 4, and finally 3. It is also clear that the majority of the site was never finished or used, although Sector 2 was in use for several centuries as demonstrated by radiocarbon dating. Another

very important consideration that we must take into account when attempting to understand the function of Pikillacta is that the chronological evidence indicates a very long period of occupation. The radiocarbon dates indicate that the Wari occupation endured for four to five centuries (probably from A.D. 600 to A.D. 1100). The relative ceramic dates are more problematic in that it is clear that a revision of the stylistic chronology of Wari ceramics is needed. In the excavations at Pikillacta, as well as other reported instances such as the Cerro Baúl site (Williams 2001), the ceramic chronologies and in particular the Ocros style are inconsistent with the radiocarbon dating. Nevertheless, additional radiocarbon dates from the Wari occupation of the site of Chokepukio located adjacent to Pikillacta conform with the occupation chronology ranging from A.D. 600 to A.D. 1100, indicating that the radiocarbon chronology is sound (McEwan et al., 1995, 2002).

It is inconceivable that there was not significant cultural evolution within the Wari state during such a long period. Consequently, the function of Pikillacta surely evolved and changed over time. Evidence from Pikillacta indicates that the construction and use of Sector 2 occurred significantly earlier than in the other sectors. This suggests that the construction of Sectors 1, 3, and 4 was a response to evolutionary change within the Wari state. It is important to remember that we have not captured a snapshot of Pikillacta at a discrete moment in time. Instead we have a generalized view over a very long period of time.

The cost of constructing Pikillacta can only be calculated in terms of man-days since we have little understanding of the Wari economy. Suffice to say that it was a very expensive undertaking, with the completed parts requiring nearly six million man-days. The spectacular canal and aqueduct system that had to be put into place before construction could even begin is in itself an engineering marvel and monumental investment. The fact that numerous other Wari centers were under construction in diverse parts of Peru at approximately the same time is a clear indication of the enormous power and wealth commanded by the empire. Not only was the empire capable of maintaining its expansion with the large bureaucracy and field armies necessary for this task, but it also commanded sufficient surplus to divert tremendous resources into construction projects.

All of this, however, does not shed any light on why Pikillacta was built and what it was used for. The great investment involved demonstrates that its function was considered important and necessary to the functioning of the empire. Its vast size suggests that it played a major role in the conduct of Wari affairs. These affairs consisted primarily of operating and administering the empire, and thus we can postulate in a general way that large Wari centers such as Pikillacta must have been *administrative* in function.

Nevertheless the question of what this means in terms of specific activities and functions for the site and architecture of Pikillacta persists. The excavations at Pikillacta, and the analyses of the data described in the previous chapters, now permit us to approach the problem of determining the functions of three types of structures found in the provincial architecture of the Wari Empire. This, in turn, will suggest the overall function of the large complexes containing them. However, this analysis is limited by the fact that ancient Wari buildings do not fit our familiar architectural formal categories. Thus, their forms do not readily suggest palaces, fortresses, houses, barns, or any of the other various building types common to the experience of contemporary westerners. Intuitive recognition of function is extremely unlikely. We are left to interpret these buildings by examining their meager contents and comparing their form with other ancient Peruvian structures that were built before and after the Wari Empire.

Recognizing full well the dangers of circular reasoning in this type of interpretation, I am presenting this architectural analysis as a speculative hypothesis. These interpretations, although far from conclusive, represent a point of departure for looking at this very alien archi-

tecture. The evidence presented here seems to support a combined ritual/ceremonial and administrative function for the Wari provincial complexes, and by extension, points to a strong religious component in Wari imperial ideology, an observation made by Menzel (1964) with respect to the distribution of Wari ceremonial ceramics.

I suggest that the Wari were the Andean innovators of the large-scale practice of political manipulation and co-option through kinship, fictive kinship, and ancestor worship and that they utilized these means as an element of statecraft in controlling their empire. Large Wari architectural complexes such as Pikillacta and Viracochapampa were the physical manifestation of this state policy. Ultimately, this element of statecraft was inherited by the peoples of the Cuzco region, where the Wari built Pikillacta, and was used as official policy by the later Inca Empire.

Kinship and Ancestor Worship in the Peruvian Andes

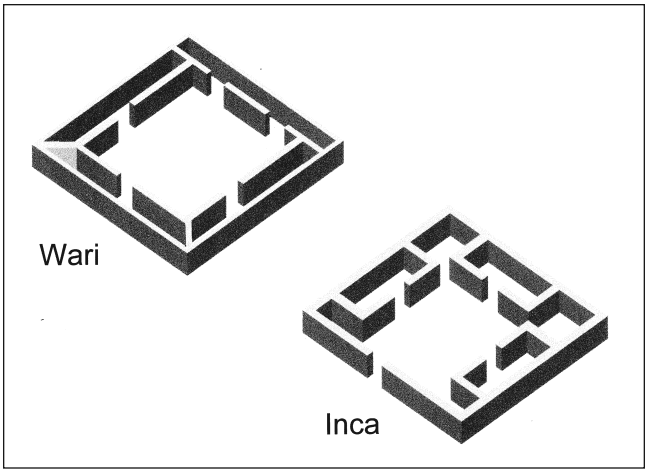
In order to elaborate the arguments for the function of Pikillacta's architecture, it is first necessary to provide a brief background on the subject of Central Andean kinship beliefs. One of the most unusual and perhaps most difficult features of Andean society to comprehend is the relationship of continuity between the living and the dead. In the Andean worldview certain deceased personages exert enormous influence and control over the actions and well being of the living, and a reciprocal obligation exists between the living and the dead to take care of each other. The living must guard, feed, and care for the mummies of important dead ancestors. In return, the ancestors provide for the living in all essential ways but most especially in maintaining the access of the living to the land and water necessary to sustain life.

Peter Gose comments:

> The political structure of the Pre-Columbian Andes took form primarily around a system of sacred ancestral relics and origin points known generically as *huacas*. Each *huaca* defined a level of political organization that might nest into units of a higher order or subdivide into smaller groupings. Collectively they formed a segmentary hierarchy that transcended the boundaries of local ethnic polities and provided the basis for empire like that of the Incas. . . . these *huacas* were also the focus of local kinship relations and agrarian fertility rituals. The political structure that they articulated therefore had a built-in concern for the metaphysical reproduction of human, animal, and plant life. Political power in the Pre-Columbian Andes was particularly bound up with attempts to control the flow of water across the frontier of life and death, resulting in no clear distinction between ritual and administration. (1993: 480)

Among the many different forms of *huacas,* some of the most important were ancestral mummies. These mummies were responsible for food, clothing, the water supply, land tenure rights, health, and fertility. Oracular advice was also provided by the mummies. Since the mummies in life had usually been political authorities, their influence on the people was understood in terms of rule (Gose 1993: 497). A priest spoke for each of the mummies who were consulted on all important matters, and rites were conducted to "wine, dine, praise, and reassure the ancestors" (Salomon 1995: 323).

