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Inka Rule in the Northern Calchaquí Valley, Argentina

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Inka rule in the northern Calchaquí Valley in NW Argentina employed a varied strategy that drew the region's societies into the empire in the 15th century A.C. Surface survey, site mapping, and excavation, combined with review of historical documents, show that the Inkas applied measures designed to ensure security, intensify production of agropastoral and mineral resources, introduce state ideology, administer state activities, and establish cultural relations with compliant subjects. Because the Inkas tailored their approaches to the sociopolitical and natural circumstances of each region, imperial rule resulted in two different kinds of occupations: a discrete set of state installations in the north and a mixed, state-local occupation in the mid-valley.

Introduction

Beginning in the early fifteenth century A.C., the rapid expansion of Inka¹ dominion throughout the Andes was one of the most remarkable occurrences of New World prehistory. As they incorporated peoples from northern Ecuador to central Chile and NW Argentina into *Tawan-*

tinsuyu (The Four Parts Together), the Inkas asserted their rule over societies that ranged from simple communities to at least one other expansionist state (Chimor). Like the rulers of other early empires, the Inka leaders were confronted with widely varying demands on their organizational skills. Its dominance notwithstanding, the capital at Cuzco could not unilaterally dictate the terms of relations between state and subject in most regions. On the imperial side of the ledger, provincial relations depended on the abilities and interests of the state leadership, coupled with

1. This spelling of Inka conforms to the orthography adopted by scholars of Quechua in the 1970s (e.g., glossary in Guaman Poma [1980]).

security concerns and the character of regional imperial development (e.g., conquest, consolidation, retrenchment). Balanced against those features were the sociopolitical and cultural forms, demography, resources, technological capacities, and geography of the subject regions. Together, those elements shaped the kinds of state policies that could be effectively applied in any given region.

The study of Tawantinsuyu presents a formidable challenge because of its scale, complexity, and diversity. Recent documentary studies of life under Inka rule have moved away from notions of a highly ordered, monolithic state toward a more nuanced picture with many variations. Building on the work of such scholars as Rowe (1946), Murra (1980), and Rostworowski (1983, 1988), researchers have shown how the Inkas used existing social formations both as archetypes for imperial rule and as structures for enacting state policies (e.g., Julien 1988; Pease 1978; Salomon 1986; Wachtel 1977). By adapting state practices to local circumstances, the Inkas forged a polity that relied on a situational mix of alliance, clientage, intensive incorporation, and, on Peru's north coast, dismantling the upper echelon of a potent competitor. In practice, Inka politics combined elaborate ceremony and a structured bureaucracy that depended heavily on the cooperation of local elites. Imperial rule in any given province thus arose from both innovative, central policy and the constraints of existing institutions. By extension, as conditions and the interests of the principals changed, Cuzco's policies likely shifted in many regions over time.

Archaeological study of the interactions between state and subject has also taken on a different tenor in recent years. A traditional focus on monumental architecture and material culture has been complemented by work on issues ranging from household economics to the spatial arrangement of shrines around Cuzco (e.g., Bauer 1992; Bauer and Dearborn 1995; D'Altroy 1992). Much of the research has taken place in the provinces, as researchers have combined documentary studies with archaeological fieldwork to flesh out a more complex vision of imperial rule along the length of the Andes (e.g., Malpass 1993). Researchers have been paying special attention to the nature of imperial installations along the road networks (e.g., Raffino 1983, 1993; Morris and Thompson 1985; Stehberg 1991–1992).

In an effort to build our understanding of both the particulars of Tawantinsuyu and the nature of empires in general, the Argentine-United States Proyecto Arqueológico Calchaquí (PAC) has been investigating Inka rule in the Calchaquí Valley of NW Argentina since 1990 (FIG. 1). This paper reports some of the major results of that research, with a particular focus on settlement organization and eco-

nomics. The research has been explicitly designed to be comparable to the participants' prior work in the Upper Mantaro Valley, Peru (e.g., D'Altroy and Hastorf, in press; Earle et al. 1987), and Catamarca, Argentina (e.g., Williams 1996; Williams and Lorandi 1986). In 1990, research focused on three issues at the heart of the regional economy under Inka rule; these were the subsistence activities of both imperial personnel and the subject populace, the production and consumption of goods intended for exchange and for elite consumption, and settlement organization. The 1992 season broadened that analysis by investigating the distribution and layout of key Inka settlements (Williams et al. in press). Between 1994–1996, Elizabeth DeMarrais (1997) intensively surveyed and selectively mapped the main and lateral valleys to refine our understanding of the two millennia of indigenous development, and the role played by ideological leadership in the formation of increasingly complex society (DeMarrais, Castillo, and Earle 1996). In 1997, mapping and test excavations were conducted at the Cortaderas complex, which includes a fortified hilltop settlement and a variety of state facilities distributed around its base, along the Inka road.

The sections that follow describe the nature of the indigenous occupation just before Inka rule and the transformations introduced by imperial incorporation. We begin with an overview of Inka rule and then describe the natural and cultural setting at the time of the Inka annexation of the region. We then examine the nature of Inka rule, paying special attention to the imposition of an administrative infrastructure, the transformation of the regional demography, and the economy.

Inka Rule in Kollasuyu, the SE Quarter

Although the southern Andes are often portrayed as having been marginal to the Inkas' interests (e.g., González 1983), the archaeological record shows that a considerable effort was made to incorporate the area into the empire. Raffino and his colleagues (e.g., Nielsen 1996; Raffino 1983, 1993) have catalogued more than 300 imperial installations or local sites with intrusive Inka sectors from the southern Bolivian altiplano to just south of Santiago, Chile. Much of the region remains to be systematically surveyed, but the number of recorded state installations is appreciably higher than on the Peruvian north coast and in central Ecuador, both areas known to have been important to imperial concerns. The density of state sites is only an indirect measure of Inka interest, of course, for the elaboration of the largest south Andean sites does not approach that of the grandest centers along the royal highway between Cuzco and Quito (Hyslop 1984, 1990). In that

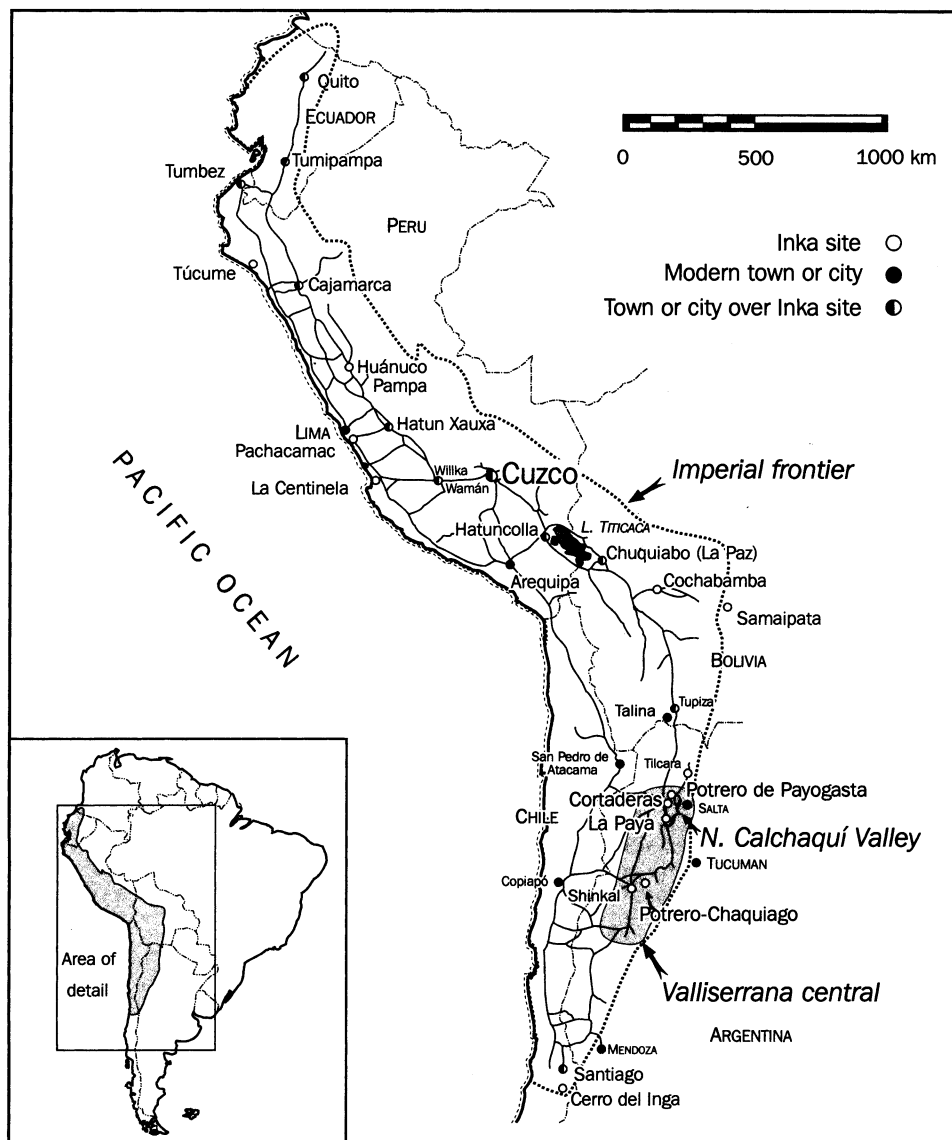


Figure 1. The Inka road system, modified from Hyslop (1984: frontispiece), showing major provincial centers. The northern Calchaquí Valley is located west of Salta, NW Argentina, in the Valliserrana Central.

sense, the southern state installations paralleled the scale and complexity of indigenous south Andean societies, which were modest compared to those of the north.

Even so, many of the apparent differences between the Inka occupations of the southern Andes and areas to the north are as much a product of colonial history and modern scholarship as a result of imperial organization (D'Altroy, Williams, and Lorandi in press; Lorandi and Boixadós 1987–1988). The early documentary record for the south is very thin compared to regions from Lake Titicaca northwards. Only a few chroniclers visited the south (e.g., Bibar 1966) and some societies in the important Valliserrana re-

gion (FIG. 1) successfully resisted Spanish rule until 1650. By the time of detailed written records, some native peoples were free of Inka rule for longer than they had been dominated. Evaluations of southern Inka rule thus depend unusually heavily on archaeology. Considering that most overview studies of the Inkas rely chiefly on documentary sources (e.g., Pease 1991; Rostworowski 1988; Rowe 1946), it is no surprise that the southern Andes often get short shrift.

Present evidence suggests that the Inkas had integrated five approaches in the southern Andes by the end of Cuzco's dominion (see D'Altroy, Williams, and Lorandi in

press for a fuller consideration). First, to ensure security, the military established almost 50 forts along the eastern and western flanks of the mountains, at the southern frontier near Santiago, and at key points along the main road network—a density matched only by the rings of forts protecting the Quito basin, in Ecuador. A second approach was the erection of state installations along the two main highways and trans-Andean trunk routes (Hyslop 1984, 1990; Raffino 1983). Most activities there were probably related to military support, politics conducted in a ceremonial atmosphere, and economic production, as was the case further north. In some cases, the Inkas appear to have claimed and developed areas that had been sparsely populated, whereas in others, they apparently closely integrated their activities with those of the native peoples.

