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Special Issue: Personal Ornaments in Early Prehistory

Settlement Dynamic and Beadwork: New Insights on Late Upper Paleolithic Craft Activities

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ABSTRACT

In this paper, we explore the social motivations underlying the settlement pattern of the foraging communities 15,000 years ago in the southwest of France. We report on a significant collection of several tens of teeth and shell beads from the Upper Magdalenian site of Peyrazet (Lot, France) and perform a detailed microscopic analysis of this assemblage. We explore which species were selected, examine technological and taphonomic modifications of the material, and compare this collection with the use of similar personal ornaments in Western Europe. Bone industry and zooarchaeological data also provide additional information to discuss and contextualize the bead assemblage. Our results indicate a complex economy dedicated to the accumulation of shells, reindeer skins, and teeth off-site. Peyrazet is identified as a location dedicated to the sewing and decoration of reindeer skins and is an isolated case in the region so far. We conclude that foragers created their personal ornamentation at specific sites in the region and that symbolic productions played a role in the mobility strategies of the communities during the Upper Magdalenian.

This special issue is guest-edited by Daniella E. Bar-Yosef Mayer (Steinhardt Museum of Natural History and Institute of Archaeology, Tel Aviv University) and Marjolein D. Bosch (McDonald Institute for Archaeological Research, University of Cambridge). This is article #8 of 12.

INTRODUCTION

When studying foraging societies, mobility is a central concern in the reconstruction of their past behavior. Land-use strategies and social networks developed by Pa-

leolithic societies are often investigated through raw lithic material catchment strategies combined with the organization of lithic reduction at landscape scales and the maintenance of stone toolkits (Andrefsky 2009; Cowan 1999; Kelly

1995; Jones et al. 2003). Spatial location and organization of the hunting and gathering strategies are also typically investigated to reconstruct mobility and territory of past societies (Binford, 1980; Delagnes and Rendu, 2011; O'Shea et al., 2013). Despite many attempts to explore the reasons that led communities to move from place to place and the skills necessary to do so, there have been remarkably few critical discussions of how personal ornaments can influence mobility strategy. This is despite the fact that many ethnographic studies show subsistence strategies account for only part of the motivations behind the movements and networks created by societies (Goldschmidt 1951; Kroeber 1922; Sharp 1952; Spencer and Gillen 1927; Thomson 1949). This oversight may be due in part to the fact that while faunal and lithic exploitations produce a large volume of remains at archaeological sites, these questions can be tricky to explore from productions that leave little manufacturing waste, such as personal ornaments. Although complex bead manufacturing processes involving long reduction sequences have been sporadically identified within the Paleolithic record (Heckel et al. 2016; Wei et al. 2017; White 1989), Paleolithic beads are mostly made from shells and mammal teeth simply perforated or notched (Perlès and Vanhaeren 2010; Vanhaeren 2005; Vanhaeren and d'Errico 2001; White 2007; White and Normand 2015). Consequently, we have little knowledge on where exactly past foragers procured, used, and discarded their personal ornaments. Space and time scheduling, distribution of manufacture activities, and potentially logistic organization involved in the production of most of the Paleolithic beads remain largely hidden (Peschaux et al. 2017; Rigaud et al. 2014, 2017; White et al. 2017).

The several tens of beads made of shells and mammal teeth discovered within the Late Upper Paleolithic occupation of Peyrazet, a rockshelter located in the southwest of France, offer a unique opportunity to document human organization at landscape-scales and to infer the appropriate analytical frameworks to examine the personal ornaments data in this perspective.

PEYRAZET ROCKSHELTER

Peyrazet (Creysse, Lot) is a cave/rockshelter located in the Haut-Quercy region of France, at the interface of two different geomorphologic areas—the Aquitaine basin and the Massif Central. The rockshelter opens on the edge of the Martel limestone plateau, several hundred meters from the current Dordogne River valley (Figure 1). The site was discovered in 1990 by speleologists and the first test pit excavated in 1991 by P. Chalard revealed a stratigraphy rich in bones and flints. Excavations carried out in 2008–2015 have yielded a Late Glacial archaeo-sequence (Langlais et al. 2009, 2015,) comprised of five archaeological levels. Radiocarbon dates indicate that the stratigraphy of Peyrazet (Costamagno et al. 2016; Langlais and Laroulandie 2014; Royer 2016) extends from the end of the pre-Bølling (Level 5) to the beginning of the Holocene (Level 1). The upper levels correspond to the recent Laborian period, a lithic technocomplex occurring during the transition be-

tween the Younger Dryas and the Preboreal in southwest France (Langlais et al. 2015). Level 3 (Azilian) and the top of Level 4 containing Azilian artifacts is an interface between the Laborian above and the Magdalenian below. The lower portion of Level 4 is an Upper Magdalenian occupation. Radiocarbon dates give a time range falling during the Bølling/pre-Bølling period, circa 15,000 years ago (cal BP). The lowermost Level 5 is sterile as far as humanly-modified remains are concerned and corresponds to a roof cave-in.

The analysis focuses on several tens of personal ornaments made of shells and mammal teeth recovered from the Upper Magdalenian occupation of Level 4.

MATERIAL AND METHOD

TAXONOMIC IDENTIFICATION OF SHELLS

Taxonomic identification involved two steps—the characterization of the shell's general shape for class determination (e.g., Scaphopoda, Gasteropoda, Bivalvia) followed by an examination of the number of whorls, shape of the aperture, lip, ventral and dorsal sides, and ornamentation to determine genus or species (Harasewych and Moretzsohn 2010; Poppe and Goto 1993). The nomenclature employed here adopted classifications available in the Clemam seashell database (Check List of European Marine Mollusca Database <http://www.somali.asso.fr/clemam/index.clemam.html>, search performed on 15/08/2014), the Paleobiology Database (<http://www.paleodb.org/cgi-bin/bridge.pl>, search performed on 15/08/2014), and the *Biodiversity Heritage Library* for fossil species. A consideration of the configuration and distribution of regional biotopes particular to each shell species and fossil outcrops revealed their probable procurement location(s) (Bar-Yosef Mayer et al. 2010; Rigaud 2013; Vanhaeren 2002;).

MORPHOLOGICAL AND MORPHOMETRIC ANALYSES OF SHELLS

Differences between natural populations and archaeological samples bring to light the strictness of the selection strategy applied by the shell gatherers. To this end, morphometric variables of the archaeological material (shell length and width, width of the spire, and aperture) were recorded.

To explore size selection strategies, modern and fossil reference collections of scaphopods (*Dentalium* sp.) were used. The shells were hand-collected along the Atlantic coast within thanatocoenoses. All shells visible to the naked eye were collected on the shore. The reference collections consist of 339 modern *Dentalium vulgare* collected in the Arcachon Bay and 244 fossil *Dentalium* sp. from the Miocene outcrop of Saucats Geological reserve (Vanhaeren 2002; Vanhaeren and d'Errico 2001).

ANATOMICAL AND TAXONOMICAL IDENTIFICATION OF MAMMAL TEETH

Based on morphological criteria including lateralization, size of the teeth, shape of the crown, and the occlusal wear facet, paired teeth have been systematically looked for

