

Technological study of the “La Paya” ceramic collection from Peter the Great Museum of Anthropology and Ethnography (Kunstkamera, Russia)



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Abstract

The Calchaquí Valley archaeological complex presents numerous Santamariana-Calchaquí ceramics of varied production techniques, shapes, and painted decoration. The most frequent ceramic containers are bowls, so widely spread that they were used for manufacturing complex shapes (burial urns, asymmetric pots, and libation vessels). The technological analysis of La Paya vessels and their replication through experimentation allowed us to identify traditional technologies specific to the Calchaquí Valley pottery production, such as the usage of molds. According to ethnographic collections, South and North American cultures created different vessels using organic materials, such as baskets. Analysis of ceramic container surfaces showed that baskets may have served as molds to manufacture some of the bowls belonging to the Santamariana-Calchaquí stylistic tradition.

KEYWORDS: Argentine Northwest; Calchaquí Valley; Late period; Pottery; Mold; Basketry; Archaeological experimentation

El estudio tecnológico de la colección cerámica “La Paya” del Museo de Antropología y Etnografía Pedro El Grande (Kunstkamera, Rusia)

Resumen

El complejo arqueológico del Valle Calchaquí se caracteriza por su abundante registro de cerámica Santamariana-Calchaquí, que muestra variedad en la tecnología de

producción, formas y ornamentación. El recipiente cerámico más frecuente es la escudilla, de tan amplia aplicación que incluso se usó en la construcción de otros recipientes más complejos (e.g. urnas funerarias, ollas asimétricas, vasos "libatorios"). El estudio tecnológico de las escudillas de La Paya y su reproducción mediante prácticas experimentales permitió identificar tradiciones tecnológicas típicas de la producción cerámica del Valle Calchaquí, como la utilización de moldes. Según colecciones etnográficas, las culturas de América del Sur y del Norte manufacturaron diversidad de vasijas usando materiales orgánicos, tales como los cestos. El análisis de las superficies de las vasijas cerámicas muestra que los cestos habrían sido utilizados como moldes para la manufactura de algunas escudillas de la tradición estilística Santamariana-Calchaquí.

PALABRAS CLAVE: Noroeste Argentino; Valle Calchaquí; Período Tardío; Cerámica; Molde; Cestería; Experimentación arqueológica

Introduction

The Russian Academy of Sciences Peter the Great Museum of Anthropology and Ethnography (MAE)¹ in St. Petersburg has a collection of 104 ceramic vessels that arrived in 1909 as a result of an exchange with the Museo Etnográfico "J. B. Ambrosetti" in Buenos Aires (Ambrosetti, 1912, pp. 6-7; Dmitrenko, 2017; Sprovieri y Dmitrenko, 2020). The collection had been compiled by its founder and first director, Juan Bautista Ambrosetti, to showcase the diversity and richness of Northwest Argentina's ceramics from the Calchaquí Valley. The vessels come from the following archaeological sites: La Paya, Guitián², La Poma and Payogasta.

Letters sent to Ambrosetti by Leo Sternberg inform that the vessels broke into several fragments during sea shipment. Even though successful, the subsequent restoration and shape reconstruction of these vessels hindered further studies of their production techniques because of glue and plaster covering most technological traces on their surfaces. The collection included different types of ceramic vessels: painted bowls³, black polished bowls, libation vessels, wide rimmed jars (*ollitas de cuello evertido* or *vasos de boca ancha*, *sensu* Ambrosetti, 1907), urns, and asymmetric jugs. However, most of the collection consists of bowls (71 pieces), presenting different shapes, sizes, and surface treatments.

A significant aspect of the study of Northwest Argentina's Late period (called *Período de Desarrollos Regionales*) is the analysis of ceramic materials and their production techniques (Baldini y Balbarrey, 2004; Baldini y Sprovieri, 2014; Calo, 2008; De La Fuente, 2011a, 2015; Cremonte, 1984; Pérez y Gasparotti, 2016; Tarragó y Renard 1999; among others). This paper aims to identify a particular technique used to produce several bowls during the Late period in the Calchaquí Valley. Understanding the techniques

1 The Museum of Anthropology and Ethnography (MAE) got its official name in 1878 and belonged to various authorities until 1992. It finally became Peter the Great Museum of Anthropology and Ethnography of the Russian Academy of Sciences (RAS) in 1992. Through all these years, however, it was the same museum: The Museum of Anthropology and Ethnography.

2 The site of Guitián is located on the north bank of the La Paya River. This site was most likely built during the Inca Period and is considered part of the La Paya archaeological locality by Ambrosetti (Sprovieri, 2013, pp. 51).

3 The author uses this term for both shapes: *escudilla* and *bol*.

employed for manufacturing bowls is relevant because other more complex shapes were based on them (e.g., libation vessels, *ollas*, burial urns).

