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A Reassessment on the Lithic Artefacts from the Earliest Human Occupations at Puente Rock Shelter, Ayacucho Valley, Peru

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Abstract

Richard "Scotty" MacNeish, between 1969 and 1972, led an international team of archaeologists on the Ayacucho Archaeological-Botanical—Project in the south-central highlands of Peru. Among several important archaeological sites identified there, MacNeish and his team excavated the Puente rock shelter. As a part of an ongoing research program aimed to reassess the lithic remains from this endeavor, we re-studied a sample by making diverse kinds of morpho-technological analysis. The remains studied come from the lower strata at Puente, where a radiocarbon assay from layer XIIA yielded a calibrated date of 10,190 to 9555 years BP that the present study identifies, various activities were carried out at the site, mainly related to manufacturing and repairing unifacial and bifacial tools. The artifacts studied are comparable with the lithic remains found in other sites located in the Ayacucho Basin, and with other early evidence from other parts of the south-central Andes.

Keywords

Lithic Analysis, Late Pleistocene/Early Holocene Archaeology, South America, Peru, Ayacucho Basin

1. Introduction

Headed by Richard MacNeish (Robert S. Peabody Institute of Archaeology), between 1969 and 1972, an interdisciplinary team of archaeologists carried out the "Ayacucho Archaeological-Botanical Project" in the Ayacucho Basin, highland Peru (e.g., MacNeish, 1969, 1981; MacNeish et al., 1970, 1980). Becoming a seminal research in the Americas' archaeological history (Dillehay, 1985), this project allowed the excavation of several sites. Worth mentioning are the Pikimachay, Ayamachay, and Rosamachay caves, as well as Jaywamachay and the Puente rock shelters. These sites, and particularly the latter, revealed a remarkable archaeological record spanning from the Late Pleistocene to historical times. Several volumes have provided very much data, information and results of this investigation. However, the reported lithic artefacts lack standard definitions, detailed studies, and associations with other sites; hence, this evidence should be better organized based on comprehensive reviews. In pursuing this goal, a detailed revision on the Ayacucho-Huanta Project collections is being carried out, as well as new fieldwork in the area. As a part of this ongoing research, this paper reports the lithic analysis of the specimens belonging from the lowest strata of the Puente site (**Figure 1**), and observations on a few remarkable bone remains.

Figure 1. Location of Puente site in Ayacucho Basin, Peru (from Google Earth Pro 2020).

2. Excavations, Stratigraphy and Chronology

The Puente rock-shelter (Ac158) was located in the Department of Ayacucho, northeast of the Huamanga (13˚8'7.70"S, 74˚12'49.17"W, 2640 m.a.s.l.). At the base of its talus is the usually dry Wichqana Creek. The site takes its name from *Puente Totorilla*, a nearby bridge. Its excavators suggested that the rock shelter slope was the eroded remnant of a terrace formed by the collapse and erosion of the cave's ceiling (MacNeish, 1969: p. 24; MacNeish, 1981: p. 82). The site has been destroyed by use of heavy machinery during agricultural activities (**Figure 2(a)** & **Figure 2(b)**).

In 1969, A. García Cook and MacNeish excavated a trench of 9 m long by 1 m wide, reaching two meters depth (MacNeish, 1981: pp. 83-84, fig. 4-2 to 4-7). A team directed by García Cook (**Figure 3**), in 1970, excavated a large surface using a one square meter grid (**Figure 4**). Several unpublished images depict the deposit's depth, as well as different views during the field-work (**Figures 5(a)-(d)**). The excavation showed that the site was inhabited by different human occupations thought time, mainly of pre-ceramic nature (MacNeish, 1969: pp. 17-24, 31-33; MacNeish et al., 1970: pp. 5-16, 31-34).

Figure 2. (a) General view of Puente site from the Wichqana creek; (b) Current condition due to machinery impact. Except when clearly expressed otherwise, all the pictures are by J. Yataco Capcha.

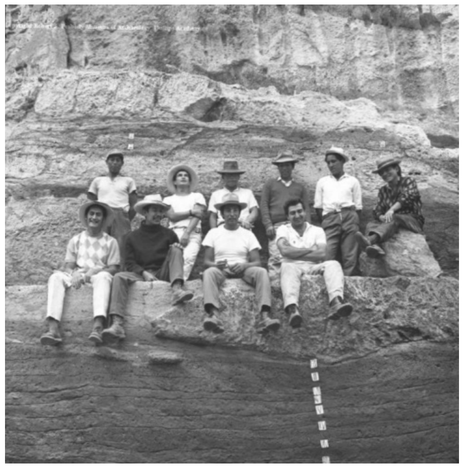

Figure 3. The Ayacucho Archaeological-Botanical Project team members during the excavations of the Puente site in 1970. Sitting from left to right: V. Cárdenas, A. García Cook, unknown, and E. Sáenz; standing: unidentified laborers (Copyright: Robert S. Peabody Institute of Archaeology, Phillips Academy).

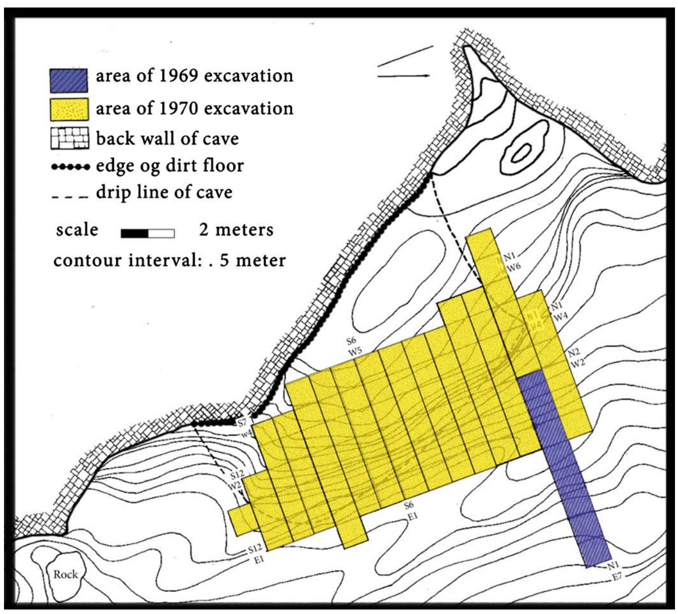

Figure 4. Puente site floor plan (modified after Cook and MacNeish, 1981: p. 81, fig. 4-1).

