# Obsidian Lithic Technology, *Chaîne Opératoire* and Symbolic Meaning in the Northern Hualfín Valley (Northwest Argentina) during Late - Inka Period

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**Abstract:**

The main objective of this research is to analyse the lithic technology applied to obsidian, a raw material popular amongst pre-Columbian populations from Northwestern Argentina (NWA) because of its social and symbolic value. The analysed assemblage comes from the archaeological site of Villavil 2 (VV2), located in the Hualfín Valley (Catamarca, Argentina) and distant *ca*. 100 - 200 kms from the nearest sources of this raw material. VV2 was discovered in 2015 by one of the authors and shows a particular presence of rock art which had not previously been registered in this area. The site was associated to the Late and Inka Period (*ca.* 10th - 16th centuries CE). So far, we suggest that this was a place of temporal, but periodical use that best fits with what we would call a ceremonial space.

The assemblage comprises the totality of obsidian elements collected from both superficial and stratigraphic contexts. It was divided into three typological classes: tools (projectile points), flakes with natural sharp edges (FNSE) and waste products (WP). We did not identify the presence of cores. The analysis considered the following variables: knapping methods and techniques, size, amount of cortex, flake type and edge types.

At VV2, points are the only retouched tools made of obsidian. They correspond to the triangular unstemmed concave-based type, very common during the Late-Inka Periods, and they were shaped using the perimetral bifacial pressure technique, possibly from flake blanks. FNSEs' size is small, and they present scarce cortex. On the other hand, the abundance of very small-sized WPs is remarkable. They were found in the same stratigraphic context and attest a complete finish of the points (edge retouch).

The results let us infer that the point-shaping tasks were carried out *in situ*. Moreover, the implemented technology involved both major production efforts and skills, that contrast with those involved in local raw material knapping. It is possible that this curated strategy was not related to the difficulty of accessing this allochthonous material. Instead, these choices could reflect social and symbolic meanings. According to linguistic and ethnohistoric information, the obsidian brightness and transparency are propitiatory to win the favour of the *w'akas*. Furthermore, in NWA the obsidian long-distance exchange is an ancient pre-Columbian tradition that lasted for a long time. Obtaining obsidian could display the ability of a social group to access distant resources and legitimize their political status.

*Journal of Lithic Studies* (2023) vol. 10, nr. 2, 24 p. DOI: https://doi.org/10.2218/jls.7240

Published by the School of History, Classics and Archaeology, University of Edinburgh
ISSN: 2055-0472. URL: http://journals.ed.ac.uk/lithicstudies/

Nevertheless, we cannot forget that this raw material also was very important for making different artefacts for subsistence activities.

Keywords: Obsidian; lithic technology; Hualfin valley; Late Period; Inka Period

## 1. Introduction

The Hualfín Valley is located in the middle-west of the province of Catamarca (Northwest Argentina - NWA). According to González (1979), this valley is part of the Valliserrana Region, a mountainous area at an altitude of 1,200 to 3,000 meters above sea level. The hunting and gathering resources, as well as the agricultural potential of the region, favoured good conditions for human settlement (González 1979).

Agropastoralist societies have inhabited the Hualfín valley, at least since 200 BCE until the Spanish conquest. However, archaeological evidence indicates important changes in social conditions since the Late Period (*ca*. 10th - 15th centuries CE) (González & Cowgill 1975; González 1979). During this time, the importance of agriculture in subsistence and in agricultural technical improvements increased, while population grew, and social groups were regionally differentiated all-around NWA (Núñez Regueiro 1974). This might have produced several conflicts between populations (Núñez Regueiro 1974). One of those local groups, named Belen, was characterized as a chiefdom that controlled the Hualfin Valley until the Inka conquest (Raffino 2004a; Sempé 1999; 2005). Some authors have proposed the presence of different types of conflicts among Belen society (Balesta *et al*. 2011; Wynveldt & Balesta 2009).

According to ethno-historical sources, the Inkas incorporated NWA within their empire in 1471 CE (Rowe 1946: 204). However, recent studies of radiocarbon dating in different sites along the NWA proposed earlier dates for their arrival, during the late 14th century and the early 15th century, until the Spanish conquest in 1532 CE (D'Altroy *et al*. 2007; García *et al.* 2021; Lynch 2012; Marsh *et al*. 2017; Meyers 2016; Williams 2000; Wynveldt *et al.* 2017). One of the Inkas' frequent political practices consisted in maintaining local institutions and chiefs (Rowe 1946: 269) in exchange for taxes, mainly in the form of work (*m'ita*) (Espinoza Soriano 2008; Murra 1983). This may explain their presence in Late sites located in the Hualfin valley (Raffino 2004b). Furthermore, the absence of both natural and man-made defensive structures in the Inka sites located in this region (Raffino *et al*. 1978) may indicate an environment without armed conflict and little resistance from the local population (Lynch & Giovannetti 2018).

On the other hand, studies of lithic technology focused on agropastoral pre-Hispanic societies from NWA proliferated during the last decades, displaying a preferential use of obsidian in the making of small triangular projectile points (Escola 2007). This kind of points were predominantly stemmed during both Early and Medium period (*ca*. 2nd century BCE - 9th century CE) (De Feo & Álvarez Soncini 2010; Escola 1991; Nielsen 1996), while the frequency of unstemmed concave-based morphology (*base escotada, sensu* Escola 1991) became the most frequent during Late-Inka times (Avalos 2003; Chaparro 2008; Flores & Wynveldt 2009; Gaal 2014: 267; Ledesma 2003; Nielsen 1996; Sprovieri 2007; Varde 2020). However, the region of Antofagasta de la Sierra basin shows some divergences. Although there was registered the same change in the morphology of points from one period to the other, some sites whose chronology corresponds to Late-Inka times present a continuity in the predominance of stemmed points (Elias 2014).

Despite the morphology of projectile point was often considered a cultural marker or index fossil (Knetch 1997), point typology may be questionable because it can change due to breakage and rejuvenation to functional ones (see for example, Hocsman & Alderete 2022; Towner & Warburton 1990). Instead, specific reduction techniques remained constant, and they are cultural choices specific to a particular past group. Therefore, they can be used as cultural markers (Crabtree 1972: 1-4; Flenniken 1990). Debitage analysis can indicate manufacturing stages and the techniques involved (Crabtree 1972: 1).