Methodology

Santamariana-Calchaquí ceramics have a variety of technological features. The ceramics housed in the MAE were analyzed by a binocular stereoscopic microscope (MBS-10) of 56x magnification, following A. A. Bobrinsky's approach. This method combines the microscopic study of pottery production with experimental and ethnographic studies to infer the variety of socio-cultural patterns. It is based on the hypothesis that the methodology of the vessel's body fabrication and shape changed slowly in ethnographic and archaeological ceramics (Bobrinsky 1978; Tsetlin, 2010, 2012, pp. 131-133).

The study included 33 bowls (called *pucos*) collected by Ambrosetti in 1906-1907 during his excavations in La Paya and currently housed at the MAE (Ambrosetti, 1907; Sprovieri, 2013). According to their shapes, they could be classified as follows: a) truncated conical dish with convex rim; b) hemispheric bowl; c) hemispheric bowl with convex rim; d) truncated conical dish with straight collar; e) truncated conical bowl with arched collar; f) bell-shaped bowl (*campanuliforme*); and g) truncated conical dish (atypical for the MAE collection) (Figure 1).

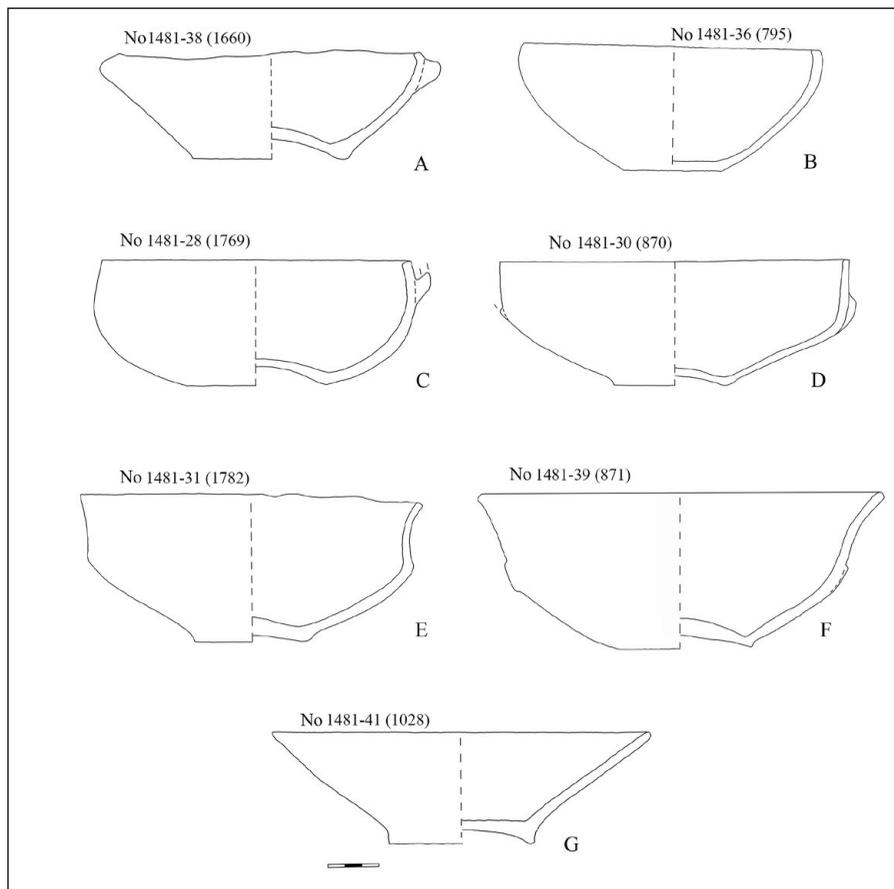


Figure 1. La Paya" bowl shapes from the MAE-RAS collection: A) truncated conical dish with convex rim; B) hemispheric bowl; C) hemispheric bowl with convex rim; D) truncated conical dish with straight collar; E) truncated conical bowl with arched collar; F) bell-shaped bowl (*campanuliforme*); G) truncated conical dish (atypical for MAE collection).

Description of materials with imprints

Very distinctive imprints have been identified through cross-light photography near the base on the exterior surface of two types of vessels: hemispheric bowls and truncated conical dishes with straight collars. Such imprints could be a product of a fabric used for modeling pressure vessels into a mold cavity. But they do not look like textile imprints because no crisscross pattern of woven fabric is present. Such textures usually leave imprints of lengthwise and weft thread. At first sight, imprints on La Paya vessels look like imprints from a net with diagonal stitches and lines of 0,4-0,5 cm long resembling thread. However, imprints found on the bowls usually create only diagonal lines of stitches (2-3 lines) and do not have a regular textile or woven texture on the inner surface. In each case, imprints are visible on a surface that lost its slipcover and consequently lost its original texture of the thread inside imprints.