Third, the Inkas intensified craft, agricultural, and pastoral production by developing resources set apart from those of the local societies, which was a basic part of their imperial strategy virtually everywhere. The chronicles that describe the region's incorporation observe that a main goal was to exploit mineral resources (e.g., Betanzos 1996: 148), a view supported archaeologically. Raffino (1983: 59–71) enumerates 126 Inka sites in southern Bolivia, Argentina, and Chile that were involved in mining gold, silver, copper, galena, zinc, tin, and other minerals. Fourth, the Inkas developed state farms, in some cases on a grand scale. In Argentina, the unfinished agricultural terraces of Coctaca cover about 6 sq km (Albeck 1992–1993; Nielsen 1996), and state farms in the Lerma Valley piedmont contained about 1700 storehouses (Boman 1908; Snead 1992). In order to carry out this production and to improve security, the Inkas relocated some of the native populations. Some groups, such as the Tucumanos, struck an alliance with the Inkas for their own protection and were resettled at several state installations. Others, such as the Calchaquíes, were displaced and lost resources (Lorandi 1988, 1991; Lorandi and Boixadós 1987–1988).

A final and distinctive aspect of Inka rule in the south was a concerted effort to claim the sacred landscape by erecting shrines on more than 50 mountain peaks at elevations over 5000 masl (e.g., Beorchia 1987; Ceruti 1997; Reinhard 1985; Schobinger 1966). High mountain shrines and other kinds of ceremonial caches are known from Peru and Ecuador, but the emphasis given to the practice in the south was of a different order. Reinhard (1985) argues that the firmly dated high-elevation shrines are all related to the Inka occupation and suggests that the Inkas may have been interposing themselves as mediators between the native peoples and the natural powers of the peaks, where local ancestral origin places often lay.

These combined policies indicate that the Inkas took a

sophisticated approach to rule in the south, coupling military control, ideological claims, ceremonial hospitality, demographic reshuffling, preferential treatment of particular ethnic groups, and intensification of agropastoral and mineral production. A closer examination of Inka rule in one region will help explain how those approaches were implemented and how they affected local societies. For that purpose, we turn to the northern Calchaquí Valley.

Natural and Cultural Setting

Natural Environment

The Calchaquí Valley (2600 masl) in Salta Province is one of the easternmost valleys of the Argentine Andes. The environment is a high scrub and cactus desert that features narrow flood plains along the longitudinal drainages. To the west lie small valleys that are fed by runoff from the glaciated peaks of the high mountain ranges. Because the lateral valleys are protected and relatively humid, they create microenvironments that are agriculturally more favorable than most of the main and eastern drainages (Tarragó 1978). Even so, the arable land in the region is quite restricted and capable of sustaining only a population in the low tens of thousands.

In the seasonal and dry climate, winter temperatures can dip below freezing and summer temperatures reach 40°C. Annual rainfall averages 30–35 cm, concentrated in torrential summer rains that leave many roads impassable (Aparicio and Difrieri 1963). The natural flora are dominated by cacti, including cardón (*Trichocereus pasacana*), Zigoftiaceae, jarilla (*Larrea* spp.), and wild legumes. More tree species grow in the *quebradas* (narrow, often small drainages), including the leguminous trees *Acacia visco* and *Proposis ferox*, and the shrubs *Schinus areira* and chilca (*Baccharis salifolia*). In the *prepuna* (transitional zone between high grasslands and main valleys), the rugged terrain and limited water supply constrict agriculture, but irrigation permits cultivation of alfalfa, various types of maize (*Zea mays*), quinoa (*Chenopodium quinoa*), ataco (*Amaranthus mantegazzianus*), oca (*Oxalis tuberosa*), and potatoes (*Solanum* sp.) (Cabrera 1976). Pastures for grazing are readily available in the nearby *puna* (high grassland).

Some flatter valley bottoms resemble the *monte* (shrubby forest zone) region that stretches to the west and south, typified by plains, mountain slopes, and small mesas (Cabrera 1976: 36–40). At present, the principal cash crop for the region is pepper (*Capsicum* sp.). The area's woody vegetation is larger and denser than that of the upper slopes of other *prepuna* lands. The growth of jarillal communities typically occurs in the sandy and rocky soils of the valley bottom. Other woody plant communities include algar-

Date A.C.	Periods in Valliserrana Central	Cultures of Calchaquí and Santa María Valleys
1536 1480	Hispanic-Indigenous	Hispanic-Indigenous
	Inka	Inka
1300	Late Regional Developments	Santa María
	Early Regional Developments	
1000	Upper Formative	Aguada
		Ciénaga
600	Lower Formative	Condorhuasi-Alamito
1		

Figure 2. Ceramic period chronology of the Calchaquí and Santa María Valleys of NW Argentina, using conventional historical dating.

robo forests (*Prosopis* sp.), thickets of june (*Allengolkea vaginata*, *Suaeda divariticata*, *Heterostachys riliteriana*), and pichana (*Cassia aphylla*). Those and other trees have been largely destroyed for wood and fuel over time.

The Pre-Inka Archaeological Context

As they were throughout the Andes, the Inkas were late-comers to the Calchaquí Valley, which experienced more than eight millennia of prehistoric human occupation (Bennett, Bleiler, and Sommer 1948; González 1983; Tarragó 1978; FIG. 2).² The era immediately preceding the Inka occupation is known as the Regional Developments (*Desarrollos Regionales*, or DR) period; the regional archaeological culture of this period is known as Santamariano. Conventionally dated to A.C. 1000–1480, the DR period featured marked population growth, expanded farming through irrigation, settlement diversification, and the formation of settlement hierarchies (DeMarrais 1997; Tar-

ragó 1978: 501; FIG. 3). Occupants of the main valley and western tributary drainages lived in settlements called conglomerate villages or towns, which lay adjacent to the limited but fertile farmlands. Some of the sites were positioned in defensible locations and surrounded by terraces and walls, suggesting that conflict may have been a concern. Other sites that lie in the upper ridges and puna to the east and west of the valley remain to be examined in detail (Lorandi and Boixadós 1987–1988).

The available evidence suggests that the Santamariano societies were not especially complex. Although some towns in the Santa María Valley, such as Quilmes and Fuerte Quemado, housed as many as 5000 people, González (1983) suggests that the largest polities still had no more than 20,000. Site hierarchies were not well developed and little evidence exists for monumental constructions, while metal artifacts, including elegant bronzes and rarer gold pieces, attest to the specialized artisanry often found in mid-range societies. The diversified ceramic types, especially the funerary urns for which the Santamariano region is best known, further suggest localized interaction.

The distribution of settlements in the northern Calchaquí suggests that several small DR polities may have been present, centered on compact towns (DeMarrais 1997; Pollard 1983). Among the principal settlements were Cortaderas Alto (9 ha), Valdéz (60 ha), RC-16 (30 ha), Las Pailas (6 ha), Corral del Algorrobal (10 ha), Borgatta (12 ha)/El Tero (6 ha), and Puerta de La Paya (12 ha)/Guitián (6 ha) (FIG. 3). Smaller villages and hamlets tended to cluster around each town, suggesting that a series of independent community groups was present in the late pre-Inka era (DeMarrais 1997).

Many settlements, among them Borgatta, El Tero, and Las Pailas, were formed of large subrectangular compounds sharing accumulated middens and linked by meandering pathways (DeMarrais 1997; Pollard 1983; Tarragó 1978). On occasion, entire settlements were enclosed by perimeter walls (e.g., Cortaderas Alto). Some community or neighborhood planning is also visible in the arrangement of compounds around large open plazas. Residential structures, which varied widely in size (up to 20 m on a side), were sometimes built on the ground surface, but semi-subterranean dwellings were more typical of the era. Construction techniques typically included double, mortarless walls, dry-wall construction with pebble and fine sediment fill, and foundations reinforced with large slabs or blocks. In the larger sites, the more elaborate compounds typically lay in central positions or adjacent to large open spaces, while the finer tombs were placed within the intersections of major compound walls. Two major DR sites studied by PAC—Valdéz and Cortaderas Alto—will be

2. Early research in the Calchaquí Valley itself centered on Inka-era sites, such as the cemeteries and habitation areas at Puerta de La Paya (e.g., Ambrosetti 1902, 1907–1908; Boman 1908), Quipón (DeBenedetti 1908), and Potrero de Payogasta (Difrieri 1948). Important works on excavations and settlement studies include Tarragó (1978), Tarragó and Díaz (1972, 1977), de Lorenzi and Díaz (1977), Baldini (1980), Pollard (1981, 1983), Díaz (1983), Hyslop and Díaz (1983), and González and Díaz (1992).

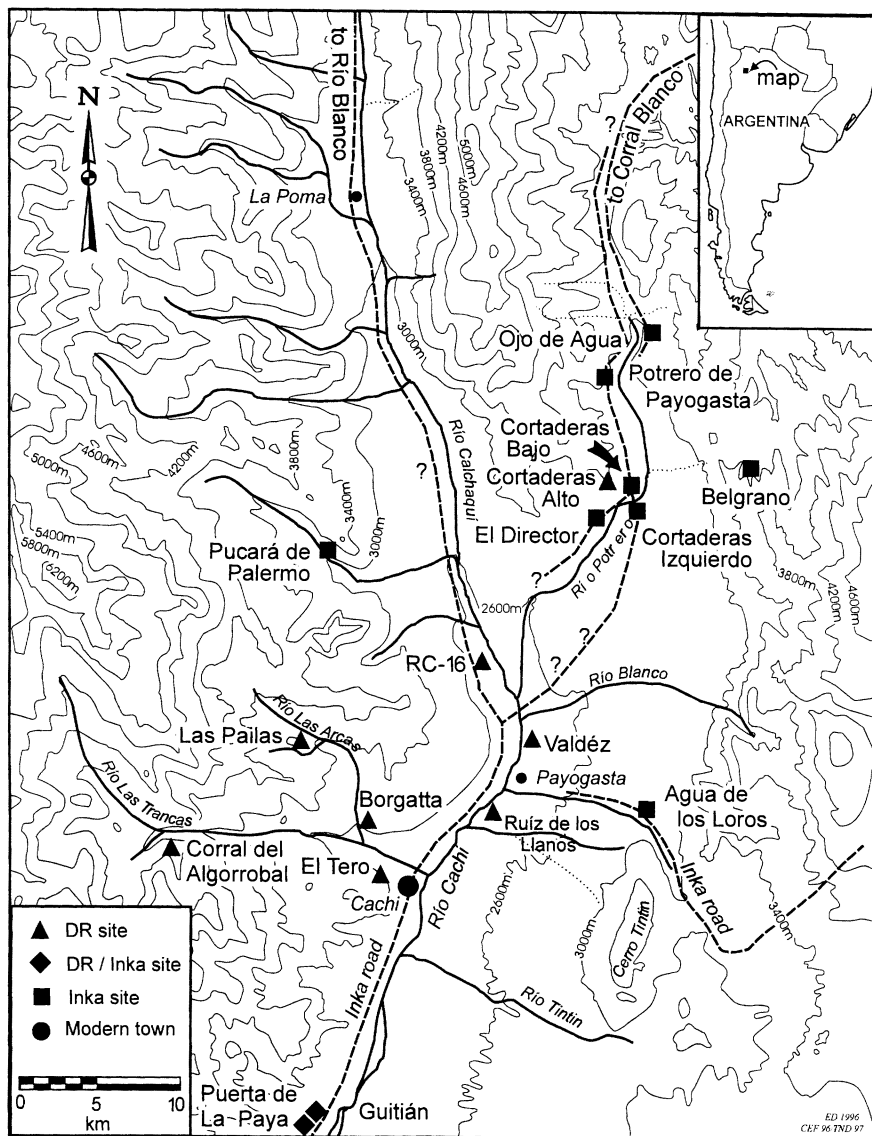


Figure 3. The study region of the Proyecto Arqueológico Calchaquí, modified from DeMarrais 1997; illustrated are the larger indigenous towns and Inka installations of the Regional Developments (DR) and Inka eras.

described briefly here, to illustrate the architectural variety that characterized the area before the imposition of Inka rule.

