Journal of Archaeological Science 57 (2015) 315–321

Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

Review

A use-wear analysis of wood technology of patagonian hunter–gatherers. The case of Cerro Casa de Piedra 7, Argentina

L. Caruso Fermé [a, *], I. Clemente [b], M.T. Civalero [c]

[a] CONICET, Centro Nacional Patagónico, Bvard Marron 2915 U9120 ACD (9120), Puerto Madryn, Argentina
[b] Departamento de Arqueología y Antropología, Institución Milá i Fontanals (CSIC), Spain
[c] CONICET, Instituto Nacional de Antropología y Pensamiento Latinoamericano, 3 de Febrero 1370, Buenos Aires, Argentina

ARTICLE INFO

Article history:
Received 6 December 2014
Received in revised form
10 March 2015
Accepted 11 March 2015
Available online 20 March 2015

Keywords:
Patagonian hunter–gatherers
Wood
Use-wear analysis

ABSTRACT

In the Patagonian archaeological record, the preservation of wooden artefacts is very restricted. Functional analysis of lithic artefacts is a way to get a better understanding about the use and consumption of the wood. Technological and use-wear analyses are applied in order to reconstruct the production processes of the wooden artefacts, from the raw-material supplying to the production of the finished tools.

In this paper we present the results of a taxonomical and techno-functional analysis of the traces preserved on the surface of the two wooden artefact retrieved from layer 17 (9390 ± 40 C14 years BP) and layer 6 (5310 ± 110 BP) at the site of Cerro Casa de Piedra 7 (province of Santa Cruz, Patagonia, Argentina). The interpretation of these two objects is complicated due to the absence of ethnographical references and the lack of similar archaeological findings in Patagonian hunter–gatherers sites. However, through the observation of the use-wear traces it is possible to reconstruct part of the manufacturing process and advance hypothesis on their mode of employment. Due to the distribution of the wears and the mineral-organic residues identified on the surfaces, it is proposed that one of the wooden artefact was probably used for rock-art production.

1. Introduction

The exploitation of plants by human groups is not limited to the mere meeting of food demand. Plants have been often used as fuel, but also to produce artefacts of varied nature, as recipes, clothes, weapons or other types of tools required to transform other raw materials. The strategies adopted to obtain woody material partially show the social organization of a group, and its perception of the environment (Henry et al., 2009; Picornell et al., 2011; Zapata et al., 2003). Woodworking implies a deep knowledge of the natural environment and of the plant characteristics. Moreover, it is also related to cultural choices and crafting traditions (Beyries and Hayden, 1993). The use of stone tools on vegetal materials produces characteristic wears on the lithic surfaces that allow archaeologists and use-wear analysts to reconstruct the type of worked plant and the type of activity carried out (Palomo et al., 2011; Lozovskaya, 2011; Lozovskaya y Lozovski, 2013; Semenov 1968). This data represents a fundamental contribution for the understanding of the strategies of exploitation of the vegetal resources among hunter–gatherers groups (Caruso et al., 2008, 2012). The other way around, the techno-functional study of wooden artefacts – when they are available in the archaeological record – is another way to explore the knowledge that prehistoric groups had on plant environments (Chabal and Feugère, 2005).

Although there are plenty of records on woody plants in Patagonic archaeological complexes, the recovery of wooden objects is extremely rare in archaeological excavations of Patagonic hunter–gatherer sites (Caruso et al., 2008, 2012; Caruso Fermé et al., 2011). Only in very rare cases it has been possible to recover wooden artefacts (Pérez de Micou, 1979–82; Capparelli et al., 2009; Caruso Fermé, 2012; Caruso Fermé et al., 2012 etc.).

Exceptional conservation conditions that represent a characteristic of the site Cerro Casa de Piedra 7 – Province of Santa Cruz, Argentina – (Aschero, 1996; De Nigris, 2004; etc.) made it possible

* Corresponding author.
E-mail address: lcarusoferme@gmail.com (L. Caruso Fermé).

http://dx.doi.org/10.1016/j.jas.2015.03.015
0305-4403/

to recover two wooden objects. The main purpose of this paper is to carry out an analysis of the technological processes involved in the manufacture of these objects. The objective of this study is to deduce the type of instruments that have been used to manufacture the wooden objects that have been recovered. It is worth pointing out that the absence of ethnographic sources and the lack of archaeological reference collections for instruments of this type from contexts attributable to Patagonic hunter–gatherer societies make it difficult to interpret the function of the artefacts recovered. Therefore, the purpose of this paper is not to approach the function/s of these instruments on the basis of the analysis of the experimental traces; the other way round, our aim is to reconstruct the crafting processes involved in the production of those tools through the analysis and interpretation of the technological wears found on their surfaces.