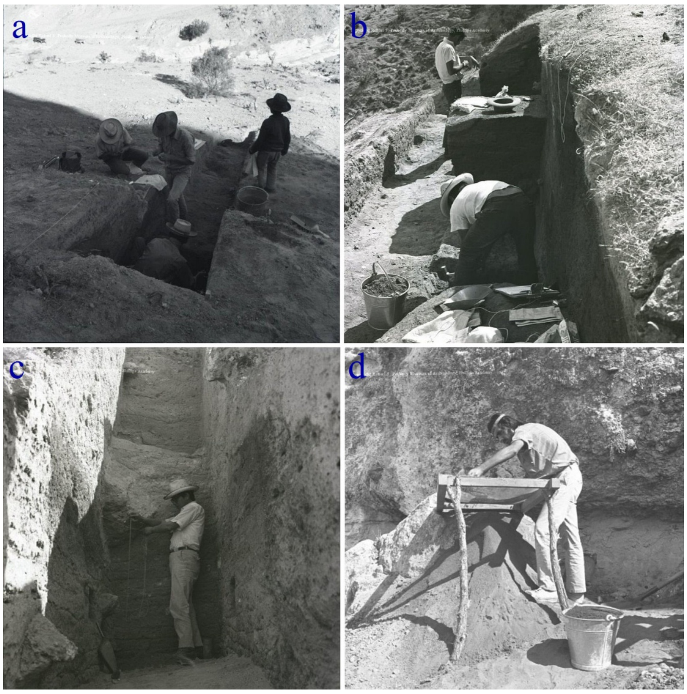

Figure 5. Images of the Puente rock-shelter excavations performed in 1969 (a) and 1970 (b)-(d). (a) Opening the initial trench; (b) Recording the stratigraphy in the step trenches; (c) M. Benavides working on north-south cross trench at the beginning of the season; (d) C. Chaud sieving sediments (Copyright: Robert S. Peabody Institute of Archaeology, Phillips Academy).

Stratigraphic analysis identified fourteen layers, called "zones" (*cf.* MacNeish, 1981: pp. 88-89, fig. 4-10; MacNeish et al., 1983: pp. 50-57). The deposit's depth varies according to its location on the site. This paper focuses on material from strata XIIA to XIV, located in the front part of the rock shelter's talus, and indicated with colors in **Figure 6**. A brief description is as follows: XIIA is ~8 cm thick formed by yellowish-brown sediment. Covering a surface of ~87 square meters, layer XIII is light brown sediment with yellowish spots ~15 cm thick. Finally, XIV is the deepest stratum deposited over the bedrock. It is composed of light yellow colored sediment mixed with volcanic ash. Concerning the archaeological finds, the most abundant remains come from layer XIIA-XIII, while XIV yielded the smallest quantity from grids S4, S5, S4E1, S6E1, and S7E1.

As depicted in **Figure 7**, ten radiocarbon assays on charcoal samples were obtained from the excavation (Ziólkowski et al., 1994). They were calibrated using the OxCal v4.3 program and the SHCal13 southern hemisphere calibration curve (Bronk Ramsey & Lee, 2013; Hogg et al., 2013). Additionally, the results agree with the stratigraphic provenance of the samples. Furthermore, the majority of the dates (n = 9) spanned the ~7 - 8 kya cal period. The earliest assay of 8860 ± 125 uncalibrated years BP (Ziólkowski et al., 1994: p. 330) coming from stratum XIIA is 10,190 to 9555 calibrated years BP (**Figure 8**). Considering the dates, layers XIIA-XIII belong to the early Holocene, and probably layer XIV, to the Pleistocene-Holocene transition/Holocene.

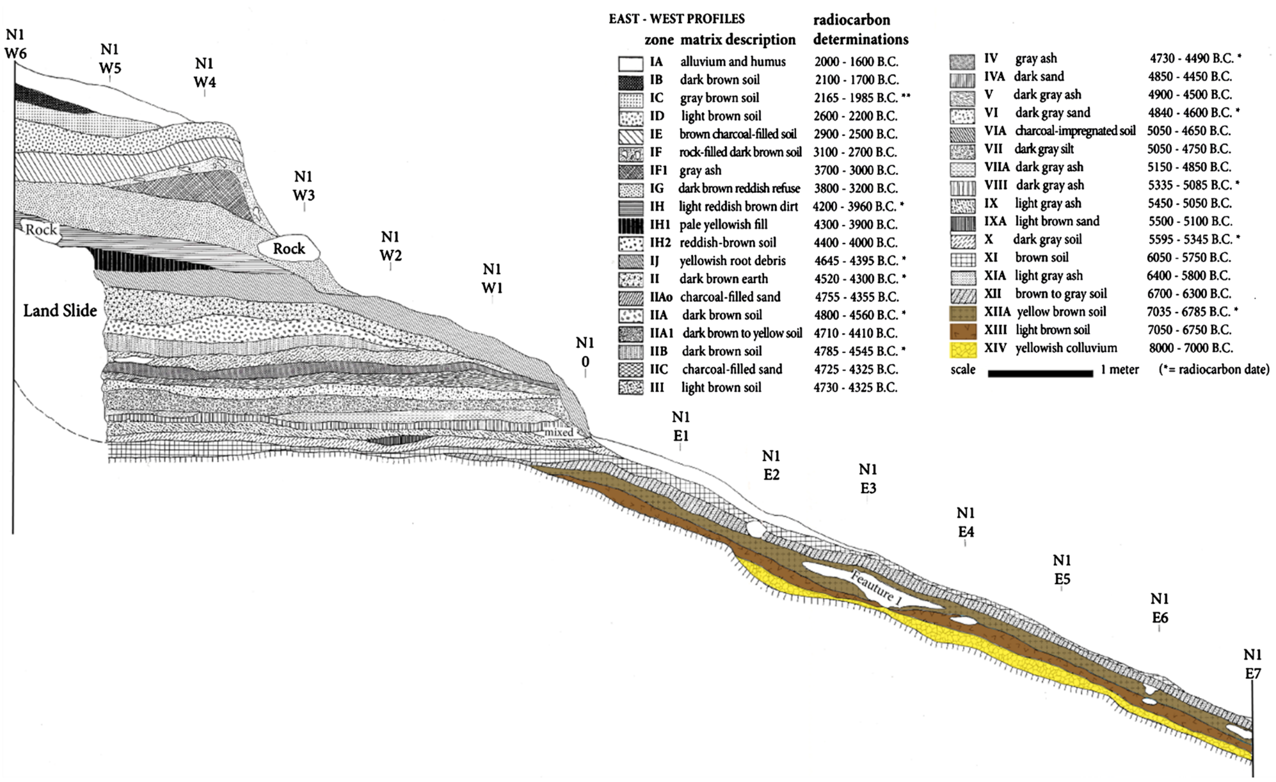

Figure 6. Detailed stratigraphic sequence recorded in the east–west section of the Puente rock shelter. Redrawn from García Cook et al. (1981: pp. 88-89, fig. 4-10).