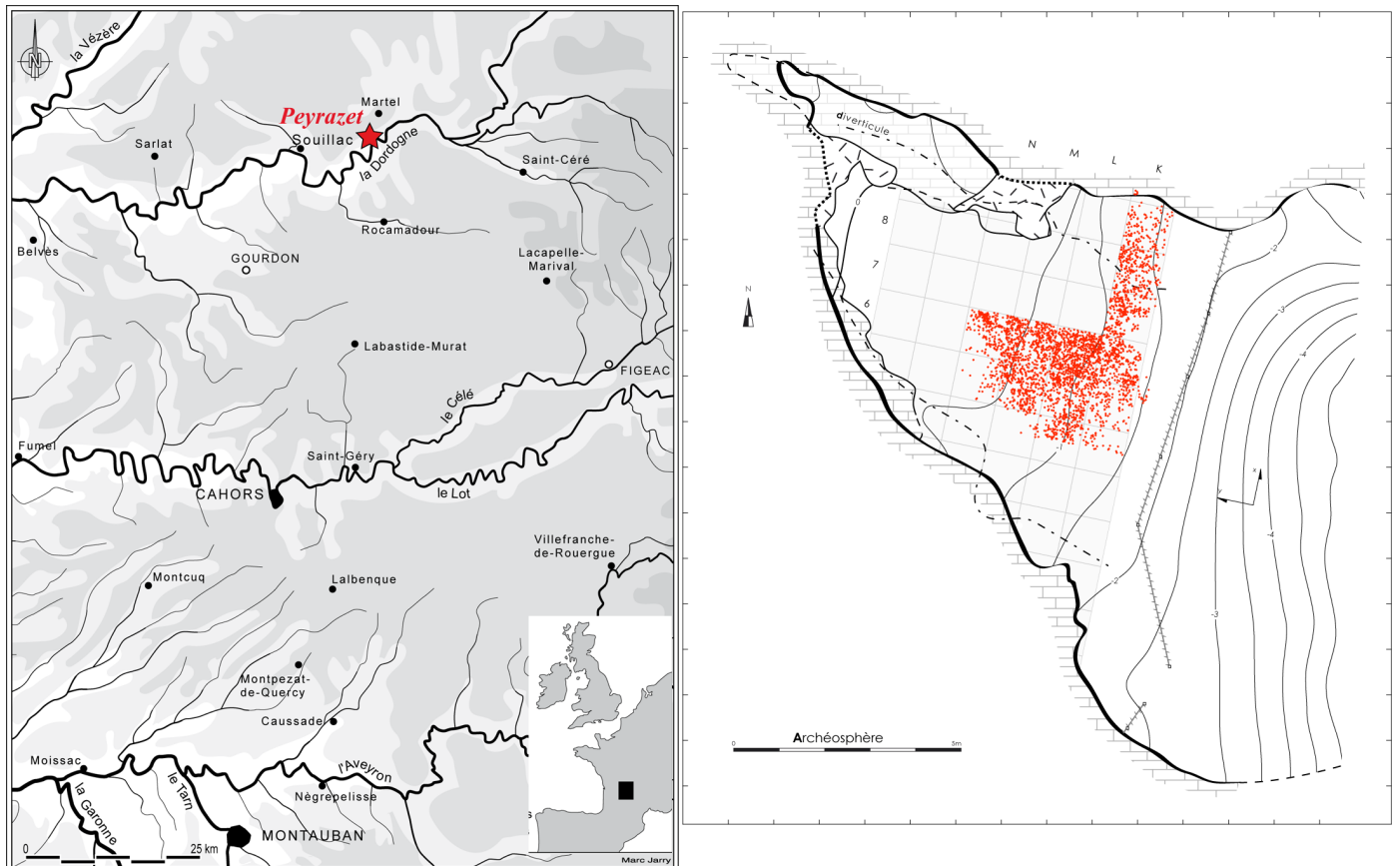


Figure 1. Location of Peyrazet rockshelter and zenithal distribution of the Magdalenian artifacts recovered during the excavation.

in order to calculate the Minimal Number of Individuals (MNI) exploited to accumulate the teeth. The shape of the crown and root, the stages of occlusal wear, the stages of root development, the state of calcification of the pulp cavity, and the presence/absence of the disto-linguo-cervical-lobe, were used to identify the sex and age of the red deer from which the canines had been extracted (d'Errico and Vanhaeren 2002).

MICROSCOPIC ANALYSIS

A microscope Leica Z6 APO equipped with a digital camera was used to document surface modifications on each shell and tooth. Shell surfaces show microscopic modifications testifying to events occurring either during the life of the mollusk or post mortem. In the case of shells collected and/or modified by prehistoric groups, microscopic analyses provide information relevant to the environment in which shells were collected as well as subsequent taphonomic and anthropogenic modifications (Dupont 2006; d'Errico et al. 2005; Taborin 1993; Vanhaeren et al. 2013). The presence, location, and degree of natural modifications impeding microscopic analysis (calcite deposits, cracks) were recorded for each specimen, along with the degree of preservation of the shell's and tooth's original shape and feature. Anthropogenic modifications such as fractures, use-wear, and modifications produced by suspension (e.g., perforations, residues, incisions) also were systematically recorded.

RESULTS

IDENTIFICATION AND SOURCING OF SHELLS

Seven shell species, including bivalves, gastropods, and scaphopods are present in the material (Figure 2, Table 1). The shells are highly fragmented. Two gastropods, *Homalopoma sanguineum* and *Cyclope* sp., were exclusively Mediterranean during the Pleistocene. Shells belonging to the *Cyclope* genus can be attributed to *C. neritea* or *C. pellucida*, two species that cannot be separated based on morphometric criteria due to their high intra-specific variability. *Littorina obtusata* is almost exclusively present in the Atlantic, but the species has been sporadically identified in the western Mediterranean (Hayward and Ryland 2017; Williams 1990). The presence of *Littorina obtusata* on a few Paleolithic sites in the south of France and in eastern Spain suggests that this species may have been sporadically available on the Mediterranean shore during the Upper Pleistocene (Cataliotti-Valdina 1984; Jorda Pardo et al. 2010; Taborin 1993). The other gastropods, scaphopods, and bivalves identified in the material of Peyrazet are present on the Atlantic coast as well as the Mediterranean shore (Poppe and Goto 1993). Gastropods belonging to the genus *Trivia* can be attributed to the species *Trivia monacha* or *Trivia artica*. The two species can be distinguished based on their natural ornamentation, however, these natural surface features are rarely

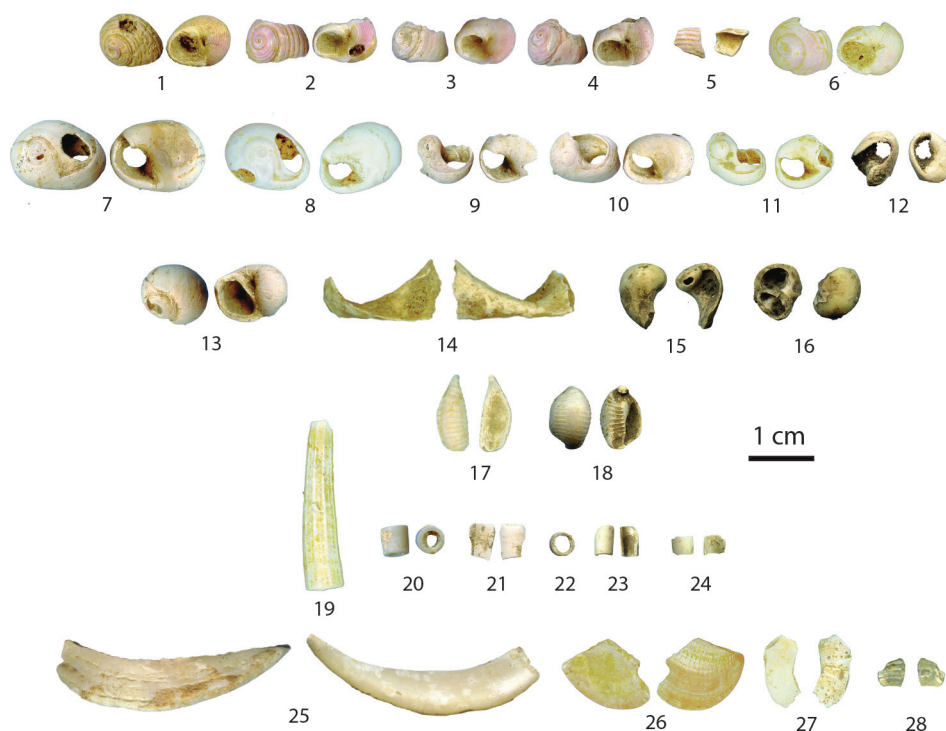


Figure 2. Photos of the ventral and dorsal sides of the shells and fragments of shells identified to the Upper Magdalenian at Peyrazet.

preserved in archaeological context. Surface alterations and the degree of fragmentation of the *Dentalium* sp. also prevent species identification. Most of the shells identified at Peyrazet are intertidal species, except for *Dentalium* sp. and *Glycymeris glycymeris*, which are deep-water shells.

TAPHONOMICAL AND FUNCTIONAL ANALYSIS OF SHELLS

The bivalves are highly fragmented and no anthropogenic modification was visible on their surface. One *Cyclope* sp. shows a moon shape perforation close to the first spire whorl resulting from the abrasion of the surface by surf action (Figure 3a). Small dissolution pits are also present on the surface attesting to the predation of the shells by a *Porifera*. These modifications indicate that the shell was collected within a thanatocoenosis. Two *Cyclope* sp. show a circular dorsal perforation (see Figure 3). Micro removals surrounding the perforation edge show that the shells were perforated by pressure from the inside of the aperture. One shell is extremely well preserved and shows a use wear facet on the ventral side close to the aperture, indicating it was suspended before it was discarded at the site (Figure 3c). The other *Cyclope* sp. show a large invasive dorsal perforation. Multiple irregular breakages along the edges of these perforations result from post-depositional processes and prevents identification of how the perforations were made.

Four *Homalopoma sanguineum* are perforated on the dorsal side. The circular shape of the perforation and the micro-removals on the edge indicate that these shells were perforated by pressure from the inside of the aperture (Figure 4). The fifth *Homalopoma sanguineum* shows a large in-

vasive dorsal perforation with multiple irregular breakages on the edge, resulting from post-depositional alterations. No use wear was identified on the shells.

One specimen of *Littorina obtusata* is nearly intact with only a few millimeters missing at the edge of the aperture due to post-depositional alterations. The shell is not perforated and does not show any anthropogenic modification (see Figure 2). The remaining *Littorina obtusata* are highly fragmented. Two fragments of *Trivium* sp. are present in the collection. The vestige of a dorsal perforation is visible on one fragment and a use wear facet, which has erased the ribs naturally present on the surface of the shell, flattens the dorsal side (Figure 5). The use wear on this shell indicates that it was used and suspended before being discarded at the site.

The level of fragmentation has prevented any measurement on all *Dentalium* sp. but four. Two pieces are shorter than the smallest scaphopods of the modern and fossil reference collections. The length of another specimen falls within the size variability of the fossil reference collections and the biggest shell falls within the variability of both the modern and fossil reference collections (Figure 6). The scaphopods of Peyrazet present irregular extremities, including rounded ends, as well as straight and irregular fractures (following the classification of Vanhaeren and d'Errico 2001), which do not correspond to natural intact extremities (see Figure 6).