VALDÉZ (SSALCAC 12)

Valdéz was likely the most important community in the main valley in late prehistory (FIG. 4; Pollard 1983). Set on a river terrace just south of the confluence of the Potrero, Blanco, and Calchaquí rivers, it may have been the town the conquistadores called Payogasta (Lorandi and Boixadós 1987–1988). Detailed mapping has shown that the site’s cultural debris covered at least 60 ha and contained

more than 500 mounds up to 2 m high and 20 m across. A possible extension toward the river may have been destroyed by modern irrigation agriculture. Little evidence for formal planning is preserved in the town’s layout, but the largest mounds tend to be concentrated in the community’s center, which has been disturbed by a seasonal wash.

The evidence from 24 surface collections, with special attention to those yielding evidence of metallurgy, was used to select four mound complexes for excavation. Test pits and trenches placed within mounds and adjoining open areas helped define subsurface architecture. Both the

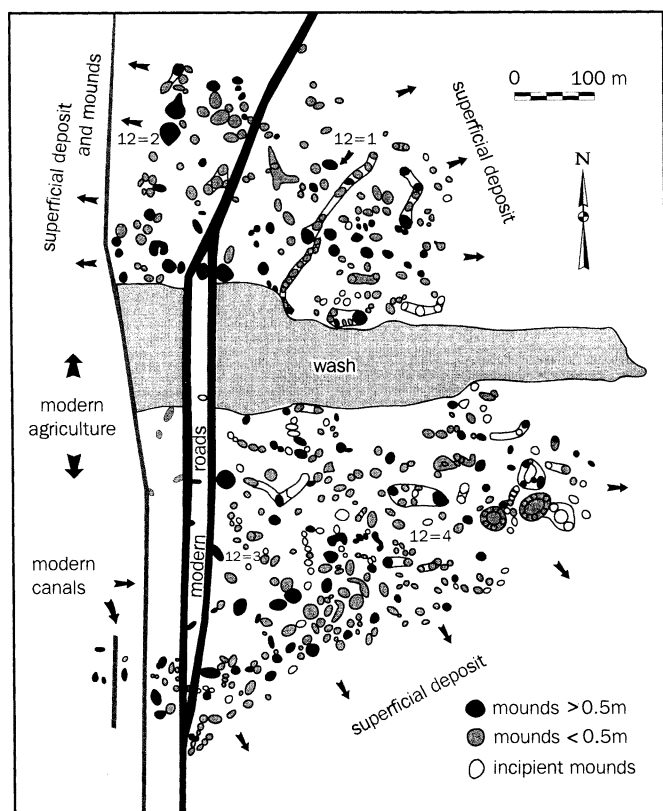


Figure 4. Plan view of the Santamariano (Pular) settlement of Valdéz (SSalCac 12). Black mounds are >0.5 m high; grey mounds are <0.5 m high; white mounds are incipient accumulations.

surface and subsurface deposits indicate that Valdéz was occupied intensively, but perhaps not continuously, from the DR period into the Hispano-Indígena period, which ended ca. A.C. 1650. Architecture, far more ephemeral than at Inka installations, consisted largely of packed earth floors, with borders demarcated by melted adobe, brush, or wattle and daub walls. The mounds contained both architectural remains and dense middens, notable for household refuse and debris from copper production (see below).

Five radiocarbon dates from widely scattered excavated contexts at Valdéz are concentrated within little more than a century, from A.C. 1047–1169 to 1229–1288 (TABLE 1). Their clustering suggests that much of the settlement may well have been occupied at one time. Those dates also conform well to two dates from a pre-Inka occupation at Potrero de Payogasta (TABLE 1: QL-4706, QL-4707) and to Pollard's (1983) carbon dates from Borgatta.

CORTADERAS ALTO (SSALCAC 65)

Cortaderas Alto is a fortified settlement draped over the top and slopes of a steep ridge overlooking the Río Potrero

(FIG. 5). It consists of densely packed cellular compounds, with walls reaching almost 2 m in thickness and 3 m in height. The principal architecture at the crest covers about 3 ha, but the full extent of the settlement may be 9 ha. Wall construction suggests that the settlement grew both by accretion and by subdivision of large compounds. The entire site was encircled by stone-faced terraces (some up to 3 m high)—including a series of as many as 25 levels in parts of the north face—that both protected the community and provided platforms for dwellings. Test excavations showed that at least part of the settlement had two phases of occupation, as the main plaza in the western sector was raised and leveled by the construction of a terrace over earlier architecture. Both ceramic affiliations and obsidian hydration readings indicate that the main occupation on the peak occurred during the DR period (DeMarras 1997), but there is a substantial array of Inka architecture around the base and on the lowest slopes of the hill (see below).

When the Inkas first appeared in the Calchaquí Valley, therefore, they found settled, agrarian communities with links to the herders of the nearby puna. Like many of their counterparts in the central Andes, the societies were probably ranked, rather than stratified, and may have been involved in frequent local hostilities. The population was smaller and more dispersed than among the societies to the north and the landscape less hospitable than the more verdant valleys of Peru. Even so, there were people whose labor could be appropriated and a considerable promise of mineral wealth.

The Inka Incorporation

The Historical Framework

Although the Spaniards had taken effective control of Peru by A.C. 1536, the societies of the Valliserrana Central resisted Spanish rule so effectively that early documents from indigenous local sources, such as those from the central Andes, are rare. Instead, the early historical information on the annexation of the south Andes comes primarily from the major chroniclers, most of whom never visited the region (e.g., Betanzos 1996; Cieza de León 1967). Those sources consistently reported that the southern Andes were incorporated in a grand sweep by armies commanded by the second ruler of the imperial era, Thupa Inka Yupanki. Modern scholars usually follow Rowe's (1946: 209) lead in using Cabello Valboa's (1951) dates for major imperial events (e.g., Tarragó 1978). Cabello Valboa wrote that Thupa Inka assumed military leadership ca. 1463 and the throne in 1471 (see also Betanzos 1996: 160). According to that chronology, the Inkas annexed the Valliserrana territories ca. 1470–1480. During Wayna

Table 1. Radiocarbon dates from Valdéz and Potrero de Payogasta, calibrated according to Stuiver and Reimer (1993).

Site Provenience	Lab no.	C-14 Age b.p.	Calibrated dates A.C.	Context of recovery
Valdéz				
12=2-40-2-2-1/1	QL-4711	952 ± 25	1047–1169*	Compact floor, material on floor surface.
12=3-41-1-12-14/1	QL-4712	860 ± 25	1219–1260	Adobe, mud wall.
12=1=40-1-13-1/1	QL-4713	854 ± 25	1221–1276	Ashy midden outside structure.
12=1=40-1-5-1/1	QL-4710	830 ± 18	1237–1279	Midden with ash outside structure.
12=1-50-3-5-1/1	QL-4703	810 ± 50	1229–1288	Possible occupation zone inside structure.
Potrero de Payogasta				
42=4-20-8-12-2/2	QL-4706	785 ± 35	1279–1291	Cultural fill below floor level.
42=14-1-1-5-1	QL-4707	767 ± 25	1280–1293	Occupation zone laid down during use.
42=7-20-5-3-1/3	QL-4708	550 ± 30	1409–1436	Surface inside structure.
42=16-50-1-4-1	QL-4714	486 ± 30	1436–1458	Cultural fill below floor level.
42=15-90-1-4-3/1	QL-4709	453 ± 20	1447–1478	Occupation zone laid down during use.
42=21-20-1-2-1/3	QL-4704	413 ± 22	1473–1621	Occupation zone inside structure.
42=4-20-5-3-1/2	QL-4705†	360 ± 80	1472–1660	Cultural fill on floor.

* One-sigma (68%) calibrated date A.C.
† Sample is from dung. All others are from wood.

Qhapaq's rule (ca. 1493–1526), Guaraní societies made incursions into territories held by the Inkas, at one point accompanied by the Portuguese adventurer Alejo García (Nordenskiöld 1917). Wayna Qhapaq dispatched Yaska to lead a military campaign that reasserted control and hardened the frontier with an array of forts (Cieza de León 1967: 211–212).

Saignes (1985) and Pärssinen (1992: 120–136) provide reviews of local sources from the closest well-documented areas nearby—the southern altiplano of Bolivia and the adjacent eastern lowlands. These sources suggest that the first major Inka efforts at dominating the lands as far south as Charkas territory, in southern Bolivia, and adjacent lowlands to the east took place during Pachakuti's reign. Lacking any documents suggesting that that occupation extended into NW Argentina, Pärssinen and others (e.g., Lorandi and Boixadós 1987–1988) have concluded that the Valliserrana Central was annexed under Thupa Inka's direction, as Rowe had judged. As we will see below, however, there may be reason to believe that the Inka era in the south began earlier than 1470.

Creating the Infrastructure of State Rule

The Inkas faced daunting challenges in incorporating their southern domain. The population was much sparser than in the north, but there was considerable resistance along the eastern plains, in parts of the Calchaquí Valley, and in central Chile. It is not surprising, therefore, that there is far more evidence for fortified Inka installations in the south than in any other area of the empire, save the Quito basin (Raffino 1983). The Inkas nonetheless followed many policies that were fairly standard throughout the highlands. They established administrative regions,

constructed a series of installations along a road network, and set the local populace to work, often in new locations. The region that now falls within Chile and Argentina was organized into five provinces. In the eastern ranges, the province of Chicoana included the area from Talina, Bolivia, to just south of the settlement called Chicoana. That installation, perhaps the site now called Puerta de La Paya, was the Inka provincial center. To the south lay the provinces of Quiri-Quiri and Tucumán, while the southernmost province extended from La Rioja and Mendoza to central Chile. The PAC study region lies in the southern part of Chicoana, just north of the border with Quiri-Quiri.