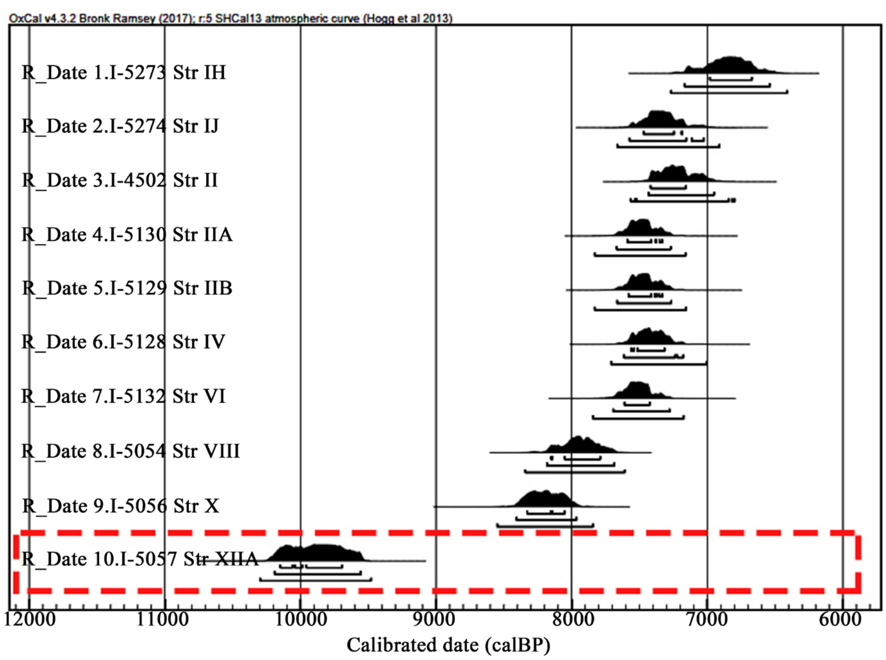

Figure 7. Calibrated radiocarbon ages of the Puente rock-shelter. The red rectangle with dashed lines indicates the earliest date at the site.

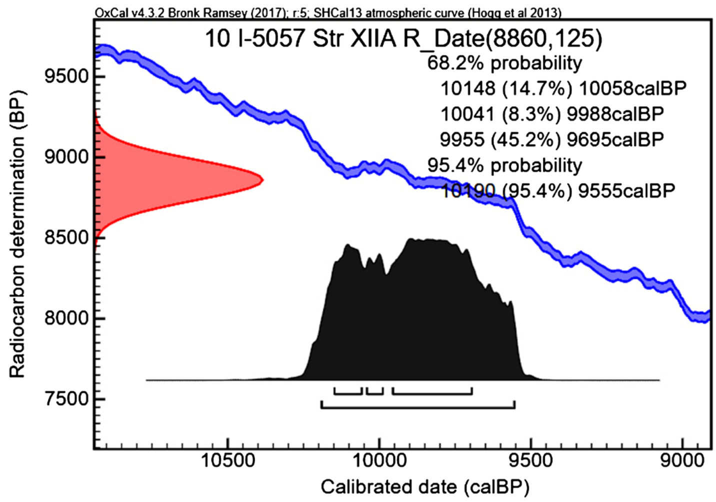

Figure 8. Plot showing the date of the sample I-5057 from XIIA strata as well as the 95.4% and 68.2% probability calibrated age ranges and the ShCal13 curve for the southern hemisphere.

3. Materials, Analysis and Observations

The analyzed collection is curated in the Museum of Archeology of the San Marcos University (Lima, Peru). Also, there are a few objects at the Environmental Archaeology Program of the Florida Museum of Natural History (FLMNH), Gainesville, Florida, USA. The study of the field-notes taken by MacNeish and his team at the Robert S. Peabody Institute of Archaeology (Andover, Massachusetts, USA) complemented this research. A total of 4052 human-made artifacts were studied and recorded whose distribution by strata is described in **Table 1**.

We processed the morpho-technological analysis according to several general typological guidelines (de Sonneville-Bordes & Perrot, 1956; Bordes, 1981; Piel-Desruisseaux, 1989; Merino, 1994; Inizan et al., 1995); the schemas were proposed explicitly for the Peruvian Andes (Bonavia, 1982, 1992; Chauchat, 1972, 1982; Lavallée et al., 1995), and other lithic analysts (e.g., Crabtree, 1972; Callahan, 1979; Andrefsky Jr., 2005; among others). Following is the list and a brief description of the tools' classes defined for this investigation.

A. Unifacial tools.

*A.*1. *Flakes with marginal retouch*. These are diverse kinds of flakes presenting small non-regular discontinuous, unifacial, bifacial, or alternating retouches, generally located at the distal portion and/or lateral edges (Bordes, 1981: p. 67).

*A.*2 *Denticulates*. Made on flake-blanks showing series of cut-outs or multiple-notched shapes as more or less regular indentations on one or more edges (Merino, 1994: p. 69).

*A.*3 *Unifaces*. Pieces reduced on one face generally having oval shapes, and generally plane-convex cross sections (Andrefsky Jr., 2005: p. 229).

*A.*4 *Side-scrapers*. Made on flakes with semi-abrupt continuous retouches modifying one or more edges, creating a straight, concave, or convex edge without cut-outs (Merino, 1994: p. 64; Piel-Desruisseaux, 1989: pp. 75-76).

Table 1. Lithic list discriminated by layers.

Lithic Typology Puente site			
Categories	Strata		
	XIV	XIII	XIIA
A. Unifacial tools			
A.1. Flakes with marginal retouch	-	11	4
A.2 Denticulates	-	2	-
A.3 Unifaces	-	2	-
A.4 Side-scrapers	-	3	-
A.5 End-scrapers	-	9	14
B. Bifacial artifacts			
B.1 Projectile points	-	14	1
B.2 Early bifacial stages and preforms	-	6	-
C. Pebble implements			
C.1 Hammer-stones	-	1	-
C.2 Manuports and ecofacts	-	4	2
D. Flaking waste			
D.1 Flakes and shatters	38	1754	2181
D.2 Cores	-	4	2
Total	38	1810	2204

*A.*5 *End-scrapers*. Generally made on different types of flakes that show a continuous non-abrupt retouching delineating a rounded or convex distal edge (Merino, 1994: p. 67; de Sonneville-Bordes & Perrot, 1956).

B. Bifacial artefacts.

*B.*1. *Projectile points*. This is a pointed artefact that was hafted to a weapon, sometimes used to accomplish other functions such as a knife.

*B.*2. *Biface and preform*. Piece partially or totally flaked on both faces with shapes varying from roughly oval to the outlining of the desired product (Crabtree, 1972; Callahan, 1979; Nami, 1986, 2003, 2017).

C. Implements and ecofacts.

*C.*1. *Hammer-stones*. Oblong pebbles with impact marks on one of their ends, usually resulting from percussion (Crabtree, 1972; Callahan, 1979).

*C.*2. *Manuports and ecofacts*. Pebbles that were without use-wear or modification, but possibly transported to the site by a human intervention (Leakey, 1979; Sharer & Ashmore, 1979).

D. Flaking waste.

*D.*1. *Debitage*. Here we include the by-products resulting from the stone tool's manufacture, such as flakes and shatters (Andrefsky Jr., 2005; Leroi-Gourhan, 2005: p. 309).

*D.*2. *Cores*. Pieces resulting from blank obtaining for making stone tools

(Leroi-Gourhan, 2005: p. 792; Andrefsky Jr., 2005: pp. 81-82).

