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Graves, beads, and trade in Northwest Argentina: a first ED-XRF characterization of very well-formed objects

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Abstract

The Tafi Valley has a deep-rooted archaeological research tradition in Northwest Argentina. Most the archaeological settlements are from the Formative Period (500 BC – 1000 AC), these have been studied from several perspectives. This article presents the results of non-destructive ED-XRF analyses on exceptionally manufactured beads dating to 1560 ± 35 BP, recovered from a grave located within a Formative residential unit. The beads were made from chrysocolla, variscite, and turquoise, all of which are foreign materials in the valley. These results indicate that the Tafí Valley was part of the caravan trade route across Northwest Argentina, representing part of the eastern limits of this circulation pattern for the early Formative.

Keywords
ED-XRF
Northwest Argentina
Formative Period
Caravan trade
Beads
Chrysocolla
Turquoise
Variscite

Tumbas, cuentas e intercambio en el noroeste argentino: primera caracterización ED-XRF de objectos excepcionalmente formatizados

Resumen

En el valle de Tafí las investigaciones arqueológicas tienen un profundo acervo histórico para el Noroeste Argentino. La mayoría de los asentamientos arqueológicos pertenecen al Período Formativo (500 BC- 1000 AC), los cuales han sido estudiados desde perspectivas diferentes. Este artículo presenta los resultados obtenidos de materiales recuperados en una tumba ubicada dentro de una unidad residencial Formativa. Se llevaron a cabo análisis no destructivos utilizando la técnica ED-XRF para caracterizar

Palabras clave
ED-XRF
Noroeste Argentino
Período Formativo
Tráfico caravanero
Cuentas
Crisocola
Turquesa
Variscita

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cuentas con diseños excepcionales datadas en 1560±35 BP. Estas se confeccionaron en crisocola, variscita y turquesa, todos alóctonos en el valle. Estos resultados indican que el valle de Tafí formó parte de la ruta de tráfico caravanero que cruzó el Noroeste Argentino como uno de los límites orientales de este patrón de circulación durante el Formativo temprano.

Introduction

The Tafí Valley is an elongated basin of approximately 450 km^2 located in the west of the Tucumán Province, Argentina (Figure 1). The valley bottom is located between 1,800 and 2,500 meters above sea level (masl). Geologically it is a tectonic basin lying to the Northwest of the Sierras Pampeanas (Sierras de Aconquija and Cumbres Calchaquíes, over 3,500-4,000 masl). Metamorphic rocks of Precambric and Cambric ages predominate (banded schists, migmatites, and phyllite), and include lesser outcrops of granite, tonalite, and granodiorite with pegmatite structures. Some quartz dikes with tourmaline cut across these units (Ruiz Huidobro 1972). Quaternary sediments (loess, debris flow, and slope accumulations) dominate the lower areas of the valley, interbedded in some places with tephra layers (Peña Monné and Sampietro Vattuone 2016). The valley climate is semiarid with scarce vegetation, this vegetation is mainly constituted of highland grasses (Sampietro Vattuone 2002).

The Tafí Valley has a deep-rooted, and strong tradition in archaeological research in Northwestern Argentina (NW Argentina). Its Formative settlements (500 BC – 1000 AC) were among the earliest agricultural sites in this region. They are well known and have been studied from several perspectives, such as settlement patterns, agricultural practices, soil deterioration, geoarchaeological analysis, among others (Sampietro Vattuone 2010; Roldán 2014; among others). Stone monoliths (up to 3 m high) and stone-rooms dating to the earliest Prehispanic population in Tafi, were discovered during the first archaeological research studies conducted in Northwestern Argentina (Ambrosetti 1897; Bennett *et al.* 1948; Lafone Quevedo 1902). However, González and Núñez Regueiro in the 1960's were the first ones to characterize the Tafí Culture (González y Núñez Regueiro 1960).

Nowadays, researchers define the Tafí Culture by its lithic sculptures (stone monoliths and stone masks), settlement patterns (circular rooms built with dry stone technique, either isolated or clustered in varying numbers around a central patio, sometimes agglutinating into more complex sets), agricultural structures, and its ceremonial center (a mound associated with several stone monoliths at the Casas Viejas archaeological site, El Mollar) (Berberián 1988; Sampietro Vattuone 2002, 2010; Tartusi and Núñez Regueiro 1993). Tafí Culture radiocarbon dates obtained so far range between 2296±70 BP (413-207 cal BC) (González 1965) and 1040±20 BP (993-1017 cal AD) (Roldán *et al.* 2016).

The domestic economy of this population had as its final objective the reproduction of the family unit. The domestic activity included a common ritual component, evidenced in the existence of human inhumations, and the presence of stone monoliths within the domestic space. In this sense, they constructed stone structures in the patio of the residential units and used them as food deposit chambers, silos, and funerary cists, where more than one individual and their burial offerings could be interned (Berberián 1988; Salazar 2010). There are several communal spaces scattered throughout the valley (Berberián 1988; Caria *et al.* 2009). At these sites, the Tafí people gathered to celebrate a series of rituals related to the Pachamama, a primary goddess of Andean agrarian