The place of each *ayllu* and each individual member of society in the larger social system was determined by descent from their founding ancestor. As a consequence, loss or destruction of the ancestral *huaca* was a very grave matter. Legitimacy of land and water rights could be lost and survival itself imperiled. Political power in society could be severely curtailed or extinguished by loss of the ancestors. Physical control of the ancestors allowed the wielding of enormous social power.



10.1. Form of Wari patio groups compared to form of Inca *canchas*.

Prestige and power could also be accrued through alliances with important and prestigious lineages. This could be accomplished through marriages, adoptions, or "discovery" of more ancient links to common ancestors or *huacas*. The establishment of kinship bonds engendered a set of reciprocal obligations and legitimized power relationships in a way that mere force of arms could not.

By manipulating this system at the state level, the Wari would have been able to achieve through social coercion the power to govern. By inserting themselves into the existing web of social relationships at the highest level, they would legitimize their rule as a natural consequence of divine order. Furthermore, the rulers would take upon themselves the responsibility for maintenance of the cycle of life in the Andes. This ability to rationalize their empire in terms comprehensible to even the smallest *ayllu* represents the breakthrough in statecraft that permitted the formation of the first Andean empire.

Architectural Functions at Pikillacta

Type I. Patio Groups

At Pikillacta there are 222 of these structures, comprised of rectangular compounds with long narrow chambers surrounding an open patio. The size of these buildings varies greatly, but there does not seem to be a clear hierarchy. Until all of the interconnecting doorways and corridors are discovered, it is impossible to tell whether the smaller structures are merely subdivisions of larger units or if they should be considered independently.

What is clear is that this structural plan provides an inward-looking arrangement of small, narrow rooms arranged around a patio which offers a great deal of privacy because of the limited number of access points and the extremely high walls. The overall effect is very similar to that achieved by the royal *canchas* in Inca Cuzco (see fig. 10.1 for a comparison of forms). Privacy and security seem to be emphasized in these spaces.

The evidence for the function of these spaces at Pikillacta consists of the artifact assemblages found within them. These consist principally of animal bones (primarily camelids) and ceramic remains. A small number of metal objects made of bronze including sewing needles, *tupu* pins, and various fragments were found. The *tupu* pins imply that women were present in these structures. A few exotic objects of imported materials such as *Spondylus princeps*, beads of colored stone, and obsidian were also recovered, which suggests the presence of elite persons.

Glowacki's (1996a) study of the Pikillacta ce-

10.2. Reconstructed scene of a Wari feast at Pikillacta. Art by Greg Harlin, copyright © National Geographic Society.

ramic collection indicates that the majority of the vessels found at Pikillacta were used for preparing and serving food and drink as opposed to storage. A number of hearths were encountered in various chambers of the buildings, which could represent locations where food was prepared or warmed. Although the majority of the chambers excavated within these structures were empty, a few (e.g., Units 43-A4 and 43-B1) showed evidence of having been used to store food stuffs. The cellular nature of these chambers and their small dimensions make them seem unlikely as living quarters, although we cannot rule out this function. There is also the problem of illumination in these multistoried buildings. They appear as dark and uncomfortable spaces to the modern observer. These chambers do seem to be well suited to storage, however, and if their contents were valuable and perishable non-foodstuff—fine cloth or feathers, for example—perhaps the explanation for their emptiness is that the contents were removed at the time of abandonment.

Drawing on the Inca analogy, I suppose that the function of the Type I patio groups was feasting. This feasting probably incorporated both administrative ritual and religious practice and perhaps both simultaneously. The administrative ritual of the Inca similarly involved bringing together a ruler or his surrogates and his subjects for ceremonial performance that was related to the fictitious reciprocal relationships established for labor extraction. These relationships would have revolved around the reciprocal obligations engendered by kinship and lineage ties, both real

and fictitious. Ceremonial feasting and drinking in which great amounts of native beer and food were consumed characterized these rituals. Conspicuous generosity was also practiced at these feasts, and the numerous chambers in these structures at Pikillacta perhaps were used to store and stockpile quantities of goods to be distributed to the participants. The archaeological correlate is the presence of large numbers of ceremonial serving and drinking vessels in the artifact assemblages of the site (Morris and Thompson 1985: 81–96). Drinking is both ritually essential yet also very dangerous in that it renders the participants insensible and therefore vulnerable. The Type I Patio Groups provided a secure, private location for such performances. The varying sizes of these structures perhaps reflect the size of the administrative unit or kinship group involved.

Patio groups in other Wari sites have also produced different kinds of evidence suggesting that the correspondence between this architectural form and the activities carried out within it are not as specific as those described for the niched halls discussed below. At the site of Wari itself, Isbell, Brewster-Wray, and Spickard (1991) found trash deposits suggesting a domestic-type occupation in some of the patio groups found there. It is not clear, however, whether this was a primary or secondary usage of these buildings. At Jincamocco, Schreiber (1992: 257) found some evidence for cooking in the patio groups that she excavated. The lack of primary archaeological deposits in most patio groups investigated throughout the Wari domain make a secure diagnosis of structural function impossible. It is also very likely that a variety of functions would have taken place in these structures.

Type II. Niched Halls

In the case of niched halls the argument for a single specific function can be made with more confidence. Niched halls seem to be the focal points of activity at Pikillacta because of their association with the largest open spaces within the site. There are eighteen of these structures found both embedded in the surrounding architecture and free standing in the open patios of rectangular enclosures at Pikillacta. Their defining characteristics are the presence of internally rounded corners, large wall niches, and offering pits in the corners and beneath the door threshold.

The excavations of the niched halls at Pikillacta uncovered surprisingly few artifacts. These artifacts were almost exclusively from offering contexts in specially prepared pits located below floor level in the corners or thresholds of the buildings. A few pot sherds were found outside of these offerings, but these are not very illuminating. The reason for this scarcity of artifacts is that the niched halls, once completed, were lined with gypsum plaster floors. This hard surface does not permit artifacts to be trodden into the floor or by other means accidentally deposited. The care taken in building these white gypsum floors implies that they were kept clean — probably frequently swept of any cultural debris that might have accumulated. Further, evidence for a deliberate and orderly abandonment implies that nothing of value was left in situ on the surfaces of these buildings. As a result, the only artifacts remaining were those deposited as offerings. These included objects of bronze, *Spondylus princeps* shells, and camelid bones. Very probably they also included sets of turquoise figurines representing costumed humans. The contents of these offerings are further discussed below.