The distribution of state facilities in the northern Calchaquí Valley illustrates how the Inkas tailored their approaches locally and likely changed strategy over time. Two distinct approaches are visible in the valley's north and central sectors. In the north, the goal appears to have been to install an enclave solely of state settlements. Hyslop and Díaz (1983) recorded seven state sites on a 50-km stretch of Inka road from Cortaderas to Tastil, uninterrupted by any coeval, major Santamariano community. They are Cortaderas, Potrero de Payogasta, Ojo de Agua, Corral Blanco, Capillas, Apacheta Ingañan, and Corralito (FIG. 3). Another series of Inka sites lies along the western road branch in the La Poma drainage: Pucará de Palermo, Río Blanco, Los Graneros, La Encrucijada, and Apacheta Acay. In addition, Agua de los Loros and Tin Tin lie at exit points from the valley on the road running to the east, down through the Quebrada de Escoipe and ultimately to the Lerma Valley on the Andes' eastern piedmont. In contrast, the mid-valley occupation consists most importantly of state enclaves installed directly into important local towns.

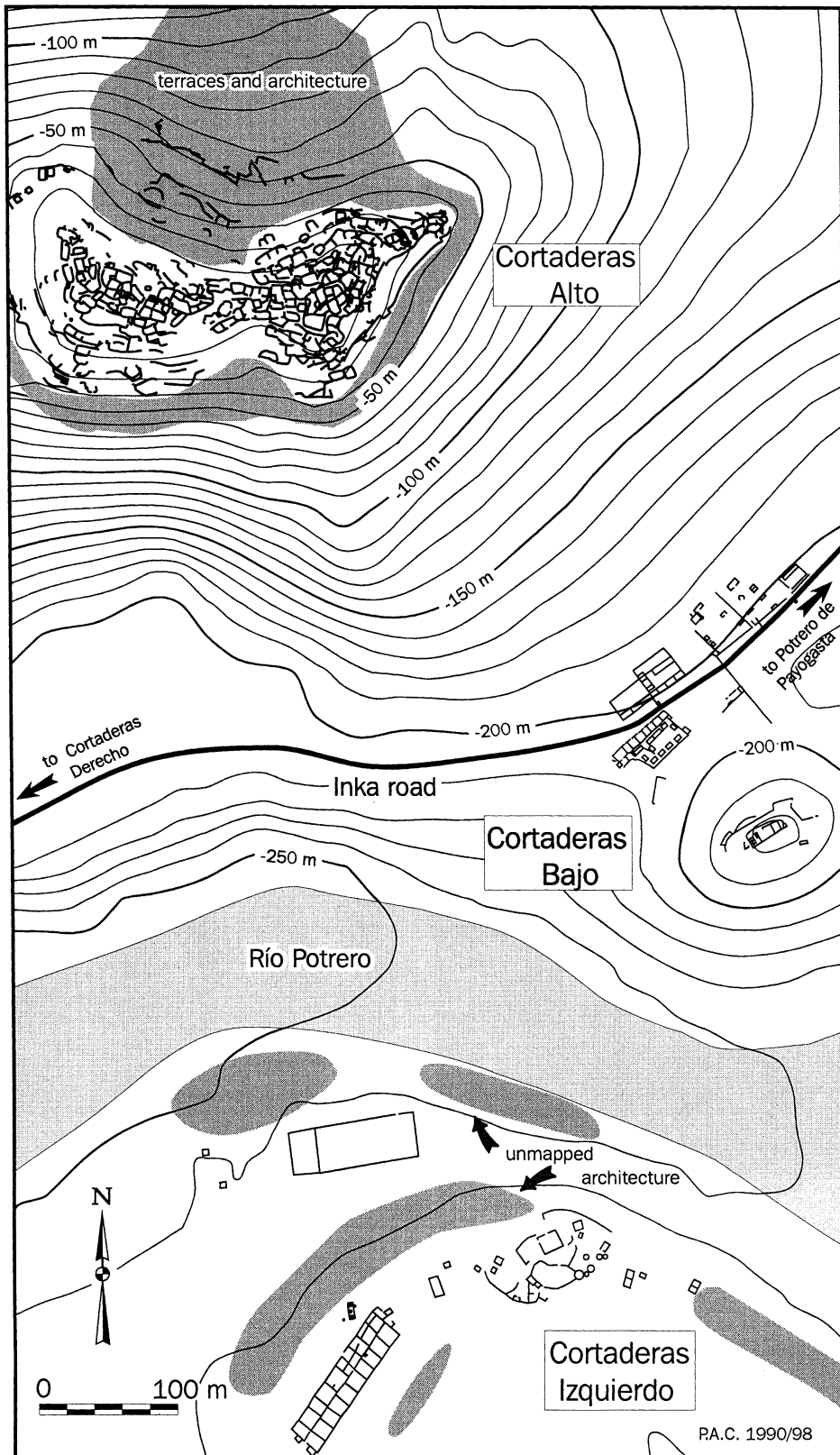


Figure 5. View of three of the main sectors at the Cortaderas complex: upper DR fortification (Cortaderas Alto) and two lower Inka sectors (Cortaderas Bajo and Izquierdo), along with an Inka road.

Puerta de La Paya and Guitián stand out as major pre-existing settlements with intrusive Inka sectors (Calderari 1991; González and Díaz 1992; Tarragó 1978). Here we describe briefly four of the Inka-era settlements.

Puerta de La Paya (*SSalCac 1*) and Guitián (*SSalCac 2*) together formed the central valley's main Inka installation (FIG. 3). Research was initiated there by Ten Kate and Ambrosetti around 1900 and has since continued intermittently (see González and Díaz 1992). Our research at La Paya in 1990, conducted by Calderari for her doctoral thesis, consisted of taking seven surface collections distributed according to visible architectural remains; mapping the associated compounds; and excavating three tests to help clarify the sequence of occupation.³ Surface remains at La Paya consist of irregular, Santamariano residential architecture, into which a complex of Inka-style rectilinear structures was intruded. A thick, zig-zag wall encloses the site, apparently for defensive purposes. The most prominent building in the Inka sector is the Casa Morada, a rectangular structure (13.55 m E–W × 4.24 m N–S) built of reddish sandstone blocks (Ambrosetti 1907–1908; González and Díaz 1992). The Casa Morada is bordered by a series of patios on the north and south, and by a variety of structures on the east and west. Ambrosetti's 202 excavated burials constitute the most spectacular array of Inka grave lots yet found in NW Argentina. The material goods that were recovered include Inka-style ceramics, bead strings, and 35 metal objects (Ambrosetti 1902, 1907–1908; Calderari 1991; González 1979; González and Díaz 1992).

An associated mixed Inka-Santamariano site, Guitián (6 ha; FIG. 6), lies north of La Paya, across a wide gully and on the foot of a terraced slope. Guitián is also a conglomerate settlement, surrounded by a double-faced wall. Its Inka sector contains a central plaza and pyramid platform, and rectangular compounds typical of state settlements. Surrounding the plaza are interconnected rectangular compounds, likely used for habitation. This sector contains more finely finished surfaces than the local architecture, and coursed double-faced walls within which there is little fill. On the west side is the *kallanka* (a rectangular gabled hall), which retains supporting ledges on both the interior and exterior. The preserved Santamariano architecture consists primarily of the foundations of large semi-subterranean enclosures. They contain curved walls and external passages or platforms that provide communication among compounds.

Cortaderas (*SSalCac 65*; FIG. 5) was a complex settlement about 40 km up the valley from Puerta de La Paya.

3. Analysis of the materials recovered is still underway and will be reported in Calderari's thesis.

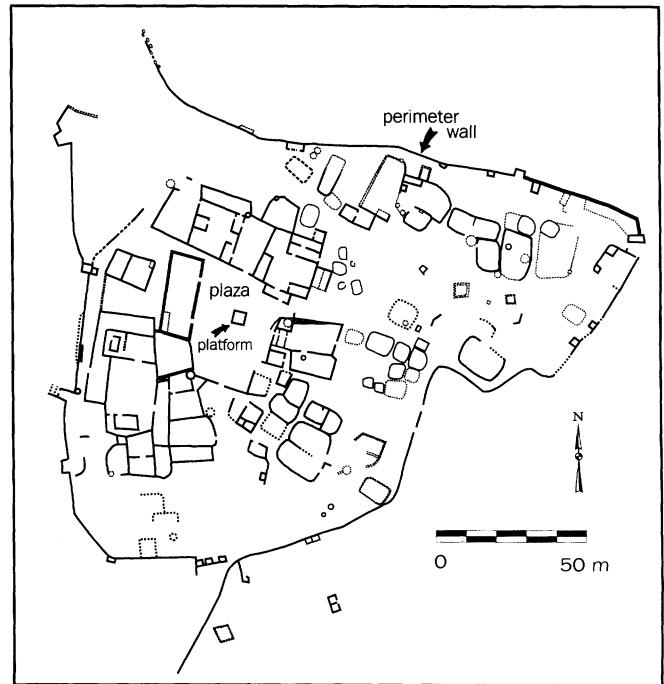


Figure 6. Plan view of the principal architecture at Guitián (*SSalCac 2*), showing the Inka sector intruded into an area of Santamariano architecture.

As described above, a fortified upper sector called Cortaderas Alto contains dense cell-like compounds on the hill crest and cut into its face. A lower sector named Cortaderas Bajo (4 ha), situated on a saddle between the crest and a low knoll, contains numerous rectilinear compounds and a fortified enclosure on the knoll. The main Inka highway passes through the site's center and is flanked by cell-like architectural complexes (Hyslop 1984: 175–77; FIG. 7). Excavations in one building revealed a prepared earth floor with a drain, and practically no artifacts, suggesting that it was likely part of a set of state storehouses, or *gollqa* (Acuto 1994). Construction techniques in this sector included double-faced dry *pirka* (fieldstone masonry) with scant fill, trimmed surfaces on some rocks, and plastering, traces of which still adhere to wall surfaces. A residential community, called Cortaderas Derecho or El Director, contained residential compounds overlooking a square enclosure (29 m on a side) set in a natural shallow amphitheater (Acuto 1999; DeMarrais 1997). Cortaderas Izquierdo (6 ha), across the river, was probably the administrative center for the entire complex. It contains about 100 buildings, most notably a compound (130 × 35 m) formed of 19 enclosures arrayed in a double row. Also present are connected rectangular enclosures, a truncated pyramid, a possible *kallanka*, and sets of circular buildings that were likely



Figure 7. Cellular architecture in Cortaderas Bajo (see FIG. 5), looking north. The buildings are probably storehouses adjacent to the Inka highway, which lies just to their left.

storehouses. Just to the south, residential and farming settlements with some Inka ceramics line both sides of the river for about a kilometer.

Potrero de Payogasta (*SSalCac* 42; 9 ha) was a multi-purpose state installation toward the head of the Río Potrero (Difrieri 1948; Hyslop 1984: 177–178; Schávelzon and Magadán 1992; FIG. 8). Located next to the main Inka road, the settlement commanded traffic between the valley and the puna to the north. In the drainage above the site, the state built roads on both sides of the river that sometimes hugged the cliff faces. The productivity of this narrow valley was enhanced through the construction of stone-lined canals on each side of the drainage. The site contains seven main architectural sectors distributed along a low ridge. A fortified hilltop sector, about 1 km NW of the main occupation, contained storehouses and residences.