Considering technological issues and the techniques applied, the making of obsidian-points involved a greater production effort: unifacial and bifacial shaping and extended or partially extended retouch, as well as maintenance and rejuvenation (Álvarez 2004; Avalos 2003; Escola 2004; Elías 2012; Flores & Wynveldt 2009; Sprovieri 2007). Therefore, Escola (2007) and Moreno (2005: 80-85) proposed a social and symbolic value for obsidian points, while other authors such Varde & Muscio (2018) consider its role for hunting and interpersonal violence.

Instead, within other obsidian artefacts, bipolar technique, manufacture of several edges on the same item, as well as maintenance and rejuvenation were identified, which demonstrate a behaviour associated with an economy of raw material. However, the use of unifacial flaking, unstandardized blanks and low investment in manufacturing effort (both non-retouched and marginally retouched flakes) can be considered an expedient strategy (Elías 2012; Flores & Wynveldt 2009).

The use of obsidian raw material in NWA is recorded since Early Holocene (López 2020; Pintar *et al*. 2016). In the Puna of Catamarca region, the most heavily used outcrop was Ona, which supplied obsidian since Early to Late Holocene. In this region, the number of other minor sources exploited for manufacturing tools increased during Middle Holocene, including Laguna Cavi, Archibarca, Salar del Hombre Muerto, and Cueros de Purulla-Chascón (Pintar *et al*. 2016). Regard a decrease in the number of sources and some fluctuations in the use of the minor sources, such scenario remained relatively stable, with the predominance of Ona from late hunter-gathered contexts (*ca*. 4500-3000 B.P.) to consolidated agro-pastoral occupations (*ca*. 2100-1100 B.P.) (Escola & Hocsman 2007; Escola *et al*. 2016), as well as, showing a continuity during Late and Inka times (Chaparro 2009: 535; Elías *et al*. 2018; Sprovieri 2010: 235-236; Yacobaccio *et al*. 2002; 2004).

This pattern of use of obsidian, based in Ona outcrop and the minor sources, appears to have laid the foundation of the southern sphere of distribution, which supplied the Puna of Catamarca and the valleys to the east (Valliserrana Region) during Middle and Late-Inka times with a range of 350 km (Pintar *et al*. 2016; Yacobaccio *et al*. 2002; 2004). At the same time, Zapaleri and other sources provided the northern sphere of NWA. The Hualfin valley is placed into the southern sphere (Escola *et al*. 2009), whose sources should have supplied the populations that inhabited there, as some studies have demonstrated so far (Flores & Morosi 2012; Flores & Balesta 2014).

The current paper presents the analysis of the lithic technology of obsidian, carried out in Villavil 2, a Late - Inka site located in the Hualfín valley (Figure 1). Additionally, the relationship between raw material and projectile points, as well as both the economic and the social role of obsidian will be discussed.

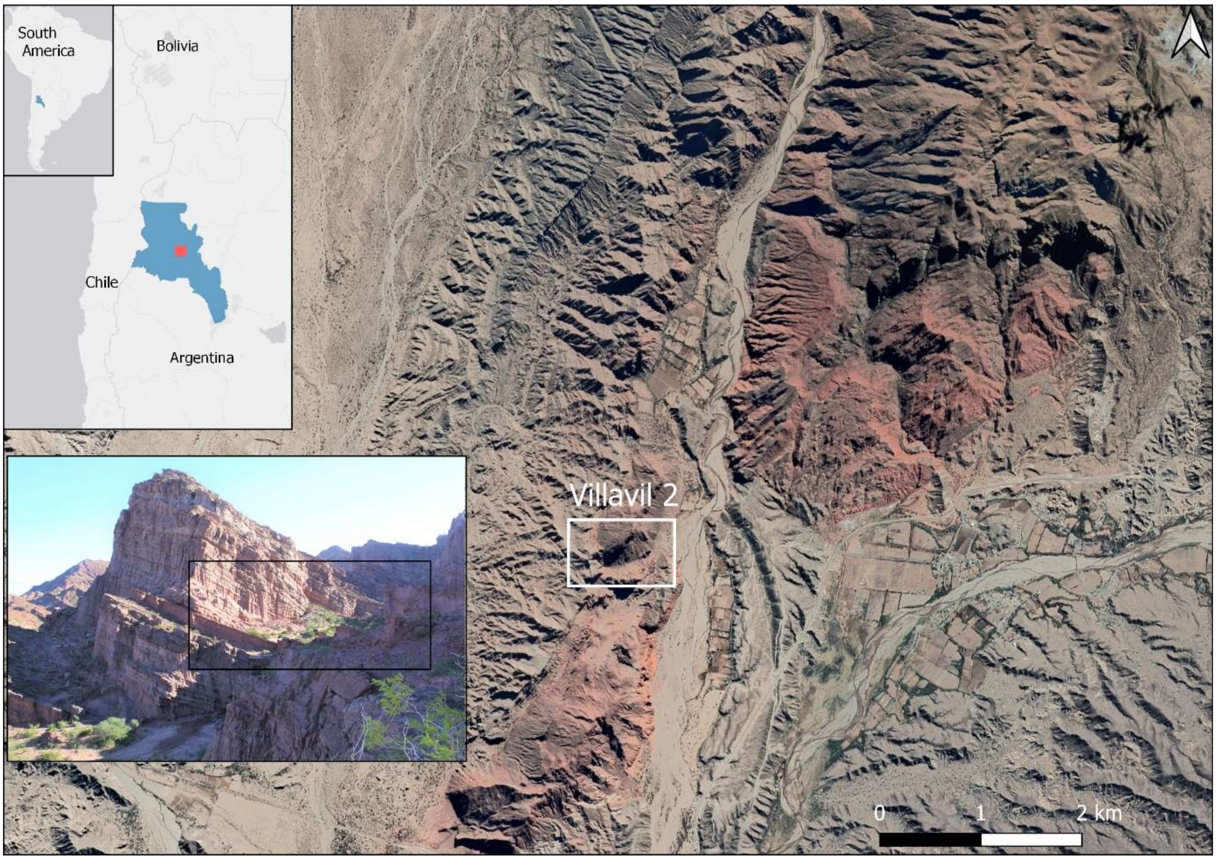


Figure 1. Location of the archaeological site of Villavil 2 (Hualfin Valley, Argentina).

