Preistoria Alpina
ISSN 0393-0157
homepage: http://www.muse.it/it/Editoria-Muse/Preistoria-alpina

Article

Insights into the Late Mesolithic toolkit: use-wear analysis of the notched blades. Case-studies from the Iberian Peninsula

Niccolò Mazzucco[1]*, Juan Francisco Gibaja Bao[2], Unai Perales Barrón[3], Maria San Millán Lomas[4], Oreto García Puchol[5], Manuel Rojo Guerra[6], Jose Ignacio Royo Guillén[7], Iñigo García Martínez De Lagrán[3], Joaquim Juan Cabanilles[8], Jesús García Gazolaz[9], Bernard Gassin[10]

[1] UMR 7055 « Préhistoire et Technologie », CNRS / Université Paris Ouest Nanterre La Défense, Maison de l'Archéologie et l'Ethnographie, 21 Allée de l'Université, 92023 Nanterre cedex, France.
[2] Departament d'Arqueologia i Antropologia, Institució Milà i Fontanals, Consejo Superior de Investigaciones Científicas (IMF-CSIC), C/ Egipcíaques 15, 08001 Barcelona, España.
[3] Departamento de Geografía, Prehistoria y Arqueología, Universidad del País Vasco (UPV-EHU), C/ Tomás y Valiente s/n, 01006 Vitoria-Gasteiz, España.
[4] Departament de Prehistòria, Universitat Autònoma de Barcelona (UAB), Edifici B Facultat de Filosofia i Lletres, 08193 Bellaterra, España.
[5] Departament de Prehistòria, Arqueologia i Història Antiga, Universitat de València (UV), Avda. Blasco Ibáñez 28, 46010 València, España.
[6] Departamento de Prehistoria, Arqueología, Antropología Social y Ciencias y Técnicas Historiográficas, Universidad de Valladolid (UVA), Plaza del Campus s/n, 47011 Valladolid, España.
[7] Dirección General de Patrimonio Cultura, Gobierno de Aragón, Avda. Gómez Laguna 25, 50071 Zaragoza, España.
[8] Museu de Prehistòria de València, C/ de la Corona 36, 46003 València, España.
[9] Sección de Arqueología, Departamento de Cultura, Deporte y Juventud, Gobierno de Navarra, C/ Navarrería 39, 31001 Pamplona, España.
[10] UMR 5608 TRACES, Université de Toulouse II-Le Mirail, Maison de la Recherche 5, allées Antonio Machado, 31058 Toulouse cedex, France.

Key words

- Late Mesolithic
- Notched Blades
- Use-Wear Analysis
- Iberian Peninsula

Parole chiave

- Mesolitico recente
- Lame a incavi e denticolate
- Analisi funzionale
- Penisola Iberica

* Corresponding author:
e-mail: *nicco.mazzucco@gmail.com*

Summary

During the last decades we have gained a considerable amount of data about the Mesolithic lithic toolkit in the Western Mediterranean. A large set of instruments probably existed for a variety of purposes: foraging practices (both hunting and fishing), food processing, crafting activities, etc. Disposable tools, scarcely elaborated, coexisted with formal and more complex instruments, often composed of multiple parts and realized on a variety of raw-materials (e.g. stone, shell or bone inserts; bone or wood hafts, etc.). In this paper we will consider one particular type of tool that appears in the Western Mediterranean starting from the Seventh-Sixth millennia BC: the notched and denticulated blades. We will consider and interpret from a functional viewpoint materials from five different Late Mesolithic contexts: the Cocina Cave and Vallmayor IX in the NE of the Peninsula, Artusia rock-shelters in Navarre and Atxoste and Mendandia rock-shelters in the Basque country.

Riassunto

Durante l'ultimo decennio, la nostra conoscenza dello strumentario litico Mesolitico nel Mediterraneo Occidentale si è considerabilmente arricchita. Sappiamo che esistevano una varietà di strumenti utilizzati per scopi diversi: l'ottenimento di alimenti (sia attraverso la caccia, che la pesca), l'elaborazione di tali alimenti, la produzione di artefatti, etc. Strumenti di natura speditiva, scarsamente elaborati, coesisterono con strumenti formali, più complessi, spesso costituiti di più parti e di materie prime diverse (es. inserti in pietra, conchiglia, osso, manici in legno od osso, etc.). In questo articolo ci concentriamo su un particolare tipo di strumento che compare nel Mediterraneo Occidentale tra il VII-VI millennio a.C.: le lame a incavi e denticolate. Consideriamo i materiali provenienti da cinque diverse siti del Mesolitico recente: la Grotta Cocina e il sito di Vallmayor IX nel nord-est della Penisola Iberica, il riparo sottoroccia di Artusia in Navarra e i siti di Atxoste e Mendandia nei Paesi Baschi e ne proponiamo un'interpretazione funzionale.

Redazione: Giampaolo Dalmeri

pdf: *http://www.muse.it/it/Editoria-Muse/Preistoria-Alpina/Pagine/PA/PA_48-2016.aspx*

Mazzucco N., Gibaja Bao J.F., Perales Barrón U., San Millán Lomas M., García Puchol O., Rojo Guerra M., Royo Guillén J.I., García-Martínez De Lagrán I., Juan Cabanilles J., García Gazolaz J., Gassin B., 2016 - Insights into the Late Mesolithic toolkit: use-wear analysis of the notched blades. Case-studies from the Iberian Peninsula. *Preistoria Alpina*, 48: 151-157.