Pieces number (N°) 870 and 922 (Table 1) are examples of bowls with straight collars that exhibit imprints. Bowl N° 870 (MAE N° 1481-30), from sepulcher LIV within the perimetral walls of the La Paya site, has a partial slipcover and fragments of painted ornaments with square spirals (*grecas*) (Figure 2A y 2E). Bas-relief imprints are visible on the near-bottom outer surface (Figure 2D y 2F), while rough scrapped traces of tools are also visible on the base of the inner surface (Figure 2C). The tool traces are similar to a modern potter's knife used to cut out excess clay and thin out vessel walls (Figure 2G y 2H). Ambrosetti did not send any tools for ceramic production from La Paya to the MAE. But they could have been comparable to bone tools present in the contemporaneous collection from the Pucara de Tilcara, presumably used for surface treatment of vessels. They have a strongly flattened thin edge on one end with rough use-wear traces on and around it (MAE N° 1800-85, 7555) (Figure 3). A few of them contain pigment residues of black and red color on the surface. It is, however, only an assumption that needs to be tested by further traceology studies. Traces on the interior surface of the bowl may be the result of a surface finishing treatment like the one identified by De la Fuente for Sanagasta bowls from the Abaucán Valley:

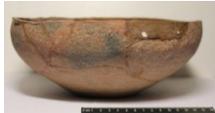
Item No.	MAE storage number* (Ethnography Museum of Buenos Aires field numbers, used by Ambrosetti (1907))	Name	La Paya structures and page numbers by Ambrosetti (1907)	Picture
1	1481-30 (870)	truncated conical with straight collar	32 (Sep. LIV), p. 119	
2	1481-69 (1439)	hemispheric	34 (Hall. CCIV), p. 121	
3	6741-5 (753)	hemispheric with convex rim	106 (Sep. II), pp.191-193	
4	6741-13 (922)	truncated conical with arched collar	27 (Sep. XLIII), p.115	

Table 1. La Paya bowls with imprints of "lattice twinning" woven baskets on external surfaces.