### 1.1. The site of Villavil 2

The archaeological site of Villavil 2 (VV2) was discovered in 2015 by one of the authors and shows a particular presence of rock-art which had not previously been registered in this area. The site is associated with Late and Inka Period (*ca*. 10$^{th}$ - 16th CE) according to rock-art motifs and pottery styles. So far, we suggest that this was a place of temporal but periodical use that best fits with what we would call a ceremonial space (Lynch & Giovannetti 2018).

The site of VV2 occupies a topographic location on top of a vertical cliff with very difficult access that ends in a dead-end gorge where different remains of ancient activity are visible on the ground (Figure 2). This sector presents sandstone blocks with rock art (Figure 3), whose iconography was identified as Belen and Santamaria styles, as well as possible Inka style (Lynch 2015).

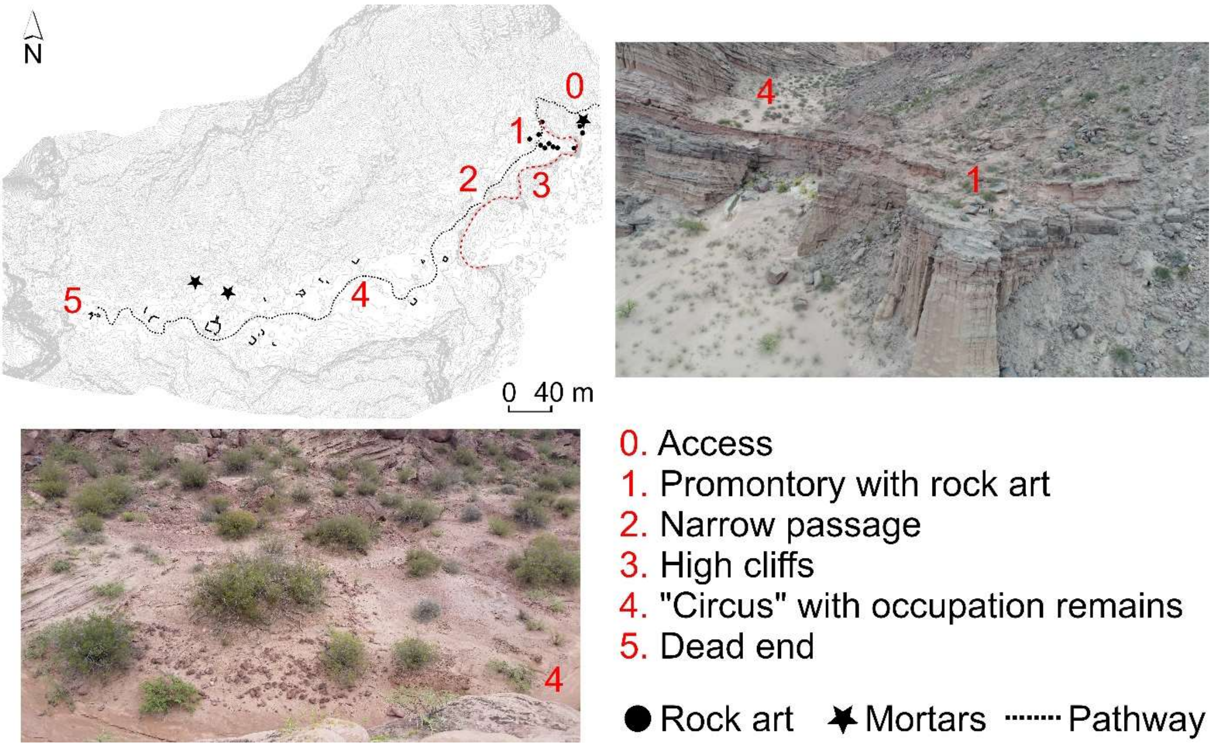


Figure 2. Aerial view of the site Villavil 2.