While there was very limited artifactual data recovered, a great deal of architectural data was recorded. As a class of buildings, niched halls have a consistent set of characteristics. These diagnostic characteristics seem to exhibit, however, considerable variation in terms of size and form. The large niches are found in a variety of sizes, and there are a number of different niche placement patterns within the walls. Some buildings (e.g., Unit 36) have them only in the short end walls. In others (e.g., Unit 34), they are located on both sides of a corner. Examples from

Viracochapampa exhibit multiple rows of niches located in all walls. The shape of the niches also is not entirely consistent. Most present a narrow front and wide back, but there are exceptions, even in adjacent niches. The niche in Unit 45 is entirely anomalous except for its placement within the building. Its large height, low threshold, and rectangular cross-section are unique.

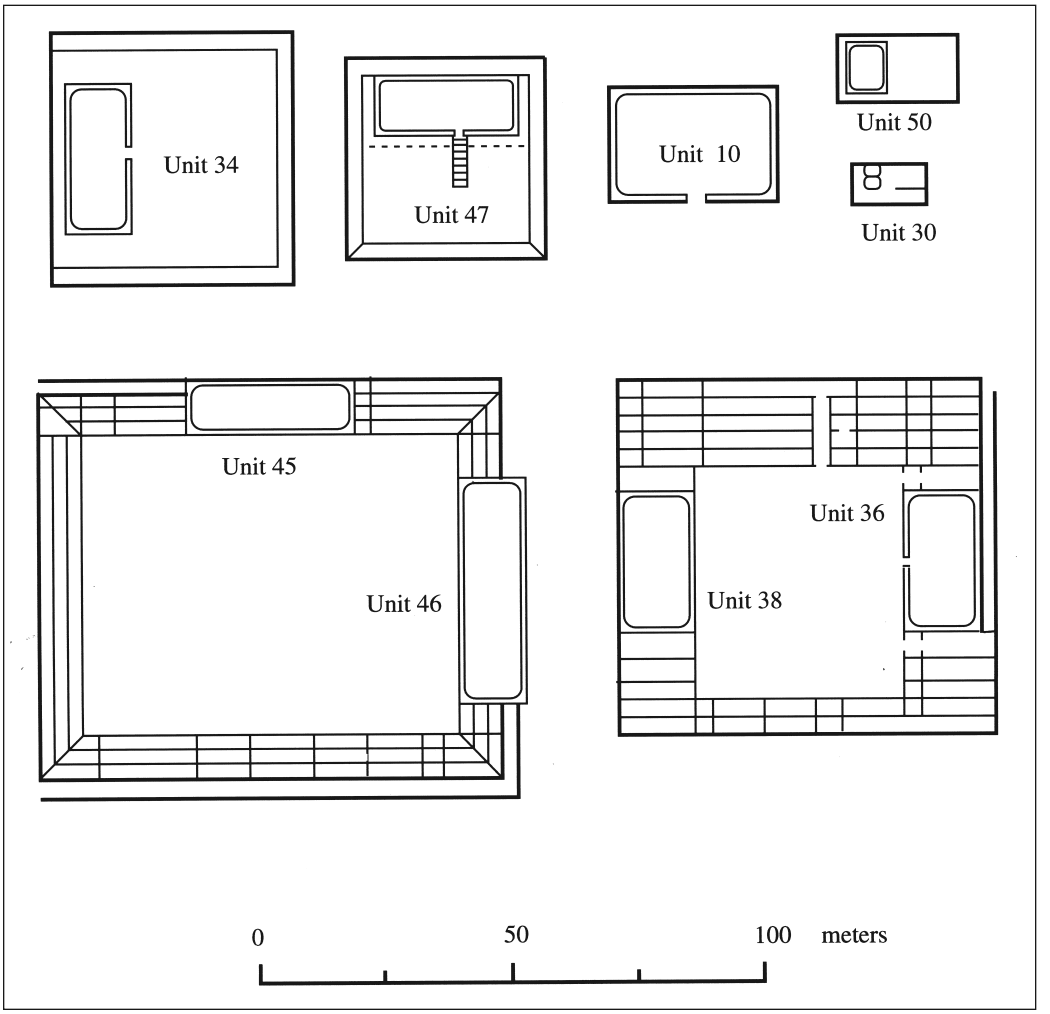
The other major category of variation among the niched halls is size (fig. 10.3). The smallest known example at Pikillacta is Unit 31, measuring 3.5 by 4 meters, whereas the largest example is Unit 46 measuring 15 by 42 meters. The significance of this size disparity is, at present, unknown.

The number of niched halls sampled, eight of eighteen, is sufficient to enable us to draw some conclusions regarding the function of these buildings by using several strands of evidence. These include artifactual evidence from the excavation of niched halls at the major Wari provincial centers of Pikillacta and Viracochapampa, evidence from the Wari temple site of Wari Wilka, interpretation of structures depicted in Wari art, and comparisons with ceremonial buildings of earlier and succeeding Andean cultures.

As mentioned above, very few artifacts were recovered from the niched halls, and almost all of these were from looted offering contexts. Nevertheless, the remaining contents of these offerings, *Spondylus princeps* shell, bronze, and camelid bones, provide evidence that the function of these buildings was religious. It is also very probable that originally these offerings contained additional objects that directly link the function of the buildings with ancestor worship.

In 1927 two sets of turquoise-colored stone figurines were found by looters in the ruins of Pikillacta (fig. 10.4). Each set was comprised of forty figurines dressed in distinctive costumes and headgear. The contents and circumstances of this find were reported by Valcárcel in 1933 and again by Trimborn and Vega in 1935. In a recent article, Cook (1992) has provided the results of a thorough analysis of these objects that sheds light on the function of Pikillacta as a whole. She concludes that these figurines "arguably represent the legendary 40 founding ancestors of the Wari polity" (Cook 1992: 358). Further, she suggests that "ancestor worship could be appropriated by the state to ensure rights of inheritance, domination, and sacred legitimacy and in this sense serve administrative ends" (Cook 1992: 360). A similar use of ancestral figurines has been reported by Julien (2000: 257) for the Inca. She comments that according to the chronicle of Betanzos (1987[1551]: 50–53) miniature gold figures representing the lineages descended from Manco Capac were buried at the foot of a stone representing the sun that was set up in the main plaza of Cuzco.