2. The site Cerro Casa de Piedra 7

The site Cerro Casa de Piedra 7 (also abbreviated as CCP7) – 47°57′S, 72°05′W – is located in the mountains of the Perito Moreno National Park, in the North-West of the Province of Santa Cruz (Argentina). Cerro Casa de Piedra is a volcanic rhyolitic hill, with several caves and rock-shelters looking northwards. It is located approximately 2 km East-Southeast of Burmeister Lake. The latter, together with lakes Belgrano, Azara, Nansen and Mogote forms one of the glacial basin set up in the Northwest of Santa Cruz province, Argentine Patagonia (Fig. 1).

The oldest radiocarbon dates proceed from cave 7. This site has been deeply studied, revealing a series of human occupations dated between *ca.* 10 600 and 3400 ^{14}C yr BP. Site frequentation is remarkable across the almost the entire Holocene. Several occupations, dated to ca. 5000 yr BP (Aschero, 1996), documented a number of hearths which included faunal and lithic assemblages. The cold and dry climatic conditions of the cave favored the preservation of guanaco (*lama guanicoe*) skin/hide, vegetable fiber, bones, vein thread, as well as artifacts made of wood, bone and chert raw-materials. A settlement strategy based on a residential mobility has been suggested: CCP7 probably served as a base camp where a broad range of subsistence activities took place (Aschero, 1996; Civalero et al., 2006/07).

The archaeological data is complemented by an overlapping series of paintings on the cave's walls (Fig. 2). The walls of the site Cerro Casa de Piedra 7 are characterized by representations of both hands and guanaco (*Lama guanicoe*). The colors of the images are: black, red, and white. Depending on the colors of each image we observe differences in the orientation of the painted sequences (Aschero, 1996). On the basis of the relation between animal representations and the negative handprints it is possible to hypothesize that juvenile, infant and adult people (possibly women) are co-participating in the observation and/or in the execution of the rock art.

Fig. 2. The production of the rock art.

Geomorphologic studies suggest that the cave was abandoned in a period of landslide *ca.* 3500 AP (Aschero et al., 2005) and later temporarily occupied during periods of exploitation of terrestrial resources (Civalero et al., 2006/07). The exceptional preservation

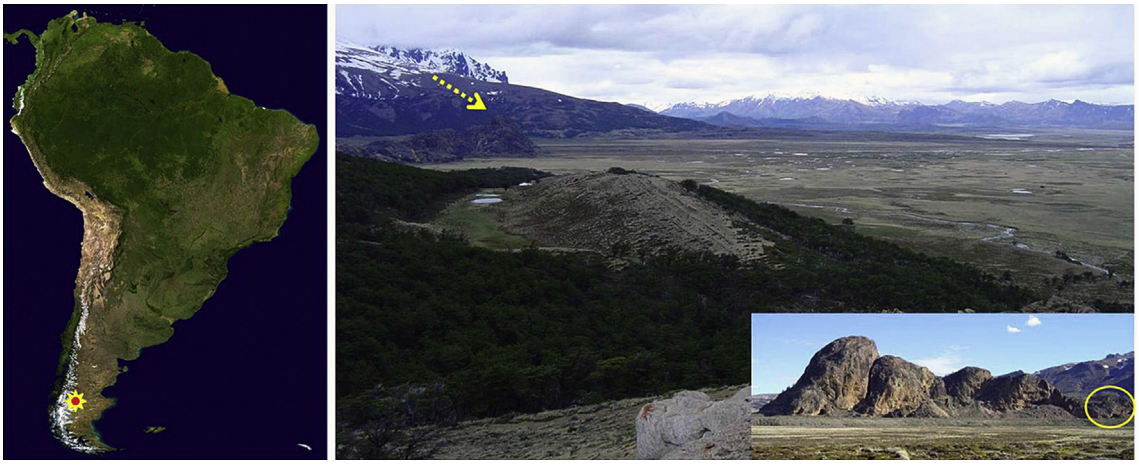

Fig. 1. Cerro Casa de Piedra 7 site.

conditions that characterize CCP7 enabled the recovery of two wooden objects.

3. Materials and methods

3.1. Sampling

The two wooden artifact were recovered during the excavation works in Cerro Casa de Piedra 7. The first one (N°857), was recovered from a hearth documented in the stratigraphic level 17 (9390 ± 40 C14 years BP BP). The second, (N°897), from level 6 (5310 ± 110 C14 years BP BP), was also recovered during the emptying of a combustion structure (Fig. 3).

The study of technological processes is based on the taxonomy analysis, morphological analysis and use-wear analysis.

3.2. Botanical identification

The identification of the wood species was held out by observing the three anatomical planes of the wood (transversal, radial longitudinal and tangential longitudinal). The samples were obtained extracting three thin sheets from each of the planes with the aid of a cutting instrument. Thin sheets extracted from the artifacts were, later, observed through a transmitted-light microscope (Zeiss, Axioskop 40) and compared with current reference wooden samples.

Obtaining thin sheets it is an invasive technique. The samples extracted must be of a size appropriated for the identification of the species, but not too large to damage the object (Caruso Fermé et al., 2011; Caruso Fermé, 2012). Moreover, wooden objects in Patagonic archaeological sites are not common. Thin sheets must be obtained from areas of the objects that present fractures, polished surfaces or cracks. The purpose of this technique is to produce the least damage to the artefacts and, at the same time, to allow the taxonomic identification of the wood (Caruso Fermé, 2012).