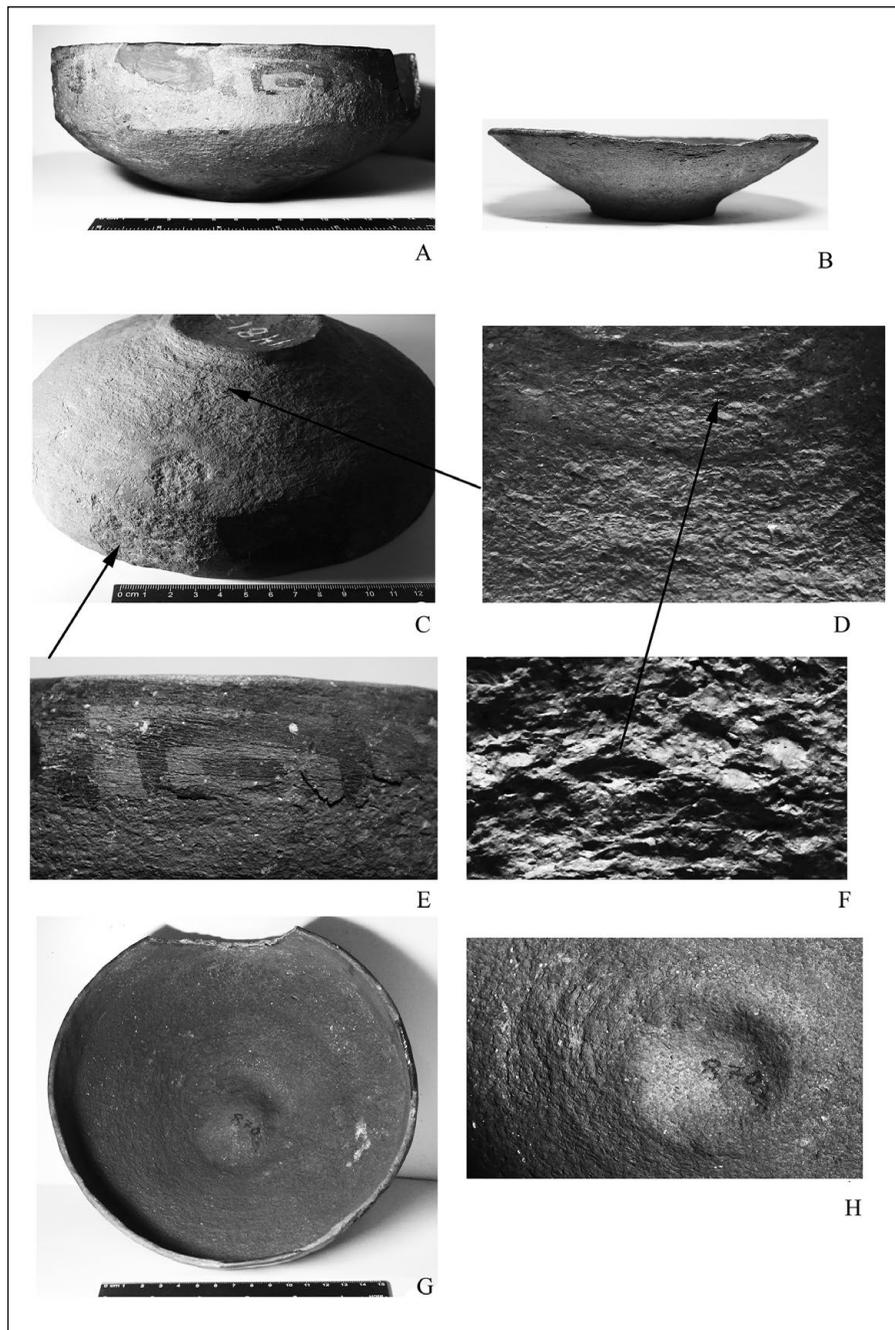


Figure 2. A) "La Paya" straight vertical rim bowl (MAE N° 1481-30[870]); B) truncated conical dish (Ambrosetti N° 1028 (MAE N° 1481-41); C) external near-bottom surface of the bowl photographed in cross-light; D) relief imprints on external near-bottom surface; E) external surface partly preserved slip covered with painted ornament; F) macrophotography of "textile" imprints exposed after the loss of slipcover; G) internal surface of the bowl with scrapped concentric traces; H) traces of scrapping on the internal surface.

Secondary forming techniques: 1. paddle and anvil was determined in different sections of the body to achieve an even thickness in all vessel walls and to eliminate air pores in order to get an optimum dry (Figure 7); 2. smoothing was identified in all analyzed bowls; it was easily observed in the concentric marks left by the potter's hand both in the external and internal surfaces of the vessels (Figure 7) (De la Fuente, 2011b, p. 92).

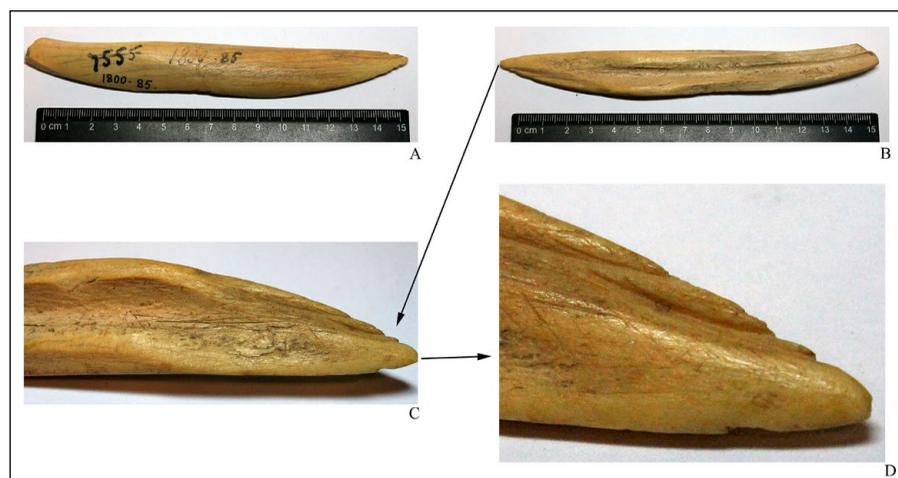


Figure 3. Bone tool from Pucara de Tilcara fortress (MAE N° 1800-85 (Ambrosetti N° 7555). A-B) front and back side; C) rough use-wear traces on the edge; D) macrophotography of the edge.

Bowl N° 922 (MAE N° 6741-13) was found in sepulcher XLIII and partially preserves painting designs on the interior and exterior surfaces near the base. Similar to piece N° 870, it also shows diagonal discontinued thread imprints on the outer surface. The main feature of these bowls' shape was their manufacture in two distinct steps: 1) the body and 2) the collar. Most of these bowls exhibit flaws in the seam between these two parts of the pieces.

The bottom section of truncated conical bowls with straight collars is similar to the truncated conical dish (atypical) N° 1028 (MAE N° 1481-41) (Figure 2B). Relief straight imprints are visible on its rim's exterior surface, presumably a result of a coiled basket, tilted nearly 30-40 degrees towards the edge, and lightly covered by a slip.

