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Article

Use-wear analysis of a Mesolithic assemblage: the Mourre de Sève rock shelter (Sorgues-Vaucluse)

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Key words

- South France
- Mesolithic
- Use wear
- Castelnovian
- Sauveterrian

Parole chiave

- Sud della Francia
- Mesolitico
- Tracce d'uso
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- Sauveterriano

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Summary

This research concerns the characterisation of the economy of a Mesolithic settlement from Southern France. The Mourre de Sève site is a rock shelter located close to the Rhône and Ouvèze confluence and it represents the exploitation of a riverine environment by hunter-gatherers. The latest excavations, in 1994 and 1997, dated the site using AMS to the Sauveterrian and the Castelnovian periods. The Castelnovian lithic industry from the top levels of the site constitutes one of the few blade and trapeze complexes of the region between the Alps and the Pyrenees. In this article we discuss the results of use-wear analysis carried on the lithic artefacts from the recent excavations. The results of this analysis are linked to multidisciplinary studies of the archaeological material to characterize the economy of the site. The findings suggest continuity in economy type from the Sauveterrian to the Castelnovian occupations.

Riassunto

Questa ricerca concerne la caratterizzazione dell'economia di un sito mesolitico nel sud della Francia. Mourre de Sève è un riparo sotto roccia collocato non lontano dalla confluenza dei fiumi Rhône e Ouvèze e rappresenta l'occupazione di un ambiente umido da parte di cacciatori raccoglitori. Gli scavi più recenti, svolti tra il 1994 e il 1997, hanno datato il sito (AMS) ai periodi Sauveterriano e Castelnoviano. L'industria mesolitica, dei livelli più alti della stratigrafia, rappresenta uno dei pochi esempi di industrie a lame e trapezi della regione situata tra le Alpi e i Pirenei. In questo articolo saranno presentati i risultati delle analisi funzionali svolte sui materiali litici rinvenuti durante gli scavi recenti. Al fine di caratterizzare l'economia del sito, i risultati della nostra ricerca sono stati confrontati con quelli di analisi multi disciplinari condotte sul resto dei materiali. L'esito delle nostre analisi sembra suggerire una continuità nel tipo di economia dalle occupazioni sauveterriane a quelle castelnoviane.

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Introduction

This paper present the result of use-wear analysis carried out at the site of Mourre de Sève (Sorgues-Vaucluse). The site is composed of several Mesolithic occupations, which show similarity in lithic production and homogeneity in environmental exploitation, from the Sauveterrian to the Castelnovian period. The aim of this research is to better understand the technical system and function of the site during Mesolithic through a functional analysis of stone tools.

Study area

The Mourre de Sève (Sorgues, Vaucluse) rock shelter is located close to the confluence of Rhône-Ouvèze Rivers in the Comtat plain region of Southern France (Fig. 1). The site is located under an overhanging cliff at 80 m a.s.l., and faces north. During Mesolithic period this area was characterized by a riverine environment and was situated in the meso-mediterranean vegetation belt, with the predominance of *Quercus cf* forests.

The stratigraphy

During the first excavation, in the 1950's, several occupations dating to the Mesolithic and Neolithic were discovered (Paccard & Marcq 1993). Limited field notes were found about the site stratigraphy from this excavation, and the data was published in 1993 (Paccard & Marcq). The latest excavations (Binder 1994 and 1997), in 1994 and 1997, revealed different Mesolithic occupations and they found a small undisturbed area between E2 and E3 squares (Fig. 2). The deposit of this area cut a Miocene molasses layer next to a big block fallen from the cliff. In this part of the site, it was possible to recognize and to date, by AMS analysis, three Castelnovian occupations between 6650 and 6200 cal BC. The basal level contained some Sauveterrian remains, probably mixed with Castelnovian artifacts, which is dated between 7540 and 7420 cal BC. (Binder & Sénépart 2004).

Outside of this area, the sediment contained Neolithic and Mesolithic artefacts. However, the sediment was disturbed, making it impossible to distinguish any discrete occupations. For this reason, the functional analysis was applied mostly on lithic artefacts coming from the E2 and E3 squares.

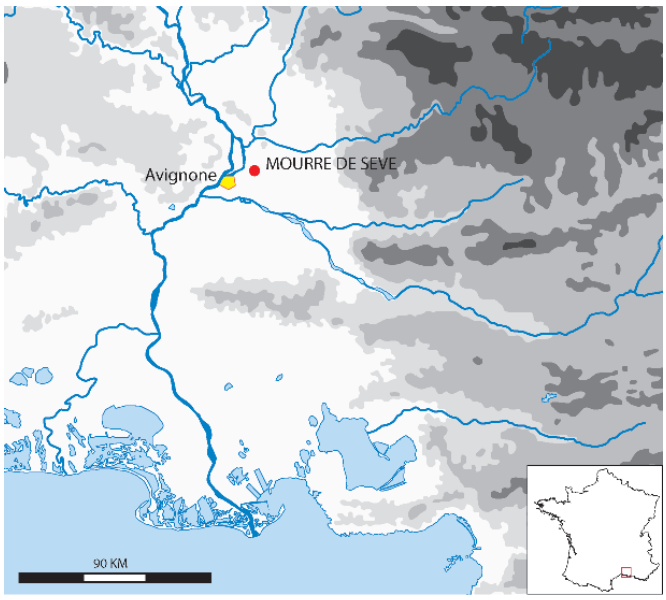

Fig. 1 *-The Mourre de Sève location in the Rhône Valley / Localizzazione geografica del sito di Mourre de Sève nella valle del Rodano.*

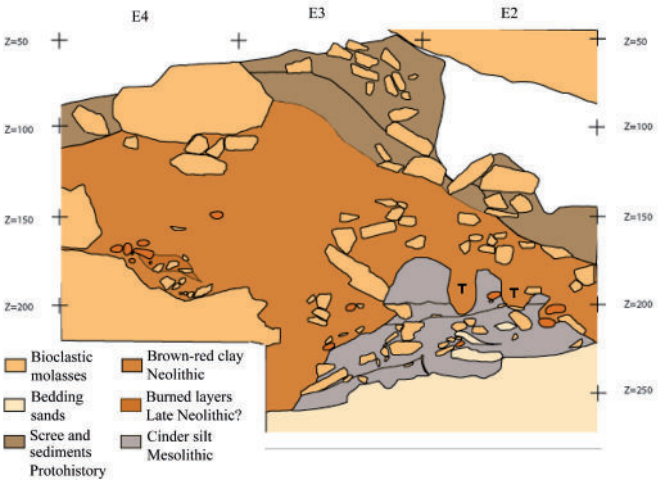

Fig. 2 *-Stratigraphic profile of E2 and E3 squares of the Mourre de Sève site. The large blocks fallen from the cliff are visible in the stratigraphy and two burrows are referred by a "T" in the section of E2 square (Binder & Sénépart 2004). / Sezione stratigrafica dei quadrati E2 e E3 del sito di Mourre de Sève. I grandi blocchi caduti dalla falesia sono visibili nella stratigrafia. La presenza di due tane sono segnalate dalla lettera "T" nella sezione del quadrato E2 (Binder & Sénépart 2004)*

Environment and economy

The anthracological analysis run by S. Thiébault (Binder & Sénépart 2004) showed the presence of a forested environment during the Mesolithic period. *Quercus cf. pubescens*, *Acer sp.*, *Ulmus sp*. and *Rosaceae sp.* characterized the forest and the presence of *Populus sp.* and *Salix sp.* indicated a riverine environment nearby the site.