MAMMAL TEETH: IDENTIFICATION AND MINIMAL NUMBER OF INDIVIDUALS

The teeth used in the manufacture of personal ornaments

TABLE 1. SHELLS COLLECTED WITHIN THE UPPER MAGDALENIAN OCCUPATION OF PEYRAZET.*

Year	Square	1/4 m ²	Layer	n° ID	Material	Identification*	Modification	Figure
2011	M5	A	4	sieve	Shell	<i>Dentalium</i> sp.	frag.	Fig. 1, 23
2011	N6	B	4	sieve	Shell	<i>Littorina obtusta</i>	frag.	Fig. 1, 15
2011	N6	B	4	sieve	Shell	<i>Littorina obtusta</i>	frag.	Fig. 1, 16
2011	K9	D	6	14	Shell	<i>Glycymeris glycymeris</i>	frag.	Fig. 1, 25
2011	M4	B	4	sieve	Shell	<i>Dentalium</i> sp.	frag.	Fig. 1, 24
2011	N6	A	4	sieve	Shell	<i>Trivia</i> sp.	frag.	Fig. 1, 18
2011	M6	A	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 12
2012	L6	A	4	sieve	Shell	<i>Dentalium</i> sp.	frag.	Fig. 1, 20
2012	L6	A	4	sieve	Shell	<i>Dentalium</i> sp.	frag.	Fig. 1, 21
2012	M6	A	4	sieve	Shell	<i>Dentalium</i> sp.	frag.	Fig. 1, 22
2012	L4	B	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 7
2012	L6	C	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 9
2012	L6	C	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 10
2012	L6	A	4	sieve	Shell	<i>Homalopoma sanguineum</i>	perfo.	Fig. 1, 3
2012	L6	C	4	sieve	Shell	<i>Homalopoma sanguineum</i>	perfo.	Fig. 1, 4
2012	M5	A	4	sieve	Shell	<i>Homalopoma sanguineum</i>	perfo.	Fig. 1, 2
2012	M5	B	4	sieve	Shell	<i>Homalopoma sanguineum</i>	perfo.	Fig. 1, 1
2012	M6	C	4	sieve	Shell	<i>Homalopoma sanguineum</i>	frag.	Fig. 1, 5
2012	N6	D	4	sieve	Shell	<i>Littorina obtusta</i>	intact	Fig. 1, 13
2014	K5	B	5	sieve	Shell	indet	frag.	Fig. 1, 27
2014	L5	A	4	sieve	Shell	indet	frag.	Fig. 1, 14
2014	K5	B	4	sieve	Shell	<i>Trivia</i> sp.	frag.	Fig. 1, 17
2013	K8	D	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 8
2013	L5	B	4	sieve	Shell	<i>Homalopoma sanguineum</i>	perfo.	Fig. 1, 6
2013	L6	A	4	sieve	Shell	<i>Cyclope</i> sp.	perfo.	Fig. 1, 11
2013	L6	C	4	sieve	Shell	Bivalve indet	frag.	Fig. 1, 26
2013	L6	D	4	sieve	Shell	<i>Dentalium</i> sp.	.	Fig. 1, 19
2013	K6	D	4	sieve	Shell	<i>Homalopoma sanguineum</i>	frag.	.
2013	K6	D	4	sieve	Shell	<i>Homalopoma sanguineum</i>	frag.	.
2013	K8	D	5	sieve	Shell	indet	frag.	.
2013	K8	A	4	sieve	Shell	<i>Littorina</i> sp.	frag.	.
2009	L5	D	4	sieve	Shell	indet	frag.	Fig. 1, 28

*frag: fragment; perfo: perforated.

were acquired from three species—red deer (n=2), reindeer (n=22), and chamois (n=13). Ten modified teeth cannot be clearly attributed to reindeer or chamois due to the advanced wear or absence of the crown (Table 2), while thirty-three teeth do not show any modification.

Systematic pairing of the teeth shows that the teeth were extracted from 12 reindeers, 4 chamois and 2 red deers (Costamagno et al. 2018). Morphological criteria registered on the red deer canines indicate that the teeth were extract-

ed from two adult stags, one of them relatively young and the other older.

MAMMAL TEETH: TAPHONOMICAL AND FUNCTIONAL ANALYSIS

The two red deer canines are perforated on the root (Figure 7a). The canine extracted from the young stag shows biotic and abiotic alterations on the surface, preventing detailed technical analysis (Figure 8a). Alterations include the slight

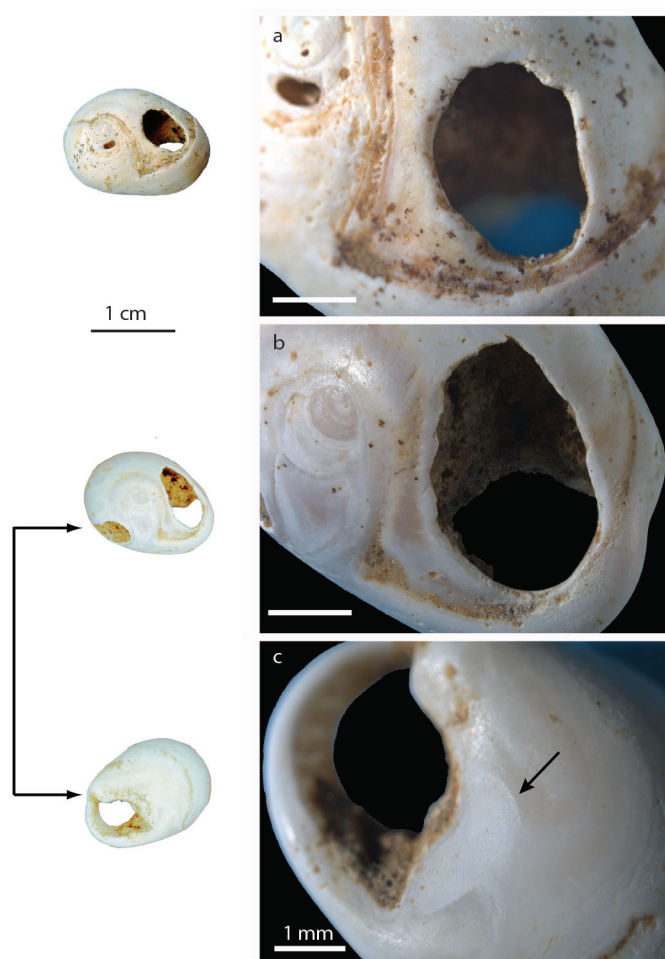


Figure 3. Anthropogenic perforations (a, b) and use-wear (c) observed on the *Clyclope* sp.

erosion of the surface and dissolution pits. Nevertheless, circular striations are still visible on the edge of the perforation, indicating the perforation was made by the rotation of a lithic point (see Figure 8c). A red residue is visible on the apical edge of the perforation.

The canine extracted from the older stag is better preserved. The lingual and vestibular sides of the root are covered with long striations parallel to the main axis of the teeth. The striations indicate that both sides were scraped with a sharp lithic cutting edge (see Figure 8h). The edge of the perforation is abrupt and covered with circular striations showing the root was perforated by bifacial rotation with a lithic point (see Figure 8d, e). Rotation traces cross-cut the scraping striations, indicating that the scraping technique was used to prepare the root before its perforation. The apex of the root is absent, and the root is shorter than usually observed on red deer canines. Microscopic analysis shows that a vestigial hemi-perforation is present on the extremity of the root (see Figure 8f). The perforation is smooth, shiny, and no rotation traces are visible, suggesting that the perforation was heavily used. The top of the root is covered with straight striations perpendicular to the main axis of the tooth. The striations extend from one side

to the other side of the perforation and cross-cut the longitudinal scraping traces resulting from the shaping of the root (see Figure 8g). These overlapping modifications indicate that the root has been perforated close to the neck of the tooth. Next, the apical part of the root was cut in order to remove the first perforation, which had probably either weakened or broken from advanced use. A red residue is visible inside the vestigial perforation (see Figure 8f) and below the second perforation (see Figure 8h).

Thirty-three reindeer and chamois incisors and canines are intact and do not show any anthropic modifications. Two reindeer incisors show a deep groove, perpendicular to the main axis of the tooth, on the vestibular side of the root close to the neck (see Figure 7b 1, 3). The groove is covered with multiple thin striations indicating that a cutting tool was used to make the incision (see Figure 9g). The root is absent or shortened on 31 reindeer and chamois incisors and canines. The breakage sections are oblique and the vestibular part of the section is covered with thin cut marks (Figure 9). The shape of the breakage (see Figure 9a, b, i, p) and the systematic absence of cut marks on the lingual side (see Figure 9a, b, p) indicate that the roots were removed by flexion after the cutting of the vestibular side of the roots. The root is absent on 12 other teeth and no cut marks are visible on the roots. However, the location and orientation of the breakage section suggest that the same technique was used to remove the roots. Two sets of paired reindeer incisors are composed of one incisor simply grooved on the vestibular side of the root and one incisor which has been cut on the vestibular side and broken by flexion (see Figure 7b 1, 2 and 3, 4).