Table 1 shows the list of artifacts by layers, and Figure 9(a) & Figure 9(b) gives the origin, measurements, raw materials, tool class, and other data. Figure 10

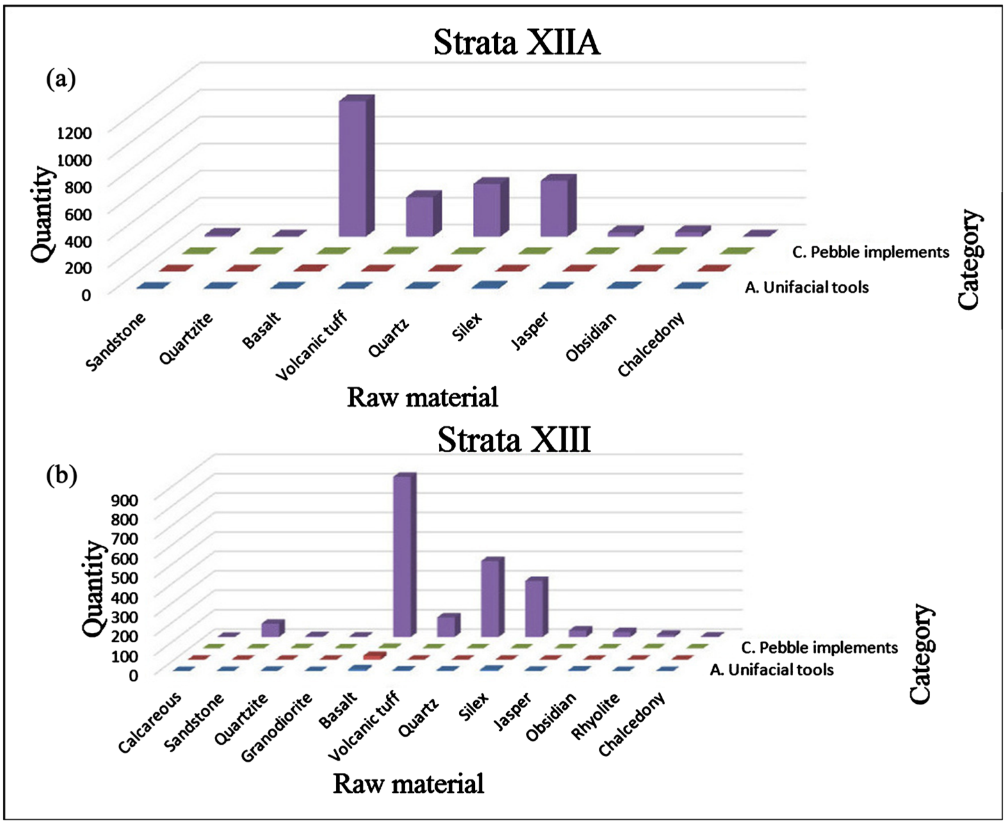

Figure 9. Raw materials' distribution versus debitage and lithic categories from strata XIIA (a) and XIII (b).

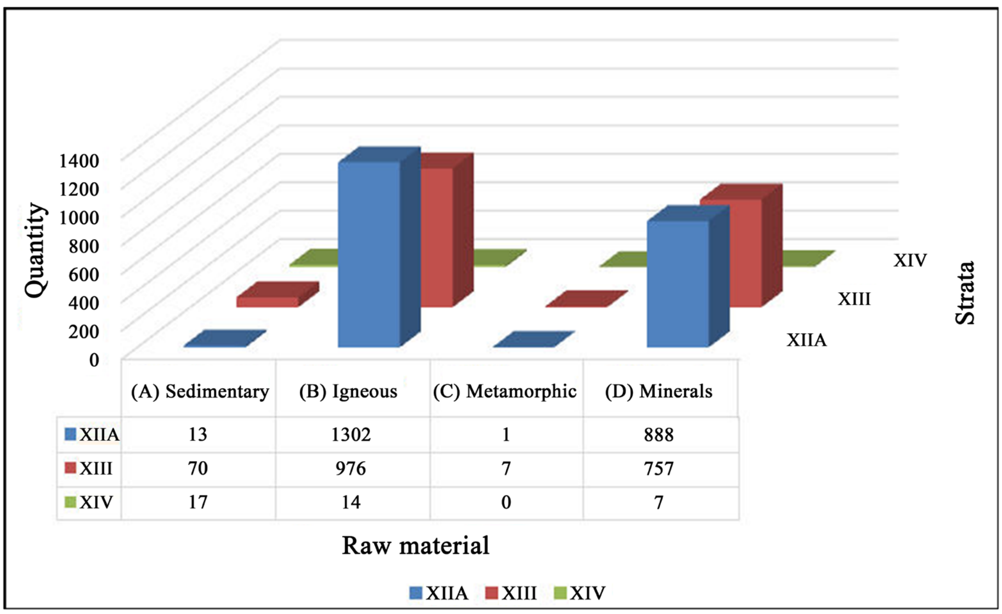

Figure 10. Raw materials' quantity discriminated by group and strata.

