Kala Uyuni

An Early Political Center in the Southern Lake Titicaca Basin

2003 Excavations of the Taraco Archaeological Project

Edited by

Matthew S. Bandy

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Contributions of the Archaeological Research Facility

University of California, Berkeley

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An Introduction to Kala Uyuni and the Taraco Peninsula Polity

Matthew S. Bandy and Christine A. Hastorf

The Titicaca Basin of Peru and Bolivia is one of the few regions of the world in which primary or pristine state formation (Fried 1967) took place (Stanish 2001). This state, the Tiwanaku Polity, has been the focus of ongoing archaeological interest for the better part of the past century (Albarracin-Jordan 1996; Bennett 1934; Bermann 1994; Couture 2003; Janusek 1994; Kolata 1982, 1993; Ponce Sangines 1981, 1995; Posnansky 1945). Our understanding of the processes that lead to the formation of the Tiwanaku state, however, remains poorly developed. This is so despite the fact that research on the long Formative period that preceded and led to Tiwanaku state formation began very early (Bennett 1936; Kidder 1943) and continued at a modest pace throughout the 20th century (Chávez 1988; Browman 1978, 1980, 1981; Kidder 1955; Ponce Sángines 1970; Portugal Ortiz 1992).

In the past decade, however, there has been an explosion of research focused on the Titicaca Basin Formative (see Janusek 2004 and Stanish 2003 for recent syntheses). A large number of researchers have made rapid advances in our understanding of culture history and social process in the Titicaca Basin Formative, the cultural matrix from which the Tiwanaku state emerged. The Taraco Archaeological Project (TAP) has been a leading participant in this most recent wave of research activity. Since 1992, TAP has conducted excavations at the site of Chiripa on the Taraco Peninsula (figure 1.1). This work has been designed to provide a baseline cultural and ceramic chronology for the southern Titicaca Basin, and to identify the key social, economic, ideological and political processes taking place during this important time period. Our work at Chiripa has resulted in a detailed sequence of ritual architecture spanning the Early and Middle Formative periods, and has elucidated the origins and early development of the sunken court architectural form and the Yaya-Mama Religious Tradition (Bandy 2006; Hastorf 1999, 2003). It has also produced information on the early development of Titicaca Basin agriculture and subsistence (Bandy 2005; Bruno & Whitehead 2003; Whitehead 2006). Equally importantly, Lee Steadman, the project ceramic specialist, has produced a robust chronology of Early and Middle Formative period ceramics (Steadman 1999, 2001, this volume; chronology summarized in table 1.1).

The work of TAP expanded to include the whole of the Taraco Peninsula with Bandy's 1998-99 full coverage survey (Bandy 2001a, 2004a, 2006). Using Steadman's ceramic chronology, Bandy was able to document the Taraco Peninsula settlement system from 1500 B.C.. through the Spanish conquest. Significantly, his survey was one of the first in the Titicaca Basin

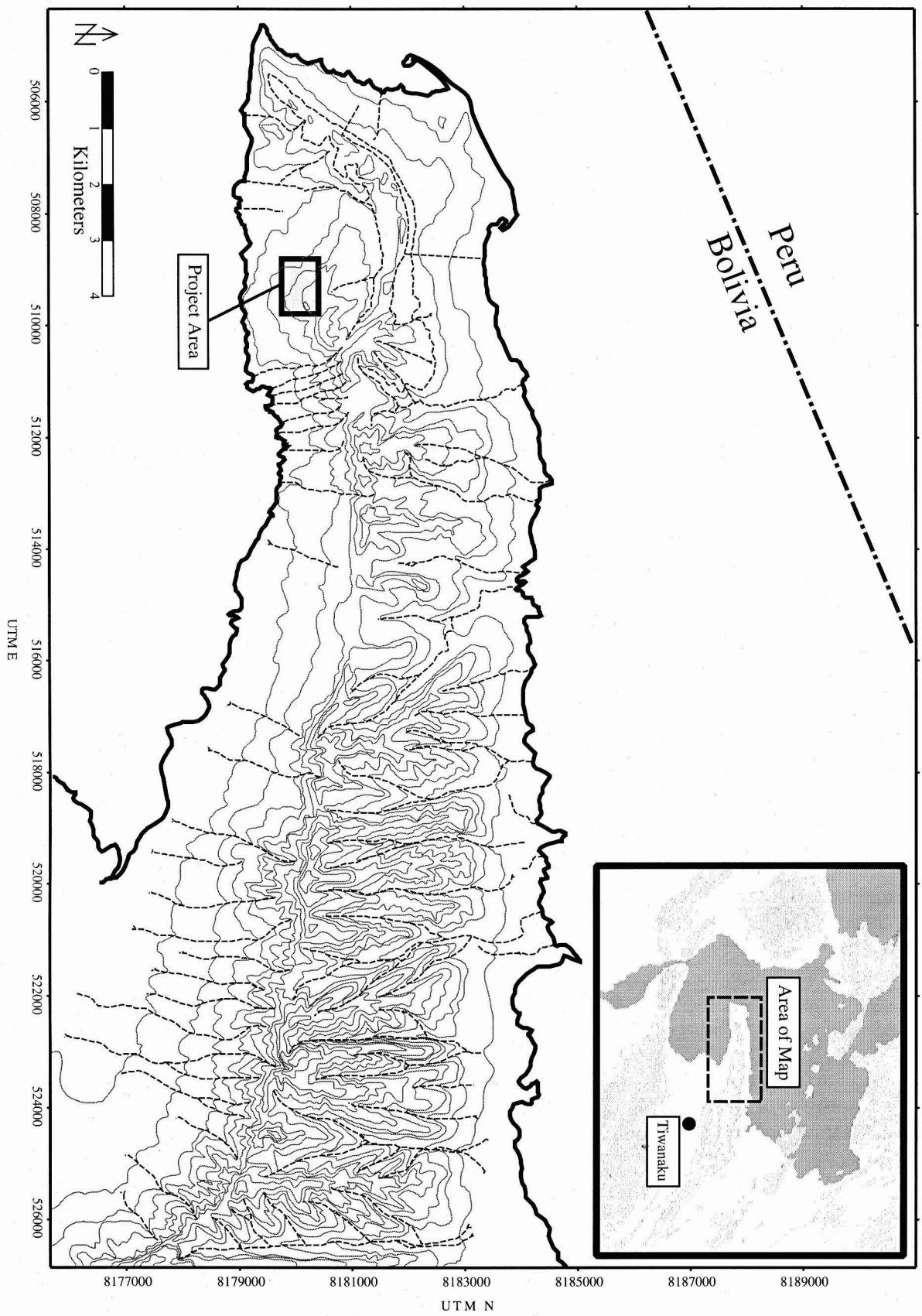

Figure 1.1 A map of the Taraco Peninsula with the location of Kala Uyuni indicated.

that was able to subdivide the Formative period into relatively fine-grained chronological units (see Lemuz 2001 for another chronologically fine-grained southern basin settlement analysis). Applying Steadman's ceramic chronology to a regional pedestrian survey permitted him, for the first time, to study changes and transformations within the Formative period on a regional scale with a fairly fine-tuned time-scale.

Bandy's survey was followed by three field seasons of excavation, in 2003, 2004, and 2005. These excavations, the third phase of TAP's research, investigated sites located in Bandy's survey, and were designed to expand upon the database we had already built up in Chiripa. This fieldwork addresses questions of political development raised by our long-term research at Chiripa in light of the regional settlement sequence, made available by Bandy's survey. We are now addressing questions of social change and evolution on a regional scale. The sites excavated were Kala Uyuni (2003, 2005), Sonaji (2004, 2005) and Kumi Kipa (2004). The present volume reports on our excavations in 2003 at the site of Kala Uyuni.

Taraco Peninsula Culture History

The Taraco Peninsula is a modest spit of land (approximately 100 square kilometers in area) projecting into the Bolivian portion of Lake Titicaca (figure 1.1). The spine of the peninsula is formed by the Lomas de Taraco, a low range of hills, rarely exceeding 4000 m.a.s.l. Politically, the peninsula is located within Cantons Santa Rosa and Taraco, Ingavi Province, in the Department of La Paz, Bolivia. It lies approximately 80 km due west of the city of La Paz. Table 1.1 illustrates the various temporal sequences that are currently being applied to our region. The phases and periods in this table will be employed throughout this report.

It is a cross-cultural pattern in many parts of the world that early agricultural village populations are not evenly distributed across a landscape but tend rather to be clustered in a small number of dense settlement enclaves surrounded by vast expanses of lightly inhabited terrain. Examples of such early agricultural village concentrations include the Etla subvalley of Oaxaca (Blanton et al. 1982), and the Ixtapalapa Peninsula of the Basin of Mexico (Blanton 1972; Parsons et al. 1983). This is often the case because highly localized microenvironments, water sources, and soils provide a more productive, or less risky situation than other areas. Further, groups may have found certain locations to be especially important to their social cohesion and identity formation,

TITICACA BASIN PERIOD	LOCAL CERAMIC PHASE	CALENDAR YEAR
Early Formative 1	Early Chiripa	1500 - 1000 BC
Early Formative 2	Middle Chiripa	1000 - 800 BC
Middle Formative	Late Chiripa	800 - 200 BC
Late Formative 1	Tiwanaku I	200 BC - AD 300
Late Formative 2	Tiwanaku III	AD 300 - 500
Middle Horizon	Tiwanaku IV-V	AD 500 - 1100
Late Intermediate Period	Early Pacajes	AD 1100 - 1450
Late Horizon	Pacajes-Inka	AD 1450 - 1540
Early Colonial Period	Late Pacajes	AD 1540 - 1600

Table 1.1 Chronological scheme employed in this volume.

making certain landscape features, vistas, or locations particularly important to live near, see and regularly visit. The Taraco Peninsula appears to have been such a population concentration. This is not surprising since the Taraco Peninsula, like the Santiago de Huata Peninsula to the North (Lemuz 2001), is a protected, undulating lake shore where there is a great variety of resource zones, as well as a temperature regime moderated by the lake itself.

In Early Formative times (the Early/Middle Chiripa phases; see table 1.1) population density on the Taraco Peninsula has been estimated to be approximately 8 persons per square kilometer, whereas the population density in the Juli-Pomata area at the same time was roughly 1 person per square kilometer (Bandy 2001a:104; 2006:216).

The settlement dynamic during the Early and Middle Chiripa phases was structured by the process of village fissioning. Bandy has documented that these early villages on the Taraco Peninsula grew no larger than about 150 persons (approximately 3 ha). Upon reaching this critical population size, the villages would split into two or more smaller villages (Bandy 2004a, 2006).

Around 800 B.C., in the Late Chiripa phase, however, these same villages ceased fissioning and began to grow to much larger sizes, up to as much as 450 persons in some cases. This change in settlement behavior took place at about the same time that we see the emergence at Chiripa of what Karen and Sergio Chávez call "the Yaya-Mama Religious Tradition," an integrated suite of artifactual and architectural traits that appear to be related to public ceremonialism (K. Chávez 1988; S. Chávez and K. Chávez 1975). Portugal Ortíz (1981) also discusses sculptural iconography associated with this complex, calling it by the Aymara term 'Pa'Ajano', and Browman (1972) similarly called it 'Pajano'. These terms refer to the occasional elaborate back-to-back figures of male and female images that occur on stelae of this style. This group of images that we associate with this 'tradition' conveys a sense of organic union, fertility, and ancestral ties, with more emphasis on the human form than in earlier styles, though continuing in a surreal manner. These images have been found within sunken enclosures and also later in stepped platforms (Stanish 2003). Bandy (2004a, 2004b, 2006) and Hastorf (2003) have hypothesized that public ritual activity associated with the Yaya-Mama stylistic complex served a social integrative function, allowing the formation of much larger communities than was possible in earlier phases.

The Late Chiripa settlement system on the Taraco Peninsula was dominated by four major villages, each with an estimated population of about 400 persons (approximately 7 ha). These sites are Chiripa, Yanapata, Janko Kala, and Kala Uyuni, the subject of the this volume. Together, these four villages accounted for more than half the total population of the peninsula at the time. Each of these villages appears to have been politically independent. From completed archaeological field work, we know that at least three of them had their own ceremonial precincts with sunken courts. All shared a common political culture, of which the Yaya-Mama Religious Tradition was part of the material expression. Based on our analysis, Late Chiripa social organization may be characterized as an autonomous village system, with no evidence of regional political hierarchy or the domination of one settlement by another (Bandy 2001a, 2006).

The Taraco Peninsula Polity

This situation changed dramatically at the beginning of the Late Formative 1 period, around 250 B.C. (table 1.1). During this 500-year-long phase, most of the old village centers on the Taraco Peninsula actually decreased in size, probably losing population size as well as social influence. This was not an episode of depopulation on the peninsula however. Instead it was an episode of population movement, selective aggregation at some settlements and depopulation at others. Why and how this happened is part of the Taraco Archaeological Project's charge.

While most of the old villages of the Middle Formative were reduced in population, one of the four major Late Chiripa phase villages

grew substantially. This site was Kala Uyuni. During this phase, Kala Uyuni grew from its Late Chiripa phase population of about 360 (6.75 ha), to a Late Formative 1 maximum of around 900 inhabitants (15.25 ha). In this phase, therefore, it grew to be more than twice as large as any other contemporaneous village on the Taraco Peninsula.

Based on survey data, Bandy (2001a: 190-96; 2006) has linked this site size increase at Kala Uyuni to that settlement gaining political dominance over the other Taraco Peninsula villages. The excavated archaeological evidence also supports this idea, that the peninsula was politically unified for the first time. While many archaeologists would term this an instance of chiefdom formation, we prefer to use the term multi-community polity formation. Whatever term we use, however, a dramatic transformation had taken place. We call the new political entity that emerged in the Late Formative 1 "the Taraco Peninsula Polity." Why and how Kala Uyuni came to dominate its neighbors and to centralize political authority is at the core of TAP's research goals.

Other episodes of multi-community polity formation seem to have taken place in the southern Titicaca Basin at about this same time as well. Tiwanaku was first occupied during the Late Formative 1, apparently, and was probably the center of its own independent multi-community polity similar to the Taraco Peninsula Polity. Other multi-community polities may have been centered at Kallamarka, in the Upper Tiwanaku Valley, at the site of Kanamarka/Lakaya on the Peruvian side of the lake south of Yunguyu, and at Khonkho Wankane in the Desaguadero Basin (Bandy 2001a: 196, 2004b; Janusek 2004; Stanish et al. 1997:92-93).

Multi-community polity formation was therefore a process that was taking place in many parts of the southern Titicaca Basin during the Late Formative 1. This sea-change in socio-political dynamics and the political institutions that resulted from it, was certainly implicated in the process of state formation that transformed the Tiwanaku Polity at the end of the Late Formative period. An understanding of multi-community polity formation in the Late Formative Titicaca Basin is clearly necessary for an adequate model of Tiwanaku state formation.

For all of these reasons, the current phase of TAP's research is focused on multi-community polity formation over this 500-year period, with special reference to the case of the Taraco Peninsula Polity. Our excavations at Kala Uyuni in 2003 and 2005 were part of three planned seasons of excavations devoted to exploring this research problem.

Kala Uyuni

The archaeological site of Kala Uyuni is located in the modern community of Coa Collu. Coa Collu is located on the south side of the peninsula between the towns of Taraco and Santa Rosa, as indicated on figure 1.1. The site was identified by Bandy in his 1999 survey of the Taraco Peninsula (Bandy 2001a). Kala Uyuni in fact consists of two separate and distinct surface artifact scatters, and for this reason it was initially recorded as two sites: T-232 (Kala Uyuni) and T-225 (Achachi Coa Kkollu).

The upper area, T-225, is a ceramic scatter covering approximately 1.5 ha, located on a relatively level terrace near the top of Cerro Achachi Coa Kkollu (figure 1.2). Several worked limestone blocks are visible on the lower surface of this expanse. The site is characterized by a high density of ceramics and other cultural materials. Excavations in 2003, discussed by Cohen and Roddick in chapter 6 of this volume, revealed the presence of two sunken courts in this area (figure 1.3). The ceramics include a high frequency of decorated sherds, including exotic ceramic styles either imported from the northern Titicaca Basin or manufactured in imitation of northern wares (Bandy 2001a, figure 6.2c, e, f; Steadman, chapter 7 of this volume). The sunken court evidence together with the unusual ceramic surface assemblage led Bandy to propose that this was a ceremonial sector dating to the Late Chiripa phase (2001a: 122-23). This field hypothesis has been confirmed by the excavations reported on in this volume. We have demonstrated that the principal occupation of T-225 (1.5 ha, two

sunken courts) indeed dates to the Late Chiripa phase. Minor occupations on the hillside (0.5 ha), without any apparent monumental architectural remains, are also documented for the Early Chiripa, Middle Chiripa, and Late Formative 1 phases. T-225 is referred to in this book as the Achachi Coa Kkollu sector, the AC area, or KUAC.

The T-232 area is defined by a much larger ceramic scatter, located at the base of Cerro Achachi Coa Kkollu and southwest of T-225. (figure 1.4). The entire T-232 scatter extends over some 15 hectares, covering the area from the base of the hill down to the modern road. Today, the entire area is devoted to modern cultivation and residence. There are some topographical features suggestive of mounds and terraces, especially where stones have been piled up in the process of field clearing. The area of the Early and Middle Formative village (the AQ area, described by Bruno in chapter 3 of this volume) is located on a substantial raised promontory, evident on the topographical map of the site (figures 1.5 and 1.6). This area of the settlement is a tell accumulation, produced by the long-term occupation of that part of the site, and does not seem to reflect any intentional landscape modification. Some worked limestone blocks are scattered about the site, but no monumental architectural constructions are evident on the surface or from our auger tests.

This lower area of the slope was primarily a residential area. The occupation of T-232 began in the Early Chiripa phase. This occupation was not detected on the surface, but Early Chiripa materials were encountered at the base of the AQ area excavations (chapter 3). By the Middle Chiripa phase, T-232 had become a substantial village, covering approximately 2.5 ha with some 127 estimated inhabitants. This influx of population was probably related to the fissioning and abandonment of the nearby major Early Chiripa village of Cerro Choncaya (T-2) at around 1000 B.C. (Bandy 2004a, 2006).

During the Late Formative 1 this geography shifted. The lower T-232 sector grew explosively to cover 14.75 ha with an estimated 883 inhabitants. At the same time, the T-225 sector was largely abandoned. The sunken courts fell

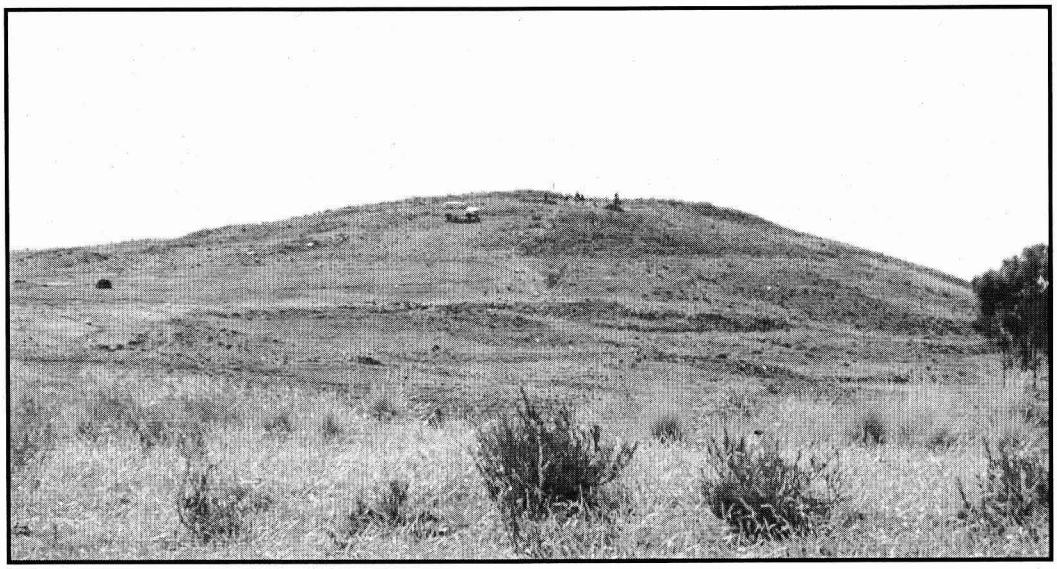

Figure 1.2 A view of the AC sector hilltop from below. Truck serves as scale.

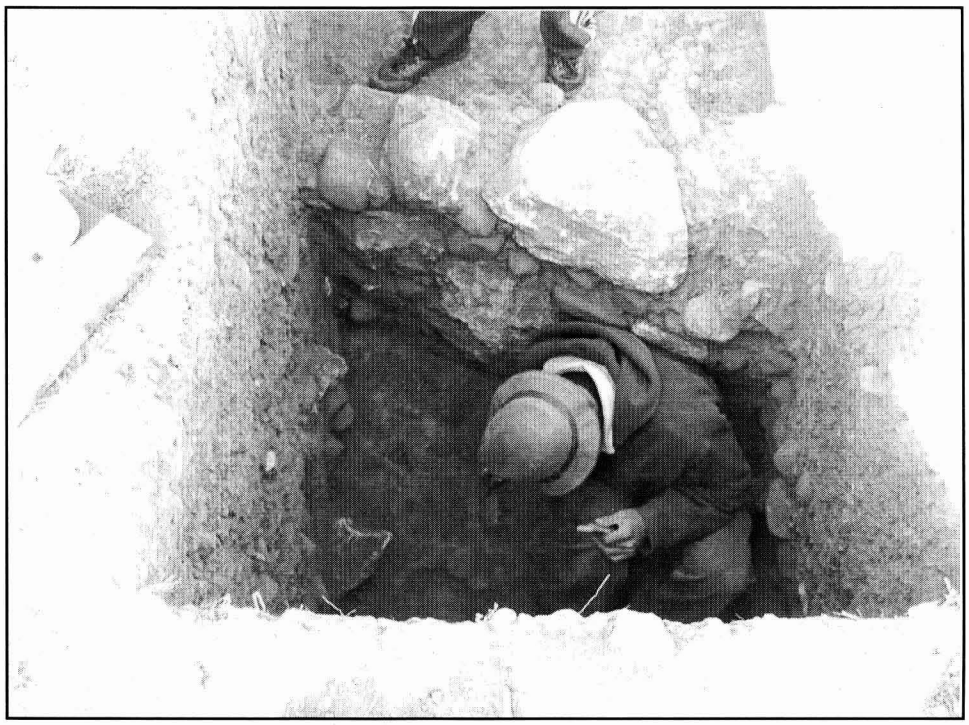

Figure 1.3 A portion of a sunken court wall under excavation (ASD-1, AC sector).

into disrepair, and the hilltop ceramic scatter was reduced to 0.5 ha. The combined settlement of Kala Uyuni was by far the largest Late Formative 1 site on the Taraco Peninsula, and one of the largest in the southern Titicaca Basin. It was at this time that we believe the Taraco Peninsula Polity took form, with Kala Uyuni as its political and demographic center.

The importance of Kala Uyuni in the Late Formative 1 period is underscored by the fact that we recovered considerable numbers of sherds of a particular ceramic style, here called Kalasasaya polychrome incised, on the surface (Bandy 2001a: 166) and from excavated contexts (see Steadman's comments in her summary of the ceramics, chapter 7 of this volume). These ceramics are very rare, and seem to occur almost exclusively at Late Formative 1 political centers such as Kallamarka, Kanamarka/Lakaya, and Tiwanaku itself.

Kala Uyuni's central position in the Taraco Peninsula Polity did not continue through the following Late Formative 2 period, however. During the Late Formative 2 the occupation area of T-232 was dramatically reduced to 1.5 ha, quite a small village by Taraco Peninsula standards. The virtual abandonment of the site may reflect the Taraco Peninsula's incorporation into the rapidly expanding Tiwanaku Polity around A.D. 300 (Bandy 2001a: 196-98, 2006; Hastorf 2005). A small portion of T-232 was reoccupied in the Tiwanaku IV-V phases. At this time Kala Uyuni was again a substantial village of 5.25 ha, with an estimated population of almost 300 persons. Never again, however, did Kala Uyuni achieve the importance it had enjoyed in the Late Formative 1. Portions of the lower slopes (T-232) are referred to in this volume as the KU or AQ areas. These excavation areas (see figures 1.4 and 1.5) account for only a small part, however, of a very large sherd scatter.

This Volume

This volume presents the results of the Taraco Archaeological Project's 2003 excavations at Kala Uyuni. Chapter 2, by William Whitehead,

provides information on our radiocarbon dating program. A series of chapters describing excavations in three areas of the settlement are then presented, followed by two chapters dedicated to artifact analysis.

In chapter 3, Maria Bruno describes excavations in the AQ area, where she excavated a deep series of stratified midden deposits of the Early, Middle, and Late Chiripa phases. She excavated within the area of the Middle and Late Chiripa village occupation. The materials from this excavation will provide invaluable data to compare with existing data from Chiripa, and to document a domestic assemblage distinct from the more special-purpose assemblages present in the hilltop ceremonial sector (AC).

José Luis Paz and Soledad Fernandez then describe, in chapter 4, their excavations in the KU area. Their excavations were located outside of the area of the Late Chiripa village occupation but within the much larger Late Formative 1 site. The most important find in this area was the stone foundation of a small structure dating to the Late Formative 1. Judging from the associated artifacts, this structure served a ceremonial rather than a residential function, though Paz and Fernandez offer a different interpretation. It may have been part of a larger complex of such structures in the KU area as a second structure was located just to the north of it during the 2005 excavations.

In chapter 5, Maria Bruno and Mary Leighton describe a small stratigraphic excavation also in the KU area, in a unit to the west of the one reported by Paz and Fernandez. Importantly, they recovered a series of stratified deposits sitting on a plaza surface that may contain refuse related to activities carried out in the rectangular structure excavated by Paz and Fernandez.

Cohen and Roddick report on the upper part of the site in chapter 6, with an account of excavations in the Achachi Coa Kkollu (AC) sector. They excavated a large number of small units in order to identify and define two sunken courts. Both of these courts are trapezoidal in plan, wider to the south than to the north, and date to the Late Chiripa phase. Each sunken enclosure revealed a complex sequence of construction and remodeling. One of the courts contained a sandstone monolith and a piece of portable stone sculpture in the Yaya Mama style. The other enclosure contained a human dedicatory burial associated with its initial construction episode. Importantly, Cohen also excavated an extramural midden deposit associated with the use of the courts.

Steadman's detailed ceramic analysis of these areas, together with the excavation data, appear to indicate that the AC sector functioned as a spatially distinct ceremonial sector for the Late Chiripa community of Kala Uyuni. This is a finding of great significance, as it should allow us to more clearly distinguish public/ceremonial from domestic artifactual assemblages in the Lake Chiripa phase at other settlements as well. Such a distinction was difficult to demonstrate at Chiripa, since ritual and domestic spaces were immediately adjacent to one another, and ritual and domestic refuse were commonly intermingled in the same midden deposits.

The volume closes with two chapters providing results of specialized analysis that was carried out in conjunction with the excavations. Chapter 7, by Lee Steadman, presents a very informative analysis of ceramics from the 2003 excavations. Her chapter is very important for two reasons. First, it represents the first systematic description of a Middle Formative (Late Chiripa) ceramic assemblage from a southern Titicaca Basin site other than Chiripa itself. We are pleased to say that Steadman's existing Chiripa chronology (Steadman 1999) appears to be valid for the Early and Middle Formative periods at Kala Uyuni, as well as for the type-site. Secondly, her chapter contains the first description by TAP of Late Formative 1 and 2 ceramic assemblages. In future publications we expect this description to become increasingly formalized and statistically grounded, with expanded sample sizes and further in depth analysis. Steadman's research in this direction constitutes a major advance in Titicaca Basin archaeology, since Late Formative ceramics are at present the least well known of any period in regional prehistory.

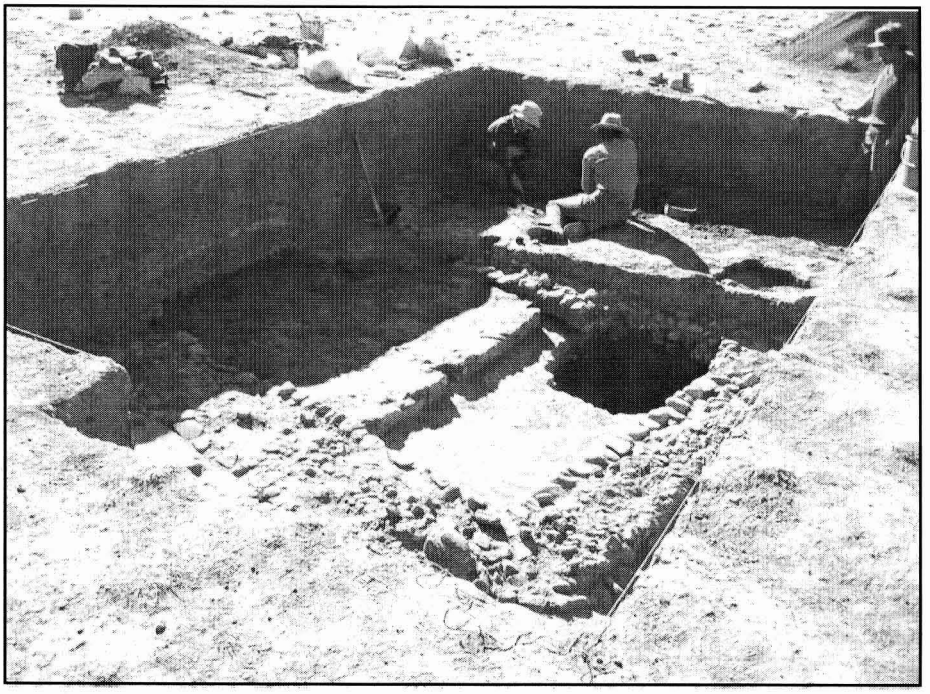

Figure 1.4 A view of the KU sector excavations in progress.

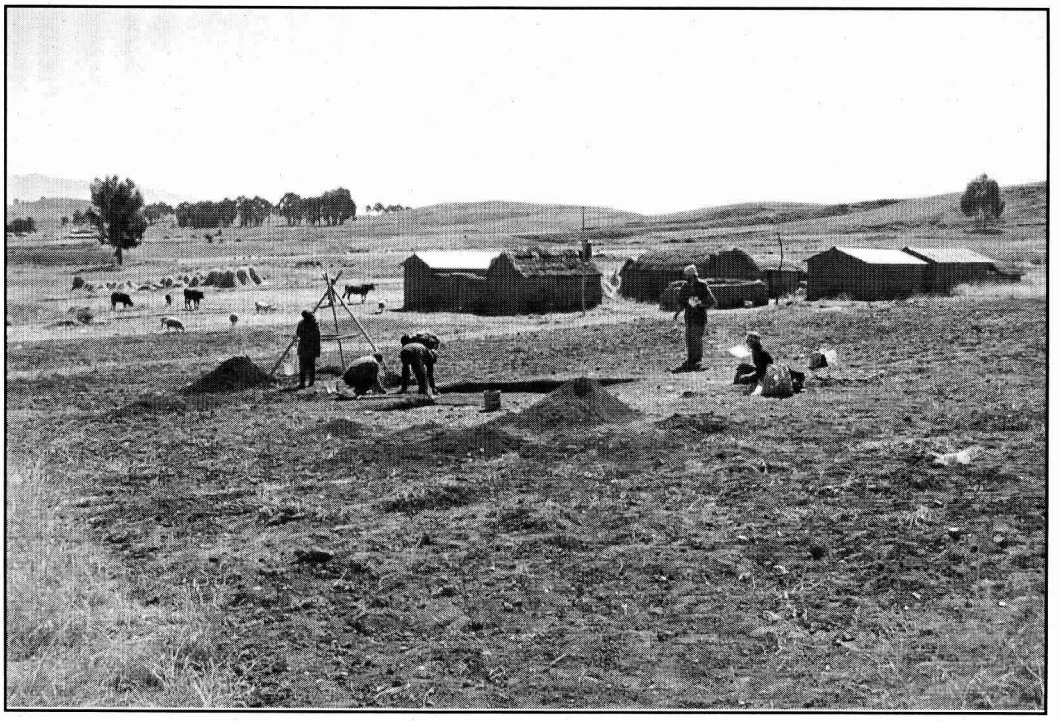

Figure 1.5 A view of the AQ sector excavations in progress.

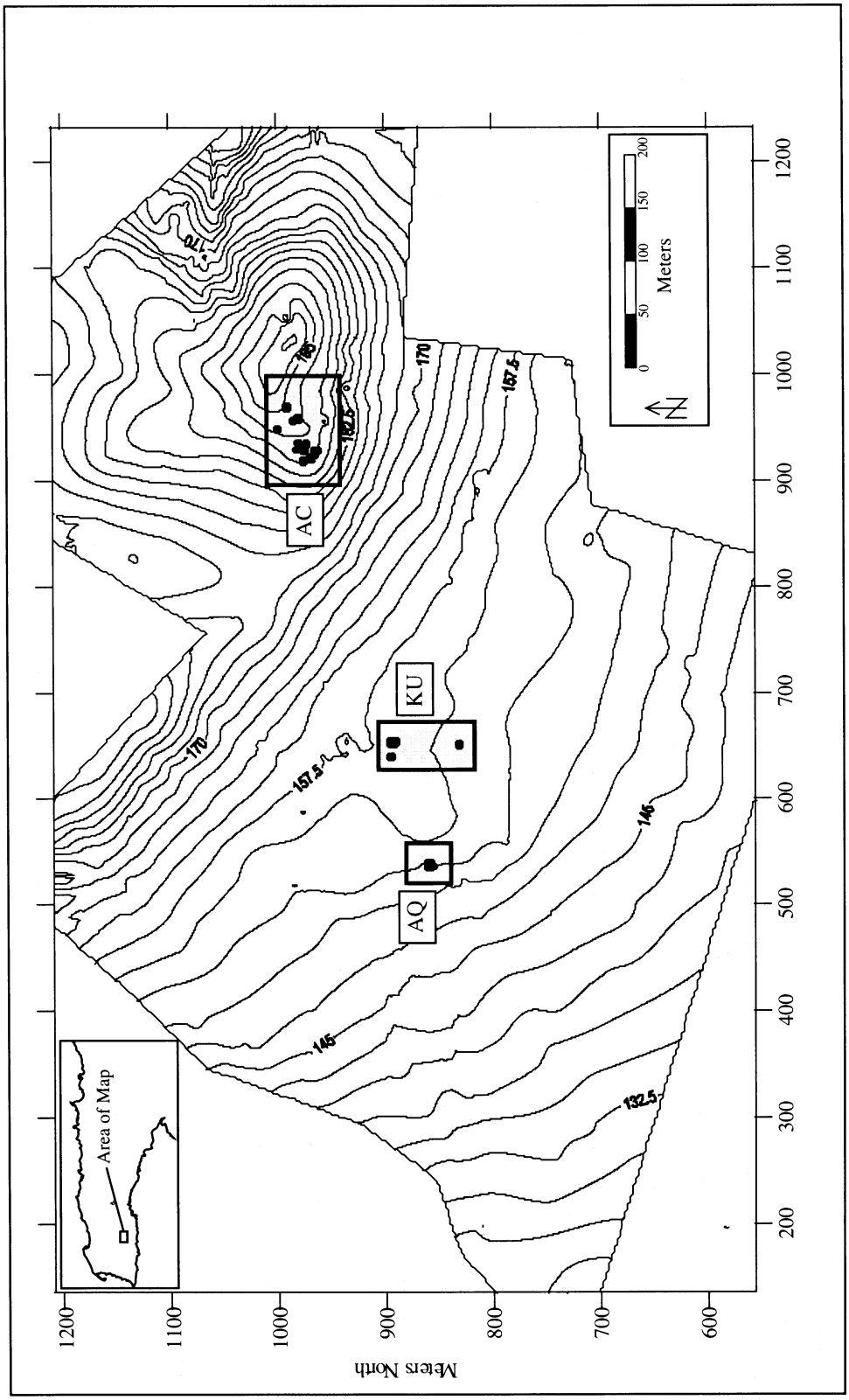

Figure 1.6 Topographic map of Kala Uyuni with excavation areas indicated.

In chapter 8, Katherine Moore, Maria Bruno, José Capriles, and Christine Hastorf present a highly innovative and sophisticated analysis of burning at the site of Kala Uyuni. Their analysis serves as a model for archaeobiological research of this type, and as a template for future fine-grained materials analysis by TAP specialists. Their analysis is subtle and complex, but one significant conclusion is that the behavior that produced burned archaeological faunal and floral assemblages differed strikingly between domestic and ritual contexts at Kala Uyuni. They also convincingly document the wide variety of cooking behaviors that existed in the Titicaca Basin past.

Finally, chapter 9 summarizes the results reported in the volume and their implications for regional culture history and social process.

The research reported in this volume documents the early stages of the third phase of the Taraco Archaeological Project's field research. We expect to complete our extensive anlayisis based on a series of sites on the Taraco Peninsula over the coming years. Our understanding of Formative period social processes will be greatly refined by these future excavations and analyses. Just as importantly, however, new questions and new interpretive challenges will come to light; questions that we cannot now anticipate or imagine.

2

Radiocarbon Dating

William T. Whitehead

The Taraco Archaeological Project (TAP) uses radiocarbon dating for two reasons: to give an absolute time frame for cultural events in our Harris Matrices and to link our relative ceramic chronology to the radiocarbon curve (Whitehead 1999). In archaeology, the way we think about radiocarbon dating has changed from the greatest tool of the twentieth century for absolutely date specific events, "the magic bullet approach;" to a more sophisticated but limited use to create chronologies linked to the fluctuating and sometimes frustrating radiocarbon curve. TAP has not had large budgets for its excavation and analysis; therefore, we have to make our few radiocarbon dates do more in relation to our science goals. We try to maximize the usefulness of each radiocarbon date by a careful selection process of archaeological deposits, only using one type of botanical species in the dating methodology, and calibrating each date with the latest radiocarbon software.

The greatest limitation of radiocarbon is the simple fact that the amount of radiocarbon in the atmosphere fluctuates through time. Therefore, we cannot use the raw activity level in a sample and a simple mathematical formula to calculate the age of the organic specimen. All radiocarbon samples should be calibrated against a curve that shows the fluctuating amounts of activity from known-age carbon sources. This is done with long lived tree species such as the bristlecone pine, where the annual rings are dated and the real levels of radiocarbon in the atmosphere are measured. For our time periods of interest 1500 B.C. to A.D. 500, we can see the radiocarbon curve has several plateaus and steep drop offs that can make a calibrated age have a much larger or smaller real age range than the activity and error would predict. The major radiocarbon anomaly can be seen in figure 2.1, with the time periods and phases in grayscale. The most striking feature is that the entire Late Chiripa phase/ Middle Formative is within the 2150-2550 B.P. major anomaly. This four hundred year radiocarbon period calibrates to 600 calendar years, a major shift when we consider the 200-year difference between the radiocarbon and calendar years is about 10 generations of humans.

Methods

TAP does not collect radiocarbon samples in the field, which is a main recovery technique for radiocarbon in many archaeological programs. The source of the majority of our radiocarbon samples are carbonized *Chenopodium quinoa Wild.* seeds gathered from flotation

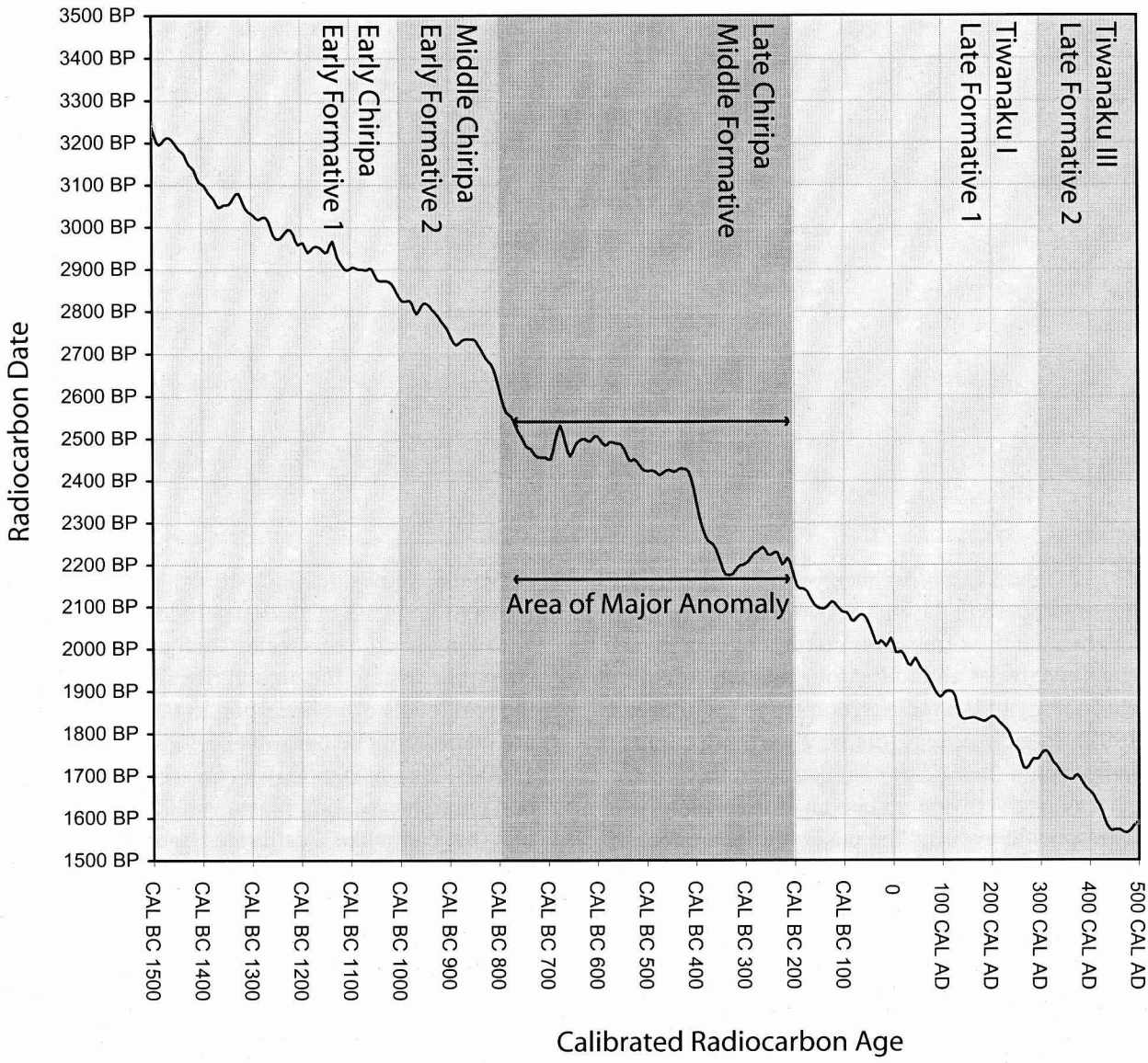

Figure 2.1 Radiocarbon curve from Calib 5.0, Intercal 4.0 data set (Stuiver et al. 2005). Note that the entire Middle Formative period is within a major radiocarbon anomaly.

Site Area	Event	Locus	Flotation Sample ID	Description	Material	AA#	F	dC^{13}	C^{14} age BP	2 sigma Age Calibrated
AC	A144	5344	13344	Fill between Floors	wood	AA59711	0.7271+-0.0032	-26.1	2,560+-35	CAL BC 808-541
AC	A147	5347	13323	Fill of Pit, cut into sterile	seeds	AA59712	0.7015+-0.0028	-24.9	2,848+-32	CAL BC 1127-915
KU	B97	5322	13311	Midden and Ash above sterile	seeds	AA59713	0.7886+-0.0031	-25.2	1,908+-32	25-214 CAL AD
AC	A116	5342	13299	Uppermost clay floor	wood	AA59714	0.7554+-0.0029	-25.4	2,253+-31	CAL BC 394-205
AQ	C18	5065	13035	Midden over sterile	seeds	AA59715	0.7293+-0.0029	-25.0	2,536+-32	CAL BC 800-523
AQ	C4 & C5	5070	13050	Midden	seeds	AA59716	0.7335+-0.0029	-24.9	2,490+-32	CAL BC 786-413
AC	A33	5183	13143	Bone and Ash in Floor	seeds	AA59717	0.7383+-0.0057	-24.7	2,438+-62	CAL BC 762-402
AC	A108	5233	13166	Midden above sterile	seeds	AA59718	0.7032+-0.0038	-24.4	2,829+-43	CAL BC 1126-844
AC	A11	5288	13229	Fill between floors	seeds	AA59720	0.7100+-0.0045	-24.7	2,751+-51	CAL BC 1000-811
KU	B22	5164	13220	Clay lens by structure	wood	AA59719	0.8008+-0.0034	-25.2	1,785+-34	132-340 CAL AD
KU	B39	5274	13232	Med. Density midden	seeds	AA59721	0.7925+-0.0034	-23.9	1,868+-35	73-237 CAL AD

Table 2.1 Radiocarbon dates from Kala Uyuni.

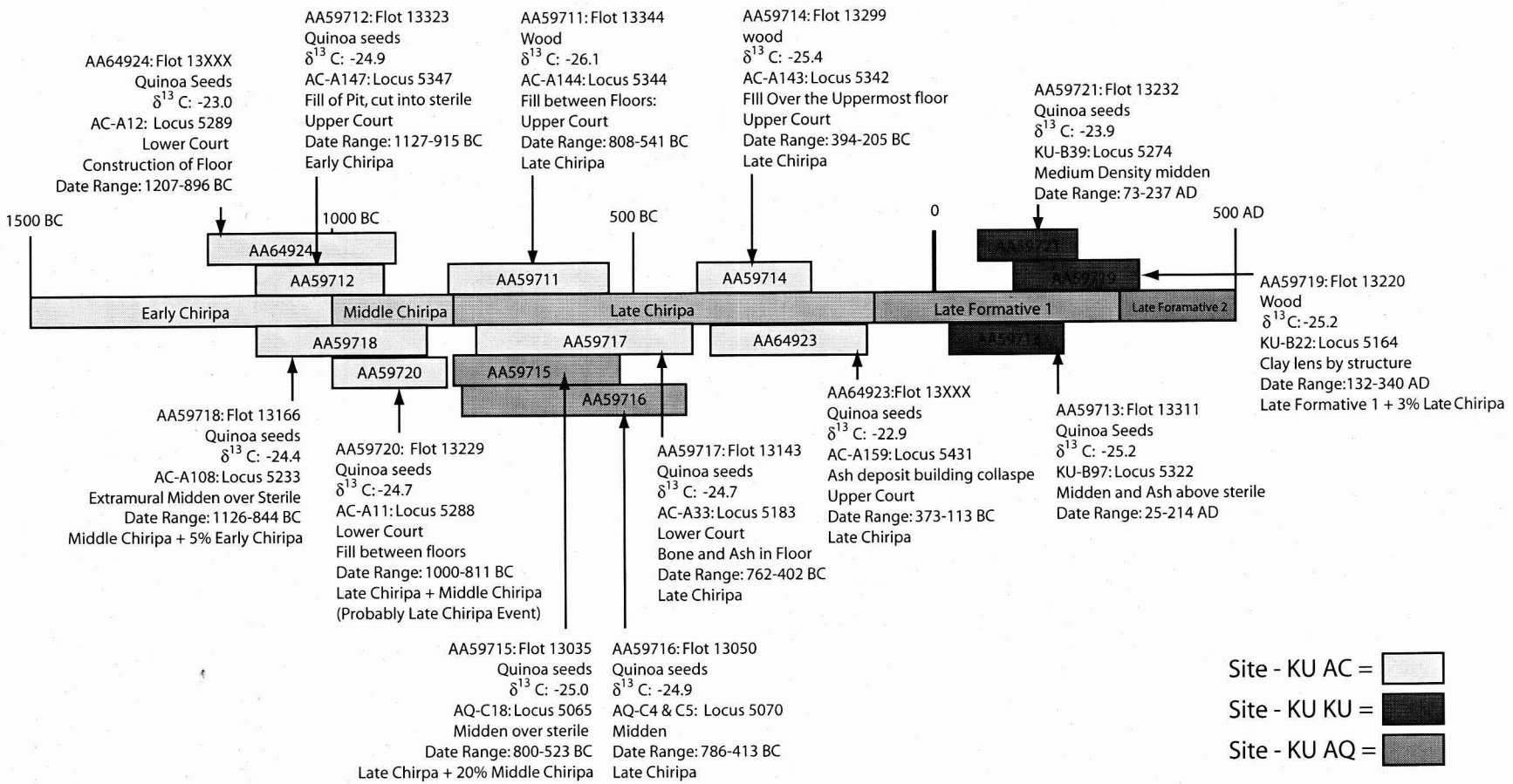

Figure 2.2 Calibrated radiocarbon dates from Kala Uyuni showing 2 sigma calibrated age range for all dates against the local and regional chronology and relevant information about archaeological context.

samples. This means we are only using annual carbon, from the same plant species, and in most situations these seeds would have been gathered and used within a year before the event we are interested in dating occurred. In the lab, the seeds are processed with a hydrochloric acid and sodium hydroxide base and distilled water washing method to remove foreign sources of carbon such as carbonates and humic acids from the soil that may have infiltrated the seeds. The seeds, having been in the soil for the last two millennia, can accumulate a significant amount of foreign material; however, the pretreatment seems to be sufficient to purify the samples so we are only dating botanical carbon in the sample. The carbon is then sent to the University of Arizona, Radiocarbon Dating Lab for AMS dating. With this method we feel confident that the data produced are accurate and reliable. All dates are calibrated with Calib 5.0 using the Intercal 4.0 curve and reported as a two sigma calibrate age range (Stuiver et al. 2005).

We processed thirteen samples from the site of Kala Uyuni, divided between the three major excavation areas of AC, KU, and AQ. The selection process was driven by the need to place major construction and use events for the structures at Kala Uyuni and to refine the ceramic chronology in the Late Formative period.

Results and Discussion

The raw and calibrated results are shown in table 2.1 and graphically plotted in figure 2.2. At first glance we can see that there are two zones of activity at the site reflected in the dates: the construction of Chiripa phase semi-subterranean courts at the top of the nearby hill, the AC area, during the Chiripa phases, and the Late Formative 1 occupation in the KU area on the *pampa*.

The semi-subterranean courts seem to have been constructed approximately simultaneously and were in use for as much as 800 years. This is a compelling finding; these seemingly quaint structures were created early in the Middle Formative and continued to be used and modified throughout the Late Chiripa phase (see Cohen and Roddick's discussion of the chronology of court construction in chapter 6 of this volume). The population that constructed these sunken courts lived at the base of the hill on which they are located, in what we call the AQ area of the site.

There may have been a brief hiatus of occupation before a Late Formative 1 occupation was established. This is an exciting finding and these dates seem to be coinciding with Late Formative 1 dates from other areas of the southern Titicaca Basin.

These radiocarbon dates do not change the overall chronology of the site. Instead, they largely confirm determinations based on Steadman's ceramic chronology (chapter 7 of this volume). The radiocarbon dating program of TAP has confirmed a robust ceramic chronology with radiocarbon dates that agree across several time periods and sites.

3

Excavations in the AQ (Ayrampu Qontu) Sector

Maria Bruno

Ayrampu Qontu, named after a nearby hill, or *qontu* in Aymara, where a particular cactus called *ayrampu* grows, is the westernmost sector of the Kala Uyuni site. This area was selected for excavation based on the high density of Early and Middle Formative period ceramics encountered by Bandy (2001a) in his survey of the Taraco Peninsula. The density and utilitarian character of the ceramics led Bandy to conclude that this sector represented a Chiripa-period residential area. Recovery of a Chiripa-period household has been a longstanding goal of the Taraco Archaeological Project, and we hoped excavation of this area might reveal such remains. While such a structure failed to materialize, we excavated nearly two meters of stratified, well-preserved midden that, based on the ceramic assemblage, dates between the Early and Late Chiripa phases.

Altogether, we opened seven contiguous 2x2 meter units (figure 3.1). Units N857/E535, N857/E537, and N855/E536 were opened as individual 2x2 meter units. Unit N855/E536 was reduced to 1x1 meter and excavated to sterile. We also conducted deep excavations in a larger area, two contiguous 4x2 meter units, referred to as unit N859/E535.

We began with Unit N857/E539. After removing the plow zone (approximately 20 cm thick), we encountered several distinct deposits that appeared to run diagonally (southwest to northeast). Particularly suggestive were wide and linear deposits of a dense orange clay that we hypothesized might be the remains of an adobe wall. The other deposits consisted of a dark, silty clay with flecks of charcoal that we hypothesized might be midden associated with the structure. An alternative explanation for these features, however, was that a series of strata had been deposited on a western trending slope, the crest of which was truncated by plowing (see figure 3.2). The truncation of these sloping strata could create a banded pattern such as we saw at the base of the plow zone.

From the first 2x2 units, we decided to expand horizontally and removed the plow zone from Unit N857/E535 and the large Unit N859/

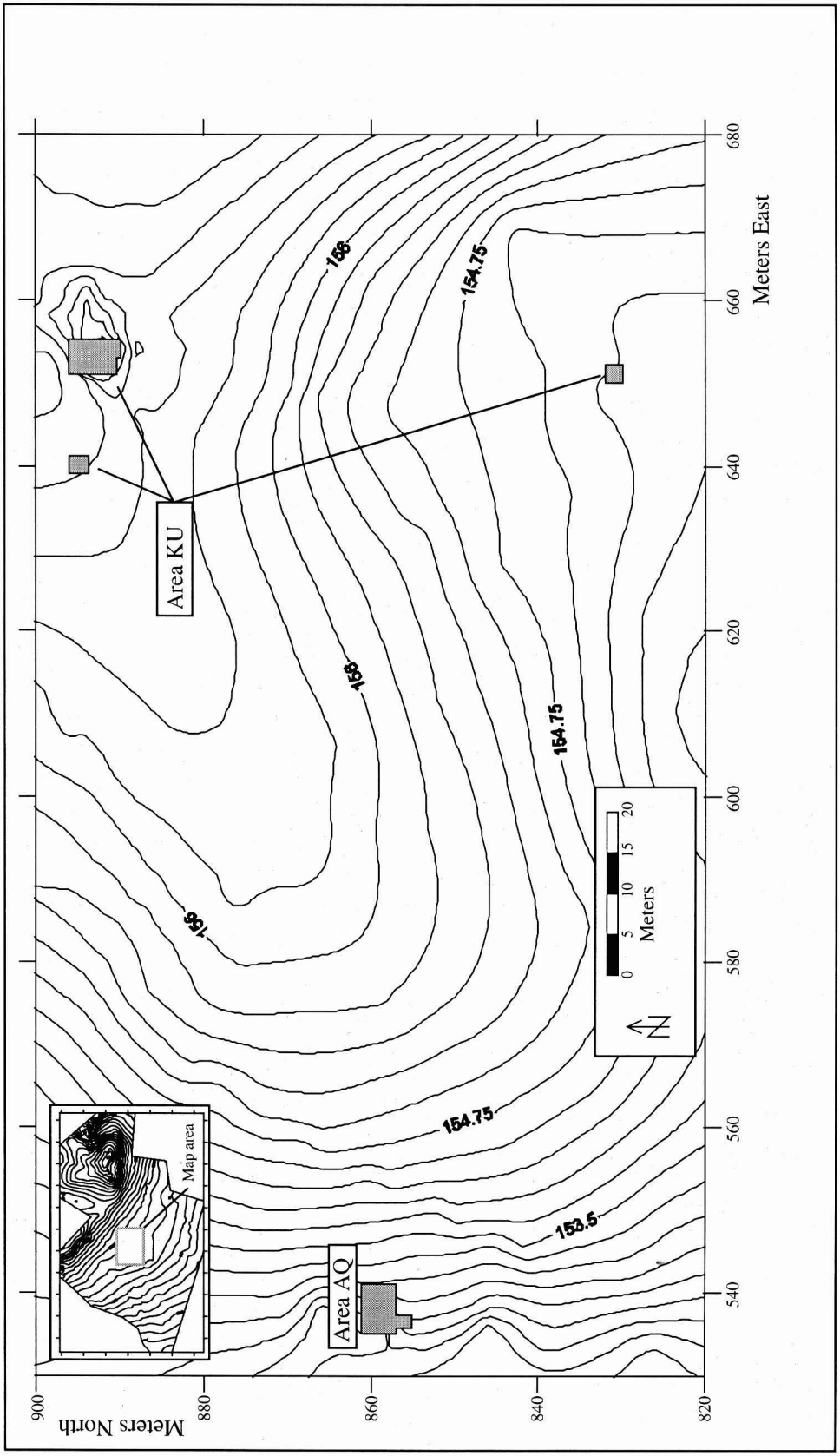

Figure 3.1 Map of AQ and KU areas. The AQ area is located on the left side of the map.