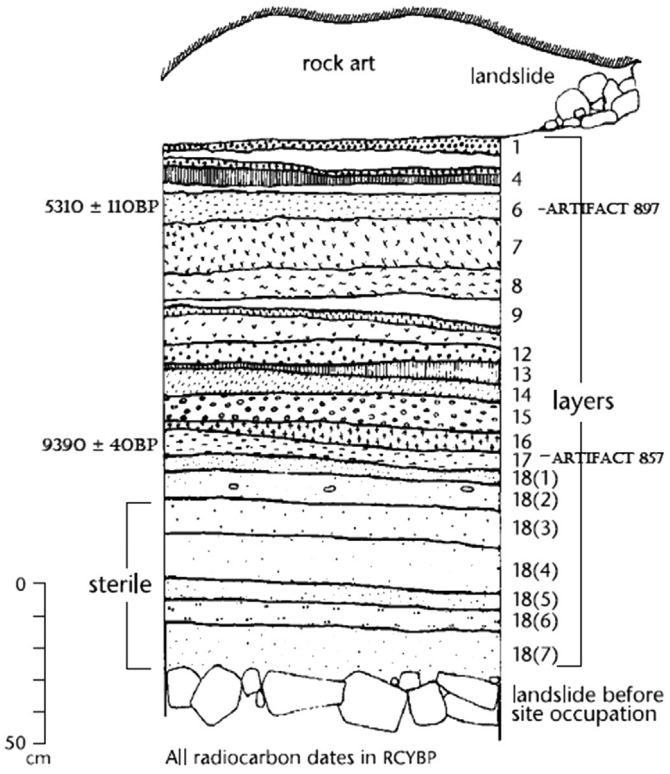

Fig. 3. Stratigraphy and radiocarbon dating of CCP7.

3.3. Morphological analysis

Morphological analysis is based on metric data: length, width and thickness of each artifact. Length and width are taken from the central part of the object and at both ends: distal end (A) and proximal end (B) (Figs. 5 and 6).

Moreover, the presence of remains of bark, signs of thermal alteration, remains of adhesive and the characteristics of the surface of the material – polished or with marks of bark removal – is recorded as well.

3.4. Use-wear analysis

The different traces seen on the surface of the artifacts were recorded. They were analyzed by the joint use of a binocular loupe (Leica DM 2500M) equipped with a camera (Leica IC 3D) and a stereomicroscope (Leica MZ16A) with a camera (Leica DFC 420). Traces analyzed have been selected and captured using different phocal planes with Helycon Focus v4.2. The criteria followed in the identification of the wears are: the distribution of the wear-marks over the surfaces; their brightness, their depth and their directionality. Thus, bright spots, abrasions, strias and pits, all of those features has been recorded and interpreted.

4. Results

Both wooden artifacts are in good conservation conditions, without any evidence of thermal alteration or alterations by microorganisms, contrarily to what observed in most of the archaeological contexts (Dani Nadel et al., 2006).

4.1. Botanical identification

Taxonomy analysis of the two wooden artifacts provided evidence of the use of two different woody shrub species. In the case of the object recovered from the stratigraphic level 17 (nr. 857), the species used is: *Berberis* sp. (Caruso Fermé, 2012). Species of the *Berberis* genus are many in Andean-Patagonic woods (Fig. 4A). In general, they grow as bushes and only exceptionally as small trees (Moore, 1983; Correa, 1998).

In the case of the artifact from the level 6 (nr. 897), the woody species used as raw material is: *Maytenus magellanica* (Lam.) Hook. F. (Caruso Fermé, 2012). *M. magellanica* (Fig. 4B) grows in wet environments associated to species of the genus *Nothofagus*, characteristic of the province of Neuquén to Tierra del Fuego – Argentina – (Dimitri, 1974; Moore, 1983; Correa, 1998; Guerrido and Fernández, 2007; Barthelemy, 2008).

4.2. Morphological analysis

Morphologically, the two artifacts show very different characteristics (Figs. 5 and 6). Object nr. 857 shows small dimensions: total length is 19.93 mm. The width of the upper end (A) is 12.3 × 5.16 mm; whereas the central portion, 12.93 mm × 6.12 mm; and the lower end (B), 6.65 × 3.25 mm. (Fig. 5). Both ends have been cut and polished. The proximal end is not complete, as a consequence of a fracture. No remains of bark were found; moreover, on one of the sides of the piece there are remains of mastic (adhesive or resin).

