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Ornamental traditions in the Eastern Adriatic: The Upper Palaeolithic and Mesolithic personal adornments from Vela Spila (Croatia)

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ABSTRACT

This paper advances the current knowledge on past foragers' ornamental traditions by comparing the Late Upper Palaeolithic and Mesolithic personal adornments from the southeastern Mediterranean, with a particular focus on the site of Vela Spila (Korčula island, Croatia). The assemblages we discuss here date from c. 19,500–8150 cal BP, with occupational evidence both before and after the Pleistocene–Holocene transition in the region. The assemblages from Vela Spila comprise one of the largest and richest records of prehistoric personal ornamentation in Southeastern Europe. Our analysis has allowed us to reconstruct changing traditions and technologies of social expression and symbolism in the Adriatic during a crucial period of social, technological, and environmental transition. In particular, our data reveal an apparent shift in ornamental traditions and technologies from the Late Palaeolithic, when diverse marine and terrestrial raw materials were collected and modified to make ornaments, to the Mesolithic, when a single marine gastropod was used exclusively. When these results are contextualised and compared across the Adriatic region, and, more broadly, at sites throughout southeastern Europe, Vela Spila appears unique in its significance as a procurement and processing centre for one important type of Mesolithic ornament, *Columbella rustica*. The repeatedly and exclusive selection of this marine gastropod to make ornaments during the Mesolithic seems to be a clue that it was fundamentally important for the construction and maintenance of identity and personhood.

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1 Introduction

Personal ornaments, used by most if not every contemporary human society, are widely recognized as non-verbal means of social communication. The anthropological record demonstrates that beads are used as "communication technologies" that mediate and facilitate a range of social interactions. Their visual appearance conveys and broadcasts different meanings (e.g. self-embellishment, objects to trade or exchange, markers of age, gender, or social status, signs of power, etc.) to both intimate and distant audiences (Kuhn and Stiner, 2007). Although the specific functions of ornaments vary across different human societies, their existence is widely interpreted as evidence of symbolic thinking.

This paper advances previous research by comparing the Late Upper Palaeolithic and Mesolithic personal ornaments from the southeastern Mediterranean, with a particular focus on the site of Vela Spila (Korčula island, Croatia). The ornamental assemblages from Vela Spila offer a unique opportunity to trace the evolution of symbolic technologies and expression across the pivotal Pleistocene–Holocene/Palaeolithic-Mesolithic transition in southeast Europe. We contend that studying the technological production of beads, and their subsequent use/display, is crucial to understanding the construction of social identities and relationships in both the present and the distant past. The Late Upper Palaeolithic and Mesolithic body ornaments from Vela Spila (Korčula island, Croatia, dating c. 19500–8150 cal BP) include perforated marine gastropods and bivalves and animal teeth. The material diversity and longevity of ornamental traditions at the site allow us to reconstruct changing traditions and technologies of social expression and symbolism in the Adriatic region spanning a crucial period of social, technological, and environmental transition. Our data reveal an apparent shift in ornamental traditions and technologies from the Late Palaeolithic, when diverse marine and terrestrial raw materials were collected and modified to make ornaments at Vela Spila, to the Mesolithic, when a single marine gastropod was used exclusively. Contextualising and comparing these results to the

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broader Adriatic region, and, more broadly, across southeastern Europe, Vela Spila appears unique in its significance as a procurement and processing centre for one important type of Mesolithic ornament, *Columbella rustica*: the repeatedly and exclusive selection of this marine gastropod to make ornaments during the Mesolithic seems to be a clue that it was fundamentally important for the construction and maintenance of identity and personhood.

2. Past research on personal ornaments

Over the past three decades, archaeological research has situated ornaments in a privileged position, highlighting their unique ability to shed light on the interplay between prehistoric cognition, society, symbolism, and technology. Many efforts to date the origin of human symbolism focus on identifying and dating the origin and evolution of "modern" human cognition—i.e. mental structures that facilitate self-awareness, metaphoric thinking, and creative expression. Beads are widely considered key archaeological evidence for modern cognition and symbolism (e.g., d'Errico and Stringer, 2011; Kuhn and Stiner, 2007; Vanhaeren et al., 2013; White, 2007; Zilhão et al., 2010). While the specific meanings of these earliest forms of human communication remain unknown, many archaeologists agree that the appearance and rapid adoption of beads may have been organic to the evolution and dispersal of Anatomically Modern Humans (AMH) and to their need to broadcast social information about the wearer's identity to larger groups of geographically dispersed but socially connected people (Kuhn and Stiner, 2007). However, other scholars question the efficacy of "rational/mental" approaches for understanding the nature of the human experience in the world (e.g., Gamble, 2007; Ingold, 2000; Rowlands, 2010). Studying beads only in relation to the earliest evidence and initial evolution of modern human cognition is limiting and potentially excludes consideration of the many social nuances in systems of ornamentation, including the intimate relationships between ornaments and human bodies (Miller, 2009). Chapman (2000) has contributed one effort to balance this fixation on beads and modern human cognition by adopting a more relational approach (following Gamble, 2007). Chapman (2000) considered necklaces (and, by extension, bracelets, dress-embroidery and ornamented objects) as "sets" of discrete elements grouped together; if fragmented and distributed across a social landscape, these individual elements could be used to build and mediate new social relationships (Chapman, 2000). Thus, beads are produced during common (social) activities (i.e., raw material procurement, manufacturing, etc.), through which they acquire social significance; this significance is extended to the people who wear, view, and share these artefacts.