Of special relevance to the analysis of the function of niched halls is the very close correspondence that appears between them and the description of the location of one of the caches of figurines given by Trimborn and Vega (1935: 89), who report that the cache was 2 meters below a floor that was in turn 3 meters below the surface. Valcárcel (1933: 3) reports that the other cache was found 1 meter beneath the floor of a building. These caches were said to have been accompanied by *Spondylus* shells and objects of bronze. For many years visitors to the site of Pikillacta have been shown a patio group near the center of Sector 2 as the place where the caches were found (McEwan 1984: 94). However, examination of this structure during the Pikillacta Archaeological Project failed to turn up any evidence of a prepared offering cache of the depths reported in the disturbed area of the building. Excavations in other buildings of this type, notably Unit 37, also failed to reveal any prepared offering pits of the type described. In contrast, our excavations in Unit 36 provide a very similar context to that reported for the figurine caches. The offering pits in Unit 36-A match very closely the description given by Trimborn and Vega, while the pit in Unit 36-C matches the description of Valcárcel. I believe that it is reasonable to conclude that the turquoise figurine caches,



10.3. Variations in size and morphology of niched halls at Pikillacta.

probably representing the Wari ancestors, were likely found in a niched hall, if not in the one represented by Unit 36 itself.

At Pikillacta, eight Type II niched halls were sampled. These produced a consistent set of diagnostic attributes that serve to define these structures and also to give clues to their function. The diagnostic attributes include: (a) internally rounded corners, (b) large wall niches that are trapezoidal in the horizontal plane (i.e., wide in the back and narrow in the front), and (c) offering deposits located in the rounded corners of the walls or in the floor directly in front of the rounded corners.

Viracochapampa, the Wari site most frequently compared to Pikillacta, is located in the north Highlands near Huamachuco. It is also the only other Wari site where niched halls have been investigated. At Viracochapampa the architectural block is laid out in the form of a nearly perfect square and measures approximately 560 by 580 meters (Topic and Topic 1983: 7). The ground plans of the site made by McCown (1945: fig. 13) and the Topics (1983: fig. 1) indicate that the architectural block of Viracochapampa is made up of the same basic structural types as Pikillacta. There appear to be nineteen niched halls and forty-six patio groups (fig. 2.9).

10.4. Set of turquoise figurines from Pikillacta that are presently in the Museo Inka of the Universidad Nacional San Antonio Abad del Cuzco.

The relatively high proportion of niched halls is interesting. Whereas at Pikillacta, patio groups predominate, the largest group of complex structures at Viracochapampa consists of niched halls. The Topics' (1983: 14–15) excavation in one of these halls produced data rather similar to the results in the excavations in Pikillacta. In both cases the structures have internally rounded corners and contain wall niches that are trapezoidal in horizontal cross section, although the buildings at Viracochapampa seem to have more niches per structure than at Pikillacta. Also at Viracochapampa, there is surviving evidence of a hall containing two rows of niches. Niched halls at both sites contained evidence of secondary human burials. At Pikillacta, this consisted of a cache of human skulls located under the floor in one corner of Unit 10. At Viracochapampa, the secondary burial consisted of parts of several bodies found in a cavity in the corner of the structure (Topic and Topic 1983: 16). There also were cavities located in the corners of at least one niched hall at Pikillacta (Unit 36), but these had been looted of their contents, so it is impossible to say whether they had contained burials. These results would suggest a similar function for these structures at both sites.

Comparison of the niched halls at Pikillacta and Viracochapampa to a Wari building known to have had a ceremonial function, at least at the time of the Spanish Conquest, yields some interesting information. The site to which I refer is called Wari Wilka. It lies approximately 5 kilometers southeast of the modern city of Huancayo in the Mantaro Basin. The remains of the site consist of a large, rectangular building that appears today as a Type I patio group structure. This is due both to remodeling of the building during the Late Horizon Inca occupation and to modern reconstruction efforts that

have substantially altered the original ground plan. David Browman (personal communication, 1995), who saw the structure before its modern reconstruction, states that there was archaeological evidence for one or more buildings located within the enclosure. This architectural plan possibly corresponded to that seen in Wari niched halls such as Units 34 and 47 at Pikillacta.

The historic function of Wari Wilka as a temple is well documented (Flores 1959; Matos M. 1967, 1970; McEwan 1979; Shea 1969). Pedro Cieza de León described the temple in detail as he saw it shortly after the Spanish Conquest (Cieza de León 1959; Flores 1959; Matos M. 1967, 1970; McEwan 1979; Shea 1969). Shea (1969), who analyzed the site for his doctoral dissertation, concluded that the structure housed a religious shrine containing an oracle that was somehow related to the shrine at Pachacamac on the coast near Lima. He also thought that the use of the site as a religious shrine predated the Middle Horizon and that the Wari took it over and renovated it during their occupation. Wari Wilka is situated on top of a spring that is said to be the origin place of the Huanca ethnic group and therefore functioned as an important shrine for ancestor worship. Browman's observations of the architecture together with Shea's analysis of the site's function provide a possible link between the Wari niched hall and its function as a religious or ceremonial building related to ancestor worship.

An additional interesting comparison can be drawn from an examination of the depictions of architecture in Wari art. Depictions of Wari architecture are rare in the archaeological record, but a number of large, ceremonial urns recovered from a Middle Horizon 1B offering deposit at Pacheco in the Nazca Valley illustrate buildings that are somewhat similar to niched halls. Located within a rectangular enclosure, a pair of these buildings is depicted, showing high walls and steeply pitched dome-shaped roofs. The dome shape possibly resulted from the thatching technique discussed by Lee (1988) in which roofs were made to be six-feet thick or more. Also represented are two parallel rows of rectangular marks that W. H. Isbell (1977: 50) has interpreted as windows. I would speculate that these more probably represent rows of niches on the interior walls, specifically indicating to the viewer that this is a niched hall. Nevertheless, the conventions of representation in Wari art are still too poorly understood to state definitively that interior niches are depicted. It is also possible that what is depicted are windows, but windows of this type are completely unknown in the well-preserved walls at any of the Wari sites. These paintings also depict what appears to be a pole raised in a vertical position, protruding through the roof in the center of the buildings. This pole calls to mind the ceremonial poles described by John Topic (1992, 1994) in his account of contemporary ceremonies of ancestor worship that take place in the niched halls in Huamachuco in the north Highlands of Peru. On the painted surface of the Pacheco urns, these buildings are presented in association with depictions of plants and modeled felines that form the handles of the vessel. If these representations are indeed niched halls, their presence on ceremonial ceramics in an offering context, together with feline and plant associations, suggests that these buildings were ritually important.