The total length of artifact nr. 897 is 133.89 mm. The proximal end has a diameter of 11.81 × 10.34 mm, the central portion is 11.72 × 10.7 mm and the distal end, 11.92 × 10.92 mm. The two

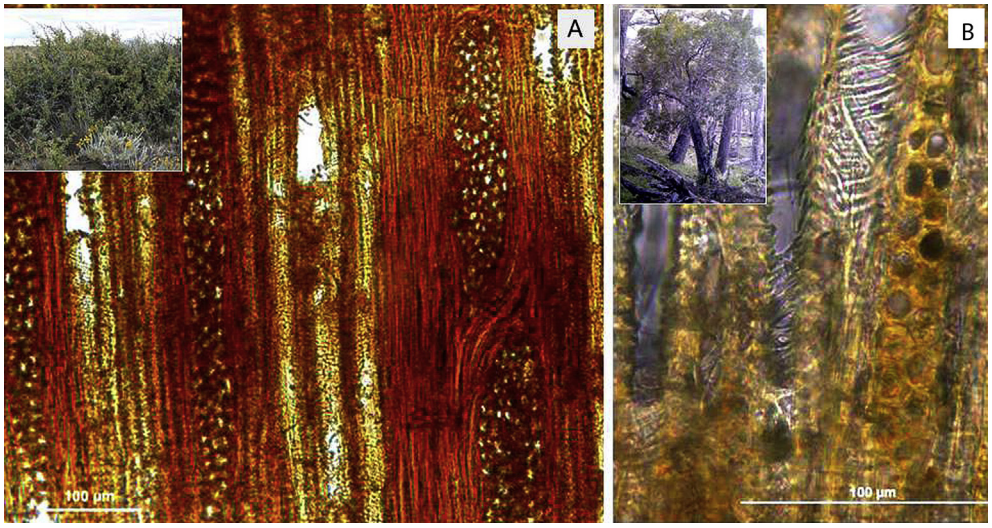

Fig. 4. Samples of tangential section. A) Berberis sp. B)Maytenus magellanica.

extremities of this artifact (Fig. 6) show different characteristics. The proximal one is straight cut, while the opposite end shows cylindrical-shaped layers. The diameters of the cylindrical-shaped layers of this end are: 9.44 × 8.35 mm where layers begin, and 7.94 × 6.35 mm towards the end of the piece. The proximal end displays signs of several incisions of different depth, probably made to thin the branch; finally the artifact has been broken by bending it.

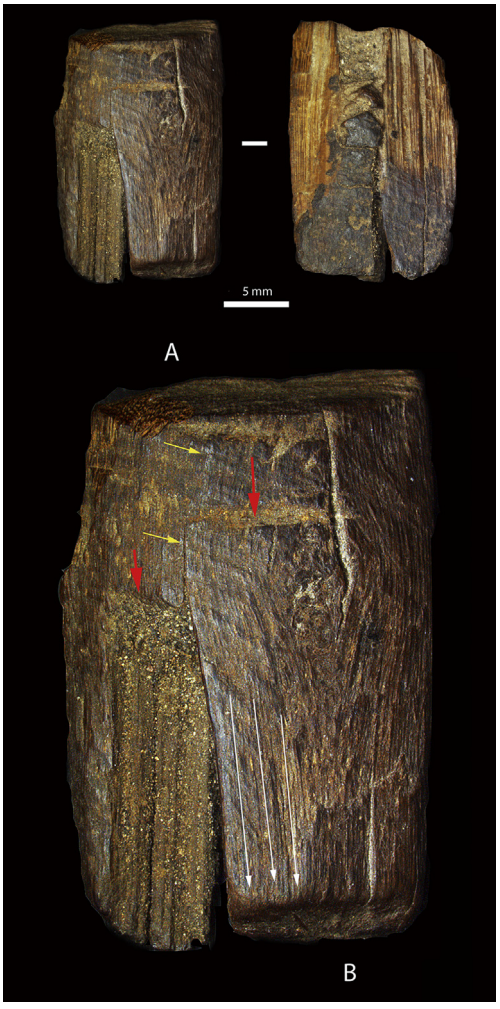

Fig. 5. Wooden artefact N°857, level 6, site CCP7.

4.2.1. *Use-wear analysis*

Microwear analysis of the two wooden artifacts make it possible to record different traces in the surface of both tools. Artifact nr. 857 is characterized by a variety of residues and wears; on the ventral

Fig. 6. Wooden artefact N°897, level 17, site CCP7.

side of the wood we highlighted the presence of black spots, probably residues of resine/bitumen (Fig. 5). On the opposite side, which correspond to the external surface of the wood, we highlighted several technological wears: 1) a series of weak lengthwise wears that cover almost the entire dorsal side, probably produced by the debarking action – see the white arrow in Fig. 5) a set of oblique traces that suggest the thinning/planning of the wood blank –see yellow arrows in Fig. 5) two deep and wide marks, one with a longitudinal and one with a transversal orientation that are associated to the scraping of the dorsal surface as well – see red arrows in Fig. 5.