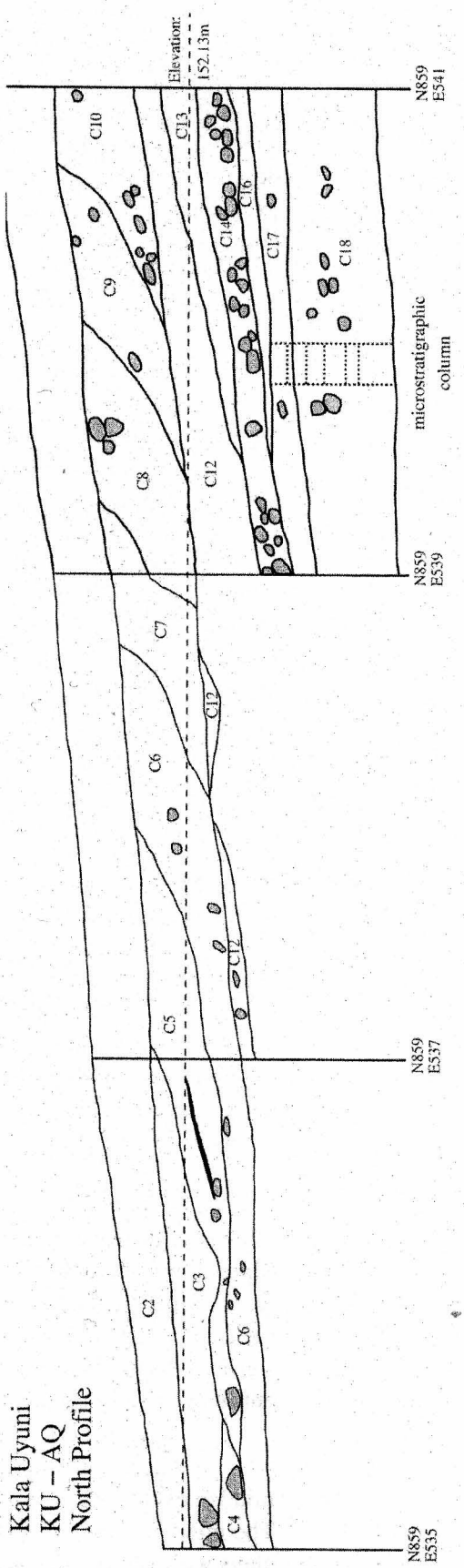

Figure 3.2 AQ North profile.

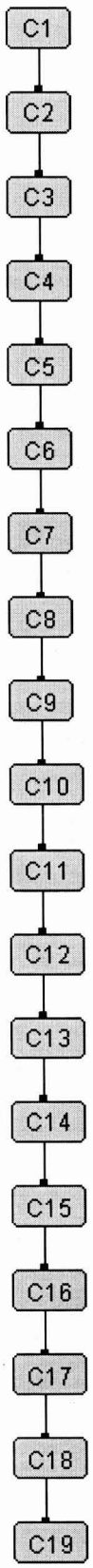

Figure 3.3 Area AQ Harris Matrix.

E535. As a result of these excavations we were able to determine that the clay deposits did not form part of a structure. Instead, it appeared as if we had encountered a fairly complex series of superimposed midden and architectural rubble deposits (figure 3.2). We decided to rapidly excavate a 1x1 meter sounding in the southwest corner of unit N855/E536 in order to determine the depth of the site and the general stratigraphic sequence.

After completing excavation of the 1x1 meter sounding, we decided to excavate a larger area in order to obtain a good sample of what appeared to be a stratified, Chiripa-period midden. Beginning in the western Unit N857/E535, we excavated the most recent midden deposits, Events C3, C4, and C5 (see figure 3.2 for a Harris Matrix). The ceramics from C4 and C5 are Late Chiripa and a radiocarbon date from a locus within these events revealed a calibrated C14 age of 786-413 B.C. (see chapter 2, this volume). The removal of these deposits in this unit exposed midden Event C6, which was identified in the initial excavations in Unit N857/E537. Leaving a 50 cm balk from the eastern wall of Unit N857/N537, we excavated Event C6 in one locus that extended through both units. Beneath, we encountered Event C7, which was primarily orange, clay-rich material. While it was difficult to interpret its origin, we described it as a dump of adobe-like material, possibly architectural rubble. It is possible that it could be the highly disturbed remains of an adobe structure, but its condition precludes such a conclusion.

Beneath C7 we encountered a dark midden (C8) that extended across both units. Since it appeared that the archaeological deposits were deeper to the east, we decided to continue the excavations in Unit N857/E539 down to sterile so as to obtain a proper sample of the entire occupation sequence.

Altogether, we excavated 13 distinct midden events and 3 adobe dump/slump events. The midden events consisted primarily of silty clays with varying densities of carbon and

clay inclusions, ranging in color from red to yellowish-green. Several of the midden events had very high densities of fish and camelid bone. Dr. Katherine Moore found several bone weaving tools such as shuttles, spindle whorls, and combs in her analysis of the bones from several of the midden deposits. There were also large quantities of ceramics in the midden deposits. Analysis of the ceramics suggests that they are overwhelmingly utilitarian, with very few decorated sherds present (Steadman, chapter 7 of this volume).

The majority of these midden events date to the Late Chiripa phase. The earliest deposit, C18, appears to be a mixture of Early and Middle Chiripa, with some Late Chiripa. A date obtained on carbonized seeds from Locus 5065 of this event produced a calibrated radiocarbon age of 800-523 B.C. While excavating the lowermost loci, we noted the occurrence of large pore sizes and insect disturbance. These insects excavate burrows about 5 cm in diameter, which often fill with a soil distinct from the primary matrix. This creates the appearance of many small lighter- or darker-colored circles in the soil. Dr. Melissa Goodman took a micromorphological block sample from this area, but her field assessment was that it was highly disturbed and that the Early and Middle Chiripa deposits (the earliest deposits in the AQ area) had most likely been homogenized by post-depositional bioturbation. Interestingly, however, Dr. Steadman detected a vertical separation of Early from Middle Chiripa in the ceramic assemblage of superimposed loci in Event C18, so perhaps this movement may not have affected the larger artifacts.

The excavated deposits and the artifacts contained therein, therefore, support Bandy's hypothesis that Ayrampu Qontu was a domestic habitation area in the Early, Middle, and Late Chiripa phases. The majority of the material pertains to the Late Chiripa phase, and promises to provide rich data on changes and/or continuities in domestic life during this time and an interesting comparison to the Achachi Coa Collu (AC) ceremonial sector of Kala Uyuni (reported by Cohen and Roddick, chapter 6 of this volume).

4

Excavations in the (KU) Kala Uyuni Sector

José Luis Paz and Maria Soledad Fernandez

The Kala Uyuni sector of the eponymous site is an extensive colluvial surface that slopes gently down to the south and is located approximately 400 meters from the shore of Lake Titicaca. At present the area is used as agricultural land by various families of the community of Coa Kkollu, and among the most salient features of the site are the small mounds of stones produced by field clearance and preparation.[1] These mounds are interspersed among topographic irregularities that, according to our subsurface augering data, are produced by variation in bedrock topography. There are also variations in surface soil color, of greater or lesser area and intensity, randomly distributed, which are mainly the result of modern manuring. A third element that should also be noted is the sector's very dense, strongly patterned surface ceramic distribution. Overall, though, the surface of the sector gives few clues to the nature of the underlying archaeological deposits.

1 These activities consist, principally, in the accumulation, on the edge of active fields, of cobbles brought up by the plow. These are later used for building construction.

In order to determine something of the nature of the subsurface deposits, we used a three-inch bucket auger to test areas of high surface density of Middle and Late Formative ceramics. We tested twenty-four auger holes oriented to the site grid at intervals of 10 meters. In addition, we tested four auger holes in the center of the most pronounced surface soil stains. This testing program served to identify two potential excavation areas. In each of these areas we excavated a 2x2 m test pit. The results of these excavations are described below.

Description of the Finds

N830/E650

In the first excavation unit we noted a thick stratum of silty clay loam (7.5YR 3/6) with a high density of artifacts pertaining to the Late Formative and Tiwanaku periods (event B3). Immediately below this, at 50 cm below datum, we encountered a cobble fill (B4; see figure 4.1 for profile drawing), set in a clay loam matrix

(10YR 4/3), which contained only Tiwanaku IV-V materials and overlay sterile clay (5YR 6/4). This interesting case of inverted stratigraphy was apparently produced by erosion of sediment from a nearby elevated area. This colluvium accumulated on top of an existing Tiwanaku period deposit (B4). On the other hand, this cobble fill (B4) was undoubtedly produced by cultural activity, possibly reflecting architectural rubble. This interpretation is supported by the cobbles themselves, the shape and size of which indicate intentional selection.

Included in this cobble fill were the fragmentary lower limbs of an adult human, found in the west profile of the excavation unit, which exhibited pronounced surface damage (Katherine Moore, pers. comm. 2003). This suggests the disturbance of an earlier burial and its later exposure to the elements (Schiffer 1996). However, a small pile of cobbles atop these remains suggests the possibility that this may represent a tomb of the Tiwanaku period, although no indications of a formal mortuary feature were identified in the course of the excavations.

A second context associated with the B4 cobble fill was a small hearth, 30x60 cm and 15 cm deep, located in the southeastern corner of the excavation unit. The hearth fill (B5) consisted of ash contained within a concave pit cut (B6) that was lined with a thick layer of yellow clay.

N890/E651

In the second excavation unit we encountered the southeast corner of a prehistoric structure (ASD-2) at a depth of approximately 1 meter below datum, It was necessary to excavate further contiguous units in order to determine its size and shape. The total excavation area eventually reached 12 m^2. The result of these labors was the complete exposure of a slightly trapezoidal structure foundation. The external corners of this structure were rounded, though the one preserved internal corner was a right angle. The south wall measured 3.5 m, the north wall 3 m, and the east 2.8 m (figures 4.2 and 4.3). The west wall was not excavated due to time constraints, but it is apparently incomplete, be this a reflection of poor preservation, prehispanic disturbance, or a different construction technique (see figure 4.4 for a drawing of the West profile). The foundation (B13) consists of a double row of large cobbles, interior and exterior, separated by a space 60 cm in average width. In this space between the interior and exterior faces we encountered a gravel fill, as well as some indications of adobe bricks (10YR 3/2) and some Middle Formative ceramics. All of these features, which make up the walls of the structure, are tied together by a layer of compact yellow clay (10YR 7/6) with a height of 20 cm.

The entrance to the building was possibly located in the north wall where the foundation is interrupted by a thin layer of yellow clay (B24). Alternatively, it may be located to the west where the wall foundation is missing. The floor of the structure (B12) is a compact, undulating layer of yellow clay (2.5Y 7/4), 3 cm thick, which rises slightly to meet the structure walls. This floor was remarkably clean. Above it, three thin deposits of sandy clay loam (B10, B11, and B23) that are separated by two thin lenses of yellow clay (B22 and B24) were discovered. According to Melissa Goodman, who inspected them in the field, these lenses could possibly represent a poorly preserved floor or perhaps various reflooring events.

On the exterior of the structure we identified two use-compacted surfaces. The first (B21), located to the south of the structure, is comprised of fugitive lenses of yellow clay, dispersed irregularly and associated with significant quantities of pottery. Additionally, in the east profile we found a small pit from which we extracted a whole pottery vessel.

The use surface located to the north of the structure (B77) is more compact and continuous, being apparently better preserved. It is associated with a dense ash concentration (B76). The surface contains few artifacts and was covered by a thin deposit (B75). On top of this, the excavators later found a hearth pit (B61), 70x30 cm and some 15 cm deep, which was

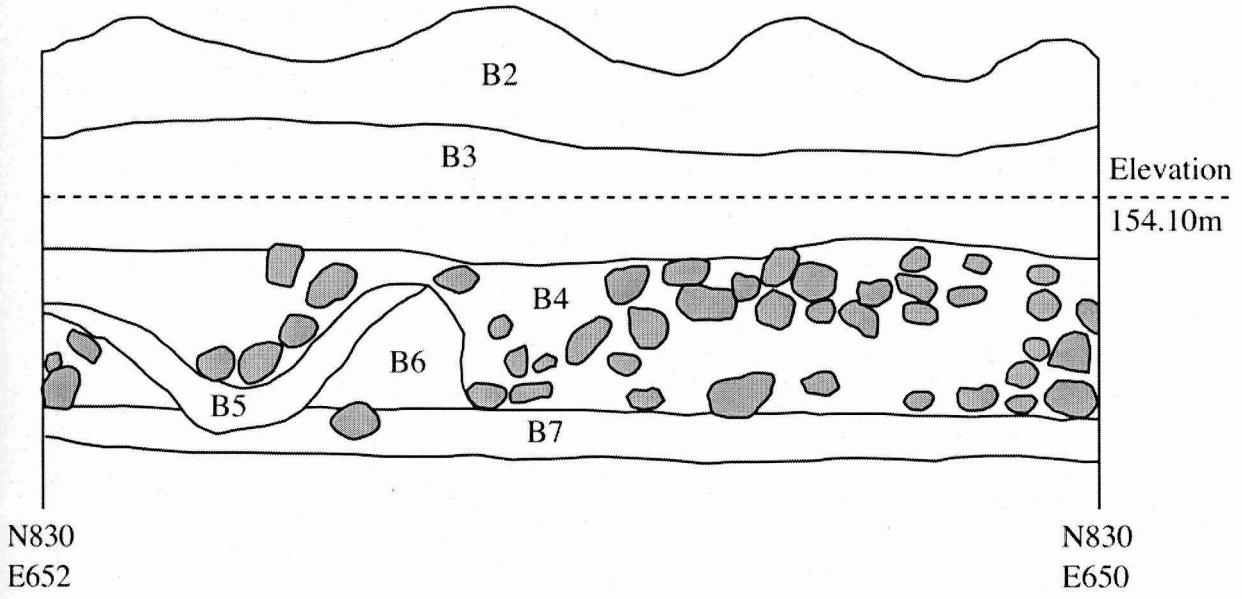

Figure 4.1 Unit N830/E650, South profile.

located in the eastern profile of the excavation unit.

It is clear that both surfaces discussed above have in common the presence of thin lenses of clay that would have been formed by the washing of fine particles from the standing walls of the structure. These features are related to the proximity of these surfaces to the structure itself. However, the use histories of the two surfaces were radically different. The greater compaction of the northern surface reflects intensive trampling (Schiffer 1996), and the two hearths represent two distinct moments of occupation, separated as they are by a thin deposit (B75). Conversely, the patchy and fugitive nature of the southern surface would indicate less foot traffic and only one occupation level is evident.

The northeast interior corner of ASD-2 was destroyed by a large intrusive pit (Rasgo 6), 1.2 m in diameter and 2.5 m deep. This pit was somewhat bell-shaped (the pit cut is event B15) and is filled with a series of four superimposed deposits of silty soil (B16, B17, B57, and B78) and various lenses of ash, clay, and sand. The pit also contained a substantial assemblage of large, intact stone artifacts (hoes, hammerstones/peckingstones, grinding stones, etc.), seven large grinding slabs (*batanes*), some of them intact, and a variety of intentionally broken ceramic vessels. Of these, two large jars could be reconstructed as well as some bowls similar in form and decoration to the Kalasasaya ceramics of Tiwanaku. These pertain to the Late Formative 1 period of our regional chronology. One important aspect of this pit is that it extends well below the floor level of the ASD-2 structure, and its profile clearly reveals a long and complex stratigraphic sequence preceding the construction of ASD-2.

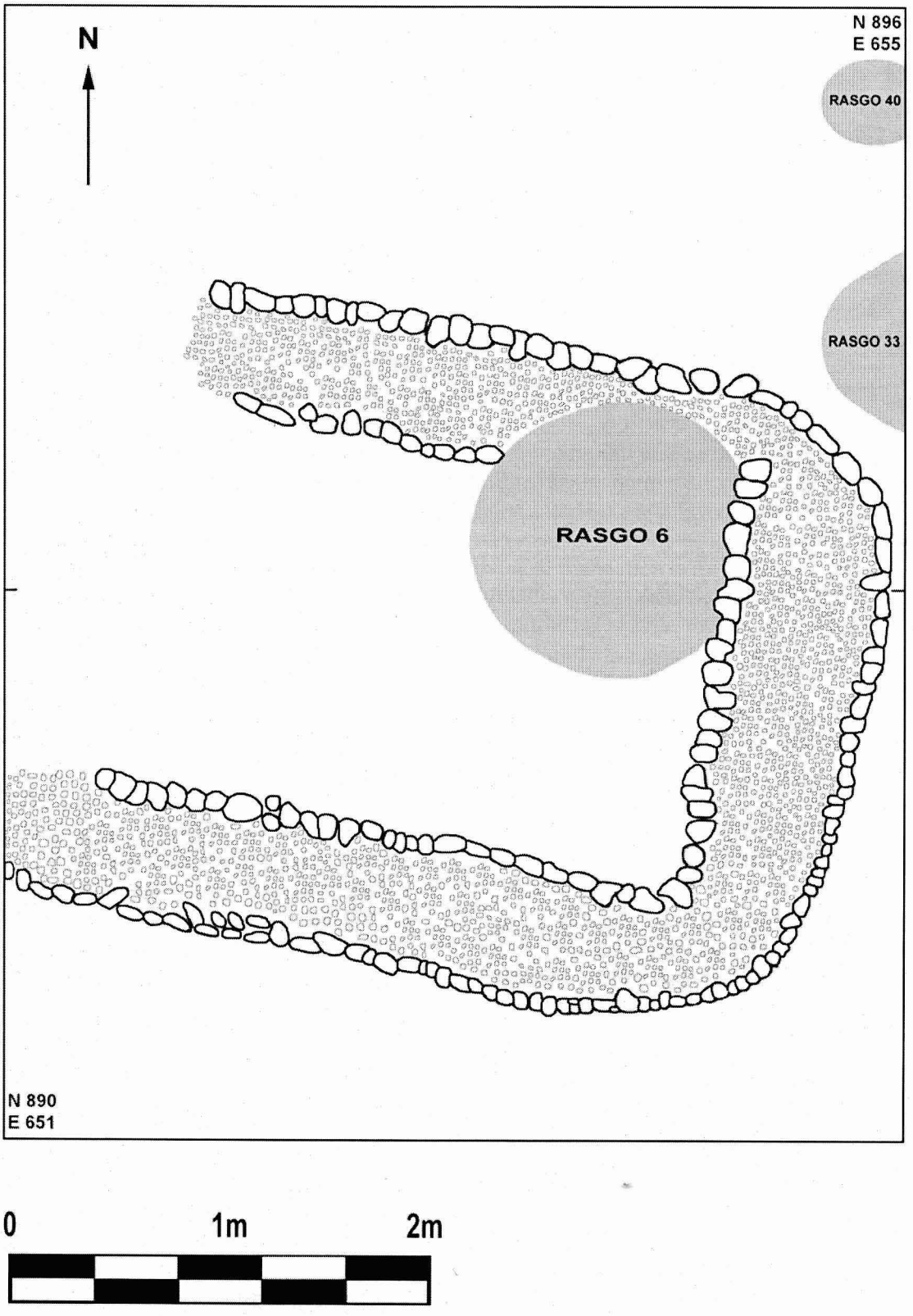

Figure 4.2 Plan of ASD-2 structure and nearby features.

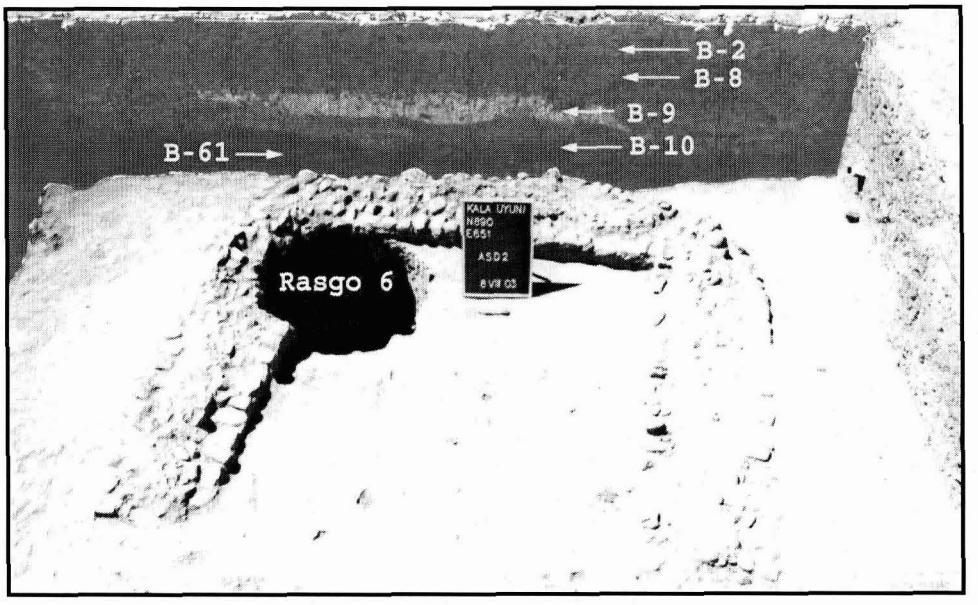

Figure 4.3 Photograph of unit N890/E651 modified to enhance the visibility of strata in the East profile (visible beyond the ASD-2 structure).

The strata in the interior of the structure, and the wall remnants themselves, were capped by a layer of yellow clay (B9) that is very thick in the east profile and may represent an episode of wall collapse and subsequent erosion. The principal argument in support of this interpretation is that the stratigraphic contact between this event and the foundations of the structure has a marked inclination (see figure 4.3). This hypothesis is further supported by the preliminary analysis of Melissa Gooodman (pers. comm. 2003) that suggests that this event (B9) could have originated from the erosion of *tapia* (puddled adobe) walls.

All of these Late Formative 1 contexts (figure 4.3) were covered by a thick Tiwanaku-period occupation level with no apparent intervening Late Formative 2 deposition. This late occupation level comprised, in the area excavated, four intrusive pits and two thick horizontal strata. The first of these events (B80) was an enormous pit located in the north profile, some 2.1x1.1 m across and 40 cm deep. The fill of this pit was composed of cobbles, ash and silty clay soil (B26, B63 and B64). The fill also contained two small ceramic vessels, thin fragments of sheet copper, numerous pottery sherds, and abundant fish bone. At present we are uncertain of the function of this feature, but similar pits in other Tiwanaku period contexts have been interpreted as trash-filled adobe borrow pits (Bermann 1990; Janusek 1994). The second pit (B19), located in the west profile of the excavation unit, measured 70x50 cm and 25 cm in depth, was bell-shaped and lined with yellow clay (B79). The fill of this pit (B20) is composed primarily of a silty clay soil. This could indicate a storage function, since this type of soil can be produced by the decay of organic material (Stein 1992). In this regard, the yellow clay lining could have helped to keep the pit contents dry (Janusek 2001). The third pit was 30 cm in diameter and 15 cm deep, and was also located in the western profile of the excavation area. This pit also was bell-shaped (pit cut: B82) and also contained a

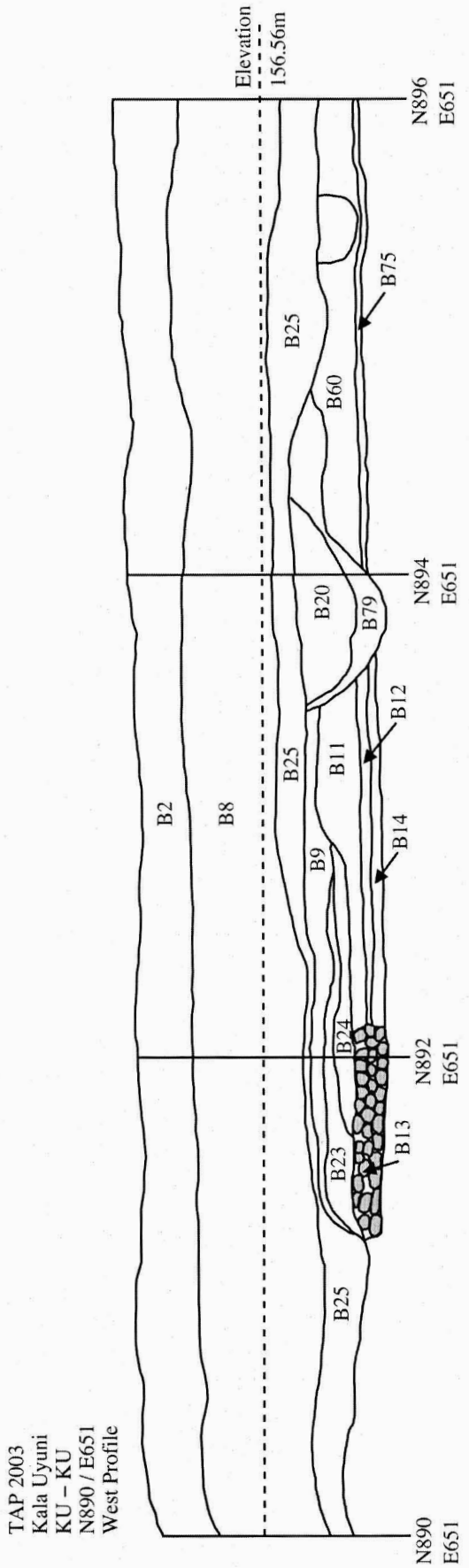

Figure 4.4 Unit N890/E651, West profile.

silty clay soil. We suggest that this pit may also have been a storage pit for the reasons outlined above, though its lack of a clay lining may indicate a different function. Finally, a fourth pit (B28) was excavated pertaining to this level, measuring 60x30 cm and 30 cm deep. In this pit we found the articulated rib cage of an adult camelid, numerous fragments of charred plant material, and fish bones, all suspended in silty clay soil matrix (B27).

These four features were found beneath an irregular stratum (B25) of a sandy texture. An extremely high density of sherds and other materials dating to the Tiwanaku period characterized this deposit. The density and diversity of artifacts strongly suggest that this stratum represents a substantial midden deposit. On top of this midden lies a thick colluvial deposit (B8), the same as is found throughout the KU sector below the plow zone. The upper portion of this colluvial (that is to say, secondary and post-occupation) level was disturbed by cultivation, grading into the overlying plow zone (B2).

It should be mentioned that the two excavation areas discussed in this chapter are both represented in a single Harris Matrix (figure 4.5). Cultural features in this matrix have been emphasized by the use of special symbols, as indicated in the legend, to produce a second, more interpretive Harris Matrix (figure 4.6) (Paice 1991).

Conclusions

The stratigraphy of the KU sector was produced by a combination of: 1) the decay and decomposition of the subsoil, 2) the erosion of the upslope colluvium, and 3) aeolian deposition. The two former processes, in addition of course to cultural deposition, contributed significantly to the formation of the deposits in the KU sector. That the majority of archaeological deposits at the site are rich in clay and in medium-sized, semispherical gravel inclusions is a testament to the action of these processes. On the other hand, aeolian deposition generally contributed only a small component of the soils in the sector, and in only a few cases appears to have functioned as the predominant depositional process (e.g., thin lenses of windblown sand).

As far as the sector's occupation sequence is concerned, the earliest event that we have excavated is a thick stratum (B14) dating to the Late Formative 1 period (see chapter 7 by Steadman in this volume). The ASD-2 structure was built on top of this stratum during the same chronological period. According to the radiocarbon dates at our disposal (see chapter 2 by Whitehead in this volume), the floor of the structure (B22) was in use sometime in the interval of 132-340 A.D.: in the final few centuries of the Late Formative 1 period.

This structure apparently had a domestic function, though complemented by certain ritual practices. Our proposal that domestic activities were carried out in the structure is based on the following points: a) the few sherds found on the floor(s) lack decoration; b) the presence of hearths on the exterior of the structure and the greater density and diversity of materials on the exterior suggest that most activities took place outside of the structure; c) the absence of features in the interior indicates that the structure was used primarily as a sleeping quarter; d) the very limited interior space could only have been used by a small use group, such as a nuclear family.

Once the floor(s) of the ASD-2 structure were in place, a deep pit (Rasgo 6) was excavated in the northeast interior corner, slightly disturbing this area of the foundation in the process. Into this pit were thrown various stone tools and whole vessels as described previously. Some of these vessels were decorated, and the act of their deposition undoubtedly had ritual significance (offering pit, structure closure and abandonment, relocation of its inhabitants, etc.). Later came the collapse of the walls, and the entombment of the structure foundation, floor, and features beneath a mound of clay rubble. The erosion of this rubble ultimately resulted in the formation of the B9 event, which is restricted to the interior of the structure.

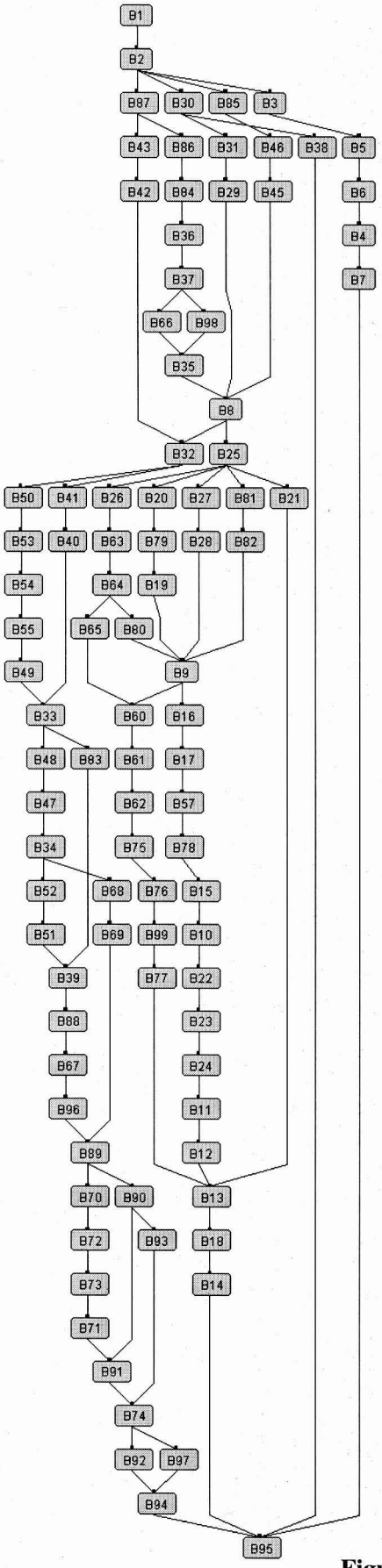

Figure 4.5 Area KU Harris Matrix.

Some types of ritual activity occurred within the domestic sphere (e.g., *challas* [libations], weddings, initiation rites) and were conducted, at least occasionally, within domestic architectural spaces (Bermann 1990; Dean & Kojan 2001; Hastorf 1999). This interpretation hinges upon the idea that the function of cultural features is specific (e.g., tombs, hearths, structures, etc.), but that this function can be determined only with reference to their wider contexts (for example, the presence of burials in habitation structures would not be interpreted as a "cemetery"). As a consequence, it is impossible to establish a clear taxonomic distinction between "ritual" and "domestic" contexts based on the presence of decorated ceramics since these two types of behavior were not mutually exclusive during the Late Formative period.

On the other hand, the identification of various stones placed within a hard yellow clay matrix (possibly a form of mortar) in the northeast corner of the excavation unit leads us to suspect the existence of another structure adjacent to ASD-2. These two structures apparently would have been arranged around a compact exterior surface.

In a regional perspective, the ASD-2 structure at Kala Uyuni displays similarities in form and spatial organization with the buildings of the first occupation phase at Lukurmata (Bermann 1990) and with a building reported by Max Portugal Ortiz (1993) at the site of Tiwanaku.[2] This last has been attributed to the Tiwanaku I phase, equivalent to our usage of Late Formative 1. However, there are also important differences between ASD-2 and these other structures, such as: 1) the rounded shape of its external corners; 2) the absence of cultural materials on its floor, possibly indicating different occupation intensity, activities, or degrees of cleaning; and 3) the differences in the shape and

2 Within this structure were found ceramics, lithics, and a small hearth.

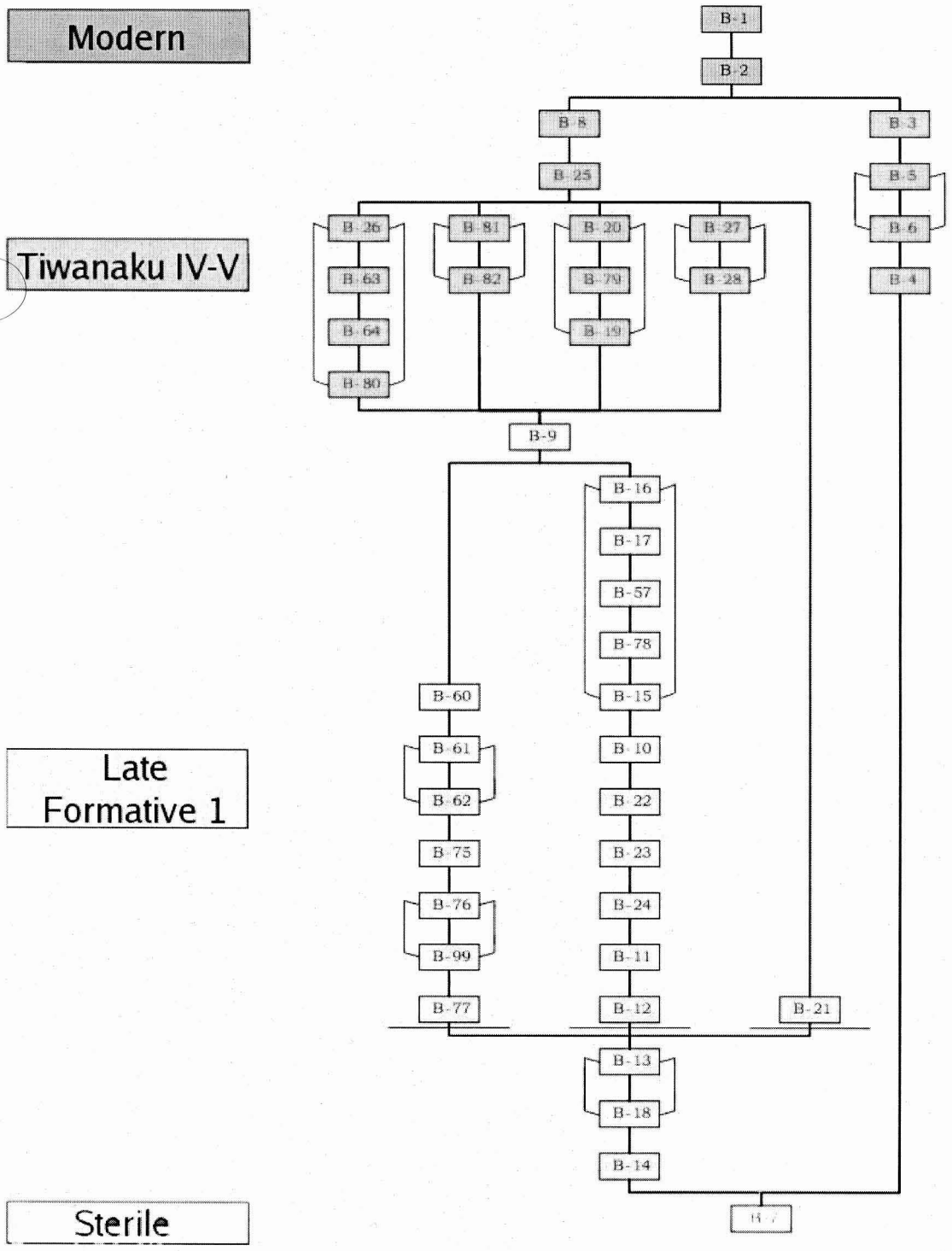

Figure 4.6 Simplified area KU Harris Matrix, modified to reflect interpretations presented here.

thickness of the foundations[3] not only indicate a greater investment of time and effort but also display a variety of construction techniques and possibly social functions.

Unfortunately, other known Late Formative structures are not strictly comparable to ASD-2. For example at Qeyakuntu, Janusek and Kolata (2003) found a curved wall with stone foundations and walls of adobe and gravel. This construction was associated with a human burial and various body parts. Also, at Kirawi, the same investigators excavated the "red building." This was a probable ritual structure characterized by foundations of red clay and two completely clean superimposed interior floors. A second construction at this site was the so-called "multicolored building." This had blue or gray adobe foundations and yellow clay walls. Within this probable domestic structure were excavated seven superimposed red or yellow clay floors, a blue clay bench, a large hearth, a rectangular storage feature, and a post hole. On the structure exterior were a large storage pit, the cist tomb of an adolescent, and a midden area. A third site with structures dating to this time period is CK-70, also in the Katari Basin and also excavated by Janusek. Here only wall segments and three post holes were found (Janusek and Kolata 2003).

These comparisons indicate that we cannot conceive of all Late Formative structures as homogeneous or identical, since the known structures from this period differ in form, size, contents, spatial organization, and so on. This diversity may reflect variations in domestic practice (distinct use of space, taste, aesthetic sensibilities, etc.), functional or design factors (living quarters, storage facilities, etc.), social status (e.g., elite versus commoner houses), ethnic affiliation, or even gender distinctions. What is certain is that these Late Formative period structures appear to be very heterogeneous, and it is premature to restrict ourselves to a single interpretive model given the current state of archaeological research and knowledge.

After the collapse and decay of the ASD-2 walls there was apparently an occupation hiatus, followed by an occupation dating to the Tiwanaku period. Unlike at other sites, however, there was no reoccupation of the structure, nor was it intentionally destroyed (Bermann 1990; Janusek 1994; Paz 2000) since it was already buried by that time. This last cultural level in the Kala Uyuni sector is characterized, as is common in sites of this time period, by numerous pits, varied in form and content, that intruded into the underlying levels. While the function of three of these appears to be clear (one hearth, one storage pit, and one offering pit), the interpretation of the others (a trash pit and a second storage pit) is debatable. These data indicate that the form of a pit determined its contents, but in some cases interpretive difficulties exist that may be attributed to: 1) the construction of various pits with different forms but destined for the same use (e.g., storage pits either hemispherical or bell-shaped), or vice versa (e.g., hemispherical pits used for storage or trash disposal), and 2) multifunctionality and/or reuse of some pits (e.g., artifact storage pits later used as granaries, trash pits reutilized as latrines). As a consequence, we believe that it is unsatisfactory to think of all of these events as trash pits.

Another particularity of these pits is that all of them begin at about the same depth, in a very small space. Despite the fact that no associated use surface has been identified in excavation, it is clear that there must be nearby habitation areas dating to the Tiwanaku period. This settlement should not be understood as a simple stratigraphic superposition, but rather as a complex process that varied in intensity, magnitude, and dynamic from site to site and from region to region (Berenguer and Dauelsberg 1989; Browman 1997; Paz 2000). The most compelling support for this proposal is the fact that the Tiwanaku-period occupations of Kala Uyuni and Iwawe are radically different. Iwawe, though located only five kilometers to the east, is a much more substantial site and may possibly display traces of civic-ceremonial construction (Albarracin-Jordan 1996; Burkholder 1997; Isbell et al. 2002).

3 The foundations of ASD-2 consist of a double alignment of cobbles separated by a gravel-filled space approximately 60 cm in width. The Lukurmata structures, on the other hand, had a double alignment of cobbles separated by no more than 30 cm.

5

Additional Excavations in the KU Sector – N894/E639

Maria Bruno and Mary Leighton

In order to complement the horizontal excavations being carried out by José Luis Paz and Maria Soledad Fernandez in the Kala Uyuni area, we opened a single 2x2 meter unit, N894/E639, with the intention of reaching sterile and obtaining a sample of the entire occupational history of this area (for a map of the KU area, see figure 3.1). In doing so, we hoped to find a complete chronology of the Formative period, particularly the transition between the Middle (Late Chiripa) and Late Formative, since this has not yet been properly dated. Another goal was to get a good chronological sample of Late Formative ceramics so as to better understand and differentiate the two most commonly recognized periods, Late Formative 1 and Late Formative 2 (see Steadman this volume).

Below the plow zone (B2), we encountered a Tiwanaku IV-V occupation that was represented by two horizontal strata, several pits, and two burials. The youngest deposit was B8, previously defined by Paz and Fernandez as "soil with artifacts." We did not have the yellow clay layer (B9) below B8, as Paz and Fernandez did. Instead, we came upon a yellowish-brown mottled deposit of silty clay with inclusions of limestone flecks and charcoal. The event (B32) had a fairly high artifact density, and we defined it as a medium density midden.

Several pits cut into these Tiwanaku deposits. Feature 8 (B29, B30, B31), Feature 9 (B35, B36, B37, B66, B84, B98), Feature 18 (B42, B43), and Feature 41 (B38, B86, B87) were all pits with mixed fills that contained Tiwanaku VI-V ceramics (see figure 4.5 for Harris Matrix and figure 5.1 for a profile drawing). Feature 41 included a cobble deposit (B38) that may have been related to some type of construction event. We encountered no other evidence of architecture in this unit, however.

Two burials probably supplied the best-defined contexts we had for the Tiwanaku IV-V occupation in this trench. Burial 2 (Feature 14, Events B40 and B41) was a poorly preserved child burial. We believe the pit may have been grass-lined, because we found a white substance that looked like thin layers of fibers. The impressions may be the remaining silica cells (phytoliths) of a degraded grass lining. Burial 4 (Feature 16, Events B45, B46, and B85; figure 5.2) is the tomb of a well-preserved adult

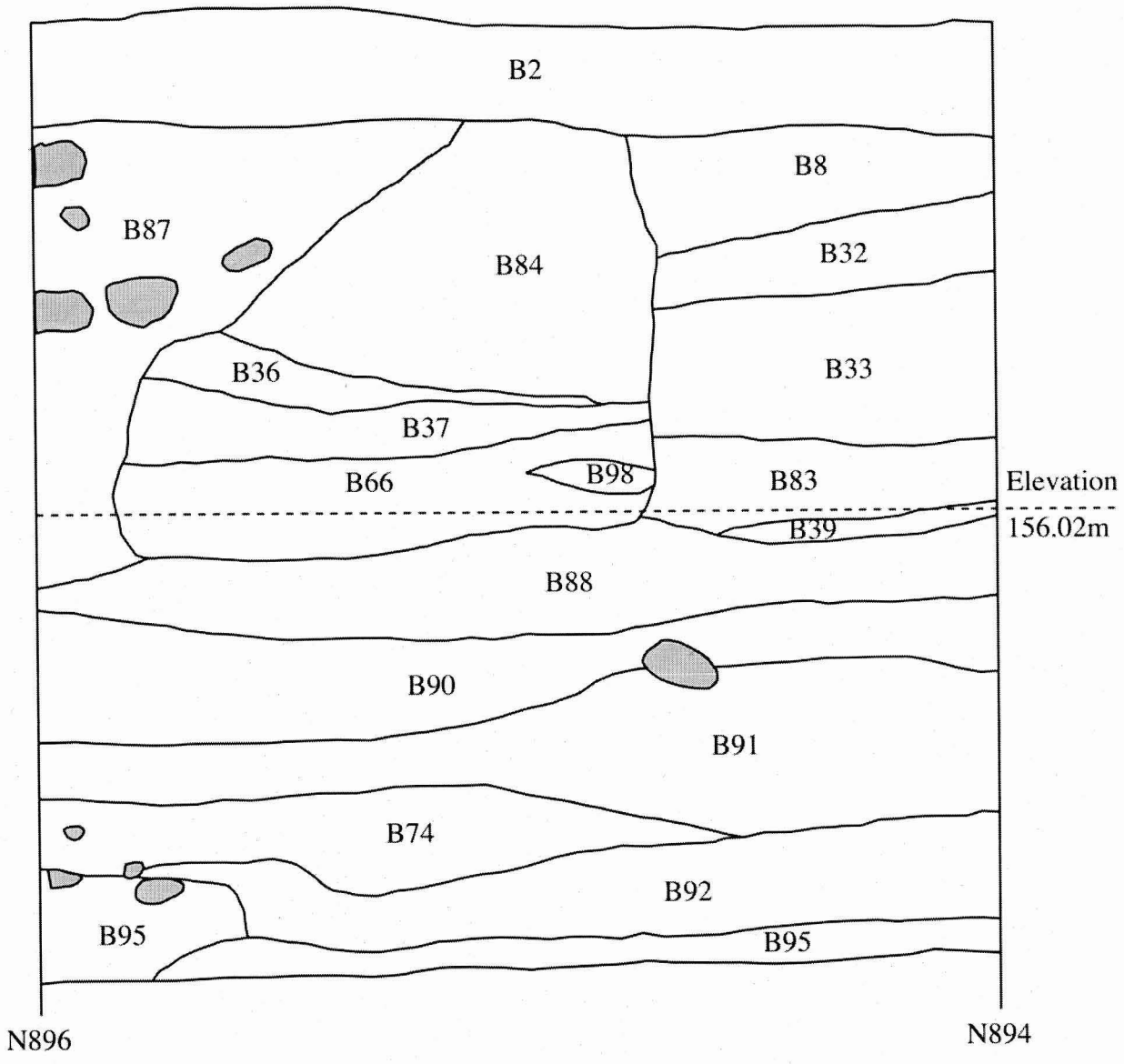

Figure 5.1 Unit N894/E639, North profile.

accompanied by a *sahumador* and blackware *kero* (figure 5.3). The individual was in a seated flexed position facing east. The grave was a cist or shaft tomb that had several large *batanes* lining and capping the pit.

Based on analysis of the ceramics, it appears that the Tiwanaku IV-V to Late Formative 2 stratigraphic transition occurs about 156.6 meters in elevation with Event B33. This deposit is a heterogeneous, silty clay loam with many inclusions of yellow and red clay, limestone flecks, and charcoal. We described this as a medium-density midden. The ceramic assemblage was primarily Late Formative 2. There was a small quantity (10%) of Tiwanaku IV-V pottery in this stratum, but it may actually derive from the upper fill of Burial 4, which was mistakenly combined with B33 (Locus 5265).

We also encountered pits cut into Event 33. Feature 20 (B47, B48), in the southeast wall of the unit, was filled with ash and charcoal. The ceramics in this pit were mixed Tiwanaku IV and Late Formative 2. Also cut into B33 was a large pit, Feature 22 (B49, B50, B53, B54, B55), that we located in the center of the unit. This pit was about 30 cm deep and varied between 40 and 45 cm in diameter. The pit had very irregular boundaries and was difficult to define during excavations. It contained four sequential fill events, two of which were almost pure ash and charcoal mixed with silty clay (B50 and B54), one that was a fairly dense clay loam of highly irregular thickness (B53), and one that was primarily a dark silty clay loam with some charcoal and ash (B55). The ceramicists inspected but did not formally analyze B50, and reported that the assemblage looked like Late Formative 1 and 2. They did analyze B55, however, and described it as mostly Late Formative 2, with only 3% mixing of Late Formative 1 materials.

Below B33, we uncovered a yellow clay loam that extended through the northern part of the unit. The clay was quite regular and compact and may have been part of a prepared surface (Event B34, Feature 32), although the limited excavations did not permit us to identify any associated features. The analysts defined the ceramic assemblage from this event as unmixed Late Formative 2. Thus, we might group Event B33 and the pits dug into it as the remains of a Late Formative 2 occupation of the site.

At about this depth, the stratigraphy in the unit became quite complicated and difficult to excavate. This was in part due to the large pit in the center of the unit, Feature 22, that made it difficult to follow any stratum across the unit, but also it seems that there were distinct depositional events in the northern and southern sectors of the unit. For example, to the south of the clay surface, at about the same depth, was a brown clay loam with artifacts (B83) whose origin was not discernible but seemed to abut B34. Due to this complicated stratigraphy and often very subtle changes in the archaeological deposits, many loci had mixed events in this part of the excavation. Below, we provide descriptions of the events as they were encountered during the excavations, and later clarified by examination of the profile and the Harris Matrix.

Beneath the possible clay surface (B34) in the northern area of the unit, we encountered a looser soil that was a brown, slightly mottled, silty clay with pebble inclusions. We interpreted this event (B39) as a medium-density midden, and it contained predominantly Late Formative 1 ceramics. We obtained a date (AA59721) on carbonized seeds from this event (Locus 5274) that fell between 73-237 cal A.D. Below B34, and cut into B39, we found a small ash pit (Feature 27; Events B51 and B52) that has not been analyzed yet but likely dates to the Late Formative 1 period.

Below B30 was a compact clay-to-clay loam deposit with large stains of bright yellow and orange soil and a relatively high density of artifacts. This event, B67, appeared too thick to be a floor and was defined as a possible occupation zone. To the east, the stains of colored clay continued. The entire area seemed to have a similar density of artifacts and seemed equally heterogeneous. Therefore, we excavated

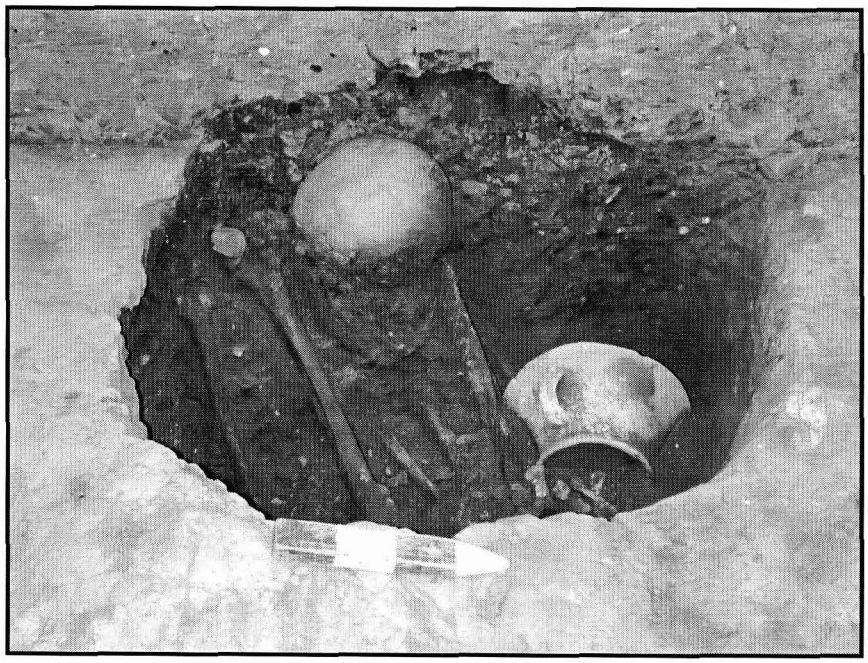

Figure 5.2

Burial 4
(Tiwanaku IV-V).

it as a single event (Locus 5308). In the profile, however, we could see that to the east there were, in fact, two distinct deposits that were not recognized during the excavation. Two new events were defined after their identification in the profile, B68, a fairly homogeneous deposit of yellow clay, and B69, a dark, organic lens.

Beneath the occupation zone (B67) was a distinct deposit of yellow clay loam, with a lower artifact density and with charcoal inclusions, which we defined as a medium-density midden (B89). During the excavation of B89 we also encountered a fairly large ash deposit, B70, that seemed to be somewhat mixed with B89. It appeared that perhaps bioturbation, particularly insects and animal burrowing, probably had disturbed the stratigraphy in the northwest corner of the unit at this depth.

Due to the mixing of these events during the excavation and by post-depositional processes, the contexts were not prioritized for analysis. The ceramicists did analyze an unmixed locus (5310) of the ash deposit, B70, and found it to contain mostly Late Formative 1 ceramics with 6% Late Chiripa intrusives. This reflects the potential mixing of these deposits. The high level of disturbance may be related to the burial directly beneath these deposits.

Below B89 and B70, in the northwest corner of the unit, we found a pit that contained two burials. The earliest burial (Feature 31, B73, Burial 5) was a fairly well-preserved adult in a flexed position and oriented east-west. It seems to have fallen on its back or was placed lying down. It, unfortunately, extended into the western and northern profiles. When the excavation of the unit finished, we sacrificed the profiles to remove the entire burial, particularly to retrieve the cranium. Placed at the foot of this individual was a small Kalasasaya (red-rimmed) bowl (figure 5.4). This and the accompanying ceramics associated this burial within the Late Formative 1 period. Similar to the later Tiwanaku IV-V burial (Burial 4), the tomb pit (figure 5.5) was lined and capped with large *batanes*. Just above this interment was another, less well-preserved individual (Feature 31, B73, Burial 6). This person was even more embedded in the wall, so we just exposed the elements that fell within the unit, including

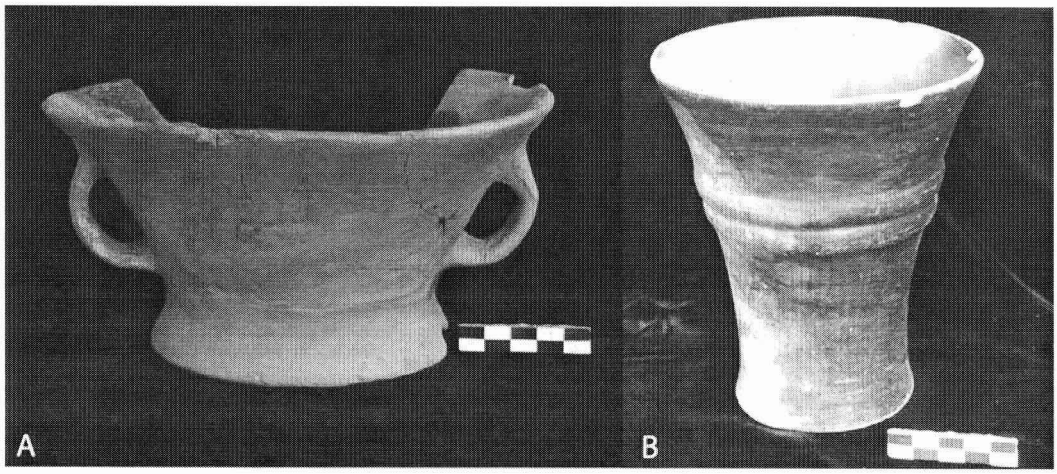

Figure 5.3

Ceramic vessels discovered in Burial 4.