Few faunal remains were recovered during the recent excavation (Binder 1994). A small sample of bones of wild boar (n=1), deer (n=3) and roe deer (n=6) showed evidence for hunting activities. The scarceness of mammal remains is contrasted with the high number of fish and turtle (*Emys orbicularis*) remains recovered from the site. The former was represented by fish of varying sizes and in particular by a large quantity of eel remains, all of them headless. Fishing was a very common activity during the Mesolithic and evidence can be found at other sites from the Provence and Languedoc region, including the Sauveterrian site of Fontbrégoua (Salernes) (Courtin 1975), the Castelnovian site of La Font de Pigeons (Châteauneuf-les-Martigues) (Courtin *et al.* 1985) and at the Mesolithic site of La Baume de Montclus (Binder & Sénépart 2004, Rozoy 1978). As well, turtles were a common part hunter-gatherers' diet from these regions, as witnessed at the sites of de Chinchon

Tab. 1 *-Comparison between the tools type and the number of cores coming from the two excavations. / Confronto tra gli strumenti e i nuclei provenienti dai due scavi.*

EXCAVATION	BLADES	END-SCRAPERS	NOTCHED BLADES	CORES
Marcq	High index of blades, but not calculated	14	5	13
Binder (E2-E3 squares)	44,4%	1	3	1

Tab. 2 -Number and types of projectiles coming from Marcq's excavation (Mesolithic levels) and Binder's excavations (E2 and E3 squares and the disturbed areas). / Quantità e tipologia delle armature provenienti dallo scavo di Marcq (livelli mesolitici) e dagli scavi di Binder (quadrati E2 e E3 e zone rimaneggiate).

EXCAVATION	BACKED BLADELET	TRAPEZE	SEGMENT	POINT	TRIANGLE	TOTAL
Marcq	-	19	1	-	-	20
Binder E2-E3 squares	11	3	-	1	1	16
Binder (disturbed areas)	5	13	-	-	2	20
Total	16	35	1	1	3	56

Tab. 3 -Number of analysed blanks for each occupation. / Numero dei supporti analizzati per ogni occupazione.

OCCUPATIONS	BLANK WITHOUT USE-WEAR	NON-DIAGNOSTIC	PROJECTILES	USED BLANKS	TOTAL
Castelnovian	103	11	10	8	132
Sauveterrian	38	8	6	5	57
Total	141	19	16	13	189

and Fontbrégoua (Royer *et al.* 2009). The analysis of turtle plastrons and the carapaces showed evidence of burnings, suggesting the turtles were cooked (*ibid.*).

The anthracological and archaeozoological analysis showed continuity in the environmental characteristics and exploitation throughout the Sauveterrian and Castelnovian levels. In fact, the faunal remains and their quantity were constant during all occupations. The same continuity was found in some features of the lithic industries.

Lithic industry

Several raw materials were used for lithic production during the Mesolithic, the most common was a Cretaceous (Bedoulian) honey flint and a Tertiary flint (Sannoisien). Raw material sources are found approximately 30 km from the rock shelter (Binder 1998). During the Castelnovian occupations, the main products made from the honey flint are regular bladelets produced by pressure flaking (Binder *et al.* 2012) and were used primarily for the production of geometrics. When present, the proximal parts of these blanks have pressure removals features: developed and well-delimited bulbs and well-expressed tearing-out lip. The blades are prismatic and regular, between 2 and 5 mm thick and 10 mm width. Aside this kind of *débitage*, other laminar blanks were produced by soft hammer percussion.

The lithic industry coming from Marcq's excavation has the same raw materials characteristics, methods of *débitage* and shape of the blanks. The over representation of plain *débitage* blades reveals a selection of blanks, which were used mostly for the production of geometrics.

Only one core comes from E2 and E3 squares, from Castelnovian layers. It is a prismatic core made from Bedoulian flint, bearing negatives of small flakes.

Sauveterrian and Castelnovian industries have a small number of tools (Tab. 1). Among the material analysed in this research, only one end-scraper is present. The rest of the tools are composed by blades, bladelets, and elongated flakes with retouch or irregular scarring on the edges. In this group of artefacts there are three notched blades[1]. The "Montbani" blades, so-called by Rozoy (1967), are supposed to be a typical element from the late Mesolithic lithic industry of France, North of Italy, Spain and even from Upper Capsian of the Maghreb (Gassin *et al*. 2013). The notched blades of Mourre de Sève have one notch (Fig. 3 n.1), or multiple notches (Fig.3 n.7), created by a semi-abrupt retouch. All notched blades have some fractures (on the distal or/and proximal part), but they do not affect the notches.

The projectiles group is composed of geometrics and hypermicroliths. The former are emblematic of Castelnovian deposits, while the latter are typical of *microlamellaire* Sauveterrian complexes. Their presence all along the Mesolithic stratigraphy (Tab. 2) characterizes this industry (Binder 1994). The same association of Sauveterrian hypermicroliths and Castelnovian industries is present at Châteauneuf (Binder & Courtin 1987). The recovery of these two projectile types at Mourre de Sève confirms that their association is not the result of mixed industries, but that they regularly occur together (Binder 2000). The absence of these tools from Marcq's excavation could have resulted from the use of a large screen size to sieve deposits (Binder 1994).

The production of geometrics occurs at the site evidenced by the high percentage of microburins in the assemblage (Binder & Sénépart 2004). Symmetrical and asymmetrical trapezes come from the Mesolithic levels of the entire site. Finally, techno-typological analysis (Binder 1994; Binder & Sénépart 2004) confirms the Mesolithic production of projectiles in the disturbed areas of the site (Tab.2).

The technological characteristics of the Castelnovian assemblage place the Mourre de Sève series within the Rhodanian aspects of the Castelnovian (Binder 2000). This industry is characterized by: production of prismatic and regular blades made by pressure, notched blades, use of non-retouched blades and flakes, several type of projectiles (triangles and trapezes) and flat and inverse retouch on small truncations.

