

Ceramics of the Indigenous Cultures of South America

*Studies of Production and Exchange
through Compositional Analysis*

EDITED BY

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UNIVERSITY OF NEW MEXICO PRESS • ALBUQUERQUE

Testing the Social Aggregation Hypothesis for Llolleo Communities in Central Chile

Style, Pastes, and Instrumental Neutron Activation Analysis of Ceramic Smoking Pipes and Drinking Pots

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INTRODUCTION

After having sprinkled the animal blood, the one that officiates the ceremony (*nillatun*) moves towards the fire, accompanied by men who carry the sheep or the lamb. Then he smokes a pipe while a youngster cuts the sheep's liver into small pieces and divides it up between 15–20 people. One of the supplicants, both of which are on horseback, carries a jug of *mudai* and the other carries a pipe full of tobacco (Hilger 1957:150–151).

Historically, a major challenge in archaeology has been to actually engage in social archaeology, in the sense of building an understanding of the different spheres of human life. Using different lenses, the social theme in archaeology was introduced by Childe in the 1930s (Childe 1942), strongly promoted by Renfrew in the 1970s (Renfrew 1984), and consolidated since then by different schools of thought (e.g., Hodder 1991; Lumbreras 1974). The overarching problem has always been that the ways in which people relate to one another, and to their social networks, have no direct correlation with archaeological evidence. Traditionally, ethnography has been a rich source of analogies and of the “nonmaterial” aspects of different kinds of societies (Johnson and Earle 1987; Sahlins 1972; Sanhueza 2016; Service 1962). In the case of small-scale social groups—that is, contexts in which

political units are identified with subsistence units—one assumes that there would be mechanisms and practices to maintain supralocal networks. Such arrangements have been widely described in anthropology as tribal systems (Parkinson 2006), networks of cooperation and communication among nonhierarchical, highly autonomous units that have forged potential ties among themselves, and as risk-minimization strategies, especially in times of need (Braun and Plog 1982). In these cases, the social structure is flexible enough to allow social groups to interact on different levels, and bonds are institutionalized to some degree not by economic and/or political centralization but by symbolic or ritual practices that enable the flow, reinforcement, and reproduction of interaction and integration (Parkinson 2006).

In prehispanic central Chile, and particularly for Llolleo groups living in the Early Ceramic period, these assumptions have materialized explicitly or implicitly in a multi-scale view of social organization that ranges from small social units to the supraregional social grouping, the archaeological point of reference for which is the Llolleo cultural complex. Initially, their social history was constructed on the basis of anthropological assumptions (Falabella and Stehberg 1989). In more recent years, ceramic and spatial analyses have contributed to the formulation of proposals based on more solid archaeological evidence to identify coresidential and local units integrated to different degrees (Falabella and Sanhueza 2005–2006;

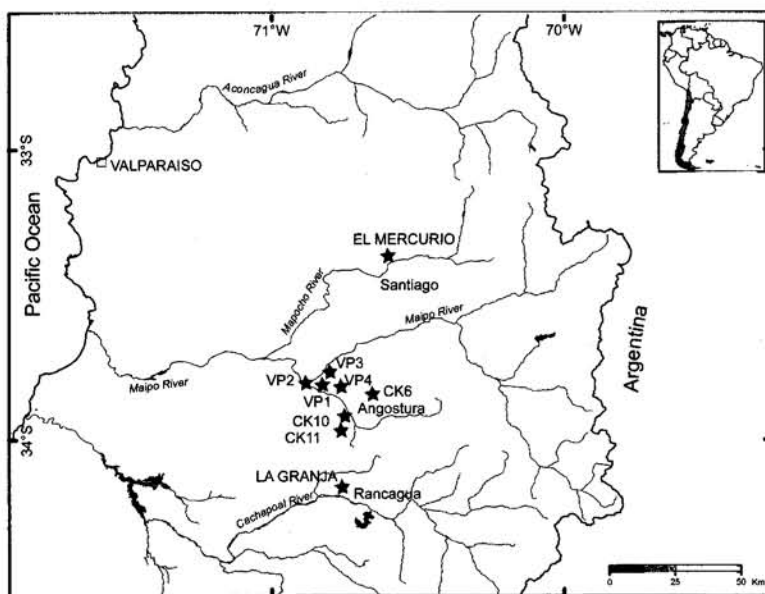


Figure 16.1. Map of central Chile showing the Llolleo sites mentioned in the text. Map by Fernanda Falabella.

Falabella et al. 2014; Sanhueza 2016; Sanhueza and Falabella 2009). Notwithstanding these advances, more information is necessary to evaluate social integration on a broader scale.

This work addresses the problem of Llolleo social integration with new lines of evidence obtained from the La Granja site, located in the Rancagua Basin (34° S, 71° W) (Figure 16.1). La Granja is the only archaeological site to date that has been identified as a social activity hub for Llolleo communities in central Chile (Planella et al. 2000). The information presented comes from instrumental neutron activation analysis (INAA) and paste analysis from ceramic smoking pipes and pottery, as well as analysis of the morphological and decorative features of pipes used for smoking.

THE LLOLLEO SOCIAL SYSTEM

The Llolleo complex is an archaeological unit of the Early Ceramic period in central Chile with a common set of material attributes and cultural practices that existed from approximately AD 300 to 1300. Those attributes include (1) ceramic vessel styles and manufacturing techniques, (2) the use of necklaces for bodily ornamentation, (3) how and where funerary ceremonies were conducted, (4) strategies of procurement and production of lithic instruments, and (5) a subsistence pattern that incorporates maize to a greater or lesser degree, as well as hunting and gathering of wild resources. The complex's

distribution area extended from near the Aconcagua River in the north at least to the Rancagua Basin in the south. Its settlements were distributed among coastal terraces, valleys of the Coastal Range and Andes Cordillera, and the central valley. The area covered is approximately 150 × 180 km (Figure 16.1; Avalos 1999; Correa 2004, 2006; Falabella 2005; Falabella and Planella 1980; Hermosilla et al. 2003; Pavlovic 2000; Pavlovic et al. 2003; Planella and Falabella 1987; Sanhueza 2004; Sanhueza et al. 2003). This complex has been described as the archaeological materialization of a social system that consisted of smaller, horticulture-based social units with no notable hierarchies or inequalities among them (Sanhueza and Falabella 2007).

The basic Llolleo settlement nucleus was the coresidential unit, which consisted of a few dwellings arranged on gently sloping land alongside rivers or streams. The soils were suitable for gardening, which provided these groups with a significant portion of the resources they needed to survive: quinoa (*Chenopodium quinoa*), corn (*Zea mays*), beans (*Phaseolus* sp.), and squash (*Cucurbita* sp.) (Planella et al. 2014). The settlement patterns were dispersed, with some areas of denser groupings of these units, and spaces between them in which virtually no evidence of Llolleo occupation has been found (Sanhueza et al. 2007). Studies conducted on a local scale show that these spatial groupings were economically self-sufficient and politically independent local communities that interacted regularly and transmitted technical knowledge (Falabella et al. 2014).¹ This hypothesis is supported by (1) the

analysis of the provenance of the ceramics found at the sites, which shows that production of domestic vessels was organized on the community scale (Falabella et al. 2015); (2) studies of lithic raw material, which show differences according to the particularity of the “lithic landscapes” of each locality (Galarce et al. 2007); and (3) larger-scale comparisons (in the Santiago and Rancagua Basins) of various Llolleo sites, which indicate that these groupings are correlated with particularities in the material culture, suggesting that this level was important for social reproduction and cohesion (Sanhueza and Falabella 2009). The repeated use of certain spaces over time—and not others with the same soil and habitability conditions—reflects the fact that these Llolleo communities appropriated certain places and maintained a notion of territory that they passed down to subsequent generations (Falabella et al. 2014).

This scenario—that there was a Llolleo cultural complex (macro-identity) based on multiple local groups (micro-identities), each in its own territory—implies the existence of mechanisms of social integration enabling the reproduction of social units with few members and the existence of cultural practices that could keep the groups interacting over such an extensive space and time. It has been proposed that the Llolleo functioned as a tribal (Falabella 2005) or multi-scale (Sanhueza and Falabella 2007) system, and models for such prehispanic social organizations have been sought in the ethnography and ethnohistory of the Mapuche indigenous peoples of central and southern Chile (Falabella and Sanhueza

2005–2006; Sanhueza 2016). Spanish chronicles dating back to the sixteenth and seventeenth centuries and ethnohistoric studies acknowledge that central and southern Chile’s Indians shared a common language, Mapudungun, and some social practices and cultural features (e.g., Manríquez 1999; Vivar 1979 [1558]). Archaeological studies have shown resemblances in cultural contexts from the Early Ceramic period in both regions, suggesting a common cultural background (Correa 2009).