Many scholars have noted the inherent connections between processes of producing and displaying symbolic material culture, such as ornaments, on the body, and the ways individual and group social identity and personhood are formed and transmitted (e.g., d'Errico et al., 2003; Kuhn and Stiner, 2007; Vanhaeren, 2009; White, 1992). The *chaîne opératoire*, which identifies the technologies of making, ways of using, and ultimate contexts and means of discarding or depositing ornaments, is the primary methodology most scholars use to study individual or group identities and traditions (e.g., Newell et al., 1990; Rigaud, 2011; Taborin, 1993; Vanhaeren and d'Errico, 2006). Yet, Perlès has underlined how ornaments may be better indicators of cultural continuities and stable worldviews than of social boundaries and variability, and she has cautioned that ornaments may operate on a different scale of change than other categories of material culture in specific regional sequences over time (Perlès, 2013: 296).

Despite their promising potential, interpreting early prehistoric beads and ornaments remains a challenge. They survive in limited quantities, especially in comparison to the far more abundant and ubiquitous lithic assemblages. One promising but under-utilised approach to the study of these relatively small assemblages is an intra-regional comparison that compares several different techno-complexes. In Europe, body ornaments became widespread c. 40,000 years ago (Vanhaeren and d'Errico, 2006, White, 2007). During the subsequent 30,000 years of the Upper Palaeolithic and extending into the subsequent Mesolithic, there are discernable regional patterns in the use of particular types of ornaments for body adornment, some of which persisted for several millennia (Vanhaeren and d'Errico, 2006). Despite the potential for cross-cultural comparisons, scholars have rarely endeavoured to compare these two periods to explore any links or transformations in tradition and technology.

3. Site background and excavation methodology

Vela Spila is a cave on the western end of Korčula Island, in the central Dalmatian archipelago, Croatia. Archaeological excavations were first conducted in 1951, and fieldwork continued under Božidar Čečuk (1974–1995), Dinko Radić (1996–2006), and Dinko Radić and Preston Miracle (2007–present). Vela Spila preserves evidence of a very long sequence of occupation from the Late Upper Palaeolithic (Epigravettian) through the Bronze Age; this paper focuses on personal ornaments and other symbolic material culture excavated from the oldest contexts, which are attributed to Epigravettian and Mesolithic technocomplexes.

Vela Spila consists of a single, large chamber approximately 50 m long, 30 wide, and 17 m high (Fig. 1). The cave formed in Cretaceous (Cenomanian) limestones, and the cave's entrance (4 m wide × 10 m high) faces southwest, overlooking the bay of Vela Luka, currently at 121 m above sea level. During the Late Pleistocene, corresponding with the Late Upper Palaeolithic occupation at Vela Spila, sea levels were as much as 120 m lower than today, so the bay would have been exposed land and the coastline would have been about 10 km away. As the sea level began to rise following the Last Glacial Maximum (LGM), the coastline moved closer to the cave, and from the beginning of the Holocene, there is an apparent transition in the archaeological material reflecting a shift to Mesolithic lifeways.

Pleistocene sediments have been systematically excavated in an area of about 20 square metres. Sediment excavated before 2006 was dry sieved using a 5 mm mesh, while all sediment excavated after 2006 (10 square metres) was wet sieved using a 3 mm mesh. The lowest unit (1 m thick) is archaeologically sterile and was deposited before *c.* 20,000 cal BP, probably at the time of the LGM. A series of horizons with abundant archaeological remains overlay the sterile layer; radiocarbon assays on charcoal and bone date these deposits from *c.* 19,500–14,500 cal BP. These horizons contain abundant lithic and organic Upper Palaeolithic remains that are typologically similar to well-known Epigravettian sites in the wider region (e.g., Crvena Stijena, Badanj, Kopačina, Šandalja, Paglicci Cave, etc.). Large vertebrate faunal remains are dominated by red deer (*Cervus elaphus*) and, less frequently, extinct half-ass (*Equus* cf. *hydruntinus*); other less abundant taxa include roe deer [*Capreolus capreolus*], aurochs/bison [*Bos/Bison*], wild boar [*Sus scrofa*], and hare [*Lepus* sp.]); taxa represented by only a few specimens include wolf [*Canis lupus*], lynx [*Felis lynx*], wild cat [*Felix silvestris*], fox [*Vulpes vulpes*], and hedgehog [*Erinaceus* sp.] (Spry-Marqués et al., in press). Smaller vertebrate remains (e.g., rodents, birds, bats, reptiles, fish) are not abundant in the Pleistocene layers.