Useful comparisons also can be made with earlier and later examples of ceremonial buildings from other Andean cultures. The association of wall niches and internally rounded corners with ritual buildings is very ancient in the Andes. The most salient examples are found in highland late Preceramic Period temples such as La Galgada (Grieder et al. 1988). These buildings are generally believed to have been used in religious ceremonies involving fire, during which foodstuffs, including chili peppers, were burned.

Later in time, buildings with rounded corners and wall niches occur at the Initial Period site of Moxeke in the Casma Valley on the north-central Peruvian coast. Huaca A at Moxeke, a multi-chambered structure made up of rooms

with rounded corners and walls containing numerous niches, is believed to have been used to store ritual paraphernalia and foodstuffs (S. Pozorski and T. Pozorski 1986). This is interesting in view of the plant associations of the niched hall shown on the Pacheco urns.

Much later in time, during the Late Horizon, we find another example of a niched hall that makes an interesting comparison with those of the Wari. John Topic (1986) has proposed that niched halls were introduced into Wari architecture through contact with the north highland Huamachuco culture. He proposes a sequence of these structures starting with the Early Intermediate Period Huamachuco forms and continuing with the Middle Horizon Wari forms. This sequence culminates in an Inca form called the *kallanka* that he believes was inspired by the Incas having seen niched halls in the ruins of the Wari site of Pikillacta in the Cuzco Valley.

In this series of examples, the common points of similarity are the general shape of the building and the presence of niches, as well as the positioning of these structures adjacent to plazas. The rounded corners seen in the Wari versions seem not be transmitted to the later Inca *kallanka*, which has more or less right-angle corners.

The Inca building called the *kallanka* was a very large niched hall with numerous doorways. Surviving examples have been recorded throughout the empire and studied by various scholars (Gasparini and Margolies 1980; Morris and Thompson 1985; Niles 1987). The functions of the *kallanka* were diverse, according to Gasparini and Margolies. Function seemed to have been related to location of the individual structure. *Kallankas* that were located along the royal highways served to shelter large groups of travelers such as military units or llama caravans. The most important *kallankas*, those structures located in the hearts of important settlements, often around the main plaza as in Cuzco, served a more ceremonial function. They are variously described as council houses or audience chambers and were said to provide shelter for large groups of people participating in ceremonies during bad weather (Gasparini and Margolies 1980: 197–200). It is these structures, associated with important ritual ceremonial spaces or plazas, that seem most directly analogous to the niched halls of Pikillacta.

Another important analogous Inca structure that is known to have functioned as a ritual/ceremonial building is the great temple of Viracocha at Raqchi, located southeast of Cuzco. This temple and many of its adjacent structures were created in the form of niched halls. They are built of stone and adobe and exhibit similar proportions to both the Inca *kallankas* and the niched halls of the Wari. Further, ongoing excavations by the Peruvian National Institute of Culture are demonstrating that the Inca temples are underlain by a Wari occupation at this site.

It is worth noting in passing that there is one other class of buildings from a culture later than the Wari that has been associated with administration and ritual. These are the *audiencias* of Late Intermediate Period Chimu. *Audiencias* are similar to niched halls in that they are defined by their niche-lined walls and often have offerings and human interments beneath their floors (Bruce 1986; Kolata 1982: fig. 4.3). Although often characterized as U-shaped structures, *audiencias* exhibit a wide variety of forms (see Kolata 1982: fig. 4.3), as wide a variation as the Wari niched halls. Most examples have been thoroughly looted, so their function must be inferred from their location within Chimu elite compounds. They seem to be related to the control of access to possible storage areas and have thus been termed "administrative." Clues to the nature of the offerings placed beneath them would seem to argue for the ritual importance of these structures (Bruce 1986). As I have noted elsewhere, the Chimu compounds containing *audiencias* seem to be Wari-inspired (McEwan 1990b). The *audiencias*' characteristic niche-lined walls and subfloor offerings suggest an analog to the Wari structures.

Multiple lines of evidence suggest that Wari

niched halls can be interpreted as ritual/ceremonial buildings. The prominence and frequency of these buildings within the two largest Wari provincial sites, Pikillacta and Viracochapampa, provides the first clue to their importance. They constitute a tightly defined class of structures sharing the characteristics of horizontal trapezoidal wall niches, internally rounded corners, sub-floor offerings, and secondary human burials. In addition, artifacts related to ancestor worship seem to have been associated with this class of structures.

Illustrations on Wari offertory ceramics seem to depict niched halls in context with felines and plants, suggesting a religious connotation. That the Wari temple at Wari Wilka was still in use in Inca times and its function recorded by the Spanish conquerors provides another clue, since it may have been a niched hall. In terms of form, internally rounded corners and distinctive wall niches are characteristics of ceremonial buildings dating back as early as late Preceramic times. The presence of these characteristics in Wari niched halls may therefore be significant.

Additional formal qualities related to niched halls appear in the architecture of later cultures. Inca niched halls known as *kallankas* are recorded by the Spanish in association with ceremonial functions; it has been suggested that they were derived from the earlier Wari model. Chimu ceremonial/administrative buildings called *audiencias* also share key similarities with Wari niched halls.

In sum, a ceremonial function for niched halls is indicated. These structures have a broad geographic distribution throughout the Wari domain, and their interpretation as ritual/ceremonial buildings is consistent with the pattern of distribution of Wari ceremonial art as noted by Menzel (1964). That there are a large number of these structures within both Viracochapampa and Pikillacta indicates the central position of religion within the Wari social structure. Further the fact that they are found within larger, presumably administrative complexes, rather than as stand-alone ceremonial centers, is reflective of the subordination of religion for state purposes. This seems to echo the Middle Horizon secularization trend noted by Menzel (1964) and Schaedel (1966).

Type III. Small Conjoined Buildings

At Pikillacta there are 501 of these structures, each averaging 4 × 5 meters in size. They have both internally and externally rounded corners. Examples at other sites, such as Azángaro, exhibit only internally rounded corners. These small structures, arranged in groups of rows with carefully controlled access have occasioned much speculation in regard to their function. A number of investigators (Harth-Terre 1959; Lanning 1967; Sanders 1973) have thought that they might be storage silos that had the same function as the Inca *qolqa*. Our excavations did not confirm this. A large number of these structures appear to never have been completed.