Methods

The analysis employs Semenov's method (Semenov, 1964) using a stereomicroscope (Olympus SZH magnification from x0.74 to x64) (Tringham 1974) illuminated by a fibre-optic light source and an illuminated reflective light microscope (Leica DMLM magnification from

1 Two notched blades come from the Sauveterrian layers and one comes from the Castelnovian layers.

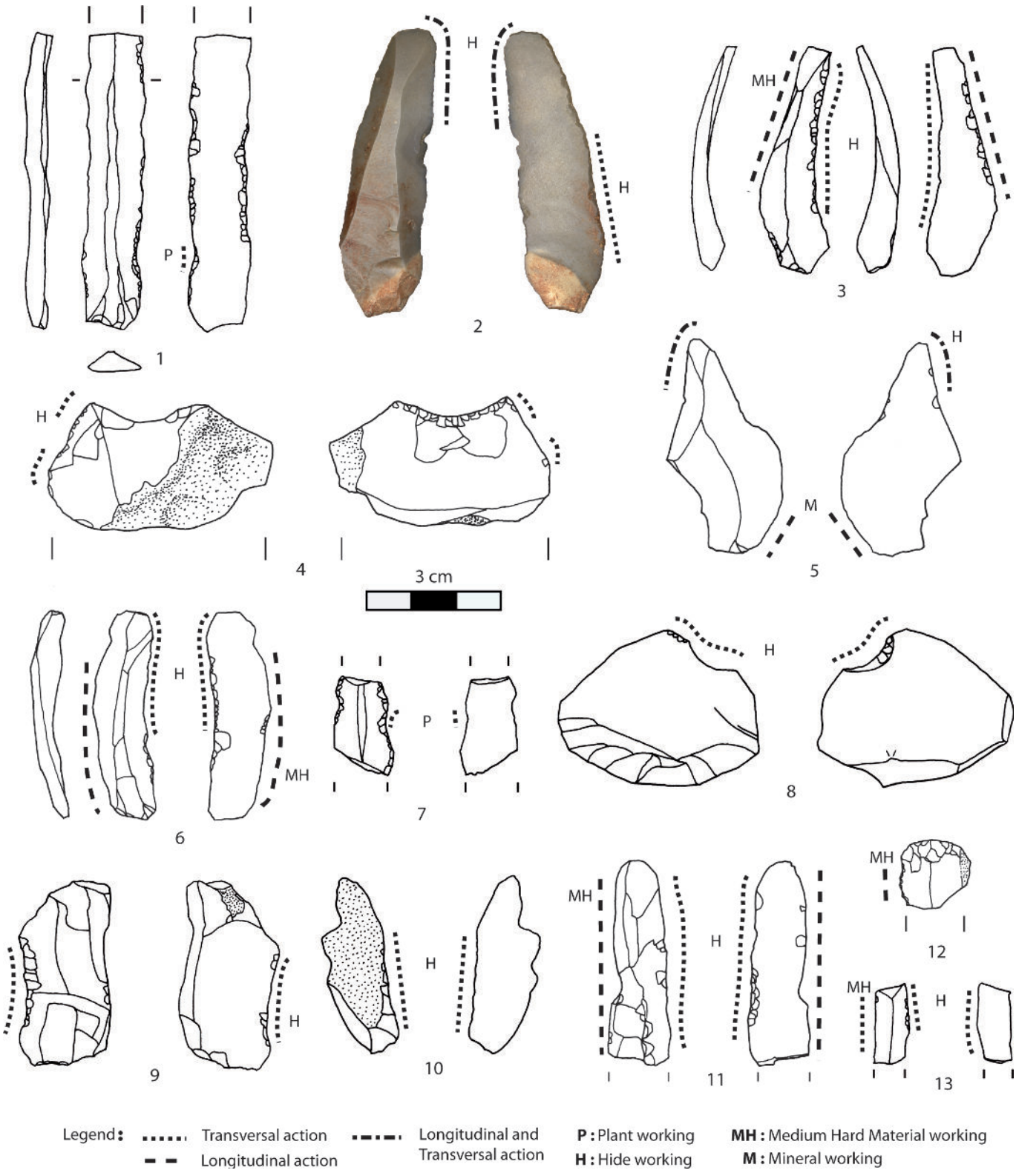

Fig. 3 *-Tools from Sauveterrian (n° 1,2,3,4 and 13) and Castelnovian levels (n° 5, 6, 7, 8, 9, 10, 11, 12) displaying use-wear. Drawings (1, 3, 6, 7, 11, 12) D. Binder and (4, 5, 8, 9, 10, 13) C. De Stefanis. / Strumenti con trace d'uso provenienti dagli strati Sauveterriani (n° 1,2,3,4 e 13) e Castelnoviani (n° 5, 6, 7, 8, 9, 10, 11, 12). Disegni (1, 3, 6, 7, 11, 12) D. Binder e (4, 5, 8, 9, 10, 13) C. De Stefanis.*