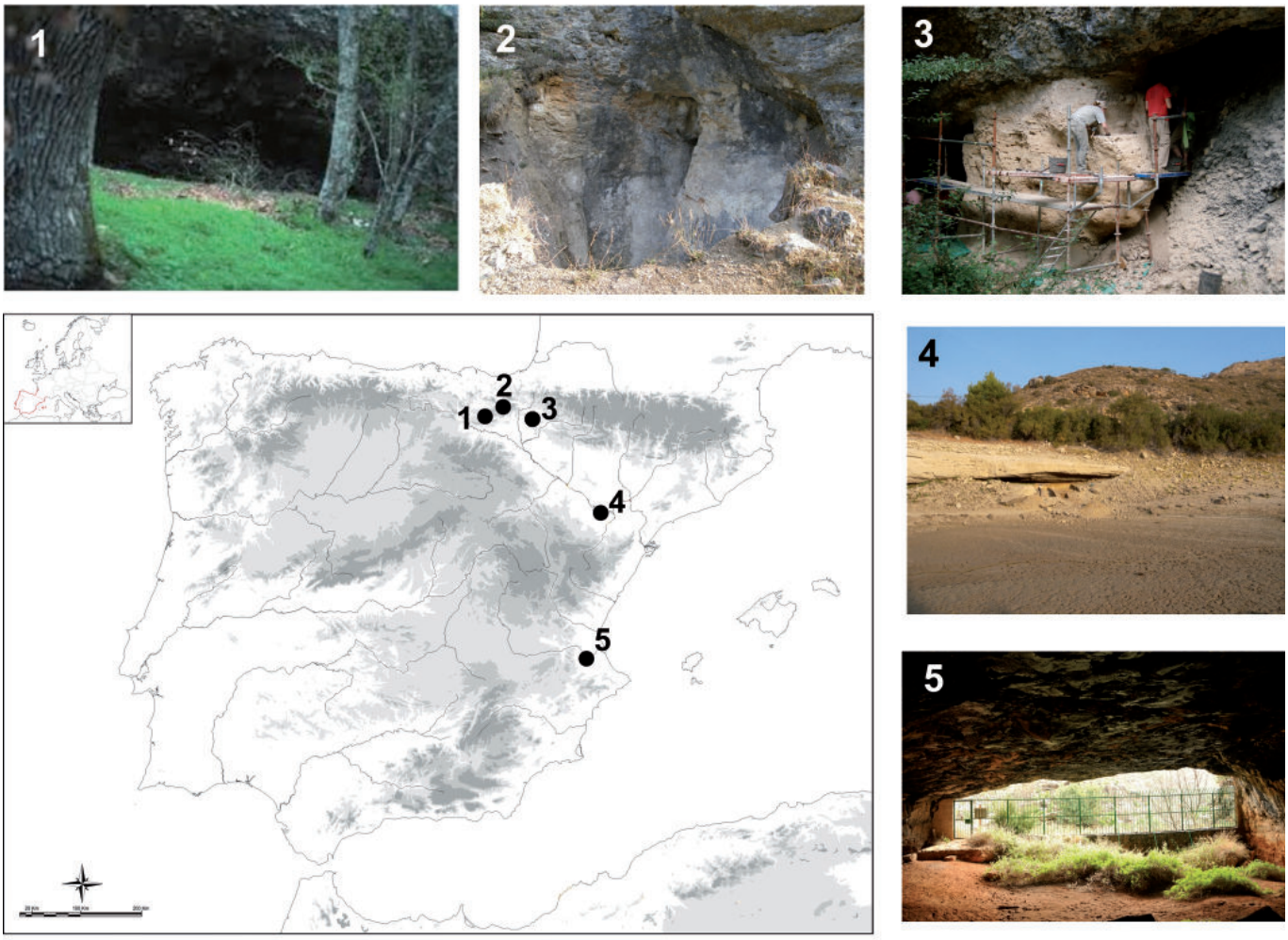

Fig. 1 - Sites location and overview. 1) Mendandia; 2) Atxoste; 3) Artusia; 4) Vallmayor XI; 5) Cocina Cave. / Posizione e panoramica dei siti. 1) Mendandia; 2) Atxoste; 3) Artusia; 4) Vallmayor XI; 5) Grotta della Cocina.

Introduction

Our knowledge of the Mesolithic craftsmanship has increasingly grown during the last decades. The period is considered a time of technological innovation characterized by a variety of sophisticated equipment, including bow and arrow, fishing gears (such as nets, traps, hooks) and seagoing craft such as canoes (see for example Pickard & Bonsall 2007; Lozovski *et al.* 2013). Altogether this set of artefacts implied the development of fresh knowledge, know-how and tools; in turn, such transformations in technology were associated with broader social and economic changes involving mobility patterns, groups size and site location, duration and seasonality of the occupations, subsistence strategies, symbolic and burial behaviours, etc. (Zvelebil 2009; Jordan & Cummings 2014; Warren 2014).