What little evidence that was found is rather enigmatic. A few of these structures contained trash from the Middle Horizon period consisting of ceramic fragments and animal bones. Six of these rooms contained small fire hearths with associated animal bones. The quantities of material and the size of the vessels represented by the pot sherds did not seem consistent with large-scale storage.

Four of these chambers contained some fragments of human remains. In one case an arm, a few ribs, a few pieces of skull, and some teeth. These were found in a fire hearth. In the other cases, bones and isolated teeth were discovered.

One of the chambers was completely filled with a very large stone. The Wari had failed to remove this and had simply built the structure around it. This practice was common in Inca times, and we assume that such a stone, left in situ, was a *huaca* or sacred object. Interestingly, there are two very small niched halls in Unit 30 (fig. 10.3), not much different in size from the conjoined rooms, located nearby in Sector 4. These were also built around a stone outcrop so that the stone fills their chambers.

The fragmentary human remains and the *huaca* stones may suggest that we have misunderstood the nature of what was stored in these structures. In previous work (McEwan 1984b, 1987) I argued that Sector 4 had likely housed a highly restricted and controlled group of people. Glowacki (1996a: 365–369) argues in favor of a more ceremonial use for this sector. She believes that the conjoined rooms provided an intimate ceremonial setting where small number of people may have gathered for ritual feasting, which would explain the deposition pattern of the artifacts. Both Glowacki (1996a: 365–369) and I (McEwan 1984: 82–83) have noted that there also seems to be a correlation between the location of these structures and the walled avenue running to the north from this area of Pikillacta that seems to ceremonially connect a series of prominent rock outcrops, which I believe are *huacas*, to the architecture of Sector 4. The stone enclosed in one of the Type III structures as well as the two small Type II niched halls encompassing rock outcrops are also suggestive of the sacred nature of this area of the site. The curved walls of the individual structures also may point to their ceremonial character since temples often seem to have rounded corners in the Andes. Constructing them in this fashion, with both internally and externally rounded corners, is a singularly inefficient method of building. Much more stone and effort is required for them than for building straight walls, and there is no obvious advantage to doing so. For some reason these walls needed to be curved. Perhaps they are designed to be womb-like.

Could it be that what was stored in Sector 4 (or more properly, who was housed there) were lower-ranking lineage heads in the form of ancestral mummies or *huacas*? Each of the individual structures may have served as a small house in which the deceased was regularly visited and feasted by living descendants. This would correspond well with the deposition pattern and may well account for the human bone that was found. The small fire hearths may represent burned offerings made to the deceased.

Salomon (1995: 315–353) has discussed mortuary practices for west-slope central Peruvian communities in the early colonial period. The information comes from early accounts of both European and native sources. Due to the conservative nature of ancestral cults, the practices reported may reflect pre-Colombian behavior. However, because the information was collected often through coercive measures and translated by persons of varying competency with separate agendas and recorded by yet others who undoubtedly shaped it to their own purposes, archaeological analogies must be made with caution (Salomon 1995: 319). Bearing this caution in mind, I nevertheless find some suggestive similarities between Salomon's descriptions of mortuary practice and the architectural situation at Pikillacta.

Salomon (1995: 321) comments that "in the Andes, the building of permanent, highly visible, durable dwellings for ancestors symbolized and enforced commitment to a program of social organization through inheritance." He goes on to say that "each small *ayllu* was affiliated with a local ceremonial center. The set of *ayllus* whose cults, and whose entitlements of resources, were celebrated at such a center is typically the unit called *llacta* in colonial usage." These ceremonial centers "housed among other sacred things the mummified ancestors of one or more small *ayllus*. Sometimes the respective *ayllu*-'founding' ancestors had common parents, that is, mummies ancestral to the whole *llacta,* but more typically *ayllu*-founders were said to be descendants of superhuman beings, *huacas*, whose physical substance inhered in monoliths, statues, or other sacred objects. The *huacas* in turn were imagined to be the progeny of major permanent land features or natural forces such as great snow-capped mountains or lightening. In this fashion ancestry could be imagined as a seamless web expanding from family organization to geographic and even cosmological order."

Most interesting is his description of the typical *llacta*: "a small plaza close to, and often

overlooking, an area of houses for the living. The plaza would be bordered by small stone chambers or cells described as 'tiny lodgings,' something 'like storehouses.' (They were called by the Quechua term *colca*, which also means 'storehouse.') These contained preserved bodies. It was at this plaza . . . that the village's *ayllus* jointly fêted their 'founders.' The small chambers in which the mummies dwelled usually also contained collections of lesser holy objects, such as *conopas* or fertility 'idols' " (Salomon 1995: 321). Also of interest is the fact that "it was typical of the best documented *llactas* to imagine some of their component *ayllus* as descended from ancient, valley-owning, agricultural heroes and ancestors (called *huari* or *llactayoc*), and others as descended from immigrant conquerors whose origin lay in the camelid-herding heights. The latter were called *llacuas*. The set of mummies and *huacas* housed in a typical western Andean ceremonial center my well have included members of both classes" (Salomon 1995: 322). Salomon's descriptions fit very well with the data from Sector 4. I would suggest that Pikillacta may have served as a very large regional *llacta*.

In a recent work W. H. Isbell (1997) has also explored the role of the dead and their *llactas*. In discussing the origin of the social unit called the *ayllu*, he argues that these organizations headed by important ancestral mummies were a response to "intense pressure put on kin organizations during the state formation process" (Isbell 1997: 290–291). He sees the *ayllu* as "a powerful institution for defending kin interest while challenging class based differences and privilege (Isbell 1997: 292–293). These *ayllu* organizations served to legitimize social relations and resource ownership in a nonliterate society. Legitimacy was established "not by recourse to written documents but by the consistent order of space, time, ritual and kin organization. Interpretive control was not in the courts. . . . but in the society of the *llacta* ceremonial center, reconstructing itself yearly in rituals that sanctioned and naturalized transformations" (Isbell 1997: 98). The cult of the mummy had power to communicate and maintain the social order in the face of outside threats or pressure. The main object of the imperial state then would be to co-opt this organization rather than confront or attempt to destroy it. As Isbell comments, "a good deal of the ethno historic information about Andean religion seems to have been concerned with appropriating the ancestors of conquered peoples so that their spiritual powers could be harnessed for the good of the conquerors" (1997: 298). Sector 4 of Pikillacta may represent the Wari administrative response to the need to co-opt and control the many *ayllus* in their domain by bring them into a larger *llacta* structure both physically and symbolically. The construction of Sector 4 as a *llacta* for the dead may have been a systemic response to increased resistance on the part of the conquered peoples of the empire.