One practice that is extensively described in early documents dating from the time of the conquest is the *junta de indios* (Indian meeting; Manríquez 1999; Planella 1988). These meetings were held for many different purposes. They brought together the *parcialidades*, or local communities, to address issues that required the involvement of more than just one family or group. These events were held in a specially designated place, sometimes very large, that was prepared by and valued by the communities. Whatever the specific purpose of the meeting—forging marriage ties or other alliances, house (*ruca*) building, games of *palin* (Mapuche game played with sticks and a ball), burials, initiation of a *machi* (shaman)—there were always lots of alcoholic beverages on hand (Coña 2010; Joseph 1931; Montecino 1999). So much so that the Spaniards called these places *bebederos* (drinking places) and the ceremonies held there the generic name of *borracheras* (drinking binges) (Vivar 1979 [1558]). No meeting was held without ensuring a good supply of *chicha*, the fermented maize beverage that Joseph (1931:46) describes as “strong and intoxicating” (Figure 16.2). As for smoking



Figure 16.2. Mapuche *nguillatun* ceremony in Carahue, early twentieth century. Photo courtesy of Margarita Alvarado.

pipes, while they do not appear to have been a central element in the general meetings, historic accounts indicate that the machis used them for incensing with smoke during purification rituals called *machitun* (Medina 1898; Núñez de Pineda y Bascuñan 1984 [1663]; Rosales 1877–1878). Mapuche ethnography contains descriptions of smoking pipe use during machi initiation rites, in the ceremonial rogation rite of *nguillatun*, and in the *palitun* (palin game), in which the machis participated by “incensing with tobacco” (Cooper 1949; Foerster 1995; Foerster and Gundermann 1996; Guevara 1911; Hilger 1957; Housse 1940). Joseph (1931:236) tells an intriguing tale that mentions a game of *chueca*, or palin, where *col-lons* (wooden masks) were used, “some of them having wooden, silver-ringed smoking pipes with the mouth-piece attached to the mask’s opening.” The “feasts” lasted from a few days to several months and were attended by groups consisting of a few families to a vast kinship group with extended friends and allies. In all cases, however, the participants came there temporarily and resided at the site, and so these public/ceremonial spaces were equipped with temporary dwellings that also accommodated domestic activities (Adán 2014). Adán believes that these spaces were a fundamental part of the Reche-Mapuche settlement system and were necessary for maintaining ties and alliances among relatives and friends in a population that was usually scattered.

Taking Mapuche ethnography as a model, it has been proposed that La Granja may be an archaeological site for social gatherings used by different communities to conduct activities necessary for establishing and maintaining ties and alliances with the larger Llolleo social group in central Chile (Falabella, Planella, and Tagle 2001; Planella et al. 2000). For this reason, the “gathering place,” situated hypothetically at La Granja, has been incorporated into the Llolleo social model as a level of supraregional social and spatial interaction (Falabella et al. 2016).

LA GRANJA SITE

The La Granja site is on the northern bank of the Cachapoal River in the Rancagua Basin, situated on a vast esplanade of archaeological materials that extends for about 800 m north to south, as determined by archaeological surveying and test pits; east to west, parallel to the river, the dimensions have not yet been clearly defined. The site is not uniform but rather has zones with a high

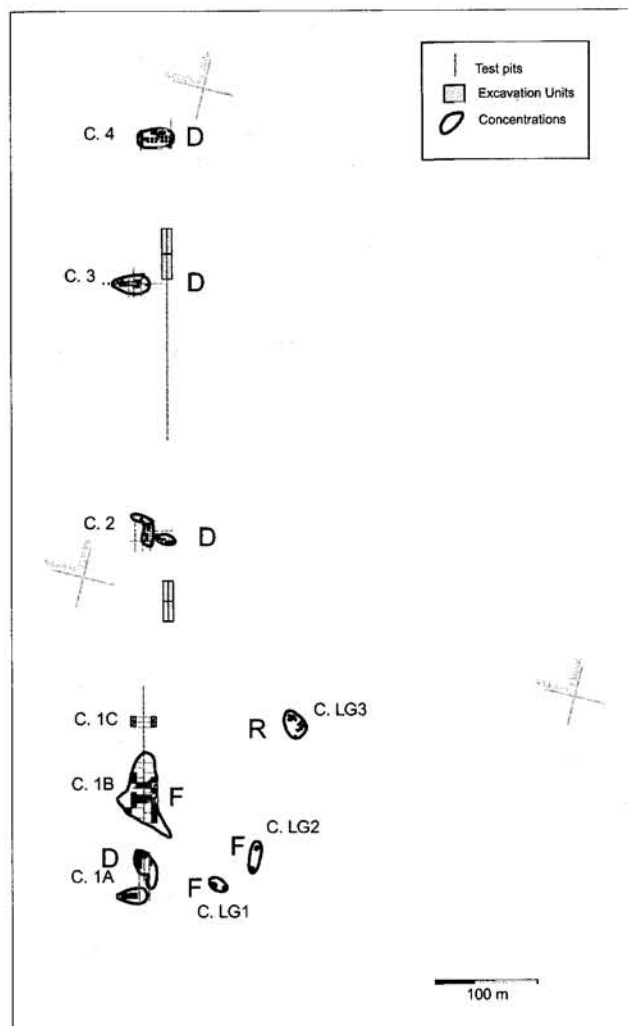


Figure 16.3. The La Granja site: plan of the excavations and concentrations with high density of material remains (adapted from Ciprés Consultores 2002). D = domestic refuse, F = garbage from feasting events, and R = ritual activity deposits (classification from Barrera 2016).

concentration of materials, separated by spaces with very few archaeological remains (Figure 16.3). Available thermoluminescence and radiocarbon dates indicate that all of the concentrations were at least to some degree contemporary (Table 16.1). Within the area that the site occupies, concentration areas for domestic activity are evident (C.2, C.3, and C.4), as well as others with large secondary deposits in which the density of ceramic material and flora and fauna remains suggests they were waste dumps generated during large group celebrations (C.LG1, C.LG2, and C.1B) (Barrera 2016). There is also one particular sector, C.LG3, that contains primary deposits, including extremely dense accumulations of smoking pipe sherds,

TABLE 16.1. THERMOLUMINESCENCE AND RADIOCARBON DATES FOR THE LA GRANJA SITE

| SECTOR | PIT/LAYER (CM) | CAL AD 2σ / TL | REFERENCE | ID LAB | DATE RANGES AD |
|--------|-------------------|-----------------------|-------------------------|------------|----------------|
| LG1 | 1amp. 20–30 | 650 \pm 80 | Planella et al. 1996 | UCTL 549 | 570–770 |
| | 1B. 40–50 | 640 \pm 130 | Planella et al. 1996 | UCTL 550 | |
| LG2 | 2B. 10–20 | 580 \pm 110 | Planella et al. 1996 | UCTL 637 | 385–1160 |
| | 2B. 20–30 | 525 \pm 150 | Planella et al. 1996 | UCTL 636 | |
| | 2D. 30–40 | 500 \pm 120 | Planella et al. 1996 | UCTL 638 | |
| | 2D. 50–60 | 485 \pm 100 | Planella et al. 1996 | UCTL 639 | |
| | 1B. 60–70 | 665–980 | Planella et al. 1996 | Beta 77408 | |
| | 1B. 80–90 | 790–1165 | Planella et al. 1996 | Beta 77409 | |
| | | | | | |
| LG3 | C. 20–30 | 655–1025 | Planella et al. 1996 | Beta 82959 | 480–1150 |
| | J3. 20–30 | 865–1155 | Planella et al. 1996 | Beta 82962 | |
| | A4. 30–40 | 820 \pm 130 | Planella et al. 1996 | UCTL 769 | |
| | L3. 60–70 | 600 \pm 120 | Planella et al. 1996 | UCTL 771 | |
| | A2. 60–70 | 700 \pm 100 | Planella et al. 1996 | UCTL 770 | |
| | I–J–K. 95–120 | 715 \pm 130 | Planella et al. 1996 | UCTL 772 | |
| | C–R2. 116–121 | 790–1040 | Planella et al. 1996 | Beta 82960 | |
| | | | | | |
| C.1 | T1. PA. 10–20 | 725 \pm 120 | Nahuel Consultores 2002 | UCTL 1443 | 605–1190 |
| C.1B | J21NE. 90–100 | 894–1154 | Ciprés Consultores 2002 | A-12468 | |
| | J20. 110–120 | 898–1187 | Ciprés Consultores 2002 | A-12467 | |
| | I19. 160 | 689–1136 | Ciprés Consultores 2002 | A-12466 | |
| C.2 | T3. P4–4a. 90–100 | 570 \pm 140 | Nahuel Consultores 2002 | UCTL 1444 | 430–760 |
| | T3. P4–4a. 20–30 | 620 \pm 140 | Nahuel Consultores 2002 | UCTL 1445 | |
| C.3 | T1. P6–6a. 20–30 | 580 \pm 140 | Nahuel Consultores 2002 | UCTL 1446 | 440–720 |
| C.4 | T3. P8. 30–40 | 650 \pm 130 | Nahuel Consultores 2002 | UCTL 1447 | 520–780 |

which has been considered the locus of ritual activity as such (Planella et al. 2000). This sector has alignments of stones on the occupied surface and others intentionally buried, as well as a circular outline of what appears to have been a well (Falabella, Planella, and Tagle 2001). Unlike the situation at Llolleo residential sites, where funerary remains are buried beside the dwellings, in La Granja only three burials have been recovered, which clearly does not coincide with the abundance of other kinds of archaeological remains at the site.