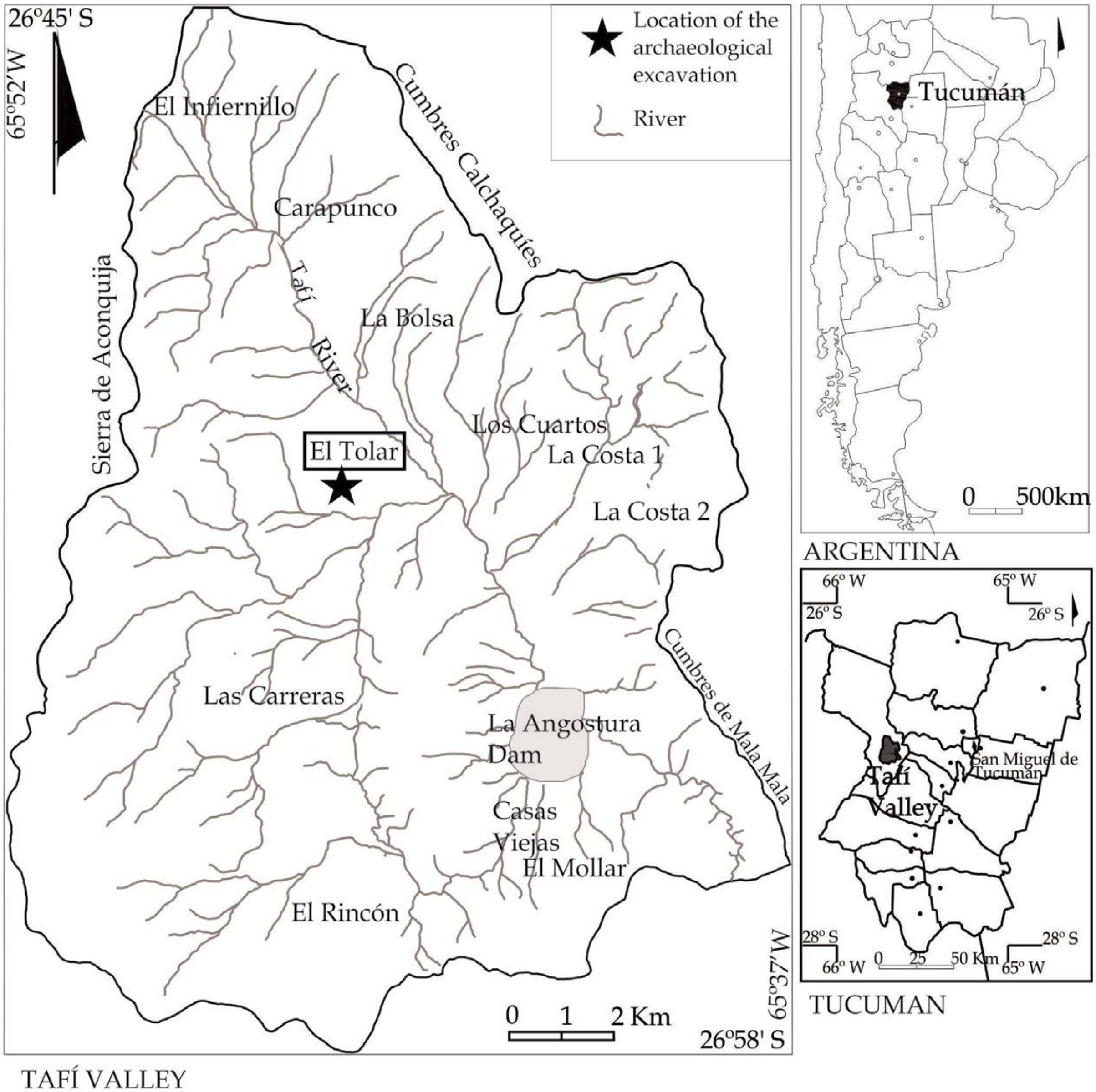

Figure 1. Study area. Tafí valley location at Northwest Argentina.

societies. Among other attributes, this goddess was linked to the soil's fertility, the places where these people cultivated and fed their animals (Sampietro Vattuone *et al.* 2008).

Despite being sedentary, this Prehispanic population had a high spatial mobility both inside and outside of Northwestern Argentina. The valley was located along a transitional area located between the arid highlands and the wet forests of the Tucumán piedmont. Typical Tafí cultural material were found at Quebrada del Portugués, on the traditional route that run through the Tucumán plains (Heredia 1975; Núñez Regueiro and García Azcárate 1996), at El Infiernillo, a Ciénaga Culture site in the north of the valley (Caria *et al.* 2006; Oliszewski 2007), at La Ciénega Valley in association with Candelaria material culture (Bernasconi de García and Baraza de Fonts 1985; Cremonte 1996), and at the Medina Valley (Krapovickas 1968). However, little is known about the trade and exchange of raw materials and finished products through this strategic zone.

To this end, this paper's objectives are: (a) to present the results obtained through ED-XRF analysis of the most relevant and unique beads found during the excavations of a residential unit from the El Tolar archaeological site in the Tafí Valley; (b) to contextualize the finds according to their excavation provenance; (c) to compare the finds with possible raw material sources; (d) to suggest the mechanisms by which these beads arrived at the Tafí Valley. To date, no studies of this nature - including the composition of the set of beads and their stylistic characteristics - have been reported.

Background

One of the biggest archaeological sites of the Tafí Valley is El Tolar (Figure 1), located in the central area of the valley, it has an average altitude of 2,300 masl. The area comprises an alluvial cone formed by debris-flow deposits, which were episodically strewn on its surface by the Blanco River. The surface of the cone contained an extensive terraced area for agricultural purposes, interspersed with residential units. These residential units are composed of circular patios of around 20 m diameter surrounded by small rooms of variable size and number. All rooms are connected to the patio, and only the patios are connecting to the exterior. Walls are made of large mortarless stones. The survey showed that none of these houses had any special features that stood out from the others (Sampietro Vattuone 2002). The settlement pattern was statistically analyzed, establishing that the residential units were regularly distributed along the geomorphological unit, implying some competition between them. Residential units, and each extended family, required a minimal amount of surface to accomplish self-supply. This is coherent with an egalitarian social organization, as proposed for the Tafí Culture (Sampietro Vattuone 2002).