Nevertheless, from an archaeological point of view, it is not always simple to highlight such diversity in technology and crafting techniques. Most of the Mesolithic crafting processes involved perishable materials, such as wood, vegetal fibres, animal skins, etc., which are only rarely conserved in the archaeological contexts. In this sense, the application of traceological analysis on both coarse and flaked stone tools has represented an important instrument for detecting craft and processing activities that otherwise would have not been emerged from the archaeological record. For example, the study of the use-wear patterns has demonstrated that vegetal materials, both ligneous and non-ligneous plants, covered an important role within the Mesolithic crafting system (Clarke 2009; Gijn 2010; Guéret 2013, Guéret *et al.* 2013 among others). Bone and antler tools were intensively produced and used as well (Gijn 2007; Osipowicz 2007; Maigrot *et al.* 2014; Bergsvik & David 2015). A broad variety of crafting tools probably existed; disposable, scarcely elaborated elements coexisted with formal and more complex instruments, often composed of multiple parts and realized on an assortment of materials (i.e. stone, shell or bone inserts; bone or wood hafts, etc.).

Recent researches on the Late Mesolithic complexes in Europe and North Africa have shown that not only hunting weapons (i.e. triangles and trapezes industries) were geographically distributed over large areas, but also some crafting tools were characterized by certain homogeneity from a technological and functional point of view in almost the entire Western Mediterranean (Gassin *et al.* 2014). Notched blades, removed by pressure or indirect percussion, became one of the characteristic elements of the flaked stone assemblage starting from the 9-8th millennium BP depending on the geographical area (Perrin *et al.* 2009). In the absence of any functional study, different hypotheses were proposed to explain the production and use of these notched blades: blank tools used to scrape wooden sticks in order to shape arrow shafts, the notches created by the work itself (Rozoy 1978); tasks correlated with an intensification of plant processing (Rahmani & Lubell 2012), etc.

In this work we will consider the notched or denticulated blades from five different Late Mesolithic contexts of the Iberian Peninsula (Fig. 1). The traceological analysis of those elements is presented and discussed in the light of experimental works recently performed (Gassin *et al.* 2013; Guéret et al 2013; Gassin *et al.* 2014).

Methods of analysis

Traceology has today a well-established method shared by most of the analysts. During the last forty years, the traceological approach to the study of the lithic industries has been defined and updated by the works of several authors. Since the pioneer works of Semenov, new techniques and methodologies have been introduced constantly. For a detailed state of the art, one can look at the recent synthesis of Marreiros *et al.* (2015). Nevertheless, apart from the methodological improvements that occur along with the appearance of new techniques and analytical tools, one can fundamentally divide the traceological work into three main steps:

I. A first evaluation of the conservation of the archaeological material is done through stereoscopic microscopy. A sample of artefacts is observed, in order to identify the presence of eventual post-depositional alterations and, thus, to evaluate the feasibility of the analysis;

II. Once defined the state of conservation of the assemblage, a detailed analysis of each single artefact is undertaken. The first step of the analysis involves the employment of stereoscopic microscope. The analysis of edges and surfaces is directed to the identification of possible active zones (PUAs - Possibly Used Areas) (Gijn 1989). Moreover, the macroscopic observations allow a first level of inference; it is already possible to formulate hypotheses about the hardness of the worked materials (i.e. soft, medium, hard) and about the type of movement performed (i.e. longitudinal, transversal, circular, impact, etc.). The analysis of macro-traces is also important for the recognition of possible hafted parts, transportation traces, post-depositional and post-excavation modifications, etc. Several works of reference are available for the so called 'macro-traces' among which: Tringham *et al.* (1974), Odell & Odell-Vereecken (1980), Gonz ález & Ib áñez (1994). The categories considered in this study have been mainly taken from these works, classifying the macro-traces on the basis of semi-qualitative variables.

III. When possible used areas (PUAs) or other modified zones are detected, artefacts have been submitted to a detailed microscopic analysis through the employment of reflected-light microscopy (Olympus BH2, 50X-400X). The objective of this analysis is, first of all, to prove the nature of the previously identified PUAs. If PUAs are actually used we call it AUAs (Actually Used areas) (Gijn 1989). Once the consistency of the traces has been proved, the analysis is directed toward the interpretation of the micro-features through the observation of their characteristics. For the definition of the semi-qualitative variables employed for micro-wears classification one can refer to several works among which Gijn (1989), González & Ib áñez (1994) and Gassin (1996).

The number of tools analysed in this work amounts to 89 elements. All the notched blades showing traces of use have been analysed both macro- and microscopically. Wears identified in the archaeological specimens have been compared with the experimental samples. Indeed, fresh experimental data has been obtained during a collective blind test performed in Barcelona in October of 2012, allowing greater care to be taken with our interpretations (Gassin *et al.* 2014).

Archaeological contexts and studied materials

Atxoste

Atxoste site is located in the Puerto de Azáceta, near the village of Vírgala Mayor. It is a limestone rock-shelter with south orientation with a south orientation, located a few meters away from the Berrón River (Alday 1996). Near Atxoste, in a range of one kilometre of distance, there are other two Mesolithic sites: Kanpanoste (Cava 2004) and Kanpanoste Goikoa (Alday 1998). All of those sites are located in a strategic position for territorial control, connecting the lower valleys with the highlands and the mountain ridges.

Atxoste stratigraphy goes from the Upper Palaeolithic to the Early Neolithic. Analysed tools belong to layers IV and IIIb2, both belonging to the Geometric Mesolithic horizon. The former, which is superposed to the Notched and Denticulated horizon, is dated around the half of the 8th millennium BP (GrA-13469: 7480±50 and GrA-13418: 7340±50). The latter, superposed to the layer IV without any clear stratigraphic break, is dated to the end of the beginning of the 7th millennium BP (GrA-13458: 7140±50 and GrA-13415: 6940±40 (Alday 2002, 2005; Alday & Cava 2009).