One of the particularities of this site is that approximately 1,000 pipe fragments have been recovered, an unusual number for Llolleo sites.² Most of the fragments correspond to open segments of tubes from inverted T, two-mouthpiece-type pipes, with polished or smoothed surfaces that are brown or black in color, some covered with red paint or specular hematite (Figure 16.4). A few are decorated with incised geometric motifs. Some, like the inscribed angles, chevrons, and spirals, are recurrent; others have been found on one or two fragments only. In addition to the above, the record includes a few fragments of tubes with ellipsoid or subrectangular cross sections, with different decorative patterns from the previous ones.

Other fragments pertain to tubes with a blind and flattened end that were parts of the “fishtail” pipes associated in central Chile with Bato groups, which were contemporaneous with the Llolleo and inhabited the same region in the Early Ceramic period (Falabella et al. 2016). In addition to these finds, one vertical pipe and a pipe with a single and curved tube along with four fragments of stone pipes were found. Residue analyses for all of these types of pipes indicate that they were used for smoking wild tobacco (Belmar et al. 2016; Echeverría et al. 2014). Additionally, one of them had residues of *Phaseolus* spp., and two of them contained remains of *Zea mays* and *Datura stramonium*, a psychotropic plant used by the Mapuche people in premonitory rituals (Planella et al. 2005–2006).

With regard to pottery, La Granja presents a ceramic context that is not significantly different from that found at other Llolleo sites. It includes pots for preparing and cooking food; larger containers for storing food; small and medium-sized, symmetrical and asymmetrical drinking pots with one handle; and small and medium-sized open-necked pots (Ciprés Consultores 2002; Planella et al. 1996). These items exemplify the morphological, decorative, and technological style of the Llolleo culture

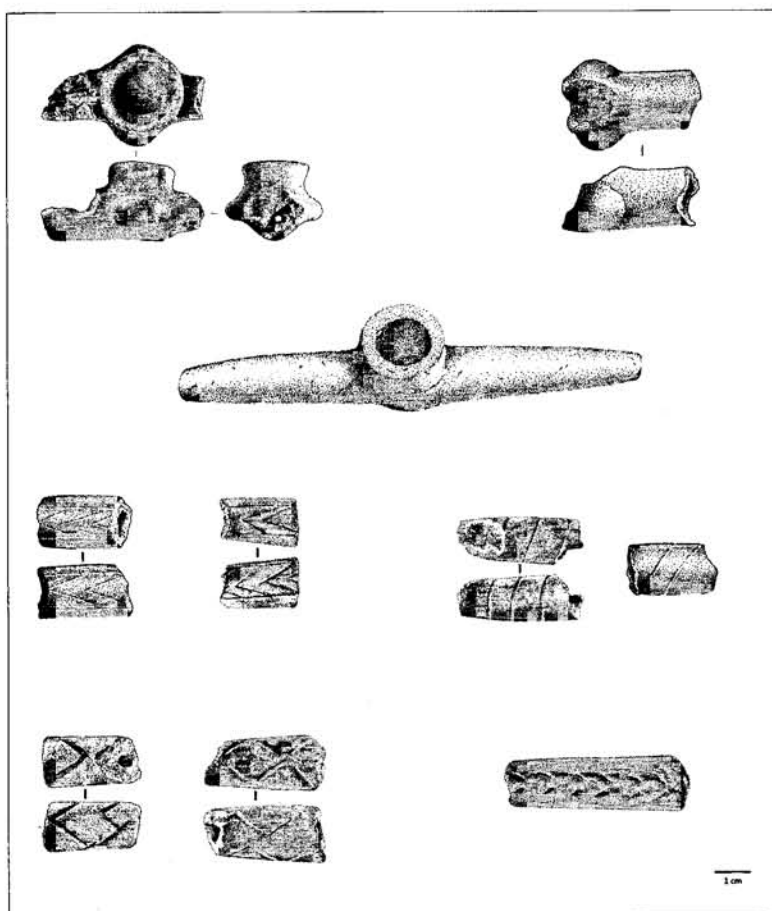


Figure 16.4. Llolleo inverted T-type smoking pipes with two bulges on the base of the bowl and opened tubes with incised decoration. Illustration by Silvia Alfaro.

of central Chile. The differences of the La Granja ceramic assemblage in relation to the assemblages found at residential sites is a higher percentage of drinking pots compared to other morpho-functional categories and a greater variety of decorated fragments, among which anthropomorphic representations are especially evident (Figure 16.5; Falabella, Planella, and Tagle 2001).

RESEARCH QUESTIONS AND EXPECTATIONS

Based on the available information, it can be affirmed that La Granja is indeed significantly different from all other Llolleo sites known to date. Despite systematic surveying conducted in the Rancagua and Santiago Basins and in the Maipo River valley (Sanhueza et al. 2007), no other archaeological sites have been found with the same characteristics. La Granja is much more spatially extensive, with areas differentiated by activity, and it includes deeper secondary deposits of discarded artifacts and food

remains, unusual objects, a greater quantity and variety of decorated drinking pots, and a remarkably high density of smoking pipes. Notwithstanding the above, there are still questions to answer before we can understand the internal organization of this very complex site and the role it played in the Llolleo social system. Specifically, more direct data are needed to validate the hypothesis that the site was indeed a place where people from different communities and parts of the region came together for meetings.

The smoking pipes and drinking pots may help answer these questions because they were active agents in public ceremonial practices. In the case of the pipes, the practice of smoking psychotropic plant-based substances has been closely associated with ritual activities among the Mapuche and other groups in the Americas (Bollwerck and Tushingham 2016), and evidence of this practice is also present in most Llolleo residential sites, but it is extraordinarily abundant only in La Granja. The drinking pot, for its part, is one of the most tangible items of Llolleo identity, given its morphological and decorative

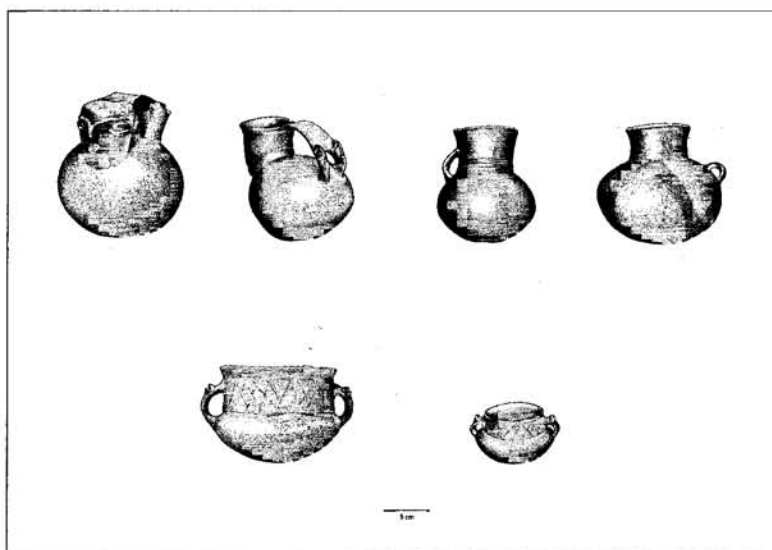


Figure 16.5. Llolleo drinking pots and wide-mouth pots. Illustration by Silvia Alfaro.

homogeneity at the supraregional level, which could have actively promoted a sense of belonging (Sanhueza 2004). Ceramic paste analysis has yielded evidence that the drinking pots, while locally manufactured, circulated around central Chile more than any other ceramic vessel (Sanhueza 2004) and were the preferred vessel for funerary rites (Sanhueza 2016). There is also evidence that they were used to hold *muday*, or maize chicha (Correa et al. 2015; Planella et al. 2010), a fermented beverage that was an essential part of Mapuche social gatherings and had deep ritual significance throughout the southern Andes (Hastorf and Johannessen 1993; Planella et al. 2010, 2014). Because they are ceramic materials, both objects can point directly to their provenience (Neff and Glowacki 2002) and therefore shed light on the movement of people and their artifacts from their usual place of residence to a gathering place, especially when production was organized at the household or community level, as it has been shown is the case with the Llolleo.

New lines of evidence on the general problem of macro social integration in Llolleo groups are needed, including responses to the following specific questions: (1) Does the distribution of visual attributes of the smoking pipes in Llolleo domestic sites show local “microstyles” that can be traced in the site of La Granja? (2) Does the distribution of visual attributes and technological and chemical characteristics of the smoking pipes from the La Granja site vary in different sectors of this site? As the central gathering place, one might expect artifacts recovered from sector C.LG3 to be more variable/diverse since it is the locus where all participants came together. (3) How many

raw material proveniences can be identified in the sample of La Granja artifacts? Several chemical groups at the site that can be linked to the presence of diverse, far-flung communities of origin might be expected. (4) Were the smoking pipes and ceramic vessels manufactured in the same place or in different localities, assuming participants came to these gatherings with their personal items, as is described in Mapuche ethnography?