One of these residential units (26°50'34.71"S; 65°44'16.09"W) was excavated in 1998 and is presented here for the first time. During the excavations, a green collar was discovered and eight of its beads were analyzed with optical microscopy, X-ray diffraction, and mass spectrometry with inductive mass couple and laser ablation (ICP-MS-LA). Given the destructive nature of the technique no other pieces were analyzed. The identified lithologies were brown sandstone; green, blue, and pale green turquoise; opal; and a green mineral from the muscovite group (Domínguez Bella and Sampietro Vattuone 2005).

The residential unit was excavated using the traditional method of horizontal spits 20 cm deep. It comprises one large central patio surrounded by five smaller rooms. The central patio was 15 m in diameter. Walls were built with large stones cemented with clay. In some cases, the structure was up to 2 m high. We excavated 57% of its surface. In the southwestern room, we discovered a hearth on the floor. AMS radiocarbon results place it at 1560 ± 60 years BP (nsrl 10907, charcoal) (425-551 cal AD), this was within our expected range (Figure 2). The funerary cists were found under the patio floor at 60 cm depth from the modern-day surface. The graves were excavated following the same criteria stated above when possible, although this depended on their architecture.

We found three cists under the patio floor (C1, C2 and C3), these were constructed with stones and sealed with a corbelled arch (Figure 3A-D). C2 was open and empty, however each of the other burials contained at least one body. Funeral offerings were found only in C3. These cists are like, those found in other residential units (Berberián 1988; González and Núñez Regueiro 1960; Salazar 2011, among others).

Underground Structures and Bodies

As mentioned above, three well-constructed structures were found under the residential floor level. The construction sequence was: first, a circular hole of

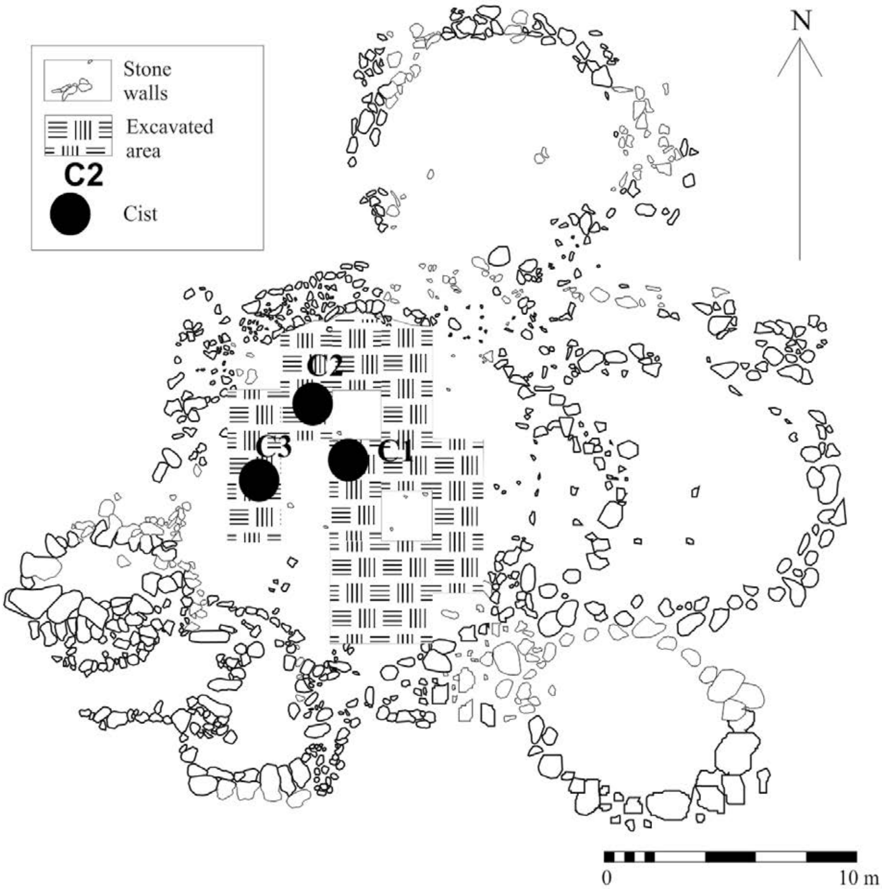

Figure 2. Excavated residential unit with cists locations.

approximately 1.5 m in diameter was dug under the room floor and the pit sides were consolidated with flat stones arranged vertically. Secondly, the dead body was deposited inside the tomb along with the offerings, and the tomb was sealed with a series of prismatic stones placed in the form of a ring around the upper part of the pit; and finally, an ever-decreasing ring of stones was placed, until the pit was sealed. Thirdly, four flat stones were placed over the construction, and the vault was sealed with a big capping stone. Lastly, the construction was cemented and its top covered with clay. The residential floor was made and then consolidated over the construction. It was impossible to detect the position of any of these graves, using just your naked eye (Figure 3E).

Cist 1 had a deteriorated body, and it was impossible to recover any bones from the clayey mass that had probably percolated as a result of infiltrations from the surface; no offerings were found. Cist 2 was ruined and empty. Finally, Cist 3 presented a skeleton in a left lateral decubitus position, with the face oriented to the North (Figure 3E5). The offerings included a fragmented crude ceramic bowl, and the beads that we present in this article.