The number of analysed tools amount to 13 tools, three of which are characterized by a truly denticulated edge, while the remaining shows a single notch. Both voluntary retouched notches and involuntary fractures are present. Average dimensions are comprised between 32-26 x 29-18 x 3-4 mm.

Mendandia

Mendandia is a medium-sized rock-shelter located in the Oquina-Sáseta area (Treviño) at *ca.* 740 m a.s.l. (Alday 2006). The site shows several common features with the other Mesolithic settlements of the Basque region: a rock-shelter near permanent water-sources, located in a strategic overview position. Like Atxoste site, Mendandia rock-shelter is interpreted as a temporary camp, part of a larger network of complementary sites, recurrently occupied by groups of nomadic hunter-gatherers (Alday 2002, 2005, 2009; Montes & Alday 2012).

Site stratigraphy ranges from Late Mesolithic to Early Neolithic. Analysed tools belong to the Geometric Mesolithic level (layer III - GrN-22743: 7620±50 BP) and to the so-called Notched and Denticulated Mesolithic (layer IV - GrN-22745: 7780±40 BP (Alday 2006).

The number of analysed tools amounts to 12 notched blades, eight of which present exclusively one notch, while the remaining four are characterized by a truly denticulated edge. Average dimensions are comprised between 44-38 x 34-23 x 3-4 mm.

Artusia

Artusia rock-shelter is located in the municipality of Unzué, in the Navarra region. The rockshelter opens near the 'Arroyo de Artusia' creek, a seasonal affluent of the Zidacos River. The site is located in one of the narrow sectors of the valley, partially protected by conglomerate deposit. However, only part of the prehistoric deposit has been preserved against the erosive processes. During the years 2009-2010 excavation campaigns have been carried out revealing a stratigraphic series which ranges from the Upper Paleolithic to the Mesolithic (Rojo *et al.* 2012). Both Geometric Mesolithic and Nothced and Denticulated Mesolithic layers have been detected.

The number of analysed tools amounts to 15 notched blades, eight of which present exclusively one notch, while the remaining four are characterized by a truly denticulated edge. Average dimensions are comprised between 32-21 x 15-9 x 4-2 mm.

Valmayor XI

Valmayor is a rock-shelter located in the Mequinenza municipality (Zaragoza). The site opens in the Mequinenza gorge, near the creek's mouth. Currently, the site is covered by the waters almost all year round, except during very dry seasons. This is the case of the summer of the 2011, when the first and the last excavation campaign has been carried out at the site (Rojo *et al.* 2012).

Site stratigraphy goes from Geometric Mesolithic to Early Neolithic levels. An intermediate layer between Mesolithic and Neolithic horizons has been detected. It represents an intermediate stage, where a Mesolithic assemblage is mixed with few ceramic fragments, even if it is not clear whether such commingling is the result of a

stratigraphic, post-depositional factor or of human behaviours.

The number of analysed notched blades amounts to 16 implements, two from the Geometric Mesolithic horizon (U.S. 21), six from the intermediate horizons (U.S. 6 & 14) and eight form a superficial layer (U.S. 0). Their dimension is comprised between 66-50 x 16-27 x 5-3 mm. Notches are often characterized by overlapping fractures, likely a consequence of the edge-use and not of a voluntary retouch; however retouched notches have been observed as well.

Cocina

Cocina Cave is located in the Valencia region, in the ravine known as 'Barranco de la Ventana', one of the last mountains before the plain of the Jucar River. It represents one of the most important sites for the chrono-cultural sequence of the Iberian Mesolithic. The site was discovered and excavated during the 1940s by L. Pericot (1945) and later (in the 1970s) by J. Fortea (1973). After the publication of Fortea's book about the Epipalaeolithic complexes on the Mediterranean Coast of the Peninsula Iberia, Cocina Cave has reached an international relevance in relation with the characterization of the last Mesolithic assemblages of the Western Mediterranean (Geometric Mesolithic).

Recently, the first radiocarbon dates for the Mesolithic levels of Cocina have been obtained. Results indicate that the Mesolithic period began about 8500 cal BP and lasted until 7700 cal BP.

The number of analysed notched tools amounts to 33 implements. Their dimensions are comprised between 45-37 x 11-9 x 4-3 mm. The retouch is generally made by pressure, from the ventral toward the dorsal face. Except for one element, which is realized on a flake, all the remaining tools are on laminar blanks. The majority of tools (n. 18) is characterized by a succession of notches, thus forming a denticulated edge, while the remaining part is composed of one-notched tools.

Results & Discussion

Of the totality of analysed notched blades more than 60% show traces of use (n. 56). Moreover, several blades of this assemblage were characterized by more than one area of use (AUA), with 22 items which show a double active zone and 3 items characterized by three active zones. Therefore, the final number of activities recognized amounts to 83 areas of use.

Our analysis highlighted certain homogeneity among the analysed materials, both on a technological and functional level. Used blanks are mainly blades with one or more notches produced on the dorsal face of the tool. Flakes are only marginally employed to produce such type of tools, at least during the chronologies considered in this study.