METHODOLOGY AND MATERIALS

The pipes’ morphological attributes and decorations were analyzed using traditional laboratory procedures for ceramic artifacts (Alfaro 2013). One thousand Llolleo smoking pipe fragments from the La Granja site and 67 from other sites in the region were analyzed to define any possible local “microstyles” that could be identified among the finds at La Granja. Paste analyses were oriented to recognizing temper groups based on physical attributes such as color, form, size, and density of inclusions observed in a fresh section of the sherd under a binocular microscope at 10x to 40x magnification. All smoking pipe fragments that could be cross-sectioned were analyzed ($n = 586$). The analysis of the ceramic fragments was based on prior studies (Ciprés Consultores 2002; Planella et al. 1996), and the pastes for all fragments preselected for INAA were reanalyzed ($n = 251$).

INAA analyses were used to identify compositional groups that were assumed to represent geographically limited sources or zones where raw materials were

obtained (Neff and Glowacki 2002). This strategy is crucial for enabling the determination of whether the smoking pipes at the La Granja site came from one or more different localities. The samples for INAA were prepared and were analyzed at the University of Missouri Research Reactor (MURR) using standard procedures for the analysis of pottery and ceramic raw materials as described in chapter 1 of this volume. Quantitative analysis of the data generated by INAA follows pattern-recognition methods described in Glascock (1992), Neff (2000), and chapter 1. Cluster analysis and principal component analysis were performed on the variance-covariance matrix of the logged elemental data, and a number of principal component plots and bivariate plots of the elements were then examined to identify groups of compositionally homogeneous samples. Probabilities of group membership based on Mahalanobis distances were evaluated. The results of the La Granja samples were compared with each other and against the chemical data available on ceramics from various other sites in the Angostura region, 30 km north of the La Granja site (Falabella et al. 2015).

A sample of 178 smoking pipes was analyzed. In selecting samples, we attempted to conserve sherds with unique attributes and so instead chose pieces that were extremely fragmented and would be damaged as little as possible. Within these limitations, we sought to amass a sample from different concentrations that was as varied as possible. From the set of pottery fragments, we focused primarily on those from drinking pots, which were recognized among the sherds for their polished or smoothed surfaces and thin walls. We also included 11 sherds of

Llolleo open-necked pots with reticulated incisions, as these could be linked to communities of the Angostura-Cordillera socio-spatial grouping (Sanhueza and Falabella 2009). A sample of 228 pottery sherd fragments was analyzed. In selecting the sample, we sought to achieve a balanced sample from the different concentrations and paste groups and to include sherds of different decorative types.

RESULTS AND DISCUSSION

Visual Attributes of the Smoking Pipes

The spatial distribution of the different smoking pipe types among the concentrations at the La Granja site display only slight differences ($\chi^2 = 48.580$, $df = 36$, $p = 0.079$), mainly at C.1B, which exhibits more blind-end pieces and more unusual types of smoking pipes than expected in a random sample, and at C.LG3, with twice the number of inverted T-type fragments (Table 16.2). The presence/absence of decorated smoking pipe fragments is unevenly distributed in the La Granja site ($\chi^2 = 56.218$, $df = 9$, $p = 0.000$). The frequency of decorated fragments is notably high at C.2 and notably low at C.LG3, where only three of these specimens were recovered (Table 16.3).

Expectation was for the locus of the "ritual" to yield the greatest variety of smoking pipes, or the pipes with the most singular characteristics—for example, those that were more energy-intensive to produce, as reflected in their surface treatments, decoration, or uniform manufacture. The results indicate that concentrations at C.1B

TABLE 16.2. MORPHOLOGICAL TYPES OF SMOKING PIPES IN THE CONCENTRATIONS OF THE LA GRANJA SITE

| CONCENTRATION | INVERTED T-TYPE | | OPEN TUBES WITH CIRCULAR SECTION | | TUBES WITH BLIND END | | UNUSUAL PIPES | | TOTAL |
|---------------|-----------------|------|----------------------------------|------|----------------------|-----|---------------|-----|----------|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> |
| C.1A | 2 | 6.9 | 26 | 89.7 | 0 | 0.0 | 1 | 3.4 | 29 |
| C.1B | 13 | 6.0 | 188 | 87.0 | 6 | 2.8 | 9 | 4.2 | 216 |
| C.1C | 1 | 3.4 | 28 | 96.6 | 0 | 0.0 | 0 | 0.0 | 29 |
| C.2 | 1 | 3.3 | 26 | 86.7 | 1 | 3.3 | 2 | 6.7 | 30 |
| C.3 | 1 | 8.3 | 11 | 91.7 | 0 | 0.0 | 0 | 0.0 | 12 |
| C.4 | 0 | 0.0 | 3 | 100 | 0 | 0.0 | 0 | 0.0 | 3 |
| C.LG1 | 3 | 8.6 | 32 | 91.4 | 0 | 0.0 | 0 | 0.0 | 35 |
| C.LG2 | 2 | 5.4 | 35 | 94.6 | 0 | 0.0 | 0 | 0.0 | 37 |
| C.LG3 | 16 | 15.5 | 84 | 81.6 | 2 | 1.9 | 1 | 1.0 | 103 |
| Total | 39 | 7.9 | 433 | 87.7 | 9 | 1.8 | 13 | 2.6 | 494 |

TABLE 16.3. DISTRIBUTION OF DECORATED SMOKING PIPE FRAGMENTS IN THE CONCENTRATIONS OF THE LA GRANJA SITE

| CONCENTRATION | DECORATION ABSENT | | DECORATION PRESENT | | TOTAL |
|---------------|----------------------|------|-----------------------|------|----------|
| | <i>n</i> | % | <i>n</i> | % | <i>N</i> |
| C.1A | 42 | 89.4 | 5 | 10.6 | 47 |
| C.1B | 278 | 85.5 | 47 | 14.5 | 325 |
| C.1C | 31 | 91.2 | 3 | 8.8 | 34 |
| C.2 | 30 | 61.2 | 19 | 38.8 | 49 |
| C.3 | 12 | 92.3 | 1 | 7.7 | 13 |
| C.4 | 6 | 85.7 | 1 | 14.3 | 7 |
| C.LG1 | 59 | 85.5 | 10 | 14.5 | 69 |
| C.LG2 | 55 | 90.2 | 6 | 9.8 | 61 |
| C.LG3 | 179 | 98.4 | 3 | 1.6 | 182 |
| Total | 692 | 87.9 | 95 | 12.1 | 787 |

TABLE 16.4. COMPARATIVE FREQUENCY OF SMOKING PIPE COLORS BETWEEN SECTOR OF C.LG3 AND ALL OTHER CONCENTRATIONS AT THE LA GRANJA SITE

| COLOR | CONCENTRATION C.LG3 | | OTHER CONCENTRATIONS | | TOTAL | |
|---------------|------------------------|------|-------------------------|------|----------|------|
| | <i>n</i> | % | <i>n</i> | % | <i>N</i> | % |
| Dark brown | 9 | 4.9 | 46 | 7.6 | 55 | 7.0 |
| Brown | 12 | 6.6 | 125 | 20.7 | 137 | 17.4 |
| Grayish brown | 10 | 5.5 | 71 | 11.7 | 81 | 10.3 |
| Gray | 11 | 6.0 | 76 | 12.6 | 87 | 11.1 |
| Black | 138 | 75.8 | 240 | 39.7 | 378 | 48.0 |
| Non-observed | 0 | 0.0 | 4 | 0.7 | 4 | 0.5 |
| Red | 2 | 1.1 | 43 | 7.1 | 45 | 5.7 |
| Total | 182 | 100 | 605 | 100 | 787 | 100 |

and C.2 have the most unusual pipes,³ as well as the highest percentages of decorated pipes and the greatest variety of motifs; C.LG3 has the highest percentage of pipes with polished surfaces (97.7%). Also at C.LG3, the frequency of polished black pipes is especially notable—20% higher than average, or significantly higher than any other concentration ($\chi^2 = 76.107$, $df = 6$, $p = 0.000$; Table 16.4). Among the 62 smoking pipes in the sample for which the substance smoked could be determined, tobacco occurs in all sectors equally, while C.LG3 stands out for also presenting remains of *Zea mays* and *Datura stramonium* and C.1B for one *Phaseolus* spp. (Belmar et al. 2016). These results caused us to revisit the initial expectations and consider the possibility that other variables of these artifacts—such as their black color or the process of smoked firing—may have made them preferable for ceremonial purposes. From Durkheim (2012 [1912]), Mauss

(1979 [1923–1924]), and subsequent authors, as well as Mapuche ethnographic information (Foerster and Gundermann 1996; Gundermann 1985), we know that the rituals of different cultures are always governed by rules. It is therefore possible that this particular appearance of the pipes is part of a behavioral pattern that was sanctioned by the community and its celebrants to legitimize their participation in the ritual. This information should be treated with caution owing to the differences in the number of remains among the concentrations, including some (C.3 and C.4) with very few.