DISCUSSION

SHELL ACQUISITION

Dentals and bivalves of the genus *Glycymeris* are deep-water species, but can be easily found in natural shell accumulations on sheltered beaches. The presence of deep-water species in the assemblage associated to one *Clyclope* sp. showing traces of bio-erosion indicates that the shells were collected within thanatocoenoses. Some 15,000 years ago, the sea level was 100 meters below the modern coastline (Lambeck and Bard 2000; Lambeck et al. 2014), positioning Peyrazet more than 300km away from the Atlantic and Mediterranean shores. The distance of the site from the coastline indicates that the acquisition of the shells, either direct or indirect, relied on a large circulation network extending over several hundred kilometers, to the west and southeast.

Raw materials (Langlais and Laroulandie 2014) used for flint tool production at Peyrazet were mainly locally acquired. Other exogenous siliceous materials, carried as tool blanks, represent less than 5% of the production, and were acquired no more than 200km to the northwest of the site (outcrops in Charentes). The movements and networks devoted to the acquisition of this exogenous raw materials from the northwest may have facilitated the acquisition of the Atlantic shells. The acquisition of Mediterranean shells,

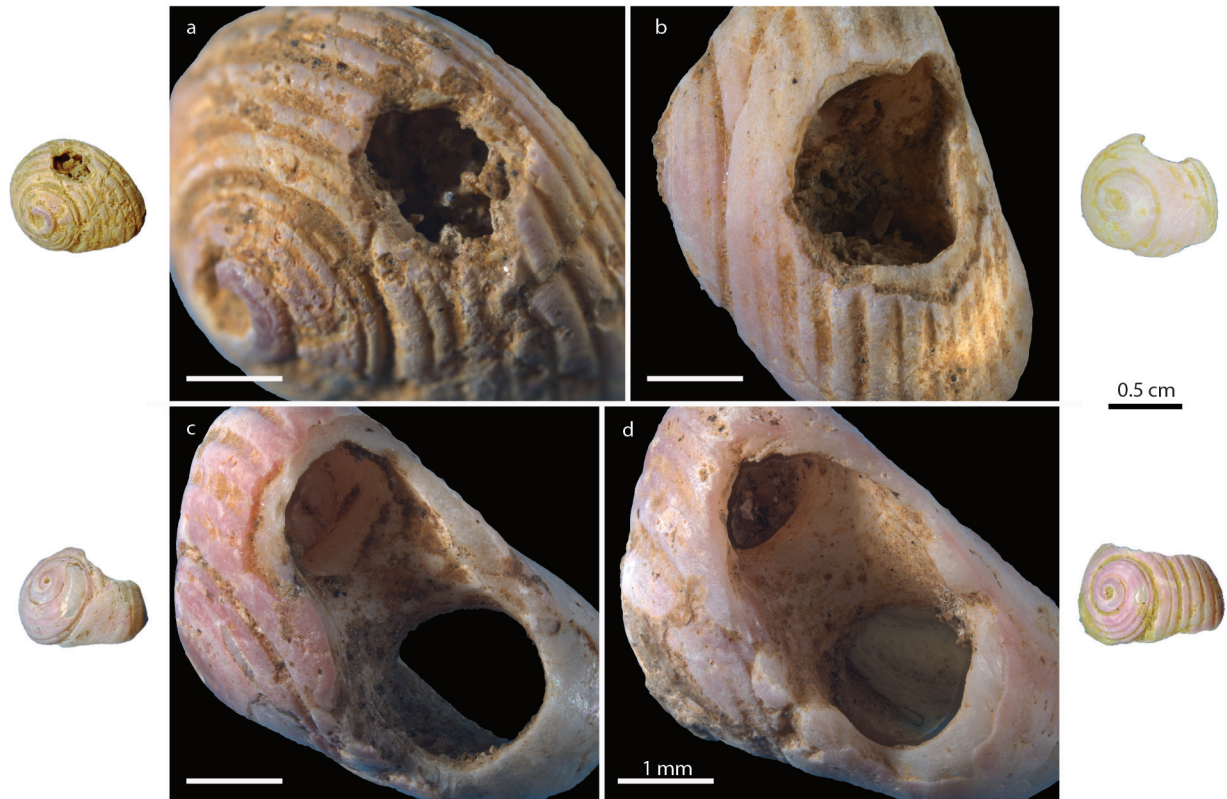


Figure 4. Anthropogenic perforations of the *Homalopoma sanguineum*.

however, had no connection to the procurement and production of stone tools at the site, and instead was related to an alternative contact network.

SELECTION, TRANSFORMATION, AND USE OF THE SHELLS

The presence of one unmodified *Littorina obtusata* indicates that some of the shells were not transformed prior to their introduction at the site. The other Atlantic shells present various states of fragmentation, including very small frag-

ments of tusk shells with irregular fractures on the extremities. Similar fractures are observed on the scaphopods from the modern and fossil reference (Vanhaeren and d'Errico 2001). Experimental data also indicate that very small fragments of tusk shell with irregular extremities are obtained during sewing. The breakage of the smaller proximal extremity of the *Dentalium* occurs with the use of a needle too large to slip into the tusk shells (Vanhaeren 2002). The presence of the full manufacture sequence of bone needles at the site, including finished and worn needles, confirms that

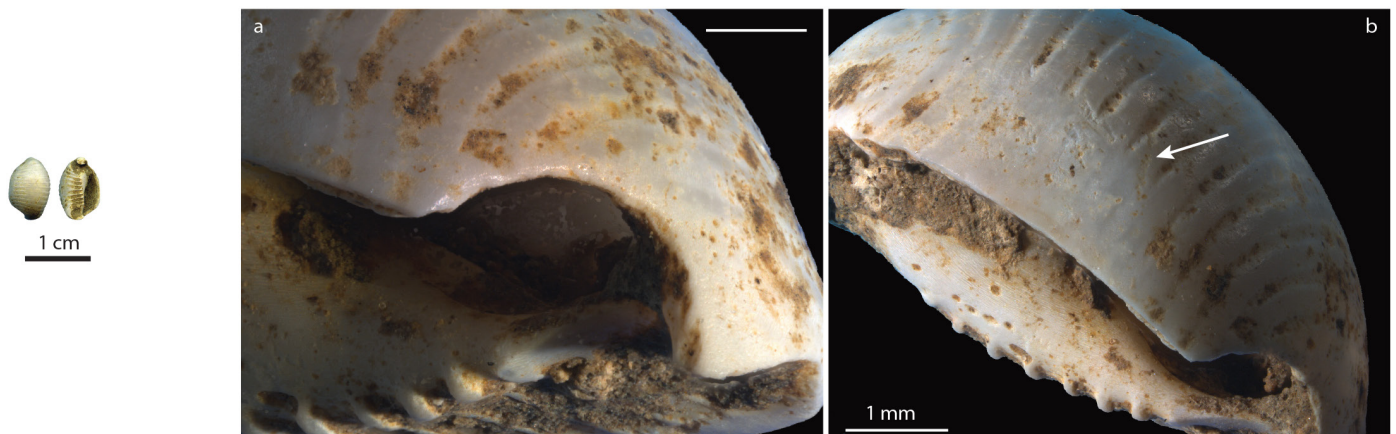


Figure 5. Anthropogenic perforations of the *Trivia* sp. (a) and use wear on the lateral side of the shell (b).