By analyzing artifact nr. 897 (level 6) evidences of different types of traces have been recognized. Thin longitudinal marks on the surface suggest that the bark was removed and the branch was probably smoothed using the edge of a lithic implement (Lozovskaya, 2011; Lozovskaya and Lozovski, 2013). In the distal end a polishing action over an area of 37.03 × 10.92 mm has been noticed. Sixteen engraved lines, with a length between 3.69 and 6.82 mm have been highlighted in this area (Fig. 6). The position of the polishing traces – on one of the extremities of the object – and their directionality – opposite to the orientation of the wood fibers – might suggest that once the distal end of the wood has been engraved it has undergone some type of friction on a soft matter, probably as a consequence of a horizontal action.

The most outstanding characteristic of this artifact is the presence of black striations that completely cover its surfaces. These traces always laid perpendicularly to the lengthwise axis of the object, keeping a relatively constant distance among them. They present a larger depth in the distal part of the branch, whereas they gradually tend to disappear in the medial and proximal parts, becoming less deep; especially in the proximal end they look like thin lines painted on the surface. Preliminary experimental works, still unpublished, suggest that those type of striations are easily filled by impurities (such as dust, dirt, remains of skin from the hand, etc.) after a short time of use. Thus, their black coloration is interpreted as result of residues deposition.

On the distal part of this wooden artifact we have identified marks that can be attributed to its use and/or handling. These traces consist of:

1) *Erosion:* A noticeable erosion can be seen on one side of the artifact, where the wood fibers have suffered pressure and abrasion along the lengthwise axis (Fig. 7A).
2) *Polishing:* A glossy, greasy polishing can be seen on the same side of the erosion (Fig. 7B) contrasting with the more mat polish distributed on the other side of the wood and on the medial and proximal parts of the long edges of the artifact.
3) *Residues and coloring*: Reddish-coloring has been observed on the distal end. In the area where it is best conserved, the micropolish is oriented, glossy, and has a closed mesh which is similar to the wears produced by the contact with mineral substances in other raw materials (e.g. quartz, flint, bone) (Fig. 7C). Remains of whitish coloring, covering a large part of the surface on the reverse of the staff, also seem to be mineral residues when observed under a microscope (Fig. 7D). Additionally, black residues are seen on different parts of the object. Some of these are flat stains, while others appear in the form of small drops adhered to the surface.

5. Discussion

The exceptional preservation conditions of the site Cerro Casa de Piedra 7 allowed the recovery of two wooden pieces nr. 857 (level 17 -9390 ± 40 C14 years BP BP-) and nr. 897 (level 6 -5310 ± 110 BP-). The different analysis carried out – taxonomical, morphological and microwear traces analysis –, provide fresh information the manufacturing of these instruments.

The study of artifact nr. 857 provided evidence of the use of *Berberis* sp. wood as raw material. This result allows to corroborate the exploitation of the vegetation species since early periods as a source of raw material among Patagonic hunter–gatherer groups (Caruso Fermé, 2012). The wood of such bush was chosen by the different groups that inhabited the Argentine Patagonia since, at least, 9390 ± 40 BP until the contact with the Europeans, for the manufacturing of different types of instruments (Caruso et al., 2008, 2012, in press; Capparelli et al., 2009; Ratto and Marconetto, 2010; Caruso Fermé et al., 2011). Historical sources on Selknam and Yamana hunter–gatherers from Tierra del Fuego (Argentina) also mention the use of this same bush to elaborate shafts (Gallardo, 1910; Gusinde, 1937; among others).

Meanwhile, taxonomy analysis of the artifact nr. 897 provided evidence of the use of another bush species: *M. magellanica*. So far, this woody species has not been archaeologically documented as raw material for the crafting of objects among Patagonia hunter–gatherer groups (Caruso Fermé, 2012).

Taxonomical analysis of the carbonized archaeobotanical assemblage of the archaeological layers of CCP7 (17, 10, 8, 6, 5, 1) highlighted relevant differences between the various phases. In the early periods of occupation – layer 17: 9.390 ± 40 C14 years BP – the taxonomic study revealed a high biodiversity among the exploited woody species; such a variety of woods is not recognized in later periods. Indeed, in the remaining layers the main represented specie is *Nothofagus pumilio*. The analysis of uncarbonized remains provide a quite different information; even if *N. pumilio* still cover relevant percentages, in some of the layers we observe a much more remarked biodiversity, including *Escallonia rubra, Ribes magellanicum, Embothrium coccinuem, Berberis* sp. etc.). In no one of the analysed layers remains of *M. magellanica* (Caruso Fermé, 2012) have been found. This result suggests the selection of this particular wood just for the crafting of this specific artifact (nr. 897) (Caruso Fermé, 2012; Caruso Fermé and Civalero, 2014).

The morphological study of the two objects supplied evidence of very different characteristics between them. Results from piece nr. 857 show that this artifact has been cut at both extremities. Artifact nr. 897 show a larger size and its extremities show different features: the distal end has been thinned or planned, while the proximal end has been cut.

The analysis of the different types of traces present on the surface of the two objects, made it possible to establish an operative sequence in terms of the production processes carried out for these two instruments. Artifact nr. 857 show traces of bark removal, following the natural orientation of the natural fibers of the wood, and afterwards the blank has been scraped and thinned.