Figure 5.4

Kalasasaya bowl from Burial 5.

parts of both feet and probably the right tibia and pelvis. This also appears to have been an adult or sub-adult, but we found no grave goods associated with it.

Returning to about the depth of B67 (approximately 156.05 meters in elevation) in the southern area of the unit, we encountered another distinct deposit, B88, a heterogeneous silty clay loam deposit with inclusions of charcoal, limestone fragments, variously colored clay, and pockets of sand. The deposit contained high quantities of ceramic, lithic, and bone artifacts, thus we defined it as a high-density midden. This event seemed to have been deposited prior to B39, the possible clay surface, but later than B67, the possible occupation zone. The ceramics fall into the Late Formative 1 period.

Directly beneath B88 in the excavations was B90, a medium density midden, comprised of a sandy clay loam matrix with inclusions of charcoal. This stratum appears to have been deposited prior to the midden event B89 found in the northern part of the unit. Unfortunately, the ceramics from these events have not yet been examined.

At about 155.70 meters elevation, we

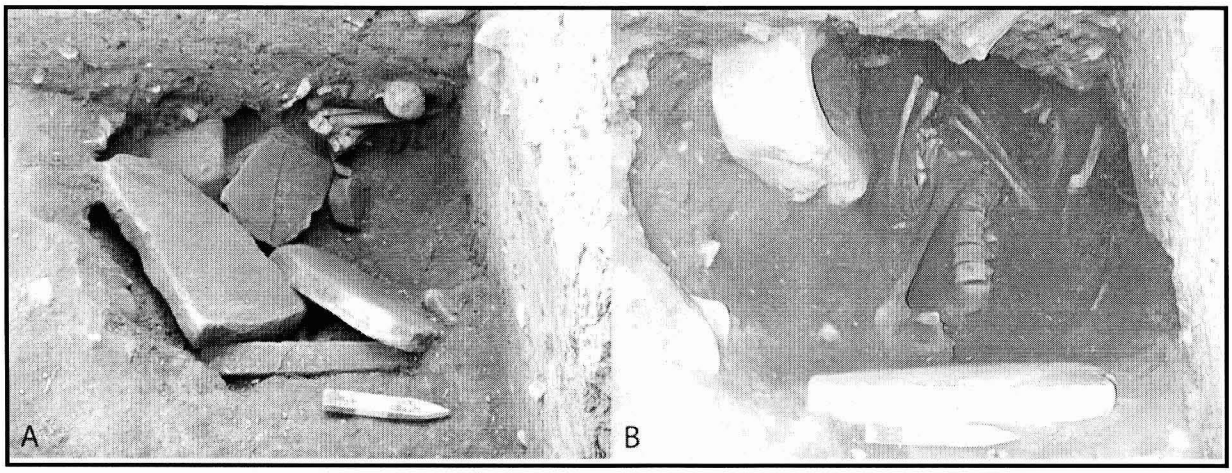

Figure 5.5 Burial 5 (Late Formative 1).

finally found a deposit that extended across the entire unit, except where disturbed by the burial (Event B73). Event B91 was a dark brown clay mottled with red, yellow, and orange clays, as well as charcoal. It contained many artifacts of all classes, and we defined it as a high-density midden. The ceramics fall into the Late Formative 1 period. Beneath B91, in the northern sector of the unit, we encountered another high-density midden deposit, B74, that was distinguished by its very high quantities of ash and charcoal. It also contained Late Formative 1 ceramics. The final deposit above sterile soil was another high-density midden, B92, that had a thin lens of ash and fish bones (B97). B92 contained primarily Late Formative 1 ceramics but had a small percentage of Late Chiripa sherds. (Locus 5321 had 2% Late Chiripa, and Locus 5323 had 5%.) We dated carbonized seeds from B97 and obtained a date (AA59713) of 25-214 cal A.D.

These Late Formative 1 midden accumulations are interesting in that a high percentage of the ceramics that we recovered were decorated and quite fine. Kalasasaya zoned incised sherds were relatively common, as were fragments of red-rimmed Kalasasaya bowls (see Steadman, chapter 7 of this volume). Previous excavations have found such ceramics associated with burials and offerings such as at Tiwanaku (Ponce 1993) and Lukurmata (Bermann 1994). One finely made, red-rimmed bowl was associated with a burial, and we recovered fragments from the midden deposits as well. Paz and Fernandez (in chapter 4 of this volume) suggest the structure (ASD-2) they excavated may have been used for domestic purposes. If the deposits encountered here were associated with the use of the structure, however, we might suggest that the activities resulting in these midden accumulations were non-domestic, but ritual or festive in nature.

At the outset, we were hoping to also encounter Chiripa-period deposits, providing information on the transition from the Middle to Late Formative at the site. The small quantities of Chiripa ceramics in the lowest strata suggest there was a Chiripa-period occupation nearby. Unfortunately, we did not find any unmixed contexts. Although we did not encounter the Middle-Late Formative transition, these excavations provide one of the best Late Formative ceramic assemblages for the region. Analysis of the ceramics and other artifacts will provide, we hope, an improved chronology for the Late Formative periods.

6

Excavations in the AC (Achachi Coa Kkollu) Sector

Amanda Cohen and Andrew Roddick

The Achachi Coa Kkollu (AC) sector of Kala Uyuni is located on communal land, on top of a steep hill (figure 6.1) overlooking the Middle and Late Formative Kala Uyuni village. The 2003 TAP excavations focused on three different areas at Achachi Coa Kkollu—two sunken court structures, lower and upper, and a nearby midden. Our excavations were initially guided by the presence of several large white limestone blocks protruding from the ground in the southwest corner of the area. These blocks had been originally identified by Bandy (2001a: 122) while community members were in the process of digging up and inverting two of the stones as part of a local rain ceremony. Their presence, together with the continued ritual significance of this area to the local community, suggested that this may have been the ceremonial sector of the site in prehistory. The presence of these blocks and the high surface densities of Late Chiripa decorated ceramics, along with lithic flakes, ground stone, and projectile points, as well as specialty items such as stone labrets, beads, and exotic imported ceramics, hinted at subsurface architectural remains.

As indicated in figure 6.1, the 2003 excavations adjacent to the limestone blocks did indeed reveal a sunken court, deeply buried under a thick colluvial deposit (Event A3). We refer to this court as the 'lower court' (ASD-1). Further exploration in the area upslope of the lower court identified a line of deeply bedded limestone blocks, as well as a large red sandstone block protruding from the surface. Excavations in this area revealed another sunken court, the 'upper court' (ASD-3), with a standing sandstone monolith in the center. Additionally, to the northwest and to the east of the upper sunken court (ASD-3), the surface soil was found to be very dark and exhibited a high density of artifacts, particularly bone, distinguishing it from the surface characteristics of the upper and lower courts themselves. Test excavations in this area revealed the presence of a midden deposit that we interpret as being related to the activities performed in the two courts.

The excavation strategy of the sunken courts focused on identifying the walls in order to reveal the construction sequences and techniques as well as the scale of the structures. This strategy resulted in the location of a few meter-wide sections of each wall, which allows for an estimate of the size of each court to be made. The final construction of the lower court measured approximately 18m x 18m, or 324 m^2, and the final construction of the upper court

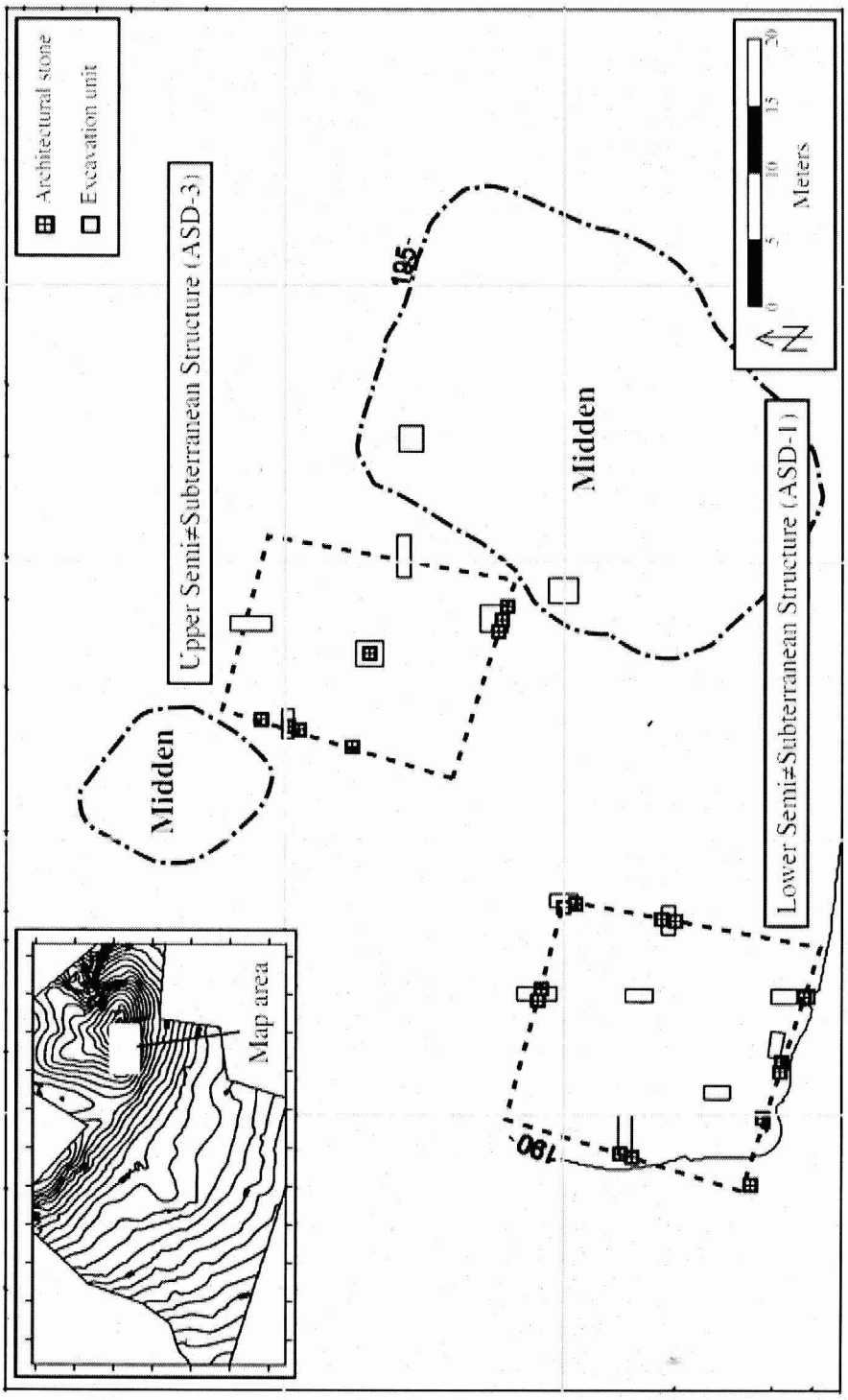

Figure 6.1 Area AC sunken courts and excavation units. Reconstructed sunken court perimeters and midden areas are indicated.

measured approximately 18m x 15m, or 270 m^2. These calculations somewhat overestimate the actual area of the structures because they were constructed in the trapezoidal rather than rectangular form (figure 6.1). More precise size calculations would require further excavations.

Lee Steadman's analysis of the ceramics associated with these structures and the radiocarbon results have permitted their placement within the broader chronological sequence of the Taraco Peninsula. Ceramics from the Early and Middle Chiripa phases were identified in this sector of the site, although these courts were not constructed and used until the Late Chiripa phase. The courts were both abandoned late in the Late Chiripa phase, though the AC sector continued to be used at a lower level of intensity during the Late Formative period 1. The excavations and associated finds are briefly discussed below. The stratigraphic sequence of the AC sector is represented on a Harris Matrix in figure 6.2.

Excavation of ASD-1—The Lower Court

South Wall (N964.37/E923.91 and N962/E928)

The excavation of the lower court (ASD-1) concentrated on defining the walls and both the interior and exterior surfaces of the structure. As in most of our Achachi Coa Kkollu units, we began by excavating a thick layer of colluvium (A3), with a highly mixed cultural matrix consisting of Late Chiripa and Late Formative 1 materials, before reaching any unmixed cultural deposits. This dense, hard, clay-rich deposit had the effect of disguising subsurface features as well as slowing excavations. Fortunately, however, the aforementioned limestone blocks were visible on the surface, and the surface topography seemed to indicate the presence of a sunken temple (see contour lines in figure 6.1). We began excavating this part of the site with 2x1 and 3x1 meter excavation units in order to locate the walls. These southern units revealed a highly disturbed context near the wall, with architecture that was for the most part wall-fall, and deep deposits of clays in the trough of the slope. Our first unit (N964.37/E923.91), on the down-slope side of ASD-1, was especially shallow and disturbed, and as we placed the unit parallel to the wall, we simply encountered the top of the wall-fall deposit.

These initial excavations did, however, allow floor and interior fill events to be recorded, as seen in the 3x1 meter unit of N962/E928 (figure 6.3)—a unit that proved to be especially helpful in defining the sequence in the southern section of the court. After removing the post-abandonment depositional events (A3, A5) and the wall rubble events (A4, A6), we encountered the upper interior floor of the structure (A8). This yellow clay floor (8.5 YR 3/2) was very thin and was highly mixed (due to erosion and other post-depositional processes) with the above occupation zone and a lower fill. This floor extended below the southern wall, demonstrating clearly that the wall was built after the floor.

Analyses of ceramics associated with the A8 floor indicate a Late Chiripa use of the surface. Below this surface we encountered a fill level with some cobbles (A11, A9) and a lower clay floor with few inclusions (A12). This earlier floor was highly mottled, with carbon inclusions and a high density of Late Chiripa sherds. The clay was moist and much easier to excavate, but this also made it difficult to distinguish between the occupation zones and the original floor. The ceramics identify this surface with a Late Chiripa construction and use. There seem to have been several resurfacings of the floors, although there was no clear fill between the levels. It is important to note here that the floors of these structures were highly variable and difficult to define; it was only in the process of creating a Harris Matrix (figure 6.2) that the A8 and A12 floors could be respectively linked between excavation units. Below the A12 floor we encountered a subfloor fill (A13), and finally encountered a hard pebbly sterile deposit (A14).

Interestingly, the ceramic assemblages from the lower strata of this unit (A11, A12, and A13) all contained some Middle Chiripa material (up to 20%) mixed in with the Late Chiripa

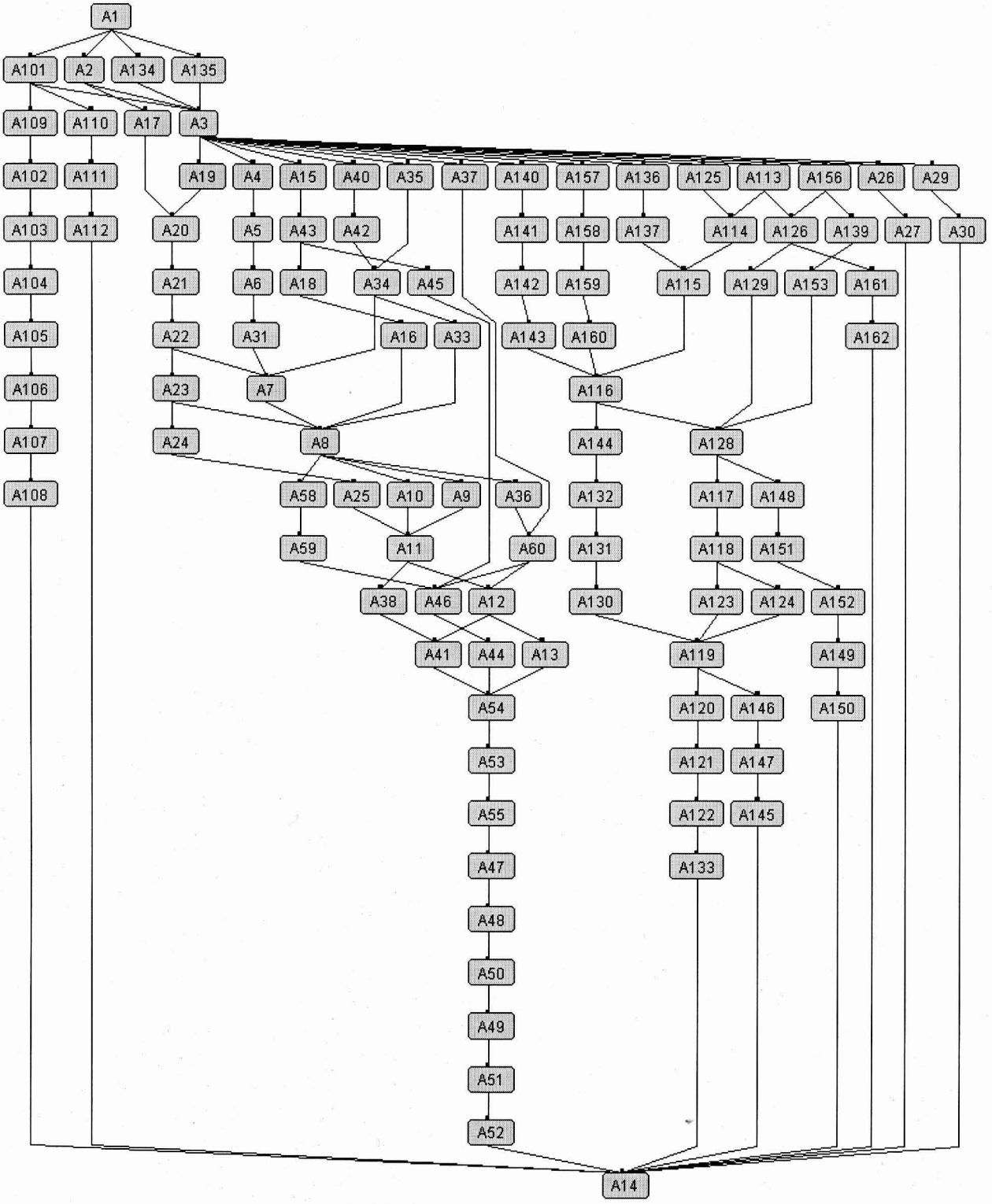

Figure 6.2 Area AC Harris Matrix

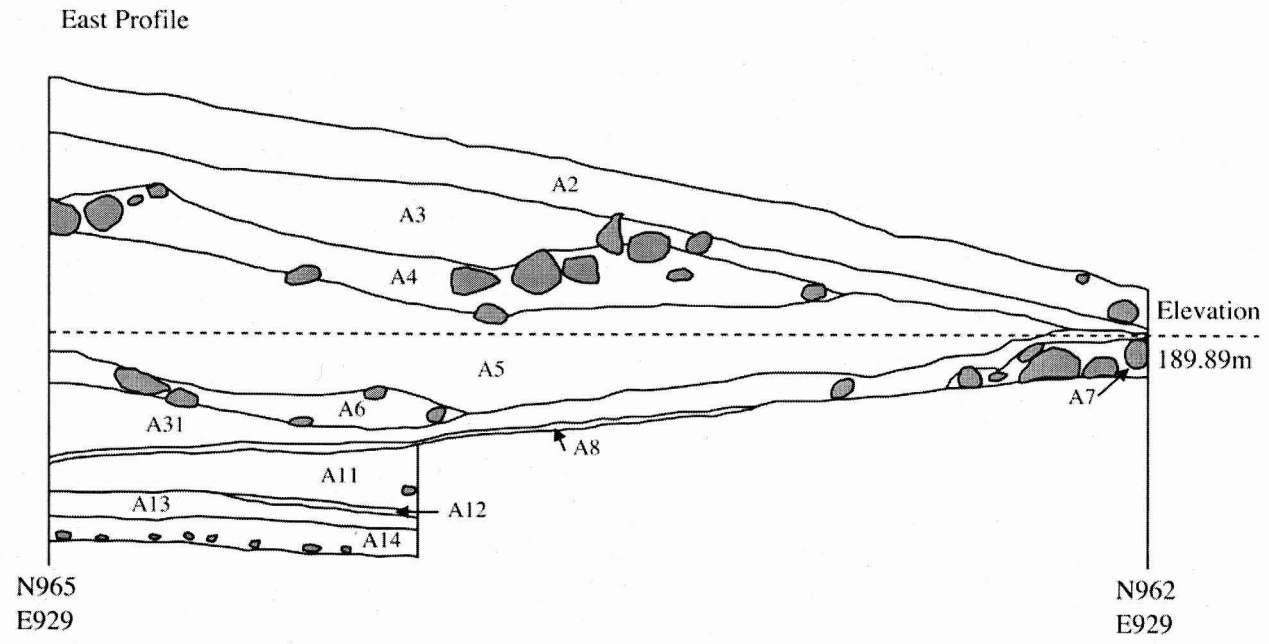

Figure 6.3 Unit N962/E928, East Profile.

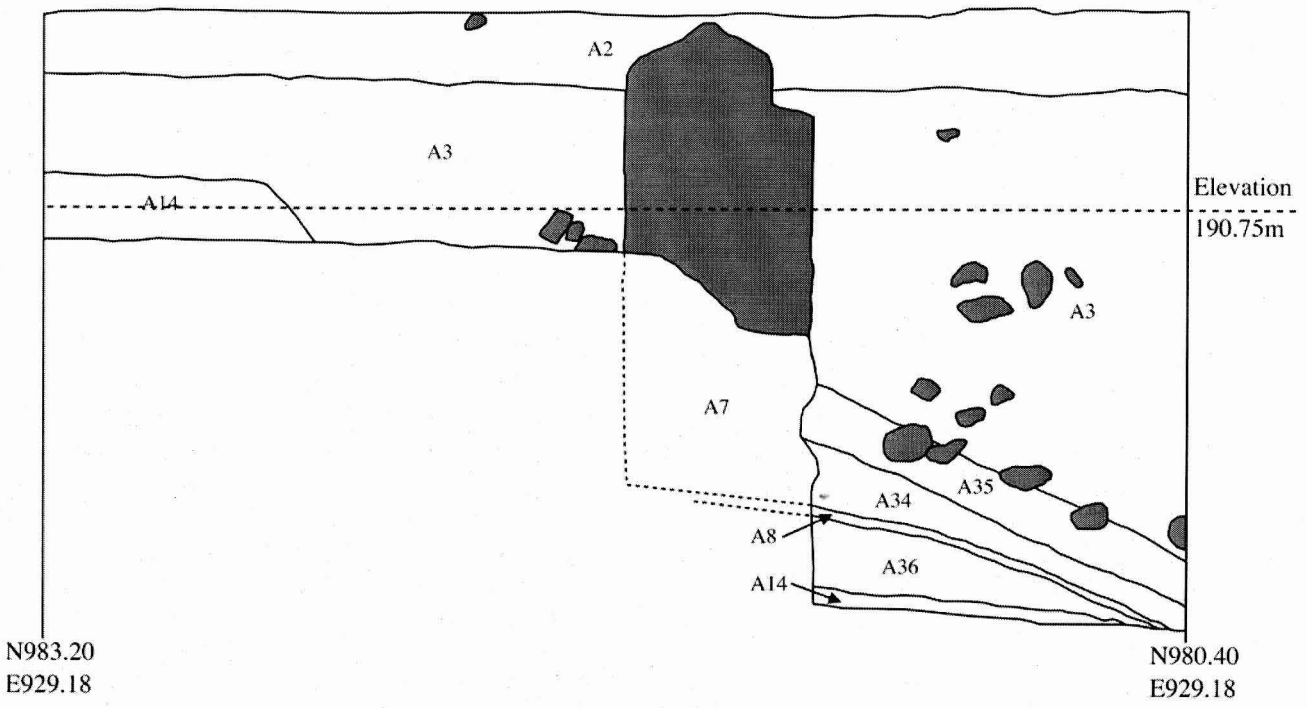

Figure 6.4 Unit N962/E928, East Profile.

ceramics. In accordance with this mixed sample, a radiocarbon sample from event A11 dates to the Middle Chiripa phase (1000-811 B.C.). This indicates that there was a Middle Chiripa occupation, or at least some kind of activity, in this sector of the site prior to the construction of the sunken courts, and that some of this earlier material was mixed into deposits related to court construction and use.

North Wall (N980.4/E928.18 and N979/ E935)

The two excavation units of the preserved north wall of ASD-1 permitted a better view of the lower court and a glimpse into its complex construction sequence, the wall construction technique and the exterior spaces of the court. Our units were placed based on a hypothesized size of the structure, and after a failed attempt (see unit N973.6/E928.11 below), we succeeded in locating the northern wall approximately 18 meters north of the southern wall (figure 6.1).

After excavating the A3 colluvium in unit N980.4/E928.18, we discovered a pit filled (A26) with ash and high densities of fish bones, along with a very low density of camelid bone, which had been excavated into the external sterile surface. As will be seen below, this seems to have been a standard practice for the surfaces surrounding the lower temple. Based on the ceramic analysis, which identified Late Chiripa phase ceramics in the pit fill, these pits seem to be contemporary with the structure. As such, we propose that they represent a repeated consumption activity, perhaps indicating communal feasting within or around the sunken courts.

We encountered a very large limestone block in the center of the unit (figure 6.4). Excavations revealed alternating limestone and cobble blocks, which were mortared with clay-rich soil. The wall in the north section was approximately 1 meter wide, and preserved to approximately 1 meter in height. Many of the upper cobbles had been dislodged and created a wall-fall level (A35) that extended deeply into the court interior and was also associated with a water-deposited sediment derived from the wall (A34).

Below the base of the wall (approximately 10 centimeters beneath the top of the preserved wall)— and in contrast to the southern unit—we encountered the upper floor (A8), which slanted steeply down into the interior of the court. The surface of the A8 floor was irregular. Captured within the undulations of the floor, and sealed beneath A34, was a lens of ash and fish bone (A33). A radiocarbon date on quinoa seeds from this ashy deposit produced a date of 762-402 B.C. This date corroborates the identification of Late Chiripa phase ceramics associated with this event.

Beneath the A8 floor we identified an interior occupation zone (A36) above sterile (A14). It is important to note here that we did not find the lower, earlier A12 floor; it was neither visible in excavation nor in profile. The implications of this are discussed below.

Unit N979/E935 contained the northeast corner of the structure, another fortuitous unit placement, although preservation here was poor. We excavated this 3x1 meter unit to the top of the wall. Outside of the structure, we encountered another fish bone midden pit, filled with ash (A29). The ceramics from this pit were contemporaneous with the use of the court, all pertaining to the Late Chiripa phase. This pit was cut into the exterior surface associated with the court, which consisted of the sterile subsoil. This northeast corner was constructed at an obtuse angle, which suggests that the structure was, in fact, trapezoidal in plan. This fits with evidence seen elsewhere for the Middle Formative period (Late Chiripa and Late Qaluyu) in the Titicaca Basin (Chavez 1988; Cohen 2006; Hastorf ed. 2001; Bandy 2001a: 131-32).

East Wall and Burial 3 (N972/E933)

The 2x1 meter unit of N972/ E933 offered another excellent profile of the construction technique of the lower court, with good intact preservation of both cobbles and limestone blocks in the wall (A7)(figure 6.5). It

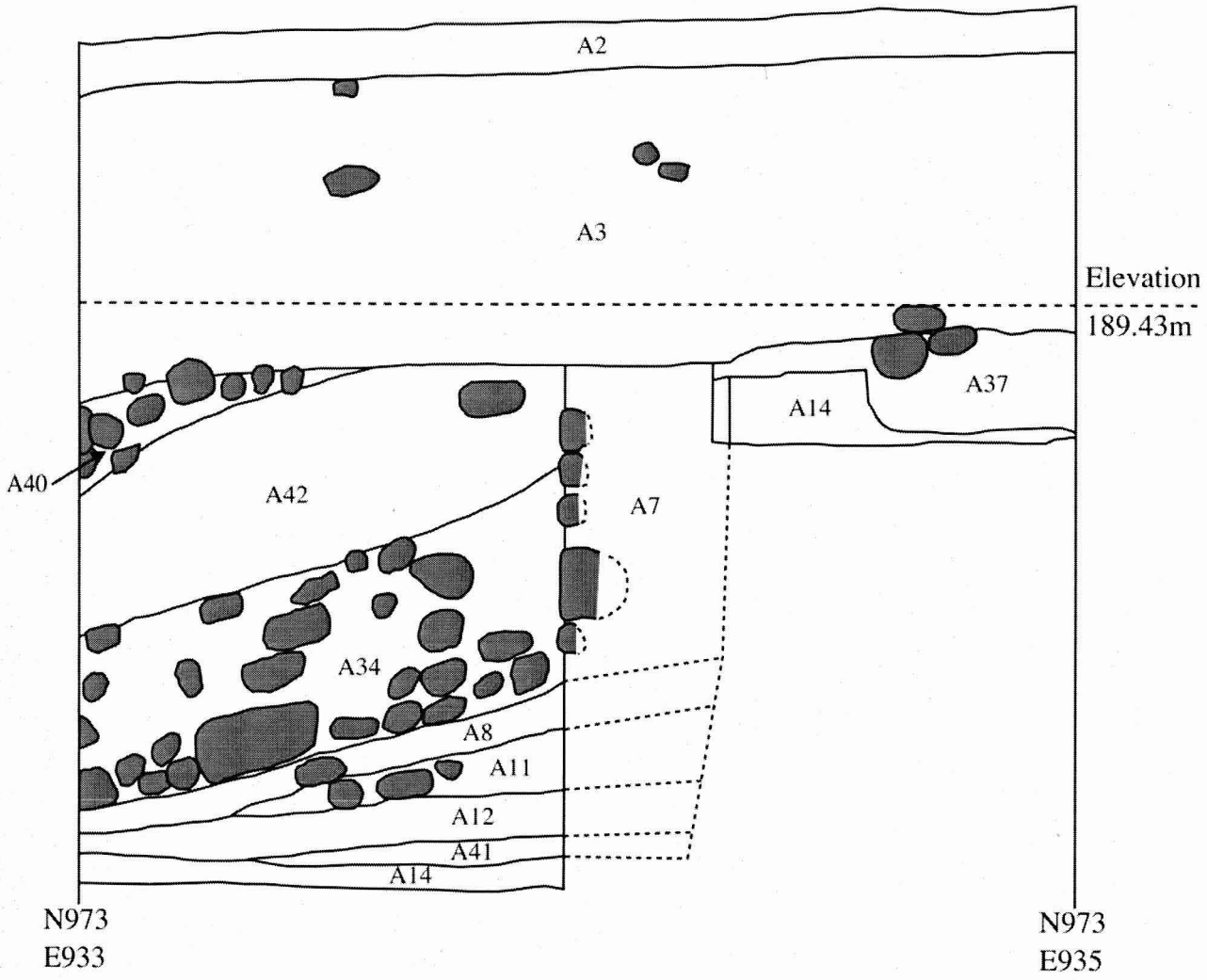

Figure 6.5 Unit N972/E933, North Profile

also offered further evidence for the upper floor being located below the base of the wall (see figures 6.5 and 6.6). As in previous ASD-1 units, the sterile subsoil served as the exterior surface. We identified two additional fish bone and ash pits cut into this exterior surface. Ceramic analysis from one of these pits (A37) identified Late Chiripa phase pottery, consistent with the analysis of the two pits previously discussed. The most notable feature of this unit, however, was Burial 3, located in the clay of the lower (A12) court floor (figure 6.7).

In the process of excavating to the interior A8 court floor, we encountered a cranium embedded in the clay. The cranium was significantly modified, and in poor condition. In this portion of the unit, the A8 and lower A12 floors were intermingled due to the thickness of the A12 floor in this area. As is visible in the profile drawings (figures 6.5 and 6.6), the two floors were separated in most places by a fill event (A11). After excavating the cranium, we located most of the upper body. The individual was buried within the lower floor (A12), on its back, with the cranium disarticulated and placed on its chest (figure 6.7). The left arm was by its side, with the hand under the pelvis, whereas the right arm was raised beside the head. The legs were bent up beside the body, with both femurs running parallel to the wall, and the lower

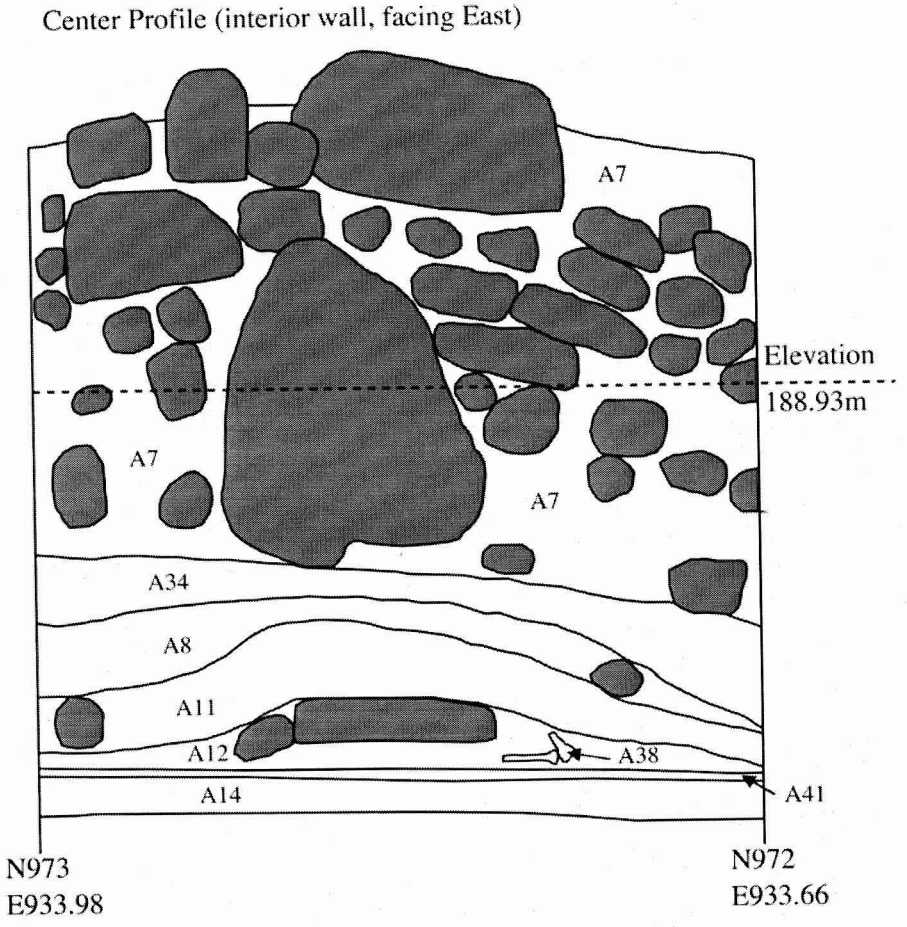

Figure 6.6

Unit N972/ E933, Wall Elevation, Interior. A38 is the right femur of the subfloor burial.

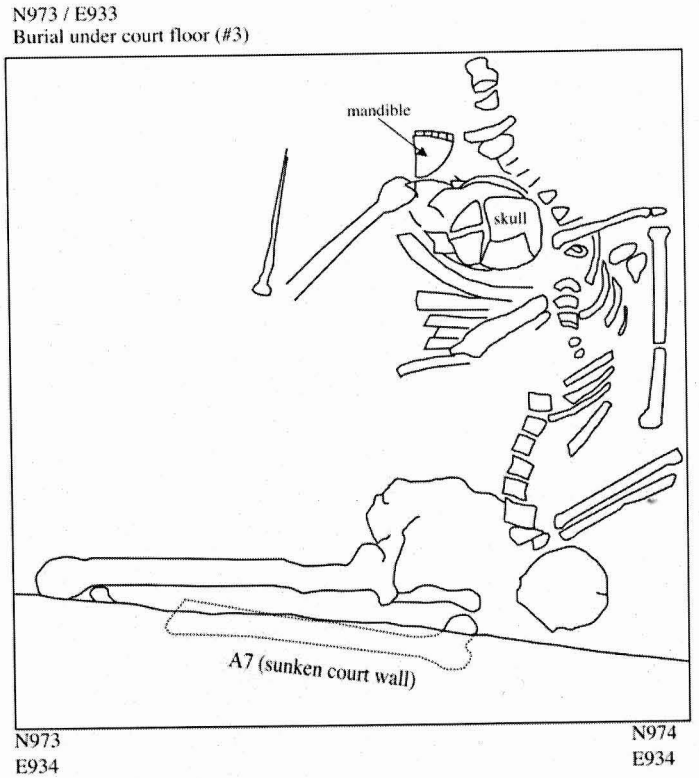

Figure 6.7

Unit N973/E933, Burial 3 under court floor.

legs positioned underneath the wall. Analysis revealed that this individual was a 22-25 year old male and that there may have been perimortem trauma to the first two vertebrae, although no cut marks were identified (Deborah Blom, personal communication 2006). The fact that the first two vertebrae were not found directly adjacent to the cranium (an expected occurrence in cases where decapitation is the cause of death) calls into question the circumstances surrounding this individual's death and the removal of his head.

There were no grave goods found with this individual. The position of the skull and the damage identified to the vertebrae support the interpretation of this individual as a dedicatory or sacrificial offering. This body would have created a significant bump in the floor near the eastern wall, even after the court had been reconstructed, a visible reminder of the individual that was buried there (see figure 6.6 profile). A radiocarbon sample taken from quinoa found in the A12 floor produced dates of 1207-896 B.C. The interpretation of this date is discussed below.

West Wall (N975/E917 and N975/E916)

The western wall of the structure gave us a very different perspective on the court. Here we found the wall construction directly upon sterile soil, with the absence of any limestone blocks interspersed with the cobble wall, suggesting that it represented an earlier manifestation of the court (figure 6.8). On top of this cobble wall we encountered a coursed multi-colored adobe/clay wall, with significant melting down into the lower erosional layers. This wall was approximately 25 centimeters wide and thus much thinner than other sections of the structure, which measured up to 75 centimeters wide.

We extended our 3x1 meter interior unit of N975/E917 westward one meter to N975/E916 to investigate the thickness and depth of the cut outside of the wall (figure 6.8). This complex unit showed an interesting sequence of cuts and more pits containing fish bone in the external areas of the court.

Inside ASD-1 (N973.6/E928.11 and N968/E921)

Although most of the excavations of this season concentrated on the perimeter of ASD-1, we also excavated two units within the structure with the aim of identifying the floor construction, its elevation, and any floor features. Only one of these units (N968/ E921) reached the level of the floor and below to sterile, while the other was abandoned at an early stage of excavation (upon reaching the top of the wall rubble).

N968/E921

This unit, located within the lower court, was selected in order to identify the floor of the court and any associated materials and activities. Below the root zone, the unit was filled with a thick colluvial deposit (A3). As in other areas, A3 was hard, compact, and contained pottery from mixed time periods and a very low density of animal bone. Within the A3 deposit were found some disarticulated human bones that seem to have been deposited with the colluvium. Another interesting feature appeared to be the remains of a burnt offering, including fragments of a dog or fox jaw and burnt vegetable fibers, likely modern.

We then encountered two colluvial deposits (A19 and A20) that differed from A3. These were characterized by a low density of artifacts and by a distinct soil matrix. Specifically, the clay-rich matrix of A3 was markedly different from the gritty, clay loam matrix of A19 and A20, which were also differentiated by a color change. This suggests that the source matrix of these deposits differed from that of A3, and was possibly related to the erosion of architecture. Beneath the colluvial deposits were two events (A21 and A22) that seemed to be associated with the structure's abandonment. The matrix of A21 was different in that it contained patches of clay as well as 10-15% pebbles. Event A22 had an even higher percentage (20-25%) of pebbles as well as 1-2% cobbles. Both of these strata were easily distinguished from upper colluvial strata in that they exhibited a higher density of pottery sherds that were better preserved (less eroded). The state of the ceramic preservation suggests

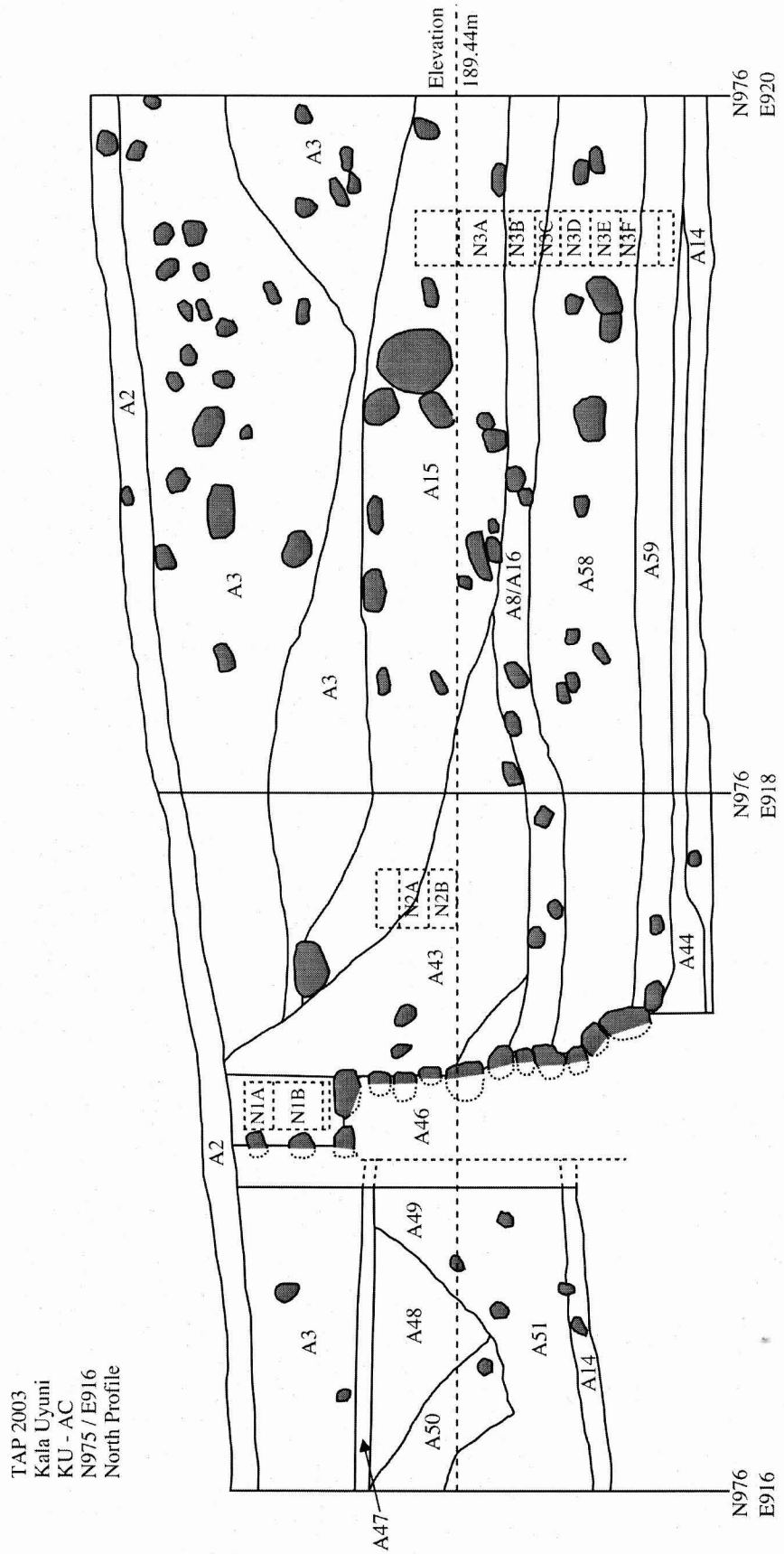

Figure 6.8 Unit N975/E916 and Unit N975/E917, North profile. Dashed boxes indicated micromorphological column samples.

that the sherds were not deposited by a colluvial process, but rather accumulated in situ following the structure's abandonment. According to Steadman's ceramic analysis, the pottery in these strata pertained to the Late Chiripa time period. We are therefore able to surmise that abandonment of this structure took place in the Late Chiripa phase.

Excavations in this unit identified two clay floors, indicating that the structure had been remodeled during its use life. The upper clay floor (A8) exhibited one floor feature (Feature 1), a depression that was lined with the same clay that comprised the floor. This feature was filled with a high density of cultural materials and around 50% pebbles. The base of this depression did not show any signs of burning. Neither was this depression the result of slump above a lower pit. Indeed, upon removal of the lining, the pit was found to be cut directly into sterile. It seems that this depression must have served some function related to the use of the structure. The floor (A8) in which this depression was formed was a compact clay with limestone inclusions and exhibited a number of flat-lying artifacts on its surface. Beneath the A8 floor was a fill layer (A23) that was darker in color and contained a higher density of artifacts. The lowermost floor (A12) was patchy and uneven in areas, measuring 1-2 cm in thickness. This poor condition may have been the cause for the reconstruction of the court. The lowermost floor (A12) had been placed above a subfloor fill (A13) consisting of a silty clay, artifact-rich deposit. Interestingly, both floors, the subfloor and the between-floor fill contained both Middle and Late Chiripa ceramics. It is likely that the construction material for these strata was extracted from another part of the AC area, possibly from an earlier midden. This could account for the presence of Middle Chiripa materials in what are clearly Late Chiripa deposits.

Excavation of ASD-3—The Upper Court

The main goals in the excavations of the upper court were similar to those of the lower court. Specifically, the aims were to expose the court walls and to determine the relationship between the walls and the floor. Excavations in the lower court had already indicated the construction technique used in the walls, as well as complicated issues such as the floor sequence. We placed units around the structure, initially in the western and southern walls, where we could see limestone protruding from the surface. The location of the northern and eastern walls was estimated from the orientation and size of the lower court, which had already been determined through excavation. Additionally, one 2x2 meter unit was placed around a protruding red sandstone block in what turned out to be the center of the court.

These excavations showed that this sunken court, like ASD-1, was trapezoidal in plan (figure 6.1). Also, the structure is interesting in that it is not entirely semi-subterranean like other sunken courts with which we are familiar. Rather, depending upon the topography, some walls line the cut of the court, while others seem to be almost entirely above the prehistoric ground surface. Still, the floor sloped steeply, so that at the center it was approximately 60 cm below its elevation at the walls. The stratigraphic sequence of each unit is discussed in detail below (and depicted in figure 6.2), along with the sequence of construction and remodeling of the upper court.

West Wall (N1000/E947)

This unit was selected due to the position of several white limestone blocks that were slightly protruding from the surface of the slope above the lower court. These blocks were oriented in a roughly north-south linear arrangement and were deeply bedded. We oriented this 1x2 m unit with the long axis across the expected line of the wall, where one large white limestone block protruded from the surface. The west wall excavation unit revealed a very complicated stratigraphic sequence (fig. 6.9).

The upper strata of this unit were similar to those in other parts of the Achachi Coa Kkollu sector. The A3 stratum was extremely compact, extending more deeply in the eastern part of the unit,

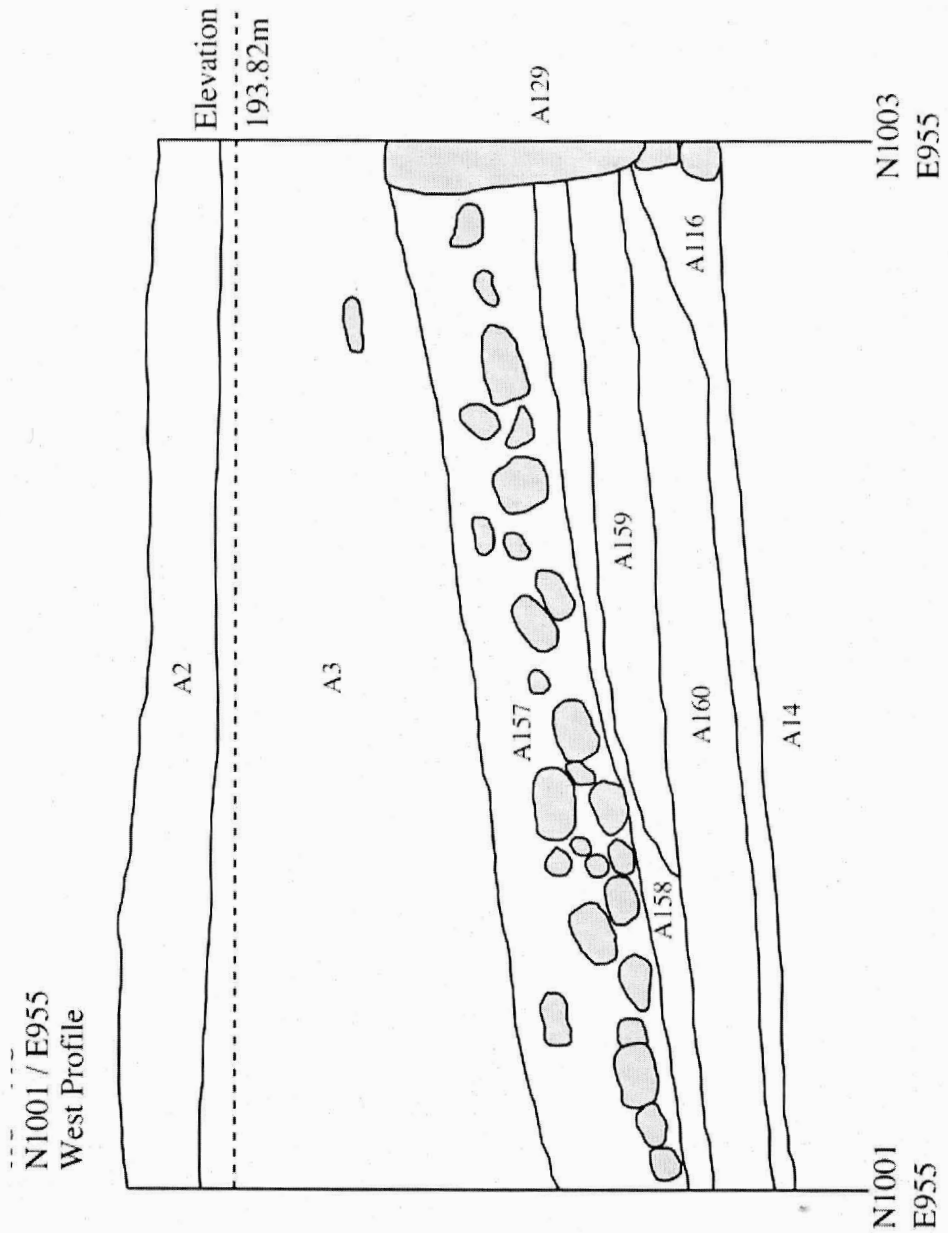

Figure 6.9 Unit N1000/E947, South profile.

above what was revealed as the court interior. As expected, the unit did identify the remains of a wall—later determined to be the western wall of a sunken court. Beneath the A3 colluvium was a layer of cobbles that we have identified as wall-fall. This wall-fall extended across most of the unit, concentrated to the east, with the highest cobbles over the wall itself. Excavations revealed that most of the wall-fall was within what would be identified as the interior of the sunken court, and a small number of cobbles had fallen to the exterior. The wall-fall (A113) had fallen on top of a stratum of colluvium (A114) that likely collected post-abandonment. This colluvium was above what was later identified as the upper floor of the upper sunken court (A116). This floor was constructed of clay, varying in color from red to yellow. Removal of the wall-fall exposed what remained of the stone base of the wall, consisting of only a few in situ stones to the north of the protruding limestone block.

The interior of the court proved to have a complicated stratigraphic sequence. As noted, the A116 floor was directly beneath a layer of colluvium. The upper floor was above an ash layer (A117) that in turn filled two pits that had been cut into an ashy lens (A118) and the surface of the lower clay floor (A119). Excavation of the lower floor revealed an ashy subfloor layer (A120). Removal of the lower floor revealed a pit (Feature 23) that had been cut into sterile and filled with an ashy, silty clay deposit with charcoal inclusions (A121).

The exterior of the court was much less complicated. The wall-fall was above an occupation zone (A126) that consisted of artifacts embedded in a silty clay matrix. This occupation zone was above sterile, and its excavation revealed a pit (R42) that had been cut into sterile and contained a cobble fill (A161).

This unit was quite shallow as compared with the majority of the units in the lower court. This is likely because this portion of the court was cut shallowly into the ground, and the wall would have protruded above the ground surface. The colluvium, therefore, barely covers the lower portion of the wall, and the majority of the wall is not preserved. The wall itself shared similar construction techniques to those seen in ASD-1, with medium-sized limestone blocks interspersed with cobbles. As noted above, this unit exposed two clay floors within the interior of the structure, indicating a reconstruction episode. The large pits and fill events are somewhat enigmatic. They may indicate an abandonment of the courts before they were reconstructed; or they may have pertained to rituals focused around the reconstruction. Also interesting is the earliest pit, cut into sterile and pre-dating the placement of the court. The fill of this pit contained primarily Early Chiripa ceramics, with a 10% admixture of Middle Chiripa sherds. This suggests that the court area may have been used for quite some time before the court itself was constructed, since this Early Formative pit was truncated by the building of the upper court.

North Wall (N1001/E955)

The placement of this unit, opened with the goal of exposing the north wall of the upper court, was calculated based on the dimensions of the lower court, which had already been defined. As excavations revealed, our estimates of the upper court's dimensions matched closely with those of the lower court.

As with other units in this sector, the uppermost strata are formed by the A3 colluvial deposit (figure 6.10). Beneath A3 was wall-fall, indicating that we were close in our estimates of court size. Removal of the wall-fall (A157), a high density of cobbles within a matrix similar to the A3 colluvium, revealed a dark, ashy deposit (A158). As with the above wall-fall event, this deposit was mixed with cobbles but was characterized by alternating thin lenses of ash, silt, and clay that seemed to have been the result of water deposits. The type of deposit suggests that A158 accumulated gradually, and likely represents court fill that was preserved by the collapse of the wall. Beneath A158 was a thick ash deposit (A159) that had accumulated against the interior wall of the court. The A159 deposit included decorated pottery as well as carbon and was likely a deposit related to the use of the structure. A radiocarbon sample from quinoa

seeds in the A159 ash deposit produced a date of 373-113 B.C.

Removal of the A159 deposit revealed a similar deposit (A160) that was characterized by alternating deposits of silt and clay within midden. It is likely, then, that A158, A159, and A160 all represent deposits that accumulated during the use of the structure, or immediately post-abandonment. This interpretation is supported by the ceramic analysis, which identified these loci as pertaining to the Late Chiripa phase. These deposits were located immediately above a thick, yellow clay floor (A127), which in turn, was above sterile.