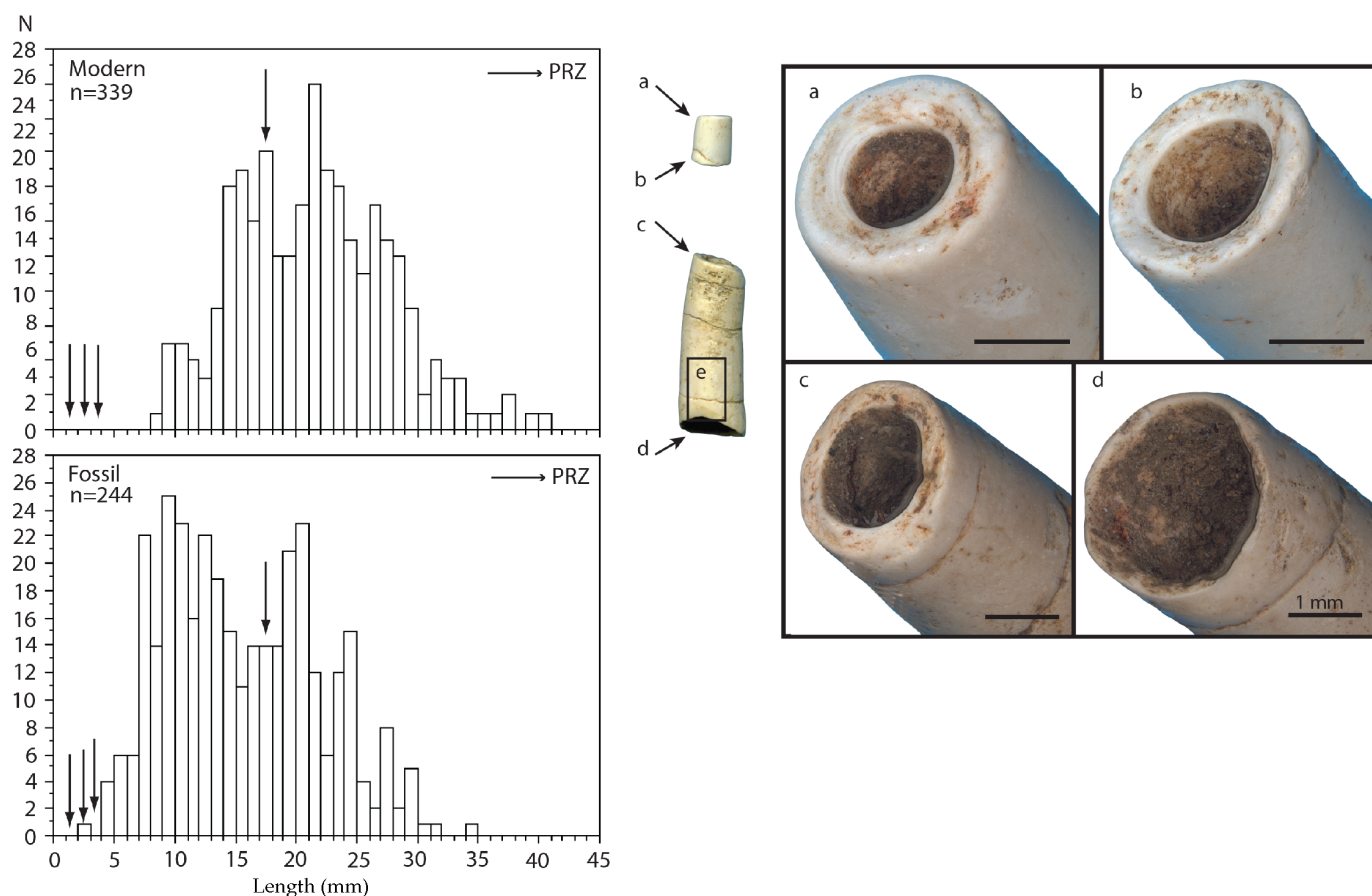


Figure 6. Histogram of the length of the scaphopods from the modern and fossil reference collections and photos of the extremities of two specimens. Arrows visible on the histogram indicate the measurement registered on the scaphopods of Peyrazet.

sewing was performed at the site (Costamagno et al. 2018).

The production and use of bone needles at the site, and the introduction of at least one intact and unperforated *Littorina obtusata*, suggests that shell beads may have been manufactured at the site. Post-depositional processes may explain the high level of fragmentation of most of the shells, but accidental breakage during perforation and sewing cannot be excluded.

One *Trivia* sp. and the Mediterranean shells were already transformed into personal ornament and used before abandonment at the site. The *Trivia* sp. and the Mediterranean shell beads may have been accidentally lost during their use at the site, or alternatively, destined to be recycled in new beadwork created at the site.

TEETH ACQUISITION

The faunal spectrum identified for the Level 4 of Peyrazet is largely dominated by reindeer, while red deer is scarce (Costamagno et al. 2018) (Figure 10). Regional bio-stratigraphic and chronological data show similar faunal spectra at other contemporaneous sites in the area (Costamagno et al. 2016; Langlais et al. 2014), indicating that red deer was not frequent in the direct vicinity of the site during the Upper Magdalenian. The intense use-wear observed on one of the red deer canines along with evidence of its repair sug-

gest that the canine was used as a bead long before its discard at the site. Evidence of restoration of the canine attests to the specific technical strategies developed by the Magdalenian craftsmen in order to extend the duration of use of bead types made of raw materials not easily available.

Phalanges and teeth, mostly incisors, dominate the reindeer skeletal profile. Chamois incisors also are overrepresented. These profiles indicate a preferential introduction of chamois and reindeer labial teeth, accumulated during off-site carcass processing (Costamagno et al. 2018).

SELECTION, TRANSFORMATION, AND USE OF THE TEETH

Reindeer and chamois labial teeth found at the site were similarly transformed. Anthropogenic modifications observed on the teeth include labial incision of the roots and, in some cases, the breakage of the root by flexion. The analysis does not identify any obvious system of suspension such as perforation. Historical examples of ornaments made from reindeer incisors and canines have been documented in different contexts. Two configurations are described: the incisors are sewn individually on a material and held by a string passing over the root (Figure 11b) or alternatively, the labial teeth are extracted from the mandible as a whole, still attached to the gingival ligament which is preserved

TABLE 2. LABIAL TEETH IDENTIFIED WITHIN THE UPPER MAGDALENIAN OCCUPATION OF PEYRAZET.*

Year	Square	1/4 m ²	Layer	n° ID	Material	Identification*	Modification	Figure
2009	L5	D	4	95	Tooth	C red deer	perfo.	Fig. 6A, 1
2012	L4	C	4	100	Tooth	C red deer	perfo.	Fig. 6A, 2
2009	L5	A	4	10036 (sieve)	Tooth	I reindeer	flex.	Fig. 6B, 20
2009	L5	A	4	10037 (sieve)	Tooth	I reindeer	flex.	Fig. 6B, 9
2009	L5	B	4	10038 (sieve)	Tooth	I reindeer	flex.	.
2011	L4	C	4	sieve	Tooth	I reindeer	flex.	Fig. 6B, 11
2011	M5	B	4	sieve	Tooth	I reindeer	flex.	Fig. 6B, 19
2011	M6	C	4	sieve	Tooth	I reindeer	flex.	Fig. 6B, 8
2011	M6	D	4	(sieve) 10138	Tooth	I reindeer	flex.	Fig. 6B, 7
2011	N6	C	4	(sieve) 10151	Tooth	I reindeer	flex.	Fig. 6B, 21
2012	K4	C	4	10342	Tooth	I ₃ D reindeer	flex.	Fig. 6B, 16
2012	L4	B	4	10342	Tooth	I ₂ D reindeer	flex.	Fig. 6B, 15
2012	L4	B	4	sieve	Tooth	I reindeer or chamois	?	Fig. 6B, 41
2012	L5	A	4	sieve	Tooth	I ₄ D reindeer	flex.	Fig. 6B, 17
2012	L5	B	4	sieve	Tooth	I ₂ D reindeer	flex.	Fig. 6B, 6
2012	L5	C	4	sieve	Tooth	I ₂ D reindeer	flex.	Fig. 6B, 13
2012	L5	C	4	sieve	Tooth	I ₂ D reindeer	flex.	Fig. 6B, 13'
2012	L5	C	4	sieve	Tooth	I reindeer or chamois	.	.
2012	L5	D	4	sieve	Tooth	I reindeer or chamois	intact	Fig. 6B, 53
2012	L5	D	4	sieve	Tooth	I reindeer or chamois	?	Fig. 6B, 39
2012	L6	B	4	sieve	Tooth	dI ₄ D chamois ?	flex.	Fig. 6B, 30
2012	L6	C	4	sieve	Tooth	dI ₄ G chamois ?	flex.	Fig. 6B, 31
2012	L6	C	4	510	Tooth	I ₂ G reindeer	incis.	Fig. 6B, 1
2012	L6	C	4	sieve	Tooth	I ₄ G chamois	flex.	Fig. 6B, 33'
2012	L6	C	4	sieve	Tooth	I ₄ G chamois	flex.	Fig. 6B, 33
2012	L6	C	4	sieve	Tooth	dI ₄ D chamois ?	flex.	Fig. 6B, 32
2012	M4	B	4	sieve	Tooth	I reindeer or chamois	?	Fig. 6B, 40
2012	M5	A	4	sieve	Tooth	I G reindeer or Isar ?	?	Fig. 6B, 38
2012	M5	C	4	669	Tooth	I ₄ D reindeer	?	Fig. 6B, 5
2012	M6	B	4	507	Tooth	I ₃ D reindeer	flex.	Fig. 6B, 4
2012	M6	B	4	sieve	Tooth	dI ₃ G chamois ?	flex.	Fig. 6B, 29
2012	M6	B	4	10337	Tooth	I ₃ D reindeer	flex.	Fig. 6B, 14
2012	M6	C	4	10339	Tooth	I ₂ D reindeer	flex.	Fig. 6B, 2
2012	M7	A	4	1	Tooth	I ₃ G reindeer	incis.	Fig. 6B, 3
2012	N5	A	4	10358	Tooth	I ₂ D reindeer	intact	Fig. 6B, 46
2012	L6	B	4	616	Tooth	I ₂ D chamois	flex.	Fig. 6B, 26
2012	L6	C	4	515	Tooth	I ₃ D chamois	?	Fig. 6B, 28
2012	L6		4	10351	Tooth	I ₃ D chamois	flex.	Fig. 6B, 27
2012	L6	D	4	10349	Tooth	I ₂ D chamois	?	Fig. 6B, 26
2012	L6	D	4	581	Tooth	I ₁ D chamois	flex.	Fig. 6B, 22
2012	M6	A	4	sieve	Tooth	I ₁ G chamois	flex.	Fig. 6B, 24
2012	M6	A	4	10350	Tooth	I ₁ D chamois	flex.	Fig. 6B, 25