The used zone is always the concave part of the notch. Most of the notches can be considered intentionally made; indeed, a scraping motion with the ventral face as a rake face would produce quite a similar notch, but with a different distribution of the use polishes; indeed in this case the bevel would be on the dorsal (retouched) face and not on the ventral one. The other way around, a positive rake with a scraping motion would produce a scarring which only partially matches the patterns observed on archaeological tools. Therefore, we think that the notches are the result of a voluntary retouch, creating a very short concave active zone with a robust straight-angled edge (Fig. 2, a). Only in the case of denticulated edges with very short and continuous notches we can imagine that the edge-fractures have been produced by the scraping action itself.

Also the cinematic of the tool appears almost identical in all the observed implements. A major variability has been observed among the worked materials. Indeed, the notches appear to be used for scraping a variety of materials, from soft vegetal and animal substances, to woody plants or hard-animal material such as bone and antler. The polish is always asymmetric, with a bevel on the ventral face, characterized by a compact domed polish, while, on the retouched dorsal face, the polish is sometimes weaker, sometimes compact and shiny. This asymmetry results from a negative rake-cutting of different materials. The end-flank is always the ventral face; the dorsal face is the rake face, with a rake angle near 90°.

From a functional point of view, it is often difficult to establish the exact nature of the worked material, because of the overlaps between use-wear traces. Some notches bear on the dorsal face a bright, smooth polish and on the ventral face either an invasive pitted and striated polish or a smooth polish with few striations (Fig. 2, b). Those tools are often associated with woodworking activities or soft plant scraping. On other notches, polish on the ventral face is limited to a band along the very edge of the tool, creating a domed bevel, often with some striations (Fig. 2, c). These tools are generally associated with the work of very hard animal materials such as bone/antler. In those cases, on the retouched dorsal face, the polish is usually not much developed. Finally, some notches show a rather rough polish on the ventral face, with striations and micro-fractures (Fig. 2, d). In those cases, traces show a major variability, from dry-wood to hide working.

The most common use, on the basis of the analysed sample, is associated with bone working (24.10%), followed by hide-working (19.28%) and woodworking (10.84%), at least among the determined materials. Hard indeterminate materials represent the 19.26%, while indeterminate materials represent the 15.66% of the AUAs (Fig. 3). In general, different uses are associated with most of the analysed sites (always in the case that a sufficient sample of materials has been analysed) (Tab. 1).

Finally, we have to remark that such tools are generally characterized by a scarce development of the use-wears. Edge exploitation is never very intense and we do not generally observe resharpening retouches made in order to prolong the tool use-life. This pattern could indicate that such tools were mainly employed for brief tasks, possibly related to very specific phases of wood/bone/hide artefacts manufacturing and/or maintenance. Therefore, despite notched blades appears quite homogeneous and standardized objects on a technological level, from a functional point of view they can be defined as disposable tools, being generally used briefly to carry out a variety of crafting tasks.

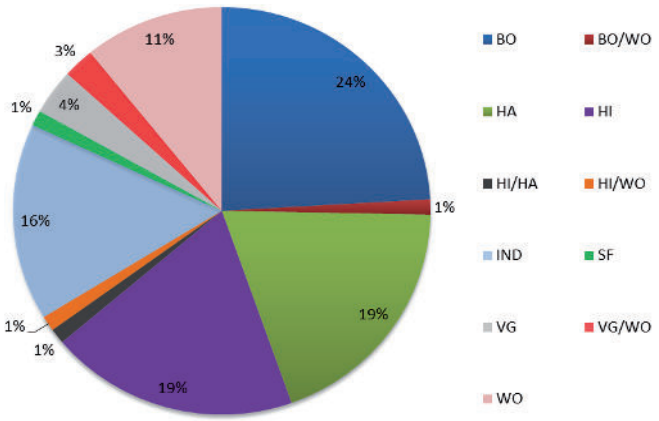

Fig. 3 - Percentage of AUAs for each class of worked material inferred. BO: Bone; BO/WO: Bone or hard wood; HA: Indeterminate hard material; HI: Hide (both fresh and dry hides); HI/HA: Hide or another Hard material; HI/WO: Hide or Soft wood; IND: Indeterminate material; SF: Indeterminate soft material; VG: Soft vegetal substance; VG/WO: Plant or wood; WO: Hard wood. / Percentuali di AUAs (Zone Usate) per ciascuna delle classi di materiali lavorati in base alla nostra interpretazione. BO: Osso; BO/WO: Osso o Legno; HA: Materiale resistente di natura indeterminata; HI: Pelle (sia fresca che secca); HI/HA: Pelle o un altro materiale resistente; HI/WO: Pelle o Piante legnose; IND: Materiale indeterminato; SF: Materiale indeterminato poco resistente; VG: Piante; VG/WO: Piante o legno; WO: Legno.