There are also imprints visible on two hemispheric bowls: N° 753 (MAE N° 6741-5) from sepulcher II within the perimetral walls of the settlement and N° 1439 (MAE N° 1481-69) from sepulcher CCIV from the necropolis. The first bowl exhibits imprints of thread stitches in different areas of its outer surface, and the second bowl has them close to the base.

Baskets from La Paya

The study of two basketry specimens recovered by Ambrosetti during his excavations at La Paya was possible in July 2017. The first specimen was an oval fragment of a basket wall (Ethnography Museum of Buenos Aires field number, used by Ambrosetti (1907) N° 1649, Museo Etnográfico "J. B. Ambrosetti" (MEJBA -28790-), whose structure appeared to be very similar to the imprints found on the external surface of bowls (MAE N° 1481-30,69; N° 6741-5,13) (Figure 4A y 4B).

Magnified photographs of the basket fragment N° 1649 (Figure 4C y 4D) allowed us to better appreciate the manufacturing technique. The basket was made of pairs of twigs woven together perpendicularly by a thread made of vegetal fibers passing under and over two twigs at a time. The 0,5-1,0 cm length thread stitches are at a diagonal angle on the external surface and are vertical on the internal one, a technique commonly referred to as "lattice twinning" (Smith-Ferri, 2018, p. 34).

The second basket specimen (N° 1650, MEJBA -28791-) was woven using the so-called "coiling" technique (Figure 4E y 4F), possibly used in the production of La Paya ceramics.