PAC worked intensively at the site because of its location, fine preservation, and high proportion of Inka ceramics—up to 40% reported in surface and excavated collections (Difrieri 1948; Hyslop 1984: 179). Forty-one architectural divisions (AD) were defined, most consisting of one or two structures and an associated plaza. Inka architectural forms include a truncated pyramid platform (FIG. 9), the largest known kallanka with a standing wall in Argentina (FIG. 10), and building complexes arranged around two principal sets of plazas. Excavations in 14 locations yielded evidence for habitation, storage, craft production, and ceremonial activities (see below).

The architecture visible on the modern surface was planned and at least partly overlay an earlier Inka component, which in turn overlay a DR occupation. Stratified deposits up to 2 m deep revealed a burned stratum at the base

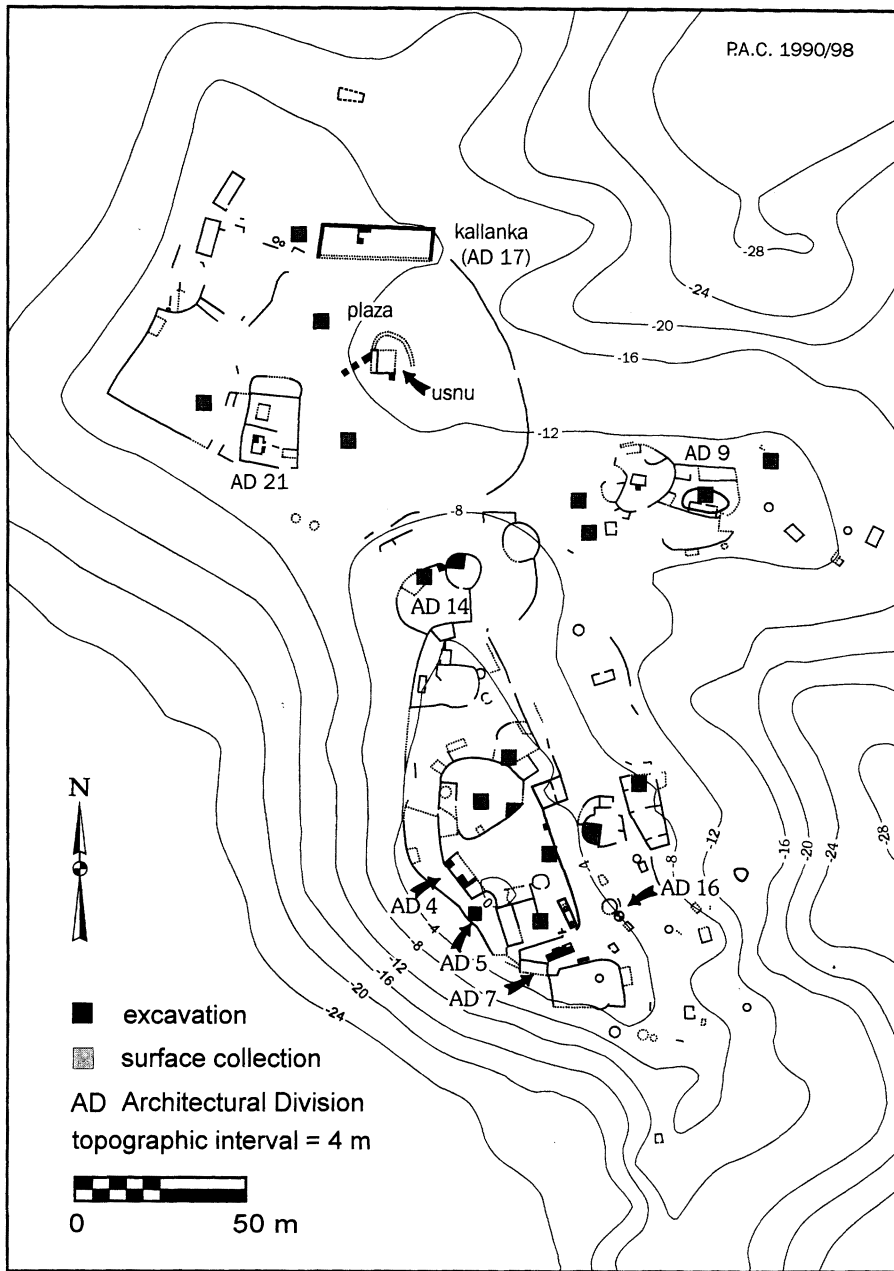


Figure 8. Plan view of the Inka imperial installation of Potrero de Payogasta (*SSalCac 42*); excavated architectural divisions (ADs) are numbered.

of Inka architecture in three locations. Two structures each contained two floors with Inka materials. We infer that an initial Inka occupation was associated with a burning event and that the settlement was at least partially rebuilt during the Inka era. Present evidence does not allow us to determine if a first occupation ended in violence or if the fire was accidental. Even so, oral histories do relate that peoples of the region resisted Inka rule and had to be conquered twice (Lorandi and Boixadós 1987–1988).

The Ceremonial Dimension to Inka Rule

Over the years, scholars have emphasized the importance of ceremonial, ideological, and cultural relations in integrating subject societies into the Inka empire (e.g., Morris 1995; Rostworowski 1983; Rowe 1982). It is often noted that Inka rule did not distinguish sharply between religious and secular behaviors, nor between the ruler as head of state and as deified individual. Thus, rela-



Figure 9. Truncated pyramid platform (about 4 m square) in main plaza at Inka center of Potrero de Payogasta; view looking SE.

tions between state and subject in the provinces integrated administrative and ideological features in a variety of contexts. For example, the rituals of the Inka religion, in which the ruler was conceived as the son of the Sun, were enacted at state installations throughout the empire. Political relations were conducted in an atmosphere of state hospitality, in which ritual played an important role. Similarly, potential subjects were enticed and compliant elites rewarded with gifts of fine cloth and drinking cups (e.g., Morris 1995; Toledo 1940: 19–20).

This approach to rule has a variety of material correlates, including the construction of shrines and ceremonial sectors in provincial installations. Although PAC's research to date was not designed particularly to investigate state ceremony (but see DeMarrais, Castillo, and Earle 1996), there is certainly evidence that attests to its importance. For example, the dominant architectural features at Potrero de

Payogasta, Cortaderas Izquierdo, Puerta de La Paya, and Guitián are all ceremonial in nature. All four sites feature platform mounds and kallanka, while large open plazas have been recorded at all but La Paya. In addition, the domestic architecture at Cortaderas Derecho is arranged around a shallow, natural amphitheater; in its central plaza lay a rectilinear stone structure, about 28 m on a side (DeMarrais 1997; Acuto 1999). These kinds of features are noted for being the locations of public rituals and sacrifices, and are often present at sites with little other architecture (e.g., Hyslop 1990: 69–101; Morris and Thompson 1985: 58–59).

On a slightly broader scale, the region contains at least two of the high-elevation ceremonial sites that characterized Inka rule throughout the south. Other investigators have located such shrines on the upper slopes of the Nevado de Cachi and Mt. Acay, permanent snowcaps towering



Figure 10. Large kallanka, or gabled hall, bordering the north side of the main plaza at Potrero de Payogasta. End walls were built of stone, adobe and plaster, whereas lateral walls were adobe only; the structure measures about 17 m long \times 8 m wide with one wall preserved to a height of 5 m; view looking east.

over the valley in the mountain range just to the west (Berorchia 1987; Reinhard 1985). A similar small site whose cultural affiliation is unclear has been located recently on Cerro Negro, in the range separating the valley from the eastern lowlands (Constanza Ceruti, personal communication, July 1997).

Reorganizing Indigenous Societies

The ethnic composition of the northern Calchaquí Valley under Inka rule was complex, partially because of state intervention. The earliest sources suggest that the Pulares were the most important, if not sole, ethnic group or *etnia* (Lorandi and Boixadós 1987–1988). The first reference to the region's *etnías* is in Juan de Alcantara's (1561–1565) *Información de Servicios*, which describes the valley of

Chicoana as the place where the Pulares lived (Lorandi and Boixadós 1987–1988). They likely shared the settlements of Cachi, Payogasta, and Atapsi with members of other groups, just north of the lands held by the Calchaquíes (Matienzo 1967: 280–281). The Pulares also lived north of Seclantás, near the *Cuesta del Obispo* east of the Calchaquí Valley, in the Quebrada de Escoipe, and at the edge of the Salta Valley. When the Spaniards under Almagro arrived in 1535, they received assistance and provisions at state settlements, notably Chicoana, but residual Inka power had collapsed by 1543, when Diego de Rojas visited the valley. The documents suggest that the Pulares held a privileged position under Inka rule which they tried to maintain with the Spaniards. Examination of their history indicates that they sometimes acted independently of their

neighbors in relations with outside powers and also used Quechua more extensively than other groups. Their status under the Inkas exemplifies the kind of mutualism that helped sustain Cuzco's rule far from the heartland.

While, in the central part of the empire, the Inkas grouped taxpayer households into an administrative hierarchy that ranged from as few as 10 to as many as 10,000 units, there is no evidence that the decimal system was introduced into Argentina. Even so, the Inkas did follow other standard policies in the south, for example by deporting recalcitrant locals and installing many internal colonists, called *mitmaqkuna* (Lorandi 1991). In the 18th century, Lozano (1874–1875) drew from regional oral traditions, preserved by the Jesuits who evangelized the valley, to write that Chicoana was populated by colonists from Sicuana or Chicoana, in the province of the Canas, south of Cuzco. Study of *mitmaqkuna* in Argentina supports this oral tradition and suggests that other groups with names like those of the Calchaquí Valley lived in the province of the Canas: e.g., Luracatas or Luracachis, Pomacachis, and Mapacioca or Paciocas (Lorandi 1991; Glave 1989). The limited documentary evidence thus suggests that the Inka occupation significantly altered the ethnic and political composition of the valley.

The archaeological record also provides some evidence for shifts in the distributions of local societies, although it is still difficult to be precise about the nature of the changes. Provincial Inka or Inka-related pottery is found at more than 20 local settlements, in both the main and the productive lateral valleys, including Borgatta and Ruíz de los Llanos (DeMarrais 1997; Díaz 1983; Núñez de Reguiero and Tarragó 1972; Pollard 1983; Tarragó and Díaz 1972, 1977). One of the important changes, however, appears to be the reduction in size or abandonment of a number of the more important DR towns, as recorded in excavations and settlement surveys by Tarragó and Díaz (1972, 1977), Pollard (1983), and DeMarrais (1997). The sector of Borgatta, for example, that contains ceramics clearly affiliated with the Inka occupation was much reduced from the DR area; current research is intended to determine the precise scope and nature of the changes. From the standpoint of security, the abandonment of the fortified site of Cortaderas Alto would have significantly improved Inka control over the northern valley. Conversely, the continued occupation of La Paya and Guitián, albeit with intrusive Inka sectors, implies that the Inka did not adopt a strategy of wholesale removal of the local populations from their home communities.