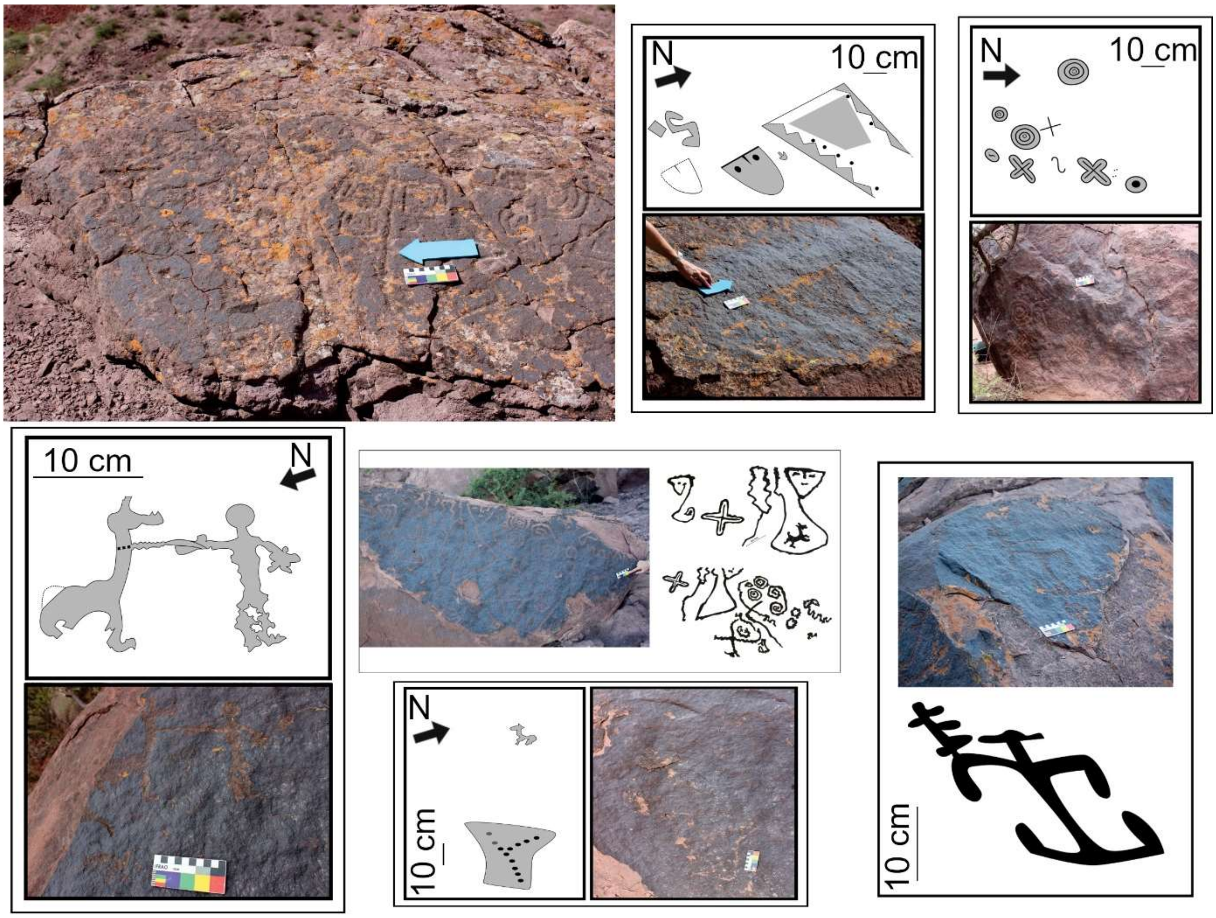


Figure 3. Rock art in Villavil 2 site. Image extracted from Lynch & Giovannetti (2018). The motifs found at the site were organised into three main groups: animals, human figures and geometric designs (in addition to some unidentified motifs).

 DOI: https://doi.org/10.2218/jls.7240

Behind this sector a dead-end gorge is reached where there are clustered stone walls and enclosures, as well as red sandstone blocks surrounded by walls (Figure 4). Through previous fieldwork in these sectors, we have identified evidence of commensalism and religious activities (Lynch & Giovannetti 2018). This can also be confirmed by the existence of large sets of multiple mortars located on the slope of the hills without association to enclosures (Figure 5). This is possibly linked to the need to produce large quantities of food and drink for festive congregations of people at special times during the year.

Figure 4. Clustered stone walls and enclosures, as well as red sandstone blocks surrounded by walls. Image extracted from Lynch & Giovannetti (2018).

Figure 5. Mortar with multiple holes found in the Villavil 2 site.

Several excavations and surface collection fieldworks were accomplished. Regarding the lithic material collected in VV2, so far, a predominant use of expeditive technology and local raw material was identified (Bentivenga & Ríos Malan 2020). Moreover, use-wear analysis carried out on unretouched tools showed a possible relationship with the active edge morphology and some engraving techniques identified in rock art production (Lynch & Lynch 2018). However, the study of obsidian technology in VV2 has remained unrealized, until now.

### 1.2. Lithic technology, operational sequence, and social issues

Lithic technology is a conceptual approach to material culture based on the reasoned study of the techniques applied to lithics (Inizan *et al*. 1999: 13). Mauss (1973) [1935] aims to study any society from its techniques and proposes that the body's technique, thought as a social phenomenon, is an effective and traditional action. In other words, it is mechanical and purposeful, as well as, learnt and socially transmitted.

From Mauss' contribution about the body's techniques, Leroi-Gourhan proposes the notion of operational sequence or *chaîne opératoire*, a time and order arrangement of the different steps employed to produce an artifact (Soressi & Geneste 2011). According to Leroi-Gourhan "Techniques involve both gestures and tools, sequentially organized by means of a "syntax" that imparts both fixity and flexibility to the series of operations involved. This operating syntax is suggested by the memory and comes into being as a product of the brain and the physical environment" (1993:114) [1964]. Furthermore, Lemonnier (1992: 26) adds that an operational sequence consists in a series of operations engaged in the transformation of raw material. Such operations involve arbitrary choices and a specific knowledge or know-how (Lemonnier 1992: 51).

As the study of lithic technology is intimately associated with action, it engages a kind of agency which involves information about people, as well as decisions, and thoughts. The notion of constellations of knowledge, proposed by Sinclair (2000), contemplates the identification of potential materials, techniques and procedures applied, as well as the tools used during the manufacture. All these elements embody an acquired knowledge. Thus, each technique represents a constellation of knowledge, and each technological strategy involves a set of constellations. Also, the choices carried out by a flintknapper embody the expression of these constellations, building and maintaining individual identities. The constellations have a reflexive quality because their components, during the manufacture process, allow to adjust the action according to the desired product. These adjustments are not only a response to the efficiency of the process, but also other aspects like aesthetic, style, procedure, and function. Therefore, tool use and production in combination with the constellations of knowledge entail an agency notion, which is reflexive and varying, although mainly usual and routine.

According to Dant (1999), the objects are social agents as they extend the human action and the meanings mediated between human beings. Hence, objects are part of the social sphere and they reflect it. Integrating social relationships, they join ideas, values and emotions, playing an important role in the expression of people's identities. The material culture both reinforces and affects the meaning of shared-values, activities and lifestyle. Then, the functions of tools are multiple: they allow us to carry out actions and at the same time enable communication and expression.

Taking into account these concepts, the aim of this research points to rebuild the operational sequence of obsidian artefacts from VV2, considering both technological and social issues involved. Given its allochthonous provenance, we expect a special treatment of this raw material because of the flintknappers' choices.

## 2. Materials and methods

The VV2 lithic assemblage comprises a total of 1,509 elements collected in the site from both superficial and stratigraphic contexts. All the soil excavated was sieved through a 1-mm mesh screen at the excavation site. Obsidian makes up the most abundant raw material: 1,199 items, which amounts to almost 80% of the assemblage (Figure 6). The second most numerous raw material is basalt (8.5%), followed by andesite (6.7%), dacite (1.7%) and quartz (1.3%). Other rocks make up the rest of the assemblage. In addition to obsidian (n=1,199), we also identified tools of basalt (n=5), andesite (n=2) and dacite (n=1).