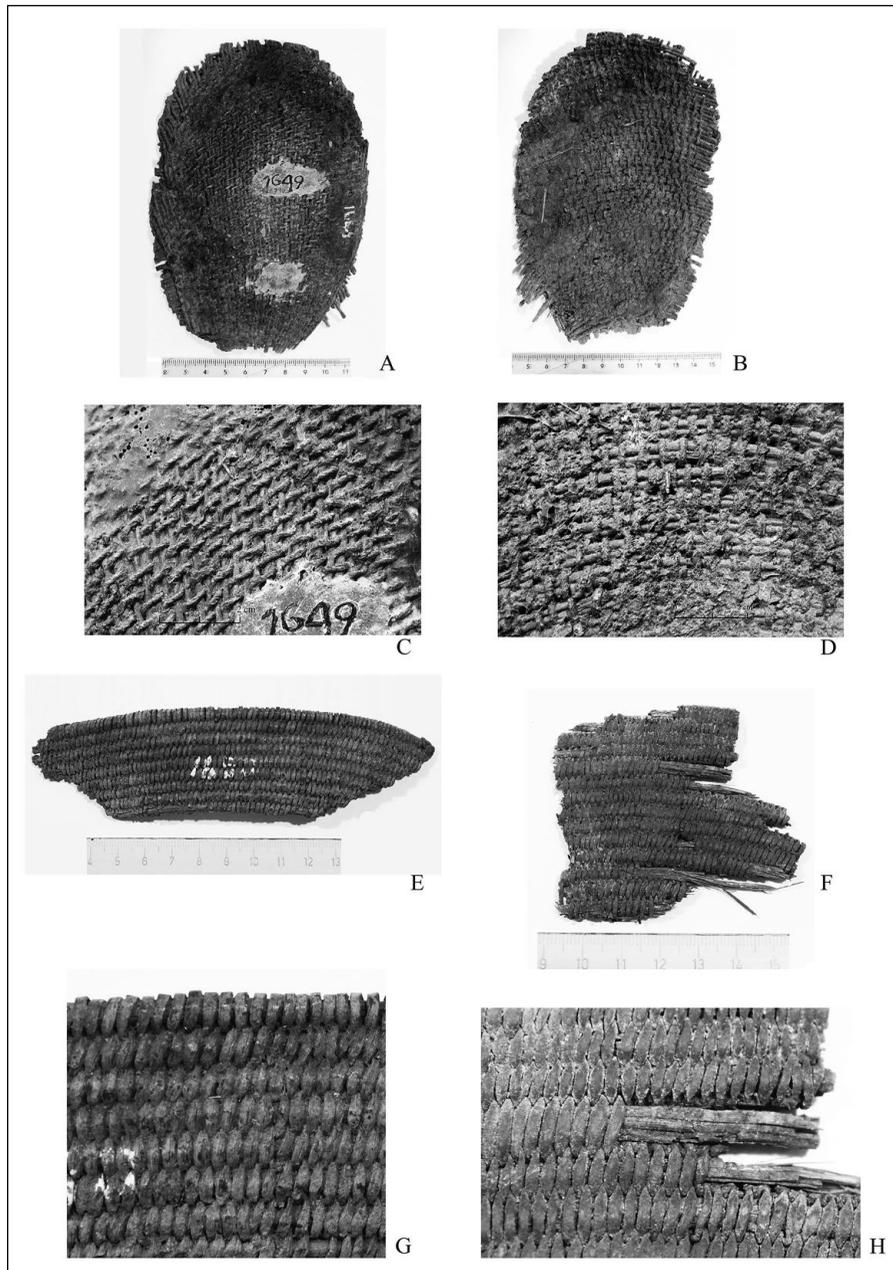


Figure 4. Archaeological samples from the La Paya site. A-B) external and internal views of a fragment of twilled basket (MEJBA -28790- 1907, hallazgo 241, Ambrosetti N° 1649); C) macrophotography of external surface with diagonal thread stitches; D). macrophotography of internal surface with vertical thread stitches; E-F) external view of fragments of coiled basket (MEJBA -28791- 1907, hallazgo 241, Ambrosetti N° 1650); G) macrophotography of horizontal basket rows entwined by bark or root cover strips; H) macrophotography of horizontal basket rows made of plant stems (cane or rush).

Only tight, long fragments of 3-4 weaving rows remained, made of plant stems (cane or rush), entwined by bark or root cover strips (Figure 4G y 4H). This kind of basket leaves tight, wide relief imprints, also described by Ambrosetti in the external surface of a miniature "Calchaqui" vessel (Ambrosetti, 1902, p. 132) and by Márquez-Miranda on two pottery containers recovered in Catamarca province (Márquez-Miranda, 1946, p. 210). Several asymmetric vessels in the MAE collection appear to preserve horizontal imprints of coiled strips close to the exterior surface of the base, but most of them disappeared

during surface smoothing. This assumption about using coiled baskets for asymmetric vessel production must be additionally analyzed and proved by further experiments.

Ethnographic Analogies

The “lattice twinning” technique is well known in the archaeological Andean tradition and widespread in South American ethnography. For example, Ye’kwana people of Venezuela and Brazil traditionally produced large, twined hourglass-shaped *wuwa* baskets made with roots of hemiepiphyte plants, used to carry *yuca*, firewood and other heavy loads (Wilkins y Hinojosa, 2016, p. 573). The Paressí people (Paresi-Haliti, Brazil) applied the same technique for making baskets for different types of loads (O’Neale, 1949, p. 20), and in Vaupés Department (Colombia) Cubeo people also used twined baskets for the same purposes (Goldman 1948, p. 95).

We needed a physical example of the twinning technique to make an experimental sample, and a pair of sieves manufactured by Pomo Indians available on the MAE ethnographic storage were close analogues of such a weaving technique (Figure 5A). These sieves, bought in the Ross settlement by Ilya Gavrilovich Voznesensky, a traveler who visited northern California during 1840-1845, were used for sifting through corn flour and were made of willow twigs tightened by strips of sedge or redbud roots (Figure 5B). The maximum diameter of their rims is approximately 30 cm. The California sieves differed slightly from La Paya baskets since they had one-twig twining in contrast to the double-twig twining technique. These sieves did not have second radial transversal rows of twigs, having used raw plant strips for weaving. The shape of these sieves is akin to the form of the base of the La Paya bowls.

Sieves also had one relevant feature: they were flexible, and both surfaces were usable, so both diagonal and vertical imprints could be found on exterior or interior surfaces of clay vessels. The shape of California sieves could be comparable to the baskets used by Santamariana-Calchaquí potters to manufacture the body of bowls with collars. They are also similar regarding the raw materials used in both cases. These examples seem rather distant from Northwestern Argentina, but they were the only accessible empirical samples available for preparing the experiment.

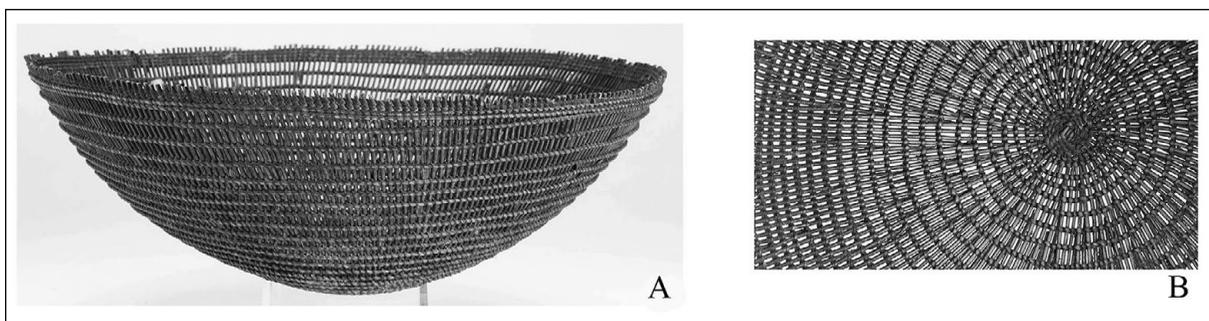


Figure 5. Ethnographic example of Pomo woven sieve. MAE N° 570-88. Diameter: 32 cm. Collector: I. G. Voznesensky in 1840. Place of origin: Ross settlement, California. A) profile view; B) macrophotography of sieve twilling.