The north wall was the best-preserved wall of the upper court. The sequence of wall construction was different from that in the other units, indicating that it had been built either at a different time or by a different group of individuals. The wall construction sequence was as follows. First, the cut was made into sterile for the construction of the court. Next, a channel was cut into sterile to delineate the position of the wall. This channel was filled with two rows of well-sorted cobbles. Above this were placed the vertical limestone uprights, of which two are located in this unit. Next, the space between the uprights was filled with cobbles to complete the wall. Finally, the clay floor was placed, buttressing up against the wall, with a steeply angled slope. Note that in this segment of wall, the wall is constructed prior to the placement of the floor. This fact, along with the presence of only one floor in this area of the court, is key to our reconstruction of the construction sequence of the court.

South Wall (Unit N984/E955)

The coordinates of this unit were selected due to its proximity to a large white limestone block protruding from the surface. This block was estimated to be close to the southeast corner of the structure. The unit, profiled in figure 6.11, was particularly important for information regarding the construction sequence of the wall itself.

The surface of this unit was covered with a modern rock pile, such as are common on agricultural fields in the region. This rock pile also included a large number of stone artifacts and ceramic sherds. Removal of the superficial rocks revealed that the pile extended beneath the surface; further excavations revealed that this area had likely been a rock pile for a long period of time. This rock concentration was stratigraphically above A3 deposits. A 10% sample of the A135 and A3 deposits were screened in this unit. Removal of the A3 deposits revealed wall-fall (A136) from the south and east walls, along with the fill of the court that was stratigraphically beneath the wall-fall. Later excavations of the east wall indicated that this unit was very close to the corner of the structure. The fill event (A137) was flecked with yellow and red clay, and carbon, and included a noticeably high number of carbonized ceramics pertaining to the Late Chiripa phase. Removal of this fill event revealed the clay floor and fully exposed the wall.

The floor sloped upwards towards the wall, passing beneath it. The slope of the floor in this unit was extreme. This floor (A116) was compact with yellow and red clay patches, along with carbon flecks and small pebbles, and the occasional cobble, embedded in the surface. The floor was positioned directly above sterile. As there is only one floor in this unit, this serves as a clue to its position in the construction sequence of the court—namely that it was part of the later expansion of the court.

The wall in this unit combined several white limestone uprights interspersed with cobbled sections. Within the wall was one very tall, white limestone block surrounded by smaller cobbles (figure 6.11). Interestingly, however, this limestone block was inserted into a hole cut into sterile and later covered over by the floor. It would have served as an 'anchor stone' for the wall. This stone gives us an interesting sequence of the wall construction in this area of the court. The sequence is as follows. First, the cut of the court was made into sterile. The cut was "bowl-shaped," in this unit sloping down to the

north and away from the wall. Next, the vertical uprights were placed, with at least the one being anchored in a pit. The single clay floor in this unit (A116) was then placed above sterile, joining with the cut behind the wall. Quartzite cobbles were then arranged above the floor and around the anchor stone to complete the wall.

The area behind the wall is not well understood due to the narrow area exposed. Beneath A3 deposits, the exterior floor (A139) was identified, a patchy clay surface with carbon inclusions. Its removal revealed a complicated sequence. It is clear, however, that this area of the Achachi Coa Kkollu sector was in use prior to the construction of the ASD-3 court. In the very small area excavated, earlier pits as well as an earlier floor were identified, indicating that there had been prior use of the area. We cannot at present say, however, whether this earlier use involved architecture. No evidence of earlier architecture was discovered.

East Wall (N991/E959)

The location of this unit was estimated based on the measurements and orientation of the lower court. The east wall was poorly preserved due to its location on a low saddle of the mountain. As a result, only a thin layer of the A3 colluvial deposits covered the architecture, providing little protection (figure 6.12). Beneath the A3 deposits were the remains of the wall-fall (A136). The wall collapse was directly above the A116 floor on the interior of the court. The floor was highly deteriorated and difficult to identify in this unit. Excavations indicated that the east wall would have protruded well above the exterior ground surface of the court.

There was only one interior floor in this section of the court. One interesting element of this unit is the presence of midden over the exterior surface of the court. This links the midden to the east of the upper court (see discussion below) with the stratigraphic position of the court and supports the idea that at least some of this midden was deposited during the use of the upper court.

Center Unit (N993/E952.5)

The central unit was placed around a protruding red sandstone block that was later identified as a standing monolith (figure 6.13). Excavations went to sterile in the eastern half of the unit, and stopped above the upper floor in the western half. This unit revealed a great deal about the construction sequence of the court and yielded two significant sculptural finds.

The A3 deposits in this central unit were quite deep and included occasional cobble concentrations. Removal of the A3 colluvium revealed a rock pile (A140) that was, in turn, above additional colluvial deposits (figure 6.14). The lower colluvium (A141) was relatively rich with cobbles (about 10% density). All of the colluvial deposits were screened using a 10% sampling strategy.

Removal of the A141 colluvial deposits revealed a stratum of cobbles. This cobble layer was clearly intentionally collected and distributed around the monolith, with the cobbles mounding up towards the monolith in the center of the unit. Excavation of this cobble deposit (A142) revealed a fill layer (A143) that had a lower density of cobbles, but a concentration of very large cobbles and boulders, including a few limestone blocks, arranged in a ring around the base of the monolith. This ring seems to have been used to provide support for the monolith. The A143 fill likely represents the terminal use of the sunken court, or its closure. A date from this event produced a radiocarbon date range of 394-205 B.C., and the associated ceramics pertained to the Late Chiripa phase.

At this stage in the excavations, we chose to excavate the eastern half of the unit, leaving the western half unexcavated. This decision was made so as not to destabilize the standing monolith. Removal of the A143 fill level revealed the upper floor of the sunken court. The floor (A116) consisted of yellowish and reddish patches of clay, with occasional inclusions of pebbles and small cobbles. Beneath this floor was identified another rocky concentration (A144),

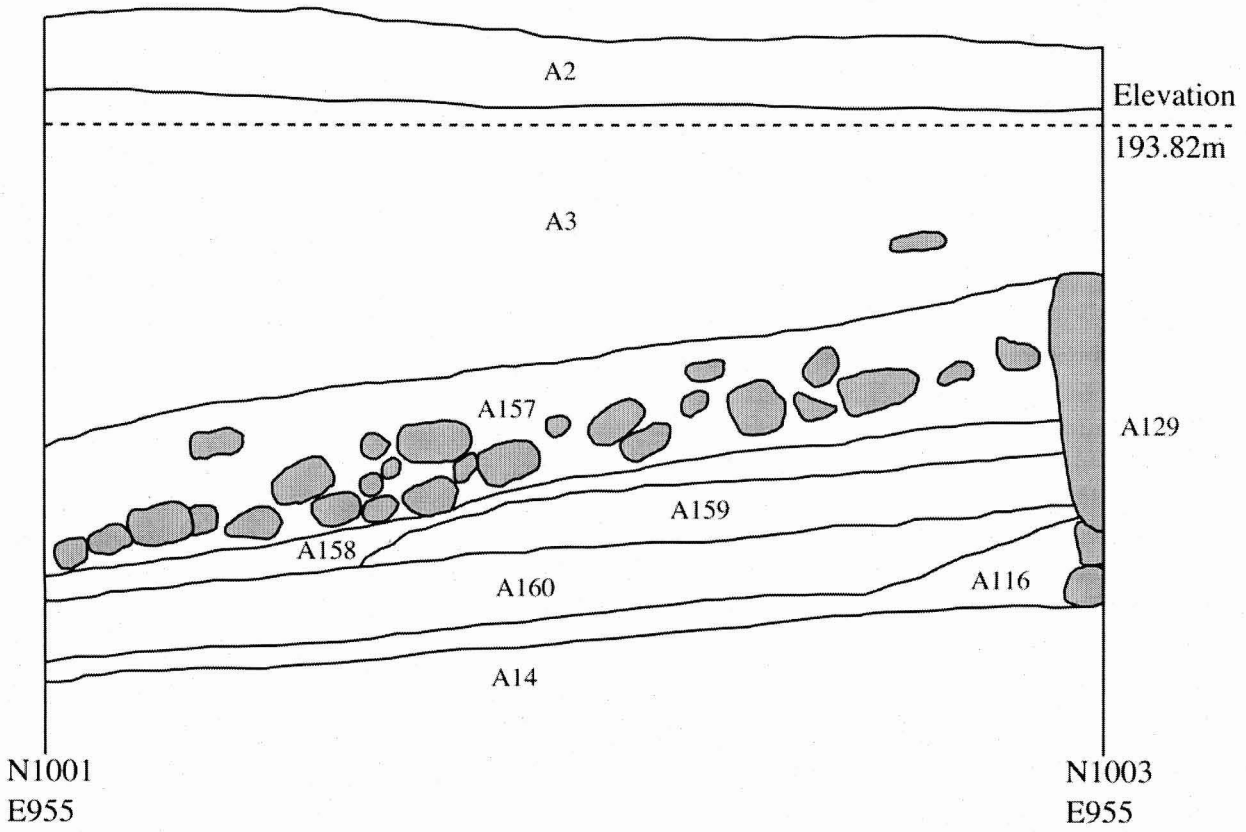

Figure 6.10 Unit N1001/E955, West profile.

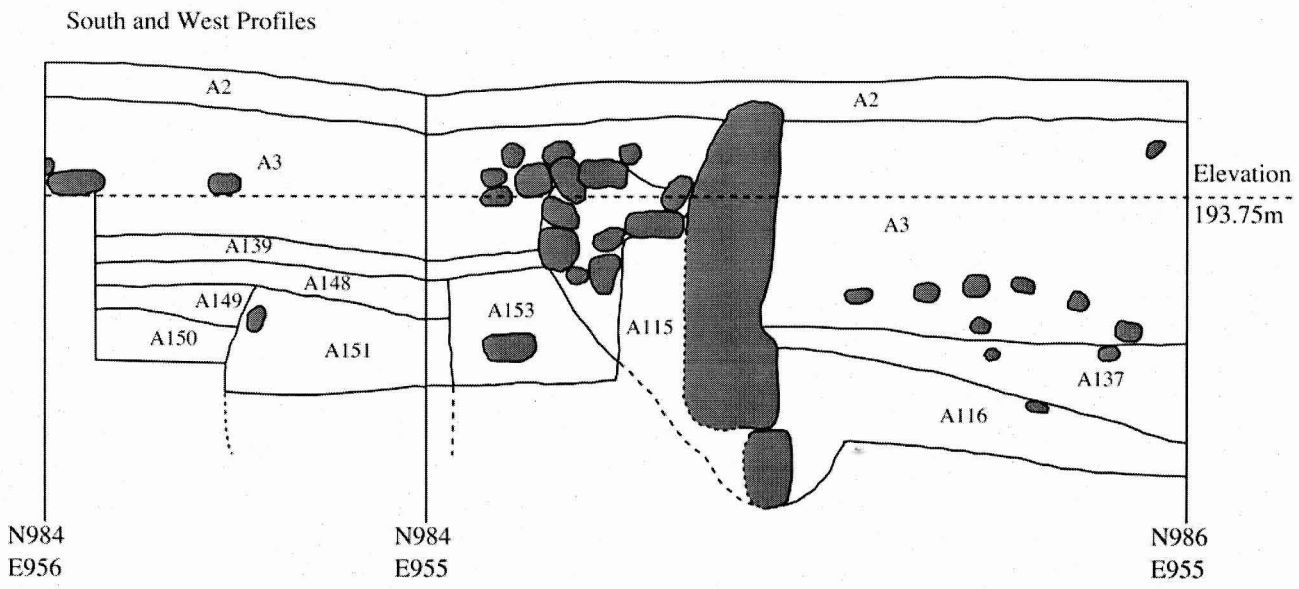

Figure 6.11 Unit N984/E955 South and West profiles.

consisting of approximately 40% cobbles and 15-20% pebbles, that served as a between-floor fill. A radiocarbon sample on wood charcoal from this fill episode returned a date of 808-541 B.C., placing this event within the Late Chiripa phase. This is consistent with the ceramic analysis from this stratum, which identified Late Chiripa pottery. Within this A144 fill event was a truly unique discovery.

A Yaya-Mama carved stone pestle was recovered from this stone fill (figures 6.15 and 6.16). This small piece of sculpture is carved with a cross formee on the top and symmetrical serpentine patterns on either side. The base of the pestle shows signs of having been used. Sergio Chavez (1971) has published similar examples of this style of sculpture, referring to them as "lightning stones." The Kala Uyuni lightning stone seems to be the only example recovered from a scientific excavation in a secure stratigraphic context.

Beneath the A144 fill event was the lower floor (A119) of the sunken court (figures 6.14 and 6.17). This was a mottled clay floor that passes under the rocky support for the monolith. Excavation of the floor revealed that it was placed directly above sterile. Interestingly, however, excavation of the A119 floor revealed a pit (Feature 36) that was cut into sterile (figure 6.17). The fill of this pit (A146 and A147) contained cobbles and large chunks of clay similar to that used in the construction of the floor. Analysis of the ceramics from Feature 36 identified them as pertaining to the Early Chiripa phase. A radiocarbon date run on quinoa seeds from event A147 returned a result of 1127-915 B.C., firmly positioning this feature within the Early Chiripa phase. Like the A121 pit mentioned earlier, this could have been an earlier pit truncated by the initial construction of the upper court.

These excavations revealed the full extent of the monolith as it stood above the interior surface of the court (figure 6.13). As noted, none of the structural supports were removed in order to preserve the monolith's stability. The monolith was shaped with a stepped profile, but bore no iconography. Interestingly, the excavations did reveal the construction sequence involved in the placement of the monolith. The lower of the two floors was not associated with the placement of the monolith. Indeed, prior to the placement of the upper floor, a pit was dug for the monolith. The monolith was placed in the pit, with a stone support system wedged into place to prevent movement. The stone fill between the floors was then laid down, after which the upper floor was put in place. The monolith as it stands was therefore put in place at the time the upper court was remodeled.

While the context of the fill above the floor remains uncertain, we do know that the monolith was intentionally partially buried and the upper floor completely covered with a large mound of cobbles, effectively 'closing' the structure. We hypothesize that this event was related to a formal abandonment ritual.

Excavation of the Midden

N990/E968 and N979/E957

Two units were excavated within the midden deposit to the southeast of the upper sunken court. This area was selected because of the dark soil and the high density of surface artifacts. In particular, there was a high density of animal bone, which distinguished this area from the courts where colluvial deposition resulted in the destruction of most animal bone. This indicated different depositional processes at work in the midden area. Rather than colluvial deposition, it seems that this area was deflated or eroded to some extent. Excavations indicated that the midden area had been plowed for agricultural fields, although the plow marks suggested the use of *chakitaklla* (traditional foot plows) rather than ox-drawn plows.

Within these middens we found a high density of fish and other animal bone, pottery and lithic materials. The ceramics from the court-associated middens are especially interesting (see Steadman's discussion in chapter 7 of this volume). An interesting find was a scattered

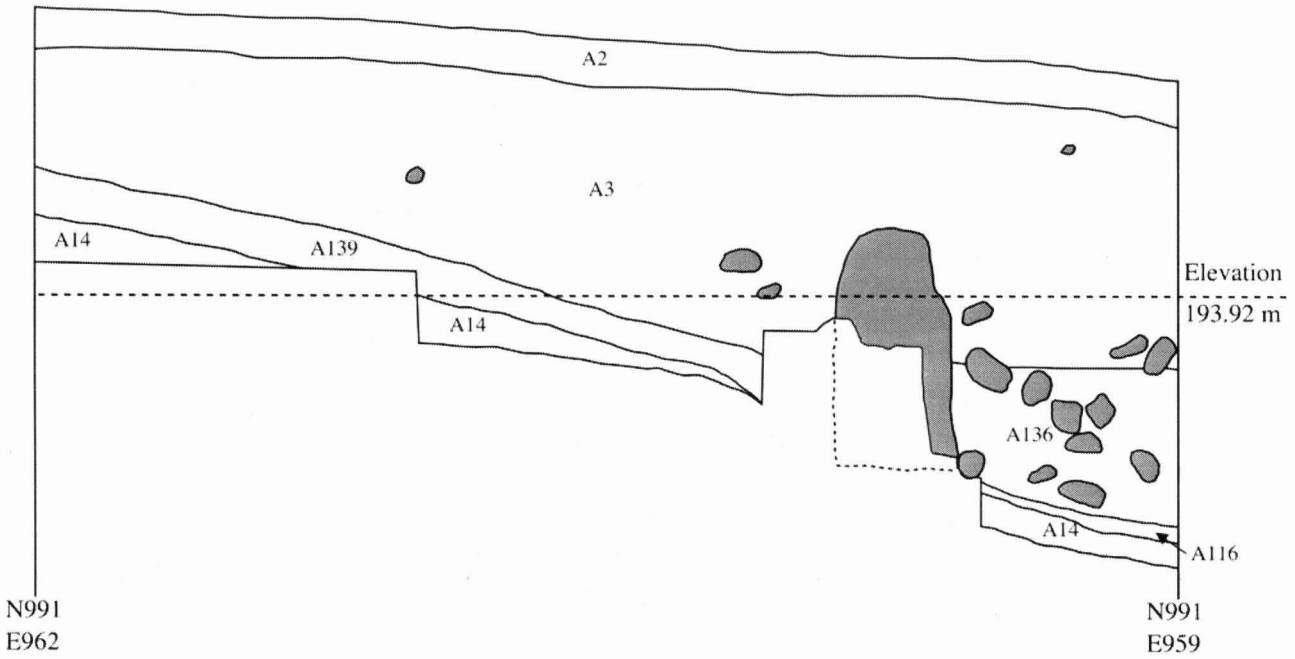

Figure 6.12 Unit N991/E959, South profile.

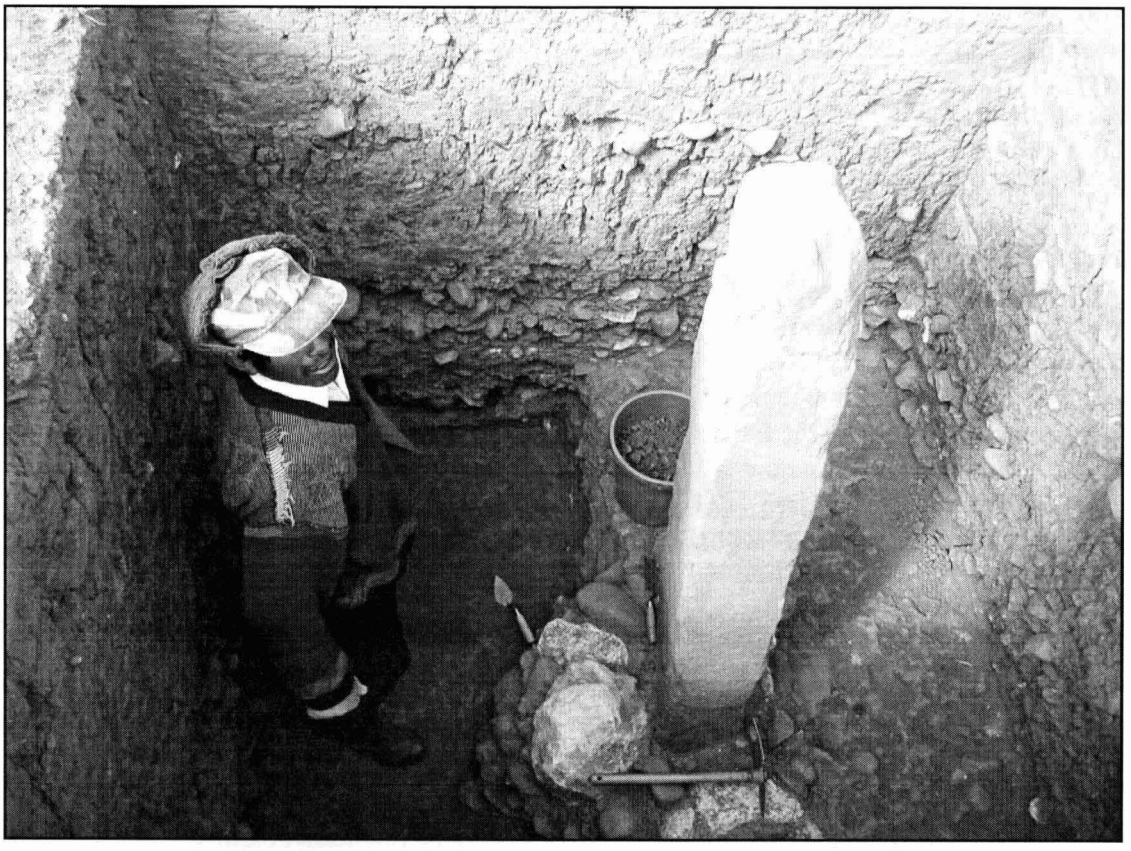

Figure 6.13 Upper court (ASD-3) central monolith under excavation.

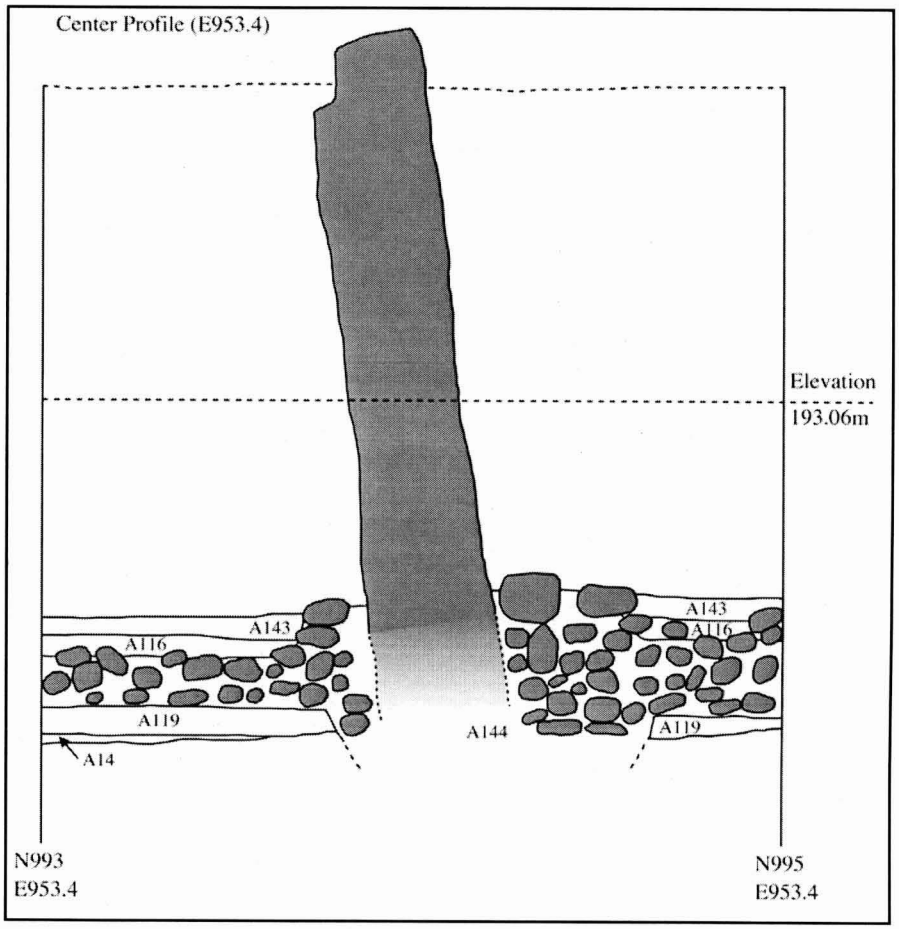

Figure 6.14

Unit N993/E952.5, central monolith, in profile.

Figure 6.15 Lightning Stone in situ.

(a)

(b)

Figure 6.16

Lightning Stone found between floors (a) front view, (b) side view, (c) top view.

(c)

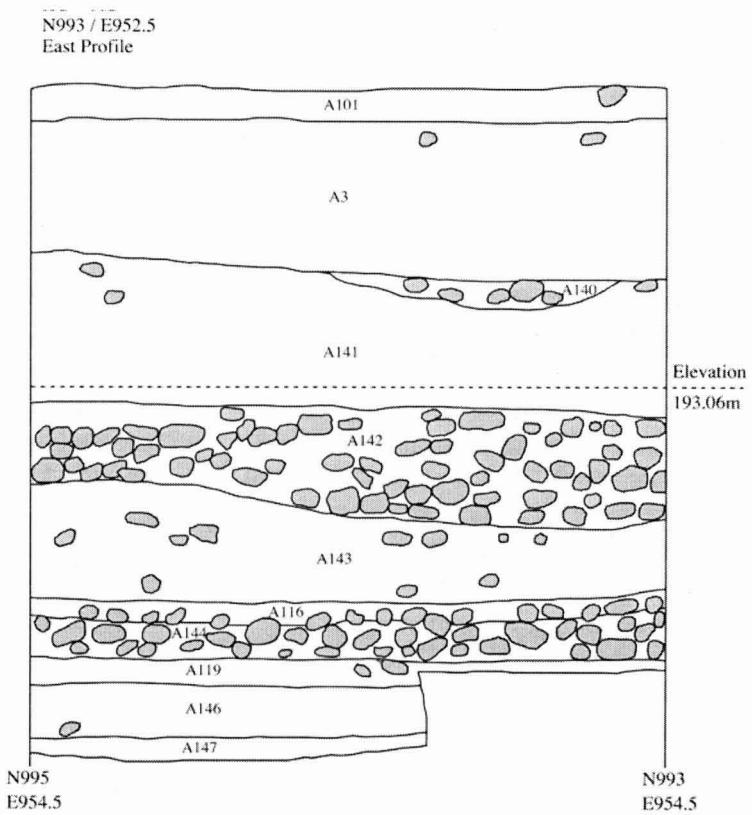

Figure 6.17

Unit N993/E952.5, East profile

pile of burnt, well-sorted rocks (large pebble – small cobble size) that suggest a dump after a *huatia* (earth oven) cooking event. The ceramics are particularly intriguing. The lower stratum in each unit (A108 and A112) includes pottery from the Early and Middle Chiripa phases (A108 contains 5% Early Chiripa pottery and 95% Middle Chiripa), while the upper strata are predominantly from the Late Chiripa phase. A radiocarbon sample from locus A108 yielded a date of 1126-844 B.C., which falls within the Early and Middle Chiripa phases. The presence of Early and Middle Chiripa phase strata indicates that there may have been an earlier ceremonial structure, or at least earlier ceremonial activities, on the site of the later ASD-1 and ASD-3 sunken courts. This hypothesis is supported by the finding of the floor exterior to the southern court wall, as revealed in unit N982/E955.

Chronology of Court Construction

The radiocarbon dates and the analysis of excavated ceramic material from within the sunken courts have provided us with evidence for the chronology of court construction, use, and abandonment. Excavations within the lower court (ASD-1) revealed the construction of both court floors, as well as a subfloor level. This subfloor level (A13) is key to our understanding of the court construction sequence. The material from this court was identified as pertaining to the Late Chiripa phase, with some Middle Chiripa phase ceramics mixed in. Additionally, the first court floor (A12) assemblage from this unit pertained exclusively to the Late Chiripa phase.

The radiocarbon date (AA64924) from the A12 floor (1207-896 B.C.) taken from unit N973/E933 is seemingly contradictory, as it spans Early and Middle Chiripa. The mixed context of the A13 subfloor level presents, however, the possibility that earlier materials were incorporated into the matrix of the floor, resulting in a misleading date. The presence of Late Chiripa pottery in the subfloor level confirms that the earliest construction of the lower court took place in the Late Chiripa phase, or after 800 B.C.

Another misleading date (AA59720) from the lower court (ASD-1) was taken from the fill between the floors and suggested an association with the Middle Chiripa phase (1000-811 B.C.). However, as noted above, ceramic analysis reveals that the lower A12 floor as well as the subfloor level both contained Late Chiripa materials, therefore invalidating the radiocarbon date as contemporaneous with the date of deposition. Rather, intrusive materials from an earlier time period seem to have been mixed in with the matrix of the fill.

The earliest date (AA59712) associated with the upper court (ASD-3) was taken from a pit that predated the construction of the court. This pit was truncated by the construction of the court and was not associated with the court's construction. This date was quite early (1127-915 B.C.), pertaining to the Early Chiripa phase. It confirms that activities were taking place in the AC Sector that dated to Early Chiripa, but again tells us nothing about the chronology of court construction.

All other dates from the lower court (ASD-1) and upper court (ASD-3) pertain to the Late Chiripa phase. From the lower court, this consists of a single date (AA59717) from ashy deposits associated with the use of the upper A8 floor (762-402 B.C.). This implies that the upper floor of the lower court was already in use before 400 B.C.

Dates from the upper court (ASD-3) include one sample (AA59711) from between the early (A119) and late (A116) floors (808-541 B.C.). This date is corroborated by the ceramic analysis, in which all materials pertaining to the early floor (A119) and to the late floor (A116) contain Late Chiripa phase ceramics. This implies that the upper floor of the upper court was constructed no earlier than about 800 B.C. (a fact we could have deduced from the ceramic evidence alone) and no later than about 550 B.C.

The remaining two dates seem to pertain to the terminal use of the upper court. One sample (AA59714) from fill over the uppermost

floor that may represent materials associated with a final, closing ceremony, produced a date of 394-205 B.C. Similarly, an ashy deposit located immediately beneath the collapse of the northern wall was dated (AA64923) to 373-113 B.C. These dates imply that the abandonment of the upper court took place at some point after approximately 375 B.C. and before 100 B.C.

Both the sunken courts, ASD-1 and ASD-3 seem, therefore, to have been initially constructed during the Late Chiripa phase, and probably early in that phase. The lower court was remodeled sometime before 400 B.C., and the upper court before 550 B.C. The extreme similarity in form, design, and construction technique between the final construction stages of the two courts might suggest that they were remodeled together. If so, this might have taken place in the early sixth or seventh century B.C. They continued to be used throughout the Late Chiripa phase, until sometime near its end, between 373 and 113 B.C.

Discussion

Kala Uyuni's ASD-1 and ASD-3 structures are very important for our understanding of Formative Period sunken courts, as well as of their role in society at this time. At the moment, these structures comprise two out of a total sample of five excavated courts from the Titicaca Basin Middle Formative period. The sample is larger, of course, from the Formative period as a whole. Two examples of Middle Formative courts have been excavated at the site of Chiripa, also located on the Taraco Peninsula: the Llusco structure and the court complex of the Mound (Hastorf ed. 2001; Hastorf 2003). One Middle Formative period court has been excavated at the site of Huatacoa, located in the northern Titicaca Basin (Cohen 2006). The Kala Uyuni structures, therefore, are an integral part of this incipient study of Formative Period ritual architecture and religious activity.

The two sunken courts excavated in the AC area have much in common with one another, including form, orientation, ritual activities, and construction sequence and technique. Both are trapezoidal in form, with the longest wall of the trapezoid facing south. The trapezoidal shape seems to have been maintained between the initial court construction and the later expansion. The construction of sunken courts with a trapezoidal plan is becoming a diagnostic for Middle Formative courts, also existing at Chiripa (Bandy 2001a, 2006; Hastorf 2003) and at Huatacoa in the northern Titicaca Basin (Cohen 2003, 2006).

Their size, with the lower court (ASD-1) measuring approximately18m x 18m and the upper court (ASD-3) measuring approximately 18m x 15m (both measurements after the court expansion), places them as the largest known courts from this time period (Cohen 2006). The size of the sunken court within the Mound at Chiripa cannot be determined due to its reconstruction during the Late Formative period, although it has been suggested that it was significantly larger (Hastorf 2003).

An interesting feature at Kala Uyuni is the presence of two contemporaneous sunken court structures. As presented above, the contemporaneity of these two structures cannot be disputed, based on evidence from both radiocarbon dates and ceramic analysis. Indeed, they seem to have undergone simultaneous expansions with shared architectural styles. This is, potentially, an unusual characteristic of sunken courts. It is possible that the courts at Chiripa were in simultaneous use (as argued by Hastorf [2003]), but they certainly did not form a unit in the way the ones at Kala Uyuni seem to have. Whether this indicates a different social structure, such as the existence of moieties, is yet to be determined.

While the original courts were constructed in the Late Chiripa phase, little of those original structures has survived. The west wall of the lower court gives us a good idea of what this structure may have been like. The initial cut of the court was lined with a cobble wall. This earlier wall included no limestone blocks and is therefore clearly different from the

later walls. The first clay floor was laid down after the wall was constructed. Above the base of the wall was an upper construction of alternating bands of yellow and red clay. It is unclear why, when all other walls were reconstructed, this single western wall of ASD-1 maintained the original wall construction. This may have been due to its state of conservation, or it may have held some special meaning; this specific part of the court wall would have been visible from the village (the KU area) below.

Sometime later, both sunken courts were remodeled. This remodeling involved an increase in the dimensions of the structures, with expansion taking place to the north and east (as indicated by the presence only of the later of the two floors adjacent to the north and east walls of both structures). In most cases, the walls were dismantled and reconstructed at the time of the expansion. As noted, the western wall of the lower court is an exception. It seems, in the case of the upper court, that white limestone anchor stones were set in place to delineate the line of the wall. Next, the northern wall was constructed, incorporating a well-built cobble foundation. The next step seems to have been the placement of the upper clay floor, which was laid over the lower floor and any subsequent fill or sediment accumulation. Finally, the remainder of the wall was constructed, incorporating both white limestone blocks and unmodified cobbles.

This style of wall construction becomes standard in the Late Formative 1 period, and can be seen in the sunken courts at such sites as Tiwanaku, Ch'isi, and Khonkho Wankane in the southern basin. At present, however, this is the first known example of this type of wall construction.

In the case of the upper court (ASD-3), it seems that a large sandstone monolith was erected at the time this remodeling event took place. It is possible that the installation of the monolith was the motivating factor behind the expansion of the courts. Whether or not there was a central monolithic sculpture in the lower court (ASD-1) remains unknown, since the center of the court was not excavated, and the colluvium filling the structure is much deeper.

The spatial segregation, elaborate architecture, and identification of a distinct set of activities as evidenced by discrete ceramic assemblages, among other behavior, indicate the special, religious nature of this sector of the site. This differentiation seems to have begun in Middle Chiripa and becomes clear in Late Chiripa. The clear separation of sectors of the site has allowed Steadman (chapter 7 of this volume) to identify a distinct ceremonial assemblage for the Late Chiripa phase. The ceramics from the AC sector are recognizable for the presence of larger cooking and serving vessels than those available in the domestic sector of the site (AQ) (Bruno, chapter 3 of this volume) as well as a higher occurrence of decorated wares. Additionally, special forms that have been identified as religious paraphernalia (K. Chavez 1988), the ceramic trumpet and incensarios, emerge in Late Chiripa and are more common in the courts. Interestingly, these special purpose ceramics seem to have been introduced after the expansion of the courts, as they are associated with the upper floors. Steadman also identifies a distinct assemblage that seems to have been indicative of the preparation of food outside of the courts. This utilitarian assemblage is not, however, domestic in nature, but rather seems to have supported ceremonial or public activities within the courts.

Non-ceramic evidence also supports the attribution of a ritual function to the AC area at least in the Late Chiripa phase. One example is the consistent presence of pits containing high densities of fish bones associated with the exterior surface of the lower court. These concentrations may be interpreted as further evidence of feasting in the courts.

Another example of ritual activity is the placement of a human sacrificial offering beneath the east wall and floor of the lower court. The symbolic placement of the individual's head upon his chest supports the interpretation of this burial as a sacrifice. Further, the splayed position

of this individual is suggestive of the treatment given to captives, enemies, or offerings, rather than to revered ancestors. Similar examples of human sacrificial offerings related to sunken court construction events have been found at the roughly contemporaneous sunken court at Huatacoa in the Pukara Valley (Cohen 2006).

The ritual activity identified at Kala Uyuni is consistent with that previously identified at the site of Chiripa for the Late Chiripa phase. As Steadman points out, however, the activities at Kala Uyuni seem to have been taking place on a smaller and more local scale than at Chiripa. These data, however, are integral to our understanding of the formation and development of the religious behavioral complex that has been referred to as the Yaya-Mama Religious Tradition (K. Chavez 1988). Whether these structures and the religious and social activities focused within their vicinities pertained to the recognition of ancestral groups (Hastorf 2003), served as the playing field for political competition expressed through feasting, or were centers of unification and gathering for moiety-like social groups, remain important questions for future investigations of the sunken court complex. The evidence from Kala Uyuni constitutes a significant contribution to these studies.

7

Ceramic Analysis

Lee Steadman

The Taraco Archaeological Project (TAP) excavations at the site of Kala Uyuni have produced unmixed ceramic samples spanning the Early Chiripa through Late Formative 2 phases. Aside from several burials, no unmixed Tiwanaku IV-V occupation was excavated at the site. This long ceramic sequence provides a unique opportunity to study Kala Uyuni in both a temporal and regional framework. As well as contributing to the definition of a continuous ceramic sequence for the Taraco Peninsula, the Kala Uyuni ceramic assemblage supplies important data for regional comparisons, particularly during the Late Chiripa and Late Formative 1 phases, the periods of maximum population at the site. The Chiripa occupation of Kala Uyuni is the first Chiripa settlement excavated by the Taraco Archaeological Project outside of Chiripa itself. From a small occupation with principally domestic ceramics in the Early and Middle Chiripa phases, Kala Uyuni becomes one of four major villages on the Taraco Peninsula in Late Chiripa times (Bandy 2001a:153). The Kala Uyuni ceramics provide a highly important comparative sample of ceremonial activity at a principal, yet slightly smaller, center in this phase. Circumstances of topography have also made it possible to separate the ceramics belonging to the domestic occupation of Kala Uyuni from those of the ceremonial sector, allowing new questions to be asked about activity patterns at the site. Settlement data indicate that in the Late Formative 1 phase, Kala Uyuni not only increases in population, but also becomes the center of a new multi-community polity, roughly equal in size to that centered at Tiwanaku (Bandy 2001a:176). The ceramic assemblage from this phase at Kala Uyuni, notable for its high percentage of decorated ceramics and specialized shapes, presents an opportunity to examine changes in ceremonial behavior in the Late Formative 1 phase and the nature of regional interaction between polities at this time.

Four hundred and fifteen bags of ceramics were recovered from the excavations at Kala Uyuni, yielding 58,168 body sherds, 6547 diagnostic specimens, and 8870 small fragments of less than 1 cm^2. The ceramics from loci selected for study were given one of three types of analysis; depending on the context of the locus. In cases where the locus was disturbed but chronological information was needed, the ceramics were categorized by phase and ware only. Ceramics from loci that were undisturbed were given a more detailed attribute analysis. The goal of this stage of the study was to create

a comprehensive and detailed description of the ceramic assemblage from each phase at the site and too further our understanding of the activities reflected by these ceramics. Attribute analyses have been used productively for the definition of ceramic sequences elsewhere in the Titicaca Basin (Steadman 1995; Chávez 1992; Chávez 1980/81; Lémuz 2001) and involve the observation and recording of individual ceramic attributes (paste, finish, color, thickness, vessel shape, rim shape, diameter, decoration, etc.) rather than the definition of a fixed set of attributes, such as is used in a typological classification (see Steadman 1995:48-50 for further discussion). As the 2003 excavations generated a large volume of ceramics, some loci were given a less detailed form of attribute analysis, particularly in cases where there were multiple loci from a single event, which focused principally on the diagnostics with only basic information recorded for the body sherds.

Only specimens from secure, unmixed levels are used in the presentation of the Kala Uyuni ceramic sequence that follows in this chapter; specimens from loci that are temporally mixed are sometimes mentioned in the text as they contribute to the chronological discussion or our understanding of activity at the site, but they are not included in the statistical sample. An initial report on the Kala Uyuni ceramics appeared in the TAP 2003 excavation report (Steadman 2004). Since that time, additional analysis of the ceramics from the site has resulted in a larger sample. Ceramic figures and percentages in this chapter therefore differ somewhat from those published previously, and a number of new vessel shapes and decorated wares are now included.

Early Chiripa

Early Chiripa ceramics were recovered from the lowest levels of the midden deposits, those resting on sterile, in both the AQ and AC sectors of the site, and from several contexts under the floors of the AC courts, including the sub-floor fill of ASD-1 and two pits under the floor of ASD-3. Few of these deposits are completely undisturbed however. The pit (event A146 and A147) in the center of ASD-3 is the only one containing unmixed ceramics. The other Early Chiripa events in the AC sector are heavily mixed, ranging from a minor presence (5%) in what is otherwise a predominantly Middle Chiripa ceramic assemblage in the lowest levels of the midden deposits to the east of the courts, to predominantly Early Chiripa material, although mixed with 15-20% Middle Chiripa ceramics, in the other ASD-3 pit and the subfloor fill contexts. In the AQ sector, bioturbation in the lowest levels of the midden has resulted in some mixing of artifacts, so that the Early Chiripa sample contains approximately 5% Middle Chiripa ceramics originating from the deposits above. Using the AQ and A146/147 events for phase analysis, the sample of unmixed Early Chiripa ceramics from the Kala Uyuni excavations totals 197 sherds. The Early Chiripa ceramics recovered from the AC and AQ sectors of Kala Uyuni are similar; there is no indication of a specialized ceramic assemblage restricted to the AC area, as will occur later in the Chiripa period.

The Early Chiripa ceramic assemblage at Kala Uyuni is utilitarian in character. No decorated ceramics were found in the sample; decorated wares from this phase have been recorded so far only in levels associated with the Early Chiripa occupation underneath the central mound at Chiripa itself (Steadman 2000, 2001). Kala Uyuni Early Chiripa ceramics are otherwise very similar to the assemblage as defined at Chiripa. More than half of the sample (53%) is manufactured in a micaceous fiber-tempered paste with biotite and translucent and opaque quartz inclusions, a paste likewise characteristic of the Early Chiripa phase at Chiripa (Steadman 1999b:62). The other ceramics are also fiber-tempered, most commonly (29%) in a paste with fine, translucent inclusions that will be particularly popular in the Middle Chiripa phase. Ceramics are mostly slipped brown (32% of the sample) or are an unslipped brown color (29%), and the predominant finishes are a complete coverage burnish (36%) or a daubed stucco (35%), a finish found exclusively on the bottoms of fiber-tempered cooking pots (see Steadman

1995:61-67 for a definition of these finish terms). Wiped and smoothed finishes, which become very common in the Late Formative, are only a minor component of the finish sample (7%).

The small sample of diagnostic shapes contains several that are limited to and characteristic of the Early Chiripa phase, such as the neckless olla (n=1, figure 7.1a) and the collared olla (n=3, figure 7.1b-c), similar to the neckless olla but with a thickened rim forming a short collar around the mouth of the vessel. These are both shapes used as cooking vessels in the Early Chiripa phase. The rest of the sample consists of short-necked (n=1) and medium-necked ollas (n=7, figure 7.1d-f, see Steadman 1995:56-58 for vessel shape definitions). Only one bowl was recovered in the sample, a small vertical-walled specimen. Although this shape is also less common at Chiripa in the Early Chiripa phase than later in the sequence, its marked scarcity at Kala Uyuni is surely due to the small size of the sample. The percentage of red-slipped specimens is relatively low at Kala Uyuni, only 7% of the sample, and the percentage of specimens with stucco finish is quite high. In fact, the percentage of sooted and stucco finished sherds at Kala Uyuni is higher, and the percentage of bowls, red-slipped, and decorated specimens lower, than at any of the Early Chiripa contexts at Chiripa itself, including not only the special use areas such as under the central mound, but also the various fill and midden deposits at that site. Compared to Chiripa then, the Early Chiripa occupation at Kala Uyuni appears to have been smaller and more domestic in nature.

Middle Chiripa

Middle Chiripa ceramics were found in both the AQ and AC sectors of Kala Uyuni. In the AQ excavations, Middle Chiripa ceramics occur in the midden deposits of the Formative period domestic occupation overlying the Early Chiripa levels, and also as intrusives in the lowest levels of the Late Chiripa midden that lies above. In the AC sector, the midden to the east of the upper court was found to have a Middle Chiripa component, mixed with small percentages (4-5%) of Early Chiripa ceramics in the lowest event and Late Chiripa ceramics in the event above. The sample of Middle Chiripa ceramics from these events totals 1017 specimens. While not used for the purposes of assemblage definition, Middle Chiripa ceramics were also present in the predominately Late Chiripa events higher up in these same AC midden units, representing at least 35% of the sample from these levels, and also represent from 10% to 35% of the floor and subfloor fill deposits in certain sections of the Late Chiripa sunken courts, as detailed below.

As in the Early Chiripa phase, the Middle Chiripa ceramic assemblage at Kala Uyuni is essentially a domestic one. No decorated ceramics pertaining to this phase were found, as they have been at Chiripa (Steadman 2000, 2001), and red slips are again less common at Kala Uyuni than they are in all contexts dating to this phase at Chiripa. Attributes of paste, finish, shape, and sooting all point to an assemblage used primarily for cooking, storage, and domestic serving. The most common pastes in the Middle Chiripa assemblage are tempered with fiber and dense, translucent, rounded quartz inclusions, one with fine-sized inclusions and the other medium-sized by the Wentworth scale. The popularity of these two pastes is particularly diagnostic of the Middle Chiripa phase (Steadman1999a,b). The percentage of the paste with fine inclusions (53%) is somewhat higher than in the Chiripa assemblage, and that of the paste with medium inclusions (21%) somewhat lower, indicating some, but not a great deal, of regional variation in the ceramics across the Taraco Peninsula during this phase. The micaceous paste common in the Early Chiripa assemblage now constitutes only 19% of the sample, while the rest of the ceramics are manufactured in a number of less common fiber-tempered pastes. Many more ceramics are unslipped in the Middle Chiripa assemblage (84%) than previously, a trend which occurs at Chiripa as well. Ceramics are mostly an unslipped red brown (29%) or black/gray color (34%). Red brown and brown are

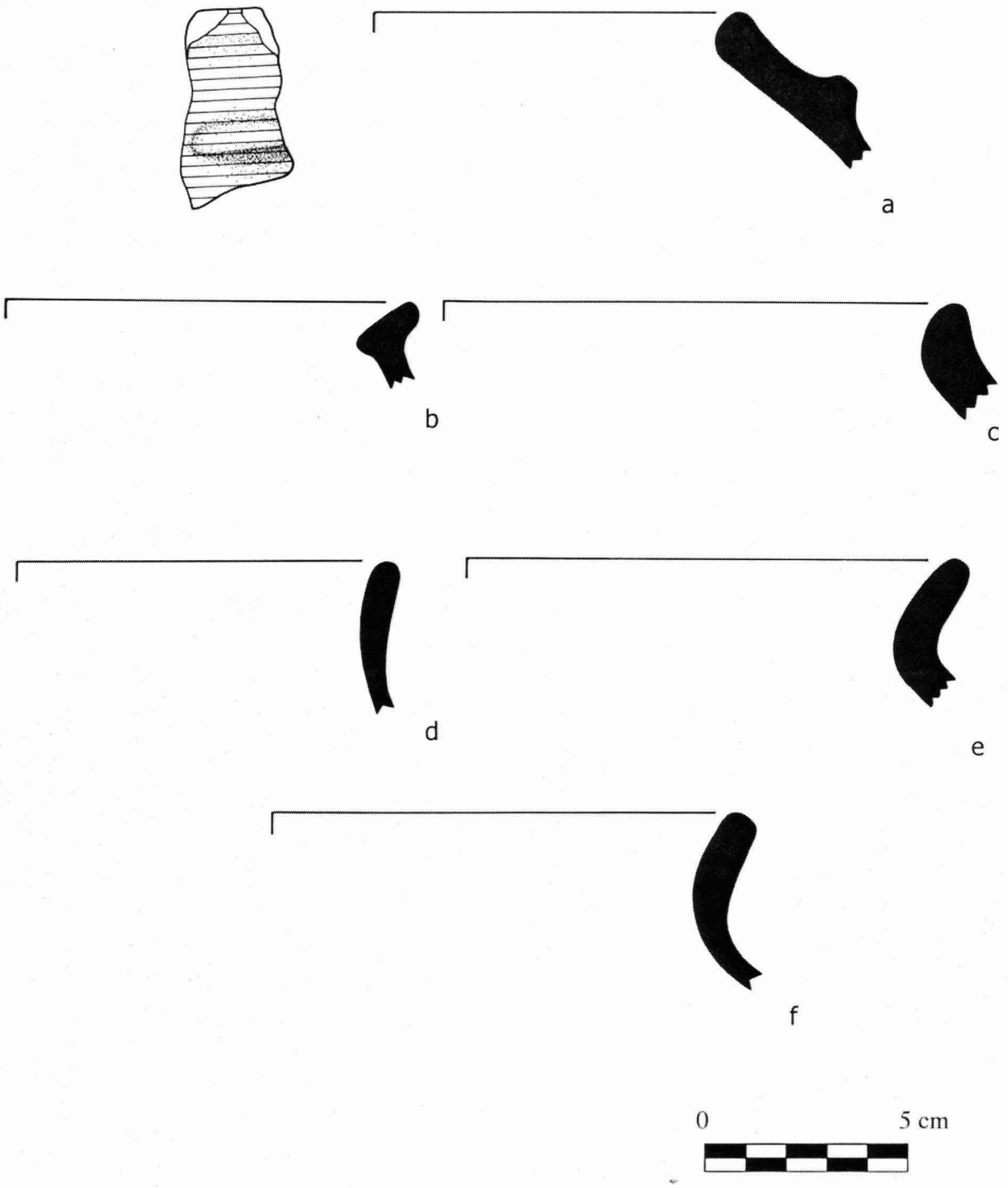

Figure 7.1 Early Chiripa neckless olla (a), collared ollas (b-c), and medium-necked ollas (d-f). [See figure 7.24, p. 111 for legend to fill patterns in illustrations.]

the most common colors in the small slipped sample, while red slips specifically decrease to only 2% of the sample. A complete coverage burnish continues to be the most common finish, and is found on an even larger percentage of the ceramics (62%) than in the previous phase. Stucco finishes average 23% of the sample across the various events at the site, while wiped and smoothed finishes continue to be rare.

The Middle Chiripa shape assemblage recovered at Kala Uyuni consists mostly of necked vessels; 83% (n=40) of all classified shapes in this phase are from this vessel class. The majority of these (67% of necked vessels with known neck height, n=22) are medium-necked ollas (figs.7.2c-g, 7.3a-b). Short-necked ollas are less common (27%, n=9, figure 7.2a-b), while jars, vessels with necks of over 4 cm in height, are present but rare (6%, n=2, figure 7.3c). Necked vessels most commonly have slightly flared necks (83% of the sample), although a few more vertical (figure 7.3b) and flared necked specimens do occur. Rims are mostly (83%) of a plain rounded, slightly rounded or tapered shape, with a few specimens having exteriorly thickened rims. Horizontal lugs on the vessel body are fairly common on necked vessels (lugs form 5% of the total sample of diagnostics). None of the Kala Uyuni specimens have handles, although vertical strap handles do occur infrequently in this phase at Chiripa (Steadman 1999b). Necked vessels appear to have had mostly rounded bases. All necked vessel diagnostics in the sample are burnished, about one-third with a complete coverage burnish. Jars and medium-necked ollas tend mostly to be slipped (58%), with brown slips particularly common. Only 2% of the entire necked vessel group is slipped red. Unslipped jars and medium-necked ollas are mostly red/brown or black/gray. The diameters of these shapes fall along a range from 14 to 25 cm, with an average of 20 cm. Short-necked ollas have a higher proportion of slipped pieces (89%), again mostly brown slips. They tend to be somewhat smaller; diameters range from 14 to 23 cm with an average of 18 cm. Jars and medium-necked ollas were the shapes most frequently used as cooking vessels, and several examples exist with sooting on the exterior and the remains of charred food on the interior.

Bowls form only 17% (n=8) of the total classified vessel shape sample, a figure similar to that found at Chiripa at this time. Most have slightly flared sides and direct, rounded rims (n=4, or 67% of those with known wall angle (figure 7.3d-e). The sample also includes bowls with a slight convexity to the vessel wall (n=2, 33%, e.g., Steadman 1999b:figure 24i). All bowls are burnished, almost all with a complete coverage burnish. This shape tends to be finished with red/brown slips or unslipped red/brown surfaces; there are no red-slipped or decorated bowls. There are also no large bowls, those with diameters greater than 27 cm, nor any large cooking vessels, with diameters of greater than 26 cm. These vessels are found in public ceremonial contexts in the Middle Chiripa phase at Chiripa, where they are believed to have been used to cook and serve the larger quantities of food consumed at these events (Steadman 2002). The Kala Uyuni bowls, which range from 10 to 26 cm in diameter with an average of 17 cm, fall at the small end of the range when compared with the Middle Chiripa bowls at Chiripa, and the necked vessels would be classified as small and medium in size. Public food consumption activities were apparently not taking place at Kala Uyuni on the same scale as at Chiripa in the Middle Chiripa phase. The ware manufactured in a dense, high-fired, fine-textured paste present at Chiripa (Steadman 1999b:63) is also very rare at Kala Uyuni, forming less than 1% of the sample. This ware was associated with large-scale cooking vessels in pits near the Middle Chiripa sunken court, and may have been used for specialized serving at public occasions. The absence of decorated wares and specialized, large-scale cooking and serving vessels at Kala Uyuni is consistent with a primarily residential occupation of the site at this time.