TABLE 2. LABIAL TEETH IDENTIFIED WITHIN THE UPPER MAGDALENIAN OCCUPATION OF PEYRAZET (continued)*

Year	Square	1/4 m ²	Layer	n° ID	Material	Identification*	Modification	Figure
2013	L6	B	4	10866	Tooth	I mam. indet	intact	Fig. 6B, 55
2013	L5	B	4	10861	Tooth	I2 reindeer	flex.	Fig. 6B, 10
2013	L6	D	4	10864	Tooth	I mam. indet	intact	Fig. 6B, 60
2013	L5	B	4	10863	Tooth	I mam. indet	?	Fig. 6B, 44
2013	L6	B	4	10862	Tooth	I mam. indet	?	Fig. 6B, 43
2013	L5	B	4	10834	Tooth	I mam. indet	intact	Fig. 6B, 56
2014	L6	B	5	11022	Tooth	I mam. indet	intact	Fig. 6B, 58
2014	K7	D	4	259	Tooth	I2 reindeer	intact	Fig. 6B, 48
2014	L6	C	5	11026	Tooth	C /I3D reindeer	intact	Fig. 6B, 47
2014	K9	D	5	sieve	Tooth	dC Chamois	?	Fig. 6B, 45
2014	K9	D	5	sieve	Tooth	dI3 Chamois	flex.	Fig. 6B, 36
2014	K9	D	5	sieve	Tooth	I mam. Indet	?	Fig. 6B, 42
2014	K9	D	5	sieve	Tooth	I mam. indet	?	Fig. 6B, 37
2014	K5	B	5	11054	Tooth	I mam. indet	intact	Fig. 6B, 50
2014	K5	C	5	11101	Tooth	I mam. indet	intact	Fig. 6B, 62
2014	L6	D	5	11028	Tooth	I mam. indet	intact	Fig. 6B, 49
2014	K5	C	5	11060	Tooth	I mam. indet	intact	Fig. 6B, 51
2014	K6	C	5	11060	Tooth	I mam. indet	intact	Fig. 6B, 59
2014	K7	D	4	11060	Tooth	I mam. indet	intact	Fig. 6B, 61
2014	L6	B	5	11023	Tooth	I mam. indet	intact	Fig. 6B, 63
2014	L5	A	5	11071	Tooth	I mam. indet	intact	Fig. 6B, 54
2014	L5	A	5	11071	Tooth	I mam. indet	intact	Fig. 6B, 64
2014	K5	D	5	92	Tooth	C/I3G reindeer	intact	Fig. 6B, 52
2014	L6	D	5	747	Tooth	I mam. indet	flex.	Fig. 6B, 35
2014	K5	A	4	11089	Tooth	CD reindeer	flex.	Fig. 6B, 18
2014	K7	C	4	11087	Tooth	CD reindeer	flex.	Fig. 6B, 12
2014	K6	D	5	11090	Tooth	I mam. indet	intact	Fig. 6B, 57
2014	K8	C	4	11088	Tooth	dC chamoix	flex.	Fig. 6B, 34
2015	K6A	gole fane rac	5		Tooth	I mam. Indet	intact	.
2013	L5	B	5		Tooth	I mam. Indet	intact	.
1991	HS	.	4.6		Tooth	I mam. Indet	intact	.
1991			4		Tooth	I mam. Indet	intact	.
2012	L6	C	4	10341	Tooth	I mam. Indet	intact	.
2015	K7	C	5		Tooth	I mam. Indet	intact	.
2011	N63		4	412	Tooth	I mam. Indet	intact	.
2012	L6	C	4	10287	Tooth	I mam. Indet	intact	.
2012	L6	C	5	606	Tooth	I mam. Indet	intact	.
2012	L6	D	5	622	Tooth	I mam. Indet	intact	.
2012	L6	C	5	604	Tooth	I mam. Indet	intact	.
2012	L6	C	5	594	Tooth	I mam. Indet	intact	.

TABLE 2. LABIAL TEETH IDENTIFIED WITHIN THE UPPER MAGDALENIAN OCCUPATION OF PEYRAZET (continued)*

Year	Square	1/4 m ²	Layer	n° ID	Material	Identification*	Modification	Figure
2012	L6	D	5	591	Tooth	I mam. Indet	intact	.
2012	L6	C	5	605	Tooth	I mam. Indet	intact	.

*"Mam. Indet." is used when the level of modification of the tooth prevents the taxonomic attribution to reindeer or to chamois. flex: breakage by flexion; perfo: perforated; I: incisor; C: Canine; d: decidual ; ?: anthropogenic breakage is suspected but technological evidence unclear. The artifacts labeled 10037–10038, and corresponding to photos 6B, 13–13' and 6B, 33–33', are respectively two fragments of the same teeth.

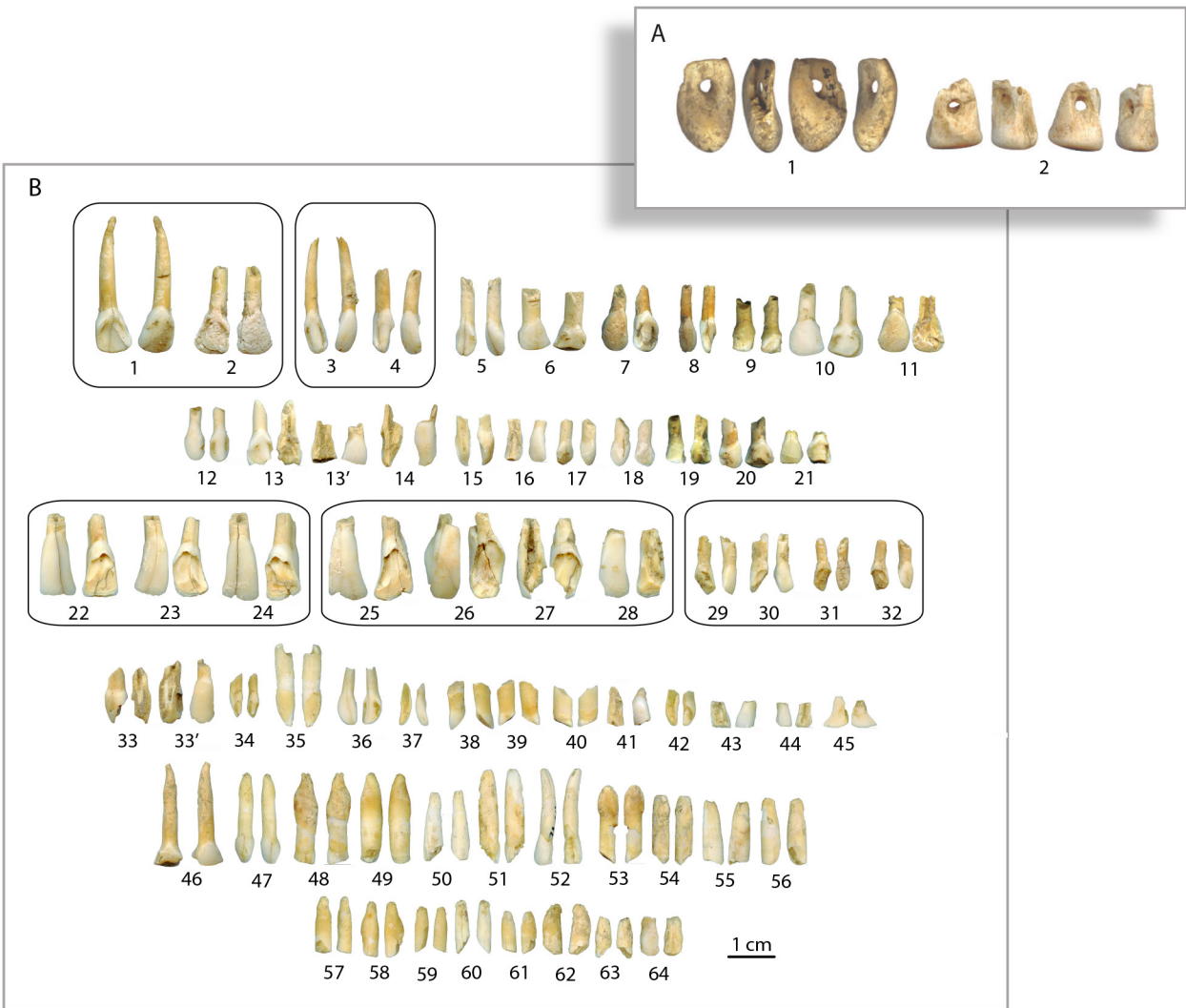


Figure 7. Photos of the personal ornaments made of teeth identified within the Upper Magdalenian of Peyrazet: a) red deer canines; b) reindeer labial teeth (1–24, 32–37, 49), chamois labial teeth (25–31), labial teeth without taxonomic attribution (38–48, 50–64). Paired teeth are outlined in black, duplicated numbers identify fragments of the same tooth.