Dating the Inka Occupation

Considering the array of changes that Inka rule brought

to the valley, any refinements to the chronology could help explain how the Inkas went about annexing the region. As noted above, the standard historical chronology puts the conquest of NW Argentina ca. 1470–1480, so that the imperial era would have lasted between 55 and 65 years. Recently, however, radiocarbon dates have placed Inka material culture and architecture several decades earlier than the historical estimates. Using data from Peru, Bauer (1992: 36–48) and Adamska and Michczyński (1996) have placed the emergence of the Inka state around 1400. For the provincial south Andes, Stehberg (1991–1992) has argued that imperial rule should also be pushed at least several decades earlier than the historical estimate (D'Altroy, Williams, and Bauer in press; Nielsen 1996; Williams 1996; but see Bárcena 1979, 1998).

In order to address this question for the Calchaquí Valley, PAC dated seven radiocarbon samples from stratigraphic deposits at Potrero de Payogasta (TABLE 1; FIG. 11).⁴ Two pertained to a pre-Inka, DR occupation (see above). The five samples clearly associated with Inka ceramics or architecture or both exhibit calibrated dates that collectively span more than a century. The two earliest samples (1 sigma error) were calibrated to A.C. 1409–1436 and 1436–1458; both are earlier than the accepted chronology for the Inka occupation of the region. The other dates bracket the period historically assigned to the Inka occupation. We note that the earliest of the five dates comes from a secure context of a hearth on the floor of an Inka structure. Such an early date would normally be thought anomalous, if not for its association with Inka ceramic forms and architectural levels, and similar Inka-associated dates from other sites in the southern Andes (e.g., Bárcena 1979; Raffino 1993; Stehberg 1991–1992; Williams 1996).

We recognize that the apparent early Inka component could be attributed to several factors, among them reuse of old wood by the Inkas, laboratory errors, incorrect attribution of carbon material from an earlier stratum to the Inka era, or an earlier Inka occupation than has usually been assumed. The first three explanations fit the current understanding of Inka history better than the last. But the narrow range of the PAC dates, coupled with their association with Inka ceramics and architecture and the parallel evidence from elsewhere, suggests that an Inka presence in the first half of the 15th century must be considered within the realm of possibility.

4. The analyses were conducted by the Quaternary Isotope Laboratory of the University of Washington. Following Stuiver and Reimer's (1993) recommendation for Southern Hemisphere samples, the radiocarbon age for each sample was reduced by 40 years. The plots in Figure 11 were prepared using OxCal Program v2.18 (Ramsey 1995).

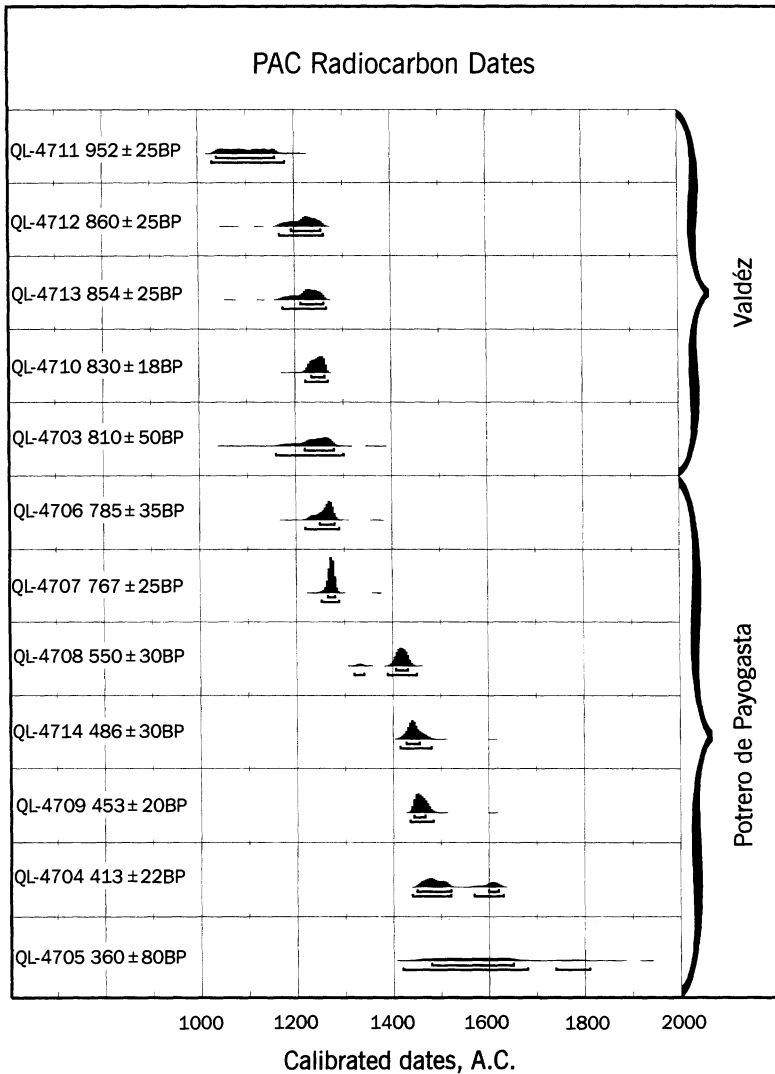


Figure 11. Calibrated radiocarbon dates from Valdéz (*SSalCac 12*) and Potrero de Payogasta (*SSalCac 42*), graphed according to OxCal v. 2.18 (Ramsey 1995). For each sample, the histograms show probability distributions, the upper horizontal brackets illustrate 1 sigma errors, and the lower horizontal brackets illustrate 2 sigma errors.

Transforming the Regional Economy

Northwest Argentina is generally understood to have been exploited by the Inkas largely for its mineral wealth, but there is also considerable evidence for intensification of farming and herding. In provincial regions throughout the empire, the Inkas typically alienated farmlands and pastures whose food, wool, and other products would be exclusively for state use. The southern Andes were no exception, as some of the largest state farms recorded archaeologically have been found at Coctaca and the Lerma Valley.

In the northern Calchaquí Valley, state agricultural production seems to have been focused in locations that were directly associated with state settlements. Because detailed

field studies of Inka agricultural activities have not yet been conducted, it is difficult to quantify how much new land was brought under production. We may infer, however, that the Inkas did not simply appropriate existing fields, but expanded the amount of farmland under cultivation. In the Río Potrero drainage, the Inkas appear to have intensified production by building canals on both sides of the river, north of Potrero de Payogasta. In the La Poma drainage to the west, expanses of irrigated land and terraces are associated with state components at Palermo and La Poma. The modern irrigated land at Palermo covers 1000 ha, but we cannot be sure that all of that area was cultivated during the Late Horizon. At La Paya as well, the Inkas

constructed a canal several kilometers long that expanded the irrigated lands across the river from the provincial center. In each case, the Inkas seem to have used irrigation to amplify the existing field systems. Because there is no evidence for large-scale state storage as is often associated with state farms (such as those at Hatun Xauxa and in the Cochabamba and Lerma valleys; see FIG. 1), however, it seems likely that the lands that were put under cultivation for the Inkas were intended largely for local consumption.

Plant Use

Study of plant use before and under Inka rule also provides a window into agricultural regimes and exploitation of the environment. Research elsewhere has shown that the Inkas selectively transformed the use of botanical resources. Most prominent was a heavier emphasis on the ritually valued crop maize, much of which was dispensed in the form of beer (*chicha*) consumed in ceremonial and political activities (e.g., Hastorf 1993; Murra 1980). In addition, the state's distribution of coca grown on state farms and granting of rights to special resources meant that the potential existed for important changes in both subsistence and prestigious plant assemblages.

To evaluate these issues, 448 soil samples were collected systematically from all of PAC's 1990 excavation units. At least one 6-liter bag was collected from each provenience. For this discussion, we have included only one sample per provenience, to ensure comparability among deposits. Of the 448 samples collected, 354 (79%) were analyzed in the University of Minnesota archaeobotanical laboratory.⁵ All samples were analyzed from the two sparsely sampled sites, La Paya and Cortaderas Bajo, 77% from Potrero de Payogasta, and 83% from Valdéz.

The plant material from Valdéz is the densest of the sites tested (specimens per sample: mean = 832, median = 704). The samples contain mostly wood; given the dry environ-

ment and general lack of trees, this suggests that shrub collection was intense and/or more trees and shrubs were present in the past. The range of values of the non-woody component suggests that the deposits were widely and evenly distributed. All major domesticated food sources found in the PAC samples were recovered from Valdéz, including maize, *Chenopodium* sp., tubers, legumes (beans), and chili peppers (*Capsicum* sp.). This suggests that a wide range of domesticated foods was available in DR times. Maize cob fragments from Valdéz are much more common than kernels, both within middens and on floors (TABLE 2); the high ubiquity and density values of cobs probably mean that the maize was grown nearby.⁶ The high ubiquity values of *Chenopodium* show that the seeds were a regular part of crop production and use. Tuber remains are sparse, with only 3% presence and a density of 0.02 specimens/liter. These are large pieces of parenchymous tissue, which could be domestic tubers, *Solanum tuberosum*, or other Andean tuber crops (Gade 1975; Hastorf 1993: 112–114). Legumes are also sparse, a situation common in the Andes, most likely related to processing techniques such as toasting and popping (Gade 1975). There is also a wide variety of wild seeds, wood, and dung. The most common wild plants at Valdéz include grasses, sedges or totora (*Cyperaceae*), cacti (*Cactaceae*, *Opuntia* in particular), and small beans. The additional wild herbaceous seeds, found commonly throughout the Andes in flotation samples, represent not only food, but fodder, fuel, and construction material (Hastorf 1993; Lennstrom 1992; Pearsall 1989).

Analysis of the two most common cultural contexts, trash areas and occupation zones, shows a marked contrast. Crops, wild seeds, dung, and wood are denser in the middens outside structures than in the living surfaces. This suggests that rubbish cleaned from the living areas was placed in middens, which may have been burned periodically, as occurs in traditional Andean households today (Sikkink 1988). All excavated areas suggest domestic activities and trash accumulation except for a disturbed context that yielded a cache of ground stone; that provenience had only two flotation samples and these produced low densities of *Chenopodium* and no other domesticates.

All the foods found at Valdéz were also found at Potrero de Payogasta, suggesting that access to and use of crops was similar, even though Potrero has more varied architectural and cultural contexts. The differences between the distribution of botanical materials at the two sites are sig-

5. This report is based on results of the flotation samples only, which recovered plant matter as small as 0.5 mm. The flotation samples were fairly uniform in size, with mean and median values of 5.7 and 5.9 liters, respectively. Fifty charred poppy seeds (*Papaver*) were added daily to one randomly selected sample, to monitor the recovery rate; the mean, median and mode of recovered seeds were equal at 45. Poppy seeds are used because they are small and not native to the New World (Wagner 1988). Charred remains were extracted from the light and heavy flotation fractions using low power Wild stereoscopic microscopes with fiber optic light sources. Each sample was examined twice systematically. All charred material greater than 2 mm was retained for identification, except for wood in the light fraction, which is too small for identification (Asch and Asch 1975). After 42% of the samples had been analyzed, we discontinued analysis of materials between 0.3–0.5 mm to increase the number of samples that could be examined in the available time; the remaining 58% were sorted to 0.5 mm. Using Bolivian samples, M. Wright has shown that there are Andean seeds smaller than 0.5 mm (e.g., small *Poaceae*, *Juncus*, *Nicotiana*), but in general few taxa will be lost completely.