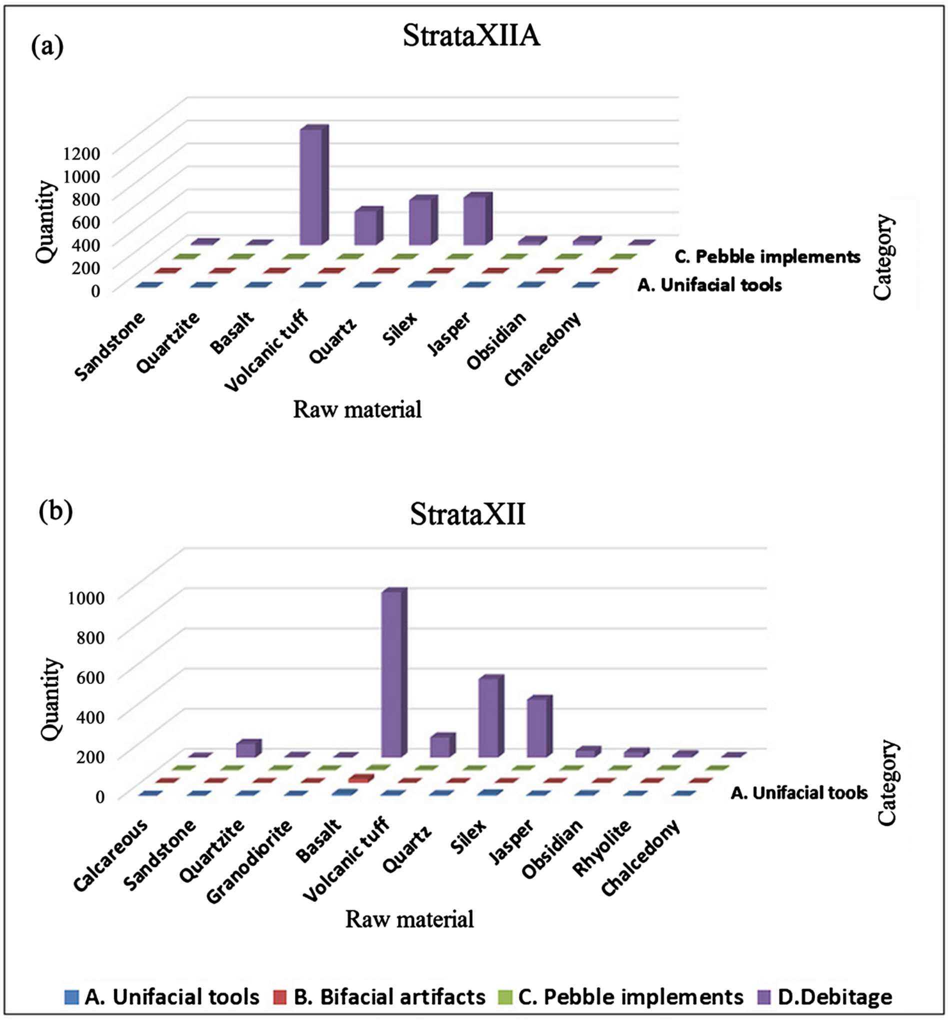

Figure 11. Raw materials' distribution versus lithic categories from strata XIIA (a) and XIII (b).

and **Figure 11** illustrate the most notable analyzed artifacts. Using experimental and ethno-archaeological research, we can make a variety of observations of the stone tool technology present in the lowest layers of the rock-shelter.

Guided by geologist C. Toledo, the raw materials were macroscopically examined using a 10× to 35× magnifying glass, and sometimes a hand-held microscope up to 250×. They were grouped as follows: Group A, Sedimentary, made up of sandstones and calcareous materials; Group B, Igneous, including granodiorite, granite, andesite, rhyolite, basalt, volcanic tuff, and gabbro; Group C, Metamorphic, among which stand out quartzite and anthracite; finally, Group D encompasses silica-based minerals, among which we include the flint-like materials (silex or chert), jasper, obsidian, quartz, and chalcedony (Dana, 1998).

Figures 9-11 show that groups B and D are the most abundant material in layers XIIA to XIV. The former is available in the seasonal creek located at ~50 m from the site. Its ravines constitute a secondary source (Luedtke, 1979) containing pebbles of quartzite, basalt, granodiorite, rhyolite, and volcanic tuff. The sources of some the Group D rocks are still unknown. However, several natural deposits at Quispisisa and Puzolana, located at Ayacucho, are the best-documented and closest obsidian supply (Matsumoto et al., 2018; Giesso et al., 2020). A few obsidian samples (n = 4) from layers XII-XIII analyzed using XRF and NAA methods showed that two artifacts come from Quispisisa, and another two from Puzolana (Burger & Asaro, 1979, 1993: table 12; Burger & Glascock, 2000: pp. 292-293).

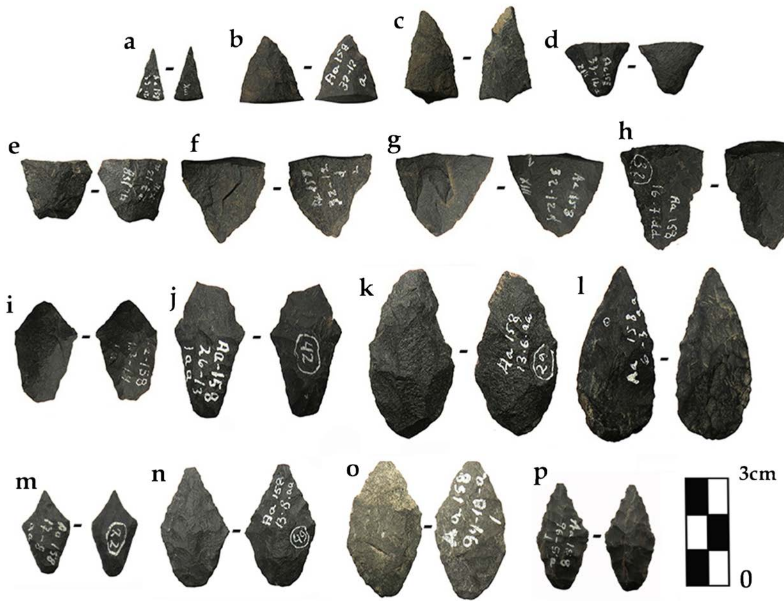

Figure 12. Projectile points in different condition recovered in stratum XIIA (p) and XIII (a)-(o).

From levels XIIA–XIII comes one rhomboidal point, and three complete pieces showing lanceolate, bi-pointed, and rhomboidal shapes, tips, and basal portions fractured by impact (Newcomer, 1980), some with contracting stems (**Figure 12**). Although, some specimens exhibit short retouches allowing the observation of the flake-blank' (**Figures 12(e)-(h)**), most were finished by covering pressure flake-scars applied with a non-regular pattern (**Figures 12(m)-(p)**). As a typical behavior in bifacial implements' life trajectories, they were resharpened and reworked (e.g. Ahler, 1971). This is detectable when the blade form and symmetry are highly modified; retouches show a change in the remaining original pattern; the borders are strongly rounded or concave (Callahan, 1981), or do not have enough mass to continue the task. This kind of repair was generally made when the piece was hafted (Nami, 2013). Considering coeval lanceolate points with little or no resharpening (e.g., Rick, 1983: fig. 44d-e), the specimens displayed in **Figure 12(i)**, **Figures 12(j)-(l)** show intense rejuvenation. This fact is also visible in other Peruvian exemplars (e.g., Lynch, 1967: fig. 2a-h; Rick, 1983: fig. 44k-l, n-o). In addition to the discarded points, the remaining five bifacial pieces from layer XIII are early manufacturing stages rejected by flaking failures, such as hinges, steps, and an oblique fracture (**Figures 13(a)-(e)**; Callahan, 1979).

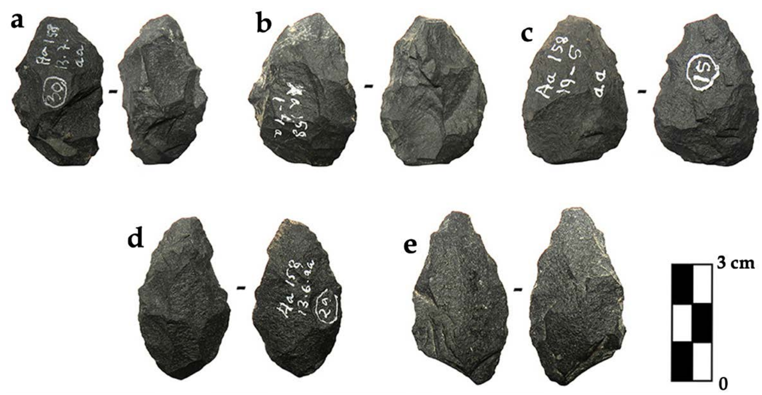

Figure 13. Bifacial stages of manufacture from layer XIII.