Stratigraphy

The stratigraphic sequence revealed that the residential unit profile was composed of two depositional cycles (Table 1): one during which the present soil was formed, with a maximum depth of 60 cm, and an earlier one with a Formative occupation. The three

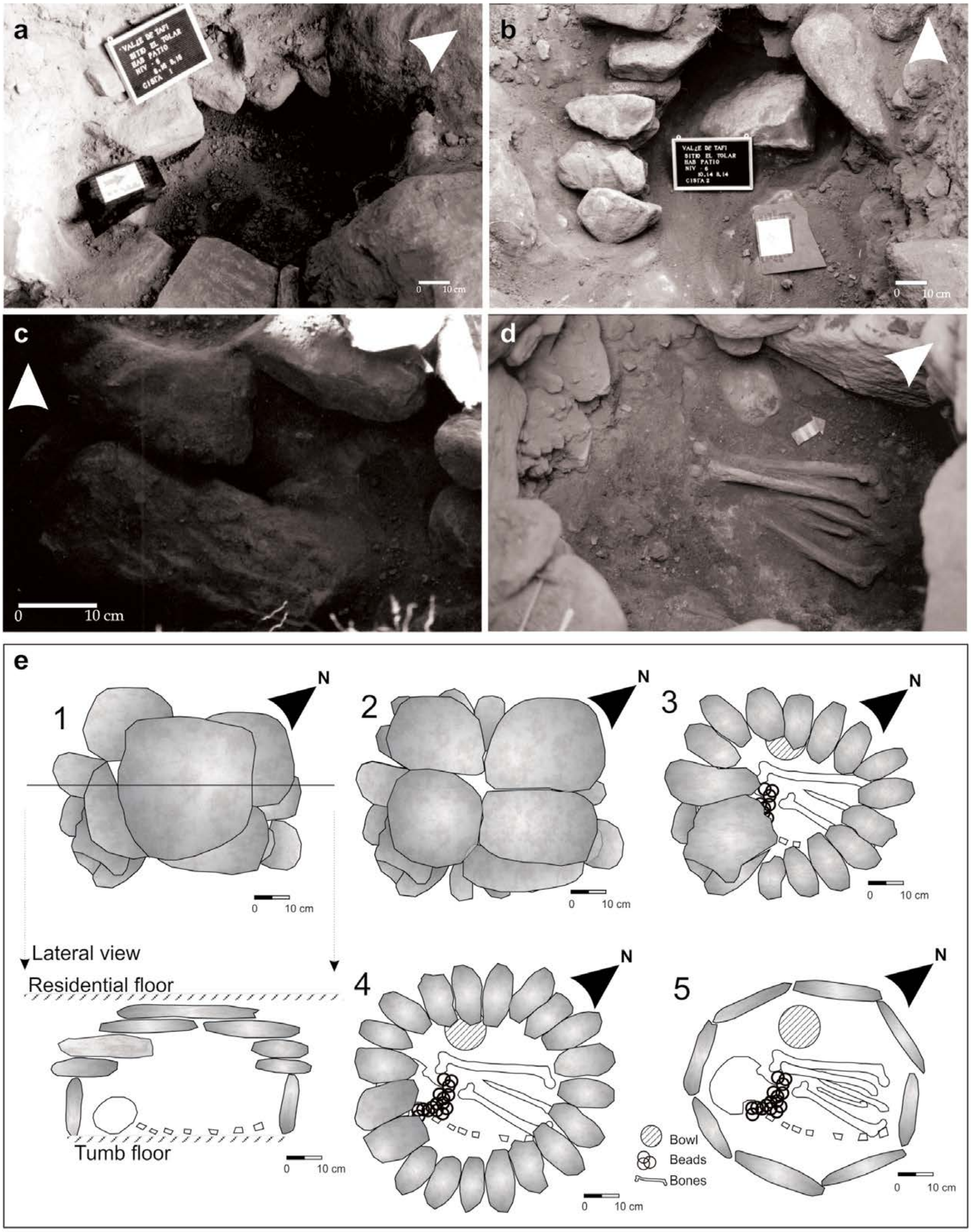

Figure 3. Cists found under the residential floor level: A) cist 1; B) cist 2; C) cist 3; and D) detail of the interior of cist 3; E) reconstruction of the excavation stages of cist 3. A to E different layers of the cist; F) transversal cut.

excavated cists belonged to this Formative phase. The base of the cists was ca. 1.80 m below the present-day surface. Chemical analyses of the sediments were undertaken, to compare the values of organic and inorganic phosphorous and calcium contents

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		Horizons	Moist color	Texture	Structure	pH	Inorganic phosphorus (mg/g)	Organic phosphorus (mg/g)	Calcium (mg/g)
Present Soil		A 11 (0-13 cm)	10YR 3/2	Sandy silt	Subangular blocks	4.4	0.54	78.5	0.32
		A12 (13-30 cm)	10YR 2/2	Sandy silt	Subangular blocks	4.8	0.51	76.2	0.56
		A/C (35-55 cm)	10YR 2/2	Sandy silt	Subangular blocks	4.8	0.50	72.6	0.40
		C (55-80 cm)	10YR 2/1	Sandy silt	Massive	5.0	0.45	95.2	0.35
Paleosol	Foramtive floor	2Ab (80-90 cm)	7.5YR 2/2	Sandy silt	Irregular prisms	5.5	0.50	104.2	1.50
		2Bt (90-113 cm)	7.5YR 3/2	Sandy silt	Irregular prisms	6.0	0.51	88.4	0.20
		2C (113-135 cm)*	10YR 3/3*	Sandy silt*	Massive	5.5	1.33*	99.8*	0.52*
		3C (135-180+ cm)*	10YR 4/3*	Sandy silt*	Massive	5.0	4.40*	111.6*	0.48*

* Values obtained from sediments from the infillings and floor of cist 2.

Table 1. Soil description and analytical results.

inside and outside the cist. It was possible to identify a high enrichment of both kinds of phosphorous, reaching concentrations as high as 4.4 mg/g of inorganic phosphorous (against 0.50 mg/g for the floor of the residential unit), and 111.6 mg/g of organic phosphorous (104.2 mg/g for the floor) at the bottom of the tomb, probably resulting from the decay processes of the body (Table 1).

Methodology

For our analysis, twenty beads were selected based on their stylistic relevance. They were analyzed suing ED-XRF, a fast, non-destructive technique that improved our knowledge of the beads and allowed a more accurate characterization of these very well-made pieces.