In contrast to the Late Chiripa phase, when public architecture and specialized ceramics in the AC sector clearly differentiate this area from AQ, in the Middle Chiripa phase there is less of a distinction between the ceramic

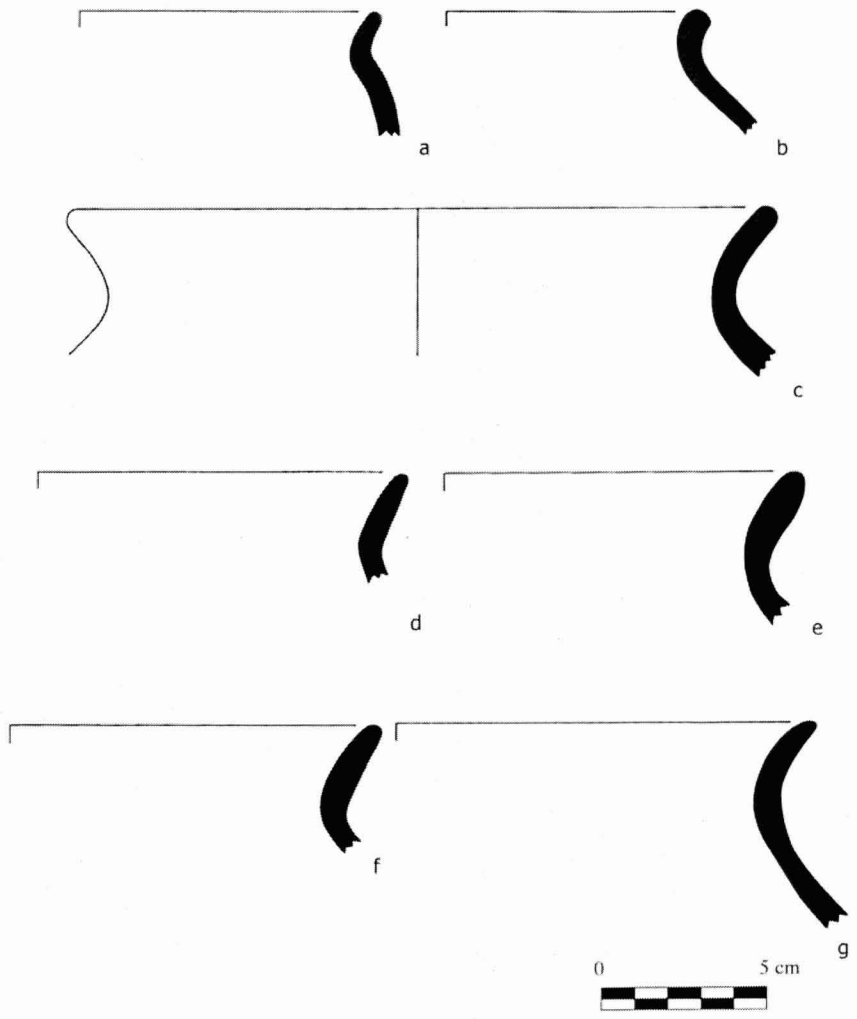

Figure 7.2

Middle Chiripa short-necked ollas (a-b), and medium-necked ollas (c-g).

assemblages from these two sectors of the site. In the AQ midden, a larger proportion of shapes are necked vessels (95% of the sample vs. 75% of the AC shapes), and there are slightly more stucco finished sherds from the bottoms of cooking pots (25% vs. 21%), suggesting that cooking activities were more frequent in this part of the site. In the AC midden however, the percentage of sooted sherds themselves is somewhat higher, and that of red-slipped sherds somewhat lower. The AC sample does contain more bowls, particularly a number of smaller, unslipped bowls with direct rims, a shape that is absent in the AQ sector. Given the size of the shape sample this difference may not be statistically significant, but it may be indicative of a set of small-scale serving activities being carried out in the AC sector during this phase, and may be evidence that the AC area was first used for special purpose activities in Middle Chiripa times.

Late Chiripa

Late Chiripa ceramics were found in all but the very lowest levels of the AQ midden, and almost all events under the mixed upper fills of the AC sector. The only Late Chiripa ceramics in the KU area are a small number of specimens that appear to have been originally incorporated into the adobes used to construct the walls of ASD-2.

The Late Chiripa phase is the first in which a substantial ceremonial sector existed at Kala Uyuni, with elaborate public architecture

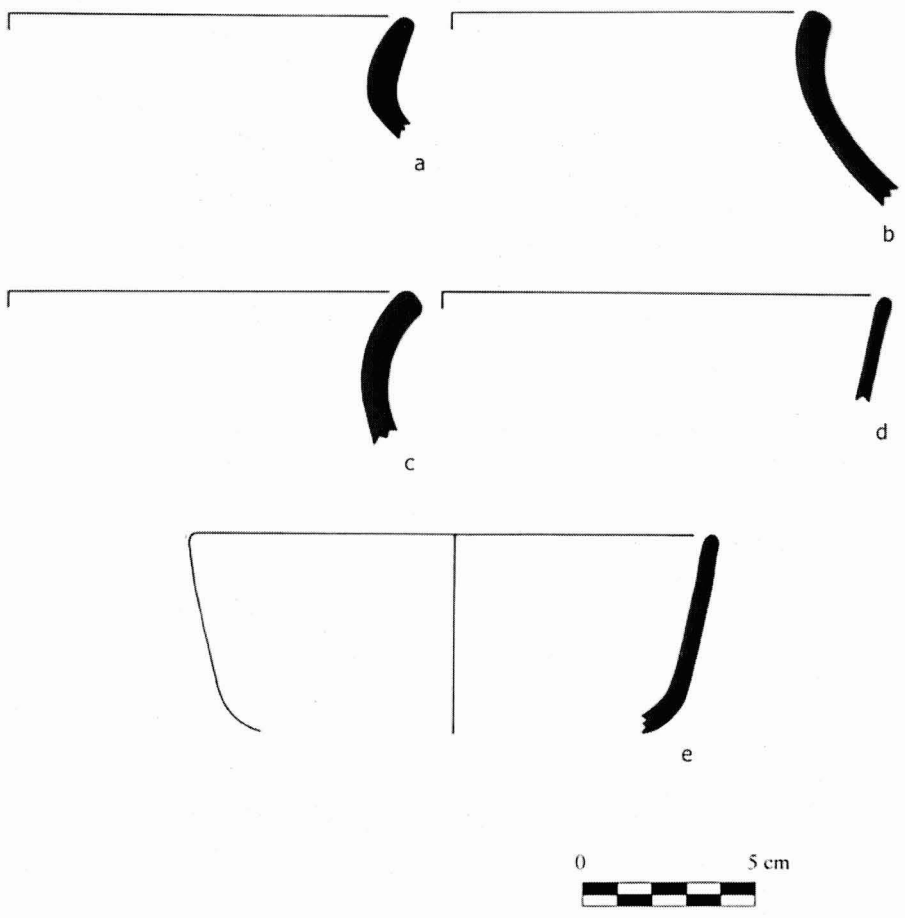

Figure 7.3 Middle Chiripa medium-necked ollas (a-b), jar (c), and bowls (d-e).

and specialized artifacts associated with these structures. It is in this phase that we see a marked increase in the frequency of decorated vessels, and the appearance of the first ceramics specifically associated with ceremonial activity, such as trumpets and ceremonial burners, as well as vessels related to the cooking and serving of food at large-scale public events. One of the remarkable attributes of the Late Chiripa sample at Kala Uyuni derives from the physical separation between the residential occupation in the AQ sector of the site and the area of public architecture and ceremonial activity near the top of the hill in the AC sector. The fortunate circumstance of physical layout makes it possible to isolate three distinct ceramic assemblages at Kala Uyuni; a domestic assemblage, with a high percentage of plain cooking and storage wares and few to no decorated specimens; a cooking/storage assemblage associated with the activities taking place in the semi-subterranean courts (rather than with domestic household-based activities); and a special purpose assemblage, with more serving vessels, larger and more frequently red-slipped or decorated bowls, and ceremonial shapes such as ceramic burners and trumpets. Cooking wares are not entirely absent from this last group, but differ in their finer pastes

from those recovered from the domestic deposits. This special purpose assemblage is found only in the AC sector of the site in association with the ASD-1 and ASD-3 courts. The ceramics recovered from most court events, including the post-use fill over the floor, the lower and upper floors and their associated occupation zones, and the fills between the floors, are all part of this assemblage.

The utilitarian Late Chiripa assemblages are found in several contexts at the site, and vary somewhat by area. The ceramics recovered from the midden in the lower AQ sector, location of the long Early and Middle Formative occupation at Kala Uyuni, are domestic in character, and the attributes of the ceramics from this area are the most weighted towards a domestic, household-based, assemblage. The cooking/storage assemblage associated with the courts is found at the top of the hill in the midden deposits to the east of the AC courts and in certain units within the courts themselves. These ceramics cannot be properly called 'domestic' as they are not principally related to residential activities, and so are referred to simply as 'utilitarian' in this report. Above the Middle Chiripa levels in these midden deposits are several events containing Late Chiripa utilitarian ceramics mixed with approximately 35% Middle Chiripa wares. Because of the mixing of phases, these ceramics were not used in the statistical sample. Material from this area was also used at various points in the construction of the courts. The same mixed Middle/Late Chiripa utilitarian ceramic assemblage as that of the midden was found in the upper and lower floor events on the west side of the upper court (ASD-3); in the subfloor fill, fill between the floors and upper and lower floors in the southwest corner of the lower court (ASD-1); and in the deposits under the upper floor on the west side of the lower court.

There are also several events of unmixed Late Chiripa utilitarian ceramics within the courts. These contexts include the lower and upper floors in the center of ASD-3, and the upper floor and the fill under the upper floor on the west side and in the southeast corner of ASD-1. The post-use fill in the southwest corner of ASD-1 is also part of this assemblage, as are several trash pits excavated outside the walls of the courts. The attributes of these ceramics closely match the Late Chiripa ceramics from the midden deposits and, with the exception of the trash pits, these deposits also appear to derive from construction material taken from the midden. The handful of well-finished vessels and decorated specimens which were found in the midden-derived material from the court floors were evidently deposited during activities taking place in the courts, as they were not present in the midden itself or the midden pits excavated outside of the walls of the courts.

The units where the Late Chiripa midden ceramics were excavated are the same units, or near the same units, which contained the mixed Middle/Late Chiripa sample; all are located on the southwest side of the structures within the area of the older courts. At the time that the upper floors were constructed, both courts were expanded towards the north and east (Cohen and Roddick, chapter 6 of this volume). With the exception of one small locus, the floor and subfloor fills of the older courts all contained Middle/Late Chiripa or Late Chiripa midden material. When the courts were renovated, the fills placed over the original courts as well as that portion of the upper floors laid down over the original courts were also midden-derived. The deposits in the newer parts of the courts to the north and east, those not over an earlier construction, do not come from the same midden. The density of the ceramics here is half that of the midden and half that of the midden-derived loci within the courts. The ceramics from these areas are not the same utilitarian midden ceramics, but form part of the distinctive special purpose assemblage. This raises the possibility of a conscious choice to use construction materials from a different source in the newer areas of the courts. The fills deposited over the upper floors follow no special pattern, with fills containing special purpose assemblage ceramics occurring in the older parts of the court and visa versa, suggesting that any restrictions governing the placement of the fills were no longer in effect

after the abandonment of the structures.

The distinction between domestic, utilitarian and special purpose assemblages was not as defined at the site of Chiripa, making the Kala Uyuni sample particularly useful for understanding the differences between residential and ceremonial activities during this phase. None of the deposits at Chiripa were as weighted toward household-based domestic activities as those from the AQ sector of Kala Uyuni, which has a larger proportion of domestic wares, more coarse paste ceramics, and more cooking ollas and jars than any Chiripa context. Conversely, we find that the special purpose assemblage from the AC courts is particularly weighted towards fancier vessels. Although there are fewer decorated ceramics at Kala Uyuni and a more limited variety of decorated wares, large serving bowls and sooted incensario sherds make up the same proportion of the sample at the two sites, with notably fewer cooking wares and coarse paste ceramics in the AC special purpose assemblage than at Chiripa. The ceramic assemblages associated with public architecture at Chiripa included a fairly high proportion of cooking and other utilitarian specimens, related mostly to large-scale food preparation for public events; plain serving, storage, and cooking vessels associated with the activities taking place at the courts at Kala Uyuni are concentrated in the midden and midden-derived deposits from the area to the east of the AC courts. Here the ceramics are more weighted towards plain, unslipped storage, transport and serving vessels than the domestic assemblage, with fewer cooking vessels and fewer coarse paste wares.

The Late Chiripa domestic/utilitarian assemblage at Kala Uyuni is composed principally of ceramics tempered with fiber and subangular, opaque white, quartz inclusions of coarse and very coarse size. This temper is also characteristic of the Late Chiripa assemblage as defined from the site of Chiripa (Steadman 1999b). It is used principally for the manufacture of jars and medium-necked ollas, particularly cooking vessels, and smaller, plain bowls. The ceramic assemblage from the AQ sector specifically (n=1667) has the highest percentage of ceramics manufactured in this paste; 78% of the sample, more than any context at Chiripa. This may be due in part to regional variation in the popularity of this paste at Kala Uyuni but also reflects that fact that the AQ midden is more weighted towards a plain domestic assemblage. The utilitarian deposits in the AC sector (n=2164) also have a high percentage of this coarse paste, although at 59% of the sample it is not as high as in the AQ midden. The remainder of the Late Chiripa domestic/ utilitarian sample is manufactured mostly (16% in the AQ area and 30% in AC) in the same paste tempered with fiber and fine, dense, rounded translucent quartz inclusions that was common in the Middle Chiripa phase. A number of other less common fiber-tempered pastes complete the sample. In general, however, a few particularly popular pastes dominate the Kala Uyuni paste assemblage, contrasting it with the more varied paste distribution found at the larger site of Chiripa.

Attributes of surface color and finish in the AC utilitarian and AQ samples point to an assemblage weighted towards cooking and plain serving and storage vessels, particularly in the AQ midden. More than half of the sample from AQ and AC (57% and 54% respectively) is unslipped. Plain black, brown and gray sherds are the most common in both areas. However, they represent a larger proportion of the AQ sample (36%) when compared to AC (27%), while the percentage of unslipped red/brown sherds, a color generally associated with serving and storage vessels, is slightly higher in the AC sample. Red slips are rare in both assemblages (5-9%). In the slipped group, brown and dark brown slips, the slip colors associated most closely with cooking vessels, are most common in the AQ area (23%), and brown (17%) as well as red/brown slips (21%) predominate in AC. Most specimens (74%) have burnished surfaces, a full 42% of the total sample with a complete coverage burnish. Wiped and smoothed finishes form a minor part of the assemblage in this phase (7%), while the daubed stucco on the bottoms of cooking pots represents 18% of the total sample.

The Late Chiripa special purpose

assemblage from the AC courts (n=1564) possesses a different suite of attributes. The paste with fine, dense, translucent quartz inclusions is the single most common (53% of the sample), followed by a micaceous paste tempered with biotite and translucent and opaque quartz inclusions (the same that had been common in Early Chiripa times), which forms 29% of the sample. In the higher percentage of these two pastes, and the much lower percentage of the paste with coarse white quartz inclusions (only 14% of this sample), the special purpose assemblage differs markedly from the utilitarian one. The coarse quartz-tempered paste is, in fact, less common in the Kala Uyuni special purpose assemblage than it is in similar contexts at Chiripa, again reflecting a greater differentiation at Kala Uyuni between domestic/utilitarian and special purpose contexts. A higher percentage of the special purpose assemblage is slipped than the AC utilitarian and AQ samples; 62% of the sherds. Red, rare in the domestic/utilitarian assemblage, is the most common slip color (21% of the total sample), followed by red/brown and brown. Most of the unslipped sherds are again black, brown or gray. Burnishes are particularly prevalent in this assemblage; 79% has this finish, including 52% with a complete coverage burnish. Stucco finishes do occur, but are less common (14%) than in the AC and AQ middens.

During the Late Chiripa phase, the first decorated ceramics appear at Kala Uyuni. Most of these are found in the AC sector; 7.6% of the special purpose assemblage from the court floors, the occupation zones associated with these floors, and the fill under the floors in both the upper and lower courts is decorated, and 3.9% of the fill over the floors of these courts, for a total of 76 specimens from special purpose contexts. The highest concentration of decorated ceramics (8.2% to 10%) is found specifically on the upper floors and associated occupation zones of the two courts. These figures are somewhat less than those for comparable contexts at Chiripa, where the percentage of decorated ceramics from all but the earliest court floor ranges from 11.8 to 14.5%. The first specialized ceramic shapes with clear ceremonial associations also date to this phase; the ceramic tube or trumpet and the incensario, a bowl shaped like other serving bowls but with the remains of sooted deposits on the interior. These two shapes are closely related to the development of the Yaya Mama Religious Tradition in the southern Basin (Chávez 1988), and are consistently found in association with special use structures. Two Late Chiripa ceramic trumpets have been recovered at Kala Uyuni, one from the fill over the upper floor in ASD-3, and one from an occupation zone associated with the upper floor of this same court. Five decorated specimens from incensarios with sooted deposits on the interior were also found. All are body sherds from finely finished cream on red bowls, and all are from the upper floors and occupation zones associated with these floors. Neither of these ceremonial shapes is found associated with the lower floors, suggesting the possibility of a change in the amount or type of ceremonial activity taking place in the AC courts through time. The sample from the lower floors, however, is small. Most loci contained utilitarian ceramics derived from the midden. Only one small locus is not midden-derived; decorated bowls are present in this sample in proportions similar to those of the upper floors, but no ceramic ceremonial shapes were recovered. Decorated wares are present as well in the domestic/utilitarian deposits recovered at Kala Uyuni, but their number is very small; 10 sherds in total, representing 0.3% of this sample. These specimens come from the AQ midden and the midden-derived fills between the floors and over the upper floors of the AC courts.

Late Chiripa decorated ceramics at Kala Uyuni are for the most part comparable to those from the site of Chiripa itself. Fewer of the decorated wares, however (22% of the sample), are manufactured in the fine, biotite and quartz-tempered micaceous paste than at Chiripa, where this paste is the most common for decorated ceramics in special purpose contexts. At Kala Uyuni most of the decorated sample (64%) is made in the paste with dense, translucent quartz inclusions. Vessels painted in cream slip on a red-slipped background (figs. 7.4a-d) form the vast majority of the decorated ceramics (83%, n=71). The proportion of cream on red wares in

the decorated assemblage is in fact higher that at Chiripa, where the greater variety of decorated wares means that the cream on red group, while still the most common, represents only 74% of the decorated assemblage. Cream on red specimens are painted mostly (49%) in cream on a red-slipped background, but variations in slip color include light brown, yellow cream, yellow or orange decoration and red/brown or light red backgrounds. Motifs consist mostly of diagonal or vertical elements, triangles, and right or acute angles. Cream on red painting occurs principally on flat-bottomed bowls with vertical sides and thickened rims. Some of these bowls were used for special purpose burning, as the five charred cream on red sherds attest. Necked vessels at Kala Uyuni were only rarely painted in cream on red; no rims from these shapes were recovered, and only two body sherds from the globular bodies of what were probably short or medium-necked ollas.

The other decorative types present at Kala Uyuni occur only in minor quantities. Black on red or black on red brown painted specimens represent 7% of the decorated sample (n=6, figure 7.4e-f). The few diagnostic specimens in this group are again vertical-walled bowls. Incision on a single color slip, at Kala Uyuni a red, dark red, or dark brown slip, constitutes 5% of the sample (n=4, figs. 7.5a-d). As at Chiripa, most of these (figs. 7.5a,c, d) are incised with a wide, U-shaped line. Vessel shapes in this group include large bowls with slightly flared walls, and the two trumpet fragments, both with the remains of post-fire paint in the incisions. Wide-line incision with post-fire paint in similar motifs of straight lines, dashes and dots is particularly common for the decoration of trumpets in both the Late Chiripa and Late Formative 1 phases (Steadman 1999a:figure 31d; 1999b:figure 27d; Steadman, Roddick and Capriles 2005:figure 6.4a; Mohr Chávez 1966:83-86). The protrusion on the trumpet in figure 7.5c appears to be a small handle rather than part of the decoration. Also present at Kala Uyuni (figure 7.5b) but not part of the statistical sample, as all come from mixed Late Chiripa loci are examples of a particular style of incised decoration closely related to the Qaluyu style of the northern Basin. Bowls in this Qaluyu-derived style have been found on the Taraco Peninsula (Bandy 2001a: figure 6.2) and on the west side of Lake Titicaca (Steadman 1994; figure 97; 1995: 438, figure 49a,c). They are incised with inclined volute motifs on slightly flared bowls with angled rims. This bowl shape, common in the northern Basin, is in all areas the most closely associated with the volute motif, even on the Taraco Peninsula where vertical-walled bowls and thickened rims are otherwise more common for decorated vessels. Most of the Taraco Peninsula specimens appear to be non-local (Bandy 2001a:115); specimens at Kala Uyuni are found in both non-local and local pastes.

Other decorated wares in the Late Chiripa sample include specimens painted in red on a cream background (n=1, 1%) and black on a red background with incision separating the color areas (n=1, 1%). The use of incision to delineate color areas will become common in the subsequent Late Formative 1 phase, but the technique first appears as a rare style in the Late Chiripa assemblage (Mohr Chávez 1966:131; Steadman 1998b:figure 27h). The final group of decorated ceramics includes a number of small-necked vessels (d=12 cm, n=3, 3% of the sample) with appliqué fillets on the neck or near the rim. Other than the few cream on red specimens, this is the only decoration to occur on necked vessels in the Late Chiripa phase. These fillets can be either wide (figure 7.5e) or narrow, and frequently are detailed with diagonal incisions. They are painted with red or red/brown slips but are not from particularly fancy vessels, being finished with only an incomplete coverage burnish and manufactured mostly in the coarse quartz paste. Additional decorated specimens from deposits within the AC courts but not in the statistical sample are illustrated in figures 7.9e and f. figure 7.9e is the broken head from a figurine, possibly camelid or avian in form, slipped red except for the area around the face. Two holes run through the ears, suggesting that additional materials, perhaps yarn, feathers, or beads, were tied on as decoration. Figure 7.9f is a small earplug with traces of yellow and red post-fire paint on the front side.

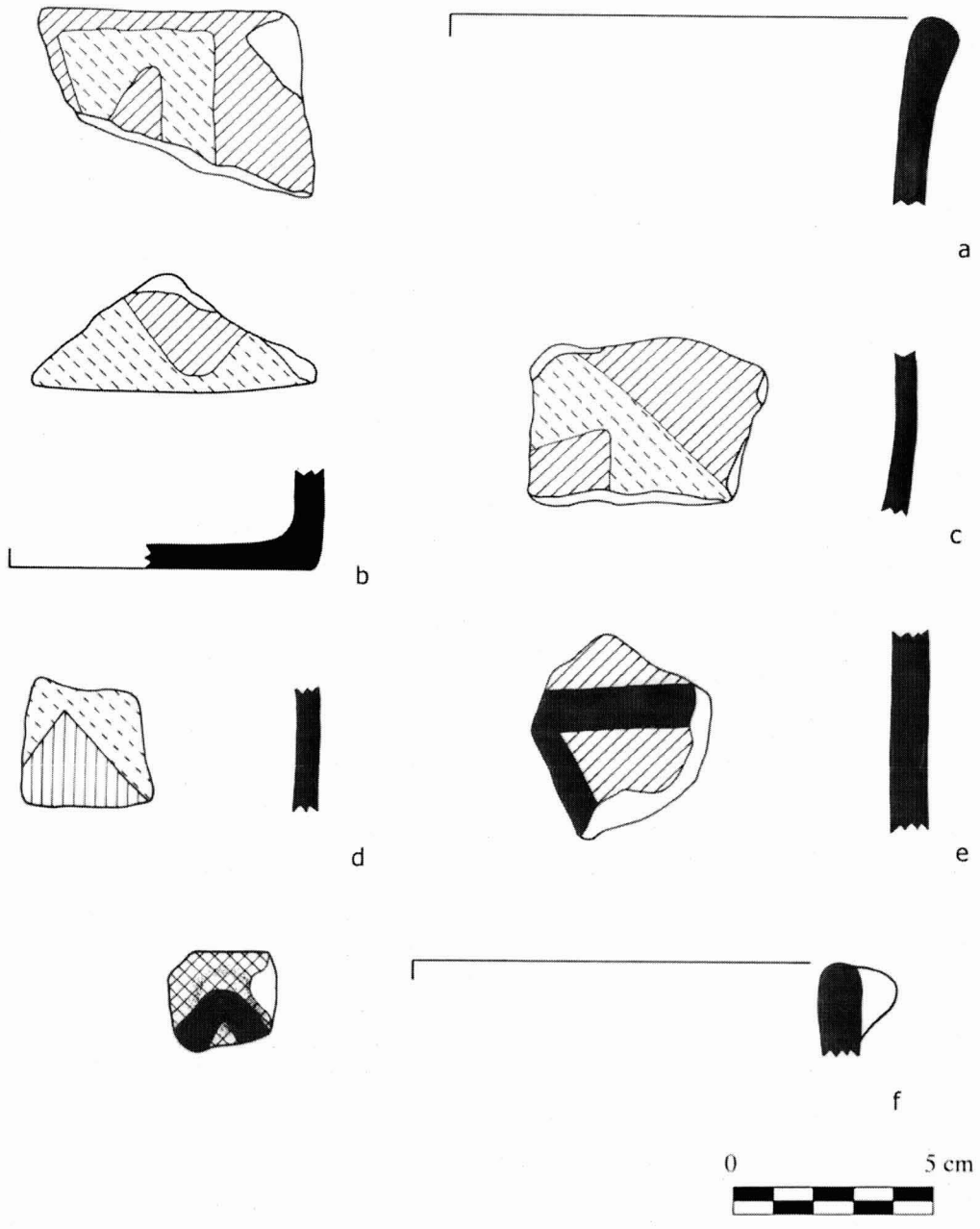

Figure 7.4 Late Chiripa ceramics: fragments of cream on red bowls (a-d) and black on red bowls (e-f), figure 7.4f with a round lug at the rim. [See figure 7.24, p.111 for legend to fill patterns in illustrations.]

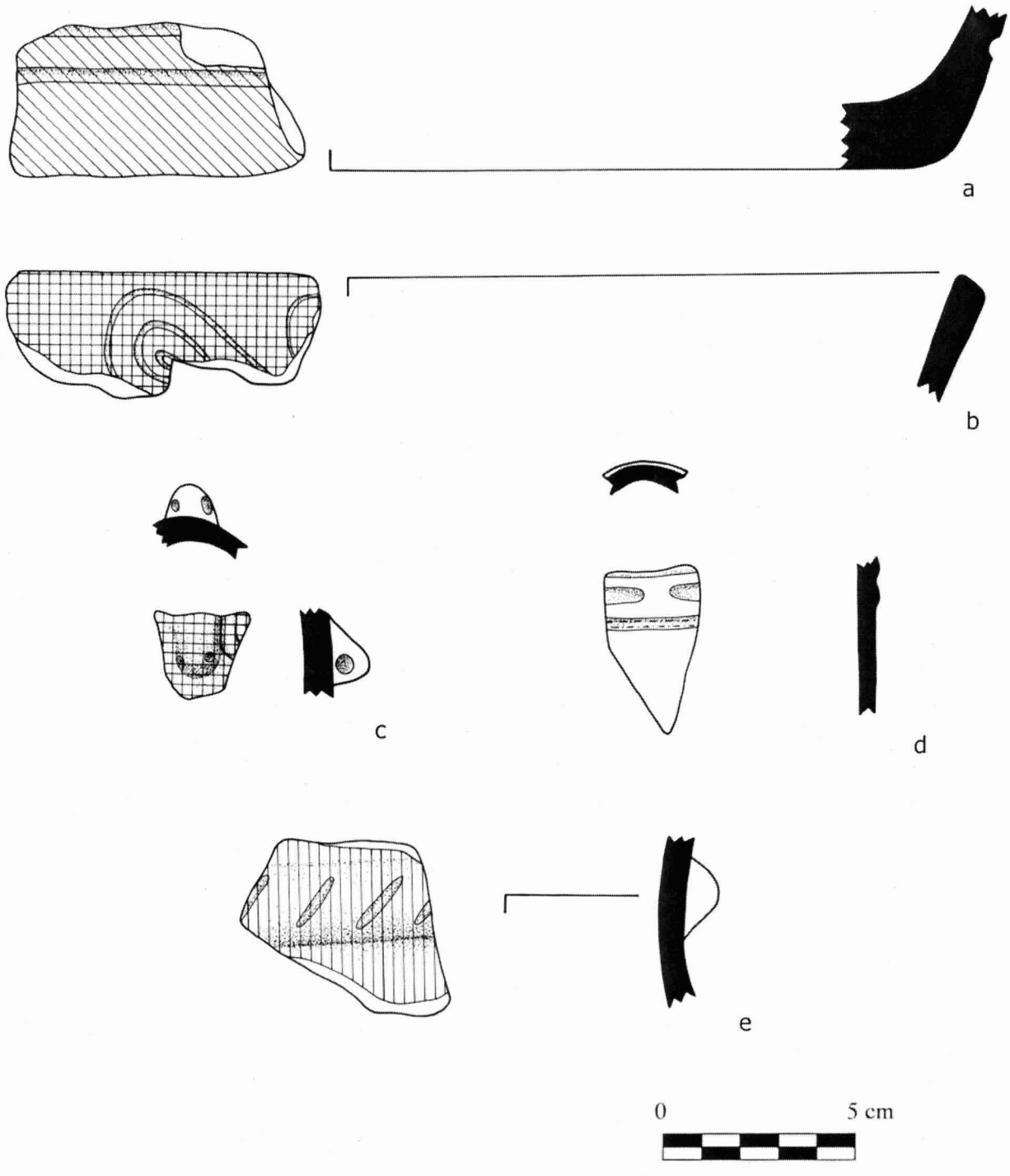

Figure 7.5 Late Chiripa decorated ceramics: incised bowls (a-b), incised trumpet fragments (c-d), figure 7.5c red post-fire paint in round incisions, figure 7.5d with orange post-fire paint where indicated, and (e) incised appliqué fillet on neck.

Bowls are more common in the Late Chiripa assemblage at Kala Uyuni than in the Middle Chiripa phase, this shape now representing 22% (n=35) of the classified shape sample. They are more likely to be found in the special purpose assemblage (26% of all classified rims) than in the domestic/utilitarian one (19% of AQ and 21% of AC). Most Late Chiripa bowls (71%) are manufactured in the paste with dense, translucent quartz inclusions, with the remainder in the coarse quartz (24%) or the micaceous pastes (5%). The coarse paste bowls tend to be smaller than average, slipped red/brown or brown, and to come from the AC utilitarian or AQ middens. Of the Late Chiripa bowls with known wall angle, most (47%, n=14) have slightly flared walls (figs. 7.5b, 7.6c-d). Bowls with a convexity to the vessel wall, generally with a slightly flared wall angle, are also fairly common, forming 30% of the bowl sample (n=9, figs.7.6e-f). Bowls with a vertical wall angle (20%, n=6, figs.7.4a, f, 7.6a-b) and those with flared walls (3%, n=1) make up the rest of the shapes. Round nubbins sometimes occur near the rims of the vertical-walled bowls (figs.7.4f, 7.6a), but no handles are present. Bowl bases are mostly flat, although a few low ring-based forms are present (figure 7.9d [These bases form only 7% of the base sample.]) The majority (85%) of bowls have direct rims, mostly rounded or slightly rounded, with a few tapered examples. A smaller number (15%, n=5, 7.6b,d) have exteriorly thickened rims. As at Chiripa itself, a larger proportion of the vertical-walled bowls have exteriorly thickened rims (50%) than the other bowl shapes, and vertical-walled bowls tend to be larger in diameter and more often slipped red and/or decorated (67% of the vertical-walled specimens) than the slightly flared or convex bowls (29-38%). Vertical-walled bowls also form a larger proportion of the bowls from the special purpose assemblages in the AC courts (30% of bowls with known wall angle) than they do in the domestic and utilitarian samples (15%). Surface color and size of the bowls also varies by context. All the bowls in the special purpose assemblage are slipped; 50% slipped red, 30% decorated and the rest slipped red/brown. In the domestic/utilitarian assemblage, only 75% of bowls are slipped; 29% slipped red and 4% decorated, with the remainder slipped red/brown or brown. Virtually all bowls, in whatever context, are burnished, most with a complete coverage finish.

Kala Uyuni bowls range from 8 cm to 32 cm in diameter, with an average of 21 cm in the special purpose assemblage and 20 cm in the domestic/utilitarian assemblage. This range is similar to the fill and wall-fall deposits at Chiripa, and the floor of the earliest Late Chiripa sunken court at Llusco, but is not as large as the bowls associated with the Upper or Lower House structures on the Mound, or those from the Quispe sunken court (Hastorf et al. 1999, 2000, 2005) which average from 26 to 28 cm in diameter. Extra-large sized serving bowls, those with diameters greater than 30 cm, first appear at Chiripa in the Late Chiripa phase in contexts associated with the sunken court structures, and are believed to be indicative of an increasingly greater participation in public eating or feasting activities occurring at this time (Steadman 2002). Extra-large-sized bowls also appear for the first time in the Late Chiripa phase at Kala Uyuni, where they are also associated specifically with the sunken structures; 40% of the bowls from the special purpose assemblage in the AC courts are extra-large-sized specimens, with all examples coming from the upper floor or occupation zones associated with the upper floor, versus only 17% from the special purpose assemblage in the post-use fill of the courts and only 5% of the bowls from the AQ midden and the midden-derived AC contexts. Although the bowls from the court floors are on average smaller and less likely to be decorated than those from comparable civic/ceremonial contexts at Chiripa, the proportion of extra-large-sized bowls in the assemblage is comparable to the Chiripa figures.

Necked vessels in the Late Chiripa phase constitute 77% (n=121) of the classified rim sample from unmixed contexts. Jars are considerably more common in this phase than previously, forming 41% (n=38, figs.7.8a-f, 7.9a-b) of the specimens with known neck height; 46% of vessels have medium necks (n=43,

figs.7.7b-g), while short-necked ollas are now much less common in the assemblage (13%, n=12, figure 7.7a). Jars and medium-necked ollas tend to have necks with a slightly flared rim angle (67%), or secondarily a flared angle (25%, figs.7.7b, 7.9a-b). Most short-necked ollas also have slightly flared necks (50%); ollas with vertical necks are also common only in this group (40%). Handles are present only on necked vessels in this phase. Only 3% of classified shapes have this feature, generally strap-shaped vertical handles running from rim to body; some vertical handles may also have been located on the vessel body wall. Handles tend to occur on the smaller vessels, those medium and short-necked ollas with diameters of 15 cm or less. The larger necked vessels, particularly brown-slipped cooking vessels, sometimes have horizontal or semi-circular lugs on the vessel body wall (figure 7.9c). Bases to necked vessels are flat, and possibly also rounded. Most necked vessels (88%) have simple direct rims, either rounded, slightly rounded or tapered, with the remaining specimens having flat, angled or exteriorly thickened rims (e.g., figure 7.7e).

All necked vessels are burnished, slightly under half with a complete coverage burnish. Most (76%) are also slipped. Surface color and diameter of the necked vessels varies considerably by shape, however, as does the paste in which the vessel is manufactured. Short-necked ollas are not generally used for cooking in the Late Chiripa phase, but rather are a class of serving vessels. They are the most likely to be slipped red of any necked vessel shape (33%), with no brown or black specimens. They tend to be smaller than the other necked vessels; diameters range from 5 to 26 cm, with an average of 15 cm. The red-slipped specimens fall at the smaller end of the diameter range. Short-necked ollas are manufactured principally (71%) in the paste with dense, translucent inclusions.

Jars are the shape used most often for cooking. All sooted rim specimens where vessel shape can be determined are jars (for example figure 7.8d), and jars are the most likely to be slipped brown of all the necked vessels (45%), in proportions similar to the colors of the sooted body sherds. Other jars are unslipped or have a red brown slip; only 5% are slipped red. The majority of jars (69%) are manufactured in the coarse quartz paste, again in proportions similar to the percentage of this paste in the sooted sample, with the rest of the jars mostly in the dense translucent paste; the micaceous paste is rare for all necked vessels. Jars are the largest of the necked vessel shapes; they range mostly from 16 to 30 cm, but examples exist as large as 39 cm. Average diameter is 23 cm. The larger jars are the most likely to be manufactured in the coarse paste and have brown slips, attributes consistent with cooking vessels. Medium-necked ollas as a vessel class appear to have served a variety of functions, including serving and storage as well as cooking. Brown- and red-slipped specimens in this sample occur in similar proportions (29% and 24%). Pastes are varied, with the figures for the coarse quartz and dense translucent inclusion pastes falling between those of the jars and short-necked ollas. Diameters range from 6 to 25 cm, with one outlying specimen at 34 cm, and average 17 cm.

Necked vessels are more common in the AQ midden and AC midden-derived assemblages (79-81% respectively of all diagnostics) than in the AC special purpose contexts (74%). The AQ midden particularly has a high proportion of jars, 57% of all necked vessels, many more than in AC utilitarian contexts (33%). Furthermore, jars in the AQ sector have the highest percentage of coarse paste specimens (78%), more brown-slipped and unslipped black/brown pieces (50%) and are, on average, larger than the jars from the special purpose assemblage. The AQ area also has the highest percentage of sooted sherds (6.2%), of which 82% are coarse paste wares. These data strongly suggest that the focus of cooking activities at Kala Uyuni was in the AQ sector. Medium-necked ollas in the AQ midden are also weighted towards coarse paste (65%) and brown-slipped or black/brown specimens (54%), and these vessels may have functioned principally as a smaller class of cooking vessel in this sector of the site. Red-slipped necked vessels of any kind are the least common in the AQ deposits (13%).

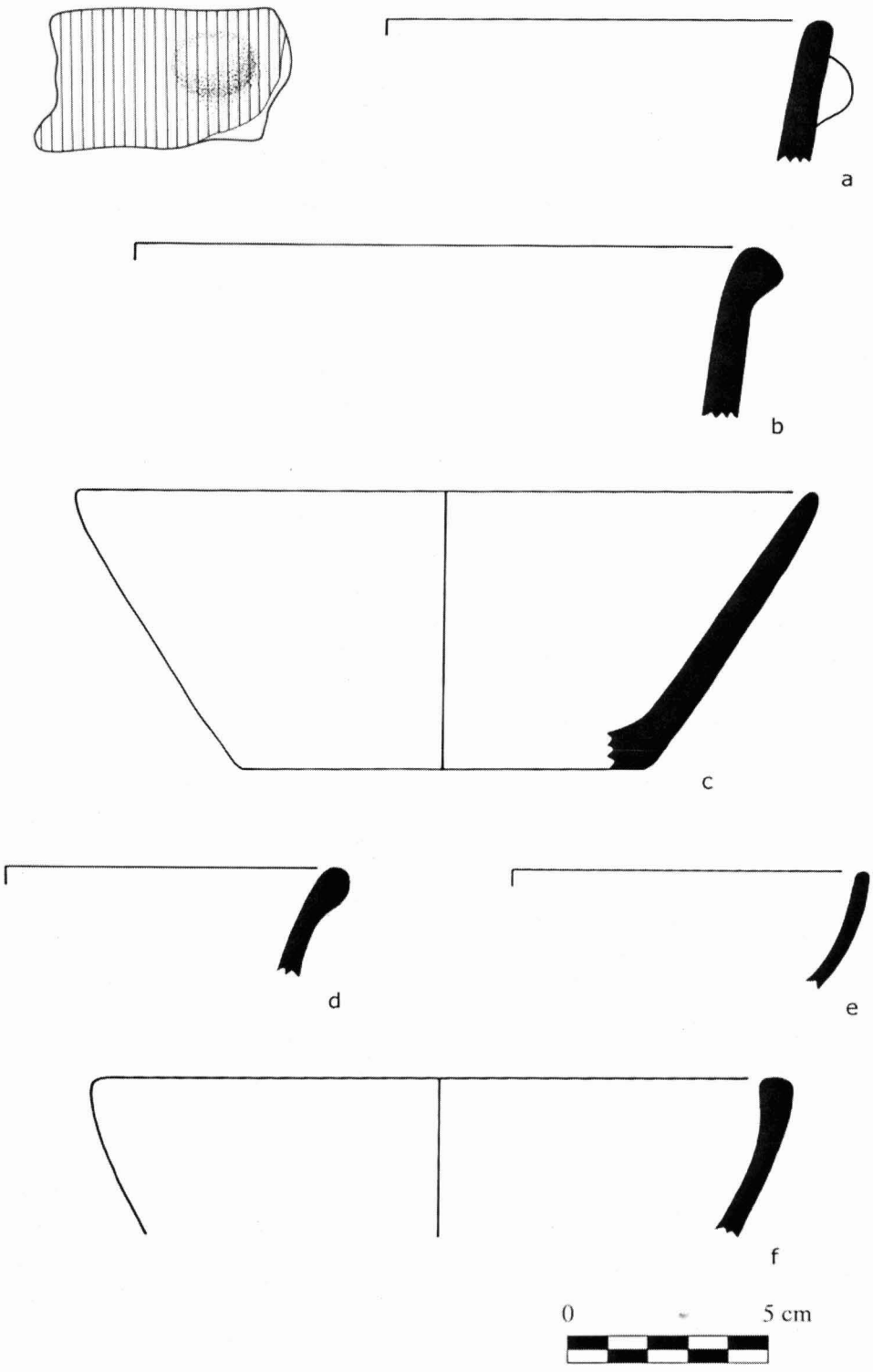

Figure 7.6 Late Chiripa bowls (a-f).

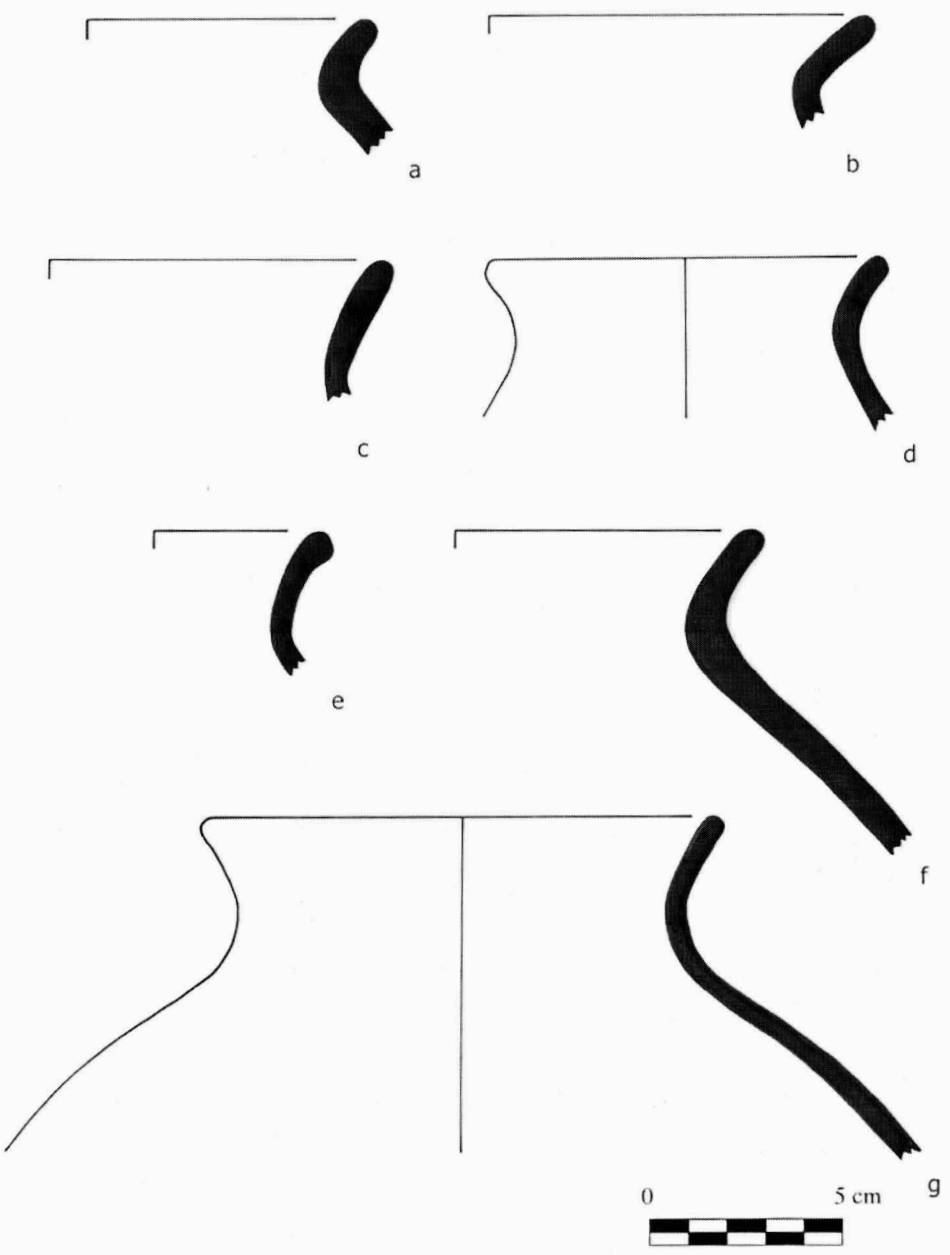

Figure 7.7 Late Chiripa short-necked olla (a) and medium-necked ollas (b-g).

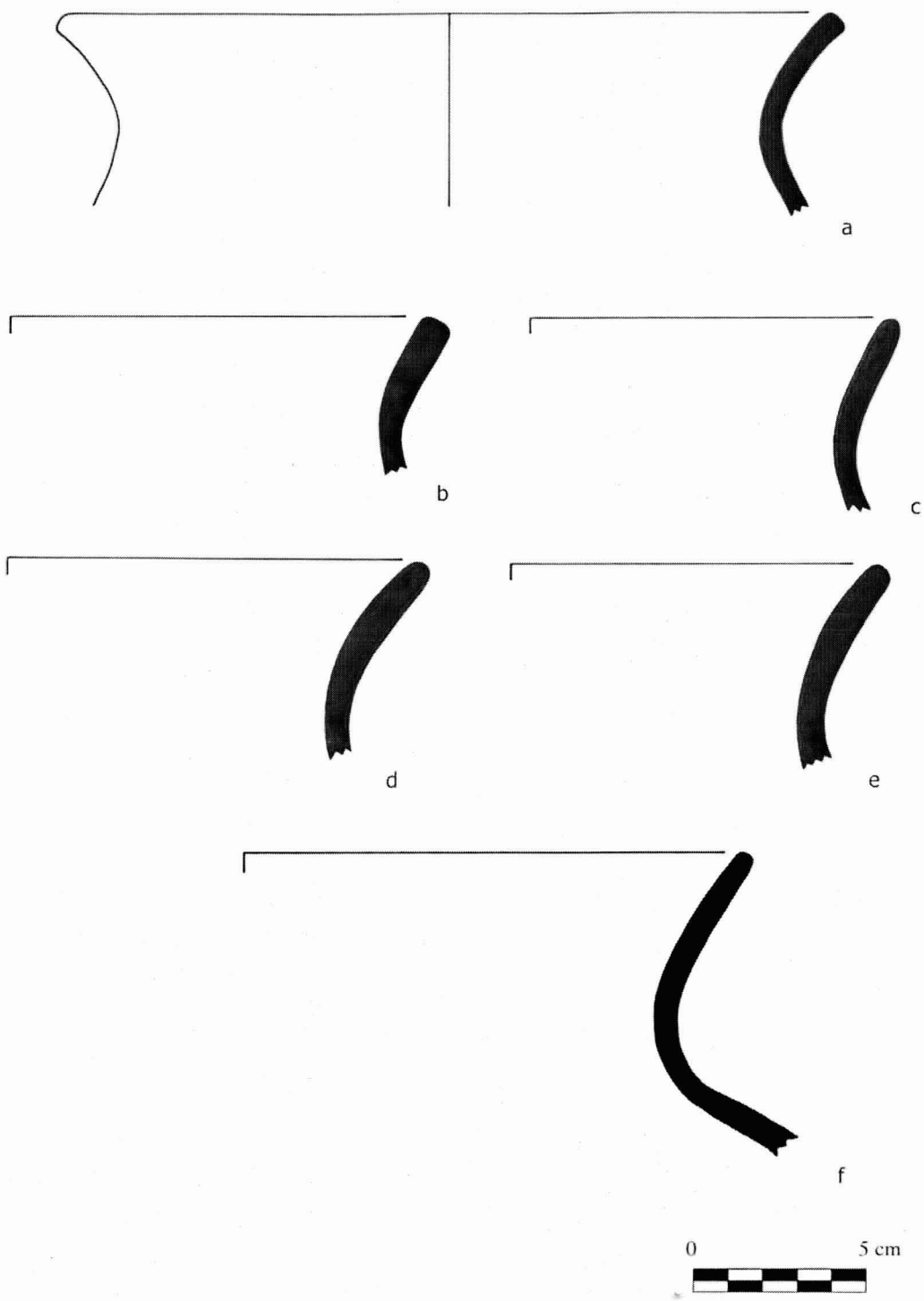

Figure 7.8 Late Chiripa jars (a-f).

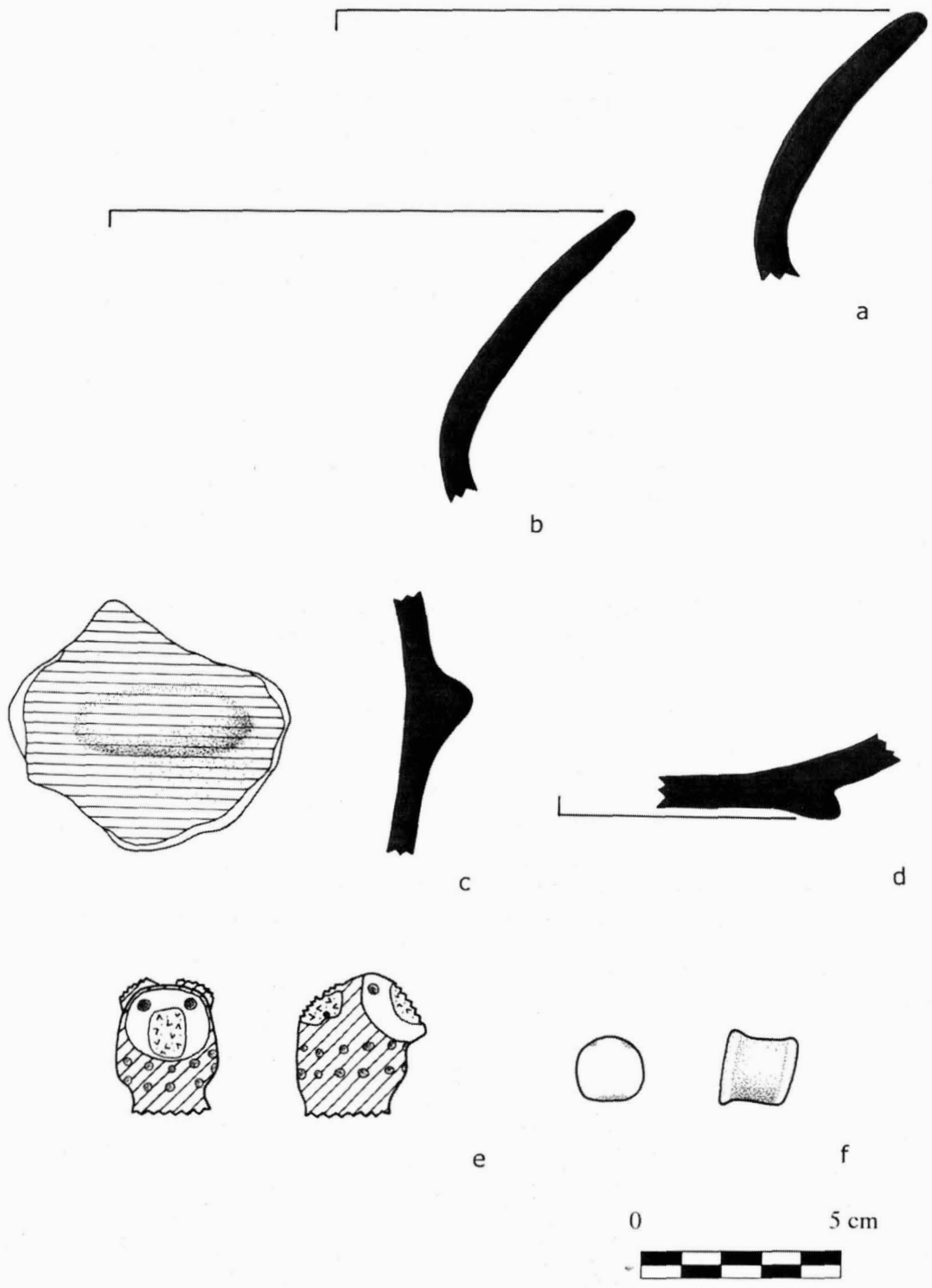

Figure 7.9 Late Chiripa ceramics: jars (a-b), horizontal lug (c), low ring base (d), head of animal figurine, ears and snout broken (e), and (f) ear plug with traces of yellow and red post-fire paint on front.

The necked vessel assemblage from the special purpose contexts of the AC courts is weighted mostly towards vessels used for serving and storage. Most necked vessels are medium (56%) and short-necked ollas (33%), the percentage of the latter the highest in any context, and markedly higher than the proportion of these serving vessels in the AQ midden (4%). The medium-necked ollas are likewise mostly serving rather than cooking vessels; most are red or red brown-slipped (60%), and they are much less likely to be manufactured in the coarse paste (22%) and to be an unslipped brown/black or brown-slipped color (20%) than in the AQ midden. Jars, even brown-slipped jars, do exist in the special purpose assemblage, but are rare in these contexts (11%). Extra-large necked vessels, those with diameters from 30 to 34 cm, which are associated at Chiripa with food preparation for large public gatherings, are also slightly more common in the AC special purpose assemblage (6% of all necked vessels) than elsewhere at the site. The vessels of this size found in the AC sector, however, are red brown-slipped ollas and probably functioned as serving vessels, while these same large vessels in the AQ/AC middens are more likely to be jars, with paste and finish attributes consistent with cooking vessels.

Although the classified rim shapes point to an assemblage heavily weighted towards serving vessels, some sooted sherds do occur in the AC special purpose sample. Some of these are the charred incensarios mentioned previously, but plain body sherds with charred material on the interior are also present (5% of the sample). Most of these vessels are not the coarse quartz ollas that dominate the AQ sample however. Only 31% of the sooted sherds from AC special purpose assemblage are coarse paste wares; most (62%) are manufactured in either the micaceous or dense translucent inclusion pastes. The distribution of pastes in the sooted sample from special purpose contexts at Chiripa also differs from that in the more utilitarian parts of the site, and also contains a markedly lower percentage of coarse paste wares. A recent stable isotope analysis (Miller 2005) has shown that the residues on the interior of sooted ceramics from Late Chiripa special purpose contexts at Chiripa have a higher nitrogen value than residues on specimens from more utilitarian contexts, indicating more meat and fish cooked in these vessels (ibid: 53). The emphasis on micaceous and translucent inclusion pastes for cooking wares found in special purpose contexts may be related to technological considerations stemming from different cooking techniques used for the meat-based foods consumed in these special purpose contexts. Aesthetic factors may also be a motive, as the generally thinner walls and more even surface contours of cooking vessels in these pastes may have been considered more appropriate for being seen at public events. Further research into these paste differences promises to yield interesting results.

Necked vessels in the AC utilitarian sample are less likely to be cooking wares than in the AQ midden, with more emphasis on vessels for serving, storage, and transport. Jars form a smaller proportion of the assemblage than in the AQ area, and although they are similar in size, they are somewhat less likely to be manufactured in the coarse paste (66%) and to be an unslipped brown/black or brown-slipped color (44%). The percentage of sooted sherds is also not quite as high in these contexts (5.5%), and only 74% are coarse paste specimens, with more of the micaceous and translucent inclusion cooking wares common in the special purpose assemblage. The medium-necked ollas are similarly less likely to be cooking vessels than those in the AQ midden; the figures for black/brown and coarse paste specimens are only slightly higher than those of the special purpose assemblage, and half those of the AQ sample. The AC utilitarian assemblage also has a fairly high percentage of short-necked ollas (27%). Both the average diameter of cooking vessels and the proportion of extra-large cooking vessels is the same as in the AQ midden, but the AC utilitarian assemblage also contains an equal number of extra-large serving/storage vessels. These extra-large serving/storage vessels were not present in the AQ sample.