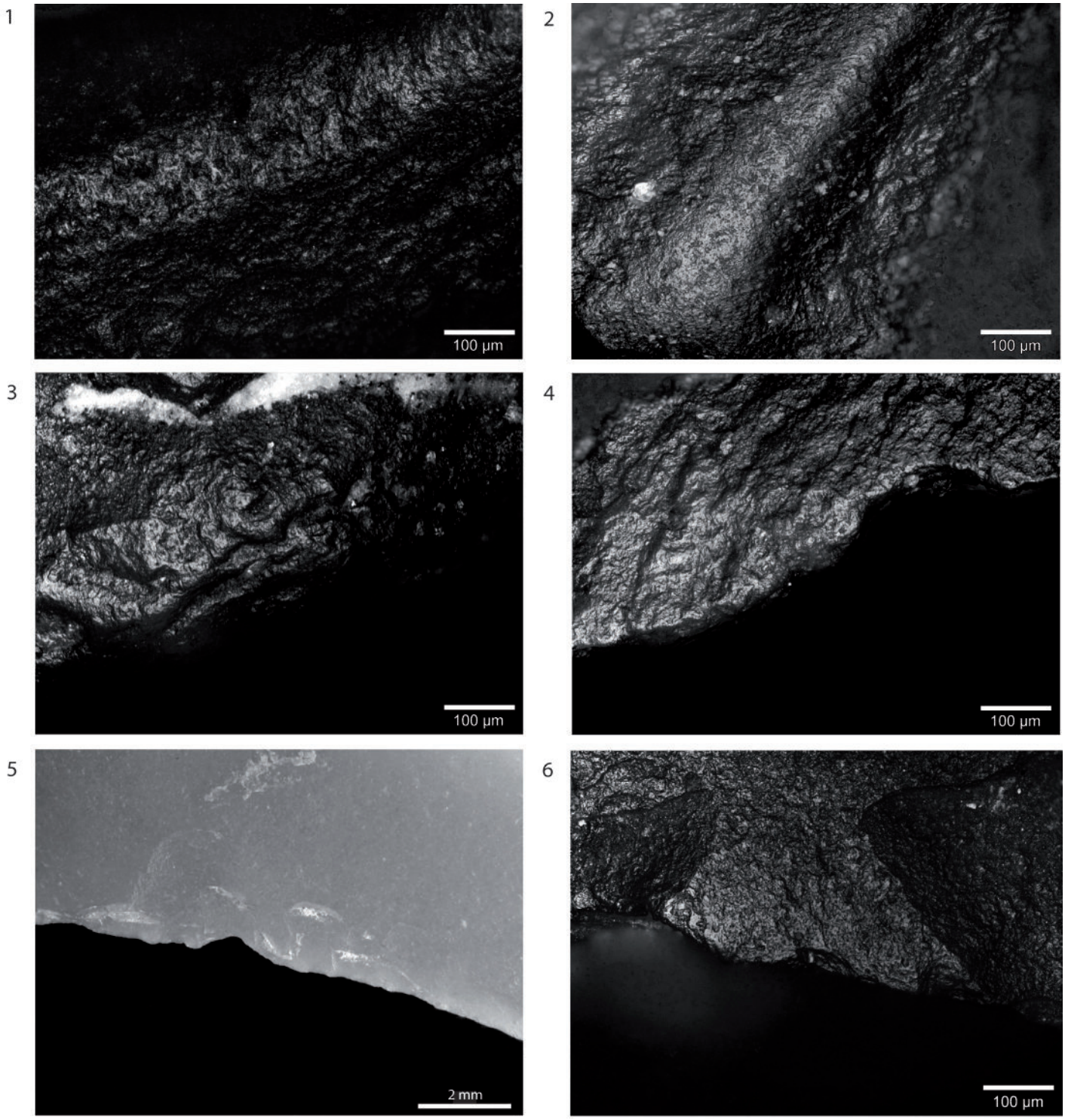

Fig. 4 *-Hide working: 1) Working on dry hide: transversal and longitudinal coarse striations cover a low linked dull polish. 2) Higher linked polish than the former with thin transversal striations and a high degree of edge rounding. Photos n. 3 (proximal left edge of the tool n. 2 Fig. 3) and 4 (UA on the tool n.3 Fig. 3) show two UA scraping on a damper hide and showing a highly linked and less pitted polish, with thin striations. The photo n. 3 shows a higher degree of rounding. 5) Quadrangular feathered and stepped scars, perpendicular to the edge, show a transversal action on a medium hard material. 6) Domed polish, with rare and fine striations, shows a transversal action on wood. The polish is interrupted by micro stepped scars. / Lavoro sulla pelle: 1) grosse strie trasversali e longitudinali coprono una politura opaca a trama larga. 2) Politura a trama più stretta della prima, con strie fini e forte smussamento dei bordi. 3) Le foto 3 (bordo sinistro prossimale del disegno Fig. 3.2) e 4 (UA sullo strumento in Fig. 3.3) mostrano due UA che hanno raschiato una pelle più umida e mostrano una politura a trama più stretta, con meno buchi e strie fini. La foto n. 3 presenta una più alto grado di smussamento. 5) Sbrecciature quadrangolari a terminazione "feather" e "step", perpendicolari al bordo mostrano un'azione trasversale su un material medio duro. 6) Politura "domed", con strie rare e fini, mostra un'azione trasversale su legno. La politura è interrotta da micro sbrecciature.*

Tab. 4 *-Tasks and worked materials by used area (UA). / Attività e materiali lavorati per zona d'utilizzo (UA).*

OCCUPATIONS	HIDE			PLANT SCRAPING	MINERAL CUTTING	MEDIUM HARD MATERIAL CUTTING	MEDIUM MATERIAL		TOTAL UA
	SCRAPING	CUTTING	MIX				LONGITUDINAL	TRANSVERSAL	
Castelnovian	5	1	1	1	1	1		1	11
Sauveterrian	4		1	1			1	1	8
Total UA	**9**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**19**

Tab. 5 *-The characteristics of use-wear of hide working identified on the Sauveterrian lithic industry of Mourre de Sève: 1-Tool Fig.3.2, right distal edge, 2-Tool Fig.3.2, left proximal edge, 3-Tool Fig.3.4, distal edge, 4-Tool Fig.3.3, right edge, 5-Tool Fig.3.13, right edge. / Caratteristiche delle tracce d'uso legate al lavoro della pelle nell'industria litica sauveterriana di Mourre de Sève : 1-Strumento Fig.3.2, bordo distale destro, 2-Strumento Fig.3.2, bordo sinistro prossimale, 3-strumento Fig.3.4, bordo distale, 4-strumento Fig.3.3, bordo destro, 5-strumento Fig.3.13, bordo destro.*

UA	ACTION	CONTACT ANGLE	HUMIDITY OF THE HIDE	ABRASIVE	ROUNDING	DEGREE OF ROUNDING
1	Scraping and cutting	< 40 °	Medium low	Coarse and fine	Flattened	High
2	Scraping	> 45 °	Medium high	Fine	-	High
3	Scraping	30°-60 °	Medium	Fine	Rounded	High
4	Scraping	30°-40°	High	Fine	Flattened	Low
5	Scraping	-	-	Fine	Rounded	Medium

x100 to x200) (Keeley 1980). The interpretation of the use-wear is based on comparisons between the artefacts and experimental collections. Each artefact was cleaned with soap and warm water, and with alcohol before the microscopic analysis. For this study, all lithic artefacts (N=189) from undisturbed areas of the site were chosen (the E2 and E3 squares) (Tab. 3).

The complete lithic assemblage from this area was studied to obtain a representative sample of the Sauveterrian and Castelnovian sequence of the site. By studying the range of tools and blanks at the site it allows us to better understand the dynamics of the choices made when using tools, without letting oneself being influenced by our modern thinking. In this way, we can give the same attention to every kind of blanks throughout the *cha*îne *opératoire,* during the analysis.

Finally, the study of impact traces on projectiles inspected all the bladelets and geometrics coming from the earliest (Marcq 1950's) and the latest (Binder 1994 and 1997) excavations (Tab. 2). The techno-typological analysis of these tools (Binder 1994 and 1997; Binder & Sénépart 2004; Paccard & Marcq 1993) showed their homogeneity and it linked most of them to the Mesolithic industry. Increasing our projectiles sample with these artefacts will help us to better understand their use and hafting.

Results

In the analysed sample, 7 % of the blanks shows evidence of use-wear (Tab. 3). The 65 % percentage of blanks show post-depositional alterations[2], and 19 artefacts are considered non diagnostic because they display too many alterations (Baesemann 1986; Mansur-Franchomme 1986; Semenov 1964; Stapert 1976; Vaughan 1981). The presence of post-depositional alterations could have erased the use-wear of the softest materials (e.g. meat). No traces linked to the butchering activities were found, despite the presence of faunal and fish remains.

In spite of the high percent of post-depositional alterations, the functional analysis allowed us to identify several different tasks on hide, vegetal, and minerals.