The technique was applied following a standard procedure. Samples were stimulated by incident X-rays and the secondary emission or fluorescence X-ray was measured. The incident radiation ejected electrons from the inner electron shells of the atoms so that the outer shell electrons could occupy the abandoned spaces. This movement generated an energy excess that was dissipated in the form of photons (secondary or fluorescent X-ray). The fluorescence X-rays were characteristic of different elements, and therefore, it was possible to identify the elements observed from the spectrum of a sample (through its wavelength) if the energy need between implied orbitals was known. The concentration of each element was determined by measuring the intensity of the observed X-ray energy for the element. The chemical characterization was carried out using X-ray fluorescence (XRF), from a Philips PW780 (Eindhoven, the Netherlands); an anticathode tube of rhodium of 4 kW was used for the chemical compositions.

Soil descriptions were made according to the procedures outlined in Soil Taxonomy (Soil Survey Staff, 1999). The central part of each soil horizon was sampled and dried at room temperature, grounded in a mortar, passed through a 100 sieve (150 micron), and stored until analysis. Then, the physical descriptions, pH, organic and available phosphorous, and calcium were determined (APHA-AWWA-WPCF 1992; Fiske and Subbarow 1925; López Ritas and López Melida 1978).

Results

The Beads

The sample included 299 beads of different sizes and shapes (Figure 4A). These shapes were classified as follows: 279 disk shaped beads, measuring from 2 to 20 mm (Figure 4C C-E, M-N); 10 tubular shaped beads (Figure 4C A-B, H, O-P); and 10 exceptionally shaped beads (Figure 4C F-G, I-M, T). The ED-XRF results of the 20 selected beads are summarized in Table 2. The beads were complemented with two embossed gold sheets. One of them was broken and had been repaired in the past (Figure 4B).

All the beads had different concentrations of P_2O_5, SiO_2, Fe_2O_3, K_2O, and Al_2O_3 (Table 2). Some of the green minerals were like turquoise, but given the absence of Na_2O in the composition of the samples it is possible to eliminate the possibility of them being jadeite. However, we did identify the presence of ajoite $(K,Na)Cu_7AlSi_8O_{24}.3H_2O$ (Pluth and Smith 2002), turquoise $(CuAl_6(PO_4)_4(OH)_{8.}4H_2O)$ (Abdu *et al.* 2011), variscite $(AlPO_4.2H_2O)$ (Anthony *et al.* 2000), and chrysocolla $(Cu,Al_2(H_2Si_2O_5)(OH)_4.nH_2O)$ (Hariu *et al.* 2013).

The nature of the studied materials (Table 2) was organized as a ternary representation (Figure 5) according to the major oxide concentrations to discriminate between silicates and phosphates. We took into account that the major oxides represented in the sampled material were P_2O_5, SiO_2, and Al_2O_3. Due to the fact, that all the materials had a very similar green tone, and that in other samples the beads presented black spots typical of turquoise matrix, the ternary representation allowed us to distinguish between minerals whose main ion was phosphate or silicate.

Three major groups and some other specimens were identified (Figure 4D). The first group (A) consisted of samples B, K, L, O, P, S, and T. According to these determinations, the mineral was a chrysocolla. Another group (B) was composed of samples A, E, J, and Q, and possibly corresponded to a variscite. Finally, group C comprised C, D, G, H, M, N, and R coincided with turquoise. Some samples, such as I and F, had minor amounts of P_2O_5; they were possibly contaminated and their area of origin was the same as that of previously described beads. The set of studied materials had similar paragenesis and their variation could be related to different extraction fronts in the deposit where the color was determined by chromophore compounds such as Cr_2O_3, V_2O_5, CuO, and Fe_2O_3.

Discussion

According to constructive features, building materials and radiocarbon dating, the tomb at this site belonged to a common Tafí residential unit from the Formative Period. Similar contexts have been described by Berberián (1988) and Salazar (2011). Considering the stratigraphy and geochemical composition, the unit did not differ from the others described in the valley (Roldán 2014), thereby confirming its affiliation to Tafí settlements.

Regarding the raw materials, turquoise, variscite, and chrysocolla are secondary minerals in copper deposits. The regional geology of Tafí – described above - does not present any evidence for these minerals. Accordingly, the raw materials from which the beads were made were foreign. On the other hand, there is currently no archaeological evidence to suggest that these beads were made in the Tafí Valley (i.e., the archaeology of the Tafi Valley has no evidence for craft workshops or tools related to this kind of handcraft).