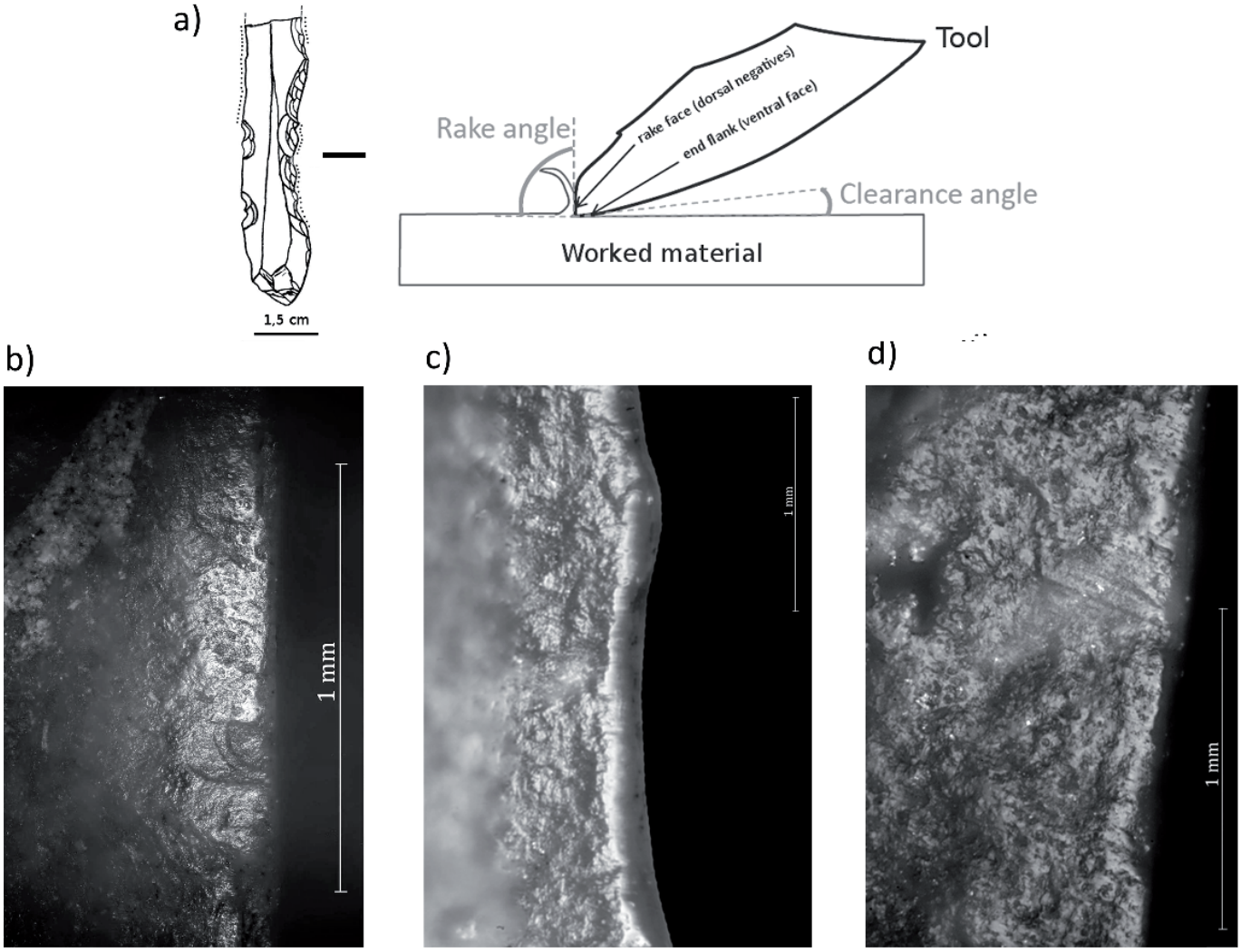

Fig. 2 *- a) Schematic representation of the mode of use of the notched blades; b) Pitted-smooth polish with few striations (50X), probably resulting from wood working - Atxoste site; c) domed bevel, with some striations (100X), probably resulting from bone scraping - Cocina cave; d) rather flat bevel on the ventral face, with striations and micro-fractures (100X), probably resulting from vegetal (plant or wood) scraping - Artusia rock-shelter. / a) Rappresentazione schematica del modo d'utilizzo delle lame a incavi; b) Politura smussata con presenza di crateri e poche strie (50X), probabilmente prodotta dalla lavorazione del legno - riparo Atxoste; c) politura su angolo dall'aspetto arrotondato con presenza di strie (100X), probabilmente prodotta dalla lavorazione dell'osso - Grotta della Cocina; d) politura su angolo piuttosto piatta sulla faccia ventrale, con numerose strie e microfratture del bordo (100X), probabilmente prodotta dalla lavorazione di sostanze vegetali (piante o legno) - riparo Artusia.*

Tab. 1 *- Sum and Percentage of AUAs for each class of worked material inferred per each site. Indeterminate or doubtful AUAs have been excluded. BO: Bone; HA: Indeterminate had material; HI: Hide (both fresh and dry hides); SF: Indeterminate soft material; VG: Soft vegetal substance; WO: Hard wood. / Somma e Percentuali di AUAs (Zone Usate) per ciascuna delle classi di materiali lavorati per ciascuna sito. BO: Osso; HA: Materiale resistente di natura indeterminata; HI: Pelle (sia fresca che secca); SF: Materiale indeterminato poco resistente; VG: Piante; WO: Legno.*

Sites	BO		HA		HI		SF		VG		WO	
	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%	Σ	%
Artusia	-	-	-	-	3	*50,0*	-	-		*0,0*	3	*50,0*
Atxoste	1	*6,7*	2	*13,3*	7	*46,7*	-	-	1	*6,7*	4	*26,7*
Cocina	18	*58,1*	10	*32,3*	-	-	-	-	1	*3,2*	2	*6,5*
Mendandia	1	*11,1*	2	*22,2*	3	*33,3*	-	-	1	*11,1*	2	*22,2*
Valmayor XI	-	-	2	*33,3*	3	*50,0*	1	*16,7*	-	-	-	-
Tot	**20**	*29,9*	**16**	*23,9*	**16**	*23,9*	**1**	*1,5*	**3**	*4,5*	**11**	*16,4*

Conclusions

On the basis of the results of our analyses, we can consider notched blades a multi-tasking tool employed in a variety of crafting/manufacturing processes on different materials. The recurrent choice of regular blades and the scarcity or absence of notched flakes or flakes with naturally straight angle edges used to scrape the same range of materials, seem to point toward a well-established technical tradition. Nevertheless, making notches to scrape different materials does not need a high level of know-how, and could have invented independently in several places and times. Therefore, do Late Mesolithic notched blades represent a convergent behaviour in response to similar technical/economic needs? Or do they represent a shared tradition, which imply the existence of similar forms of artefact production and utilization among different groups?