The Sauveterrian level

The Sauveterrian layer contains 57 lithic artefacts. Six are projectiles and none displays use or impact wear. The rest of the blanks are composed by flakes or blades/bladelets and among them five tools shows use-wear on eight used areas (UA): one related to wood working, five to hide processing and two to activities on medium-hard material (Tab. 4 and Fig. 3).

The use-wear analysis showed that hide working is the most represented task during this occupation. Four different blanks with five UA are used (a cortical flakes, two regular blades and a twisted blade). Three UA out of five are un-retouched (Fig.3 n. 2, 4 and 13). The shape of their used edges does not show the same characteristics and the edge angles varies between 35 ° and 85 °. All the UA show a weak or medium degree of wear development and none is resharpened.

It is possible to distinguish several stages of humidity of the hide, thanks to the degree of linkage of the polishes and their brightness (Vaughan 1985). Scraping is the most common action used with hide working. It is identified on 4 UA, and only one edge shows a double action (longitudinal and transversal) (Tab.5). Two of these UA display a dull and rough polish linked to the hide working. The first UA conserve a higher linked polish than the former, with thin striations, a high degree of rounding and a pitted aspect (Fig. 3 n. 4 and Fig.4 n. 2). According to these features, it is linked to a softening task on a medium dry hide. The former UA shows a double action on dry hide on the distal right edge, which has coarser striations and a low linked and dull polish (Fig. 3 n. 2 and Fig. 4 n. 1). On the same tool, another UA is located on the opposite edge. This edge worked a damper hide, which created a highly linked and less pitted polish,

2 Trampling, thermal damages, solution phenomena and Glossy appearance.

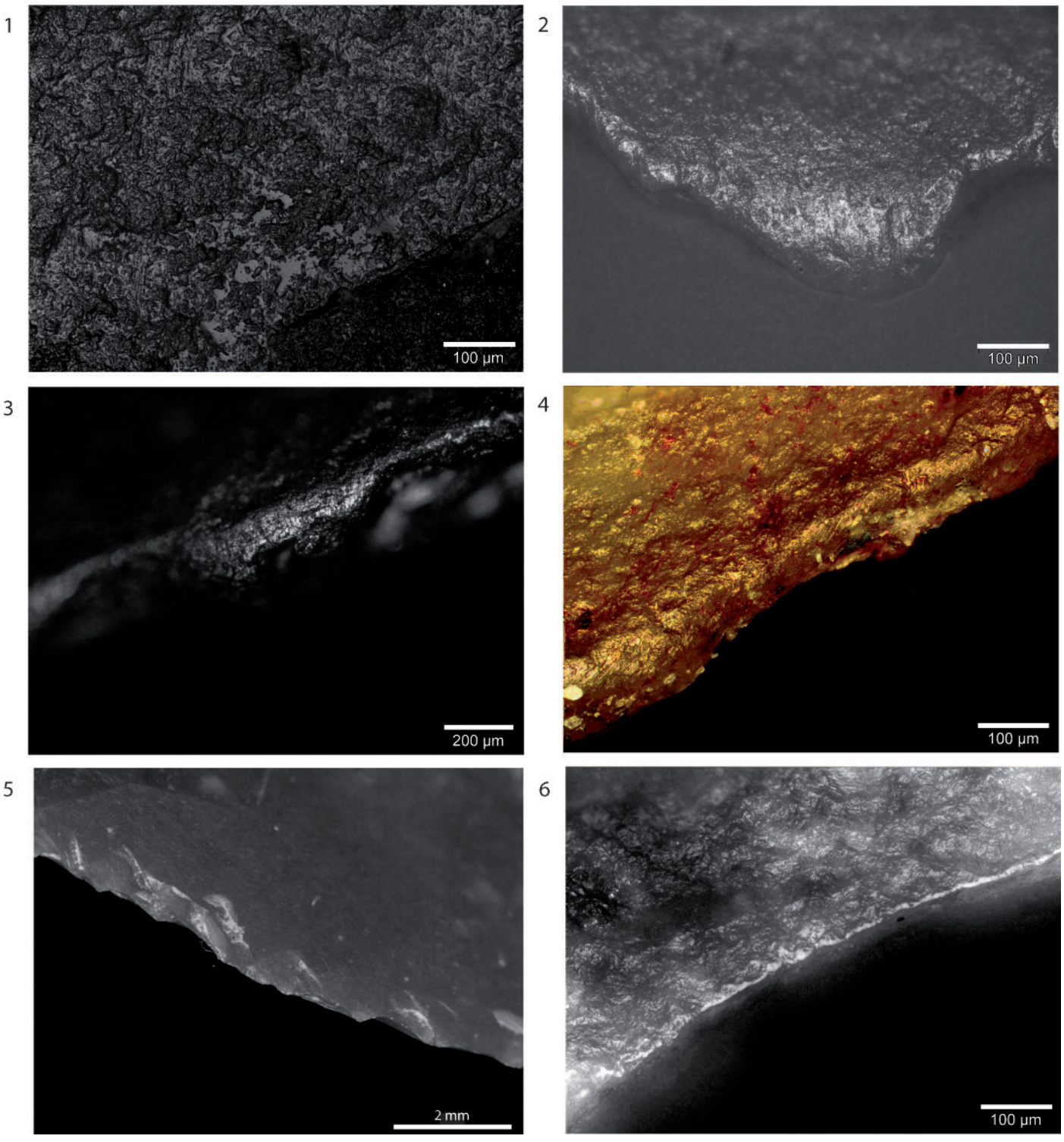

Fig. 5 *-1) The end limit of the retouch cuts the dull, rough and pitted polish of the hide. Some spots of a flat and shiny alteration cover the hide polish. Photos 2) and 3) show a dull and pitted polish, with a rough aspect and numerous striations. A flat rounding is visible on photo n. 3, and a rounding on photo n. 2. 4) Soft mineral working. A rounded edge displays a linked polish covered by numerous longitudinal striations of different dimensions and coarseness. 5) Quadrangular scars, with step terminations and oblique directions, produced by the contact with a medium-hard material. 6) Domed polish with slight transversal undulations and fine striations shows the transversal motion on soft wood. / Limite del ritocco che ha interrotto la politura della pelle. Alcune macchie di una politura d'alterazione piatta e brillante coprono le tracce della pelle. Foto 2) e 3) mostrano una politura opaca e bucherellata, con un aspetto rugoso e numerose strie. Uno smussamento piatto è visibile sulla foto n. 3, e uno smussamento arrotondato sulla foto n. 2. 4) Lavoro su un minerale tenero. Un bordo smussato mostra una politura a trama unita coperta da numerose strie di diverse dimensioni. 5) Sbrecciature quadrangolari, a terminazione "step" e direzione obliqua, prodotte dal contatto con un materiale medio-duro. 6) Politura "domed" con leggere ondulazioni trasversali e strie fini testimoniano un gesto trasversale su un legno morbido.*

with thin striations (Fig. 4 n. 3 and n. 4). This side of the tool has red colorant residues, which covers the dorsal and the ventral surfaces (Fig. 3 n. 2). If this UA was linked to a transversal action on a red mineral material it would have left coarser striations on the edge. For these reasons it is not possible to link the presence of red colorant to a mineral working. At the same time no glue residues are found and chemical analysis cannot link the red residues to the presence of mastic.