Late Formative 1

Unmixed Late Formative 1 ceramics were recovered only in the KU sector. The floors

and occupation surfaces in and around ASD-2, the adobe wall fall over ASD-2 and the deposits under the structure, all contain Late Formative 1 ceramics. The deep unit in the KU sector, N894 E639, also yielded an extensive sequence of Late Formative 1 midden events, for a total Late Formative 1 sample of 2563 sherds. With the exception of two unique contexts associated with ASD-2, the ceramic assemblage recovered from the structure is directly comparable to that from the midden levels in the deep unit, and it is clear that the two areas are closely associated. In fact, all of the Late Formative 1 ceramics in the unmixed sample are associated to a greater or lesser degree with the ASD-2 structure and thus may be representative of only a narrow spectrum of the total set of activities occurring at the site in this phase, especially since the relatively high percentage of decorated ceramics in these contexts and the elaborate ASD-2 architecture suggest that this structure may have served some special use function. The two unique contexts that differ are the surface outside of ASD-2 on the north side, which contained a large number of cooking vessels and twice as many sooted sherds as found in other parts of the site, and Feature 6, a pit dug into the structure after its abandonment, perhaps to mark the closure of the building (Paz and Fernandez this volume). This pit has a large percentage of fine paste and decorated wares. Kala Uyuni itself is notable for the high percentage of decorated wares recovered in the excavations, particularly polychrome incised ceramics, when compared to most other sites outside of Tiwanaku itself. Connections with Tiwanaku during the Late Formative 1 phase appear to have been close.

The Late Formative 1 phase marks a major change in ceramic style and technology on the Taraco Peninsula. Late Formative 1 ceramics differ from Late Chiripa wares in almost all attributes, including paste, predominant surface finishes and colors, vessel and rim shapes, and of course, decoration. Many of the new trends that appear in the ceramic assemblage at this time, such as the less labor-intensive finishes, the vertically applied finishes, and the more simply decorated bowls, would certainly have facilitated a more efficient and rapid mode of ceramic production. Whether this was the intended goal is unclear, as technological and aesthetic factors may also have played a role. Late Formative 1 ceramics appear to reflect changes in communal cooking and feasting activities during this time. Cooking and serving vessels become smaller, and the consumption of food may have played a smaller role in these large-scale gatherings. The continued presence of trumpets and ceremonial burners, however, points to considerable continuity in other ceremonial activities.

The Late Formative 1 assemblage at Kala Uyuni is principally manufactured (87% of the sample) in a group of micaceous pastes with a large amount of small to medium-sized mica present in the clay body and a medium to abundant amount visible on the surface of the vessel. Two of the pastes in this group have been in use in the Taraco area since Early Chiripa times (Steadman 1999a). They are tempered with fiber, subangular white and translucent quartz inclusions, and fine black biotite. The other pastes in the micaceous group do not have fiber temper, and appear for the first time in the Late Formative period. One is tempered with a similar suite of white and translucent quartz and fine black biotite inclusions as the fiber-tempered paste, while the other contains biotite and subrounded translucent inclusions. Mica-tempered ceramics, with varying proportions of mineral and fiber-tempered specimens, have likewise been reported as characteristic of Late Formative 1 assemblages at other sites along the southern shores of the Lake (Bandy 2001a:168; Janusek 2003:44,46; Lémuz 2001:352; Ponce 1971:18). In most contexts the mineral-tempered micaceous pastes are considerably more common (55% of the sample analyzed for paste) than those with fiber-temper (27%). Adding the few specimens in non-micaceous fiber-tempered pastes, all carried over from the Chiripa phases, a total of 31% of the Late Formative 1 sample is fiber-tempered. Fiber-tempered ceramics may have been more common in the earlier part of the Late Formative 1 phase, as the proportion of fiber to mineral-tempered ceramics is reversed in the deposits located under ASD-2.

The micaceous pastes are mostly used for serving, storage and cooking vessels, particularly jars, ollas and undecorated bowls. Decorated wares and the characteristic red-banded bowls of the Late Formative 1 assemblage are less commonly manufactured in these pastes. Therefore, while the percentage of micaceous wares remains for the most part constant across contexts at Kala Uyuni, the figures for certain special use contexts vary. All loci associated with the interior and south sides of ASD-2 have a similar amount of micaceous ceramics, ranging from 82% to 87% of the sample. The north side of ASD-2, however, has a higher percentage of these wares, 90% of the assemblage, as more cooking and storage vessels were recovered from the hearths and burnt features of this area. Feature 6, the deep pit, has a particularly low percentage of micaceous paste specimens (70%), as many sherds in this pit are manufactured in pastes unique to the decorated wares.

The other major ceramic ware in the Late Formative 1 assemblage at Kala Uyuni, representing 11% of the total assemblage, is manufactured in a group of mineral-tempered pastes with no fiber, very little mica in the clay body, and virtually no mica visible on the surface of the vessel. The principal pastes in this group are one tempered with dense, fine and medium, opaque white inclusions, and another tempered with dense, translucent, subrounded inclusions. These are both pastes that appear for the first time in the Late Formative 1 assemblage and that become increasingly popular in the Late Formative 2 and Tiwanaku phases. The non-micaceous group is used more commonly for bowls and decorated wares. It occurs in relatively constant proportions across contexts, with the exception again of the north side of ASD-2, where only 6% of the ceramics is manufactured in these pastes. The third group of Late Formative 1 ceramics is manufactured in a buff-colored paste with red inclusions and fine white and translucent quartz. A fiber-tempered version of this paste existed in Chiripa times. This paste is used mostly for decorated wares and bowls, particularly red-banded bowls and polychrome incised vessels. It comprises 2% of the total Late Formative 1 assemblage. In contexts associated with ASD-2 it ranges from 3% to 5% of the paste sample, while, because of the high percentage of decorated wares, this paste represents 18% of the sample in the Feature 6 pit.

Attributes of surface finish and color of the Late Formative 1 ceramics show a trend towards less attention to detail. A shift away from burnished finishes towards an increasingly wiped assemblage occurs over much of the Lake Titicaca Basin at the onset of the Late Formative (Janusek 2003:41; Lémuz 2001:365; Steadman 1995:303) and is not unique to the Taraco Peninsula. At Kala Uyuni, the labor intensive surface finishes of the Late Chiripa phase, which were weighted heavily towards burnished vessels, are now replaced by an assemblage where more than half the ceramics (58%) has a simple wiped or smoothed surface finish on the exterior. In addition, while in Late Chiripa times interior surface finish was generally of similar quality as that of the exterior, in the Late Formative 1 phase the majority (86%) of specimens, regardless of exterior finish, has a wiped or smoothed interior surface. The complete coverage burnish, once the single most common finish in the Late Chiripa sample, is now found on only 10% of the ceramics, and incomplete burnishes on 30%. Stucco finishes, used in the Late Chiripa phase on the bottom of fiber-tempered cooking pots, are no longer present in the Late Formative assemblages, although fiber temper is still used for the manufacture of cooking vessels. The micaceous fiber-tempered pastes in the Late Formative 1 sooted sample, however, are those least likely to have been finished with stucco in the Late Chiripa phase.

Changes in how burnishes are applied to the vessel surface also occur at this time. In the Chiripa phases vessels were always finished with horizontal burnishing strokes. In the Late Formative 1 phase 13% of the diagnostics are burnished using vertical strokes, mostly jars and ollas with a horizontal wipe on the neck and a vertical burnish or sometimes vertical wipe on the body of the vessel itself. Again, the appearance of vertical burnishes marks

the beginning of the Late Formative period elsewhere in the Lake Titicaca Basin (Steadman 1995:304). More than three-quarters (77%) of the Late Formative 1 assemblage is unslipped at Kala Uyuni, a significant increase from the Late Chiripa assemblage. Black, gray or brown unslipped specimens are the most common (39% of the sample), followed closely by unslipped red/brown sherds (35%). In the small slipped sample, red/brown (8%) and brown (6%) slips are common, while the use of red slips drops from the high figures of the Late Chiripa phase to only 6% of the sample.

In the Late Formative 1 phase, necked vessels form a smaller proportion of the classified rim sherds than they did in the Chiripa phases, representing less than half (43%, n=80) of all classified rim sherds. The micaceous pastes are particularly common for the manufacture of necked vessels (89% of the sample), more so than for the bowl shapes; the remaining vessels are manufactured in the non-micaceous mineral-tempered pastes. Handles, occurring on 4% of the classified necked vessel rims, are either vertical from rim to body, or horizontal, located on the vessel body wall (figure 7.15c). Necked vessels mostly have direct rounded or slightly rounded rims (44%), followed by flat or flat angled rims (37%). New in this phase are flat rims with a slight groove running down the middle (5%) and flat rims with a peaked lip on the exterior (11% of the sample). Necked vessels have flat bases (figure 7.12a), or bases with a thickened edge at the joint between vessel wall and base (figure 7.15d).

Jars and medium-necked ollas appear to have served similar functions as a class of cooking and storage vessels in the Late Formative 1 phase. Jars comprise 25% of the sample with known neck height (n=16). Undecorated jars have almost exclusively slightly flared necks (92%, figs. 7.10a-c). These jars fall roughly into two size classes, one with diameters ranging from 12 to 16 cm (average 14 cm), and a larger group with diameters from 22 to 28 cm (average 25 cm). Average diameter of the total jar sample is 18 cm, considerably smaller than in the Late Chiripa phase. Medium-necked ollas form 51% of the necked vessel sample (n=33). Although specimens with slightly flared necks again form the majority of the sample, they are less predominant than in the jar class (65% of the sample, figs. 7.11d, 7.12a, 7.13a), with more vertical (figure 7.13b) and flared necked (figs. 7.11a-c) vessels in this group. Vessel body shape appears to be mostly elongated with a low shoulder (figure 7.12a; Ponce 1971: figs. 1-8,11; Janusek 2003:figure 3.8). Medium-necked ollas range from 11 to 28 cm in diameter, with an average of 17 cm. Most medium-necked ollas are under 22 cm; three larger vessels with diameters of 24 to 28 cm may represent a larger size class, similar to that of the jars.

Attributes of exterior finish and surface color are the same for the jars and medium-necked ollas. Most of these vessels are unslipped (61%); an unslipped red/brown is the most common single color (41%). Slipped vessels tend to have red/brown (20%) or brown (11%) slips. Exterior red slips are found on only 2% of these shapes. Infrequently, red slips are used on the top flat part of the rim and sometimes on the interior neck; these specimens, unslipped on the exterior, represent 6% of the sample. More than half of the necked vessels (57%) have a wiped exterior finish; only 20% have some type of burnish on the exterior. Horizontal wipes at the neck and vertical burnishes or wipes on the body are common in this group. Sooted body sherds from necked vessels used for cooking are likely to be an unslipped black or brown color (77%) and have mostly smoothed (38%) or incompletely burnished (44%) finishes rather than wiped. The proportion of micaceous (87%) to non-micaceous pastes, and that of fiber (28%) to mineral-tempered pastes, is the same in the sooted sample as for the sample as a whole, with no preference for the use of one paste group as in the case of cooking wares.

The short-necked ollas form a subset of the necked vessel group. They represent 25% (n=16, figure 7.10d) of the necked vessel sample from Kala Uyuni. As in the Chiripa phases, short-necked ollas appear to be a class of storage and serving vessels, not cooking wares. Overall the percentage of slipped vessels is slightly

higher than for the taller necked forms, and, unlike the jars and medium-necked ollas, they are frequently slipped red (25% of the sample). The short-necked ollas are also less likely to be manufactured in the micaceous pastes (77%) than the larger necked shapes. Sixty-nine percent of the short-necked ollas are burnished on the exterior, significantly more than the medium-necked ollas and jars, and burnishing occurs on both slipped and unslipped specimens. Short-necked ollas have slightly flared (54%, figure 7.10d) or straight (38%) necks. They are similar in diameter to the smaller class of jar and medium-necked ollas, ranging from 9 to 18 cm with an average of 14 cm. Finally, although no bottles exist in the unmixed sample, several specimens were found at the site, including one from the mixed upper levels (figure 7.19c), finely finished and with the low ring base detail generally reserved for fancier vessels.

Decorated necked vessels are more common in the Late Formative assemblages than in the Late Chiripa phase. Two specimens in the unmixed sample have a narrow, appliqué fillet applied on the neck. One, a small medium-necked olla (figure 7.15b), was recovered from a burial along with the bowl illustrated in figure 7.19a. Although the piece is elaborate in form, with a lug on one side and a horizontal handle on the other, the exterior surface is an unslipped red/brown color with a smoothed finish. Appliqué ridges or fillets also occur on small vertical-necked jars with diameters of 10 to 14 cm. These specimens are unslipped, slipped red or, as in figure 7.15a, have a band of red at the rim. They are somewhat larger, but probably similar in form, to the globular bodied vertical-necked vessels recovered from an offering pit in the Kalasasaya structure at Tiwanaku (Ponce 1971: figure 3-26,33,34, table 7; Ponce 1970:figure 31). Some may also have had polychrome incised decoration on the vessel body, as do the examples from Tiwanaku.

The other group of decorated necked vessels in the Kala Uyuni sample (n=3, figs. 7.13c, d, 7.14a) is also jars with vertical necks and similar small diameters (10 to 12 cm). They form a distinct subset of well-finished jars, different from the more simply finished, and on average larger, plain jars. These vessels are slipped red on the exterior, either in a band at the rim or throat or over the entire exterior, are well burnished, and, most distinctively, have a wide band of thickening at the rim. Figure 7.14a is additionally decorated with a row of punctate dots along the thickened band. Fragmentary rims, probably also from vertical-necked jars of similar shape, were found with cane stamped circles on the band (figure 7.21e). This group of vertical-necked jars with thickened bands at the rim forms 4% of the classified shape sample (see Ponce 1971:figure 1-6, figure 3-1 for similar rims on smaller vertical-necked jars). The tall necks and narrow diameters of all of these jars, both those with thickened rim bands and appliqué fillets, and the careful finishing and elaboration of these vessels suggest that they were used for serving in specialized contexts. All were recovered in the midden levels of the deep unit and the pit, Feature 6, dug into ASD-2.

Bowls, as a vessel class, exhibit more change at the onset of the Late Formative 1 phase than do necked vessels. These changes encompass not only technological and stylistic attributes, but possibly also how food and drink were served at Late Formative 1 events. First, there are many more bowls than in the Late Chiripa assemblage. Bowls are the single most common shape in the Late Formative 1 sample; 57% of the classified rim sherds (n=107), compared with 22% of the Late Chiripa assemblage. Second, Late Formative 1 bowls are smaller than their Late Chiripa counterparts. There are several variants in Late Formative 1 bowl shapes (see below), but diameters are all similar, ranging from 8 to 26 cm with an average size of 16 cm. Contrasting this with the average Late Chiripa bowl diameter of 20 to 21 cm and a maximum size of 32 cm, depending on context, a trend towards a greater number of smaller bowls rather than a few large specimens is clear. This may be due to a shift away from the pattern of communal serving present in the Late Chiripa phase, where food was either eaten directly from one larger vessel by several guests, or perhaps

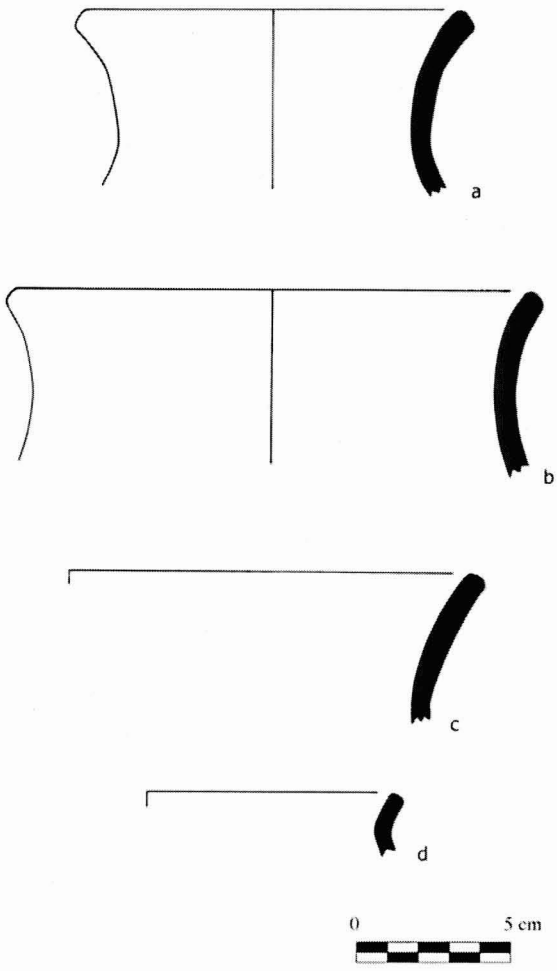

Figure 7.10 Late Formative 1 jars (a-c) and short-necked olla (d).

served from this vessel into smaller containers made of perishable materials (gourd, basketry, wood, etc.), towards single serving ceramic bowls, with each person served an individual portion in their own bowl. The decrease in the size of bowls and the disappearance altogether of the extra-large-sized bowl, combined with the decrease in the average size of cooking vessels, suggest that the communal consumption of large quantities of food was less integral to public events than it had been in the Late Chiripa phase. While the proliferation of bowls in the Late Formative 1 assemblage might suggest more serving events, if even of smaller quantities of food, or more people attending these events than in the Late Chiripa phase, a shift in the manufacture of individual-sized serving bowls from perishable materials in the Late Chiripa phase to ceramic would also explain the marked increase in the number of bowls recovered in the archaeological assemblage. It is also very possible that the smaller Late Formative 1 bowls functioned not as containers for food but as drinking vessels, again now made in ceramic rather than perishable materials. This shape gradually phased out with the emergence of tall cups or *keros* later in the sequence.

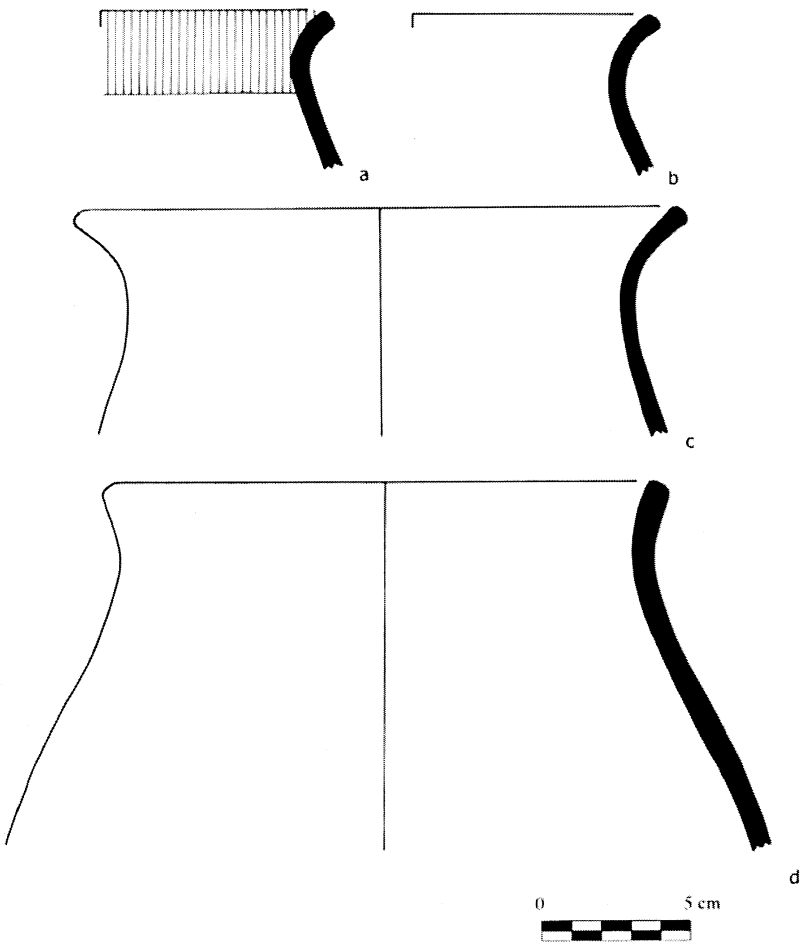

Figure 7.11 Late Formative 1 medium-necked ollas.

Most Late Formative 1 bowls are hemispherical with a flat base and slightly convex walls. These convex vessels represent a full 74% (t=75) of bowls with known wall shape. Within the convex group, the most common variant has a near vertical upper wall angle (42% of the convex bowl sample, figs.7.16c-e, 7.19a), followed by bowls with slightly flared upper walls (29%, figs.7.16f, 7.17a). Other bowls have either flared (figs.7.17b-c) or incurving walls (figs.7.17d-f). Bowls with flat bases and straight walls with slightly flared or flared wall angles, a basic shape present in Chiripa times, also exist in the Late Formative 1 assemblage, although they are now relatively rare (14%, t=14, figs.7.16a-b, 7.19b). The rest of the bowl assemblage at Kala Uyuni (13%, n=13, figs.7.18a-c) is composed of a new shape for this phase, a deep bowl with a slightly outflaring rim forming a sort of low neck around the vessel (see also Ponce 1971: figs. 3-27-30; Steadman, Roddick and Capriles 2005: figure 6.2b). Bowl rims are more likely to be rounded, slightly rounded or tapered (62% of the sample) than those of the necked vessels, with only 21% having flat or angled rims and 10% rims with peaked interior or exterior lips. A very few bowls (7%) have rounded thickening at the rim or a slight bevel on the interior.

Bowls in the Late Formative 1

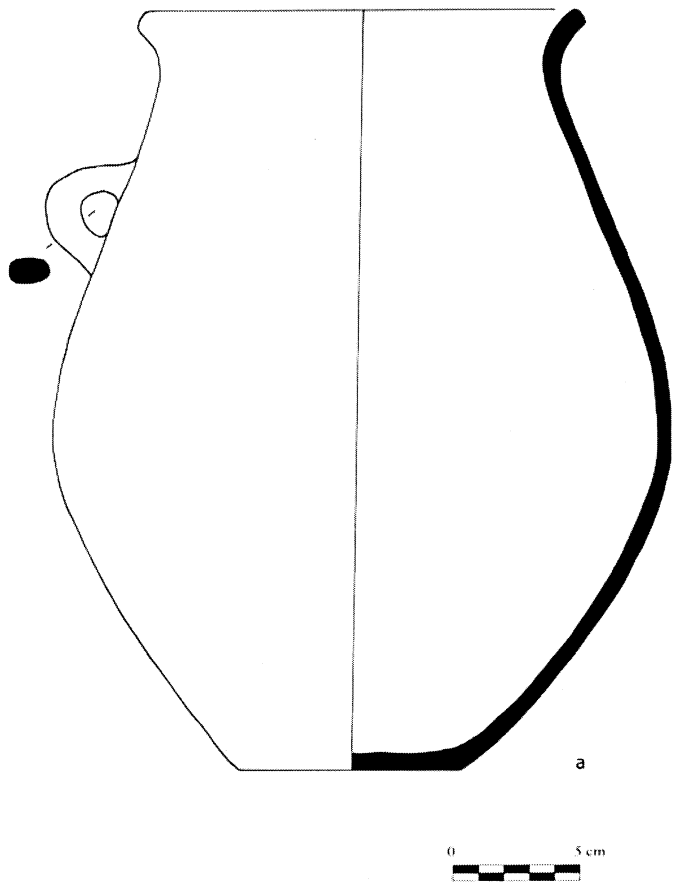

Figure 7.12 Late Formative 1 medium-necked olla with single handle.

assemblage often have handles or lugs. Horizontal strap handles located on or just below the rim are an attribute not present in the Chiripa phase. They occur on 10% (figure 7.17e) of bowls in the assemblage, either singly or in opposing pairs, depending on the vessel shape. Horizontal handles are somewhat more likely to be present on the convex bowls, but straight-walled specimens and deep, necked bowls also have this attribute. On necked bowls handles are placed lower on the vessel body wall, below the neck. Figure 7.19a, a particularly well-finished specimen from the burial in unit N894 E639 has a decorative double handle. Vertical strap handles on bowls are less common (n=1, figure 7.18c). Other types of handholds on Late Formative 1 bowls include small horizontal lugs just under the rim, (n=2, figure 7.16c) and small loop handles on the rim (n=1, figure 7.18d).

Late Formative 1 bowls frequently have some sort of decoration or slip patterning. Only 54% of the sample is not decorated in any way. Bowls making up 21% of the sample have unslipped surfaces, principally red/brown in color, and 33% have an overall slip of a single color, mostly red or red/brown occurs on 33%. The unslipped specimens tend to have simple

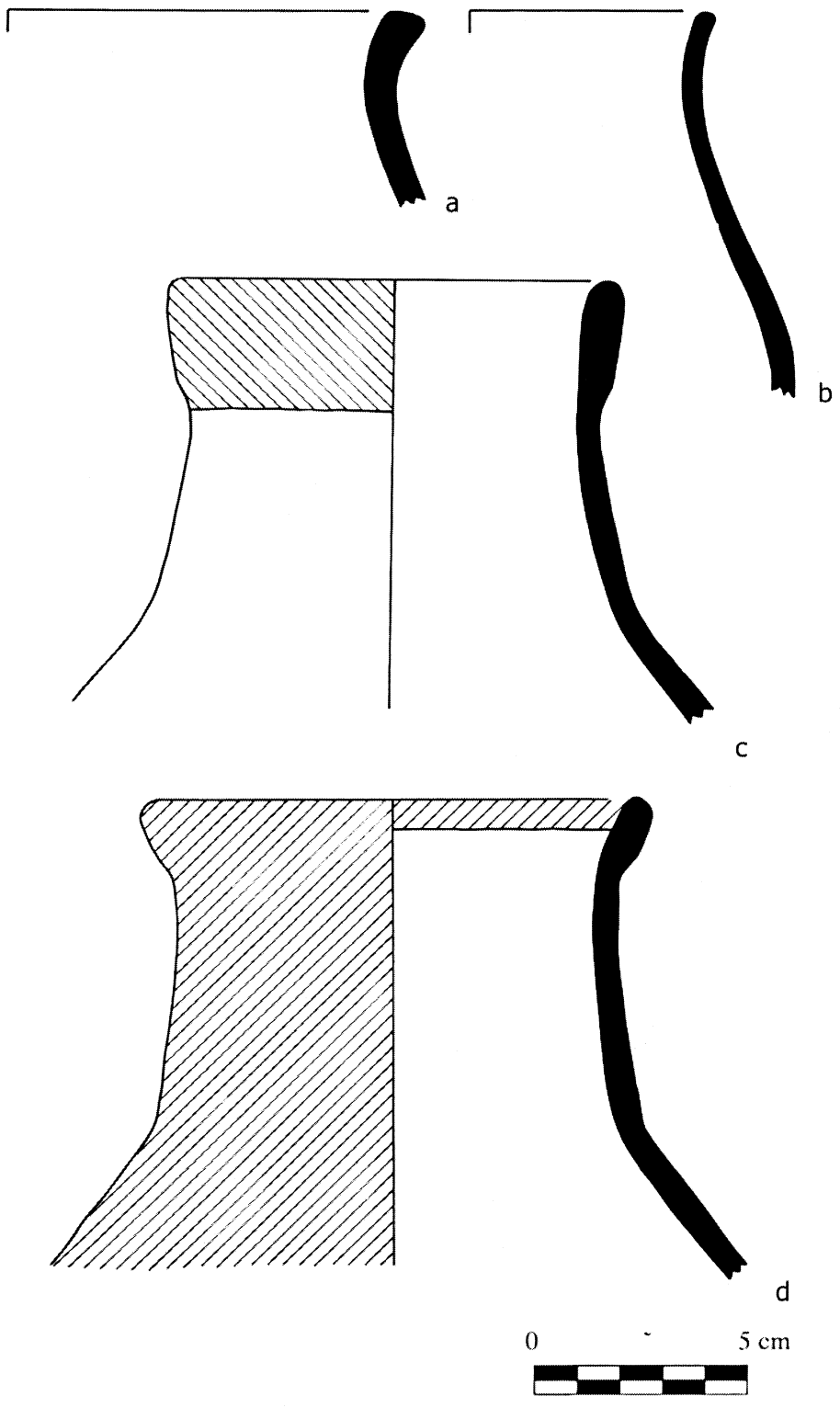

Figure 7.13 Late Formative 1 medium-necked ollas (a-b) and red-slipped jars (c-d).

wiped or smoothed finishes, and the slipped bowls tend to be burnished (67%). Micaceous pastes are also common in the undecorated bowl sample (62%), but the percentage of these pastes is smaller than in the necked vessel group, and many fewer of the vessels (15%) are tempered with fiber. The other bowls are manufactured in the buff-colored paste (12%) or the non-micaceous, mineral-tempered group (26%), including 9% in a new, fine-textured paste tempered with fine translucent and opaque white inclusions. Neither the buff nor the fine-textured pastes are ever used for the manufacture of necked vessels.

Decoration on Late Formative 1 bowls mostly takes the form of a band of red slip at the rim on the exterior, interior, or both sides of the vessel (figs. 7.16a,d, 7.17a,e,f, 7.18a-c, 7.19a). Many red-banded bowls of this kind were found in the offerings and burials excavated in the Kalasasaya structure at Tiwanaku (Ponce 1970, 1971, 1993), and hence they are sometimes referred to as Kalasasaya-style bowls. At Kala Uyuni, red-banded bowls make up a full 44% (n=47) of all bowls in the sample, or one quarter of all classified shapes in the assemblage. This is a much higher percentage of decorated bowls than in the Late Chiripa phase, but the execution of the red banding is relatively simple compared to a painted or incised vessel. There are many more convex red-banded bowls than other bowl shapes in the assemblage, but in fact a smaller proportion of the convex bowl sample (39%) is red-banded compared to the straight walled (57%) and necked bowls (77%). Red-banded bowls are on average the same size as undecorated specimens. However, unlike the undecorated specimens, 99% of red-banded bowls are burnished, the great majority with a complete coverage burnish. Red-banded vessels are also less likely to be manufactured in the micaceous pastes (only 30% of the sample) than the undecorated bowls, and more likely to be made in the buff (24%) and new mineral-tempered, fine-textured paste (26%).

Most red-banded bowls have bands on both interior and exterior walls, this band ranging in width from a few millimeters at the rim to covering the entire upper half of the vessel wall. Red banding on the necked bowls can also begin lower on the body wall (figure 7.18c). Most commonly (37% of the red-banded sample) the red band is applied onto an unslipped light brown surface. Red on unslipped red/brown is also frequent (31%) while the rest of the specimens have red bands applied over slipped surfaces, mostly light brown (15%) with a smaller number of red/brown and brown-slipped vessels. The 'red' band itself may in some cases be light red, dark red or red/brown. Very low ring bases, only 1-2 mm high, occur on roughly 9% of the red-banded bowls (figure 7.19a). On these vessels the indented part of the base on the underside of the bowl is usually also slipped red.

Bowls decorated in styles other than red banding are rare; only two of these exist in the sample (2%). One is a painted and incised slightly convex bowl (figure 7.20b, see below for further discussion). The other is a flared, straight-walled bowl (figure 7.19b) found in association with ASD-2. The two small scallops or tabs on the rim of this bowl (there was probably an opposing pair as well, but this side of the vessel is now missing) anticipate the scalloped rimmed incensario shape of the subsequent Late Formative 2 phase. This particular vessel is also an incensario, as deposits of light sooting on the interior wall and base indicate that something was burned inside. Several other shapes served as incensarios in the Late Formative 1 phase as well; two flared convex bowls (figs.7.17b, c) from under ASD-2 show light sooting on the interior, as well as several ring bases from the deep unit midden (figure 7.18e). Ring bases of this kind are associated mostly with slightly convex bowl forms with opposing horizontal handles at the rim (e.g., Ponce 1971: figs. 2-2, 5, 21, 23; Bermann 1994:figure 4.4b). Unlike the elaborate incensarios of later phases, these vessels at Kala Uyuni tend to be fairly simply finished, with unslipped or red/brown-slipped exteriors, and wiped or smoothed surfaces. Red-banded bowls are never sooted on the interior and were not used in burning activities.

The total sample of decorated wares at Kala Uyuni, classified shapes as well as body

sherd fragments, constitutes 2.9% of the unmixed excavated assemblage (n=99 of 3407 sherds when all unanalyzed body sherds are added). Decorated wares are least common (0.8% of the assemblage) in the hearths and surfaces on the north side of ASD-2, where the ceramics are related principally to cooking activities. Decorated wares are most common on the surface outside of ASD-2 to the south (9.1% of the assemblage, including a trumpet fragment), in the deep pit dug into ASD-2 (6.6% of the sample), and on the lower ASD-2 floor (3.2%), while the fills and lenses inside ASD-2, the deposits under the structure, and the midden levels in the deep unit all have a similar proportion of decorated ceramics, ranging from 2.0 to 2.9% of the assemblage.

Red-banded ceramics, body sherds, and bases as well as classified bowl rims, represent most of the Kala Uyuni decorated sample, a full 75% (n=74) of the decorated wares in this phase. Aside from these vessels, the most common decorative style in the Late Formative 1 assemblage is bichrome or polychrome incision (14%, n=14). These ceramics are often called Kalasasaya incised after the structure at Tiwanaku from which many have been recovered (Ponce 1971, 1993). Decoration consists of narrow incised lines separating areas painted in black and red, or black, red and light brown, or black and red with some areas left the unslipped red/brown or light brown color of the fired clay. Specimens where some portion of the design is left unslipped (figs.7.20a-b, e-f, 7.21a-c) are by far the most common (n=11). The few specimens where no unslipped area is visible, (n=3), such as figs. 7.20c-d, g (figure 7.20g is not part of the statistical sample) may or may not have had an unslipped area elsewhere on the vessel. Examples painted in three slip colors, generally with light brown or cream as the third color (e.g., Steadman, Roddick, and Capriles 2005:fig 6.3e) appear to be relatively rare. There are none in the analyzed Kala Uyuni sample, although two sherds with black/dark brown decoration on a light brown slip (figure 7.20d) were probably painted in red elsewhere on the vessel. Specimens with black-on-red painted decoration without incision exist but are also rare (n=2, 2% of the sample).

In the published literature, polychrome or bichrome incision is found on convex bowls, the necked bowl shape, and small, vertical-necked jars with globular bodies. Unfortunately, almost all of the polychrome incised specimens from the Kala Uyuni excavations are body sherds. Only two specimens are from classifiable vessel shapes. One (figure 7.20b) is a small convex bowl incised with a stepped motif, probably applied in a band around the upper wall such as the bowl illustrated in Ponce 1971:figure 3-24. The other specimen, figure 7.20a, is possibly also a bowl with a band of decoration at the rim. The slight thickened rim band on this piece, the only bowl to have this rim shape, is similar to that found on the red-banded jars, but the diameter of this vessel (16 cm) would seem to be too large for the jar group. This piece, and the specimens illustrated in figs.7.21a and b, are decorated with representational motifs; other motifs in this incised group are all geometric, the vast majority rectilinear rather than curvilinear. Representational motifs in polychrome incision are extremely rare in the Late Formative 1 assemblage. Only a handful have been published (Albarracín-Jordan et al. 1993:figure 15; Bermann 1994:figure 5.5c; Ponce 1971: figures 3-26,30,33,34; 1993:figure 19.2), and the specimens from Kala Uyuni add significantly to the corpus of known specimens from sites outside of Tiwanaku itself. Polychrome incised vessels are particularly frequent at Kala Uyuni. Using the TAP 2004 excavations in the Santa Rosa area as a comparative sample (Steadman, Roddick, and Capriles 2005), it is apparent that while a similar percentage of ceramics is decorated at these sites (2.7% of the excavated sample) many more are simple red-banded bowls than at Kala Uyuni (86% of the decorated wares). Other than red-banded bowls, most specimens (11% of the decorated sample) are necked vessels with appliqué ridges or punctate bands. Only 1% of the decorated wares are polychrome incised specimens, and none of these have representational motifs. The particularly high percentage of Kalasasaya style polychrome

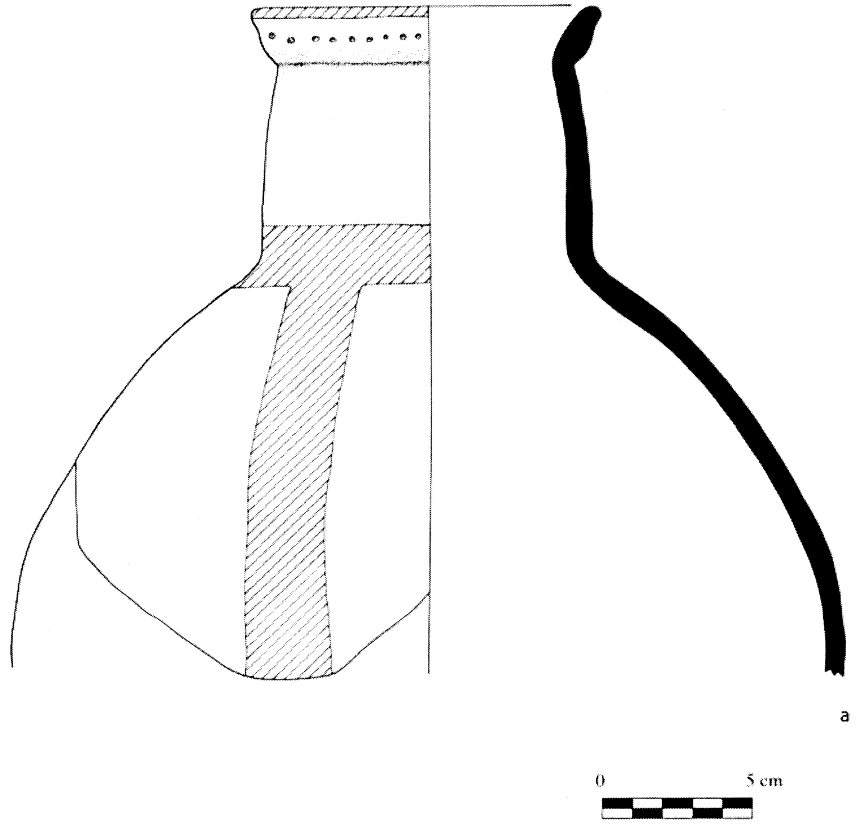

Figure 7.14 Late Formative 1 decorated jar.

incised wares at Kala Uyuni when compared not only to Santa Rosa but other sites excavated in the Tiwanaku and Katari valleys (Janusek 2003:43-46; Mathews 1992, Bermann 1994), and the quality of their decoration, which includes more of the representational motifs likely to carry complicated iconographic messages, support Bandy's original hypothesis that Kala Uyuni was a major center on the Taraco Peninsula during the Late Formative 1 phase (Bandy 2001a:176).

Because of the high proportion of polychrome incised specimens, other decorated wares in the Late Formative 1 sample from Kala Uyuni are less prominent. Incision on vessels slipped in a single color (in the Kala Uyuni sample red, brown or light brown) or on an unslipped surface represent 4% of the decorated sample (n=4). Most examples are small fragments with one or two incised lines, but this group also includes an unslipped black ceramic trumpet (figure 7.21c) recovered from the occupation surface to the south of ASD-2. Finally, a miscellaneous group of appliqué fillets, incised bands, and lugs makes up the last 5% of the decorated sample (n=5). These are all necked vessels; jars and ollas with appliqué ridges (figs.7.15a-b) or incision on a wide band of thickening at the rim, either punctate incised circles (figure 7.14a) or cane stamped circles (figure 7.21e), and lugs with incised vertical incisions or ticks (figure 7.21f). The ring lug (n=1, figure 7.21g) found mostly on red-slipped vessels may also have served a decorative as well as practical function.

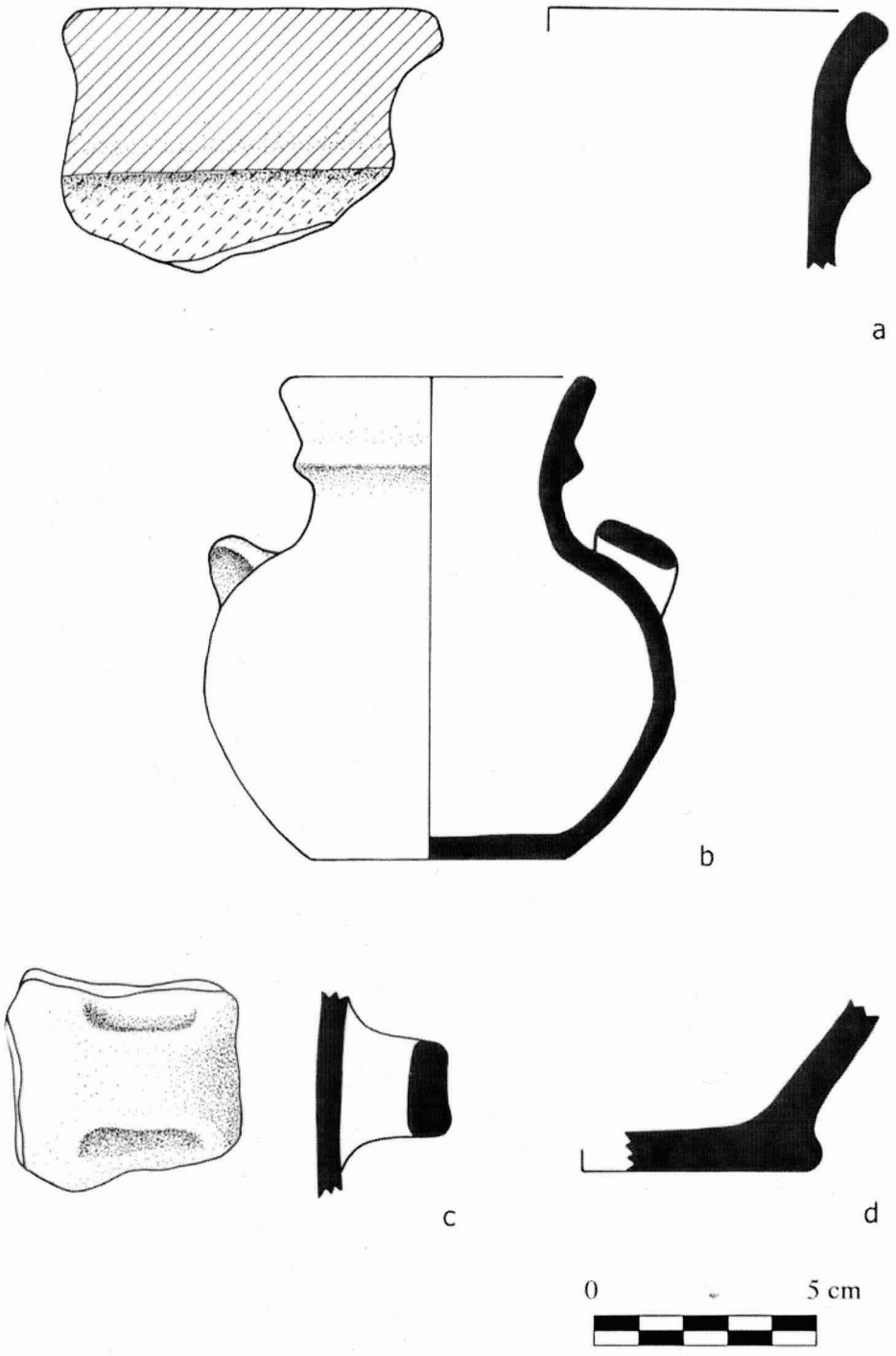

Figure 7.15 Late Formative 1 ceramics: appliqué ridges on a jar (a) and medium-necked olla with lug and horizontal handle (b), horizontal handle (c), thickened edge base (d).

Polychrome incised ceramics are all mineral-tempered; most (62%) in the non-micaceous mineral-tempered group (including 15% in the fine-textured paste) with some buff (15%) and micaceous paste (23%) specimens. In contrast, the group of monochrome incised, appliqué ridge, and punctate band specimens includes some (17%) fiber-tempered vessels. The mineral-tempered pieces in this group of decorated wares are equally as likely to be manufactured in micaceous as non-micaceous pastes. All the polychrome and monochrome incised vessels are burnished, the vast majority with a complete coverage burnish. The necked vessels with appliqués or incised bands are as likely to be wiped or smoothed as burnished.

Late Formative 2

The occupation at Kala Uyuni in the Late Formative 2 phase was considerably smaller than in Late Formative 1 times, and the sample of analyzed Late Formative 2 ceramics from the excavations is not large (n= 381). The low percentage of decorated wares and bowls, and the smaller size of the necked vessels when compared to other contemporary sites, likewise suggests a small-scale occupation of the site at this time. No Late Formative 2 levels were found in the units where the Late Formative 1 structure, ASD-2, was located; the deposits above the collapse of the structure all contain Tiwanaku IV or V materials, mostly in mixed contexts. However, in the deep unit N894 E639 there is a small Late Formative 2 deposit under the Tiwanaku IV mixed fill and lying on top of the Late Formative 1 midden levels. These Late Formative 2 contexts consist of a midden layer and a pit, both of which were significantly mixed with Tiwanaku IV ceramics from stratigraphically later pits dug into this level, a second pit, and a prepared clay floor (Event B34).

The bulk of the Late Formative 2 ceramics exhibit considerable continuity in form and technological attributes from the Late Formative 1 assemblage. The exception to this are the decorated wares, which show some very marked changes in this phase. The continuity in plain wares and domestic pottery has often created difficulties in identifying Late Formative 2 occupations when decorated wares are not present (Bermann 1994:115; Mathews 1992:104; Janusek 2003:53; Bandy 2001a:173). At Kala Uyuni, small but significant shifts in the Late Formative 2 phase in the use of different ceramic pastes, in finish and slip attributes, in vessel size, and the proportion of vessel shapes distinguish this assemblage from that of the Late Formative 1 phase. The percentage of micaceous paste ceramics, for example, declines in the Late Formative 2 phase to 77% of the sample. This trend is particularly evident in the Santa Rosa area, where the micaceous pastes form only 72% of the sample (Steadman, Roddick, and Capriles 2005:73). Concurrently, the use of the non-micaceous mineral-tempered pastes increases, so that these wares now make up 21% of the sample. The drop in the percentage of micaceous wares is mostly due to the decreased presence of fiber-tempered micaceous ceramics in the Late Formative 2 assemblage. These now represent only 20% of the sample analyzed for paste, with a total of 25% fiber-tempered ceramics overall. The buff-colored paste is equally as common (2%) as in the Late Formative 1 phase. A distinctive ware manufactured in a paste tempered with very dense flakes of mica as well as rare translucent inclusions, and with an abundant amount of mica visible on the surface, increases in popularity in this phase. These micaceous wares have been noted as particularly characteristic of the Late Formative 2 phase at other sites in the Taraco and Tiwanaku regions (Bandy 2001a:173; Janusek 2003:48,51). They are less common at Kala Uyuni than as reported at these sites however. A handful of sherds of this paste existed in the Late Formative 1 assemblage, but as they were found under the Late Formative 2 floor, they may be intrusive into these levels. In the Late Formative 2 phase the presence of these wares increases, but they still form less than 1% of the sample. This paste is also less common at Kala Uyuni when compared to Santa Rosa, where it constituted 5% of the Late Formative 2 assemblage.

Late Formative 2 ceramics exhibit a somewhat increased attention to surface finish

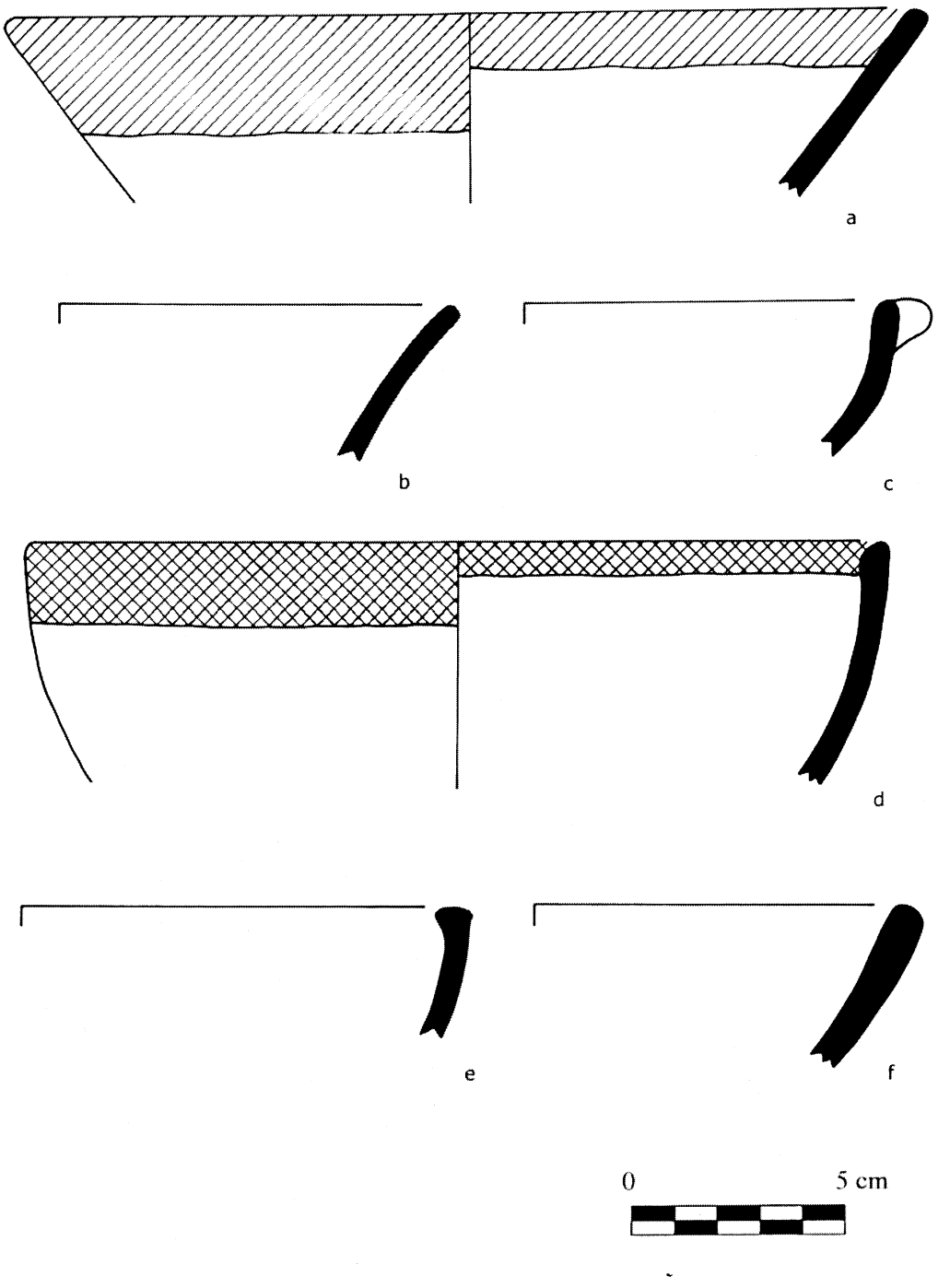

Figure 7.16 Late Formative 1 bowls and red-banded bowls, figure 7.16c with a horizontal lug at the rim.

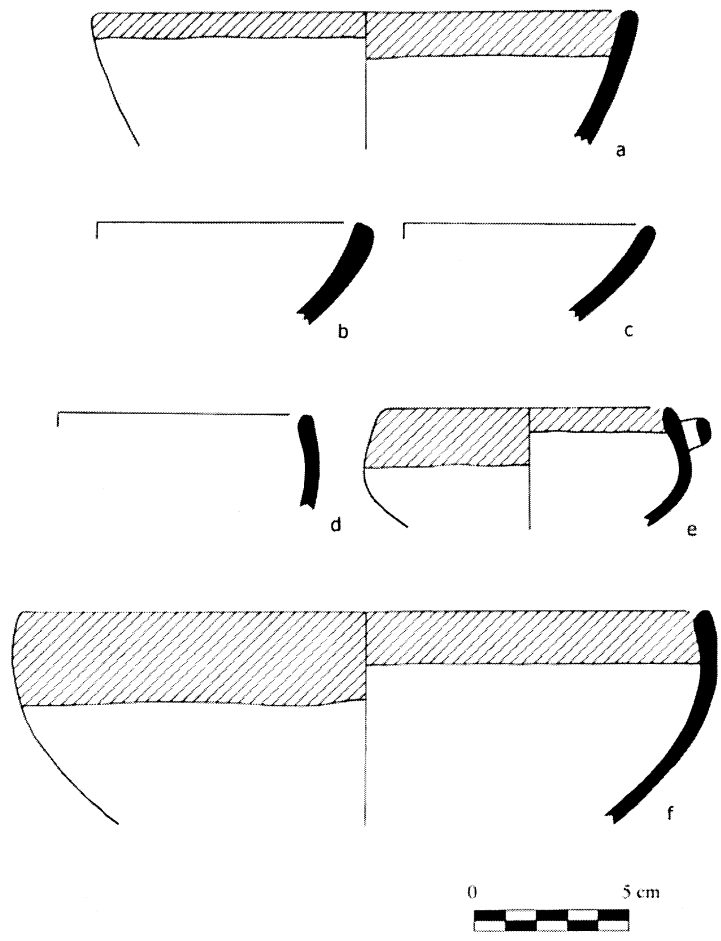

Figure 7.17 Late Formative 1 bowls and red-banded bowls, figure 7.17e with horizontal handle at the rim.

and detail than in the Late Formative 1 phase. A larger percentage of the assemblage (62%), for example, now has a burnished finish on the exterior, due mostly to the higher number of completely burnished sherds, although the proportion that are wiped or smoothed on the interior of the vessel (83%) remains high. Similarly, almost twice as many specimens (51%) are slipped than previously, principally in brown or red/brown colors. In the unslipped sample, red/brown, black, and brown surface colors are represented equally.

Necked vessels make up a larger proportion of the Late Formative 2 assemblage: 70% of all classified rims (n=19). As before, necked vessels are mostly manufactured in pastes from the micaceous group, in proportions slightly higher (84%) than in the sample as a whole. Vertical handles at the rim (figure 7.22b) and horizontal handles on the body of the vessel continue to be present. Direct rounded or slightly rounded rims continue to be most common, followed by flat rims, with fewer examples of flat grooved or peaked lip (figure 7.22a) specimens. Bases are flat with flared or slightly flared walls.