Still, our data is not sufficient to hypothesize the presence of some technical heritage or a traditional way of doing things between Mesolithic groups. However, it is to remark that direct notches on regular blades represent one of the dominant tools of the Late Mesolithic industries of the Western Mediterranean; thus they represent the material outcome of a systematic behaviour, not an occasional or isolated practice. In the future, enlarging the sample of analysed sites, we will maybe prove the existence of 'formal' tools among Late Mesolithic communities, contributing to the debate about the transfer of ideas, technological know-how and traditions during Prehistory.

References

Alday, A., 1996. Abrigo de Atxoste-Puerto de Azáceta (Vírgala Mayor, Arraia-Maeztu): I campaña de excavaciones. *Arkeoikuska: Investigación arqueológica*, 35-43.

Alday, A. 1998. *Kanpanoste Goikoa. El depósito prehistórico de Kanpanoste Goikoa (Vírgala, Alava): memoria de las actuaciones arqueológicas 1992-1993*. Memorias de Yacimientos Alaveses, 5. Vitoria-Gasteiz: Diputacion Foral de Alava.

Alday, A. 2002. Las unidades industriales mesolíticos en la Alta-Media Cuenca del Ebro. *Complutum*, 13: 19-50.

Alday, A. 2005. The transition between the last hunter-gatherers and the first farmers in southwestern Europe: the Basque perspective. *Journal of anthropological research*, 61, 469-494.

Alday, A. 2006. *El legado arqueológico de Mendandia: Los modos de vida de los últimos cazadores en la Prehistoria de Treviño*. León: Junta de Castilla y León.

Alday, A., 2009. El final del Mesolítico y los inicios del Neolítico en la Península Ibérica: cronología y fases. *Munibe Antropologia-Arkeologia*, 60, 157-173.

Bergsvik, K. A., & David, É., 2015. Crafting Bone Tools in Mesolithic Norway: A Regional Eastern-Related Know-How. *European Journal of Archaeology*, 18(2), 190-221.

Cava, A., 2004. La ocupación prehistórica de Kanpanoste en el contexto de los cazadores-recolectores del Mesolítico. *Memorias de yacimientos Alaveses*, 9. Vitoria-Gasteiz: Diputacion Foral de Alava, 5-248.

Clarke, A., 2009. Craft Specialisation in the Mesolithic of Northern Britain: the evidence from the coarse stone tools. In: Finlay, N., McCartan, S., Milner, N., Wick C. (eds.), *From Bann Flakes to Bushmills*, Papers in honour of Professor Peter Woodman. Prehistoric Society Research Paper, (1), 12-21.

Fortea, J., 1973. *Los Complejos Microlaminares y Geométricos del Epipaleolítico Mediterráneo Español*. Universidad de Salamanca.

Gassin, B., 1996. Évolution socio-économique dans le Chasséen de la grotte de l›Église supérieure (Var): apport de l›analyse fonctionnelle des industries lithiques. Monographie du CRA, 17. Paris: Éditions du CNRS.

Gassin, B., Marchand, G., Calud, E., Guéret, C., & Philibert, S., 2013. Les lames à coches du second Mésolithique: des outils dédiés au travail des plantes? *Bulletin de la Société préhistorique française*, 110(1), 25-46.

Gassin, B., Gibaja, J.F., Allard, P., Boucherat, T., Claud, E., Clemente, I., Gueret, C, Jacquier, J., Khedhaier, R., Marchand, G., Mazzucco, N., B., Palomo, A., Perales, U., Perrin, T., Philibert, S., Rodríguez, A. & Torchy, L., 2014. Late Mesolithic Notched Blades from Western Europe and North Africa: Technological and Functional Variability. In: Marreiros, J., Bicho, N. & Gibaja, F.J. (eds.), *Use-wear 2012: Proceedings of the International Conference on Use-wear Analysis*. Cambridge: Cambridge Scholar Publishing, 232-239.

Gijn, A.L. van, 1989. *The Wear and Tear of Flint: Principles of Functional Analysis Applied to Dutch Neolithic Assemblages*. Analecta Praehistorica Leidensia 22. Leiden: Universiteit Leiden.

Gijn, A.L. van, 2007: The use of bone and antler tools: two examples from the Late Mesolithic in the Dutch coastal zones. In: Gates, C. & Walker, R. (eds.), *Bones as tools: current methods and interpretations in worked bone studies.* B.A.R. Int. S., 1622, Oxford.: Archaeopress, 79-90.

Gijn, A.L. van, 2010. *Flint in Focus. Lithic biographies in the Neolithic and Bronze Age*. Leiden: Sidestone press.