The work of a medium hardness material is represented by a longitudinal and a transversal action on two different UA located on two tools, which also display hide polish (Fig. 3 n. 3 and 13, and Fig. 4 n. 5). Both areas show only macro-wears, which consist of quadrangular feathered and stepped scars. On one UA they are oriented perpendicular to the edge indicating transversal action and on the other UA they are oblique suggesting longitudinal motion.

The last task recorded within Sauveterrian occupation is a transversal activity on wood, located on a notch of a blade (Fig.3 n.1). The ventral face is the contact surface and it worked with an angle of about 45°. On this face, some quadrangular hinged and stepped scars indicate contact with a flexible and medium hard material. A domed polish with rare and fine striations suggests contact with a medium hard plant, like wood (Fig. 4 n. 6). The rest of the blank do not have other used areas but, the surface shows a lot of alterations, which could have removed the use-wear.

The Castelnovian levels

The Castelnovian lithic industry counts 132 artefacts, among them nine displays traces of hide, plant, mineral, medium material and a medium hard material working (11 UA) (Tab. 4). Seven projectiles come from these levels and three have diagnostic impact wear.

Hide working (Tab. 6) is represented by seven UA on six tools (Fig. 3), with a non-standardized shape. Furthermore, the used edges have different morphologies and most of their edges (five UA) are retouched to create angles between 55° and 90°. The majority of the used edges have a slight or medium rounding and only one is resharpened (Fig. 3.6 and Fig. 5 n. 1). According to the use-wear features, the worked hides were dry or medium dry. Indeed, the edges displays a dull and pitted polish with a rough aspect and numerous striations (Fig. 5 n. 2 and 3). If still visible through the rounding, the macro-traces have a bending initiation and a step and hinge terminations caused by the contact with a medium hard and flexible material. Among the scraping actions it is possible to distinguish two groups of tools. The first is composed by the tools which worked with a contact angle between 45° and 80°. Most of the tools edges shows a high degree of rounding and the presence of coarse striations caused by an abrasive material. In the second group, the most part of the contact angles are between 30° and 45°, and the edges displays a slightly developed flat rounding and a thin abrasive striation.

Among the tools used on hide processing, two show a second use. One of them is a medium material which produced scars and a slight rounding on the edge of a blade (Fig. 3 n.6). The other tool bears another UA which was used for a longitudinal motion on a soft mineral (Fig. 3 n. 5). The edge displays a slight rounding, which covers the marginal macro-traces, and a red mineral residue on part of the edge and spots on the inner surface. A linked micro polish covers the marginal part of the edge. The polish is characterized by numerous longitudinal striations of different dimensions and coarseness (Fig. 5 n. 4).

Only the distal fragment of an end-scraper comes from E2 and E3 squares of the site and no use-wear is found on its scraper edge (Fig. 3 n. 12). However, the endscraper has macro-wear produced by contact with a medium-hard material (Fig. 5 n. 5) on the left edge.

In the Castelnovian levels, a notched blade shows the only wear linked to plant working (Fig. 3 n.7). A domed polish is localized on the distal ventral bevel of the notch. Slight undulations and fine striations show the transversal motion, with the ventral face as the contact surface (Fig. 5 n. 6). According to the localization and the characteristics of the use-wears, this UA scraped a soft wood with a high working angle.

Projectiles

The use-wear analysis on projectiles concerns 56 artefacts (Tab. 7 and 8): 20 hyper-microliths and 36 trapezes. Without experimental experience on this particular task, we base the functional analysis on the result of other projectile experiments (Chesnaux 2014 and 2006; Crombé 2001; Fischer *et al.* 1984; Philibert 2002; Plisson 1986; Gassin 1991). Some experiments on trampling alteration on microliths (Chesnaux *op. cit.*) demonstrated that these phenomena could produce fractures similar to the impact traces, and according to the dimensions of the armatures, these scars could have several lengths. For these reasons and the small size of the projectiles analyzed, this study defines diagnostic impact fractures (DIF) as, fractures longer than 2 mm with either a burin like fracture, "*en charnière*" fractures, bending

Tab. 6 *-Characteristics of use-wear of hide working identified on the Castelnovian lithic industry of Mourre de Sève : 1-Artefact Fig.3.8, distal edge, 2-Artefact Fig.3.9, left edge, 3-Artefact Fig.3.5, left distal edge, 4-Artefact Fig.3.6, right edge, 5-Artefact Fig.3.11, right edge, 6-Artefact Fig.3.11, left edge, 7-Artefact Fig.3.10, right edge. / Caratteristiche delle tracce d'uso legato al lavoro della pelle nell'industria litica castelnoviana di Mourre de Sève: 1-Strumento Fig.3.8, bordo distale, 2-Strumento Fig.3.9, bordo sinistro, 3-Strumento Fig.3.5, bordo distale sinistro, 4-Strumento Fig.3.6, bordo destro,5-Strumento Fig.3.11, bordo destroy, 6-Strumento Fig.3.11, bordo sinistro, 7-Strumento Fig.3.10, bordo destro.*

UA	ACTION	CONTACT ANGLE	HUMIDITY OF THE HIDE	ABRASIVE	ROUNDING	DEGREE OF ROUNDING
1	Scraping	45°-60°	Medium	Fine	Rounded	Low
2	Scraping	45°-60°	-	Coarse	Rounded	High
3	Scraping and cutting	60°-80°	Dry	Coarse	Flat	High
4	Scraping	30°-40°	Medium	Fine	Flat	Low
5	Scraping	30°-45°	Dry	Corse	Flat	Low
6	Cutting	-	Medium	Fine	-	Low
7	Scraping	30°-40°	-	Fine	Flat	High