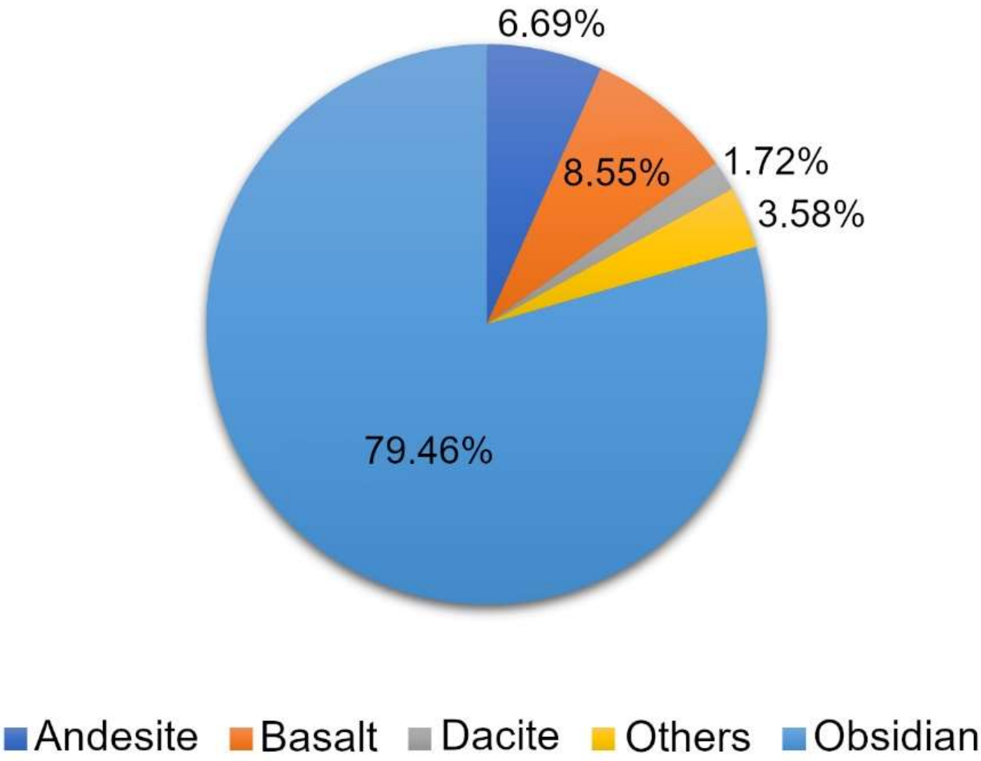


Figure 6. Percentage of raw materials found in VV2.

Regarding laboratory activities, the study involved a techno-typological approach, considering features associated with the technological data (*i.e.*, knapping techniques and methods). These features were observed by both the naked eye and under a binocular loupe (Nikon SMZ 10-50X magnification). The recording of this data in Excel allowed a reconstruction of the various phases of the *chaîne opératoire*.

According to the techno-typological analysis (Aschero 1975; 1983; Aschero & Hocsman 2004), we divided the assemblage into the following techno-typological classes: tools, flakes with natural sharp edges or non-retouched tools (FNSE), and waste products (WP). We did not find cores. FNSEs are non-retouched pieces with natural sharp edges over 20 mm in length. Also, we separated WP wider than 7 mm from micro-WP with a width less than 7 mm. These are produced by retouch and micro-retouch technique, respectively. The features considered the following variables (Aschero 1975; 1983): typological group, complete or fracture condition, amount of cortex, metric size, relative size (very small: 0.1-1.9 mm, small: 2-3.9 mm, medium small: 4-5.9 mm, medium big: 6-7.9 mm, big: 8-11.9 mm, very big: over 12 mm), technical series (*serie técnica*), kind of blank, transversal section and weight, for tools. The FNSE and

WP were recorded as in complete or fracture condition, amount of cortex, metric size, relative size, kind of platform and flake kind (internal or external).

On the other hand, the *chaîne opératoire* were reconstructed according to the following protocol (Soressi & Geneste 2011):

1. Ordering the lithic items of the same raw material, considering outcrop provenance.
2. Separating negative artifacts (bifaces, cores) from the positive ones (flakes).
3. Within these last two categories, the artifacts were separated according to the amount of cortex cover.
4. Ranking the pieces according to their size.
5. Sorting the artifacts according to the methods and techniques used to produced them (Inizan *et al*. 1999: 29-34).
6. Reconstructing a short sequence of removals by observing the organization on each piece, including its platform.

## 3. Data results

### 3.1. Typological classes

The tool class only comprises projectile points group: three complete items (Figure 7), one preform and three fragments. We have not found points made of other raw materials at the site. The complete points and the preform are small (according to Aschero 1975, 1983), unstemmed and triangular, with concave base (*base escotada* according to Escola 1991). They seem to have been shaped from flake blanks by direct percussion. Only one of these has a cortex on its dorsal surface; the rest do not, nor do they have fragments of point. The transversal sections of the complete items are asymmetric-biconvex, trapezoidal, and plane-convex (for the one with cortex). The points were finished by marginal retouch and micro-retouch, both unifacial and bifacial, which affected the edges. Points weighing bears less than 1 gram and their length, width and thickness vary from 20 - 15 mm, 11 - 12 mm and 4 - 2 mm, respectively. Metric data of FNSE and WP are shown in Figures 8 and 9.


Figure 7. Obsidian points from Villavil 2.