The co-existence of different traces on a single sector of the surface of piece nr. 897: lengthwise traces, engraved lines and polishing of the surface, suggest that different technical operations have been carried out. Observation of wood fibers allowed us to determine that the objected was crafted starting from a branch segment. The cylindrical lowering of the distal end of the artifact provides evidence of the fracturing of the wood. These lengthwise traces are additional evidences of the removal of bark and of the polishing of the branch. Afterwards, 16 engraved lines were made on the proximal end with a cutting edge instrument. Finally, a successive polishing of this area of the piece was carried out. In the rest of the instrument, after the bark removal and the polishing, slight traces all around the object – except for the proximal end – were made.

In summary, the study of technological processes of artifact nr. 857 (level 17) and nr. 897 (level 6) allowed us to determine, on the one hand, the woody species used as raw material. On the other hand, it made it possible to establish an operative sequence related

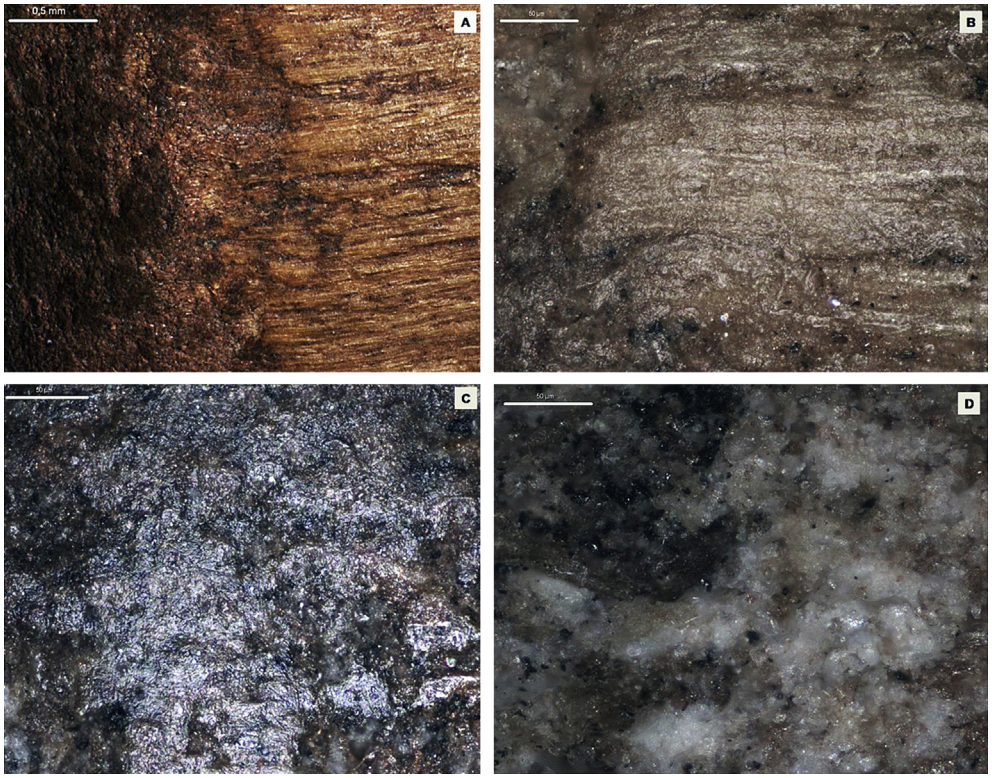

Fig. 7. Different types of traces recorded on piece N°897. A) Rounding/abrasion in the transversal section, B) Polishing: Glossy and greasy-looking, C) Reddish-colouring is seen at the distal end, D) Remains of whitish colouring.

to the production of such objects. Obtained results suggest that the crafting of these two artifacts required certain knowledge and skills in woodworking. Therefore, it is possible to deduce that the time and the work invested in their production were significant, starting from the selection and search for the right wood until its final decoration. The implementation of the similar operative crafting sequences and the selection of the same vegetation species, even if for different uses, have also been recorded among other groups in the Argentine Patagonia (Piqué, 2006; Caruso et al., 2008, 2012; Ratto and Marconetto, 2010; Caruso Fermé et al., 2011). Finally, although it was not the purpose of this paper to make an approach to the function/s of these instruments, given the absence of an appropriated ethnographic and archaeological records, it has been possible, in the case of the artifact recovered in stratigraphic level 6 (5310 ± 110 C14 years BP BP) to advance a functional interpretation. Due to the position and distribution of the wears and the mineral-organic residues identified, it is hypothesized that the branch was used in connection with the production of rock art. Future studies involving the chemical analysis of the residues and specific experimentation will validate or refute this hypothesis.