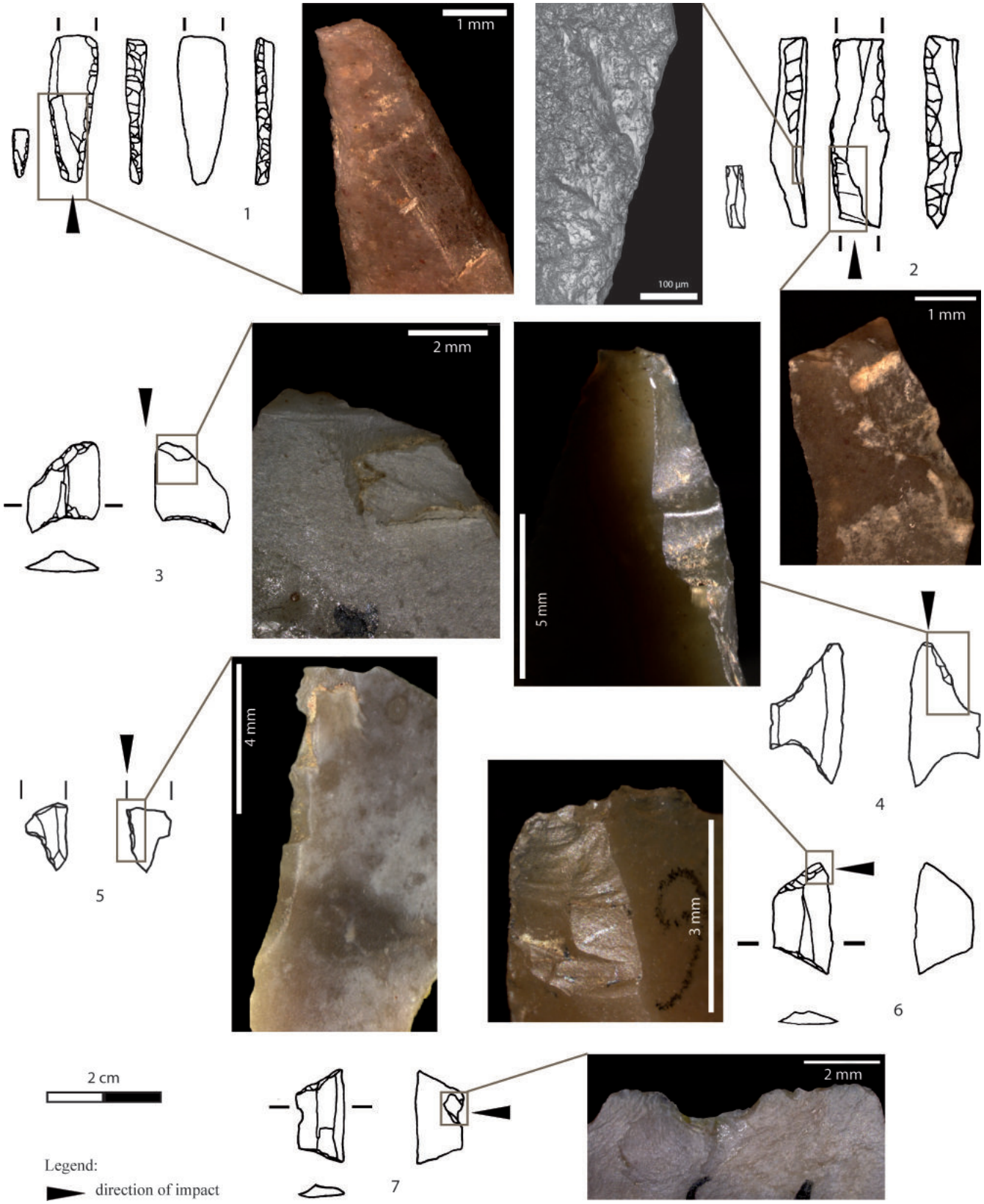

Fig. 6 *-Projectiles with DIF and MLIT of Mourre de Sève. 1) Axial bending step fracture. 2) DIF "en charniere" and MLIT on the ventral face of the bladelet. 3) Axial bending step fracture on the large point. 4) DIF "en charniere" on the large point. 5) "En charniere" fracture on the unretouched edge of a trapeze fragment. 6) Cone fractures coming from the large base to the small one, covering part of the truncation. 7) Cone and bending with hinge and step terminations fractures on the unretouched edge of the trapeze. Drawings (1, 2, 3, 6, 7) D. Binder and (4, 5) C. De Stefanis. / Armature con DIF e MLIT del sito di Mourre de Sève. 1) Frattura assiale "bending step". 2) DIF "en charniere" e MLIT sulla faccia ventrale della lamella. 3) Frattura assiale "bending step" sulla punta. 5) Frattura "en charniere" su un lato non ritocatto del frammento di trapezio. 6) Frattua a "cone" proveniente dalla grande base e diretta verso la piccola base del trapezio, copre parte della troncatura. 7) Fratture "cone" e "bending" a terminazioni "hinge" e "step" sul lato non ritoccato del trapezio. Disegni (1, 2, 3, 6, 7) D. Binder e (4, 5) C. De Stefanis.*

Tab. 7 *-Results of the functional analysis on microliths of Mourre de Sève. Each microlith type is presented with a number: 1-unilaterally baked bladelet, 2-bilaterally backed bladelet, 3-micro-triangle, 4-point "de Chaville". / Risultati delle analisi funzionali sui microliti di Mourre de Sève. Ogni numero corrisponde a una tipologia di microlite: 1-lamella a dorso, 2-lamella a doppio dorso, 3-micro triangoli, 4-punta della Chaville.*

EXCAVATION	TYPE	PRESERVED PART	DIF	MLIT
Binder	1	Mesial	x	x
(E2-E3 squares)	2	Intact		
	2	Proximal	x	
	2	Distal		
	2	Distal		
	2	Mesial		
	3	Meso-Distal		
	4	Intact		
	2	Distal		
	1	Mesial		
	1	Mesial		
	2	Distal		
	2	Meso-Proximal		
Binder (Perturbed Areas)	1	Mesial		
	2	Distal		
	3	Distal		
	2	Proximal		
	2	Distal		
	3	Meso-Distal		
	1	Proximal		

or cone fracture with a feather, step or hinge termination, the associated spin-off and microscopic linear impact trace (MLIT).

The hyper-microlith group was composed by baked bladelets, points, and micro-triangles. This set showed DIF only on two backed bladelets (Tab. 7).

According to the terminology proposed by Fisher, Vemming and Rasmussen (1984), one DIF is a step bending fracture 5 mm long (Fig. 6 n.1) and the other one is an "*en charnière*" fracture 3 mm long (Fig. 6 n. 2) (Plisson & Geneste 1986). The latter also displays a MLIT on the edge, caused by the contact with a hard material (Fig. 6 n. 2). Among the rest of microliths, 16 (80 %) show a distal or/and proximal fracture (Tab. 7). Although the high percentage of breakage, these fractures are snap terminating bending fractures, without diagnostic impact features, and the low number of the sample is not enough representative for statistical analysis.