At all other Llolleo sites that have been studied in the Maipo-Mapocho/Cachapoal region, pipes have been found in domestic contexts, fragmented and in low quantities (Table 16.5). None of the other sites studied contains the number of pipes found at La Granja or the density of sherds found at C.LG3.⁴ The results show that density per

TABLE 16.5. NUMBER AND DENSITY OF SMOKING PIPE FRAGMENTS IN LLOLLEO SITES

| SITE | CONCENTRATION | TOTAL (N) | DENSITY |
|-------------|---------------|-----------|---------|
| La Granja | C.1A | 47 | 2.62 |
| | C.1B | 325 | 3.72 |
| | C.1C | 34 | n.d. |
| | C.2 | 49 | 2.15 |
| | C.3 | 13 | 2.28 |
| | C.4 | 7 | 0.64 |
| | C.LG1 | 69 | 3.95 |
| | C.LG2 | 61 | 1.2 |
| | C.LG3 | 182 | 25.4 |
| VP-1 | | 31 | 0.96 |
| VP-2 | | 0 | 0.00 |
| VP-3 | | 3 | 0.22 |
| VP-4 | | 1 | 0.36 |
| CK10 | | 4 | 1.94 |
| CK11 | | 15 | 1.09 |
| CK-6 | | 1 | n.d. |
| Delta 4 | | 1 | n.d. |
| El Mercurio | | 11 | n.d. |
| Total | | 854 | |

site is generally very low, and that the difference between La Granja and the other Llolleo sites is notable especially in relation to C.LG3 (Table 16.5). The morphology and decorations present in those other sites are similar to those found at La Granja (Figure 16.4). One can see a wide variety of sizes (tube width and length) and treatments and surface colors, sherds with a pair of bulges on the base of the bowl, and only a few sherds that are decorated (most with incisions or red slips). The repertoires of motifs and configurations are also similar, although the small number of decorated pieces made it impossible to determine frequencies or specificities for each locality. With the available evidence, it has not been possible to define local microstyles that could help determine the provenience of the artifacts found at La Granja. Rather, the information suggests that the pipes had a certain external appearance that were reproduced in Llolleo communities, pointing to codes that were shared across the region that probably helped to reinforce a group identity rather than highlight individual or local identities. It is not possible, with the stylistic record available, to determine whether or not these artifacts were made at La Granja, or whether they came from many or a few other communities. If they did come from other communities, the evidence is also insufficient to determine whether these were in the same locality, nearby, or far away.

The uniqueness of some of the rarer finds recorded in La Granja—such as a vertical pipe, a curved-mouthpiece pipe, some “fishtail” pipes, three pipes with elliptical cross sections decorated with dotted and linear incisions, or two with rectangular cross sections with a stepped design—probably denotes the presence of elements that were not of Llolleo origin but that, precisely because of their unusualness, were only used in the on-site activities incidentally. These pieces also may have been gifts, or acquired through exchange, or indicate a particular preference of the owner.

Ceramic Pastes

Unlike the visible attributes discussed above, pastes have the potential to point to differences among communities in cases where ceramic production is organized at the domestic or coresidential level. As the data in Table 16.6 show, a diverse range of pastes were used that can be attributed to five broad families of origin: granitic origin (Gr), volcanic origin (V, VB), or a combination of the two (BGr, VGr). Very few smoking pipe fragments were found with pastes other than from these (Other paste group: 3.8%). Classifying these paste families can be instrumental in determining the provenience of the samples, as the inclusions (minerals and rocks) are linked to geomorphological formations and the sands that result from their breakdown found on watercourses and used as temper. The volcanic families are characterized by mafic and intermediate aggregates derived primarily from andesitic rocks—and basalt to a lesser degree. V patterns have a higher proportion of mafic inclusions than VB, with leucocratic rocks being the most prevalent.

TABLE 16.6. SMOKING PIPES PASTE GROUPS AT THE LA GRANJA SITE WITH AND WITHOUT DECORATION

| PASTE GROUPS | WITHOUT DECORATION | | WITH DECORATION | |
|--------------|--------------------|--------|-----------------|--------|
| | n | % | n | % |
| BGr | 11 | 2.33 | 4 | 3.88 |
| Gr | 167 | 35.31 | 48 | 46.60 |
| Other | 20 | 4.23 | 2 | 1.94 |
| V | 21 | 4.44 | 4 | 3.88 |
| VB | 107 | 22.62 | 19 | 18.45 |
| VGr | 147 | 31.08 | 26 | 25.24 |
| Total | 473 | 100.00 | 103 | 100.00 |

VGr paste is characterized by the presence of volcanic and granitic rock fragments associated with quartz and feldspar minerals. The Gr family includes aggregates of granitic or dioritic intrusive rocks, with negligible representation of the Grn variant, which is easily identified as having abundant amphiboles and/or pyroxenes as well as mineral oxidation. The paste families present in the sample suggest that the provenience of the vast majority of the pipes may be the geomorphological deposits of the Andes Mountains and the spurs of the Coastal Range near the site. However, these formations extend longitudinally over vast distances in central Chile, and as such are not singular enough to determine whether the pipes come from the Cachapoal River valley, where the La Granja site is located, from the Rancagua Basin, or from neighboring basins (Falabella et al. 2013). In contrast, granulometry reveals the choices made by the craftspeople when preparing their pastes and is also interesting for analysis, as it could help identify specific communities of potters. Two things can be inferred from the information obtained. First, the pastes with granitic inclusions have significantly more heterogeneous grain size distributions than those with volcanic inclusions. Second, the majority of the pipe fragments (61%) have fine to very fine inclusions, and this is particularly noticeable with the granitic paste group.

The morphological types of smoking pipes could not be contrasted adequately with the paste group owing to the lack of diagnostic sherds, and to the fact that the more unusual pieces were not subjected to analysis in order to preserve this precious heritage. Despite these limitations, it can be affirmed that specimens with bulges on the base

of the bowl ($n = 18$) that were found at the site were only manufactured with pastes Gr, VB, and VGr. The decorative motifs are distributed among all paste families (Table 16.6). In general, decorated pipes tend to have GR patterns more frequently. Sherds with rare pastes (Other) include the lowest percentage of decorated specimens (1.94%). One has incised chevrons and another has a red slip, elements that are quite common among the pipes found at the site. Paste information exists for 26 sherds with recognized incised motifs and 44 with surface slip or paint, and these are distributed randomly among the concentrations.

The distribution of paste families displays only slight differences among the concentrations identified at this extensive site and at different stratigraphic layers. Indeed, the differences are so slight as to suggest that this tradition was ongoing, with smoking pipes having the same variety of pastes used indiscriminately in all sectors and throughout all occupations of the site. Also worth noting is that the 21 pieces with pastes that could be considered "foreign" because of their unique characteristics (Other pastes) were found in concentrations C.1A, C.B, C.C, C.2, and C.LG2, and just one was found in C.LG3 (Table 16.7).

As for pottery sherds, the results of their analysis indicates that the pastes of drinking pot fragments recovered from this site share some patterns with the smoking pipes, but their relative frequencies vary (Figure 16.6). Among the vessels was found a greater abundance of families BGr, V, and VB; a mode of medium-sized grains; and higher temper density. Better spatial and stratigraphic distribution for the sample of ceramic vessels studied than for the pipes was obtained, as enough excavated material was

TABLE 16.7. DISTRIBUTION OF PASTE GROUPS OF SMOKING PIPES AMONG THE CONCENTRATIONS AT THE LA GRANJA SITE

| Concentration | SMOKING PIPES | | | | | | Total (%) | Total (n) |
|---------------|---------------|--------|-----------|-------|--------|---------|-----------|-----------|
| | B (%) | GR (%) | Other (%) | V (%) | VB (%) | VGR (%) | | |
| C.1A | 0.0 | 37.9 | 6.9 | 3.4 | 20.7 | 31.0 | 100 | 29 |
| C.1B | 5.0 | 36.0 | 4.3 | 5.4 | 28.3 | 20.9 | 100 | 258 |
| C.1C | 0.0 | 19.2 | 3.8 | 7.7 | 7.7 | 61.5 | 100 | 26 |
| C.2 | 0.0 | 33.3 | 7.7 | 7.7 | 15.4 | 35.9 | 100 | 39 |
| C.3 | 14.3 | 14.3 | 0.0 | 0.0 | 28.6 | 42.9 | 100 | 7 |
| C.4 | 0.0 | 33.3 | 0.0 | 0.0 | 16.7 | 50.0 | 100 | 6 |
| C.LG1 | 0.0 | 51.2 | 0.0 | 0.0 | 14.6 | 34.1 | 100 | 41 |
| C.LG2 | 0.0 | 52.2 | 8.7 | 2.2 | 8.7 | 28.3 | 100 | 46 |
| C.LG3 | 0.9 | 35.9 | 0.9 | 3.4 | 21.4 | 37.6 | 100 | 117 |
| Total (%) | 2.6 | 37.3 | 3.9 | 4.4 | 22.0 | 29.9 | 100 | |
| Total (n) | 15.0 | 215.0 | 22.0 | 25.0 | 126.0 | 173.0 | | 569 |