6. Both *density* and *ubiquity* analyses are reported here. *Density*, expressed as the number of seeds per liter of site matrix, standardizes the counts of material, permitting comparison of samples of differing original volumes (Popper 1988). *Ubiquity* is calculated as the percentage of samples containing each taxon (Hubbard 1975; Popper 1988).

Table 2. Ubiquity (percent presence) of botanical remains from excavated contexts. The values represent the percentage of the total proveniences excavated at a site that contain a given kind of plant.

Botanical remains	Pre-Inka Site	Inka Sites		
	Valdéz (n=95)	Potrero de Payogasta (n=223)	Puerta de La Paya (n=11)	Cortaderas Bajo (n=6)
Maize kernels	31	15	9	33
Maize cobs	80	42	36	17
All maize	81	43	36	50
Quinoa	80	74	18	33
Tubers	3	5	0	0
Legumes	1	1	0	0
Peppers	1	<1	0	0
Wood	99	96	64	100
Dung	46	21	0	17
Wild seeds	81	72	18	83

nificant, and may stem partly from the differing contexts of recovery and the distinct histories and statuses of the settlements. With one-tenth the excavated midden proveniences, fewer residents, and perhaps more exposed deposits, Potrero de Payogasta has about half the average density of archaeobotanical remains of Valdéz, but the plant material is highly clustered. Overall, plants were more commonly deposited in patios than in structures at Potrero, just as the middens outside of the living surfaces contained more material at Valdéz.

Although all of the crop plants are also present at the Inka installation, their densities and ubiquities are lower, except for tubers. Oddly, maize is much less common at Potrero de Payogasta than at Valdéz. That might make sense for cobs, if the plants were husked elsewhere to bring the maize to the Inka, but that does not seem to be the situation. The ratio of cobs to kernel ubiquities is the same at both sites, suggesting that the irrigated fields surrounding Potrero de Payogasta with traces of Inka construction most likely produced maize for the state site. The densities of cobs to kernels are, however, twice as high at Valdéz, suggesting that its residents processed more maize in their houses than they did on average at the contexts tested at the Inka site. That should not be surprising, since the Inka site should be more tidy and compartmentalized, given its political functions.

Wood is equally ubiquitous at both sites, but much denser at Valdéz; conversely, dung is more common at Valdéz but denser at Potrero de Payogasta. This presents a picture of spatially clustered dumping activities at both sites. It is often thought that wild seeds enter sites in burned dung, but their high ubiquity and the lack of congruity with the distribution of dung at Potrero de Payogasta suggests that the plants came from another source,

such as use in roofing. Heyne's (1992) work on wood types from 30 contexts at Potrero and 3 at Valdéz provides insight into wild plant use. Of the 54 total wood types recovered, 47 were from Potrero and 24 from Valdéz, but only 17 at both.⁷ Surprisingly few modern wood species were seen in the archaeological samples. Molle (*Eschinus* sp.), a species highly regarded by the Inkas and used widely and seen along rivers today, was found in only 5 samples. Jarilla, however, was common in the samples from both sites and still abounds in the northern valley. The cactus called *cardón*, also common near Potrero de Payogasta, was frequently recovered from that site's samples, but no cactus was found in the Valdéz samples. These data suggest both that many of today's vegetation species near the sites were also present in late prehistory and that residents of both sites emphasized use of local plants.

These comparisons must be considered provisional, because the DR samples were relatively few and came primarily from household refuse and occupations, whereas the Inka period materials were more numerous and included samples from ceremonial structures and plazas. Overall, however, the botanical data suggest that there were no particular restrictions on access to plants, for food or fuel, at either the DR occupation at Valdéz or the Inka occupation at Potrero de Payogasta. The maize remains suggest that more husking occurred at Valdéz. Surprisingly, we did not find any evidence for special maize beer processing at Potrero de Payogasta, although much more of the architecture around the plaza should be sampled before we draw a firm conclusion.

Animal Use at DR Valdéz and Inka Potrero de Payogasta

Just as they intensified agriculture in much of their realm, the Inkas nurtured great herds of camelids for food and textiles. In late prehispanic economies, pastoralism is considered to have matched farming in cultural importance and perhaps in subsistence. Faunal remains were recovered from several sites, again most notably Potrero de Payogasta and Valdéz. Of the total of 27,288 bone fragments analyzed, 3540 were well-enough preserved for secure identification, a sample adequate enough for assessment of animal use at both sites. Studies by Elsie Sandefur and Robert Daniels show that the faunal assemblages suggest only slightly differing use of animal resources at the two settlements, but the density of materials recovered differed strikingly. Valdéz, a site rich in household middens, yielded over 2.50 kg of bone per cu m of excavated deposit, where-

7. PAC has made systematic reference collections of the natural flora of the region, but not all wood species have yet been identified and correlated with the archaeological specimens.

as Potrero de Payogasta yielded only 0.26 kg of bone per cu m.

Intriguingly, each assemblage yielded comparable materials in terms of species composition. By bone frequency, about 95% of the assemblages belonged to the camelid family at each site. Also recovered were bones from dog (*Canis familiaris*), guinea pig (*Cavia* sp.), small rodents (*Oryzomys* sp.), chinchilla (*Chinchilla* sp.), and cervids, along with armadillo scales (*Dasypodidae*) and one cow (*Bovidae*) bone. The camelid species were inferred from applying Wing's species determination formulas (Wing and Brown 1979) to measurements of 56 bones from Potrero de Payogasta and 75 from Valdéz. At the Inka site, 78.6% of the animals were of the large variety, either llama or guanaco; 17.8% were of the small variety, probably vicuña, since alpacas are unknown for this part of the Andes; and 3.6% could not be assigned to either category. At Valdéz, 66.7% of the animals were large, 22.7% were small, and 10.6% could not be assigned.

Tooth eruption and wear and the size and fusion stage of leg bones were used to establish the ages at death; the sample included 249 fragments from Potrero de Payogasta and 246 from Valdéz. The results suggest that, for both settlements, animals were butchered at their optimal meat weight, between two and four years of age. The advanced ages of some animals recovered from Valdéz, however, suggest that they were slaughtered after their use for transport and wool had been exhausted. The contrast between the two assemblages may reflect differential access to food resources that likely reflects elevated state power in the region.

Sandefur and Daniels examined all bones for modifications, including burning, cutting or scraping, gnawing, or possible use as a tool. Of the fragments from Potrero de Payogasta, 29.3% showed signs of modification; of those, 92.5% were burned and 1.2% were classed as tools. At Valdéz, only 8.1% showed signs of modification; 70.7% of these were burned and 13.5% were tools. We noted above that there was a burning event associated with the lowest phase of the Inka occupation of Potrero, so some of the burned bone may have resulted from an architectural fire, rather than from roasting. Most of the bone analyzed came from the upper Inka level, however. If the burning of bone is indicative of labor-intensive roasting, then the situation may be analogous to the pattern seen at Inka-period sites in the Upper Mantaro Valley of central Peru, where the elite compounds exhibited a far higher proportion of meat preparation through roasting than through boiling (Sandefur 1988). Conversely, the higher density and proportion of tools at Valdéz indicates more effort invested in productive tasks that used bone tools, such as weaving,

than at the Inka center. Ambrosetti's (1907–1908) excavated tombs at La Paya yielded over 1000 spindle whorls and a variety of other tools used in making textiles, underscoring the importance of weaving at Inka installations in the region and suggesting that tomb excavations at Potrero de Payogasta might produce similar remains.

Craft Production

METALLURGY AND FINE ARTISANRY

Early chroniclers wrote that the Inka interest in the south Andes arose from a quest for its mineral resources, and the state's concerns with mining and metallurgy dovetailed well with our comparative research interests in political economics. A century's research in the Valliserrana has shown that well-developed craft industries existed both before and under Inka rule (González 1979; Pollard 1981), but changes introduced by Cuzco's rule were only partly understood. Most importantly, we wanted to see if the manufacture of prestige goods used in the political economy (what PAC terms "wealth") was attached to Inka state facilities and if goods were exported for use by the state.

Because Earle (1994) has described this evidence in detail elsewhere, we will summarize only the most important points, making modifications according to new information. Most importantly, our carbon dates indicate that our excavated materials from Valdéz and Potrero de Payogasta were only partly contemporaneous. They represent late DR (both sites) and Inka phase (Potrero) contexts, with the important collections from Potrero being Inka. The craft activities at the two sites are accordingly better understood as aspects of successive economies at an important local town and a state center than as complementary elements of a single economy.

The best-documented craft industry in the region is copper metallurgy. Excavated materials from our fieldwork include scoria with copper drippings; crucibles and molds encrusted with copper residues; and copper and gold scrap. Ellen Howe (personal communication 1992) identifies the raw ores as copper chloride, carbonate, and oxide, with the majority being chlorides such as atacamite and paratacamite. Metal production at the sites investigated appears to have been on a basic level, despite the evidence for various stages of metallurgical manufacture. Slag, crucibles, and ores were recovered from both DR contexts at Valdéz and Inka contexts at Potrero de Payogasta, with the greater density at Valdéz. No large burning features associated with metal production were encountered at Valdéz. The primary evidence for metallurgy there consisted of abundant ceramic molds (in 9% of proveniences), which exhibit heavy bases, flaring lips, and regular oblong troughs. For

example, a single 1 × 1 m pit, 1.4 m deep, in a midden mound yielded fragments of 15 crucibles or molds. Copper adhering to their insides indicates that they were used to make ingots before alloying with tin. In contrast, only two firing features were found in the main southern complexes at Potrero de Payogasta.

PAC recovered little evidence for the early stages of ore processing and smelting in the sites tested. Those activities seem to have been undertaken nearer the mines, such as at the site of La Encrucijada. Howe (personal communication 1992) observes that much of the slag from both sites appears not to have been from metallurgical processing, but may have been from the sides of hearths or from ceramic production. Even so, a fragment of gold scrap surely indicates fabrication of this metal at Potrero de Payogasta. Crushed quartz, which provides the matrix from which gold is recovered in this region (Pío Pablo Díaz, personal communication 1990), was concentrated in a small area about 100 m north of the main site. The end-products of metallurgy in the region show that sophisticated alloys were being produced somewhere, but not in the locations that PAC has excavated so far.

In addition to the metallurgical debris and features, evidence abounded for the fabrication of other items, but the patterning was markedly different within and between sites. At Valdéz, evidence for most craft production is limited aside from metallurgy and lithics, the latter of which appear in 109 of 191 (57%) excavated proveniences. That pattern is reinforced by extensive surface debitage. Shell debris includes broken beads and lip fragments of a large, locally available land snail; marine shell debris was present but comparatively rare. The rare mica debris was found as small and scattered fragments, perhaps from disks broken in use. A few stone beads were also recovered from the surface and from excavations. The distribution of manufacturing debris from shell, mica, and stone is low in density and evenly spread; no evidence was found for exclusive or intensive manufacturing.