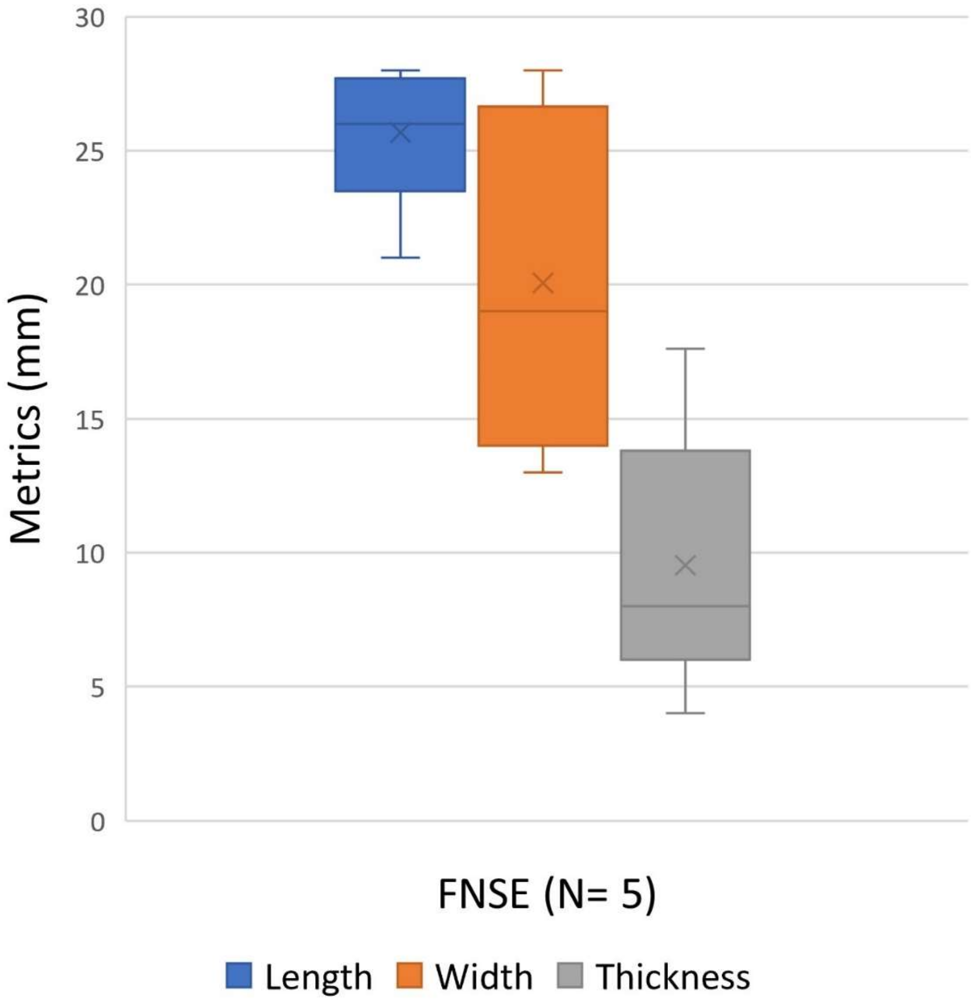


Figure 8. Metrics of FNSE: length, width, and thickness.

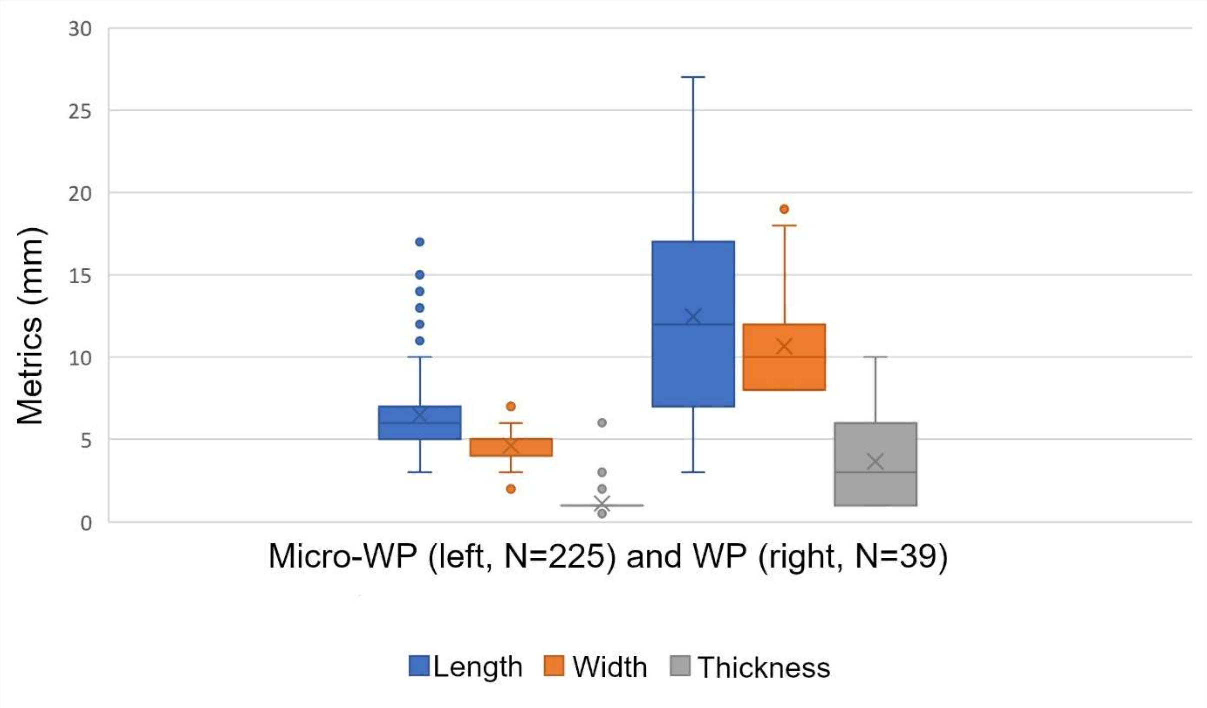


Figure 9. Metrics of WP and micro-WP: length, width, and thickness.

We also identified five FNSE. All of them are internal flakes of small and medium-small size without cortex. Two flakes are complete while the rest are fractured. Platforms were observed on four pieces, which were classified as of the plane kind. Two items show edges with macroscopic use wear.

Most of the WP class (n= 1,187) consists of micro-WPs (n= 1,148) that were recovered in the excavations carried out in the site. We analysed 225 micro-WPs (29 complete and 196 broken flakes) and discarded the rest (flake fragments and debris) because their technological features, single interior surface or point of applied force were not discernible. The size of most micro-WP is very small (n= 220), while small size is less represented (n= 5). The largest kind of flake is internal (95%), while external ones make up the remaining 5%. One hundred twenty-four items have platforms, of which the most frequent shapes (Table 1) are punctiform (37.3%) and flat (36.6%), followed by filiform (13.4%), dihedral (4.2%), cortical (2.8%) and faceted (1.4%). Regarding cortex cover, pieces without it are predominant (n= 213, 95%), nine (4%) items show less than 50% of cortex cover and three (1%) items exhibit over 50% of its upper surface covered by cortex.

Table 1. Micro-WP platform shape.

| Platform shape | Frequency | Percentage |
|---|---|---|
| Cortical | 4 | 2.82% |
| Flat | 52 | 36.62% |
| Dihedral | 6 | 4.23% |
| Faceted | 2 | 1.41% |
| Filiform | 19 | 13.38% |
| Punctiform | 53 | 37.32% |
| Undetermined | 6 | 4.23% |
| **Total** | **142** | **100%** |

WPs wider than 7 mm add up to 39 items. Three of them are complete, while 36 are fractured. The relative sizes are very small (n=13), small (n=23) and medium-small (n=3). Within fractured pieces, nine remains have a striking platform and 27 do not. Thirty-two pieces (82%) are internal flakes, while seven (18%) were sorted as external flakes. Twelve items have platforms. Thirty-three percent of these have an undetermined shape, though the most frequent shape of the ones that can be identifiable are punctiform (25%), followed by cortical (16.7%), flat (16.7%) and dihedral (8.3%) (Table 2). Thirty (77%) items have not cortex cover on their upper surface, two (5%) have over 50% of their surface and seven (18%) have less than 50%.