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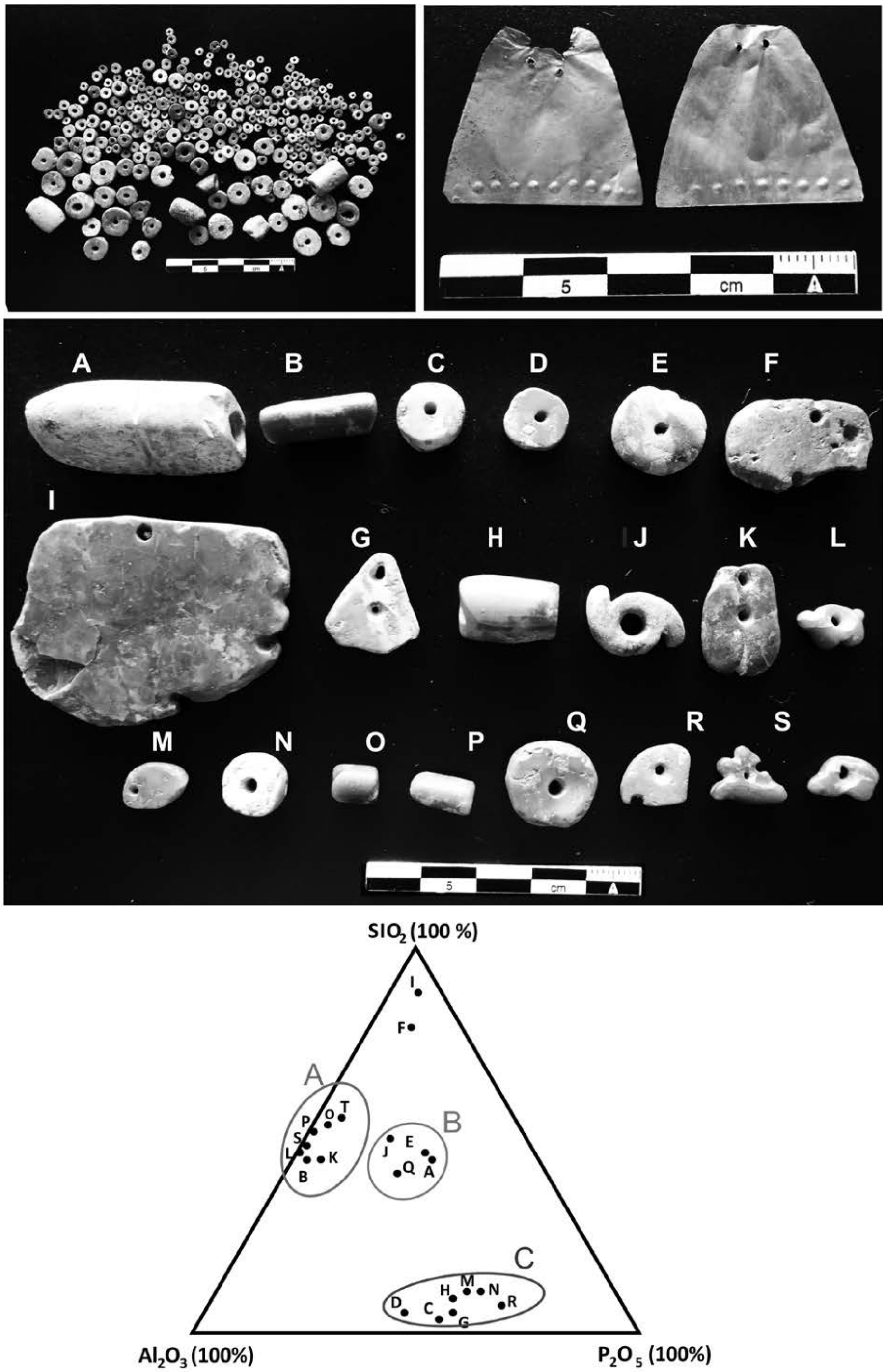

Figure 4. A) Set of beads; B) Embossed gold sheets; C) Sampled beads; D) Ternary representation of raw materials according to the major oxide concentrations: A) Chrysocolla; B) Variscite; and C) Turquoise.

The closest area with copper mineralization is on the Chilean side of the Andes, especially in Norte Grande, where copper beads were ubiquitous from the Archaic Period through to the late Prehispanic Period (Carrasco 2002). In that region, porphyry copper is extensively exploited for copper oxides and sulphide (Ambrus 1977). Geographically, the mines known us that were exploited during the Formative Period were those of El Abra, Chuquicamata, San Salvador, and Las Turquesas (Atacama, Chile) (González and Westfall 2008; Soto Rodríguez 2014) (Figure 5).

Group A - Chrysocolla	%	B	K	L	O	P	S	T
	SiO_2	46.09	45.31	44.25	46.45	44.54	46.76	47.25
	Al_2O_3	39.44	33.83	37.47	37.63	39.51	38.17	36.40
	K_2O	11.57	10.63	14.37	12.08	11.84	12.16	12.43
	P_2O_5	0.41	4.04	0.62	1.56	0.94	0.82	2.02
	CuO	0.01	0.02	0.06	0.02	0.01	0.01	0.03
	Fe_2O_3	0.72	1.31	2.00	1.05	0.77	1.36	0.98
	CaO		1.93					
	MgO	0.47	1.16					
	SO_3	0.12	0.26	0.77				0.39
	TiO_2	0.78	0.55	0.24	0.76	1.82	0.38	0.32
	V_2O_5	0.09	0.10		0.19	0.36	0.11	
	Cr_2O_3	0.22	0.24	0.21	0.21	0.16	0.21	0.15
	RuO_2	0.05						
	Rb_2O	0.01	0.02	0.03	0.02	0.02	0.02	0.02
	ZrO_2	0.01	0.02		0.03	0.02		
	Na_2O		0.55					

Group B - Variscite	%	A	E	C	Q
	P_2O_5	38.26	39.89	11.68	25.83
	Al_2O_3	29.50	34.52	27.12	25.18
	SiO_2	15.45	14.76	55.39	34.15
	CuO	10.07	7.94	2.05	4.98
	Fe_2O_3	3.14	1.21	1.39	5.54
	CaO	1.97	0.34	0.86	1.40
	MgO	0.80			
	K_2O	0.43	0.49	0.72	1.77
	SO_3	0.38	0.33	0.16	
	TiO_2		0.93	0.37	0.41
	ZnO		0.34	0.17	0.47
	As_2O_3		0.03	0.01	0.23
	V_2O_5			0.04	
	ZrO_2			0.02	0.03
	SrO			0.02	