Site Function: The Sum of Pikillacta's Parts

In the discussion of the evidence for the function of the three basic structural types found in Pikillacta, the recurring theme has been ritual feasting and ancestor worship. The strongest case for functionality can be made for the Type II niched halls, and these seem to be the central focus of the site. Although fewer in number than the other types, their prominent locations in the heart of the complex indicates their importance. It is probable that these structures housed the highest ranking and most important ancestors. Who these people were we cannot say, but it would seem likely that they are Wari ancestral personages or *huacas* (or their surrogates in the form of idols) brought from Ayacucho with the invaders. Their worship and care would be vital to the successful continuance of the imperial enterprise, and they likely would have been consulted on all important matters of state.

The Type I patio groups are much more numerous than niched halls and probably reflect the various political subdivisions of the local sector of the Wari empire. Each of these patio

groups provided the locus from which the living descendants, the rightful heirs of the ancestors in the niched halls, exercised their power, both spiritual and political. Reciprocal obligations engendered by fictive and real kinship provided the moral force to allow the Wari to dominate politically. Individuals in the bureaucratic hierarchy of the empire were undoubtedly brought together in frequent periodicity to report on their performance and to receive instruction from their supervisors. These activities would take the form of rituals involving exchange of information, the bestowing of rewards or punishments, and the reification of the new or continuing situation by ritual toasts and feasting. All of these activities would provide the sanction of the living lords and their deceased predecessors who still actively participated in the empire's events.

The Type III conjoined rooms are possibly the key to the system of power exercised by the Wari. If they did, in fact, house ancestral mummies, then it is likely that these people were lower ranking than those housed in the niched halls and probably are the local ancestors of the numerous *ayllus* making up the population of the conquered territory of the Cuzco region. The nature of the architecture with its limited access and atmosphere of high security suggests that these ancestors were not kept here by their *ayllus* on a voluntary basis. Like the Inca, the Wari would have recognized the power of social control that could be derived by holding hostage ancestral mummies and *huacas*. Undoubtedly they would have been treated with respect and courtesy, housed near the Wari ancestors in a splendid architectural complex, where their descendants were permitted to visit and care for them. However, the implied threat of their destruction, should the *ayllus* fail to obey the Wari lords, would be a powerful social motivator.

While others have also observed that Wari architecture may be related to ancestor worship, not everyone agrees that the social structure reflected necessarily represents an empire. Topic and Topic (1992) believe that niched halls are reflective of a different kind of social structure. They interpret these buildings as lineage halls for feasting ancestors, an interpretation that parallels my own. However, they consider the concentration of these halls, seen in both the non-Wari site of Marcahuamachuco and the Wari complex of Viracochapampa, as indicative of a political structure that they term a "multi-lineage confederation." They see this as a relatively egalitarian confederation in which, although the lineages would be ranked in size and wealth, the fiction of lineage autonomy and equality was carefully respected. They also state that the *repetitiveness* and *symmetry* inherent in a multi-lineage confederation was reflected in the *repetitiveness* and *symmetry* of the architecture at major Wari sites, where a limited number of building types are consistently repeated with little differentiation in size and no hierarchical structure (1992: 177).

In contrast, I argue that this architectural symmetry and repetition, while reflective of a political structure organized around lineages, does not conflict with the model of an imperial Wari state. The example of the Inca bears directly on this point. The structure of Inca Cuzco was based on *ayllus* grouped into hierarchic moieties and on royal lineages called *panacas* (Rowe 1967: 61–62). The central core of Cuzco was comprised of a series of similar, repetitive *canchas* (rather similar in form to Wari patio groups) and associated *kallankas* (large niched halls) that served as palaces for the governing rulers and lineage halls for the deceased rulers. This architectural pattern was established at most imperial Inca sites, where the overall plan is based on the constantly repeated form of the *cancha* and the *kallanka*.

It is probable that Wari sites such as Pikillacta and Viracochapampa reflect a Wari device for integrating conquered populations into their social and political organization. It is also possible that the lineage/feasting halls represented by niched halls at Pikillacta were not all intended for Wari lineages. Rather, they may have been intended for the use of fictive kin (i.e., kin relationships resulting from adoption or in-

termarriage) created by the co-option of local noble lineages. The Incas did this early in their imperial history when they created the class of Hahua Incas, or Incas by adoption. This provided the solidarity of a kinship relationship that co-opted their immediate neighbors and also relieved the structural pressure created by there being too few pure-blood Incas to fill all of the necessary imperial posts. Given the finite number of Wari people, it would be a logical strategy. Indeed, Kolata (1993: 211–212) argues that the contemporary Tiahuanaco polity very likely was structured along similar lines, making use of the patron-client relationship engendered by fictive kinship to achieve indirect rule over a wide area.

The nature of the architectural complex at Pikillacta, viewed as a whole, seems very consistent with this model. This complex provided a location where the Wari could feast with the lineages of their real and fictive kin in a physically safe, highly controlled environment. The interior layout of Pikillacta is structured for extremely controlled access with little or no freedom of movement. The maze-like quality of the access corridors, enclosed by high walls, together with the numerous narrow gates and check points through which one would have to pass, greatly hindered sudden, concerted action by would-be revolutionaries. The nonintuitive layout of passageways, coupled with the inability to see where one is going, placed the visitor at the mercy of a knowledgeable guide.

Although many of the niched halls are very similar in size and layout, at Pikillacta there does seem to be patterning suggestive of a hierarchical arrangement (cf. Topic and Topic 1994: 177). This patterning is related to the positioning of these buildings adjacent to plazas of different sizes (see fig. 2.7). There are two great plazas near the center of Pikillacta, located in Sector 2. The larger of these plazas has two niched halls, one on the northeast side (Unit 45) and one on the southeast side (Unit 46). The smaller of the two great plazas also is flanked by two niched halls. They are located opposite each other on the northwest and southeast sides (Units 35 and 36 respectively). All other niched halls at Pikillacta are associated with smaller plazas, or in three cases, no plaza is associated.

Finally, the sequence of construction at Pikillacta shows that many new niched halls were under construction at the time of its abandonment. I have argued elsewhere (McEwan 1996) that the architectural expansion of the site is probably correlated with an expansion of the empire. The niched halls that were abandoned while partially built may have been begun in anticipation of additional lineages being incorporated into the system through imperial expansion. Something apparently went very wrong, and the Wari were forced to abandon Pikillacta before ever using these buildings for their intended purpose.