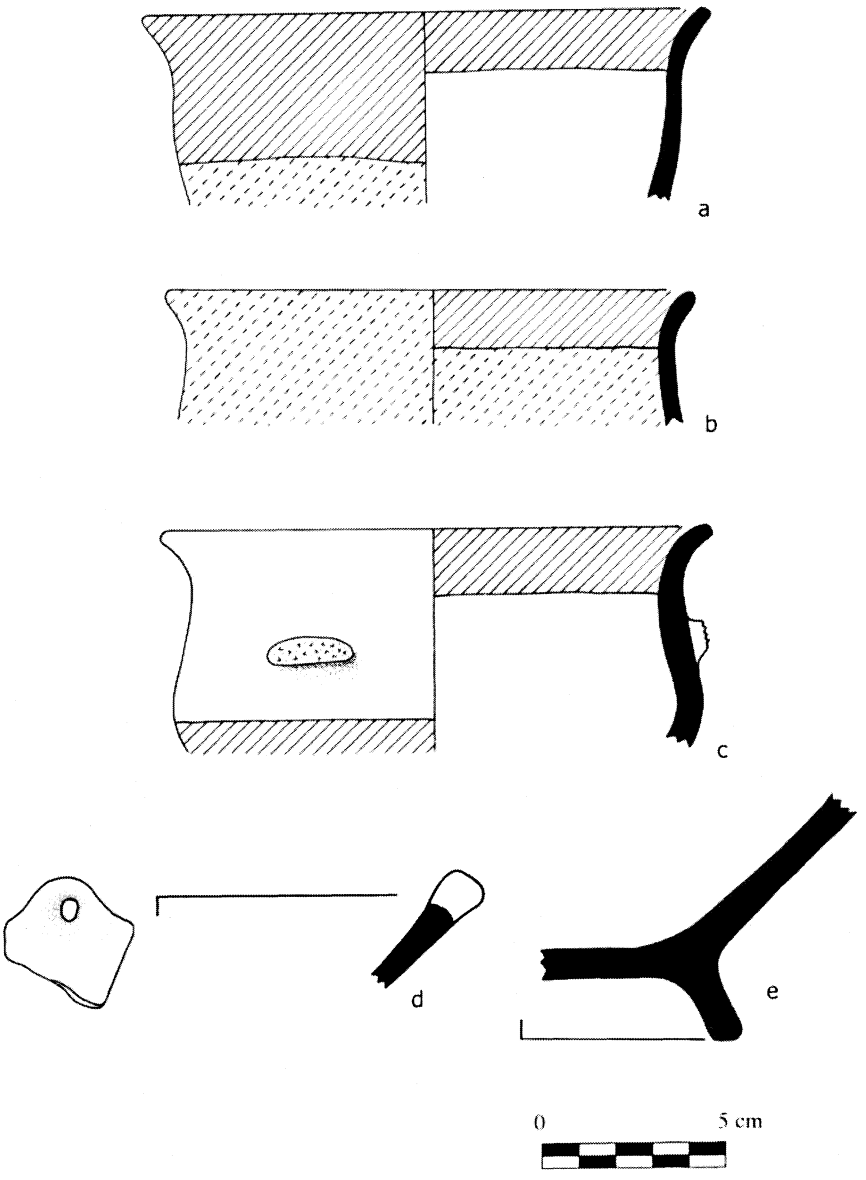

Figure 7.18 Late Formative 1 bowls: necked bowls (a-c), loop handle on bowl rim, angle unknown (d), ring-based bowl (e).

Thickened edge bases continue to be present. About two-thirds of the necked vessels are slipped, many more than in the Late Formative 1 assemblage, with red/brown and brown the most common slip colors. More jars and ollas are also burnished than previously, about one-third, with the rest being either wiped or smoothed. Necked vessels with horizontal wiping strokes on the neck and vertical burnish or wipe marks on the body continue to be present. (Of the necked vessels 33% have this attribute.)

Jars are the most common shape within the necked vessel group (54% of vessels with known neck height, n=7, figure 7.22b,c), and as such are more frequent than in Late Formative 1 times. Medium-necked ollas make up 23% of the sample (n=3, figure 7.22d). Morphologically, Late Formative 2 jars and medium-necked ollas are similar to those of the Late Formative 1

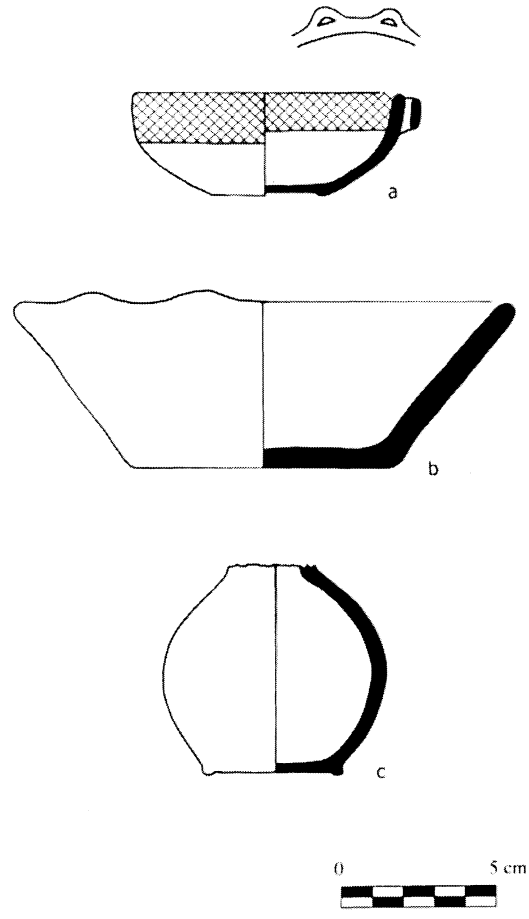

Figure 7.19 Late Formative 1 red-banded bowl with double horizontal handle (a), flared bowl with a pair of small scallops on rim (b), and bottle with broken neck (c).

phase. As well as similar rim, base and handle forms, slightly flared necks are again the most common neck angle. Rim diameters range from 12 to 23 cm with a similar average diameter, 17 cm. However, there are no examples of the large medium- necked ollas (diameter > 24 cm) that existed in the Late Formative 1 phase, and only two specimens, with diameters of 23 cm, that might fall into the large jar category. This contrasts with some of the larger, contemporary sites, where large storage jars become more common in this phase (Janusek 2003:54). Short-necked ollas represent 23% of the necked vessel sample (n=3, figure 7.22a), similar to the Late Formative 1 figures. These vessels are the smallest of the necked vessel group, with diameters of 4 and 5 cm. The class of red-slipped vertical-necked jars with small diameters (11-12 cm) also continues to be present. Although none of these are red-banded as the Late Formative 1 specimens were, some continue to be decorated with lines of punctate incision near the rim.

Bowls form a smaller proportion of the Late Formative 2 assemblage (30% of classified rims, n=8) than they did in the Late Formative 1 phase. Late Formative 2 bowls are generally somewhat larger than the Late Formative 1

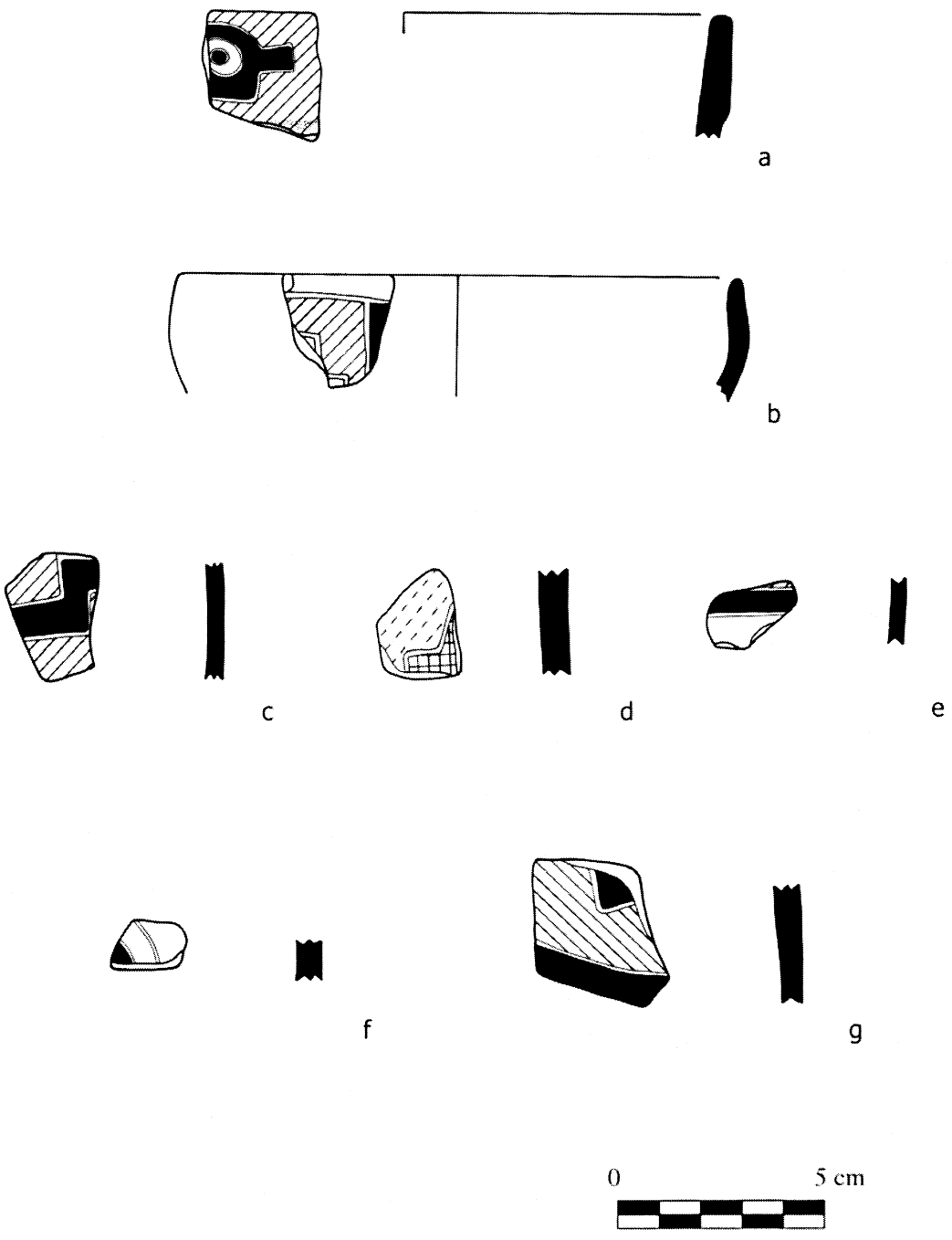

Figure 7.20 Late Formative 1 polychrome incised ceramics (a-g).

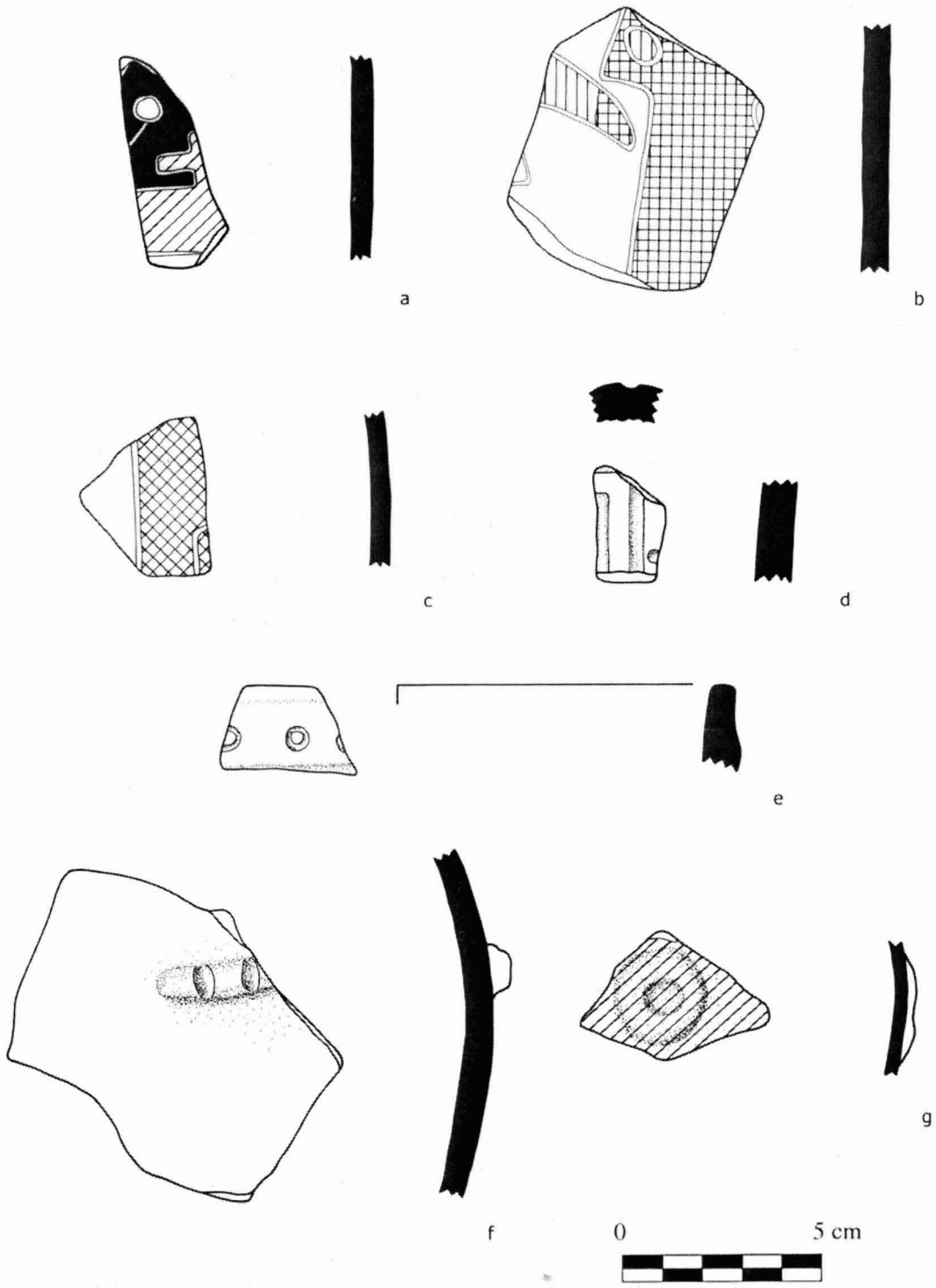

Figure 7.21 Late Formative 1 ceramics: polychrome incised fragments (a-c), incised trumpet (d), cane-stamping at rim (e), incised lug (f), and ring lug (g).

specimens, ranging from 14-27 cm, with an average of 19 cm, a trend noted at other sites as well (Janusek 2003:51). Although at present the sample is too small to be conclusive, the smaller bowls appear to drop out of or become much less common in the assemblage. The reduction in the number of bowls apparently reflects a decline in the Late Formative 2 phase in the kinds of serving activities at Kala Uyuni that required so many bowls, including possibly the need for the smaller bowl shape as drinking vessels. The slightly convex bowl (n=5, figure 7.23a), mostly with vertical upper wall angle, continues to be considerably more common than the straight-walled shapes (n=1, figure 7.23b). Necked bowls have so far not been found to exist in the Late Formative 2 assemblage. Horizontal handles on the rims of bowls continue to be present. Bowls generally have a complete coverage burnish (those that do not tend to be unslipped pieces) and have tapered, rounded, slightly rounded, or flat rims. One-quarter of the bowl sample is unslipped, similar to the Late Formative 1 figures, and the pastes used in the manufacture of this shape also show a good deal of continuity: about two-thirds of the undecorated bowls are made in micaceous pastes and one-third in the mineral-tempered non-micaceous group, with the figures reversed for the decorated bowl sample. Again, the fine-textured and the buff pastes are particularly common for the decorated bowls.

Red-banded bowls continue to be present in the Late Formative 2 assemblage as recovered at Kala Uyuni. Four of the eight bowls are decorated in this way (figure 7.23b). However, the small size of the sample precludes any statistical analysis of this attribute, and the percentage of red-banded bowls as it stands is certainly too high. In the larger Late Formative 2 assemblage recovered from the Santa Rosa area, only 25% of the bowls have red-banded decoration, a figure probably more closely similar to the proportion of red-banded bowls at Kala Uyuni, and more in keeping with the continued but diminished presence of red-banded bowls in the Late Formative 2 assemblages reported elsewhere (Janusek 2003:48; Mathews 1992; Bennett 1934:399). Red-banded decoration at Kala Uyuni occurs on both convex and straight-walled forms. Specimens with red paint on the underside of the base continue to be present, but no examples of the red-slipped indented base (e.g., figure 7.19a) were found.

Very few decorated Late Formative 2 ceramics were recovered at Kala Uyuni. Overall, the percentage of decorated wares in the sample (1.8%, n=7) drops considerably from the Late Formative 1 figures. None of the polychrome painted ceramics of the Qeya style as defined by Bennett (1934) and Wallace (1957) were present in the unmixed sample, nor were any of the shapes on which this painted decoration most commonly occurs, for example scalloped ceremonial burners, bottles, or bowls with a wide, flared rim ('escudillas'). Ceramics with geometric incision on an unslipped surface (e.g., Chavez 1985), another characteristic style of the Late Formative 2 phase, are likewise not present in the sample. In fact, only one specimen in either of these two styles has been identified so far anywhere at Kala Uyuni: a Qeya painted fragment from a mixed upper level fill (figure 7.23d). Decorated in black, orange, and red slips on an unslipped light brown surface, it is manufactured in the buff paste. This specimen, with a neck diameter of 7 cm, appears to be from a bottle with a wider than usual neck, or perhaps a small olla (such as Eisleb and Strelow 1980: figs. 21, 23; Janusek 2003: figure 3.18). It is decorated with a band of concentric triangles, a very common design for bottles and small ollas. Unlike published examples of this motif, however, there is no line of black at the top and bottom of the band, so this vessel may be a poorly executed copy.

In the absence of Qeya style decorated wares, decorated specimens in the Late Formative 2 sample at Kala Uyuni include only red-banded pieces (n=5) and miscellaneous incised vessels (n=2). Plastic decorative techniques on necked vessels continue to be prominent, as they were in the Late Formative 1 phase; one incised piece is a small rim from a jar with a wide band of thickening at the lip, of a similar type as those in figures 7.14a and 7.21e and a line of punctate dots decorating the band. Similar lines of punctation have been

reported in other Late Formative 2 assemblages (Bermann 1994:figure 8.22a; Janusek 2003:51). As in the Late Formative 1 sample, this fragment is from a smaller diameter vessel, 12 cm, and is manufactured in one of the micaceous pastes. The other incised piece (figure 7.23c) bears incision on an unslipped black surface. With a neck diameter of 4 cm, the vessel appears to be a bottle. It is manufactured in the fine mineral-tempered paste and completely burnished.

Conclusions

The Chiripa phase assemblages from Kala Uyuni are comparable to the ceramics excavated by the Taraco Archaeological Project from the site of Chiripa. While there are some regional variations in the popularity of certain pastes or vessel shapes, and differences in the presence or proportion of vessels used in ceremonial or public activities, the Early, Middle, and Late Chiripa assemblages at both sites are analogous, and exhibit the same trends through time. Chiripa ceramics, then, can be said to be fairly uniform across the Taraco Peninsula, and the ceramic sequence as originally defined at Chiripa, to be applicable to other sites in this area.

In the Early and Middle Chiripa phases the ceramics from Kala Uyuni reflect a small, mostly domestic occupation. There are no decorated wares or specialized large bowls or other serving vessels, and compared to the assemblage from Chiripa, there are more cooking vessels, more sooted sherds, and fewer red-slipped vessels. Limited ceramic evidence suggests that beginning in the Middle Chiripa phase there may have been some small-scale special purpose activity in the AC sector. An earlier structure under the Late Chiripa courts (Cohen and Roddick this volume) may be related to these activities.

The Late Chiripa phase witnesses an increase in the presence of specialized and decorated ceramics associated with public architecture. This is true not just at Kala Uyuni but at Chiripa as well, where an intensification of public ceremonial and ritual activities also occurred in this phase (Hastorf 2003, Bandy 2001a, Steadman 2002). At Kala Uyuni, new sets of ceramics related to public or ritual activities appear, such as decorated serving bowls, particularly large bowls, serving ollas, ollas for cooking larger quantities of food, and ceremonial paraphernalia for use in the structures, such as trumpets and incensarios. The two sunken courts in the AC sector of Kala Uyuni were clearly major centers of ceremonial activity and community ritual. The proportion of the largest serving bowls and incensarios is the same as in similar contexts at Chiripa, and the presence of such items as ear plugs and figurines, as well as carved stones and monoliths (Cohen and Roddick, chapter 6 of this volume) attest to the special nature of this structure. Nevertheless, Kala Uyuni is smaller and the public architecture is not as extensive as at Chiripa; ceremonial activity appears to have been less intensive as well, as a smaller proportion of the ceramics are decorated than at Chiripa, and the serving bowls are on average not as large. There is less variety in decorated wares at Kala Uyuni as well, and the assemblage is dominated by just a few particularly popular pastes, rather than the more varied distribution at Chiripa. Regional contacts therefore appear to be somewhat more circumscribed at Kala Uyuni. Less signaling activity involving different ceramic styles and motifs would also imply that ceremonial and public events at Kala Uyuni were attended by more socially or geographically homogenous groups.

The physical separation of ceremonial and residential areas at Kala Uyuni affords a unique view of the activities taking place at this site. With the residential area so well separated from the ceremonial one in distance and elevation, a substantial domestic ceramic assemblage can be isolated at Kala Uyuni, something that had not been practicable at Chiripa. Most utilitarian contexts at Chiripa are analogous to the AC midden assemblage, that is, related to behaviors taking place within the public structures rather than to residential

activities. Domestic ceramics in the Late Chiripa phase are principally manufactured in the coarse quartz paste. Vessels are mostly jars and ollas, many of which functioned as cooking vessels. Bowls are smaller and brown or red brown-slipped. The special purpose ceramics from inside the AC structures reflect a very different set of behaviors. This assemblage has very few coarse quartz wares, and a higher proportion of bowls, decorated and red-slipped bowls, extra-large bowls, and red-slipped necked vessels than elsewhere at the site. All the ceramic ceremonial objects are also from these contexts. This assemblage is clearly related to serving at well-attended public ritual or ceremonial occasions. Cooking vessels were not frequently brought into the courts; food must have been transferred into serving bowls before being taken to the structures. What cooking pots that do exist in the special purpose assemblage are, by and large, of a finer paste and with thinner walls than those in the residential part of the site, and may have contained more meat-based foods. Utilitarian vessels related to court activities are found in the midden to the east of the court. Here cooking vessels and coarse quartz wares are common, but with the domestic sample for comparison, it is clear that they are not as predominant as in the AQ midden. Rather this assemblage includes a larger proportion of plain unslipped red/brown or red/brown-slipped vessels for storage, transport, and serving. Many of the jars and ollas were probably used for carrying water and other needed items up from the community below. Like the AQ sample, the AC utilitarian assemblage has a relatively low proportion of bowls, most small and undecorated.

Eating cooked food may not have been as large a part of the ritual or public activities that took place in the AC courts as it was at the site of Chiripa. The similarity in the distribution of pastes in the sooted samples from court floor contexts at both sites suggests that similar types of cooking vessels were present in the courts, possibly containing similar specialized foods. However, cooking vessels form a smaller proportion of the AC special purpose assemblage than the assemblage from the floors of the semi- subterranean courts at Chiripa, and there are fewer cooking vessels in the AC utilitarian midden associated with the courts than in the midden deposits most directly associated with public architecture at Chiripa. The cooking vessels associated with public events at Kala Uyuni are also smaller; although extra-large cooking and serving vessels together form a larger proportion of the AC utilitarian and special purpose assemblages than the domestic one, the proportion of these vessels is still considerably less than in public contexts at Chiripa. Also, cooking vessels are not larger in the court contexts than in the AQ domestic midden. Furthermore, although extra-large serving bowls predominate in the special purpose assemblage and are as common in these contexts as at Chiripa, serving bowls are on average considerably smaller at Kala Uyuni.

The Late Formative 1 phase ushers in a number of important changes in the ceramics at Kala Uyuni in vessel shape and decoration, as well as paste, color, and surface finish. Many of these changes would have facilitated a more expeditious ceramic manufacture than that of the Chiripa ceramics. Many more vessels are left unslipped, for example, and more are finished with simple wipes rather than the labor-intensive Chiripa burnishes. Fewer vessels are decorated with painted or incised motifs and more with simple bands of color; even the vertical wipes and burnishes that appear at this time may have been quicker to apply. Changes of this kind occurred not only at Kala Uyuni, but also over much of the Titicaca Basin at the onset of the Late Formative. The shift away from more labor-intensive production techniques may be related to a desire to intensify ceramic production and increase ceramic output. This, combined with what appear to be more standardized vessel size classes, particularly in the necked vessels, and less variability in the use of pastes for different vessel shapes, evident especially for bowls and decorated vessels, would seem to suggest a change in the organization of ceramic production at this time, possibly involving an increased level of ceramic specialization. The changes, however, may also have been prompted by stylistic

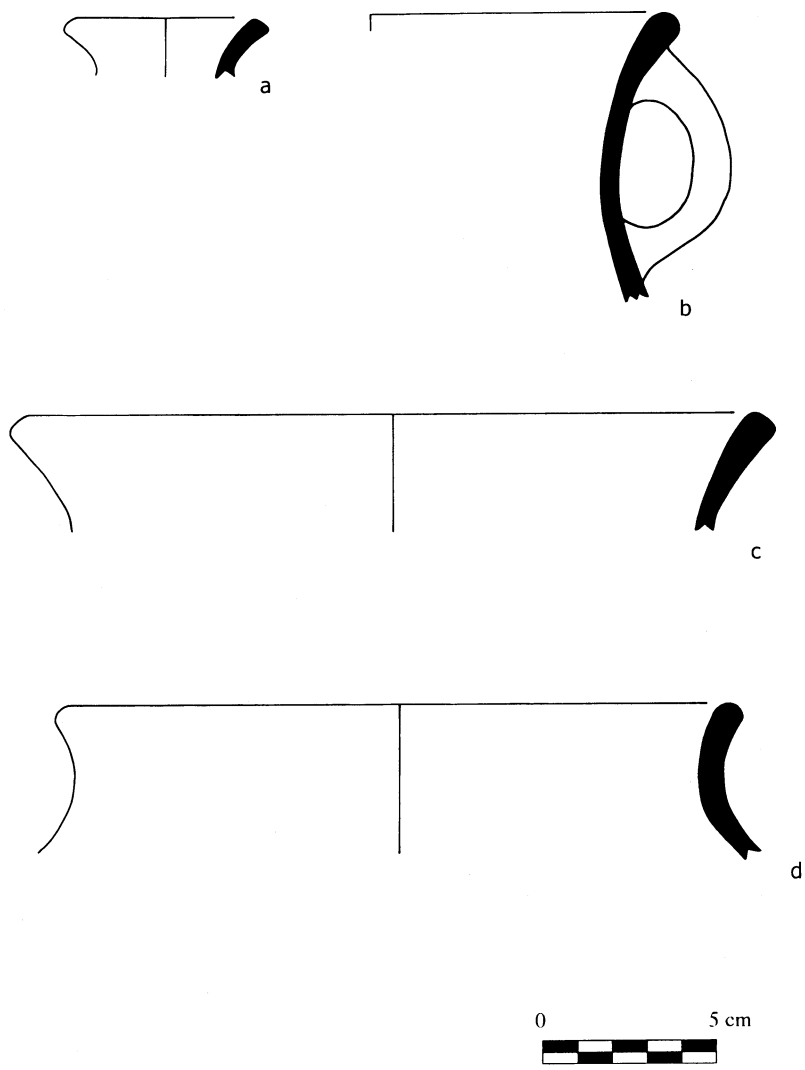

Figure 7.22 Late Formative 2 jars (b-c), short-necked olla (a), and medium-necked olla (d).

considerations, or by technological ones. A switch to a mostly mineral-tempered assemblage is not the principal causal factor, as fiber-tempered vessels that were slipped and burnished in the Late Chiripa assemblage are now unslipped and wiped in the Late Formative 1 phase.

The Late Formative 1 ceramic assemblage from Kala Uyuni reflects both change and continuity in public ceremonial activity at the site. Trumpets and ceremonial burners continue into the Late Formative 1 phase, and the style of decoration on the trumpets particularly remains much the same. The consumption of food at community or ritual gatherings, however, may have played less of a role than in the Late Chiripa phase. Even at Kala Uyuni, where there was less large-scale food consumption than at the site of Chiripa, there is still a notable change in the special purpose cooking and serving complex in the Late Formative 1 phase, including a decrease in the size of serving bowls, a disappearance altogether of the largest size bowl,

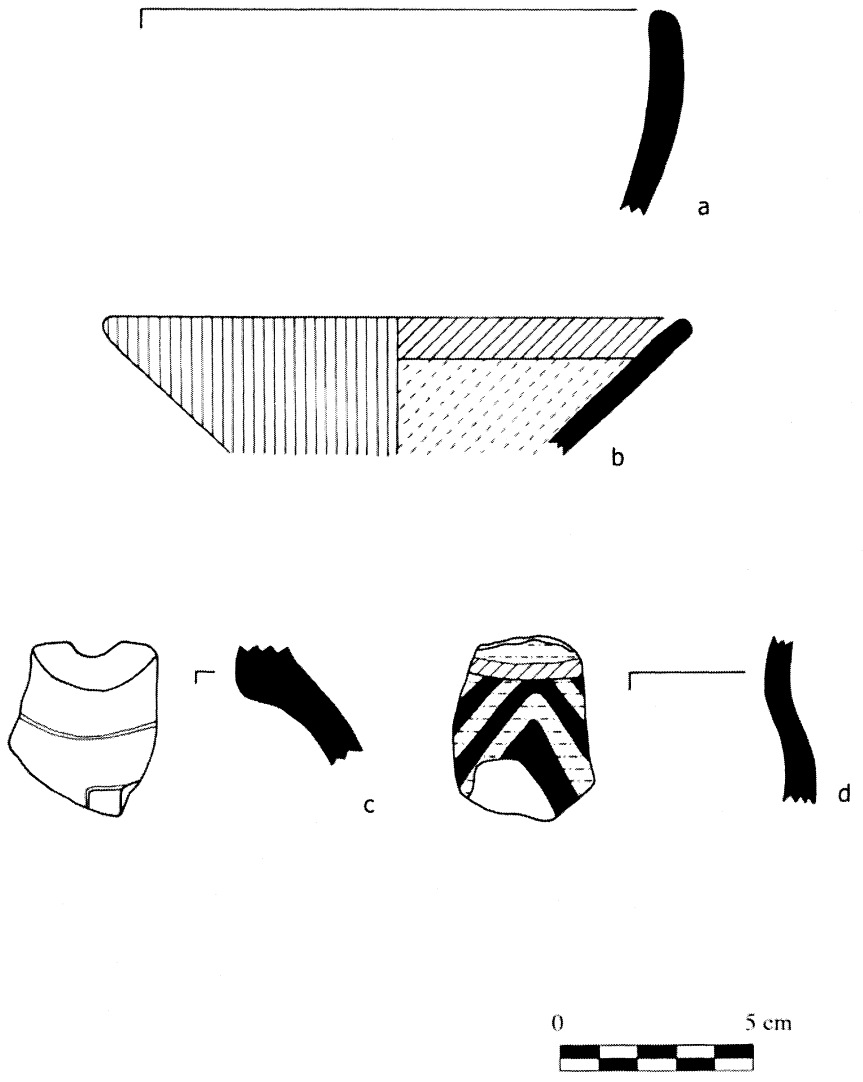

Figure 7.23 Late Formative 2 bowl (a), red-banded bowl (b), blackware incised fragment from small bottle, neck broken (c), and Qeya-style painted bottle or small olla (d).

and a decrease in the size of cooking vessels. Instead, a multitude of small bowls appear in the assemblage, many with the characteristic red banding of this phase. Serving patterns no longer involve large decorated bowls full of food to be shared communally, but rather smaller bowls sized for individual servings. Less food, or different foods may also have been served at these events, as stable isotope analysis suggests that, in contrast to the Late Chiripa phase, less meat/fish and more plant-based foods were now being served in special purpose contexts (Miller 2005). The sharp rise in the sheer number of bowls in the Late Formative 1 shape assemblage may be due to this new need for more individual bowls, particularly if more people attended these events or the events were more frequent. However, a switch in the manufacture of individual-sized food bowls, and perhaps also drinking vessels if the smaller

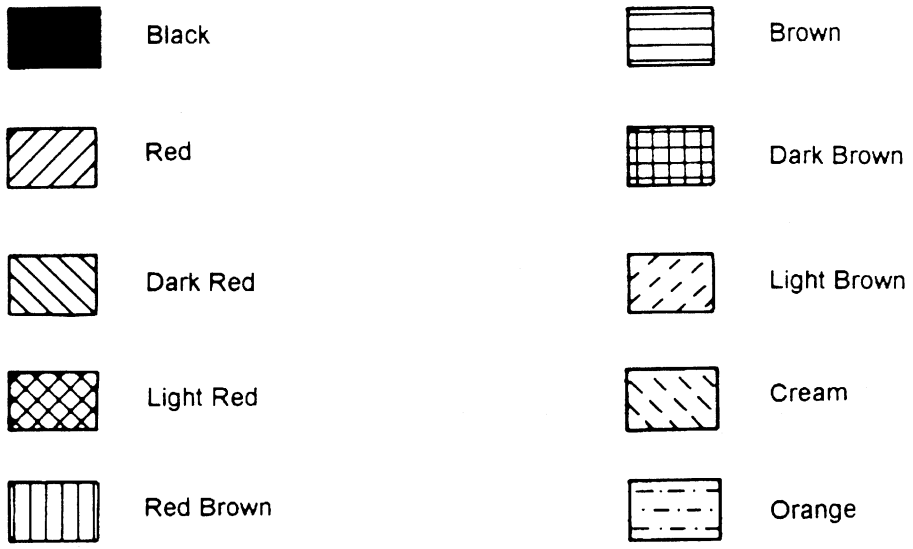

Figure 7.24 Color key for ceramic illustrations (See Steadman 1995: table 10 for Munsell equivalents)

sized Late Formative 1 bowls were in fact used as drinking vessels, from perishable materials in the Late Chiripa phase to ceramic would also increase the representation of these vessels in the archaeological assemblage.

The Kala Uyuni ceramics stand out as a particularly decorated sample when compared to other assemblages in the region. The percentage of decorated bowls, polychrome incised ceramics, and vessels carrying complex representational images in the assemblage is noticeably high (decorated bowls form 26% of the total shape assemblage, and polychrome incised specimens make up 14% of the decorated sample). Conversely, and using the more recent TAP excavations at Santa Rosa as a comparison, the Kala Uyuni sample contains fewer cooking vessels, fewer jars and fewer sooted specimens. These attributes attest to the important role this site played on the Taraco Peninsula as a political and ceremonial center in the Late Formative 1 period, although the TAP sample, coming only from the ASD-2 structure and its associated midden, is probably also biased towards more decorated and specialized vessels. Similarities between the more elaborate ceramics at Kala Uyuni and those from Tiwanaku are strong. Many of the specialized shapes from Kala Uyuni are directly comparable to specimens recovered from the offerings and burials in the Kalasasaya structure at that site. These include convex bowls with bands of incised step motifs, red-banded vertical-necked jars with appliqué fillet ridges, and specimens with representational rather than simple geometric motifs. The similarities in decorative style, in the level of iconographic messaging presented in the decorated wares, and the specialized shapes used in public or ceremonial activities suggest an array of shared ideas and a close interaction between Kala Uyuni and its neighboring polity, Tiwanaku, to the southeast.

The Late Formative 2 sample from Kala Uyuni is unfortunately not large enough to securely define the ceramic assemblage from this phase; the small number of diagnostic rim sherds

particularly makes the vessel shape sample difficult to evaluate. The Late Formative 2 plain ware ceramic assemblage, however, clearly shows a great deal of continuity with that of the Late Formative 1 phase; the principal changes at Kala Uyuni are in the distribution of pastes, in surface treatments, vessel size, and the proportion of bowls in the assemblage. Although decorated Late Formative 2 ceramics are quite distinctive, none were found in the unmixed sample at the site. The population of Kala Uyuni decreased markedly in the Late Formative 2 phase, shifting perhaps towards the Santa Rosa area to the west (Bandy 2001a:192). The ceramics likewise suggest that Kala Uyuni is no longer a principal center in Late Formative 2 times. The marked decrease in the number of bowls and decorated bowls in the assemblage would imply that public or specialized serving activities involving food and drink are now sharply curtailed. The near absence of Late Formative 2 decorated wares at the site, and of specialized or ceremonial shapes such as ceramic burners, escudillas, scalloped bowls, bottles and *keros*, is also particularly striking given the high percentage of these wares in the Late Formative 1 assemblage. Late Formative 2 decorated ceramics are relatively rare everywhere, but their virtual absence at Kala Uyuni attests to the modest nature of occupation in this phase, the last in the sequence of unmixed occupations excavated by the Taraco Archaeological Project in the 2003 season.

8

Integrated Contextual Approaches to Understanding Past Activities Using Plant and Animal Remains from Kala Uyuni[1]

Katherine Moore, Maria Bruno, José Capriles, and Christine Hastorf

A primary concern of the archaeobiological research carried out by the Taraco Archaeological Project (TAP) is the integration of information from plant and animal remains. Despite our detailed recovery and analysis of archaeobiological remains, we are continually challenged to establish the archaeological record of food in a domestic and ritual context. Hastorf and Moore (2000) reported on a pilot study of flotation samples in which plant and animal remains were compared, sample by sample, looking for coincidences and correlations in the attributes of the plant and animal. Here, we establish a more detailed framework for continuing work at recently excavated sites in the TAP study area. In addition to detailed recording of burning, weathering, and disturbance of the archaeological remains, we use experimental and ethnoarchaeological observations to more tightly connect our archaeological remains with a range of possible prehistoric behaviors.

Three components at the site of Kala Uyuni were excavated in 2003 and are the source for most of the samples mentioned in this chapter. The AC sector at Kala Uyuni is a pair of ceremonial structures and associated middens on a prominent hilltop (reported by Cohen and Roddick in chapter 6). The AQ sector is a series of stratified midden deposits about 500 m away (reported by Bruno in chapter 3). The two areas have similar earlier occupation histories from the Early Chiripa phase through the Middle and Late Chiripa phases. In the Late Chiripa phase, conspicuous differences in the ceramic assemblages and in the architecture led to the suggestion that the AC sector was the site of public ritual, including food consumption events like feasts or drinking events (see Steadman's discussion in chapter 7). In the Late Formative period a series of structures were built in an area named KU, located between AC and AQ (reported by Paz and Fernandez in chapter 4).

1 This chapter is based on a paper originally presented at the 71st Annual Meeting of the Society for American Archaeology, San Juan Puerto Rico, April 29, 2006 as part of the symposium "Quantitative Integration of Zooarchaeological and Archaeobotanical Data: A Consideration of Methods and Case Studies" that was organized by Tanya Peres and Andrea VanDerwerker (Tanya Peres, Chair).

These structures and features appear to be smaller scale and have some domestic aspects but have also yielded a distinctive decorated and elaborate ceramic assemblage, suggesting a ceremonial role. In addition to the KU samples, we chose a sample identified as a possible hearth at the site of Sonaji, excavated in 2004; and a sample identified as the remains of in situ burning at the site of Kumi Kipa, also excavated in 2004. The 2004 excavations are not reported in this volume.

Several kinds of burning or heating were inferred from different indications across the site. In her study of the ceramics, Lee Steadman (2004:67; also chapter 7 of this volume) noted that the pattern of sooted cooking wares was more concentrated at the AQ midden area than the contemporaneous AC area. On the other hand, apparent deposits of ash and burned plant material at AC attested to frequent in situ burning there. The pattern of burned animal bone showed that of the two areas, a higher percentage of burned bone was found at the middens at AQ than at the sunken courts in the AC sector. The bone tool assemblage also shows a pattern of burning. Some of this heat treatment may have been related to tool manufacture but most appeared to be post-discard. In contrast to the pattern of burning in the animal bone food remains, more burned bone tools were found in the AC midden (29% of all tools from those loci) than in any other part of the site, suggesting the intensity of craft production and burning. Ceramics were fired, though we have no convincing evidence for kiln areas. Pots were used for cooking in a way that sooted their exteriors and left deposits of carbonized foods on their interiors. Some bowl forms known as *incensarios* (see discussion by Steadman in chapter 7) were used for burning in a presumably ritual setting. Ash deposits on surfaces in structures also suggest burning as part of the maintenance or destruction of ritual spaces.

We hoped to be able to trace the remains of food and food preparation as accurately as possible, so that we could understand domestic production activities in relation to the sunken courts and the organization of behavior in the court areas. In addition, we hoped to understand the ritual or ceremonial role of burning in contexts where burning took place apart from food preparation. Most of our evidence for burning appears to indicate higher temperature than food cooking would require. We are aware that a complex mix of several different kinds of behavior took place as the result of site maintenance, reconstruction and fill of structures, weathering and bioturbation. We hoped to unpack some of this depositional history, keeping in mind that decomposition and burning have altered or removed a significant part of the plant material and some of the animal remains.

Ethnoarchaeology of Burning and Fire

In modern farming villages on the Taraco Peninsula, there are many contexts in which plants come in contact with fire and the resulting assemblages are deposited in soil (fig 8.1).

In the house, plants are used as fuel for cooking. While a gas burner is commonly used today, clay hearths are utilized for cooking soups, tubers, and other boiled dishes. The most common fuels are Eucalyptus wood (including branches, leaves, and nuts) and cattle dung, which contains seeds from various plants. In the past, local shrubs and native trees could have been utilized, as well as llama dung. Today, ashes from the hearth fires are swept into a bucket and placed on the field as fertilizer.

Outside of the house, plants are burned for other purposes. Some cooking can be done outdoors, particularly the method of pit roasting known as *watia*. A small pit is dug in a field and clumps of clay and stones are gathered to make a shelter over the pit. Wood, dung, and grass is placed inside and set on fire. The fire is maintained until the surrounding earth has absorbed enough heat to cook food. Cooks put out the fire and place tubers and meats over the hot embers and earth. Then, the pit is covered completely. After some time the earth is cleared away and the food removed. A similar pit cooking technique is used for larger meals: rocks are heated in a separate wood fire, then cleaned off and laid in a prepared pit. Meat and vegetables are placed on top of the hot rocks. The food is then covered to keep it clean, and soil is

Cooking/ Burning	Plant Density	Seed Distortion	Seed Fragmentation	Weathering	Effect on Animal Remains
Stews and Porridges	Residues on ceramics only				Residues on ceramics; no burned boned produced
Toasting seeds	High density of food plant	Low distortion	Low fragmentation		
Pit cooking (*Watia*)	High Densities of fuel, some food	Low distortion	Low fragmentation	Rake out spreads fuel and burned earth beyond pit	No burned bone from cooked meat; Heat in pit chars bone in underlying deposits
Plants as fuel for open cooking fires	High densities of fuel plants	High distortion	Moderate fragmentation	Increasing fragmentation if open	Light charring with "grilling", heat from cooking chars bone in underlying deposits
Site Maintenance, trash burning	Variable densities	High distortion	Low fragmentation	Increasing fragmentation if open	Charring, calcined bone produced with repeated burning.
Field Clearance	Low density, high ash	High distortion	High fragmentation		Little effect

Figure 8.1 Domestic Activities Involving Burning: Plants and Animals. Each kind of burning associated with a set of likely effects on the plant and animal remains produced.

piled on top to insulate it while the food steams and cooks. In this case, the fire and the process of cooking are separated by several meters.

No ceramics are manufactured in our study area today, but Tschopik (1950) recorded that Aymara potters used grass, dung, and wood to fire pots in open, above-ground kilns, renewing the fuel supply as it burned away. Fire is also used to clear away unwanted vegetation in fields. As farmers till the fields prior to planting them, they pull up plants and place them in large piles throughout the field and light them on fire to create ash that is later tilled into the earth to fertilize the soil. Bruno has also witnessed burning of grass and shrubs in uncultivated areas. Finally, garbage is often burned outside. This may be a modern phenomenon but is an effective way to reduce the bulk of waste that may have been used in the past.

We have collected flotation samples of these various contexts, such as kitchen hearths, floors, and *watias*. Hastorf studied seeds in dung (Hastorf and Wright 1998). Camelid dung would certainly have been a source of carbonized seeds in the archaeological record (see also Pearsall 1998). Preliminary observations of the plant and animal remains from these modern samples are used in this paper to develop expectations for the archaeological record of such contexts, but the samples have not yet been fully analyzed.

Analysis of the Degree and Type of Burning in the Botanical Samples

The environmental conditions of the Lake Titicaca basin are such that only carbonized remains preserve archaeologically. Thus, all the botanical material we examine has been in contact with fire. Based on Hubbard and al Azm's (1990) system for describing the variation in seed condition and preservation, Hastorf and Bruno developed a qualitative ranking system to describe observed variation in the degree of burning and preservation of our samples using material from light fractions recovered by flotation (fig. 8.2). By doing so, we hoped to better understand the contexts in which these items were burned, and/or the post-burning processes that resulted in their final deposition.

One category of burned remains that we record only on a presence/absence basis is the grayish, bubbly, slag material known as silica aggregates or opal ash. This is an altered form of the ash produced by burning fuel but cannot be further identified (Schiegel et al. 1996). In a future phase of this study we hope to integrate information from geoarchaeological research on these samples to increase our understanding of this evidence for burning.

After examining the entire sample, we ranked the entirety of the seed assemblage based on four categories: first, condition describes the preservation of the epidermis on the seeds and seed fragments. Second, quality describes the degree of distortion of seeds. Third, fragmentation describes the degree of fragmentation of seeds, an ordinal measure of the proportion of the seeds that are too fragmented to be identified. Fourth, firing condition describes the relative temperature of fire and quantity of oxygen reaching the fuel.

While they all reflect to some degree the conditions under which the items were carbonized, quality and firing conditions describe this best. Condition and fragmentation, on the other hand, reflect the degree to which the remains were disturbed after firing.

Density of plant remain categories can be recorded on a ranked scale by visually scanning the sample, but is also quantified using the weighed sorted material. The relative density of the carbonized remains compares the weight of remains to the volume of the deposit. Densities are also used to compare different kinds of plant material in the same deposit, and are essential in comparing plant and animal remains from the same deposit.

Using the qualitative measures we can hypothesize what various burning and depositional contexts might look like in the botanical assemblage. Cooking contexts might produce two types of plant assemblages. If plant foods were cooked by toasting, we might expect to get a moderately dense assemblage of seeds that had low distortion and low fragmentation. If plants were used for fuel, we might expect high densities of plant remains with high distortion

Attribute /Score	Condition	Quality	Fragmentation	Firing Condition
1	Majority of seeds with intact testa (seed coat)	Majority not noticeably distorted	Majority of seeds (>75%) whole or nearly whole	Low heat, low oxygen: indirect heat
2	Half seeds with intact testa	Majority slightly distorted, still unidentifiable	Half of seeds whole or nearly whole	Hi heat, reduced, low oxygen: hi but indirect heat
3	Majority of seeds with fragmented testa	Majority grossly distorted: unidentifiable	Majority fragmented; unidentifiable	High heat oxidized hi direct heat with distortion
4	Most seeds only identifiable on gross morphology	Seeds fused together, melted, or vitrified		Wet conditions, low heat, reduced, low oxygen: indirect heat with cell structures damaged
5	Clinkered			Wet conditions, high heat, reduced, low oxygen: high but indirect heat (good quality and condition)
6				Wet conditions, high heat, oxidized, high oxygen: direct heat, great lesions and distortions

Figure 8.2 Condition of charred botanical material: Kala Uyuni samples. The shaded cells indicate the range of observations made for the Kala Uyuni sample; note that not all possible variation is represented in this sample.

but moderate fragmentation. If the remains from these contexts were then disposed of in a midden, we might find a range of distortion, but higher fragmentation at moderately high densities.

If plant materials were burned outside a cooking setting, such as burning a midden, we might expect a moderate density of plant materials burned at fairly high temperatures. This would have high distortion. If it was immediately buried the fragmentation might be low, but if it was left exposed the fragmentation would be high.

Effects of Burning on Animal Remains

The effects of heating and burning on animal bone are well studied (Alhaique 1997; David 1990; Nicholson 1993; Shipman et al. 1984; Stiner et al. 1995), though few of these studies simulated conditions similar to that of traditional cooking. In practice, visual assessments of bone color, texture, and fracture pattern allow bone fragments to be separated into categories ranked by their exposure to heat: unburned, partially charred, fully charred and blackened, and calcined (whitened) (figure 8.3). Moore and Capriles have made observations of burned bone (and the lack of it) in a variety of experimental and ethnoarchaeological settings for this study. We have observed that no charred or burned bone is produced in normal cooking in pots. In roasted meat held over the fire, thin bands of charred bone can be produced in minutes where edges protrude from the surrounding flesh, but the flesh insulates the rest of the bone from charring. In *watia* cooking, no burned bone was created within the cooking pit, though abundant burned bone was produced by the heating of the deposits into which the pit was dug. The charring of bone in deposits under heat features was noted in experiments by Stiner et al. (1995) and was shown to extend in a zone 5 cm thick around the heated deposits.

Our timed burning events with wood fires show that charred bone can be made in as little as 10 minutes of exposure to wood flame. Calcined, gray or white bone can be formed in small quantities in 20-30 minutes. Prolonged fires produced progressively greater amount of calcined bone. Nicholson (1993) noted that higher temperatures were required to calcine fish bone than mammal bone, a difference that is relevant for our study since mammal and fish bone are found in most deposits. These burning times needed to produce discernable burned bone are well within the times needed to cook most tubers and grains, especially at 3800 m above sea level where water boils at 86 degrees C. It seems likely that the majority of charred and calcined bone in these samples was produced by burning refuse or accidental burning of bone-bearing deposits underneath fires. The exception to this generalization would be the partially charred bones that are sometimes referred to as "grilled" or scorched; these partially burned bones are very uncommon.

Putting together the qualitative aspects of the effects of burning and heat treatment on plant and animal materials, we developed parallel scales of the intensity of burning (figure 8.4). The density of unburned bone attests to the possible presence of plant materials that were not consumed in fire but that have decomposed and thus are completely missing. After firing, the condition of the animal remains can confirm the reconstruction of firing temperature and condition based on the appearance of the burned plant material. Lower temperatures (100-300 degrees C, the range at which foods actually cook) are the most difficult to track using bone condition. Mid-range temperatures (300-700 degrees C) leave charred bone. Higher temperatures are produced in the presence of abundant oxygen and can consume most fuel materials, but leave distinctive traces on bone as organic materials burn off and the bone turns white. Using dung fuel in firing experiments, Shepard (1949:78) achieved a kiln temperature of more than 900 degrees C for 50 minutes. At the highest temperatures (700-900 degrees C) that might be reached in preparation for *watia* cooking or kiln firing, the progression of calcination from mammal bone to fish bone allows us to distinguish the intensity of fire that cannot be reconstructed using the remains of fuel.

Experiments show that multiple bone fragments in the same fire, with small variation

Alteration from Heat Treatment (intensity order)	**Alteration from Physical Damage (relative order of occurrence)**
No heat treatment	Cuts marks and fracture in butchering (before discard)
Boiling, steaming (indistinguishable from unheated bone). Fish scales bend and fold.	Carnivore ravaging: punctures, grooves, crenulated edges (possibly within minutes of discard)
Partially charred (one edge or section). "Grilling" of fresh meat or incomplete burning of dry bone	Carnivore digestion: thinning, rounding, pitting (hours later)
Burned (black to brown); defleshed bone	Trampling and erosion: striae, rounding and fracture (weeks to years)
Calcined (grey-blue to white); high heat, prolonged heating of defleshed bone	Weathering: flaking and splitting of surface, more fracture (weeks to years)

Figure 8.3 Condition of animal remains, Kala Uyuni sample. The right-hand column combines several different agents that can alter bone, emphasizing the accumulation of traces and destruction over time. The left-hand column outlines heat-related changes that can take place at any time during the process of physical destruction. The scores in figure 8.2 treat the intensity of taphonomic changes on separate scales.

due to covering by soft tissue or other materials, quickly take on a uniform condition and appearance, and no unburned bone remains. Multiple similar estimates of burning conditions from different remains in the same deposit indicate the deposit may represent a consistent kind of burning event. Where indications of maximum temperatures differ within the deposit, the deposit represents repeat events of burning and dumping.

Plant Species and their Potential Uses and Entry into the Archaeological Record

The three major categories of plant remains in the samples are wood, parenchyma lumps, and seeds. The potential wood species are several species of shrubs and the native wood species *queñua* (*Polylepis* spp.) and *qiswara*

Temperature	Wood Fire	Earth and Ceramic	Food	Mammal Bone	Fish Bone
100 C	Water begins to be driven off from fuel; steam and smoke		Water boils, starches soften	No visible effect on bone	No visible effect on bone; fish scales pucker and fold
200 C	Volatiles driven off, begin to burn with flame and smoke		Meat browns and roasts	Bone begins to discolor and char, fat melts and burns	Bone blackened
400 C	Flames die back, heat produced from burning carbon			Bone begins to calcine	Bone blackened
700 C	Embers glow, ash remains	Dull red glow, low fired ceramics		Bone completely white	Bone begins to calcine
800 C	Embers glow, ash remains	Cherry red glow; low fire ceramics		Bone completely white	Bone completely white

Figure 8.4 Model for cooking and firing temperatures associated with archaeological remains.

(*Buddleja diffusa*). Only wood from the >2 mm screen was sorted and quantified. Parenchyma lumps are sorted from the >2 mm and >1 mm screens. Some have potentially diagnostic characteristics and are classified as "tuber". The potential plants are the various Andean tubers including potato (*Solanum tuberosum*), oca (*Oxalis tuberosa*), ullucu (*Ullucus tuberosus*), and isañu (*Tropaeolum tuberosum*) and possibly the starchy parts of the totora reed (*Schoenoplectus tatora*).

By far the largest diversity of plant taxa is within the seeds. These plants can be generally divided by use.

In addition to the parenchyma, the known food taxa include *Chenopodium quinoa* and another *Chenopodium* species, tentatively identified as the cultigen *kañawa* (*Chenopodium pallidicaule*), and the fruit bearing cacti *Maihuenopsis* sp. and *Opuntia* sp. We also identified some seeds of *Solanum tuberosum*.

The other seed species present in the samples are wild, weedy plants that grow throughout the landscape. While the grasses and reeds could have been used for building and domestic furnishing, they also are important for fodder and fuel.

The obvious fuel sources are the wood and grass. Another important source of fuel that contributed seeds to our deposits is dung. In ethnographic interviews, Bruno has found that just about every plant growing on the peninsula is considered food for domestic animals today. The native camelids forage broadly, but some of their favorite foods are represented here, such as the grasses and the lily *Sisirynchium*. Hastorf and Wright also found several of these species in the dung of camelids and goats in the region, including Relbunium, Malvaceae, Fabaceae, *Chenopodium*, and grasses.

Finally, there are some species that have known medicinal or hallucinogenic properties including a local tobacco species *Nicotiana undulata* and the species of *Verbena*. Chenopods also have medicinal uses. It is important to keep in mind that most of the herbaceous and shrubby species have multiple uses. Although the chenopods are best known for their role as food, their woody stalks are excellent fuel sources. Since it is nearly impossible to remove every seed from the plant, we cannot rule out the presence of this species as a fuel as well.

Animal Remains and the Use of Animals

More than 24,000 bones recovered using 6 mm (1/4 inch) screens were analyzed as another part of this study but are not considered here. For this fine-grained analysis, approximately 91,000 bones recovered from the heavy fractions of flotation samples were studied. (Fewer than 350 of these fragments would have been recovered in routine screening with 6 mm mesh.) The materials described here had been collected in the insert of the TAP flotation machine which is fitted with >1 mm mesh. Materials >1 mm were separated as bone by flotation lab personnel in the field. Moore. precisely sorted, identified, weighed and described each component. Capriles (2006) further separated and analyzed the fish bones from 17 of these samples.