Group C - Turquoise	%	C	D	G	H	M	N	R
	P_2O_5	45.50	43.62	44.40	44.09	44.67	43.66	43.26
	Al_2O_3	38.68	39.36	38.34	38.21	38.27	37.16	37.62
	CuO	9.21	9.01	9.11	8.89	9.84	8.93	8.28
	SiO_2	1.20	6.04	3.96	5.52	4.33	5.34	5.53
	Fe_2O_3	3.25	0.70	2.03	2.30	1.86	3.72	1.88
	CaO	0.48	0.36	0.45	2.86	0.48	0.39	0.72
	K_2O	0.24	0.36	0.22	0.26	0.39	0.42	0.44
	SO_3	0.13	0.02	0.22			0.22	0.28
	TiO_2		0.13	0.97			0.10	0.90
	ZnO	0.21	0.40	0.22	0.33			0.76
	As_2O_3			0.03	0.11	0.09	0.03	0.18
	V_2O_5			0.03		0.07	0.03	0.14
	SrO							0.02

Unidentify	%	F	I
	P_2O_5	2.69	1.47
	Al_2O_3	5.13	7.62
	CuO	8.78	6.25
	SiO_2	80.61	79.44
	Fe_2O_3	0.57	0.91
	CaO	0.79	0.46
	K_2O	0.50	0.63
	TiO_2		0.08
	MgO	0.94	3.14

Table 2. ED-XRF results of sampled beads grouped by its raw materials.

Therefore, it is reasonable to hypothesis that the presence of these beads in a local context is a clear indicator of a long-distance trade in goods. This trade throughout and across the South-Central Andes and Circum-puna region is a longstanding and complex phenomenon. According to the Caravan Mobility Model proposed by Núñez and Dillehay (1979), the circulation of goods could have begun in the Atacama area during the Late Archaic Period (*ca.* 1800 BC), becoming ever more complex, until its full development during the Formative Period (cal. 1500 BC – AD 500). This traffic involved people specialized in llama breeding, given that this was the only animal suitable for loading and carrying merchandise. People and llamas walked long distances in short daily treks. They covered between 25 and 45 km per day (Nielsen 1997) while transporting and exchanging different goods for consumption along the many villages on the road. Alongside the subsistence goods transported, which are hard to identify and have low archaeological visibility (Nielsen 2001), other goods of high symbolic

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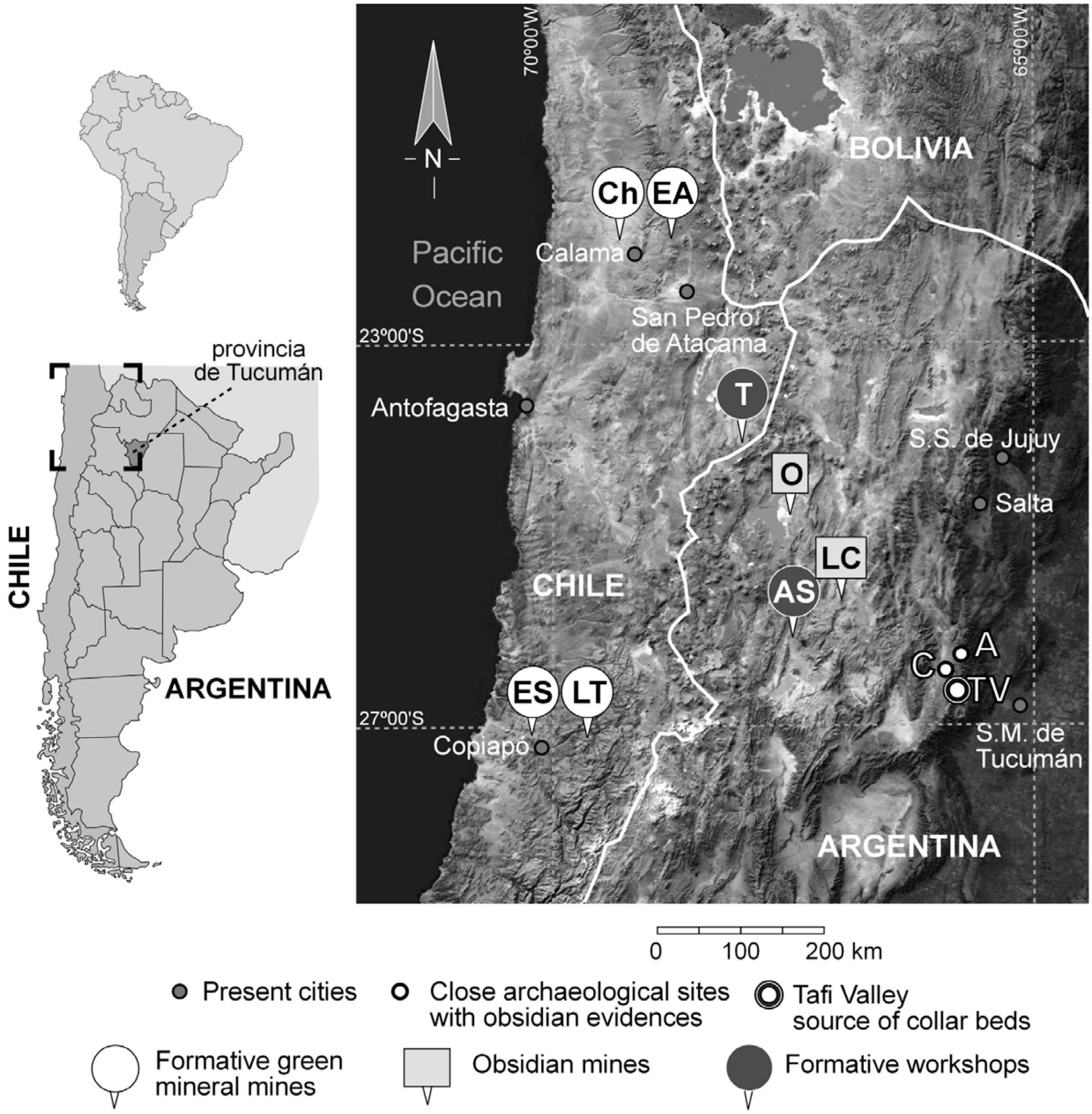