Table 2. WP platform shape.

| Platform shape | Frequency | Percentage |
|---|---|---|
| Cortical | 2 | 16.67% |
| Flat | 2 | 16.67% |
| Dihedral | 1 | 8.33% |
| Punctiform | 3 | 25.00% |
| Undetermined | 4 | 33.33% |
| **Total** | **12** | **100%** |

### 3.2. Chaîne opératoire

#### 3.2.1. Raw material provenance

The Hualfin valley is included within the southern distribution sphere of obsidian, whose sources are distant *ca.* 100 - 200 kms from the site (Escola *et al*. 2009; Flores & Balesta 2014; Yacobaccio *et al*. 2002; 2004). Procedure analysis carried out among 20 pieces recovered in Villavil 2 show that all of them match with Ona source fingerprint (Bentivenga *et al.* MS). The color of these pieces varies from translucent dark grey to light grey, some of them with black stripes. Ona nodules measure 20-30 cm in diameter (Yacobaccio *et al*. 2004). Due to the absence of cores, we hypothesize that the obsidian has arrived at the site in the shape of flakes that could be used as blanks.

#### 3.2.2. Knapping process

FNSE and WP are positive artifacts which were produced through debitage. On the contrary, projectile points were sorted as negative artifacts (bifaces), possibly knapped on flakes by shaping and retouching methods.

A minority of the items show cortex covert, totalizing 8% of the assemblage. Also, the proportion of remaining cortex among WP is higher than among micro-WP. This difference is reasonable because WP are larger, so they could be produced during an earlier stage of the sequence (Andrefsky 2005: 103-112).

Regarding knapping methods and techniques, points were made, first, by shaping. Then they were finished on the edges by marginal unifacial and bifacial, both retouch and micro-retouch, which affected the edges and the final shape.

According to the size and remaining cortex, micro-WPs (or very-small waste products) are the discard of the final point retouch (with a width less than 7 mm), likely produced by pressure. Pressure technique is necessary due to the size of the blanks and the fragility of the raw material.

### 4. Interpretations of the data

Finding an allochthonous raw material as the most abundant resource within the assemblage from the site seems to be remarkable. However, we consider that the obsidian group is overrepresented because of the technique involved. The micro-retouch technique generates many discards, especially very small flakes without platform, which biases the assemblage size, while the relative amount of both tools and FNSE pieces is significantly fewer.

Regarding the *chaîne opératoire*, the absence of obsidian nodules and cores may indicate that the first tasks of knapping occurred in other places, possibly closer to the sources. The low frequency of debitage with dorsal cortex suggests the use of flake blanks instead of pebbles (Andrefsky 2005: 103-112). Also, the low proportion of cortex cover indicates an intense exploitation of obsidian, which is expected for a foreign raw material.

Furthermore, the middle and final stages of the operational sequence are represented, according to the type of WP. The bigger WPs may represent the discard of point shaping tasks, while the smaller ones are linked to the shaping method, which includes the slimming, finishing, and sharping of the tool. According to Sullivan & Rozen (1985), an absence of cores and a low percentage of complete flake, but a high occurrence of flake fragments and broken flakes indicate mainly by-products of tool manufacture (Sullivan & Rozen 1985). The presence of WP attests that both point-shaping and retouching tasks were carried out *in situ*, as well as the production of simple tools (flakes with natural sharp edges) by *debitage*.

Concerning the knapping techniques, the analysis supports the use of at least direct percussion and pressure knapping. The presence of plane platforms suggests the former, whereas pressure knapping produces prepared platforms: phylliform and punctiform (Espinosa

1995). This last technique is used for retouch tasks aimed at finishing the desired product, because it allows to apply force to the edge of the artefact with accuracy and precision, as well as to detach controlled flakes, using tools made from organic materials (Crabtree 1972: 14-17). Both the small size and the delicate edges of the points demand pressure retouch to finish the points, as well as the obsidian fragility and the debris thinness also support this hypothesis.

Moreover, bifacial point production requires the use of both soft and hard hammers (Espinosa 1995). Our analysis of WP platforms shows that many of them are totally or partially fractured, although others remain complete. This may be the result of using both kinds of hammers. Despite the same general morphology of points and the identification of a particular locus of making, the differences registered (size, amount of cortex cover and transversal section) allow us to agree with Chaparro (2008), who proposes standardization of these tools but not craft specialization.

So far, we have presented the *chaîne opératoire* as well as methods and techniques involved in point making. Our results let us infer that obsidian was selected to make simple tools, as well as points of which the production involved major effort and skill, while good quality silex and basalt were limited to make informal tools (Bentivenga & Ríos Malan 2020; Lynch & Lynch 2016). Such ancient societies could have used local raw materials to make points, but we only found points of allochthonous obsidian. This exclusive selection of obsidian could be due to its excellent quality for knapping and, especially, its efficiency for making small triangular points.

In this regard, Odell & Cowan (1986) proposed that while non-retouched flakes can be used as projectile points, the effort invested on producing projectile points by bifacial knapping offers benefits, like being easier to haft, penetrating more deeply, and being less likely to bounce off the target. Concerning the function of the points, both weight and width were proposed to identify the kind of weapon(s) to which they belonged. Stone-headed points weighing less than 3.5 grams (Fenenga 1953) and measuring less than 20 mm wide (Shott 1997) are associated with the use of bow and arrow weapons. This technology appeared in the southern central Andes region around 3000 B.P. (Hocsman 2010) or since Formative times (Ratto 2003: 280). The metrics of the obsidian points studied in the current paper lie below these values, so they were likely utilized as tips for arrows. Also, it has been pointed out that the concave-based triangular design turns these projectile points into very effective weapons, either for hunting, which enhanced domestic herd viability, or for interpersonal violence (Varde & Muscio 2018).

Considering that many authors have proposed a conflictive landscape during Late times along different areas of NWA (Acuto 2007; Balesta *et al*. 2011; Nielsen 2007; Núñez Regueiro 1974; Wynveldt & Balesta 2009), obsidian weapons might have been used for violent interpersonal purposes. However, until now, the available evidence for the northern sector of the Hualfin Valley does not support this scenario during Inka times. Instead, Lynch & Giovannetti (2018) suggested a context free of conflict and local resistance, in which cultic landscapes built by the Inkas played an important role, articulating statal architecture with both geography and previous sites.