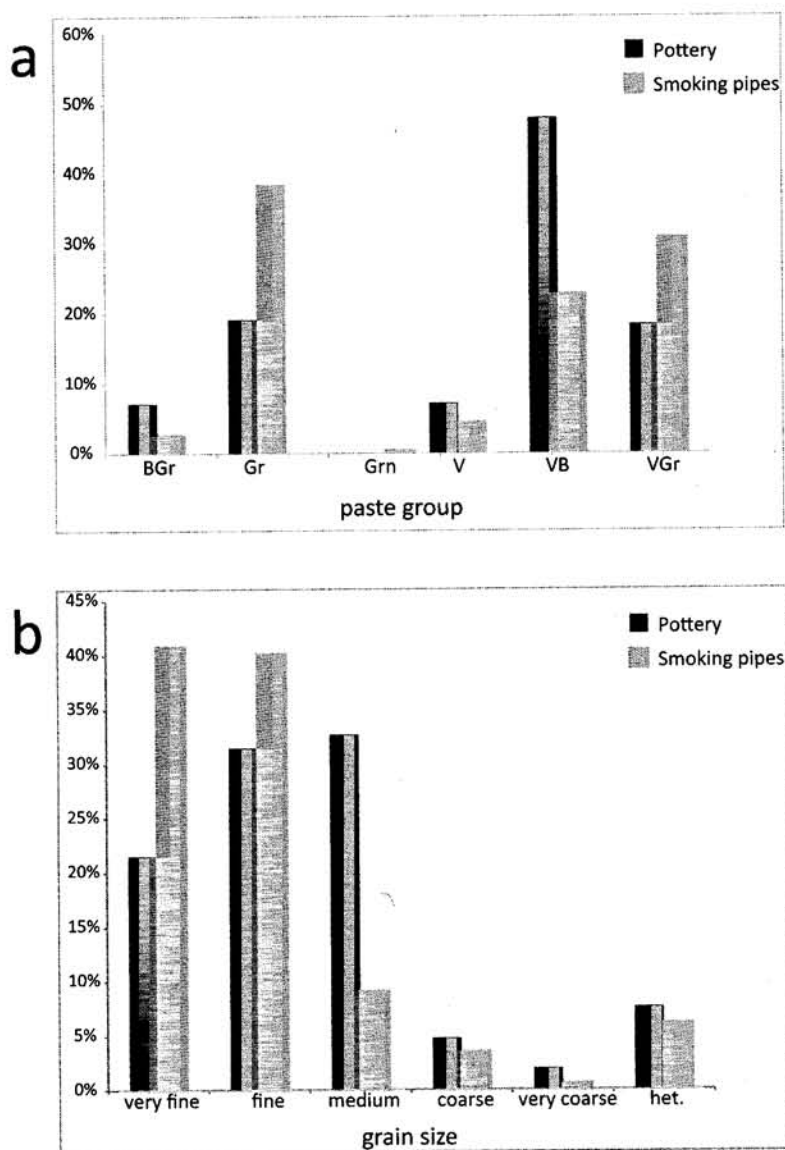


Figure 16.6. Frequency distribution of smoking pipes and pottery sherds paste groups (a) and granulometry (b).

available. Spatial distribution varies somewhat among concentrations. The only sherd with paste classified as Other was obtained from concentration C.LG3, and in that concentration and at C.LG2, the Gr family predominates, as it does with the pipes. This data leads us to suggest that the greatest spatial differences are evident among the drinking pots—they are more frequent at C.LG3, as previous investigations indicate, and display paste frequencies more closely aligned with those of the pipes. Beyond these slight differences, the results corroborated that the sherds from drinking pots that were probably used at C.LG3 were made with raw materials of a similar variety to those used to make the drinking pots used in other concentrations.

These results suggest that the pipes and drinking pots

shared the same technological style of paste preparation, and that the craftspeople who manufactured both kinds of objects had common knowledge and know-how. We believe that the differences mentioned above can be attributed to the different textural requirements of the clay used to manufacture small and compact artifacts like pipes, unlike the drinking pots—objects with thin walls, composite contours, and hollow interiors. Based on the information obtained from the inclusions in the raw material and the way in which the paste was prepared, there is no basis for proposing that the pipes were made by craftspeople other than those who made the drinking pots, or were made in places other than where the drinking pots were made. Neither is there data that would enable one to reliably identify a specific provenience.

INAA

INAA is one of the most powerful and sensitive techniques for identifying and distinguishing the chemical profiles of ceramic materials. The great advantage of this kind of analysis is that it provides data on subtle geochemical differences between the sources of ceramic raw material. When vessels are produced at the domestic and/or community level, the data can be used to group samples originating in specific local communities and overcome the limitations that analyses of common visual styles and mineralogical homogeneity of ceramic pastes present. The disadvantage of the INAA is that the number of samples processed was limited and that, owing to the

need to preserve rare heritage, the smoking pipes fragments chosen for analysis offered little information about morphological types and decorations.

Smoking pipes and pottery samples were analyzed separately. The results show that both smoking pipes and pots display a very similar chemical structure with the same associations of chemical elements that determine the loadings of the elements on principal component #1 (PC#1), PC#2, and PC#3, meaning the chemical patterns are determined by the same associations of chemical elements and their influence on each principal component: As, Cs, and Sb on PC#1; Ta, Th, and rare earth elements on PC#2; and Cr on PC#3 (Figure 16.7). In each case, the distribution of the samples in the compositional space is

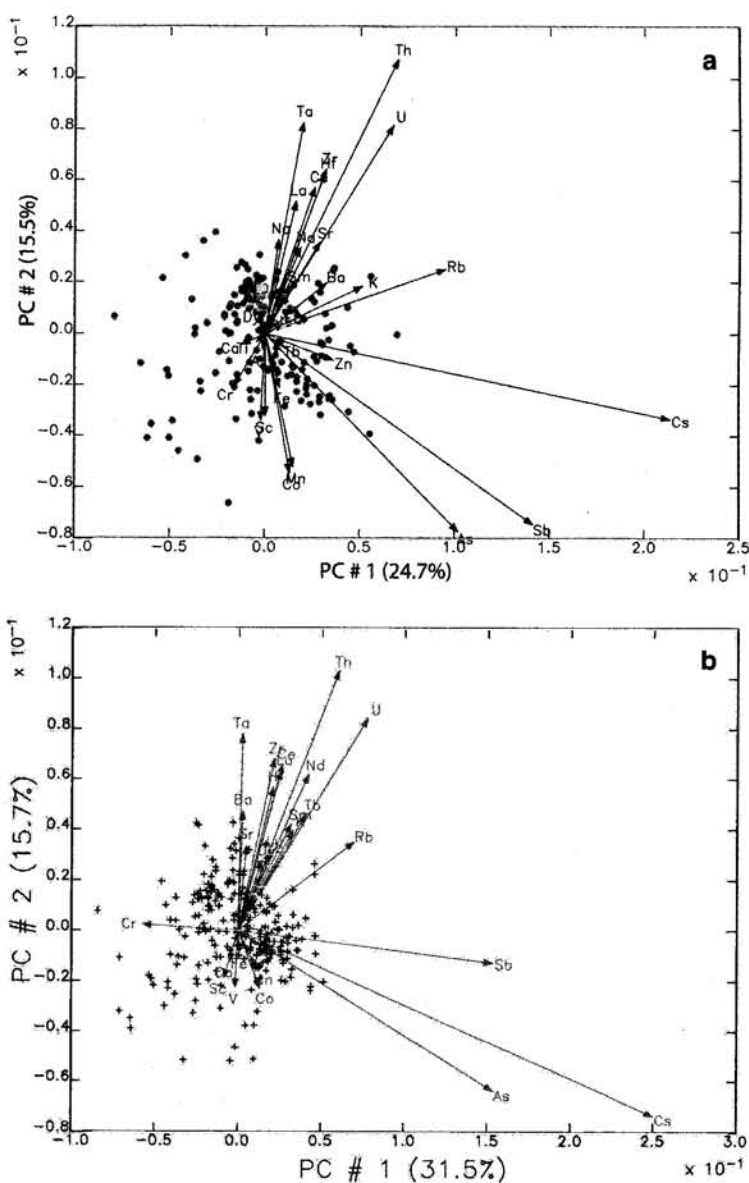


Figure 16.7. Scatterplot of PC scores and loading vectors for the first two PCs calculated from the analyzed 178 smoking pipe samples (a) and 228 ceramic sherds (b). Elemental-loading vectors are shown and labeled. Smoking pipe (•) and ceramic specimens (+) are shown.

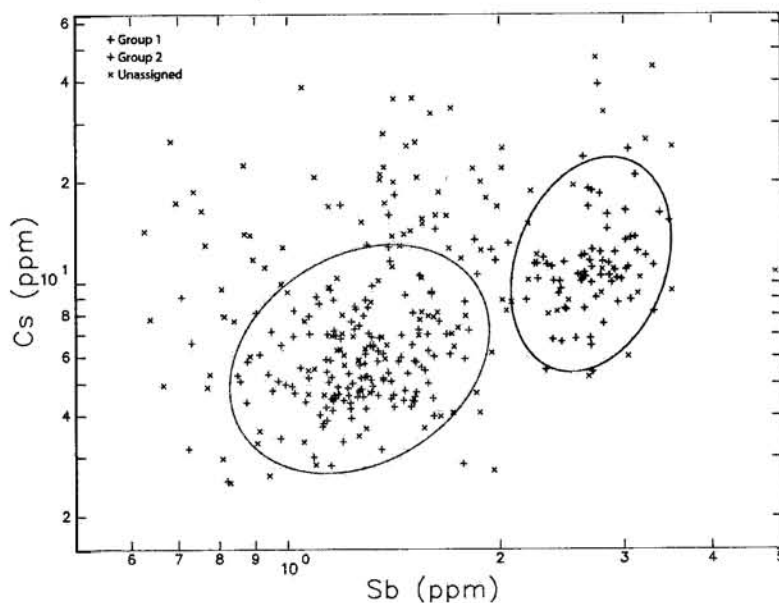


Figure 16.8. Log-log scatterplot of Rb and Cs concentrations in the La Granja data set. Compositional groups are shown with 90% confidence ellipses. Unassigned specimens are shown.