6. Conclusion

The recovery of the two wooden artifacts from the site Cerro Casa de Piedra 7 (nr. 857 –level 17: 9390 ± 40 C14 years BP – and nr. 897 – level 6: 5310 ± 110 C14 years BP), is a clear evidence of the use of woody raw-materials for the manufacturing of tools among the Patagonic hunter–gatherer groups. The analysis of these two objects allow to advance insights about their morphology, the technology employed for their production and crafting techniques adopted and the proprieties of the woody raw-materials exploited.

The various analysis carried out made it possible to determine which raw-material were used as blank and which parts of the plant have been selected for the manufacturing of the artifacts. The microwear analysis made it possible to establish operative sequences related to the production of such objects.

The analysis of the crafting processes represents an innovative research in Patagonic archaeological–botanical studies and opens a new debate both from a methodological and theoretical perspectives. So far, the results obtained provide valuable information and enrich the discussion on the social and economic organization of the prehistoric groups that inhabited Cerro Casa de Piedra 7. This study highlights the variety of uses and behaviours related to woody raw-materials exploitation and, at the same time, provides information of the type of environment in which those resources were collected. Exploitation of plants implies knowledge about their growing environment and their physical proprieties; moreover, knowledge about the necessary techniques and tools for their collection, modification and exploitation are indispensable. The exceptional preservation of CCP7 site allows us to gain more information about wood-technology among the early Holocene hunters in Patagonian area. Plant resources played a significant role not only as food, but also as raw-material for other socio-economic activities (Caruso et al., 2009; Caruso Fermé, 2010).

Acknowledgements

The authors acknowledge the comments made by the anonymous referees, which have improved our original text. Special thanks go to Niccolò Mazzucco for his comments and for his insightful corrections of the original manuscript.

References

Aschero, C.A., Goñi, R.A., Bellelli, C., Civalero, M.T., Molinari, R., Espinosa, S.L., Guráieb, G.Y., Bellelli, C., 2005. Holocenic Park: arqueología del Parque nacional Perito Moreno (PNPM). An. Adm. Parques Nac. 17, 71–119.