Most of the animal remains at the site are assumed to be the remains of food, aside from commensal animals such as the toads and mice. figure 8.5 outlines the animals raised and hunted for food in these sites. The economic importance of fish shifted over time at Kala Uyuni: for the Late Chiripa period 34.3% by weight of all bone is fish bone, but the proportion of fish bone dropped to 23.6% of bone during the Late Formative 1 period and to 13.2% for the Tiwanaku IV-V deposits. The majority of large mammals at the site were domestic camelids (*Lama*). Herds of several different breeds (based on size) were kept, and collecting fuel from the habitual dung piles of these animals would have been easy. The density of bird bone peaked sharply in the Late Formative 1 deposits, from less than 1% in the Early through Late Chiripa to 6.4% in Late Formative 1, but it is not clear that this is related to the shift in staple foods away from fish. Rodents such as the cuy (*Cavia*), and birds were minor parts of the assemblage from Kala Uyuni in all periods. The remains of a mid-sized canid in an ash filled pit outside the KU structure allow us to identify an important agent of bone destruction. While the canid remains from Kala Uyuni are not identifiable as dog, they are consistent with the size of prehistoric dogs; remains of the domestic dog have been identified at Chiripa and other Titicaca Basin sites. Bones showing signs of having passed through a carnivore digestive system (pitting, thinning) were found in several samples.

Based on evidence for fragmentation, carnivore ravaging, weathering and skeletal dispersal, large mammal bones at Kala Uyuni are assumed to have been discarded at some distance from where the associated meat was served. As noted above, bone is rarely burned in cooking, and the relatively high incidence of burned bone also indicates its secondary context. Birds and fish may have been served on the bone, and their discard location may be closer to where they were consumed. Dried meats and fish may have been prepared for storage still containing

Vertebrate Class	Taxa Identified From Archaeological Remains	Animal Parts Recovered	Probable Prehistoric Uses
Fish	**Orestias** ***(at least 3 species)***	Bone and scales	Staple food, possible offering
	Trichomycterus	Bone	Minor food
Amphibians	(2 body sizes)	Bone	Commensual, associated with middens
Birds	*Fulica*, ducks, 5-6 other important species.	Bone Eggshell	Minor food, occasional offering
Mammals	*Lama* spp., mostly domesticated; *Vicugna*	Bone	Staple food, raw materials, transport, offering
	Cervid cf. *Hippocamelus*	Antler, bone	Materials for craft production, possible food
	Cavia, *Akodon*, several other mice	Bone	*Cavia*: Offering, minor food. Mice: commensuals
	Canid, presumed domestic dog based on size	Bone	Commensual, fed freely in middens

Figure 8.5 Animals identified from flotation samples at Kala Uyuni. Identifications of large mammals to genera are drawn from study of screened remains.

bone; the hard texture of these products usually means they are prepared in water for eventual consumption, reducing the chance that bone would be exposed to direct heat and charred. Burned fish bone, on the other hand, might have been produced in the process of cooking fresh fish, when the scales and bones of the head might be exposed to direct heat. In the discussion that follows, we note for several samples that charred fish bones have reddened, burned earth still clinging to them, and speculate that these remains had been burned directly on a hot surface. We have observed cooking techniques where fish are placed on hot rocks (protected today by layers of cardboard), but we note that accidents of overcooking might lead to charring of the fish scales and bones of the head. In the Uros region on the eastern shores of Lake Titicaca, Portugal

(2002) observed fish being added to an earth oven (*waxa*), but she emphasizes that the fish were wrapped in fresh vegetation to keep them clean and moist before they were placed in the oven.

Taphonomic measures of weathering and erosion (Behrensmeyer 1978) were slightly modified to reflect the tiny fragment sizes observed. To record physical damage after food preparation, bones were scored from 0-5 with respect to weathering and splitting of the surface; and from 0-3 for erosion and rounding of the surface from trampling or water action. For weathering in these tiny fragments, bones either show splitting characteristic of weather stages described by Behrensmeyer or seem to have resulted from such splitting. Erosion and rolling were judged based on edges of fragments viewed under 10x. Burning states were recorded based on color, vitrification of the bone surface, and deformation. The intensity of burning was assessed by the density (weight per volume of soil) of burned fragments of various colors. Fragmentation in this study was evaluated by comparing the relative density of fragments greater than 6 mm and fragments greater than 1 mm (1 indicates the maximum fragmentation measure, less fragmented samples range from less than 1 to 0). A fragmentation measure used in the routine analysis of TAP faunal remains is the average weight per fragment, calculated by dividing the count of a group of bones by its weight. No counts were made for the smaller, 6 mm to 1 mm fragments in this study, so this measure is not applicable; but fragment weights were calculated for the >6 mm fragments so that they could be compared to other samples from that locus.

Characteristics of the Archaeological Samples

To integrate observations of plant and animal remains we turned to charred plant materials and animal remains from flotation samples (table 8.1). A selection of 31 flotation samples (and two replicates for one deposit, locus 5193) was examined for detailed evidence of burning, fragmentation, weathering, and erosion. For the plant samples, we took into account the density of burned material and then calculated the density of materials most likely to be fuel (wood, stems, grass, dung, and seeds from dung) and the remains most likely to represent food (crop seed such as the chenopods, cactus fruits, tubers, and undifferentiated parenchyma.) Measures of the intensity and circumstances of burning were ranked as described above. The density of bone fragments was calculated for the following categories to capture the progress of heat-related changes: unburned bone (all taxa), partially charred bone (all taxa), charred mammal bone, charred fish bone, calcined mammal bone, and calcined fish bone. Several other observations related to burning, mixing, and the speed of burial were recorded on a presence/absence basis.

The association of different archaeobiological indicators of food in the samples is positive but weak. The effect of burning to preserve plants is clear in the generally close relationship of charred foods and fuels. The association of bone density and burned bone density with plant material densities is also generally positive indicating the general association of discard and occupational intensity. The denser deposits do show considerable variation, indicating diversity of function and site formation processes. To begin to address this variation, we divided the flotation samples into four groups based on attributes of their archaeological context (figure 8.6). The first attribute is whether they appeared to excavators to be the result of discrete events or gradual accretion, and second is whether they appeared to contain abundant evidence of fire.

The general assumptions made in the field were born out by the relationships shown here: the features with obvious signs of burning did have larger proportions of charred plant material and significantly more samples with seeds distorted by firing (figure 8.7). The range of firing conditions producing those features were found to be evenly distributed between the four context categories, emphasizing that many kinds of fires were used across the site, and that clearing and dumping were ongoing activities. There was a weaker association between bone density and these four types of samples, though, reflecting the fact that unburned bone and

Flotation Sample Characteristics

Flot #	Locus	Area	Excavator's Description of Context	Ceramic phase	Context discrete	Context High burning
13035	5065	AQ	Midden, high density	lc	1	1
13050	5070	AQ	Midden with ash	lc	1	2
13055	5075	AQ	Midden, medium density	lc	1	1
13090	5079	AQ	Wall fall	lc	1	1
13105	5081	AQ	Wall fall	lc	1	1
13122	5086	AQ	Midden, high density with charcoal	lc	1	2
13131	5088	AQ	Midden, high density	lc	1	1
13140	5091	AQ	Midden, high density	lc	1	1
13128	5137	AC	Clay floor inside structure	lc	2	2
13137	5141	AC	Pit fill, ash	lc/mc	2	2
13120	5178	AC	Pit with fish bone	lc	2	1
13123	5178	AC	Pit with fish bone	lc	2	1
13115	5180	AC	Fill over floor	lc	1	1
13143	5183	AC	Ash on upper floor of lower court	lc	2	2
13144	5183	AC	Ash on upper floor of lower court	lc	2	2
13156	5192	AC	Pit with fish bone	lc	2	1
13169	5193	AC	Pit with fish bone	lc	2	1
13175	5193	AC	Pit with fish bone	lc	2	1
13177	5193	AC	Pit with fish bone	lc	2	1
13163	5229	AC	Pit with clay fill	no ceramics	2	1
13159	5230	AC	Pit fill, ash	lf1/2	2	2
13166	5233	AC	Midden, medium density, primary context	mc	1	1
13167	5234	AC	Midden, medium density, primary context	mc	1	1
13200	5238	AC	Midden with ash, high density, secondary context	mc	1	2
13204	5240	AC	Midden with ash, primary context	no ceramics	1	2
13245	5305	KU	Midden, high density	lf1	1	1
13249	5307	KU	Pit fill, ash	lf2	2	2
13359	5317	KU	Midden, high density	lf1	1	1
13339	5363	KU	Hearth	lf1	2	2
13319	5370	KU	Hearth	lf1	2	2
13351	5431	AC	Ash deposit, building collapse	lc	2	2
14284	6125	SN	Hearth	lf1	2	2
14192	6590	KK	Fill between floors, possible hearth	lf1?	2	2

Table 8.1

Summary of flotation sample data -- pages 124-127.

Charred Plant Material: Light Fractions							
Density of charred fuel, g/l deposit	Density of Charred food, g/l	Condition of seed coat	Preservation of seed, distortion	Fragmentation of seed	Firing condition	Flot # Locus	Area
0.0227	0.0107	4	3.5	3	2	13035 5065	AQ
0.0069	0.0021	4	3	3	3	13050 5070	AQ
0.0047	0.0017	4.5	3	3	1	13055 5075	AQ
0.0001	0	1	1	1	3	13090 5079	AQ
0.0074	0.0009	3	3	2	2	13105 5081	AQ
0.0199	0.0060	4.5	3	3	2	13122 5086	AQ
0.0255	0.0082	3	3.5	3	3	13131 5088	AQ
0.0594	0.0474	3	3	3	3	13140 5091	AQ
0.1204	0.0024	3	3	3	2	13128 5137	AC
0.2034	0.0606	2	2	2	1.5	13137 5141	AC
0.0162	0.0111	3	2.5	2	3	13120 5178	AC
0.0128	0.0072	2	2	3	2	13123 5178	AC
0.0133	0.0053	3	2	3	3	13115 5180	AC
0.0276	0.0060	4	4	2	3	13143 5183	AC
0.0337	0.0116	3	3	2	3	13144 5183	AC
0.0177	0.0110	2	2	2	2	13156 5192	AC
0.0191	0.0130	3	2.5	3	3	13169 5193	AC
						13175 5193	AC
						13177 5193	AC
0.0313	0.0110	3	2.5	2.5	2	13163 5229	AC
0.0615	0.0020	2	2	2	2	13159 5230	AC
0.0634	0.0046	3	3	3	3	13166 5233	AC
0.0067	0.0019	3	2	3	2.5	13167 5234	AC
0.2107	0.0449	3	2	3	2	13200 5238	AC
0.1440	0.0648	2	3	3	2.5	13204 5240	AC
0.0122	0.0031	2	2	2	3	13245 5305	KU
0.1497	0.0429	3	3	3	3	13249 5307	KU
0.0784	0.0414	4	3	2.5	3	13359 5317	KU
0.0264	0.0047	3.5	2.5	2	3	13339 5363	KU
0.0070	0.0024	3	2.5	2	3	13319 5370	KU
0.0985	0.0590	2	1	1	2	13351 5431	AC
0.1611	0.0696	1	2	1	2	14284 6125	SN
0.0062	0.0008	2	2	2	2	14192 6590	KK

Table 8.1

Summary of flotation sample data continues on these pages (126 and 127).

Animal Bone: Heavy Fractions								Flot #	Locus	Area
Density all bone, unburned. g/l	Density mammal bone, charred g/l	Density fish bone, charred, g/l	Density mammal bone, calcined, g/l	Density fish bone, calcined, g/l	Bone weathering and splitting, 0-5	Trampling and rounding, 0-3	Fragmentation, 0-1			
4.2382	0.4991	0.0636	0.0164	0	2	0	0.29	13035	5065	AQ
2.3322	0.0344	0.2000	0	0.0111	3	0	1.00	13050	5070	AQ
1.1000	0.0522	0.0889	0.0089	0	3	0	0.34	13055	5075	AQ
0.4477	0.0089	0.0078	0	0			0.29	13090	5079	AQ
1.4277	0.0378	0.0178	0.0011	0.0011	4		0.04	13105	5081	AQ
3.7189	0.1322	0.1300	0.0200	0	3		0.19	13122	5086	AQ
4.3810	0.3460	0.0750	0	0.0010	3	1	0.09	13131	5088	AQ
3.5844	0.4067	0.1289	0.0167	0	1	2	0.33	13140	5091	AQ
0.5764	0.1113	0.0943	0	0.0038	1	0	0.12	13128	5137	AC
0.2239	0.3544	0.0878	0.0322	0.0067	2	0	0.13	13137	5141	AC
8.1880	0.0710	0.0640	0.0150	0	3	0	0.90	13120	5178	AC
2.5550	0.2650	0.0440	0.0070	0.0010	4	2	0.23	13123	5178	AC
0.5578	0.0867	0.0311	0.0033	0	2	1	0.81	13115	5180	AC
2.2920	0.0800	0.0600	0.0010	0	1	0	0.09	13143	5183	AC
1.6300	0.7086	0.1386	0	0	3	0	0.13	13144	5183	AC
4.2890	0.1210	0.2670	0.0390	0.0020	5	3	0.21	13156	5192	AC
3.0910	0.1090	0.9740	0.0010	0.1130	5	3	0.36	13169	5193	AC
5.2656	0.1056	1.5456	0.0067	0.0022	2	0	0.23	13175	5193	AC
3.0850	0.1090	0.9680	0.0020	0.1130	4	3	0.36	13177	5193	AC
1.4467	0.0167	1.0700	0	0.0033	0	0	1.00	13163	5229	AC
2.3250	0.1200	1.5200	0	0	3	0	1.00	13159	5230	AC
5.0590	0.0210	0.0350	0.0010	0	5	0	0.15	13166	5233	AC
0.6110	0.0270	0.0030	0.0050	0	3	0	0.20	13167	5234	AC
14.8856	1.2011	1.6511	0.0600	0	0	0	0.09	13200	5238	AC
1.9300	1.0850	0.2070	0.2130	0.0010	1	0	0.43	13204	5240	AC
0.8922	0.0878	0.0044	0.0111	0	4	3	0.60	13245	5305	KU
0.4150	0.4270	0.0580	0.0320	0	4	3	0.46	13249	5307	KU
5.1056	1.0900	0.1633	0.0089	0	3	3	0.05	13359	5317	KU
3.8890	0.4620	0.1380	0.0040	0.0060	0	0	0.54	13339	5363	KU
0.1942	0.4989	0.0220	0.0022	0	0	0	0.42	13319	5370	KU
0.4430	0.7770	0.0740	0.1180	0.0010	1	0	0.10	13351	5431	AC
0.4540	0.0980	0.0130	0.1780	0	0	0	0.81	14284	6125	SN
0.6770	0.3410	0.0250	0.0220	0.0010	0	0	0.45	14192	6590	KK

Other Indications of Context					Flot		Area
Partial burning present	Eggshell present	Small rodents present	Burned earth, relative amount	Grassy slag abundant	#	Locus	
		x	x		13035	5065	AQ
	x	x	x		13050	5070	AQ
	x		xx		13055	5075	AQ
			x		13090	5079	AQ
					13105	5081	AQ
	x	x	xx		13122	5086	AQ
	x				13131	5088	AQ
x			x		13140	5091	AQ
					13128	5137	AC
					13137	5141	AC
					13120	5178	AC
		x	x		13123	5178	AC
	x		x		13115	5180	AC
x	x	x		x	13143	5183	AC
	x		x		13144	5183	AC
					13156	5192	AC
		x	xxx		13169	5193	AC
			x		13175	5193	AC
					13177	5193	AC
		x			13163	5229	AC
			x		13159	5230	AC
		x			13166	5233	AC
x			xx		13167	5234	AC
	x	x			13200	5238	AC
x	x		x		13204	5240	AC
	x				13245	5305	KU
					13249	5307	KU
x	x				13359	5317	KU
	x		xx		13339	5363	KU
					13319	5370	KU
	x				13351	5431	AC
x	x		x	x	14284	6125	SN
	x		x		14192	6590	KK

Table 8.1 Summary of flotation sample data continues on these pages (126 and 127).

	Accretional Contexts	**Discrete Contexts**
Low Burning	11 samples: midden, fill, adobe wash	7 samples: pits, burials-includes some ceremonial
High Burning	4 samples: midden with ash, midden with charcoal	11 samples: pits and lenses with ash and charcoal, hearths-includes some ceremonial

Figure 8.6 Distribution of flotation samples chosen for study.

plants were probably being added to all types of deposits, though our record of unburned plants has been lost (figure 8.9). Deposits with burned materials were not necessarily the location where the burning took place. In particular, calcined bone, the most intensely burned, was less dense in the high burning discrete features than the low burning discrete features. Calcined bone is also not correlated with plant remains showing the highest firing temperatures. This suggests that specific and repeated burning events across the site had accumulated in these contexts after burning took place, and that finer grained analysis might reveal some of these details.

Detailed Analysis of Samples

The amount of variation within each context category was not surprising since individual contexts have complicated histories of burning. In addition, the variable behavior we were tracking had been obscured further by decomposition, bioturbation, and weathering. To delve deeper into the issues of the source and purpose of burning, the degree of mixing, and the effect of weathering and decomposition on these archaeological contexts we turned to the model for burning developed in figure 8.1, and compared a range of individual samples to the expectations for the model. Because of our interest in food preparation, we chose several samples based on their high density of charred plant foods. We then examined the range of evidence for food processing, burning, dumping, mixing, and weathering in each of those samples. The sample characteristics were compared with our models from ethnographically observed burning (figure 8.9). Samples with consistent indications across the data points were judged to be the result of fewer different kinds of burning or discard, perhaps even the results of a single event. In other samples, the behavior indicated by plant remains and animal remains were widely divergent, suggesting multiple smaller episodes of burning, dumping, weathering, and erosion.

Mixed Kitchen Debris in an Accretional Midden

Kala Uyuni, Area AC, Event A111, Locus 5238, Flot no. 13200

A sample with high densities of both charred tubers and chenopod seeds had been identified as a midden dense in ash by excavators. This sample dated to the Middle Chiripa phase, predating the construction of the sunken courts in this area of the site. The sample was dense in

Density of Charred Plant Food Remains	Accretional Contexts	Discrete Contexts
Low Burning	.01139 gm/l	.01066 gm/l
High Burning	.02945 gm/l	.02381 gm/l
Density of Charred Fuel Remains		
Low Burning	.01533 gm/l	.00876 gm/l
High Burning	.06591 gm/l	.05759 gm/l

Figure 8.7 Density of charred plant food remains and fuel remains, according to context. Charred foods are the remains of tubers and other parenchyma, crop seeds, cactus fruits. Charred fuels are the remains of wood, twigs, grass, dung, and seeds thought to have been incorporated in dung. Figures are densities of fragments, gm of charred material/liter of deposit.

fuel remains including wood, dung, and grass, in addition to the carbonized food remains. The firing conditions appeared to indicate a lower heat, reducing fire with the majority of seeds slightly distorted. The bone remains indicated lower amounts of burning, with less than 10% of the sample showing burning and only a trace amount being calcined. Another signal of the diverse history of the deposit was the high state of weathering and erosion on both the plant and animal remains. A pottery sherd with a charred encrustation was recovered from this locus, and several of the bone tools from the locus were burned, emphasizing the many different types of burning represented, and the extent to which fuel, food remains, and floor debris have been deposited together. When this sample is compared to the model developed for burning in different contexts, it is a plausible match for the remains to be expected for earth oven cooking, but it cannot readily be distinguished from the remains of a combination of several different cooking events. In particular, the general level of weathering and fragmentation and the mixture of burned and unburned bone suggest multiple episodes of burning and dumping.

A Pit for a Ritual Meal, and then Dumping

Kala Uyuni, Area AC, Event A29, Locus 5193, Flot no.13169

A discrete pit in the AC sunken court, dating to the Late Chiripa phase, was chosen because of its high density of both plant food remains and fish bones. It was dense in plant food remains that had been subjected to distortion from direct heat and that were quite fragmented, particularly the parenchyma. Some of the mammal bones had been subjected to heat, but the dense fish bones were highly burned and significantly calcined. Many scales were bent, showing that they had been exposed to boiling temperatures, but had not heated to the same

Density All Bone, unburned and all burned	Accretional Contexts	Discrete Contexts
Low Burning	2.74 gm/l	4.11 gm/l
High Burning	6.42 gm/l	1.59 gm/l
Density Charred Bone		
Low Burning	0.25 gm/l	0.12 gm/l
High Burning	0.71 gm/l	0.39 gm/l
Density Calcined Bone		
Low Burning	.006 gm/l	.043 gm/l
High Burning	.076 gm/l	.037 gm/l

Figure 8.8 Summary of burning on animal bone between contexts. Figures are mean densities of fragment, gm of bone/liter of deposit.

extent as some of the bone. The mammal bone may have been a later dump event on top of a plant and fish cooking event. Like the plant remains, the condition of the burned fish and scales suggested they had been subjected to direct heat on a hot surface, but it is difficult to suggest if this was in a cooking accident or in clean-up.

A Hearth or Earth Oven

Sonaji, Locus 6125, Event A67, Flot no.14284

A lens of burned material was interpreted as a hearth by the excavators. It probably dates to Late Formative 1 times based on ceramics. The sample was heavy in grass and weed seeds and bits of silica slag (opal ash), but there was little evidence for wood fuels. The seeds seemed not to have been subjected to high heat or direct heat, but to a reducing fire, as though covered. Distortion and fragmentation were very low. The animal remains for this sample were highly burned, with many calcined bones. A close examination of the mixture of burning conditions in this sample showed that the seeds were highly burned but little distorted or fragmented, suggesting a lower heat but prolonged exposure to those temperatures. The amount of calcined bone would also be consistent with this suggestion, since calcined fragments are shed from blackened bone as burning progresses. The bones in this sample are very similar to our modern *watia* in the proportion of burned bone produced by inadvertent heating of the underlying soil.

A Grassy Fire and a Pot of Soup

Kala Uyuni Area KU, Locus 5363, Event B61, Flot no. 13339

Another sample identified as a hearth shows evidence of several cooking procedures dumped together, some of which did not produce burned food remains. This locus was dated to the Late Formative 1 period based on ceramics. The fuel remains from this deposit show evidence of a grassy fire, but little wood, with relatively high fragmentation from the high heat of a direct fire. Taken by themselves, these remains could be the rake out of an earth oven, a reconstruction born out by bits of burned earth, small amounts of parenchyma and crop seeds, and high densities of burned fish bone. These indicators all suggest the role of direct heat. Given this, it is striking that the densities of unburned bone in this sample are particularly high. Many small unburned bone fragments dominated the sample, suggesting that fatty crushed bone had been dumped from a soup or stew. Heat would have been needed to liberate this fat, yet it is clear that the heat was applied indirectly, probably to a ceramic cooking pot containing these remains.

Two Ash Lenses in the Sunken Courts

Kala Uyuni Area AC, Locus 5183, Event A33, Flot no 13143 and flot no.13144 (Ash lens on upper floor of lower court, radiocarbon dated to 762-402 B.C.)

Kala Uyuni, Area AC, Locus 5431, Event A159, Flot no. 13351 (Ash lens sealed by collapse of sunken court, radiocarbon dated to 373-113 B.C.)

The hilltop of the Kala Uyuni site (the AC area) is thought to be the ceremonial center of the community during the Late Chiripa phase, when two trapezoidal sunken courts were built, maintained, and then abandoned (see Cohen and Roddick, chapter 6). Two burning features were identified on the floors of these structures and were viewed as possibly ceremonial in nature because of their location. One of these lenses (A33) contained highly burned and distorted plant materials that had become fragmented. Heavy amounts of burned earth were recovered, indicating that burning probably was *in situ*. Fish bones also appeared to have been burned directly on this surface. The burned bone here was in tiny fragments, including several bird bone beads that had been burned in the feature. The other ash lens (A159), though it seemed similar in field observations, contained a very high amount of wood fuel and hundreds of quinoa seeds in a dense deposit that could have been a seed toasting feature or even a burned storage facility. Very high proportions of burned bone were recovered, reinforcing the impression of direct, *in situ* burning.

Conclusions

Our understanding of burning and discard from the ethnoarchaeological record is paralleled by our detailed evidence for how householders and cooks controlled several different kinds of fires in domestic contexts. The remains of direct and indirect burning end up in mixed deposits, even when they appeared to be discrete dumps when excavated. Evidence for earth oven cooking seems very strong and should be combined with our allied study of cooking in ceramic vessels. The evidence for cooking tubers and fish together is suggested in several deposits. In contrast, we do not have very clear evidence for cooking meat from camelids, and our evidence for preparation of meat from fragmentation and butchering traces does not seem directly related to these observations. Partial burning of long bone ends is the rarest category of heat treatment on bone. The dense crumbs of bone in sample 13339 do indicate that the fragmentation of bone to extract fat was an important technique, less familiar today because of the wide availability of cooking oils. Dried meat and fish may have differed from fresh meat and fish in the way that they entered various dishes. A closer examination of fragmentation and utility indices of body part values may help clarify this issue.

The deposits in ceremonial contexts in this study strike us because of their homogeneity of evidence for a particular kind of high burning. Clearly, behavior represented by these contexts

Cooking/ Burning	**Plant Density**	**Seed Distortion**	**Seed Fragmentation**	**Weathering**	**Effect on Animal Remains**
Stews and Porridges	Residues on ceramics only				Residues on ceramics; no burned boned produced
Toasting seeds	High density of food plant	Low distortion	Low fragmentation		
Pit cooking (*Watia*)	High Densities of fuel, some food	Low distortion	Low fragmentation	Rake out spreads fuel and burned earth beyond pit	No burned bone from cooked meat; Heat in pit chars bone in underlying deposits
Plants as fuel for open cooking fires	High densities of fuel plants	High distortion	Moderate fragmentation	Increasing fragmentation if open	Light charring with "grilling", heat from cooking chars bone in underlying deposits
Site Maintenance, trash burning	Variable densities	High distortion	Low fragmentation	Increasing fragmentation if open	Charring, calcined bone produced with repeated burning.
Field Clearance	Low density, high ash		High fragmentation		Little effect
Locus 5238, Flot no 13200, "Midden"	**High density of food and fuel**	**Moderate distortion**	**High fragmentation**	**High weathering**	**Burning 7.9% Calcined 0.3%**

Figure 8.9 Comparison of burning model with flotation samples. The samples chosen were the highest ranking in combined densities of crop seeds and tuber/parenchyma fragments.

has a different pattern or rhythm of burning and discard from that in the middens and other accretional deposits. It also appears to differ from discrete contexts such as trash pits and hearths that have received several episodes of dumping. At this time, we cannot link this behavior with the kinds of communal food consumption suggested for these public locations, but we are closer to understanding the scale and nature of the cooking that did take place. In integrating our evidence for fuel, temperature, and the food remains themselves, we get closer to the conditions that created the archaeobiological record and the behavior behind it.

9

Kala Uyuni and the Titicaca Basin Formative

Matthew S. Bandy

The Late Formative period was a critical time in southern Titicaca Basin prehistory. It was during this 500-year period that the site of Tiwanaku came to assume urban proportions, surpassing all of its neighbors, contemporaries and predecessors, in size, monumental elaboration, and economic and political complexity. This transformation set the stage for Tiwanaku's cultural dominance of the South-Central Andes for another half-millennium, and the wholesale reconfiguration of Andean society and polity in the Middle Horizon. Until recently, however, the Late Formative was very poorly known.

Ongoing research by the Proyecto Wila Jawira (Kolata 1993; Kolata ed. 2003), beginning in the 1980s, and following the lead of earlier Bolivian and foreign investigators (Bennett 1934; Ponce 1971, 1981, 1993), has admirably documented the urban space and social contours of the Tiwanaku Polity in its mature form (e.g., Albarracin-Jordan 1992, 1996; 1994; Couture 2002; Janusek 1994, 2001, 2003, 2004a, 2004b; Janusek and Kolata 2003; Mathews 1992). Research in Peru's Moquegua Valley and elsewhere has described the Tiwanaku colonies there, casting further light on the relations of the Tiwanaku Polity with its distant hinterland (e.g., Goldstein 1993a, 1993b, 2003; Goldstein and Owen 2001; Owen and Goldstein 2001). At the same time, intensive research in the Bolivian *altiplano* has traced the outline of early village societies in the southern Titicaca Basin during the Early and Middle Formative periods, prior to approximately 200 B.C. (Bandy 2001a, 2004a, 2004b, 2006; Bruno and Whitehead 2003; Hastorf ed. 1999; Hastorf et al. 2001; Hastorf 2003). The Late Formative, however, has remained virtually undocumented.

This situation has begun to change within the past five years as the result of several independent projects. First, John Janusek (2002) and Carlos Lémuz (2001) formulated, at about the same time, the rudiments of a plainware ceramic chronology for the Late Formative period. Previous investigators of regional archaëology in the Tiwanaku heartland (Albarracin-Jordan and Mathews 1990; Albarracin-Jordan 1992; Mathews 1992) had been forced to rely for the identification of Late Formative sites on the presence of the known decorated wares: Kalasasaya polychrome incised for the Late Formative 1 (what was known as Tiwanaku I) and Qeya polychrome for the Late

Formative 2 (Tiwanaku III). Since both of these decorated wares are quite rare, it was impossible for Albarracin-Jordan and Mathews to reliably identify Late Formative sites through surface survey. Janusek and Lémuz's ceramic work made possible for the first time the identification of Late Formative assemblages on the surface of sites, and the distinction of Late Formative 1 from 2 occupations. This was of course a major boon to settlement research, and I was fortunate to be able to use this chronology for my own survey work on the Taraco Peninsula (Bandy 2001a). It has also been employed by Lémuz (2001) and Janusek (Janusek and Kolata 2003). Though there remains a great deal of room for improvement in our understanding of Late Formative ceramics (see Steadman's chapter 7 in this volume for a major step in this direction), the preliminary plainware chronology of Janusek and Lémuz made it possible to identify and compare late Formative sites within and between regions in the southern Titicaca Basin. This ability led directly to the two recent projects that are doing the most to illuminate the Late Formative period.

The first of these is the Proyecto Jacha Machaca, directed by John Janusek. Beginning in 2001, this project has been concerned primarily with excavations at the major Late Formative site of Khonko Wankane in the Desaguadero drainage south of Quimsachata Mountains (Janusek et al. 2003). Janusek has also collaborated with Bolivian archaeologists, including Carlos Lémuz, to begin a settlement survey of this region and to initiate important excavations at the site of Iru Itu on the Desaguadero River. Excavations at Khonko Wankane have produced abundant evidence of Late Formative 1 and 2 habitation and ritual structures, including a very elaborate trapezoidal Late Formative 1 sunken court. Their 2005 season uncovered spectacularly broad exposures of shallowly buried Late Formative residential compounds. The work of the Proyecto Jacha Machaca has clearly established Khonko Wankane as a major center of the Late Formative period, and probably as a rival to Tiwanaku and Kala Uyuni during this time.

The second of the major projects focused on the Late Formative period is the Taraco Archaeological Project, directed by Christine Hastorf and myself. At the time of this writing we have completed three seasons (2003-2005) of excavations at three major Late Formative sites on the Taraco Peninsula: Kala Uyuni, Sonaji, and Kumi Kipa (for descriptions of these sites, see Bandy 2001a:174-83). The present volume reports the results of our 2003 excavations at Kala Uyuni. In this chapter I would like to identify some of the major results of the Kala Uyuni diggings and their implications for some of the "big questions" that surround the Titicaca Basin Late Formative period.

Varieties of Space in Middle Formative Villages

While Janusek has approached the Late Formative from the perspective of his earlier work on Middle Horizon sites and materials, we have approached the Late Formative from the opposite direction: from the perspective of our work on the Early and Middle Formative occupations of Chiripa.

One of the themes we attempted to develop in our earlier work at Chiripa was a distinction between architectural spaces and artifact assemblages that might be characterized as "domestic" and "ritual." Beginning around 1000 B.C. the sunken court architectural form comes to serve as a clear marker of "ritual" spaces and is consistently associated with distinctive artifact types and assemblages (Steadman 1999). However, one of the difficulties we encountered at Chiripa was that "domestic" and "ritual" spaces were located very near to one another within the sites, and the middens resulting from the distinct activities were frequently intermingled to some degree. Therefore, the domestic/ritual distinction was never absolutely clear at Chiripa, a fact that led some project members to deny that such a distinction was valid or useful (Dean and Kojan 1999, 2003; Paz Soria 1999).

Kala Uyuni has provided an excellent test case for us to refine our understanding of what domestic and ritual spaces are like in Middle Formative villages. As has been emphasized elsewhere in this volume, the Middle Formative

community at Kala Uyuni maintained spatially segregated domestic and ritual activity areas. Domestic habitation was concentrated in the AQ sector, where Bruno (chapter 3) excavated a series of stratified domestic middens.

Ritual activity, on the other hand, or at least ritual activity of a public nature, was concentrated in the AC sector, on top of a hill some 500 meters distant (figure 1.6). This was well documented by the excavations of Cohen and Roddick (chapter 6). Atop the small mountain of Achachi Coa Kkollu two sunken courts were constructed sometime early in the Late Chiripa phase. The precise construction date is not known due to a combination of the 800-400 B.C. calibration plateau (see the discussion by Whitehead in chapter 2) and the mixture of earlier materials into construction deposits. However, we can be certain that the courts were constructed sometime after 800 B.C., the beginning of the Late Chiripa phase, and sometime before 550 cal B.C. Depending on how early the courts were constructed, therefore, this first phase of court construction at Kala Uyuni is probably contemporary with the Llusco sunken court at Chiripa (Bandy 2006; Hastorf 2003; Paz Soria 1999) and definitely contemporary with the Lower House Level (Bandy 1999a, 1999b, 2006; Hastorf 2003). The remodeling of the two Kala Uyuni AC sunken courts took place in the middle of the Late Chiripa phase, and their use continued through the second or third centuries cal B.C., the end of the Late Chiripa phase. This second episode of use is therefore roughly contemporary with the Upper House Level at Chiripa (Bandy 1999a, 1999b, 2006; Hastorf 2003).

The Kala Uyuni sunken courts were in use, in other words, during the exact time span we investigated over the course of our four field seasons at Chiripa. The fortuitous spatial segregation of ritual and domestic contexts at Kala Uyuni, a separation not evident in any other known Middle Formative village, made it possible for us to clearly identify ritual versus domestic assemblages and activities. Steadman, for example, in her exemplary analysis in chapter 6, defines three separate ceramic assemblages at Kala Uyuni, one domestic and two special-purpose, the latter two associated with the sunken courts in the AC sector. The sunken court ceramics, significantly, contain forms such as trumpets and *incensarios* that are entirely absent from the domestic assemblages. The court assemblages also reflect an emphasis on serving wares, suggesting, as Steadman notes, that communal eating and drinking were an important component of the rituals and ceremonies conducted in these spaces.

Moore et al. (chapter 8) have also confirmed the distinction between the AQ and AC sectors in their careful analysis of burning of archaeobiological material. They conclude that the kind of burning evident in the AC materials associated with the courts reflects a range of behaviors distinct from those evident in the residential AQ contexts.

To summarize, then, the 2003 excavations at Kala Uyuni, and subsequent artifact analysis, have dramatically confirmed that sunken courts in Late Chiripa villages are a specialized ritual architectural form, associated with a range of activities entirely absent from residential contexts. This is an important finding and is consistent with recent work suggesting that the development of spatially (and otherwise) segregated ritual behavior is a significant process related to the internal social evolution of village societies (Cohen 2006).

Transformations of Public Space and Architecture

The careful excavations undertaken in the AC and KU sectors of the site have documented three major transformations of public space in Kala Uyuni's occupation history. These are: 1) the initial construction of a pair of sunken courts early in the Late Chiripa phase, 2) the parallel remodeling of these courts sometime in the middle of the Late Chiripa phase, and 3) the abandonment of the courts and the construction of a new public ritual context in the KU sector, at the Middle/Late Formative transition.

Initial Court Construction

As Cohen and Roddick note in chapter 6, the AC sector appears to have been utilized for

ritual activity from the very beginning of Kala Uyuni's occupation in the Early Chiripa phase. It continues to serve a ritual function today (Bandy 2001a: 122). However, early in the Late Chiripa phase the ritual space of the Achachi Coa Kkollu hilltop was formalized with the construction of two sunken courts. The original dimensions and plan of these courts is a little unclear, due to later remodeling and to the limited extent of our excavations. However, as Cohen and Roddick argue these two early courts were certainly trapezoidal in plan, wider to the south than to the north. They share a common orientation and appear to have been approximately the same size. The lower court (ASD-1) had a sacrificial human burial placed within its clay floor as a dedicatory offering. There is as yet no evidence for surface structures associated with thee courts. The walls of this original court construction episode appear to have been built using rounded alluvial cobbles present in abundance in the immediate vicinity of the site. In this respect, the wall construction was similar to that documented for the Choquehuanca (Dean and Kojan 1999; Hastorf et al. 2001) and Llusco (Paz 1999) sunken courts at Chiripa.

The presence of two contemporaneous sunken courts on this small hilltop, sharing similar construction techniques and identical plans and orientations, and adjacent to a substantial village occupation, is immediately suggestive of dual organization. It may be that each court was built and operated by a moiety or *ayllu* of the Middle Formative Kala Uyuni community. Dual organization is, of course, widely attested in the ethnohistoric, ethnographic, and prehistoric societies of the Andean region (Moore 1995), and dualistic architectural configurations have previously been identified in the southern Titicaca Basin Middle Formative (for the Chiripa Upper House Level, see Bandy 2006 and Hastorf 2003; for Alto Pukara, see Beck 2004). Kala Uyuni is presently, however, the only known case of a dualistic configuration of sunken courts at a single site in the southern Titicaca Basin Middle Formative. In this it anticipates the Late Formative 2 paired courts at Khonko Wankane (Janusek et al. 2003), and even the Middle Horizon Akapana/Puma Punku dualism at Tiwanaku (Kolata 1993).

Court Remodeling

Sometime in the middle of the Late Chiripa phase, probably not long before 550 B.C., both of these courts underwent parallel remodeling episodes. The later use of the courts was therefore at least partially contemporaneous with the Lower and Upper House Level structures at Chiripa (Bandy 1999a, 1999b, 2006; Hastorf 2003). The form the courts assumed at this time is very significant for our understanding of later patterns of ritual architecture. As Cohen and Roddick note, both courts were expanded somewhat in size at this time, and both had new clay plaster floors placed on their interiors. It was also at this time that a carved sandstone monolith was erected in the center of the upper court (ASD-3). Most importantly, however, the method of wall construction evident in this remodeling episode was an entirely new technique in Titicaca Basin ritual architecture, and anticipates the canonical construction method of the Late Formative period at numerous sites, and even of some Middle Horizon architecture at Tiwanaku.

I am referring here to the use of large upright stones - orthostats - placed at regular intervals along the line of the wall. This kind of orthostat/ashlar masonry technique becomes particularly diagnostic of the sunken court in the Late Formative period, appearing at Chisi on the Copacabana Peninsula, the semi-subterranean temple at Tiwanaku (Bennett 1934), the final sunken court on the mound at Chiripa (Bennett 1936; Chávez 1988), the unexcavated Late Formative 1 court at Waka Kala (Bandy 2001a:178-79), the Late Formative 1 court recently excavated by Janusek at Khonko Wankane (Janusek et al. 2003, figure 2), as well as the Late Formative 1 catfish effigy mound at Kanamarka/Lakaya (Bandy 2001a:196), among many other examples. Later variations of this technique include the Kalasasaya and Putuni platforms and the Akapana terrace facades at Tiwanaku (Vranich 2001).

At Kala Uyuni this technique appears in a transitional form with the court remodeling in the middle of the Late Chiripa phase. The Kala Uyuni sunken court walls, in their remodeled

state, contain modest limestone orthostats located at intervals in their walls. The stones forming the wall between the orthostats are rounded alluvial cobbles, such as were used to construct the walls of the earlier Taraco Peninsula courts at Chiripa and at Kala Uyuni. The orthostats themselves are modest in size, and were extracted from local limestone quarries. I have located these quarries within the modern community of Coa Collu, not more than three kilometers distant from Kala Uyuni. The labor invested in these stones is therefore not comparable to that invested in the grand monuments of later time periods. The important point is that the later tradition of orthostat/ashlar construction may very well have its origin in the Middle Formative sunken courts at Kala Uyuni, If so, the impact of the Kala Uyuni community on the eventual course of the Titicaca Basin ritual tradition was profound.

Court Abandonment and the Rearticulation of Public Space

The third and final transformation of public space at Kala Uyuni took place at the end of the Late Chiripa phase, probably sometime in the second or third centuries cal B.C. It was at this time that the sunken courts of the AC sector, in continuous use for a minimum of four centuries, were finally abandoned. Cohen, in her excavation of the upper court (ASD-3), identified a thick cobble deposit surrounding the central monolith that appears to have been intentionally deposited at the time of abandonment. This may have been related to a closing ritual of some kind, as she suggests. Whatever the case, formal public ceremonialism ceased at this time in the AC sector, though the space has never entirely lost its sacred character. What form public ceremonialism took in the following Late Formative 1 period, however, is a difficult question.

One of the frustrations of the 2003 excavations at Kala Uyuni was that we failed to locate clearly distinguishable ritual and domestic deposits dating to the Late Formative 1 period. To be clear, no unambiguous ritual/domestic distinction was identifiable for the Late Formative 1 in the same way as it was for the Middle Formative occupation. The reason for this is that intact, substantial Late Formative 1 deposits were only excavated in one area of the site. The AQ area is located within the borders of the Late Formative 1 occupation, but ceramics of the Late Formative period are, in this area, found only in the plow zone, though they occur there in quantity. The AC area, as has previously been mentioned, was basically abandoned at the end of the Middle Formative. Intact Late Formative 1 deposits were therefore encountered only in the KU area of the site: in the trenches excavated by Paz and Fernandez (chapter 4) and Bruno and Leighton (chapter 5).

These two trenches are located quite close to one another on the very northern edge of the Late Formative 1 ceramic scatter. Therefore no comparison of widely separated excavation areas, as made possible the distinction of ritual and domestic Middle Formative assemblages, could be undertaken for the Late Formative 1. A determination of the nature of the KU deposits must therefore be made in the absence of the sort of explicit comparison that we could make for the Middle Formative materials. This being so, we can expect such determinations to be more difficult and subject to debate. And indeed that has been the case. Paz and Fernandez, in chapter 4, present an argument that the Late Formative 1 rectangular structure they excavated in the KU area was a domestic residence rather than a public or ritual facility.

I should note at the outset that this is a minority opinion in the project, and is not held by myself or by most other project members. As Bruno and Leighton mention in chapter 5, and as Steadman discusses in detail in chapter 7, the Late Formative 1 ceramic assemblage of the KU structure and deposits is a special-purpose assemblage that cannot be parsimoniously interpreted-as domestic refuse. Steadman notes a very high incidence of polychrome incised ceramics in these deposits. These ceramics, traditionally associated with the Tiwanaku I Kalasasaya style, are vanishing scarce at most sites in the region. Most excavations in Late Formative 1 sites find none of these ceramics. In my survey of the Taraco Peninsula, I encountered less than 20 of these sherds, approximately

half of them from the surface of Kala Uyuni (Bandy 2001a:166-67). Such a concentration of polychrome incised ceramics of this type is very rare, and the high incidence of this style in the KU deposits strongly suggests that these were produced by activities that were non-residential in nature. Other aspects of the KU Late Formative 1 ceramic assemblage support this interpretation, including the very high percentage of serving vessels (hemispherical bowls) and the presence of some very rare special-purpose forms, such as wide-line incised ceramic trumpets. Even in the absence of a well-defined domestic assemblage, we can clearly see that the KU material is non-domestic in nature. I should note also that in our 2004 and 2005 seasons we excavated considerable volumes of domestic Late Formative 1 material at Kala Uyuni, Sonaji, and Kumi Kipa, and that the analysis of this material should considerably clarify the issue of ritual versus domestic assemblages in this time period.

Certain architectural attributes of the KU structure (ASD-2) would also appear to contraindicate a residential interpretation. First, the foundations, as described by Paz and Fernandez in chapter 4, are very elaborate and substantial, more so than would have been necessary for a simple domestic structure of the Late Formative 1 period such as those excavated by Janusek at Khonko Wankane (Janusek et al. 2003), by Javier Escalante at Tiwanaku (see architecture illustrated in Janusek 2004b, figure 4.1), or by Marc Bermann (1990, 1994) at Lukurmata. All of these structures, as well as a Late Formative 1 domestic structure excavated by TAP at Kala Uyuni in 2005, had narrow foundations, reflecting the narrow walls with which they were surmounted. The foundation of ASD-2, however, is very wide, being composed of two courses of size-selected alluvial cobbles, interior and exterior, separated by a gravel and clay fill. The width of this interior fill is approximately 60 cm, and the width of the total foundation about 70-90 cm on average (though it varies considerably). To my knowledge, the only other Late Formative 1 structures with foundations of this width and general construction technique are the structures encountered by Ponce Sangines in his excavations beneath the Kalasasaya platform at Tiwanaku (1981, 1993). These foundations were quite substantial and appear from published photographs to have approached a meter in width (Escalante 1994:109; Janusek 2004b, figure 4.1A, B; Ponce 1993:89). Though these structures have often been interpreted as the remains of a village, the great quantity of associated polychrome incised and special purpose ceramics (including trumpets) both militates against a simple residential interpretation, and further links them to ASD-2 at Kala Uyuni.

Second, the walls of the structure appear to have been made of pure yellow clay. The foundations, floors, and occupation-related deposits were covered in a mound of this substance (B9), visible in the excavation profile in figure 4.3. Paz and Fernandez interpret stratigraphic event B9 as the melted remains of the walls of the ASD-2 structure. I agree with their interpretation. If this is the case, then the entire structure that surmounted the ASD-2 foundations shown in figure 4.2 was made entirely of yellow clay. Domestic residences seem to have had walls made of adobe, rather than of pure colored clay. Formative period structures built of pure colored clay are known from the northern Titicaca Basin (Cohen 2006) and from the Katari Valley (Janusek and Kolata 2003). In all cases these have been interpreted as specialized ritual structures rather than as simple residences.

Third, the structure appears to have had only three walls (figure 4.2). Paz and Fernandez attribute the lack of a western wall to "poor preservation, prehispanic disturbance, or a different construction technique." However, the entire area was excavated, and no intrusive features disturbed the overlying B9 clay mound in this area. If the wall has once been there, the excavators would have found it. A structure with three walls would be poorly suited for residential purposes in the Titicaca Basin, due to freezing nighttime temperatures and periodic extreme weather, Again, a public or ritual interpretation is indicated.

If the KU structure excavated by Paz and Fernandez was not a domestic residence, what was it? Several observations are relevant to an interpretation. First, we know that the KU sector sunken courts were abandoned somewhat before the KU structure was built. Late Formative 1 villages, even ones much smaller than Kala Uyuni, such as Chisi or Waka Kala (Bandy 2001a), very commonly have sunken courts. It would be very unusual if Kala Uyuni did not have at least one during this period, though we have not located one in our excavations as yet. The ritual nature of the ceramic assemblage associated with the KU structure would suggest that it might be related to an architectural complex associated with an as-yet undiscovered Late Formative 1 sunken court. The apparent similarities in construction technique between the KU ASD-2 structure and the structures excavated by Ponce Sangines beneath the Kalasasaya platform fill may be an additional indication of sunken court association, since these structures were of course located very near to the Semi-Subterranean Temple at Tiwanaku. Though the form of the Late Formative 1 ritual architectural complex at Kala Uyuni remains obscure for the moment, sufficient evidence exists to suggest that the KU structure is one small element of it. Further defining this complex remains a high priority for future research at Kala Uyuni.

A Reconfiguration of Commensality in the Late Formative 1

Steadman, in her discussion of Late Formative 1 ceramics in chapter 7, makes what I believe will prove to be a critical observation for our future understanding of the Late Formative period and of Tiwanaku emergence. She notes that while the ceramic assemblage in general underwent many changes at the Middle/Late Formative transition, the portion of the assemblage related to serving activities changed most dramatically. In the Middle Formative, according to Steadman's analysis, bowls were on average quite large and one size class of bowls was particularly large, greater than 30 cm in diameter. Thus, the portions involved in contexts of public commensality would appear to have been greater than a single serving. Steadman suggests that serving might have been conducted in a communal fashion, with multiple persons serving themselves from large common containers. Feasts may have been more "pot-luck" occasions, where the roles of host and guest were distributed widely among a congregation, and the mode of commensality might be described as "many-to-many."

In the Late Formative 1 period, bowls became both smaller and more common. Steadman suggests a possible interpretation for this pattern: that the mode of commensality in contexts of public hospitality had changed from a communal serving pattern, to a pattern of participants being served individual portions in individually-owned ceramic bowls. This change is consistent with a shift to a better-defined status of "host," and a mode of commensality that could be described as "one-to-many." In this way, the small, individual serving bowls of the Late Formative 1 were the conceptual precursors of *keros* and *tazones*, the prototypical and super-abundant individual serving vessels of the Middle Horizon. *Keros* and *tazones* seem to have had a strong association with their owners, and one or two drinking vessels frequently accompany even commoner burials. This Middle Horizon mortuary practice is anticipated by the common Late Formative 1 use of red-banded Kalasasaya bowls as mortuary goods. Interestingly, ceramic bowls are almost unknown as grave goods in the Middle Formative, suggesting that these vessels at this earlier time had not yet acquired a strong identification with their owners.

The fact that this shift—from a "many-to-many" to a "one-to-many" mode of commensality in public events, combined with the strong cultural identification of an individual with his/her serving vessel—took place at the same time that we see the first appearance of complex, multi-community political organization cannot be fortuitous. This reconfiguration of the institutions and practices of commensality was no doubt intimately connected to the rise of the Taraco Peninsula Polity and its contemporaries, to the subsequent increase in the degree of social inequality and the scale of political integration in southern Titicaca Basin society, and ultimately to the origins of the Tiwanaku state.

Kala Uyuni and the Rise of Tiwanaku

To understand the rise of Tiwanaku it will be necessary to explain Tiwanaku's initial exceptionalism. In the Middle Formative Tiwanaku was not a settlement of any significance. Beginning in the Late Formative 1, Tiwanaku became the center of a local Tiwanaku Valley polity (Bandy 2001b). This was only one of a large number of contemporaneous small-scale polities in the southern Titicaca Basin. Others included the Taraco Peninsula Polity, with its center at Kala Uyuni, the Southern Ccapia Polity, with its center at Kanamarka/Lakaya, a polity centered on Khonko Wankane, and possible polities in the Upper Tiwanaku Valley (Kallamarka) and on the upper course of the Desaguadero River (Iru Itu or possibly Similake). All of these local capitals were of comparable size and possessed impressive monumental architecture. By the Late Formative 2 period, however, Tiwanaku had grown to assume near-urban proportions, becoming more than fives times as large as any of the old Late Formative 1 centers. It was during this time, then, between approximately 100 A.D. and 400 A.D., that Tiwanaku came to be greater than its erstwhile competitors, and was set on the path that led, ultimately, to the brilliant cultural fluorescence of the mature Tiwanaku state that took place several centuries later.

Why did Tiwanaku become the urban center of an archaic state (Stanish 2002) rather than any of the other Late Formative 1 political centers? What was the historical process by which it grew into a city at the demographic expense of its neighbors? These are the key questions that must be answered if we are to produce an account of Tiwanaku state formation. Elsewhere I have advanced some tentative suggestions in this direction (Bandy 2001a, 2001b, 2006). However, our recent work at Kala Uyuni and other sites in the Taraco Peninsula has produced some information that is important to this debate.

Initial Tiwanaku expansion can be identified in its immediate hinterland by a dramatic demographic effect, similar to the so-called "Teotihuacan Effect." I identified this effect in my survey of the Taraco Peninsula (Bandy 2001a). During the Late Formative 2, the Taraco Peninsula experienced an episode of population loss, with an annual population growth rate of -0.12% for this two-century period (Bandy 2001a:196). This is very noticeable, because it is the first time in the human occupation of the Taraco Peninsula, beginning around 1500 B.C., that the region had experienced an overall population decline. Population had grown steadily through the Early Formative 2 (0.47%), Middle Formative (0.13%), and Late Formative 1 (0.08 %; Bandy 2001a): an 1800-year period of uninterrupted demographic growth.

That the initial growth of Tiwanaku to urban proportions took place at the same time as the first demographic decline in the history of the Taraco Peninsula is extremely significant. I have suggested elsewhere that perhaps as much as 46% of the immigrants to Tiwanaku in its episode of initial expansion could have been from the Taraco Peninsula (Bandy 2001a:196-98). I now believe, based on more information about the population history of Tiwanaku itself, that 90% or more of the immigration into Tiwanaku in the Late Formative 2 was from the Taraco Peninsula. The Taraco Peninsula is profoundly implicated in Tiwanaku state formation, since Tiwanaku urbanism was produced, at least initially, by a massive population displacement with its origin in the territory of the Kala Uyuni polity.

This being the case, it is interesting to observe that Kala Uyuni was practically abandoned around 200 A.D. As figure 1.2 makes clear, our terminal date for the use of the KU ASD-2 structure (AA59719) is 130-340 cal A.D. Interestingly, our dates for the initial occupation of the related sites of Kumi Kipa and Sonaji, near Santa Rosa approximately 4 km to the west, begin around 200 cal A.D, in the final century of the Late Formative 1 period. There is good reason to believe that at 200 A.D. Kala Uyuni was abandoned (being reduced to a small village during the Late Formative 2) and its population relocated to the Santa Rosa area. There are two reasons why this is a likely scenario. One is that the radiocarbon dates suggest it, as I have just discussed. The other is

the sequence of occupation of the sites involved. Kala Uyuni has a long and unbroken occupation sequence starting in the Early Chiripa phase until it is practically abandoned late in the Late Formative 1 phase. The Santa Rosa sites, on the other hand, have no Middle Formative or early Late Formative 1 occupations whatsoever, and these large sites appeared with absolutely no local antecedents at precisely the time that Kala Uyuni was abandoned (see discussion in Bandy 2001a:190-92). The Santa Rosa sites continued to be the major population center on the Taraco Peninsula through the end of the Middle Horizon.

Could the abandonment of Kala Uyuni and the founding of the Santa Rosa sites reflect the overthrow of the ancient ruler of the Taraco Peninsula Polity and the political ascendancy of a new ruling group, perhaps installed as clients of the newly dominant Tiwanaku elite? This question is impossible to answer at present, since very little is known of Late Formative 1 settlement or social organization within Tiwanaku itself. What is clear, however, is that the settlement, demographic, and political history of the Taraco Peninsula is a crucial line of evidence in unraveling the difficult problem of Tiwanaku state formation.

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Cover photo: Lightning Stone found between floors at Achachi Coa Kkollu excavations at Kala Uyuni. For more photos, see pages 59-61, chapter 6.

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