The experiment

The hypothesis of using baskets to mold by pressing some of La Paya’s ceramic bowls is based on the naked eye and binocular microscope analysis of the bowls’ base and

near-base surface. However, this hypothesis required confirmation by experimentation. The experiment consisted of making a hemispheric model of a basket with the "lattice twinning" technique and getting its imprints on an experimental clay vessel surface. Thin willow twigs (Figure 6A), comparable in diameter to the archaeological sample from La Paya (Figure 6C), were used to build the basket utilizing a thread made of linen fiber for their weaving.

Repeating the structure of basket N° 28790 (Figure 6B), two samples were made: one flat and one hemispheric (Figure 6D). The first one was used to imprint both on flat clay tablets and on the surface of a small hemispherical experimental clay bowl, considering that it would make frontal imprints without deformation, whereas the hemispherical one would allow to get imprints like those of the archaeological samples (Figure 6E).

Flat clay samples, built with bands of natural ferrous clay, were used as imprint samples (Figure 6F). When the body of a vessel is molded inside a basket, its surface needs further processing to tighten the junctions of the clay coils (Villacorta Ostolaza, 2007, p. 24) or lumps (Rice, 1987, p. 125) (to protect them from destruction during the firing). Clay samples were modeled on both the exterior and interior walls of the basket. The first sample was straightly removed from the mold without further treatment (Figure 6G), and the second one was treated with a spatula and anvil (Figure 5). The first one had evident parallel imprints of woody elements (Figure 6I), never recorded in archaeological examples from the MAE. The samples from the interior surface of the basket processed with a spatula and anvil were almost identical to the imprints from the surface of La Paya bowls N° 870 and 1439. This additional surface processing consolidated the joints of building elements and disguised the vertical distinct relief with twigs on the exterior surface. It also had the same diagonal dash lines, consisting of thread stitch imprints 4-5 mm long. Because of the influence of a spatula, their relief was less visible, and the ends of imprints were slightly curved (Figure 6J). Therefore, the structure and configuration of thread imprints from the experimental basket correspond to the imprints on the surface of bowls N° 753, 870, 922, and 1439 (Figure 7).

Discussion and conclusions

The type of imprints, their location, and configuration indicate that Late Period Calchaquí Valley potters presumably used baskets as a mold to shape at least some of their bowls, manufacturing the vessel inside the basket by pressure. The analysis showed that some La Paya bowls were built by coils modeled inside baskets, which left thread imprints on their exterior surfaces.

This study of Santamariana-Calchaquí ceramics technology underscores the need for a specific methodology to analyze their surface, particularly in the areas close to the base. Cross-light photography combined with experimental and binocular analysis were the chosen methods. Cross-light is important for the detection of imprints in the first stage of analysis, usually found on the exterior surfaces that have lost their slip. The experimental samples showed features of imprints according to different kinds of surface treatment, including the disappearance of wrap imprints as a result of knocking out the surface with a spatula and anvil. The most important sources for the experimental reconstruction were the examples from ethnographic databases. The last stage of analysis was binocular observation, which showed differences and similarities between archaeological and experimental imprints.

The analysis of the Santamariana-Calchaquí collection available at the MAE made apparent that the surface of bowls manufactured using baskets needed additional steps. For example, most bowls with straight vertical rims have rough traces of cutting



Figure 6. Experimental production of basket imprints on clay surface. August 2021, Samara. A) gathering of raw material; B) making the imprints of a plate twilled sample; C) preparing of raw material (willow twigs); D) spherical experimental basket; E) thread stitches on the internal basket surface; F) clay plate for experimental production of thread stitches imprints; G) fired clay plates with imprints on the internal surface; H) clay fired plates with imprints on the internal surface treated with spatula and anvil; I) macrophotography of sample N° 5; J) macrophotography of sample N° 6.