Evidence for finishing metallurgy, shell, and mica manufacture, in contrast, is plentiful at Potrero de Payogasta. Much greater densities of the key indicators exist in all materials, except for metal molds (1% of 469 proveniences) and lithics (13%), which are rare compared to DR Valdéz. The depositional pattern shows a division between the civic-ceremonial precinct in the site's northern part and the residential areas in the rest of the site. No finished items were found in excavations in AD 15, 17, and 21, which lie in the ceremonial precinct, whereas the households consistently yielded adornments such as mica plaques (AD 4, 7, 14) and beads (AD 5, 9, 14, 16). Similarly, despite extensive excavation, almost no manufacturing debris was locat-

ed in the northern sector. In contrast, *all* the residential sectors tested at the site were involved in diverse manufacturing.

The materials associated with making mica pendants, shell and stone beads, and metal decorative pieces are concentrated in AD 7, 14, and 16. Those dwellings lie near, but not within, the highest status area on the site's topmost ridge. At AD 16, extensive mica debris (30 of 45 proveniences) is mixed with manufacturing debris of marine shell (9 of 45) and stone beads, some metal, and obsidian. Above AD 16 is AD 7, which contains similar debris outside the house (mica, 13 of 42). Scraps of metal sheet, including one gold fragment showing evidence of cutting, were recovered from the building's interior. More extensive evidence for metalwork is found inside the houses of the high status residence AD 4 and in AD 5 (metallurgical debris, 9 of 27 proveniences; mica, 14 of 27) on the terrace directly below it. The concentrated evidence for manufacture included two large burned areas associated with non-metallurgical slag, possible metallurgical slag, and a crucible. Overall, much of the work in mica, marine shell, malachite, and gold was done in the same compounds, although copper fabrication may have been somewhat separated. A similar pattern has been noted at the Inka installation of Potrero-Chaquiago, 250 km to the south, which contained a variety of architectural complexes apparently dedicated to specific crafts, such as weaving and potting (Williams and Lorandi 1986).

In the Inka period, metals and other mineral products were carefully curated, appearing principally in burials. The evidence thus suggests that the Inkas were controlling the production of fine craft goods and may have exported much of the metal for its political and ceremonial activities. Metal objects recovered from Potrero de Payogasta included a small silver clip and gold sheet that were probably pieces from ornaments, such as the two repoussé pieces described from Puerta de La Paya (González 1979: 183). In comparison, the 202 Inka-era tombs excavated at La Paya yielded elaborate ceramics, bead strings, and numerous metal objects. Most of the metal was tin bronze in such forms as axes, awls, tweezers, and *tumis* (crescent knives); only one silver and two gold objects were included in the inventory (Ambrosetti 1907–1908; González 1979). The early documents thus appear to be correct in reporting that the incorporation of the region into the empire was significant as a source of minerals.

CERAMIC PRODUCTION AND USE

Cuzco style polychrome vessels, emblematic of Inka presence throughout the Andes, were used for sustenance of state personnel, ceremonial hospitality, and storage,

while pots were also given to subject elites as a mark of favor. In the northern half of the empire, some state facilities were provisioned almost exclusively with Inka polychrome wares, whereas regional styles typically made up more than half of the ceramic assemblages in southern installations (Hyslop 1984, 1993). That pattern suggests that the activities related to ceramic provisioning and use differed between the north and south, and that the Inka state economy may have been less self-contained in the south.

The most striking feature of the late prehistoric Calchaquí assemblages is their remarkable complexity (Calderari and Williams 1991). Large burial urns with modeled faces on the necks are the archetypical Santamariano vessels, which exhibit several regional substyles (Baldini 1980). The Inka-era assemblages, broadly classified, include Imperial Inka, that is, vessels made in the Cuzco region exhibiting the standard features of Inka production, morphology, design structure, and iconography; Provincial Inka, or vessels made in the provinces, imitating Inka features, but falling short in production standards; Mixed Inka, or provincial vessels that combine Inka and local features; and Inka Phase, or pots made according to the sometimes modified local styles. The Inka-style ceramics are dominated by large storage vessels, often the flared-rim jars with conical bases called *aribalos*, and by small serving vessels, especially plates. The best-described materials are the 718 vessels from Ambrosetti's La Paya collection (Calderari 1991, 1992), but Cuzco-style Inka ceramics are generally meager, even at sites with imperial architectural forms and layout (Williams 1991).

The excavated ceramic assemblage from Potrero de Payogasta is dominated by local Inka Phase pottery, rather than by the Inka polychrome style, which made up only about 5% of the collection from excavated deposits. The predominant form is a large jar, often decorated with red, white and black slipped or painted motifs. The vessel shapes and design features of the large urns from the site collectively vary somewhat from those of La Paya and the rest of the Calchaquí and Santa María valleys, suggesting that manufacture and distribution were local (Calderari 1992; see also Ambrosetti 1907–1908: 410; Serrano 1958: 51). Similarly, analyses of the composition of the pottery indicate that resource use was complicated, but mostly localized. Macroscopic paste analyses show that the Potrero de Payogasta pottery is dominated by felsite tempers, including the Inka and utilitarian wares, whereas the predominant temper at Valdéz is a white ground-up stone that Pollard (1983) has termed granite, and micaceous tempers dominate at La Paya (see Pollard 1983; Baldini 1980; Calderari 1991).

A most intriguing aspect of the ceramic assemblage

from the state installations in the PAC region is the presence of fine pieces in several non-Inka styles that were widely circulated throughout the southern Andes. Among them are Pacajes and Yavi Chico pottery from the Bolivian altiplano, Averías, Inka Paya, and Negro Pulido. At Potrero de Payogasta, fragments of those styles are concentrated in AD 7, the same location where the gold and other metal scrap were recovered. Ongoing NAA studies show that some of the exotic fragments came from sources in the Lake Titicaca region.⁸ The association of those materials underscores the common high status of finish metalworking and interregional movement of fine serving vessels.

Together, the ceramic data indicate that the personnel charged with provisioning and conducting state business in the Calchaquí in some ways followed different, and perhaps looser, guidelines than those in the north. Much of the pottery at state centers was made in the local Santa María Cachi style, while the Inka style and imported ceramics were limited both in their scale of production and contexts of use, suggesting a more focused and less comprehensive state hand in action.

Conclusions

Inka rule in the provinces tailored systematic policies to local situations. Among the most important standard features was the appointment of a provincial administration over subject societies, which was supported by state installations built along an improved network of roads. Economic activities, including herding, farming, mining, and artisanry, were intensified for state ends through use of both *corvée* and specialized labor. Frequently, the regional ethnic composition and settlement organization were reconfigured for political, economic, and military goals. Inka rule itself was enacted in an atmosphere of ritualized hospitality, which was intended both to exemplify the state's largesse and to impose Inka cultural norms on relations of power. Because the reception to Inka rule and local resources varied, state rule combined coercive, normative, ideological, and remunerative elements according to the particular circumstances.

The evidence discussed here illustrates how the Inkas applied each of these policies to one valley of the south Andes. Even though the region south of the altiplano is often considered marginal to Cuzco's interests, the imperial occupation had a marked effect on the northern Calchaquí Valley. Before the Inka arrival, the region was occupied by mid-range agropastoral societies without a dominant po-

8. The results of Neutron Activation Analyses of Inka-era ceramics from the south Andes, conducted by Williams and D'Altroy, in collaboration with Michael Glascock and Hector Neff (University of Missouri Research Reactor), and supported by NSF, will be reported elsewhere.

litical center. The Pulares formed the principal ethnic group under imperial rule, but indigenous resistance by the more southerly Calchaquíes induced the Inkas to import colonists from the north and perhaps deport fractious local peoples. The decision to settle Chicoana with colonists suggests that they used loyal elements to manage state affairs.

The physical infrastructure of Inka rule varied substantially from one sector of the valley to another. At the north end, state facilities formed a varied array of facilities that were apparently isolated from subject communities in both major drainages. In contrast, state installations in mid-valley consisted primarily of architectural sectors intruding into existing settlements. Those differences suggest that there were substantial differences in relations between state and subject in the two sub-regions. With present evidence, we do not know how much of that difference was attributable to differing relations with local societies or to changes in policy over time. The stratigraphic and radiocarbon evidence, however, may signal an unexpectedly long, perhaps two-phase, Inka occupation in the valley, which might have left room for the application of different strategies.

In any event, both ceremonial and military activities seem to have played a role in state rule in both the north and mid-valley. The Inka architecture at the major sites studied was consistently focused around plazas, platform mounds, and large gabled halls, emphasizing the ceremonial nature of state-sponsored activities. At the same time, the apparent abandonment of one fortified DR community (Cortaderas Alto), combined with the presence of defensive constructions in both north and mid-valley sites, indicates that the Inkas were concerned at some time about security. That judgment is partially supported by the oral histories, which recalled that the Inkas had to reconquer the region at least once.

As was typical of Inka rule elsewhere, the Inkas seem to have been working toward a self-sufficient economy, managed by state personnel or colonists. That policy is illustrated in part by the expansion of agricultural systems around state installations in both the north and mid-valley. The heavy use of local ceramics at state installations suggests, however, that the state economy was not as fully elaborated in this region as it was in the central part of the empire.

A comparison between the DR occupation at Valdéz, a major indigenous site of the northern valley, and the Inka installation at Potrero de Payogasta reveals some economic differences between a local pre-Inka center and a major state site. For example, specialized artisanry occurred at both, but its nature differed. Broadly speaking, manufac-

turing of certain kinds of materials, notably bronzes, was divided into stages that were conducted at discrete locations throughout late prehistory. The evidence for production recovered from Valdéz focused on the middle stages of copper metallurgy, whereas crafts at the Inka site included the finishing steps of copper and gold metallurgy, and obsidian, mica, and shell production. Additionally, utilitarian lithic production was conspicuous at Valdéz, but rare at Potrero de Payogasta. Evidence of consumption also differed in our excavated contexts. For example, the faunal assemblage from both sites is characteristic of herd management practices in which many animals were culled and slaughtered at prime meat weight. At Valdéz, some animals were apparently maintained to the end of their useful lives for transport and wool before being eaten—a practice missing in the Potrero de Payogasta assemblage. Despite the consistency exhibited in the present data, we underscore that the scope of material recovered from excavations is still limited and that the conclusions presented here should be interpreted in that light.

In sum, Inka rule in the Calchaquí Valley was multi-component, intensive, and diverse. Although not equal in scale to the Inka occupation of Peru's central highlands, imperial dominion introduced marked changes in the region's settlement organization, ethnic composition, and economy. The documentary and archaeological records both attest to important investments of labor and resources, coupled with extraction of mineral wealth. Those patterns collectively underscore a core feature of Inka rule: the adjustment of policy to local conditions, but always in the context of a grand-scale strategy.

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