Among the trapezes, the analysis do not find MLITs, but five projectiles display fractures longer than 2 mm (Tab. 8). According to the position of these fractures on the projectiles, it is possible to suggest the use of two different axial points. The first type is represented by two asymmetrical trapezes with a large straight truncation and a small concave truncation, and a fragment of trapeze with a concave truncation (Fig. 6. n. 3-5 and Tab. 8 tools n° 1, and 23-24). They exhibit an axial fracture on the large point as a bending type fracture, and an "*en charnière*" type fracture (between 5 and 8 mm long). According to the direction and the position of the DIF, these trapezes were hafted with their bigger point as the tip of the arrow. The other type of axial point is recognized on a symmetrical trapeze (Fig. 6 n. 6 and Tab.8 tools n 31). It shows some cone fractures coming from the large base to the small one, covering part of the truncation (Fig. 6 n 6). In this case, the trapezes were hafted as transverse arrowhead, with the big base at the tip of the arrow. On the small base of the projectile there are snap fractures, which could be caused by the recoil on the shaft.

As shown in table 8, most of trapezes have snap fractures on the points and several scars on the bases, all less than 2 mm length. Experiments on this type of projectiles, as transversal arrowhead (Gassin 1991), showed that breakages and scars on the bases of trapezes could be produced by impact. In our archaeological sample this kind of fractures are present on 10 trapezes, but only one of them displays fractures longer than 2 mm and could be considered a DIF (Fig. 6 n 7).

Discussion and conclusions

The use-wear analysis carried on lithic industry of E2 and E3 squares confirms continuity in economy type from the Sauveterrian to the Castelnovian occupations. These complexes shows the predominance of irregular blanks used as tools: blades or flakes, with several edge morphologies (47 % of UA were retouched), and cortex remains (Fig. 3).

Most of the used edges are still sharp and only one displays resharpening (Fig. 5). Their low exploitation confirms a constant supply of flint.

The majority of UA show use-wear on hide working (63 %) throughout the occupations. The variation in hide humidity and the contact angle indicates several stages of hide processing (Tab 5 and 6). At the same time, the presence of cutting activities means that the hide is also transformed on the site into other items such as clothing. Although hide working is the most represented activity, no specialized hide working tools are present among the analyzed sample. For these activities irregular flakes and blades are used, with no evidence for hafting and mostly with low development of rounding and traces. The only end-scraper in our sample does not display hide polish and the 14 coming from Marcq's excavation are not analyzed. This difference of end-scrapers numbers could be linked to a spatial organization of the craft or to several occupations with different functions and activities. Unfortunately we have not enough data to understand the reasons of this spatial distribution.

In both occupations, the plant working is evidenced by two notched blades (Fig. 3 n° 1 and 7). The bevel of the notches shows a transversal activity on wood, which suggests a specialized craft for the transformation of this material. Their presence during Castelnovian and Sauveterrian occupations could suggest that these kind of tools are not specific only for Capsian and Castelnovian periods.

The hunting activities are indicated by the presence of DIF and MLIT on six projectiles (10 %). Four geometrics displays impact traces showing 2 types of arrow tips. The first is an asymmetrical trapeze with a large straight truncation and a small concave truncation used as a transverse arrowhead, with the large point as the tip of the arrow. The second is a symmetrical trapeze hafted as transverse arrowhead, with the large base at the tip of the arrow. Two backed bladelets show DIF and MLIT, but it is not possible to define their position on the shaft (point or barb). The sample analyzed here presents high variability in arrowhead type and possible hafting, but additional use-wear studies are needed to understand if this variability could be related to the hunted prey, the type of bows used, or to cultural factors.

The absence of butchering tasks is surprising, especially compared to the presence of numerous faunal remains. This lack of traces could be attributed to the high presence of alterations on stone tools, which could have removed some use-wear traces or confused their interpretations (Van Gijn 1986). For eel processing, the inhabitants of the site could be butchering off-site. In fact, among the remains of this species, no heads were found and it is probable that this kind of prey was processed on the fishing site.

Tab. 8 *-Summary of fractures on the trapezes of Mourre de Sève. The numbers in the first column identify each artefact. The provenance of different excavations is pointed out by an "M" as Marcq excavation, "B1" as Binder excavation of E2/E3 squares and as a "B2" as Binder excavation of perturbed areas. The typology of trapezes is indicated by the follow numbers: Fragment of trapeze=1, Segment=2, Trapeze with displaced base=3, Asymmetric trapeze=4, Symmetric trapeze=5. The presence or absence of fractures is showed in the rest of the table, specifying the length of breakage on the points and their morphology on the bases. / Riassunto delle fratture presenti sui trapezi di Mourre de Sève. I numeri nella prima colonna identificano ogni pezzo. La provenienza dai diversi scavi è precisata attraverso una "M" per lo scavo Marcq, con "B1" per gli scavi Binder dei quadrati E2/E3 e "B2" per gli scavi Binder delle zone rimaneggiate. La tipologia dei trapezi è indicata dai seguenti numeri: Frammento di trapezio=1, Segmento=2, Trapezio a troncature oblique=3, Trapezio asimmetrico=4, Trapezio simmetrico=5. Nel resto della tabella è riassunta la presenza o assenza di fratture, specificando la lunghezza delle fratture sulle punte e la loro morfologia sulle basi.*

N°	EXCAVATION	TIPOLOGY	INTACT	FRACTURE ON ONE OF THE POINTS					BIG BASE	SMALL BASE
				IMPACT BURINATION	EN CHARNIERE	SNAP	BENDING	CONE		
1	B2	1			> 7 mm	x				
2	M	2	x							
3	B2	3							Marginal cone	
4	M	3							Snap	
5	M	3	x							
6	M	3				x			Snap	
7	B2	4								
8	B2	4				x				
9	B2	4				x				
10	B2	4				x		< 1 mm		
11	M	4								Snap
12	M	4				x				
13	M	4				x				
14	M	4	x							
15	M	4				x				
16	M	4	x							
17	M	4						< 2 mm	Snap	
18	B1	4				x				
19	B2	4				x			Marginal bending	
20	B2	4								
21	B2	4				x				
22	M	4				x				
23	M	4					2,5 mm			
24	B2	4			8 mm					
25	B2	4				x				
26	B2	4	x							
27	B1	5				x				
28	B1	5	x							
29	B2	5	-	-	-	-	-	-	-	-
30	M	5		< 2 mm			< 2 mm			
31	M	5						3 mm		Snap
32	M	5								Cone/Bending
33	M	5				x				
34	M	5				x				
35	M	5							Bending	
36	M	5						< 2 mm		Snap

In summary, the function and the economy of the site does not change during several Mesolithic occupations. The same kinds of raw material and blanks are chosen to be used: irregular flakes and blades for domestic activities and unspecialized crafts, and the regular blades to produce geometrics and notched blades. The sample shows a low variability of activities and worked materials. Among them, hide is the most represented, however only expedient tools are used for this task. The use-wear study, combined to other multidisciplinary analysis, suggests a non-specialized function of the Mourre de Sève site, with brief occupations, due to the small assemblage size. The site seems to be linked to a network of the sites targeted towards the exploitation of different environmental resources with the region (fish and faunal resources, a forested environment, and lithic raw materials). To confirm this hypothesis additional use-wear research on other Mesolithic sites of the region will be needed.

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