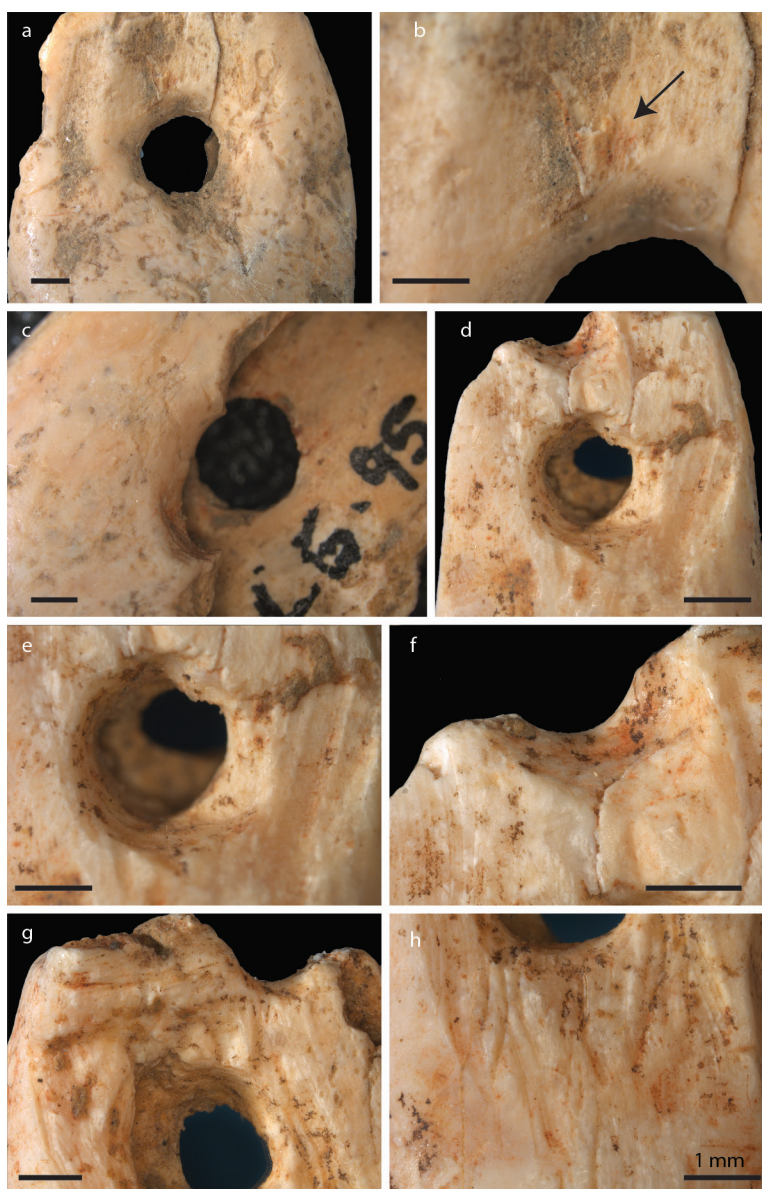


Figure 8. Anthropic modifications observed on the perforated red deer canines: a-c) modifications recorded on the canine n°1 of Figure 6a, d-h) modifications recorded on the canine n°2 of Figure 6a. Perforations made by the rotation of a lithic point (a, c, d, e), red pigment (b, f, h), perforation showing heavy use-wear and evidence of its removal by sawing, transversal striations resulting from the sawing of the root (g), striations resulting from the scraping of the root (h).

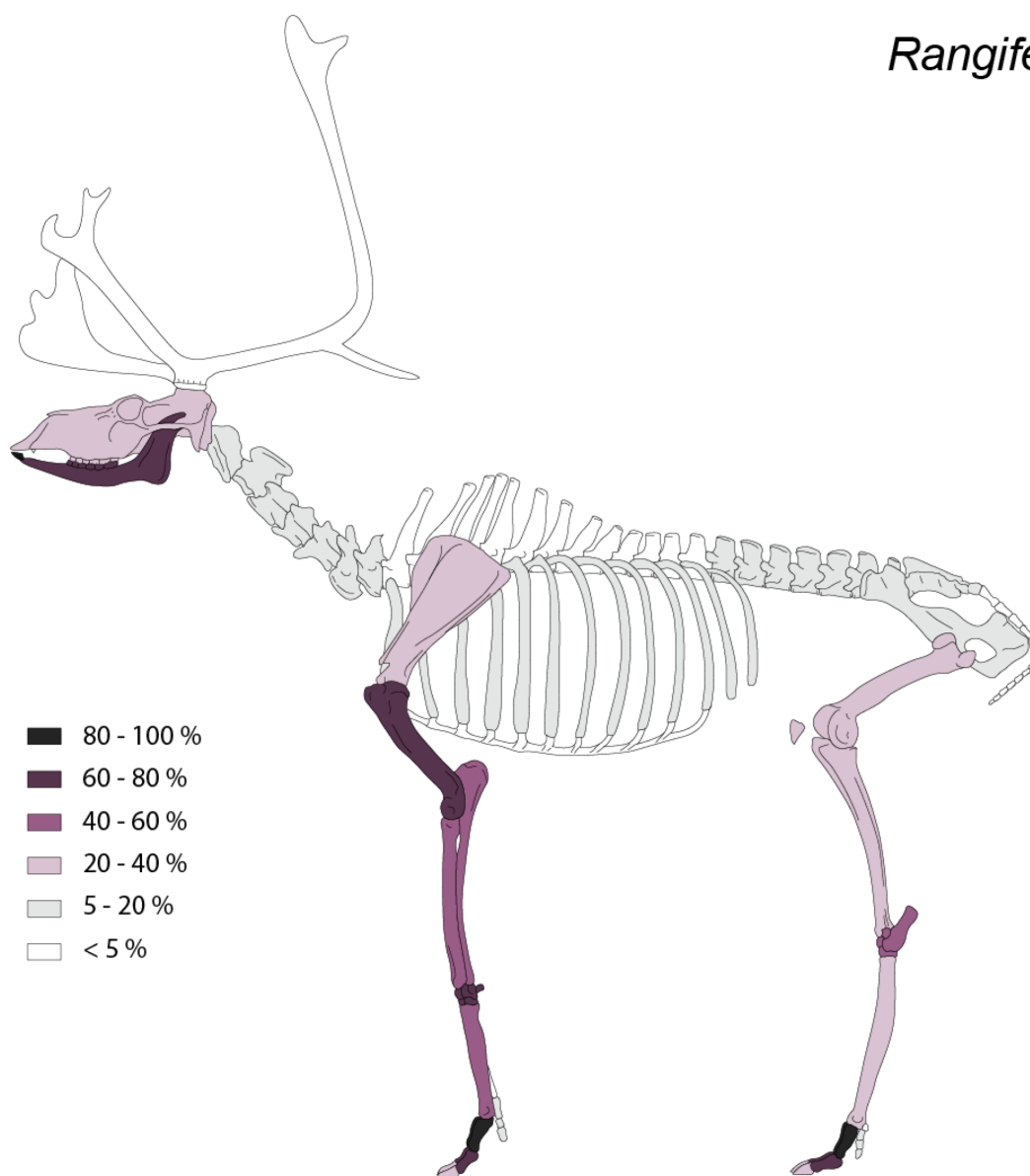
and dried to suspend complete rows of labial teeth (see Figure 11a). In some cases, the roots can be accidentally broken during the extraction (see Figure 11a) or cut and fractured voluntarily to regularize the set of teeth. The presence at Peyrazet of several sets of labial teeth extracted from the same animals supports the hypothesis of the removal of the teeth still attached to the gingival ligament. Consequently, labial incisions result from the cutting of the gingiva. The presence at the site of intact and fractured roots belonging to the same pair of teeth (see Figure 7) suggests accidental breakages during extraction. Reindeer and chamois labial teeth used to make beads do not show any evidence of their use prior to their introduction at the site.

REGIONAL COMPARISONS

The shell species identified at Peyrazet are relatively ubiquitous within Upper Magdalenian occupations (Figure 12). *Littorina obtusata*, dentals, *Cerastoderma* sp., and *Glycymeris* sp. are widespread in southwestern France and northern Iberia (Álvarez Fernández 2006; O'Hara 2017; Taborin 1993). The *Trivvia* sp. are present at six archaeological sites located in northern Spain and southwestern France (Álvarez Fernández 2006; Taborin 1993). The Mediterranean species *Cyclope* sp. and *Homalopoma sanguineum* are present at 17 Magdalenian deposits located in the north of Spain, southwestern France, Ain and southern Germany (Taborin 1985, 1993). Their distribution shows the existence of two major circulation routes at that time—one Rhone-Rhine



Figure 9. Anthropogenic modifications observed on the reindeer (a-n) and chamois (o-q) labial teeth.

Rangifer tarandus

Cédric Beauval and Michel Coutureau - © 2003 ArcheoZooorg
Modified after L. Fontana, Bull. Soc. prehis. fr. 1999.

Figure 10. Skeletal representation of reindeer elements attributed to the Upper Magdalenian at Peyrazet (modified after Costamagno et al. 2018).

route (Álvarez-Fernández 2001) and a corridor running between the northeastern Pyrenean foothills and the area west of the Massif Central. The acquisition of Mediterranean shell beads by the occupants of Peyrazet likely relied on the later.