Figure 5. Regional distribution of the localities mentioned in the text. TV: Tafí Valley. Formative green mineral mines: Ch: Chuquicamata; EA: El Abra; LT: Las Turquesas; ES: El Salvador. Potential workshops: AS: Antofagasta de la Sierra; T: Tulán 54. Obsidian quarries: O: Ona-Las Cuevas; LC: Laguna Cavi. Close archaeological sites with obsidian evidences: C: Los Corrales; A: Ampimpa.

value were traded. These high symbolic value goods, comprised materials gathered or produced in different ecological settings along a latitudinal strip bounded by the Pacific Coast to the west (Pimentel *et al.* 2011), and the rain forests of the Andean piedmont (Nielsen 2013) past the Southern Altiplano to the east. This circulation of goods continues, though in a reduced form, into the present (Nielsen 1997).

Certain forest goods appear in Formative contexts in the Chilean Altiplano, such as psychotropic plants including Cebil (*Anadenanthera colubrina*) and tobacco (*Nicotiana tabaco*). Furthermore, there is evidence for tropical bird feathers (Nielsen 2013), ceramic pipes (Núñez 1994), forest shells (*Strophocheilus oblongus*), these last were often used as containers, or as raw material for bead production (Soto Rodríguez 2014), and ceramics from NW Argentina (Núñez 1994; Tarragó 1989). In contrast, several archaeological sites in NW Argentina include beads made of copper minerals (*i.e.* Berberián 1988; Núñez Regueiro 1998), shells from the Pacific Ocean (*i.e.* Delfino *et al.* 2007), and ceramics similar to those of Tilocalar Phase (*i.e.* Aschero 1994; García 1988-1989).

In the Tafí Valley, in addition to the beads presented in this article, several other examples of archaeological material related to Formative (ca. 360 BC to 350 DC) contexts are worth mentioning. These finds includes beads of copper minerals (Leiva 2013); fragments of *Vaquerías* ceramic type traditionally associated with caravan trade and whose site of manufacture remains unknown (Tartusi and Núñez Regueiro 1993); evidence for the consumption of plants from different ecozones such as *Monte*, *Yunga*, and the Parque Chaqueño region (Carrizo *et al.* 1999). All these evidence confirms the inclusion of the Tafí Valley within these circuits of caravan trade, involving trade in materials from different ecological zones. In the Los Corrales and Ampimpa archaeological sites, located very close to the study area (10 and 20 km from the study area respectively) (Figure 5), obsidian flakes dated to Formative Period contexts were found. These obsidians were sourced to the Ona-Las Cuevas and Laguna Cavi quarries (Puna, Catamarca Province) (Caria *et al.* 2009).

The search for contemporary archaeological sites with evidence of bead manufacture in the region led to the identification of two workshops, one located in the Dry Puna of Antofagasta de la Sierra (Argentina) (López Campeny and Escola 2007), and the other in the Quebrada de Tulán (Salar de Atacama, Chile) (Núñez *et al.* 2007) (Figure 5). Beyond the specific characteristics of each site, it was possible to establish that they were places where beads were produced for trade purposes, especially considering the set of tools found (for instance, the abundance of micro-drills), the discovery of beads at different levels of completion (pre-forms), and the abundance of fragmented unfinished pieces (López Campeny and Escola *et al.* 2005, 2007; Núñez *et al.* 2005; Núñez *et al.* 2007; Soto Rodríguez 2010). The raw materials identified for bead manufacture at Antofagasta de la Sierra were atacamite, silvine, lepidolite, papagoite, devilline, aragonite and quartz; while in Tulán 54 chrysocolla, turquoise, azurite or lapis, and limestone were found (Soto Rodríguez 2014). This suggests that given the incidence of the same raw materials at both the Tafí Valley and Tulán 54, our area must have been connected to them, via a route that transported these sets of goods, and thereby traded the production of that area.

A feature that would be very useful in determining the place of production of the analyzed samples is their typological characteristics. To date, no published reports of beads or pendants similar to A, F, G, J, K, L, M, R, S, and T exist, while the remaining beads are similar to the morphologies that are present in the record from Norte Grande (Chile) (Soto Rodríguez personal communication).

Conclusions

The excavation of residential units allowed us to propose different viewpoints concerning past early and egalitarian sedentary societies. In this case, we have enough evidence to state that the residential unit excavated at El Tolar had no outstanding features according to its constructive technique, size, and room disposition. However, it did provide information on links between the Tafí Culture and long trade circulation circuits.

The circulation of goods of every kind in the South-Central Andes is a complex, long-dating issue. Mobility circuits and their roads were established very early after llama domestication and changed over time. The Tafí Valley, with its environmental and cultural characteristics (cultural stability in the context of an egalitarian society), was located in an area of fast and easy access to the resources of the *Yungas* and *Parque Chaqueño* in the forest and Andean piedmont. The archaeological record of the Valley makes it possible to infer that this trade existed and involved goods from different ecological ones. The beads, made of chrysocolla, variscite and turquoise, arrived at the valley as a finished product. According to the raw materials identified, they may have come from the Atacama Region, perhaps even from the Tulán workshops.

The locally available resources , and what could be offered in exchange or trade were items of agropastoral production. including potentially a concentration of forest and piedmont resources such as cebil (*Anadenanthera colubrina*) and tropical bird feathers (both goods of high symbolic value) together with other diverse products normally consumed as part of the diet.

To conclude, the inclusion of the Tafí Valley within a network of long distance trade is indisputable. Furthermore, the presence of exotic goods circulating from west to east is self-evident. However, until now, the routes along which these elements were transported have not been determined. In this sense, the Tafì Valley would probably have represented one of the easternmost outposts of this system.

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