Barthelemy, D., Brion, C., Puntieri, J., 2008. Plantas Patagonia. Editorial Vázquez Mancini, Buenos Aires, Argentina.
Beyries, S.Y., Hayden, B., 1993. L'importance du travail du bois en préhistoire. Traces et fonvtion, les gestes retrouvés. In: Colloque internationel de Liège, vol. 2. Éditions ERAUL, pp. 283–285.
Capparelli, A., Castro, A., Ciampagna, M.L., 2009. Descripción microscópica e identificación anatómica de un fragmento de instrumento de madera (¿arpón?) hallado en el sitio Cueva del Negro (Costa norte de Santa Cruz). In: Salemme, M., Santiago, F., Álvarez, M., Piana, E., Vázquez, M., Mansur, M.E. (Eds.), Arqueología de Patagonia: una mirada desde el último confín, Tomo 1. Editorial Utopías, Ushuaia, pp. 433–444.
Caruso, L., Mansur, E., Piqué, R., 2008. Voces en el bosque: el uso de recursos vegetales entre cazadores-recolectores de la zona central de tierra del fuego. In: *Darviniana* Publicación Botánica, 46 (2). Instituto de botánica Darwinion, pp. 202–212.
Caruso, L., Mansur, E., Piqué, R., 2009. Las chozas de madera de la zona central de Tierra del Fuego. VII Jornadas de Arqueología de la Patagonia. In: Salemme, M., Santiago, F., Álvarez, M., Piana, E., Vázquez, M., Mansur, M.E. (Eds.), Arqueología de Patagonia: una mirada desde el último confín, Tomo 1. Editorial Utopías, Ushuaia, pp. 445–456.
Caruso Fermé, L., 2010. Ethnographie, archéobotanique et expérimentation sur le site d'Ewan I (Tierra del Fuego, Argentine). Anthropobotanica 1.5, 3–17. Muséum national d'Histoire naturelle, Paris. France.
Caruso Fermé, L., 2012. Modalidades de adquisición y usos del material leñoso entre grupos cazadores-recolectores patagónicos (Argentina). In: Métodos y técnicas de estudio del material leñoso arqueológico. Universitat Autònoma de Barcelona (UAB). http://www.tdx.cat/handle/10803/134927.
Caruso Fermé, L., Civalero, M.T., 2014. Holocene landscape changes and wood use at Patagonia. Plant macroremains from Cerro Casa de Piedra 7. Holocene 24 (2), 188–197.
Caruso Fermé, L., Álvarez, M., Vázquez, M., 2011. Análisis arqueobotánico de piezas de madera del extremo austral americano. Magallania 39 (1), 221–240 (Chile).
Caruso Fermé, L., Clemente I., Beyries, S. and Civalero, M. T. in press. Wood technology of Patagonian hunter–gatherers. A use-wear analysis study from the site of Cerro Casa de Piedra 7 (Patagonia, Argentina). International Conference on Use-wear Analysis -Faro-Portugal, 10–12 October 2012-
Chabal, L., Feugère, M., 2005. Le mobilier organique des puits antiques et autres contextes humides de Lattara. Lattara 18, 137–188 cap. 9.
Civalero, M.T., Bozzuto, D.L., Di Vruno, A., Di Nigris, M.E., 2006/2007. Cerro casa de piedra 7, una fecha reciente. In: Cuadernos del Instituto Nacional de Antropología y Pensamiento Latinoamericano 21.
Correa, M.N., 1998. Flora patagónica. Parte I. Colección Científica del INTA, Buenos Aires.
Nadel, Dani, Grinberg, Udi, Boaretto, Elisabetta, Werker, Ella, 2006. Wooden objects from Ohalo II (23,000 cal BP), Jordan Valley, Israel. J. Hum. Evol. 50, 644–662.
De Nigris, M.E., 2004. El consumo en grupos cazadores recolectores: un ejemplo zooarqueológico de Patagonia Meridional, 1a ed. Sociedad Argentina de Antropología, Buenos Aires.
Dimitri, M.J., 1974. Pequeña flora ilustrada de los Parques nacionales Andino-Patagónicos. In: Anales de Parques Nacionales, Tomo XIII. Dir. General de Parques Nacionales, Bs. As, pp. 1–122.
Gallardo, C.R., 1910. Los Onas de Tierra del Fuego. Zagier and Urruty Publications, Ushuaia.
Guerrido, C., Fernandez, D., 2007. Flora Patagonia. Fantastico Sur, Punta Arenas, Chile.
Gusinde, M., 1937. Los indios de Tierra del Fuego. In: Los yamanas, Tomo 2. Centro Argentino de Etnología Americana, Buenos Aires, 2 vols.
Henry, A., Théry-Parisot, I., Voronkova, E., 2009. La gestion du bois de feu en forêt boréale: archéo-anthracologie et ethnographie (région de l'Amour, Sibérie). In: Gestion des combustiblesau paléolithique et au mésolithique: Nouveaux outils, nouvelles interprétations. BAR International Series 1914.
Lozovskaya, O.V., 2011. Dereviane izsdelia posdnego mesolita-ranego neolita lesnoi zsoni Evropecheskoi chasti Rossii; komplesnie isdelovania (po materialam stoianki Zamostje 2). Tesis Doctoral. In: Rosiskaya Akademia Nauk. Institut Istorii Materialnoi Kulturi, Saint Petersburg.
Lozovskaya, O.V., Lozovski, V.M., 2013. Modes de fabrication des outils en bois dans le Mésolithique d'Europe orientale: approche expérimentale-tracéologique. In: Palomo, A., Piqué, R., terradas, X. (Eds.), Experimentación en arqueología. Estudio y difusión del pasado, Serie Monográficas del MAC-Girona 25-1, pp. 73–83. Girona.
Moore, D.M., 1983. Flora of Tierra del Fuego. Anthony Nelson, England, and Missouri Botanical Garden, U.S.A.
Palomo, T., Piqué, R., López, O., Bosch, A., Chinchilla, J., Tarrús, J., 2011. In: Morgado, A., Baena preysler, J., Garcia Gonzáles, D. (Eds.), Análisis de los artefactos de madera del yacimiento Neolítico lacustre de la Draga: aproximación experimental, La investigación experimental aplicada a la arqueolgía. Universidad de Granada, pp. 245–253.
Pérez De Micou, C., 1979/82. Sitio Piedra Parada 1 (PP1) Dpto. de Languineo, Provincia de Chubut (Argentina). Cuadernos 9, 97–112. Instituto Nacional de Antropología.
Picornell Gelabert, L., Asouti, E., Allué, E., 2011. The etthnoarchaeology of forewood amnagement in the Fang villages of Equatorial Guinea, central Africa: Implications for the interpretation of Wood fuel remains from archeological sites. J. Anthropol. 30, 375–384.
Piqué, R., 2006. L'uso del legno nelle società fuegine: manufatti dalle collezioni del Museo Pigorini. En Finis Térrea.Viaggiatori, esploratori e missionari italiani nella Terra del Fuoco, 182–192. In: Salerno, A., Taglaiacozzo, A. (Eds.), Museo Nazionale Prehistórico Etnografico "Luigi Pigorini". Ministero per i Beni e le attivitá culturali, Roma.
Ratto, N., Marconetto, M.B., 2010. Proyectiles en acción, 20 años después… Diseños en la fabricación de astiles fueguinos de colecciones etnográficas. In: Martínez, J., Bozzuto, D. (Eds.), Armas Prehispánicas: múltiples enfoques para su estudio en Sudamérica.
Semenov, S.A., Nauka, Le, 1968. Rasvitie tejniki v kamenom veke. In: Akademii Nauk SSSR. Institut Arjeologii, ningrad.
Zapata Peña, L., Peña Chocarro, L., Gonzales Urquijo, J.E., Ibañez Estévez, 2003. Ethoarchaeology in the Maroccan Jebala (western Rif): Wood and dung as fuel. Afr. Praehist. 15, 163–175.