Perforated red deer canines are ubiquitous throughout the Upper Paleolithic from northern Spain to southwestern France (Álvarez Fernández 2006; d'Errico and Rigaud 2011; Vanhaeren 2002). Previous studies have already documented the presence of incised labial teeth during the Middle and Upper Magdalenian (Poplin 1983). Reassessment of the dataset combined with new data shows their increased frequency during the Upper Magdalenian and their pres-

ence from Spain to Germany, and from the Atlantic area to the west of the Rhone valley. Incised labial teeth used for personal ornamentation mostly belong to reindeer and chamois, but red deer and bovinds also are represented (Berganza and Arribas 2010; Bonnissent and Chauvière 1999; Castel et al. 2005; Campmas et al. 2011; Desbrosse 1972; Kuntz et al. 2015; Jarry et al. 2017; Mallye et al. 2018; Poplin 1983). More rarely, and restricted to the Alpine region, marmot grooved incisors have also been recorded (Bullinger and Müller 2005).

SYNTHESIS AND SITE FUNCTION

In addition to the overrepresentation of reindeer labial

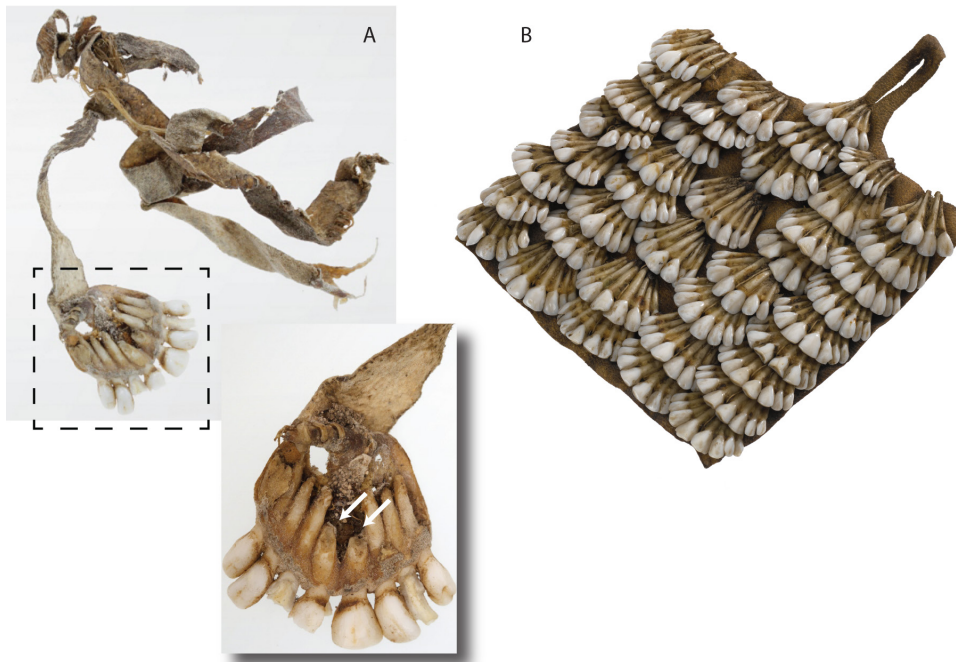


Figure 11. Modern traditional personal ornaments made of reindeer teeth: a) cloth ornament, 20th century, Arctic, Canada (inventory number ME982X.156, © McCord Museum), arrows indicate broken teeth with oblique fractures on the root similar to several teeth from Peyrazet, b) breast personal ornament, Nunavut, Hudson Bay, Southampton Island, Canada. (Brown C. collection, 1923 [inventory number A.1923.438, © National Museums Scotland]).

teeth, zooarchaeological data also indicate the overrepresentation of reindeer phalanxes, a phenomenon related to skin exploitation (Costamagno et al. 2018). The preferential introduction of the phalanxes at the site indicates that reindeer skins were processed elsewhere before their importation to the site. The intense production of bone needles is another particularity of the site. Analysis of the bone industry shows that the full reduction sequence of needle pro-

duction and use is present at the site. Moreover, needle production represents approximately 75% of the bone industry in the strict sense of the term (i.e., antler excluded), while the percentage of needles among osseous tools is higher than is usually observed at Magdalenian sites (Langlais and Laroulandie 2014). Bead manufacture is evidenced at the site and the bone industry and zooarchaeological data show that reindeer skins were likely sewn at the site. The

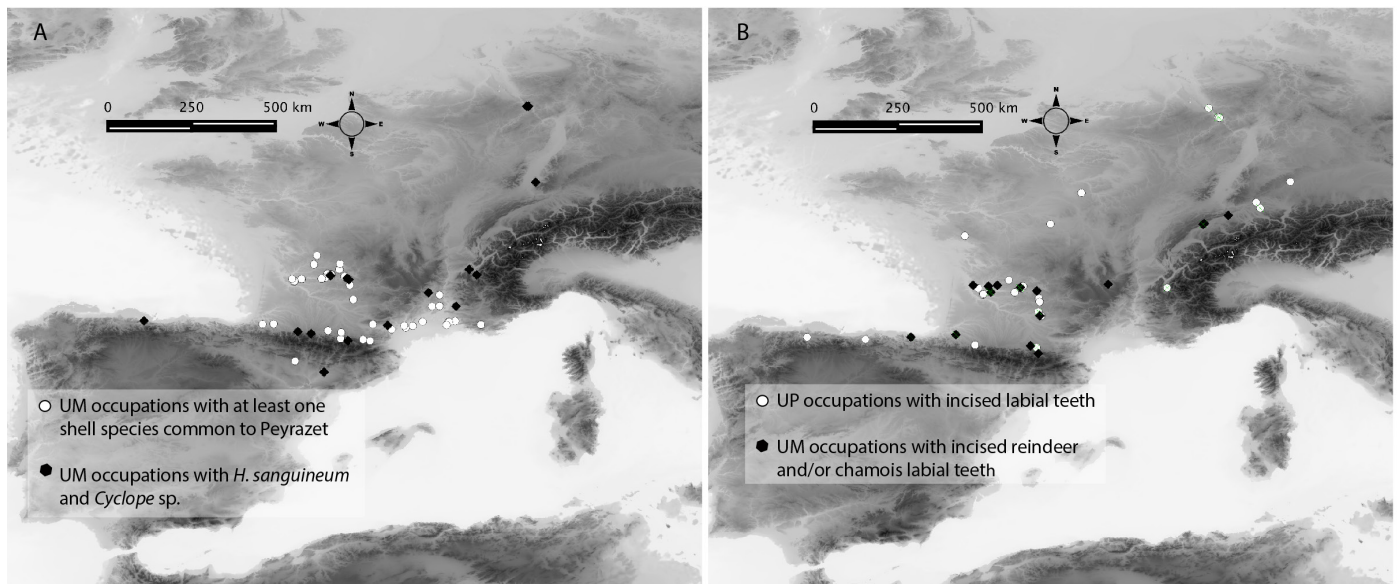


Figure 12. a) Location of the Upper Magdalenian occupations where at least one of the shell species common to Peyrazet has been recovered; b) location of the Upper Magdalenian occupations where incised labial teeth have been identified (I - incisors, C - canine).

Upper Magdalenian foragers occupied the southwest of France during the relatively cold Early Dryas/Bølling period. The use of large clothes made of reindeer skin, adapted for low temperatures, implies that beads arranged in bracelets and necklaces directly worn on the human skin were most of the time hidden. Because body ornaments are central to the creation of social and self-identity, their primary role is to be seen in order to transmit social and symbolic messages (Sciama and Eicher 1998). The sewing of the personal ornaments on garments made of reindeer skin likely contributed to their exposition, exactly as observed in modern traditional arctic societies (Brendan 2016). Our results support that a specialized activity dedicated to reindeer skin decoration was conducted at the site (Costamagno et al. 2018; Langlais and Laroulandie 2014).

The shell species selected for bead manufacture are naturally highly colorful and may have been arranged in multiple configurations. Their associations with reindeer and chamois teeth would have contributed to the various visual symbolic messages embroidered on the reindeer skins. The presence of similar bead types in a number of contemporaneous sites in the region indicates that Peyrazet belonged to a territory exploited by foraging communities who shared similar aesthetic standards during the Upper Magdalenian. Previous studies conducted at other Upper Magdalenian locations in the area rarely have evidence for bead manufacture (Taborin 1985, 1991, 1993, 1996). Beads are mostly found in low numbers and present anthropogenic modifications suggesting they were most likely introduced already used and accidentally lost at those sites. Preferential introduction and decoration of reindeer skin at Peyrazet also appears as an isolated case in the area. Without excluding that similar activities may have existed at other locations that have not been discovered yet, Peyrazet nevertheless attests to two categories of occupations within the territory, depending on whether or not bead manufacture and sewing were conducted at the site. The distribution and dispersal of personal ornaments throughout the area were dependent on the various movements of the Magdalenian foragers within the territory, combined with possible interpersonal gifting and exchange.

CONCLUSIONS

The preferential introduction of reindeer skins, and reindeer and chamois labial teeth ornaments, as well as the acquisition of exogenous shells through circulation networks, implies the gradual accumulation of raw materials off-site. Accumulating the various resources required for the decoration of the reindeer skins suggests a long-term scheduling of the symbolic production conducted at Peyrazet. The accumulation of raw materials from various origins, including outside the site's immediate vicinity, indicates the integration of the occupants of Peyrazet within a wide circulation network. Bead manufacture and skin decoration were performed at specific locations, indicating that the settlement pattern of the Magdalenian foragers present in the southwest of France 15,000 years ago also was ruled by social motivations related to symbolic productions.

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