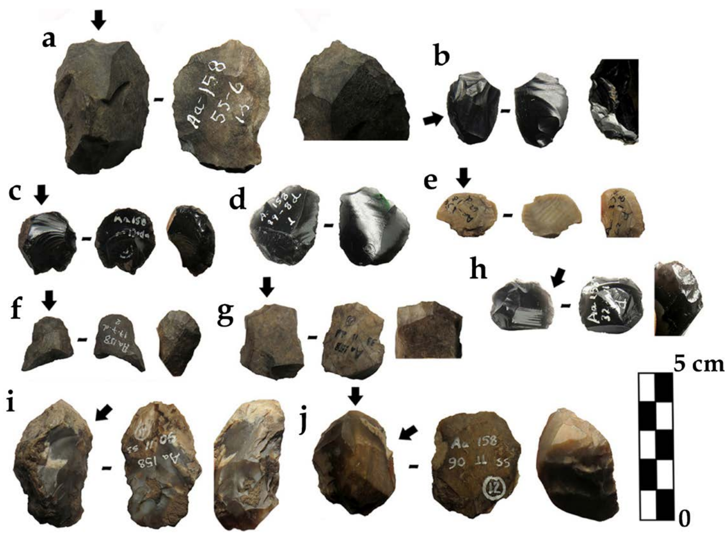

Figure 14. Illustrative examples of unifacial tools from layer XIIA. The arrows in this and the next figure point to the edges' close-up picture depicted on the right of each specimen.

Besides side-scrapers and denticulates (Figure 14((b), (h)-(j))), most unifacial tools are the end-scrapers (Figure 14((a), (c), (e), (f))) and flakes with marginal retouch (Figures 14((d), (g))). Special care was taken with the latter because pieces with a sharply acute edge-angle, their retouches, may result from a natural edge use (Bordes, 1981), unintentionally originated by trampling, and another kind of taphonomic processes (Eren et al., 2011). The unifaces were mostly made using tertiary flake blanks (Figures 14((a)-(h), (j)); Figures 15(u)-(w); Figure 16(u), Figures 14((y), (z))) and a few with primary (Figures 15((i), (t)); Figure 16(k')) and secondary flakes (Figure 14(i); Figures 15((g), (h), (j)-(q), (s), (u)-(w))). They were obtained by hard hammer (Figures 15((g), (i), (j)); Figures 16(h), (i), (n), 16(p)-(t))), or soft direct percussion flaking, exhibiting flat and diffuse force application bulbs and lips (Figures 15((b)-(e), (h)); Figure 16((e), (f), (j), (m), (o), (u)-(w))), depending on the material, as experimentally revealed (Crabtree, 1972; Callahan, 1979; Nami, 2015, 2017). The retouches vary from short regular and irregular parallel (Figures 15(u)-(w)) to scalariform (Figure 15(p)). When a flake's dorsal and ventral faces are visible, most retouches are direct (Figures 14(a)-(j); Figures 15((e)-(i), (k), (n)-(o), (q)-(t)); Figures 16((l)-(x), (i')-(l')), and inverse in a few cases (Figure 15(p)). It is highly probable that final shaping was performed by merely retouching a blank's edges using the same technique, but with another variant and/or holding position, and using soft or semi-soft hammer-stones Due to their small dimensions, most of the unifacial tools might have been used hafted (references in Shott, 1995).

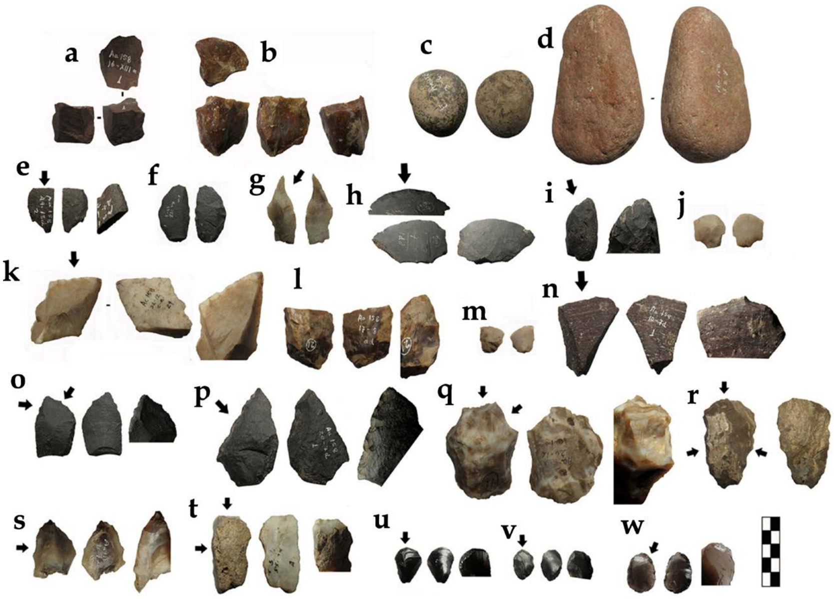

Figure 15. Cores ((a), (b)), ecofacts ((c), (d)) and unifacial tools (e)-(w) from layer XIII.

The lithic waste represents the majority of the remains of the scrutinized sample. The Table 2 describes the materials in terms of formation, origin, workability, hardness, using a scale ranging from "bad" to "excellent" according to the degree of workability of the rocks (Nami, 2015), and their potential employment in different flaking strategies and techniques (Tixier et al., 1980). Table 3 depicts its dimensional average means by strata.

The cores varied from orthogonal, trapezoidal, and bifacial shapes (Figure 15(a), Figure 15(b); Figures 16((n), (m')-(o')). The manuports and ecofacts consisted of a hammer-stone and pebbles recovered at the nearby Wichqana creek, whose shapes range from circular, elliptical, and oblong (Figure 15(c), Figure 15(d)). The former shows percussion marks on one of its sharpest sides, while the latter has soot traces, probably related to some combustion phenomena (Figure 15(c)). Besides the aforementioned cores, the drawing depicted in Figure 16 exemplifies a few laminar flakes (Figures 16(a)-(d)), pressure flake debitage (Figures 16(f)-(i)), diverse kinds of unifacial tools as well their fragmented edges (e.g. Figures 16((j)-(m), (r)-(x), (f'), (j'), (l')).

We identified twenty-six bone remains from the analyzed strata, six modified by grinding and polishing, and twenty small fragments altered by fire. As seen in Figure 17 from XIIA come two well-made awls and a part of a polish specimen (Figure 17(a) & Figure 17(b)), previously reported as "Split and Conical awls"

Table 2. List of lithic materials reported in this paper.