TABLE 16.8. CHEMICAL GROUPS DETERMINED BY INAA AND MAHALANOBIS DISTANCES FOR POTTERY AND SMOKING PIPE SAMPLES FROM THE LA GRANJA SITE

| | GROUP 1 | GROUP 2 | UNASSIGNED | TOTAL |
|---------------|---------|---------|------------|-------|
| Pottery | 47 | 113 | 68 | 228 |
| | 20.61% | 49.56% | 29.82% | 100% |
| Smoking Pipes | 21 | 103 | 54 | 178 |
| | 11.80% | 57.87% | 30.34% | 100% |
| Total | 68 | 216 | 122 | 406 |
| | 16.75% | 53.20% | 30.05% | 100% |

quite homogeneous, and a separation between two groups begins to appear. This preliminary look at the results indicates that both types of artifacts were produced with raw materials from the same array of sources and most likely using similar "recipes" for paste preparation, as the paste data suggest.

The results of a principal component analysis (PCA) of smoking pipes and pottery samples show that the chemical profile of the entire range of samples is quite homogenous (Figure 16.8). Two core groups are statistically distinguishable from each other, based on group membership probabilities for the first 12 components, which subsume 90% of the total variance in the data. Many unassigned specimens show similar elemental patterns as Groups 1 or 2. Only a few of the samples in the compositional space do not form clusters to suggest other groupings. A total of 70% of the samples were assigned to one of the chemical groups, and 30% were left

unassigned. Each of the groups contains sizeable representations of both pipes and drinking pots (Table 16.8).

The fact that the total sample can be organized into just two chemical groups can be interpreted in two possible ways: (1) the sample analyzed comes from just two clay source zones (or localities), or (2) the sample analyzed comes from a larger number of sources that are so geochemically similar that we cannot distinguish among them. This often occurs within the same locality.

Smoking pipes belonging to each of the two chemical groups are distributed randomly among the intrasite concentrations at the site of La Granja ($\chi^2 = 26.342$, $df = 18$, $p = 0.092$) and among the paste groups ($\chi^2 = 22.799$, $df = 18$, $p = 0.198$) (Figure 16.9; Table 16.9). For the drinking pots, Group 1 is found more frequently in concentrations C.3 and C.4. The only difference we have noticed in relation to the vessels' attributes, from a geochemical perspective, is that the sample of wide-mouth pots

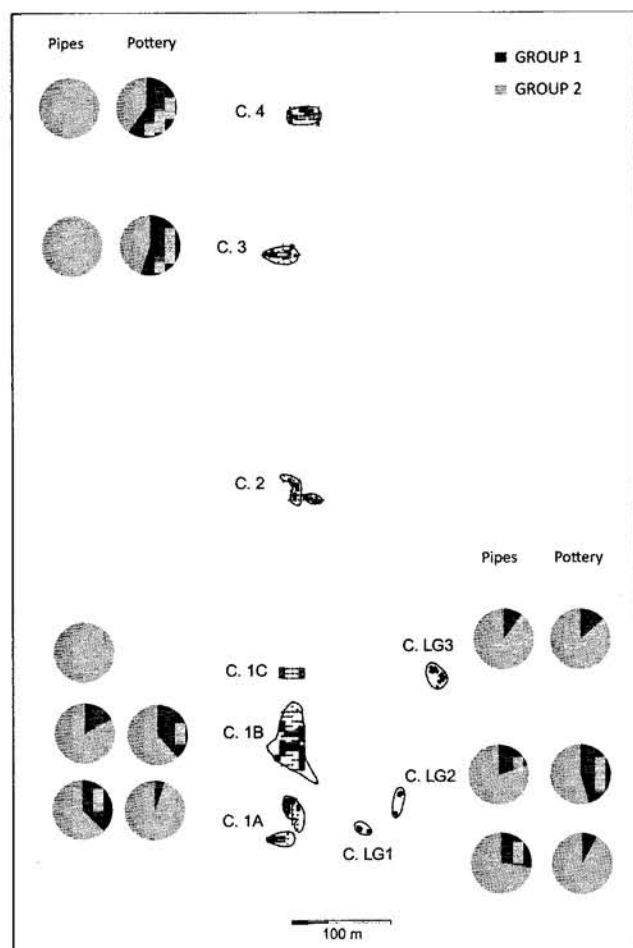


Figure 16.9. Distribution of INAA chemical groups for smoking pipes and pottery sherds in the concentrations of the La Granja site.

is concentrated in Group 1. In fact, 7 out of 10 samples assigned to a chemical group were included in it.

Because no other chemical studies have been conducted in the immediate Rancagua area, information is drawn from INAA in the Angostura region in order to provide a wider spatial perspective on the La Granja data. The PCA of the La Granja samples analyzed together with the Angostura region cooking pots shows that although many samples from both regions overlap, the La Granja samples tend to be higher on PC#2 and lower on PC#1 compared with the Angostura samples (Figure 16.10).

The projection of smoking pipes from La Granja against the two chemical reference groups for the drinking pots at this site and the five chemical groups identified for cooking pots found at sites in the Angostura region shows that 82% of the samples belong to Groups 1 or 2

of the La Granja drinking pots (Figure 16.11; Table 16.10). This implies that the chemical fingerprint of the smoking pipes is preponderantly similar to La Granja pots, and the number of samples with Angostura chemical signatures is comparatively very low. These results suggest that the vast majority of the artifacts from La Granja studied—both smoking pipes and drinking pots—probably came from a few resource supply zones or different zones with very similar chemical profiles, which often occurs within a specific geographic space.

CONCLUSIONS

This study sought to offer new lines of evidence that could help clarify the role that the La Granja site played in the social organization of Llolleo groups. La Granja is an extremely complex site (Barrera 2016; Planella et al. 2000) with archaeological deposits that differ dramatically from those found at other Llolleo sites. That complexity may in part be due to the great variety of activities that go on in such social gathering spaces (Adán 2014) and in part to the fact that the site was used by several generations of Llolleo participants. The excavations conducted have been spatially discontinuous, and the deposits of extensive sectors are still unknown, as indicated in Figure 16.3. The eastern and southern limits of the space that could potentially have been occupied are defined by the main watercourse of the Cachapoal River and its floodplain. Even so, it is difficult to determine the western limits of these occupations and the characteristics of deposits beyond the sectors that have been excavated. As such, the scope of what we can determine about the dynamics of the social gatherings held in this place is constrained by the information we have obtained from these very limited spaces.

Another aspect worth noting is that the sherds selected for paste and chemical analysis were not only limited for a deposit built up over so many years, but this also necessarily skewed the information gathered toward the most frequent and recurrent characteristics, while underrepresenting or even missing unusual attributes or unique pieces. In other words, the study shows us the panorama of artifacts most frequently used at these events and points to the types of persons and ceremonies that generated the most waste.

Considering the above, the main conclusions are (1) no

TABLE 16.9. DISTRIBUTION OF CHEMICAL GROUPS AT THE LA GRANJA SITE

| SMOKING PIPE SAMPLES | | | | | | | |
|----------------------|----------|------|----------|------|------------|------|----------|
| Concentration | Group 1 | | Group 2 | | Unassigned | | Total |
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> |
| C.1A | 3 | 37.5 | 5 | 62.5 | 0 | 0.0 | 8 |
| C.1B | 9 | 12.9 | 44 | 62.9 | 17 | 24.3 | 70 |
| C.1C | 0 | 0.0 | 6 | 85.7 | 1 | 14.3 | 7 |
| C.2 | 2 | 18.2 | 5 | 45.5 | 4 | 36.4 | 11 |
| C.3 | 0 | 0.0 | 2 | 66.7 | 1 | 33.3 | 3 |
| C.4 | 0 | 0.0 | 2 | 100 | 0 | 0.0 | 2 |
| C.LG1 | 3 | 17.6 | 8 | 47.1 | 6 | 35.3 | 17 |
| C.LG2 | 1 | 6.7 | 4 | 26.7 | 10 | 66.7 | 15 |
| C.LG3 | 3 | 6.7 | 27 | 60.0 | 15 | 33.3 | 45 |
| Total | 21 | 11.8 | 103 | 57.9 | 54 | 30.3 | 178 |

| POTTERY SAMPLES | | | | | | | |
|-----------------|----------|------|----------|------|------------|------|----------|
| Concentration | Group 1 | | Group 2 | | Unassigned | | Total |
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> |
| C.1A | 1 | 3.7 | 18 | 66.7 | 8 | 29.6 | 27 |
| C.1B | 13 | 20.3 | 21 | 32.8 | 30 | 46.9 | 64 |
| C.3 | 11 | 50.0 | 9 | 40.9 | 2 | 9.1 | 22 |
| C.4 | 12 | 44.4 | 8 | 29.6 | 7 | 25.9 | 27 |
| C.LG1 | 2 | 6.9 | 23 | 79.3 | 4 | 13.8 | 29 |
| C.LG2 | 5 | 23.8 | 6 | 28.6 | 10 | 47.6 | 21 |
| C.LG3 | 3 | 7.9 | 19 | 50.0 | 16 | 42.1 | 38 |
| Total | 47 | 20.6 | 104 | 45.6 | 77 | 33.8 | 228 |