González, J.E., Ibáñez, J.J., 1994. *Metodología de análisis funcional de instrumentos tallados en sílex*. Bilbao: Universidad de Deusto, Cuadernos de Arqueología, 14.

Guéret, C., 2013. Character and variability of Early Mesolithic toolkits in Belgium and Northern France: the contribution of a functional approach Mesolithic, In: Valentin, B., Souffi, B., Ducrocq, T., Fagnart, J.P., Séara, F. & Verjux, C. (eds.), *Mesolithic Palethnography, Research on open-air sites between Loire and Neckar*. Paris: Société préhistorique française, 147-167.

Guéret, C., Gassin, B., Jacquier, J., & Marchand, G., 2014. Traces of plant working in the Mesolithic shell midden of Beg-an-Dorchenn (Plomeur, France). *Mesolithic Miscellany*, 22(3), 3-15.

Jordan, P. & Cummings, V., 2014. Prehistoric hunter-gatherer innovations. In: Cummings, V. Jordan, P. & Zvelebil, M., (eds.), *Oxford handbook of the archaeology and anthropology of hunter-gatherers*. Oxford: Oxford University Press, 585-607.

Lozovski, V., Lozovskaya, O. & Clemente, I., (eds.) 2013. *Zamostje 2 Lake Settlement of the Mesolithic and Neolithic Fisherman in Upper Vlga Region*. Russian Academy of Science. Institute for the History of Material Culture. Sergiev-Possad State History and Art Museum-Preserved.

Maigrot, Y., Clemente Conte, I., Gyria, E., Lozovski, V. & Lozovskaya, O., 2014. From bone fishhooks to fishing techniques: the example of Zamostje 2 (Mesolithic and Neolithic of the central Russian plain). In: Mansur, E., Lima, A. & Maigrot, Y., (eds.), *Traceology Today: Methodological Issues in the Old World and the Americas*, BAR International Series, 2643. Oxford: Archaeopress, 55-60.

Marreiros, J., Mazzucco, N. & Gibaja, J.F., 2015. Macro and Micro Evidences from the Past: The State of the Art of Archaeological Use-Wear Studies. In: Marreiros, J. Gibaja, J.F. & Bicho, N. (eds.), *Use-Wear and Residue Analysis in Archaeology*. Manuals in Archaeological Method, Theory and Technique. Switzerland: Springer International Publishing, 5-22.

Montes, L. & Alday, A., 2012. Enredados en la malla neolítica de la cuenca del río Ebro. Redes, continuidades y cambios. *Rubricatum: revista del Museu de Gavà*, 5, 51-60.

Odell, G. & Odell-Vereecken, F., 1980. Verifying the reliability of lithic use-wear assessments by 'Blind Tests': The Low-Power Approach. *Journal of Field Archaeology*, 7, 87-120.

Osipowicz, G., 2007. Bone and antler, Softening techniques in prehistory of the North Eastern part of Polish Lowlands in the light of experimental archaeology and micro trace analysis. *EuroREA,*

Journal for (Re)construction and Experiment in Archaeology, 4, 11-20.

Pickard, C. & Bonsall, C., 2007. Late Mesolithic coastal fishing practices. In: Hårdh, B., Jennbert, K. & Olausson, D. (Eds.), *On the road. Studies in honour of Lars Larsson. Acta Archaeologica Lundensia*, 4(26), 176-183.

Pericot, L., 1945. La cueva de La Cocina. *Archivo de Prehistoria Levantina*, 2, 8-12.

Perrin, T., Marchand, G., Allard, P., Binder, D., Collina, C., Garcia-Puchol, O. & Valdeyron, N., 2009. Le second Mésolithique d'Europe occidentale: origine et gradient chronologique, *Annales de la Fondation Fyssen*, 24, 160-177.

Rahmani, N., Lubell, D., 2012. Climate change and the adoption of pressure technique in the Maghreb: the Capsian sequence at Kef Zoura D (Eastern Algeria). In: Desrosiers, P.M., Rahmani, N., (Eds.), *The Emergence of Pressure Knapping: From Origin to Modern Experimentation*. New York: Springer, 139-155.

Rojo, M., Royo, I., Garrido-Pena, R., García-Martínez de Lagrán, I., Tejedor, C., Arcusa, H., García-Gazolaz, J., Sesma, Mª.A., & G úrpide, B., 2012. Los caminos del neolítico: Un proyecto de investigación en el Valle del Ebro. *Rubricatum: revista del Museu de Gavà*, 5, 43-50.

Rozoy, J-G., 1978. *Les derniers chasseurs. L'Épipaléolithique en France et en Belgique,* Bulletin de la Société archéologique Champenoise, III tomes.

Tringham, R., Cooper, G., Odell, G., Voytek, B. & Whitman, A., 1974. Experimentation in the formation of edge damage: a new approach to lithic analysis. *Journal of Field Archaeology*, 1(1-2), 171-196.

Warren, G., 2014. In: Cummings, V. Jordan, P. & Zvelebil, M., (Eds), *Oxford handbook of the archaeology and anthropology of hunter-gatherers*. Oxford: Oxford University Press, 537-557.

Zvelebil, M. 2009. The Mesolithic and the 21st century. In: McCartan, S., Schulting, R.J., Warren, G.M. & Woodman, P.C. (Eds.), *Mesolithic horizons: papers presented at the seventh international conference on the Mesolithic in Europe*. Oxford: Oxbow Books, XLVII-LVIII.