Variety of Lithic Materials	Rock	Origin	Hardness*	Range	Typology+	Strategies and techniques	Figure
Sedimentary	Calcareous	local	3	R	D.1	PF, PrF	-
	Sandstone	local	3	R	D.1	PF, PrF	-
Metamorphic	Quartzite	local	7	R-B	A.1, C.1, D.1	PF	Figure 15(d), Figure 15(e); Figure 16(q)
Igneous intrusive	Granodiorite	Local, Wichqana creek	7	R-B	D.1	PF	-
Igneous volcanic	Basalt	Local, Wichqana creek	4.8 - 6.5	R-G	A.1, C.2,A.4, A.5, B.1, B.2, D.1, D.2	PF, PrF, BR	Figures 12(a)-(p); Figures 13(a)-(e); Figure 14(f); Figures 15((c), (f), (h)-(i), (o)-(p)); Figures 16((b), (e), (h), (m), (r), (w), (a'), (d'), (g'), (i'), (k'))
	Volcanic tuff	Local, Wichqana creek	7	R-G	A.1, A.3, A.5, C.2, D.1, D.2	PF, PrF	Figures 15((a), (n)), Figures 16((d), (j), (s), (j'), (l'), (m'), (n'))
	Rhyolite	local	6.5 - 7	R—G	C.2, D.1, D.2	PF	Figure 16(n)
Minerals	Quartz	not determinated	7	G-E	A.1, A.5, A.2, D.1, D.2	PF, PrF	Figures 15((g), (j), (m), (q)), Figures 16((g), (k), (p), (v), (c'))
	Silex or chert	not determinated	7	G-E	A.1, A.2, A.3, A.5, D.1, D.2	PF, PrF	Figures 14((e), (g), (i), (j)); Figures 15((b), (k), (l), (r)-(t)); Figures 16((a), (c), (f), (l), (o), (t), (b'), (e'), (f'), (h'), (o'))
	Jasper	not determinated	6.5 - 7	G-E	A.1, A.4, D.1	PF, PrF	Figure 14(a); Figure 16(x)
	Obsidian	possible Puzolana or Quispisisa	5 - 7	G-E	A.1, A.5, D.1	PF, PrF	Figures 14((b)-(d, (h)); Figures 15(u)-(w), Figures 16((u), (y)-(z))
	Chalcedony	not determinated	7	G-E	D.1	PF, PrF	Figure 16(i)

Abbreviations: *Mohs scale. R: Regular, B: Bad, G: Good, E: Excellent. +: Typology code according Table 1. PF: Percussion flaking, PrF: Pressure flaking, BR: Bifacial reduction.

Table 3. Average measurements by artefacts classes.

Artefacts' classes	Strata														
	XIV					XIII					XIIA				
	Q	L	W	T	We	Q	L	W	T	We	Q	L	W	T	We
A.1. Flakes with marginal retouch	-	-	-	-	-	11	32.7	31.6	9.2	8.6	4	26.7	22.7	8.75	7.05
A.2 Denticulates	-	-	-	-	-	2	42	42	19	38.15	-	-	-	-	-
A.3 Unifaces	-	-	-	-	-	2	46.5	27.5	11.5	17.9	-	-	-	-	-
A.4 Side-scrapers	-	-	-	-	-	3	36	42	6.6	10.6	-	-	-	-	-
A.5 End-scrapers	-	-	-	-	-	9	29	22.8	9.5	8.24	14	29	26.8	12.21	12.15
B.1 Projectile points	-	-	-	-	-	14	24.2	19.2	557	2.6	1	28	15	5	1.7
B.2 Early bifacial stages and preforms	-	-	-	-	-	6	39.8	22.1	8.1	5.91	-	-	-	-	-
C.1 Hammer-stones	-	-	-	-	-	1	97	70	41	417.2	-	-	-	-	-
C.2 Manuports and ecofacts	-	-	-	-	-	4	63.2	44.5	30.5	113.2	2	98	81	63	734.9
D.1 Flakes and shatters	36	12.85	15.75	4	8.6	1754	13.3	14.3	4	1	2181	12	13	3	0.5
D.2 Cores	-	-	-	-	-	4	42.25	41.25	24	106.75	2	57	44.5	25.5	65.6

Q: Total quantity; L: Length; W: Width, T: Thickness (mm); We: Weight (gr).

Figure 16. Illustrative specimens of the analysed sample from layers XIIA (a)-(c) and XIII (d)-(o').

Figure 17. Remarkable bone objects from layers XIIA. (a) Split bone awl; (b) polish bone fragment; (c) conical bone awls.

Figure 18. Burned mammal sawed phalange.

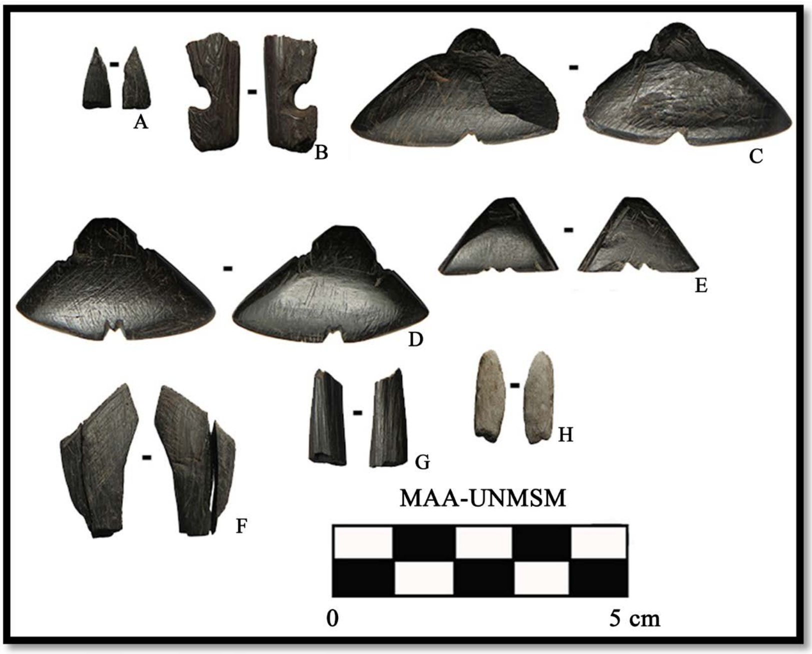

Figure 19. Bone specimens from level XIII. (a) unclassified fragment; (b) pierced base netting needles; (c)-(e) triangular pendants; (f)-(h) fragmented objects.

and "Polish bone fragment" (MacNeish et al., 1980: fig. 8-13). From the profile of grid S9, in the FLMNH collections, there is one small epiphysis of a burned phalange (EA 01180738) weighting 0.2 g with sawing marks at one of its ends that looks like score and snap debitage from making a bone good (**Figure 18**). From layer XIII comes ten burned specimens; seven are well-made objects, while the remaining are small bone fragments. Remarkable pieces displayed in **Figure 19(b)-(e)** were classified as *"Pierced Base netting needles"* and *"Triangular Pendants"* (MacNeish et al., 1980: pp. 317-318, fig. 8-14). The latter was well-made by grinding on some abrasive material that left striae visible to the naked eye; finally, polishing was employed to finishing them.

4. Results and Interpretation

The shaped tools from layers XIIA–XIII shows morpho-technological similarities. Hence, they belong to Early Holocene hunter-gatherers living at the ~≥10.3 - 9.5 calibrated kya. The low frequency of lithic artefacts in layer XIV may have come from the upper layer, or they testify the presence of an older occupation.