Within this scenario, obsidian points may have served as a hunting or symbolic function, rather than against other people. Zooarchaeologist evidence of wild fauna, like camelids and cervids, as well as small game, is present in different Late-Inka contexts from NWA, suggesting that hunting practices could have been a complementary strategy to pastoralism (D'Altroy *et al*. 2000; Izeta 2008; Izeta *et al*. 2009; Madero 1991, Mengoni Goñalons 2014, Rodríguez Loredo 1998).

In addition, other reasons of such investment and decisions are social issues (Odell & Cowan 1986), which are not incompatible with the economic and technique aspects stated above. The morphology of unstemmed concave-based tips is predominant or even exclusive in Late-Inka sites placed along NWA (Avalos 2003; Chaparro 2009: 493-496; Flores & Wynveldt

2009; Gaal 2014: 267; Ledesma 2003; Nielsen 1996; Sprovieri 2007; Varde 2020; Varde & Muscio 2018), pointing out a common knowledge shared by these populations.

These choices of using an allochthonous material and making a particular morphology of point could have reflected social and symbolic meanings. According to linguistic and ethnohistoric information the obsidian brightness and transparency are propitiatory to win the favour of the *w'akas* (Chaparro 2009: 519-523; Giesso 2003). Furthermore, in NWA, the obsidian long-distance exchange is an ancient pre-Columbian tradition that lasted for a long time (Escola *et al*. 2016; Yacobaccio *et al*. 2004). Therefore, the meaning of this raw material may testify of the ability of a social group to access foreign resources by trading with other communities, thus legitimizing their political status (Escola 2007; Lazzari & Sprovieri 2020).

## 5. Conclusions

We can conclude that the inhabitants of Villavil 2 used obsidian to make informal tools and especially projectile points, investing a greater production effort in the latter. The selection of obsidian as well as similar knapping methods and techniques for making the same morphology of points were observed in other Late-Inka sites of NWA. Furthermore, the spheres of obsidian distribution and the use of this raw material to make points lasted through time, despite the social changes registered in NWA, even after the Inka conquest. These recurrent patterns can be due to the excellent quality of obsidian for knapping and the efficiency of this kind of points as weapon. Also, they can be assessed as shared constellations of knowledge and common ideological foundations along the region and over time that expressed identity through tools and ways of making.

## Acknowledgements

We would like to acknowledge to the Organizing Committee of the 13th International Symposium of Knappable Materials, who invited us to submit this contribution. We wish to thank Ophélie Lebrasseur and Santiago Renna for their corrections to the language in this paper. We are also grateful to the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) for its support and both anonymous reviewers whose suggestions allowed to improve this paper.

## Data accessibility statement

The authors confirm that the data supporting the findings of this study are available within the article.

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# Tecnología lítica de obsidiana, cadena operativa y significados simbólicos al norte del valle de Hualfín (Noroeste Argentino) durante el período Tardío - Inka

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**Abstract:**

El objetivo principal de este trabajo es analizar la tecnología lítica aplicada a la obsidiana, materia prima muy utilizada por las poblaciones precolombinas del Noroeste Argentino (NOA), tanto por sus propiedades para la talla como por su valor social y simbólico. El conjunto analizado proviene del sitio arqueológico Villavil 2 (VV2), ubicado en el Valle de Hualfín (Catamarca, Argentina) y distante *ca*. 100 - 200 km de las fuentes más cercanas de esta materia prima. El sitio fue descubierto en 2015 por uno de los autores y muestra una presencia particular de arte rupestre que no había sido registrada previamente en la zona. Asimismo, habría estado ocupado para momentos Tardíos e Inka (*ca*. siglos X - XVI CE). Hasta ahora se puede considerar que se trataba de un sitio de uso temporal y periódico, que se puede asignar a un paisaje ceremonial.

El conjunto analizado comprende la totalidad de los elementos de obsidiana recolectados tanto en contexto superficial como estratigráfico. El mismo se dividió en tres clases tipológicas: artefactos formatizados (puntas de proyectil), artefactos no formatizados con filos naturales (ANF) y desechos de talla (DT). No identificamos la presencia de núcleos. Para el análisis se consideraron las siguientes variables: métodos y técnicas de talla, tamaño, cantidad de corteza, tipo de lasca, tipo de talón, forma base y tipos de borde.

Las puntas de proyectil son los únicos artefactos formatizados sobre obsidiana recolectados en el sitio. Éstas son pequeñas y apedunculadas, de limbo triangular y base escotada, morfología muy común para Período Tardío-Inka. En cuanto a las técnicas, fueron talladas bifacialmente por presión, posiblemente utilizando lascas como soporte. El tamaño de los ANF es pequeño y presentan poco remanente de corteza. Por otro lado, es llamativa la abundancia de DT de tamaño muy pequeño. Éstos fueron hallados en el mismo contexto estratigráfico y serían el subproducto de las tareas de formatización de las puntas (retoques y micro retoques).

Los resultados obtenidos permiten inferir que las tareas de talla de punta se llevaron a cabo *in situ*. Además, la tecnología implementada involucró grandes esfuerzos de producción y destreza, que contrasta con la estrategia más expeditiva empleada en la talla de las materias primas locales. Es posible que la estrategia conservativa aplicada a la obsidiana no estuviera relacionada con la dificultad de acceder a este material alóctono. Por el contrario, dichas elecciones se podrían deber a la eficacia que presenta la obsidiana para la talla de este tipo particular de puntas y del uso de éstas para la caza de fauna silvestre. Otra posibilidad, no necesariamente contradictoria con las anteriores, sino complementaria, es que la obsidiana estuviera asociada a significados sociales y simbólicos particulares. Según información lingüística y etnohistórica, algunas propiedades que se observan en la obsidiana, como el brillo y la transparencia, son propiciatorios para ganar el favor de los *w'akas*. Además, en el NOA el intercambio a larga distancia de dichas rocas es una tradición precolombina que perduró durante un lapso importante de tiempo, al menos desde el 3500 A.P. hasta momentos inkaicos. En este sentido, la obtención de obsidiana podría estar mostrando la capacidad de un grupo social para acceder a recursos distantes y legitimar su estatus político.

Keywords: Obsidiana; tecnología lítica; valle de Hualfin; Período Tardío; Período Inka