I believe that Pikillacta can be best understood as an administrative device for the governance of the Wari Empire. More research is, of course, needed to prove this argument, but the evidence in hand at the moment seems to fit this hypothesis. This device allowed the Wari to manipulate the populations that they controlled in such a manner that the order that they imposed was justified in the ideology of the subject peoples. This is a much more efficient way to run an empire than by direct coercion. On the one hand, it became ideologically imperative for the subject populations to cooperate for the greater good of all since the ancestors had commanded it. On the other hand, there was the veiled physical threat to the subject populations' immediate ancestors and through them to the continuing legitimacy of land tenure and water rights.

The actual operation of the Pikillacta complex can be viewed as a transformational machine. Individuals went there to receive their instructions as cogs in the vast imperial mechanism. They received their "marching orders" in such a way that it had a profound psychological impact on them. The experience not only included instructions on what was to be done from the practical point of view of imperial administration, but also incorporated a powerful psycho-

logical message of the majesty of the empire and of how the individual and his corporate group fit into the greater whole.

Imagine the experience of being conducted into the Pikillacta complex when it was functioning! Entering through the south approach avenue, flanked by very high walls, the visitor experiences immediately a loss of physical perspective. He or she can see only straight ahead or behind. Escorted by a guide, they wind their way through a maze-like series of passages, all the while not being able to see anything but the interior of the passage ahead and behind.

Eventually and seemingly quite suddenly, the passageway opens to a large patio. The patio and the high surrounding walls are all covered in stark white gypsum plaster, intensely bright in the high altitude sunlight. No one can see outside of the patio. All attention is focused within. In this open space are the other participants in the event and the officiating lords dressed in brilliantly colored tunics and headdresses, and, of course, here are the important ancestral mummies, being treated with great respect. The ceremonies take place, gifts are bestowed, cosmological order is reinforced, and instructions and reports are given. All this is followed by feasting and heavy drinking, and an altered state of consciousness is achieved. The impression of power, majesty, and mystery must have been overwhelming for the participant, who later is led back out of the complex by a guide and goes home profoundly impressed. Strangest of all, the majority of the people "living" at Pikillacta, the only permanent residents, are dead ancestors.

After the 1995 discovery by Peruvian archaeologist Julinho Zapata of the Wari complex at Huaro, located just 17 kilometers east of Pikillacta on the ancient highway, our understanding of the magnitude of the Wari occupational infrastructure changed considerably. Huaro appears to be slightly larger in areal extent and has a more extensive system of satellite sites. Further, the volume of material culture remains at Huaro, especially high-quality ceremonial ceramics, seems much more consistent with the image of a vibrant regional center. Like Pikillacta, Huaro is strategically located at a narrow point in the Vilcanota drainage and adjacent to the major shrines of Cerro Wiracochan and Batán Orqo.

If the Huaro site was a major regional center of the Wari, as now seems likely, what then are we to make of Pikillacta and its close proximity? I believe that the answer may in part be revealed by this new discovery. Most significantly, these finds from Huaro and its satellite sites, together with others turned up in the western end of the Cuzco Valley (the Araway site for example) and on the Pampa de Anta northwest of Cuzco, demonstrate that the Wari occupation of the Cuzco region was much more intensive and extensive than previously known. We have already shown that it endured for a very long time. Additional information now being brought to light by the archaeologists of the Instituto Nacional de Cultura, Region Cuzco, strongly suggests that there was a major Wari occupation at the famous Inca temple of Viracocha in San Pedro de Cacha as well as at its neighboring site of Yanamancha, about 80 kilometers to the south of Pikillacta. We can now see that Pikillacta was well behind the southern frontier of the Wari state and in territory securely controlled by the Wari. Construction of all but Sector 2 of Pikillacta would postdate these other sites further to the south, and these other three sectors were likely never fully completed nor extensively used.

I believe that Pikillacta had a special function within the greater administrative apparatus of the Wari state. This function evolved through time as the empire experimented with different policies of social control involving manipulation of kinship relationships and lineage ancestors. Ultimately, these experiments failed and Pikillacta was abandoned. I would also suggest that Viracochapampa in the north Highlands was part of these experiments and had the same function as Pikillacta. It, like Pikillacta, was never completed, despite an enormous investment, and is the only other Wari site that is directly comparable to Pikillacta in that it has a similar scale and basic layout. These two sites

seem to be the only ones incorporating niched halls.

I have made a case for the function of Pikillacta as a center for the worship of lineage ancestors and a repository for hostage lineage heads (mummies) and *huacas*. This type of center would necessarily need to be located in a very secure location, well behind the imperial frontier and at a suitable locus within the sacred landscape. The confluence of the Huatanay and Vilcanota rivers, which constitutes a *tinkuy* or sacred joining of waters, provides an appropriate locale. The sacred character of Pikillacta is reiterated in the inclusion of human burials (possibly sacrifices) in the perimeter walls of the site.

The policies represented by these site functions seem to have provided political stability for a considerable amount of time. The later architectural expansion of Pikillacta may reflect an intensification of these policies over time in terms of incorporating a greater number of existing lineages or it possibly indicates a territorial expansion of the state that would necessitate the incorporation of newly conquered lineages into the system. The importance of these policies to the Wari is directly reflected in their huge investment in constructing Pikillacta. The intensification of ancestor co-option possibly failed or proved too costly and caused the Wari rulers to abandon the architecture necessary to enact them. They may have resorted to direct force or other techniques to stabilize the political situation and thus the abandonment of Pikillacta reflects a shift in policy but not necessarily the collapse of Wari rule. As Glowacki has pointed out, there is evidence of turmoil in the empire during this part of the Middle Horizon and evidence for a continuing Wari presence in the Cuzco region after Pikillacta ceased functioning. Pikillacta can therefore be seen as only a part of a much larger administrative apparatus probably centered at Huaro. Unfortunately our studies have shed no light at all on the nature of Wari interaction with the Tiahuanaco polity to the south. Only one single artifact, a piece of bronze, can be shown to be an import from this region. This absence of evidence is curious since the probable reason for building such an enormous infrastructure in the Cuzco region was to buttress the frontier shared with a large peer polity and potential rival. More studies of the areas between the Huaro-Pikillacta complex and the Wari southern frontier are sorely needed in order to clarify this subject. What is becoming increasingly clear is the fact that the Cuzco region was subjected to nearly half a millennium of intense Wari imperial domination, which surely had major impact on the formation of the later Inca state.

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