Given the lithic waste's dimensional ranges, these are results from manufacturing tools, suggesting that it was an important activity performed at the site. They are mainly by-products from bifacial thinning, final shaping, and rejuvenation of uni- or bifacial instruments. In this endeavour, the knappers may have used hard-percussion flaking, but also soft-precursors according to the reduction technique (Flenniken 1984: p. 191) and step in the process (Callahan, 1979; Nami, 2017). Due to their size and punctiform striking platforms, some of the smallest flakes result by the use of pressure flaking (Andrefsky Jr., 2005; Nami, 2017). The most used materials were local basalt, followed by silex and jasper, the quarries of which are still unknown. The obsidian comes from the Quispisisa and Puzolana sources. The former is located at ~120 km distance from the Puente site, while the latter is in the site's vicinity at ~10 - 15 km (Burger & Glascock, 2000; Giesso et al., 2020).

One of the activities performed at layers XIIA–XIII was the weaponry repairing, possibly replacing exhausted and broken points for new ones. Although there are entire specimens, most are rejuvenated and fractured pieces, either tips or basal portions. The finding of extremely resharpened points, fractured bases, and early bifacial stages of reduction suggest this fact. In addition to waste, there is a profusion of debitage that evidences final shaping by pressure flaking. Under the actualistic baseline generated by replicative experiments on similar materials to those recovered at Puente especially basalt-, and other rocks (Callahan, 1979; Nami, 1986, 2015, 2017), it is possible to suggest that the waste's flakes resulted from hard and soft percussion flaking. This fact is consistent with that of some of the early stages bifaces, which showed flake-scars with sharp ridges and profound concave initiations remaining from pronounced bulbs of percussion (**Figure 13**). Others show flat initiations resulting from the flakes' detachment with diffuse bulbs (Crabtree, 1972; Callahan, 1979; Nami, 1986, 2017). Coincidently, much debitage displays thin, angular flakes with multidirectional ridges and curved longitudinal cross section. In addition, they show narrow and abraded faceted—or filiform—platforms, and sometimes lips. Experiments making similar lanceolate pieces (Nami, 1988-1990) suggest that the rejected bifacial specimens are early manufacturing stages and preforms. On these bases, their flake-scars' features indicate that they were probably flaked with hammer-stones (**Figures 13(a)-(e)**) and organic precursors, possibly antler or bone (**Figures 12(i)-(p)**). The small sample from layer XIV is debitage mainly represented by diverse small tertiary flakes. By their characteristics, they may result from bifacial thinning stages and final shaping (Callahan, 1979; Nami, 1986, 2017; Whittaker & Kaldahl, 2001; Purtill, 2012).

Random multidirectional flakes extremely reduced the cores, suggesting the materials' maximization. The pebbles and cobbles in traditional technologies generally are multipurpose implements (De Beaune, 1989). One was used as a hammer-stone, while the ecofacts were probably employed in diverse ways. Those with soot traces were perhaps related to some combustion or culinary action.

5. Discussion and Conclusion

In summary, the raw material procurement in general was local. However, the presence of obsidian from Quispisisa verified that, since the terminal Pleistocene, the Andean societies made long-distance interregional movements or exchanges (Burger & Asaro, 1993; Matsumoto et al., 2018). Similarly, its use for making stone tools by the earliest hunter-gatherer occupations at Ayacucho was also recorded in the Pikimachay cave, and the Jaywamachay rock shelter (García Cook et al., 1981; Yataco Capcha & Nami, 2016).

The analysed shaped artefacts show small sizes with standardized forms. The projectile points' morphology and unifacial tools agree with those registered in early Holocene sites in the Central and Southern Andes: in Peru at Lauricocha (Cardich, 1958: fig. 11a-f; fig. 12, fig. 25-27; Cardich, 1964: fig. 79-86); Quisqui Puncu (Lynch, 1967), Guitarrero (Lynch, 1980: fig. 9.1: c-d, h-j; fig. 9.2: o; fig. 9.3: a, h, j); Pachamachay (Rick, 1980: fig.6 .13-6.14, fig. 7.2-7.11; Rick, 1983: fig. 44a-o; fig. 45g-h); Uchkumachay (Kaulicke, 1999: pp. 307-324 fig.3-12); Telarmachay and Quebrada de los Burros (Lavallée, 1995: pp. 127-129; Lavallée & Julien, 2012: pp. 223-224); Tres Ventanas, Kiqche sites (Chauchat, 1972: pp. 126-132, fig, 4-5); and Toquepala (Ravines, 1972: pp. 133-184), as well many other places (e.g. Sandweiss & Rademaker, 2011); Chile (Osorio et al., 2011), Bolivia (Aldenderfer, 1998: fig. 6.24; Lizarraga-Mehringer, 2000: pp. 124-138, 156-161; Rivera Casanovas & Calla Maldonado, 2011: fig. 8a-p), and Argentina (González, 1960; Gradín, 1984; Fernández, 1988-1990).

In Ayacucho, diverse projectile point types were defined based on their morphological variations (MacNeish et al., 1983: pp. 50-57). Several reflect different shapes with little or no resharpening (MacNeish et al., 1980: pp. 53-64). However, some of these might result from the rejuvenation of the same ones, and the points from layers XIIA–XIII reflect this case. It is worth mentioning that in the lower levels of Guitarrero, Jaywamachay rock shelter and Pikimachay caves, with a similar chronology, the case of Guitarrero Cave is special, because the lithic artefacts were associated with well-preserved remains of wood, bone, antler, twine, and vegetable fibre textiles (Lynch & Kennedy, 1970: fig. 1). Like other hunter-gatherers in the world (Schier & Pollock, 2020), these elements suggest an early textile development in the Central Andes, almost coincident with the oldest evidence of Andean agriculture and the origin of the well-known socio-cultural complexification in the Central Andes (Dillehay et al., 2007).

From a culture-history perspective, MacNeish and associates proposed a long regional sequence segmented in several phases according to their excavations in the Ayacucho Basin, mostly named with traditional Quechua names, for instance Phases Puente Jaywa, Piki, Chihua, Cachi, etc. (García Cook et al., 1981: pp. 199-266). The archaeological vestiges of layers XIIA-XIII and XIV were attributed as belonging to some of the oldest phases called "Jaywa" and "El Puente" (García Cook et al., 1981: pp. 87-94; MacNeish et al., 1983: pp. 50-55). From our perspective, the findings from levels XIIA–XIII belong to Early Holocene hunter-gatherers. Those from layer XIV may come from the upper layer, or testify a short occupation event of an older Paleoindian group living at the time of the Younger Dryas at ~13.0 - 12.2 calibrated kya. In general, low remains' densities characterized some early South American records (e.g. Politis et al., 2019). From that period, the Jaywamachay rock shelter, and other Peruvian sites yielded "fishtail" points (e.g., MacNeish et al., 1980; García Cook et al., 1981; Rademaker et al., 2014; Maggard, 2015; Yataco Capcha & Nami, 2016). Widely distributed from southern Mexico to southernmost South America, this iconic Paleoindian artifact evidences the Andean/Pacific path followed by the foragers intervening in the colonization of South America (Nami, 2021).

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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