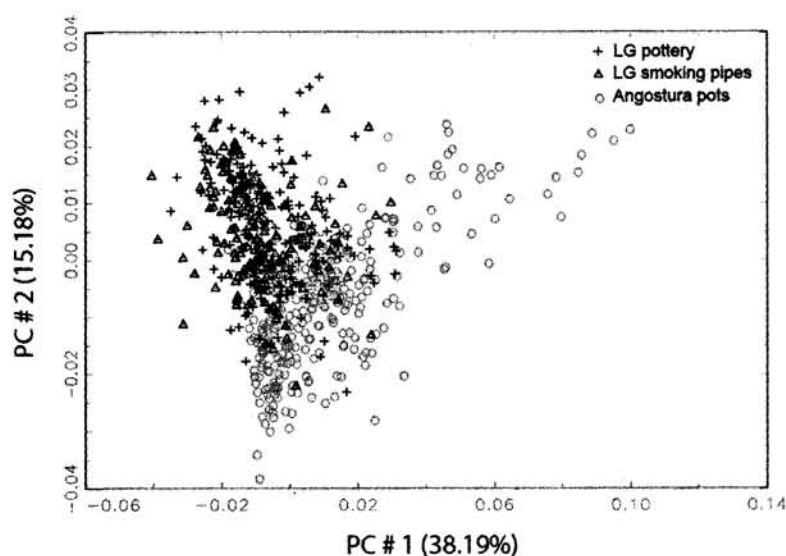


Figure 16.10. Scatterplot of PC scores for the first and second PCs calculated from the entire La Granja database and from cooking pot samples in the Angostura region.

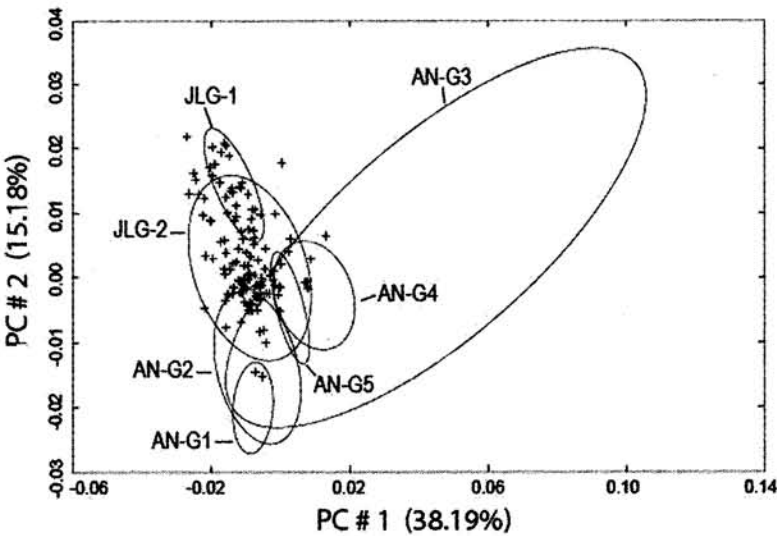


Figure 16.11. Projection of smoking pipe samples from the La Granja database on the 90% confidence ellipses for reference groups of the La Granja drinking pots (JLG-1 and JLG-2) and of the Angostura region database (AN-G1, AN-G2, AN-G3, AN-G4, and AN-G5).

TABLE 16.10. MAHALANOBIS DISTANCE CALCULATIONS FOR PROJECTION OF SAMPLES OF SMOKING PIPES FROM THE LA GRANJA SITE INTO CORE GROUPS FOR LA GRANJA AND ANGOSTURA REGION POTTERY

| SUMMARY OF BEST CLASSIFICATION OF PROJECTED SPECIMENS | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-----------|
| Into: | | | | | | | | |
| From: | JLG-1 | JLG-2 | AN-G1 | AN-G2 | AN-G3 | AN-G4 | AN-G5 | Total (n) |
| Pipes-LG | 13 | 133 | 2 | 9 | 12 | 2 | 7 | 178 |
| Total (%) | 7.3 | 74.7 | 18 | | | | | 100 |

Note: Pipes-LG = Smoking pipes from the La Granja site; JLG = La Granja pottery; and AN = Angostura region pottery.

local smoking pipe “microstyles” could be determined for the Llolleo communities. Smoking pipes had an external appearance that was shared by Llolleo communities, pointing to regional and/or supraregional codes that probably helped to reinforce a macro group identity. (2) Analyses of the visual, technological, and/or chemical characteristics of the pipes found at the La Granja site provided little evidence for identifying the “ritual” sector, C.LG3, as the locus where all of the participants gathered together. While this sector stands out for the stone alignments, the density of smoking pipe fragments, and the high frequency of polished black pieces found there (a color resulting from smoke during firing)—three special characteristics of this and no other sector—it displayed less variability/diversity, including few decorated pieces and few special morphological types of pipes. (3) We expected to find several chemical groups corresponding to the presence of diverse, far-flung communities at the site. However, the results grouped together in two clusters that could point either to the presence of local groups or to a problem with the resolution of geochemical

signatures in this area of study that would require further evaluation. The comparison of the La Granja samples with samples analyzed by INAA from vessels found in Llolleo communities around 30 km away indicates that the vast majority of pipes at La Granja fall into the same group as the drinking pots from the same site, suggesting a provenience within the same locality. This may be the most interesting piece of information extracted from the evaluation of the La Granja site as a supraregional social gathering place. In relation to current models (Falabella et al. 2016), the structure of this site and its materials suggest that it was a place that was occupied differently from other Llolleo domestic sites known to date; it was probably a place where social gatherings were held. Nevertheless, this finding significantly reduces the spatial scale of the communities represented at the sociopolitical events held there and the possible networks of interaction and integration implied by these data. It is important to note that this does not rule out the occasional or irregular presence of foreign artifacts (and/or individuals) there. (4) Lastly, given the similarities of paste groups and

chemical signatures, it is highly likely that the pipes and drinking pots were manufactured in the same localities, perhaps even by the same artisans. Thus, if the participants brought their personal artifacts (pipes and drinking pots) with them to these meetings, as has been described in Mapuche ethnographies, then they would have to have brought both pipes and drinking pots; or, if these items were provided by local residents who organized the festivities, then they would have to have provided both types of artifacts.

Although the conclusions drawn here are necessarily tentative and may change with additional data, the results do not support the hypothesis of La Granja being a central place for a wide range of Llolleo communities in central Chile. Although La Granja was apparently a primary center for group cohesion mediated by rituals involving the smoking of hallucinogenic substances, it may not have functioned on a supraregional basis as previously thought. The features found at this site and its materials suggest that it was a place occupied in a different way than other Llolleo domestic sites known to date. However, if smoking pipes and pottery are used as a proxy for the circulation of people, regular social interaction leading to group integration might have been more restricted in the Llolleo social system. Both because there are just two chemical groups (or resource zones) and because of the evidence that inhabitants of nearby Llolleo communities, such as those living in Angostura, were not regular visitors or were not regularly providing artifacts to La Granja, social processes and interaction scales should be reconsidered.

ACKNOWLEDGMENTS

The research was conducted with the Grant FONDECYT 1121097 (Los Complejos Fumatorios del Período Alfarero

Temprano en Chile Semiárido y Centro-sur: Un Estudio Multidisciplinario). Partial support for the analysis of samples in the Archaeometry Laboratory at MURR was provided by grants from the National Science Foundation (#1110793 and #1415403). We thank all coinvestigators and those who helped us with their data and discussions on a site as complex as La Granja. The editors of this volume and one reviewer provided many helpful comments for improving the original manuscript. The INAA data and sample descriptions from this project are available from the Archaeometry Laboratory website: <http://archaeometry.missouri.edu/datasets/datasets.html>.

NOTES

1. We understand local communities as supra-household groupings of repeated meaningful interaction that generate and are generated by daily routines and encourage the formation of a sense of identity (Yaeger and Canuto 2000). Different communities are separated by sufficiently small distances to make regular cooperative relations possible, and are also separated by sufficient distance to make them difficult, as well as by spaces that are empty or hardly populated (Falabella et al. 2014).
2. Smoking pipe fragments within each concentration that did not conjoin with any other fragment were considered a single specimen of smoking pipe for quantification purposes.
3. In the recent reevaluation of the functions of the different concentrations found at the La Granja site, C.1B has been considered a zone of social gathering and a waste dump for large group celebrations, while C.2 has been deemed a domestic zone (Barrera 2016).
4. Because the degree of archaeological intervention at these sites varies greatly, we used density (density = $n \text{ pipes} / n \text{ 1,000 vessel fragments}$) as a comparative criterion to approximate the relative abundance of pipes at each site rather than the absolute number of fragments of smoking pipes recorded.