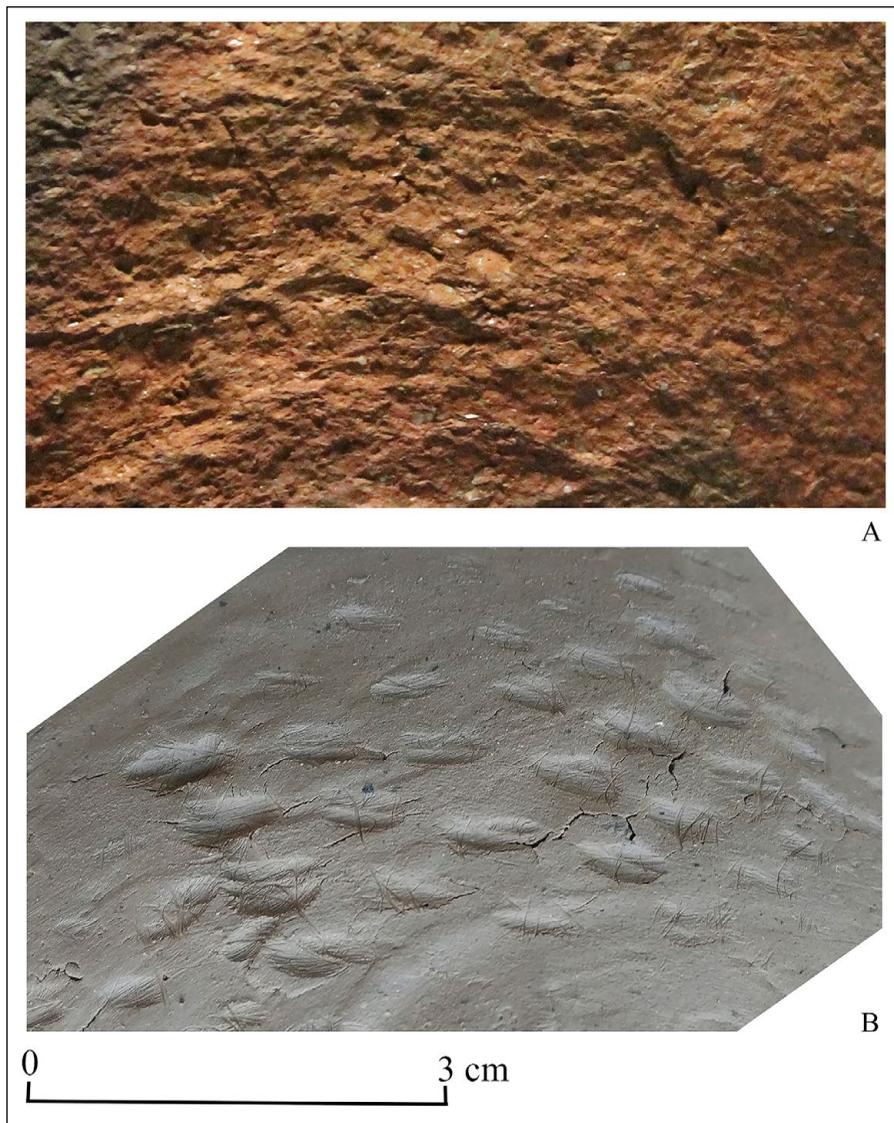


Figure 7. Macrophotography of imprints on archaeological (A) and experimental (B) surfaces.

and scraping out the clay on the interior surface. It appears that potters used that technique to achieve an established (standard) wall thickness. Scientific publications describing similar archaeological examples of imprints on vessel surfaces of “wrapped twining structure” found in Tucumán and Catamarca provinces (Pérez de Micou et al., 2014, pp. 13-14) also corroborate this hypothesis of using baskets as molds to produce ceramic vessels from MAE collection. That publication also describes modern *tipas* baskets manufactured in the Province of Catamarca with two-level crossed with twinning. These ethnographic shapes seem to be uniquely suitable for manufacturing Santamariana-Calchaquí bowls.

By all accounts, the use of semi-spherical and frustoconical bowls as the component of other more complex ceramic shapes was widespread. An example is their use as bottom parts in modeling libation vessels, asymmetric jugs, and funeral urns with three constrictions. In these cases, we can often see open junctions between bands, which lost the clay-jointed constructive elements (near the base, the body of the vessel, and the rim). It appears that the entire process of La Paya ceramics manufacturing was optimized to replicate uncomplicated, well-known pottery operations, which

increased the quality and quantity of ceramics. The production process of La Paya ceramics appears to be quite similar to that of the Batungasta site (Sanagasta culture, Abaucán Valley, Province of Catamarca) (De La Fuente, 2015, pp. 242-247). Likewise, Batungasta ceramics described by De La Fuente (2015) were part of an ongoing tradition of manufacturing ceramics with clay or woven molds. They were used to construct the body and especially the bases of standard-shaped vessels, which required other production steps, as well as cutting out excess clay. That is why we can make an example of bowls with straight vertical rims, evenly matched in shape and size, proving some form of standardization in La Paya. This aspect of standardization promises to be relevant for the research of Santamariana-Calchaquí pottery manufacture and directly depends on further analysis of the bowls' proportions.

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