The earliest Holocene contexts attributed to Mesolithic technocomplexes overlie these horizons. Radiocarbon dates from these layers range between *c.* 9350–8150 cal BP. Faunal remains from these layers include abundant marine taxa, including *Delphinidae* sp. (dolphin). The most frequent large terrestrial vertebrate faunal

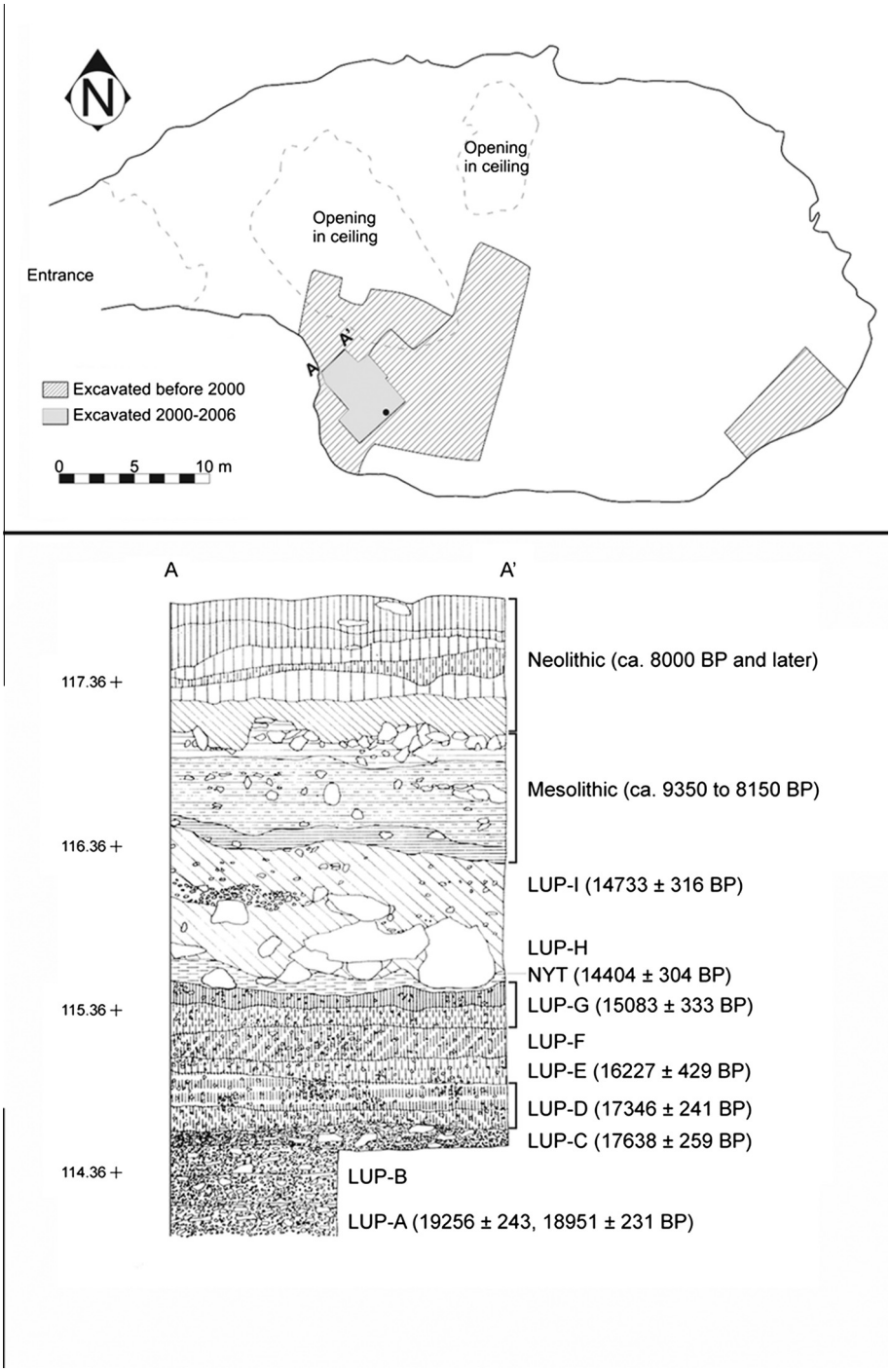

Fig. 1. (A) Plan of cave; (B) Archaeological profile.

remains are *Capreolus capreolus*, with *Vulpes vulpes* and *Erinaceus* sp. (hedgehog) also abundant in the assemblage (pers. comm. Siniša Radović, June 2013).

4. The prehistoric ornamental assemblage

We have analysed the entire assemblage of 361 ornaments and decorative artefacts recovered from late Upper Palaeolithic ($N = 23$) and Mesolithic ($N = 338$) horizons at Vela Spila to date (Fig. 2), but field-work and excavations are on-going. In the sections that follow, we summarise the results of technological, typological and contextual analyses. Subsequently, we will consider how the data from Vela Spila helps refine our understanding of the changing roles of personal ornamentation throughout prehistory in south-eastern Europe.

5. Methodology

Our methodology integrates metric, technological, and use-wear studies with taphonomic analyses of archaeological artefacts and compares these findings to objects made during experimental analyses. We examined archaeological ornaments microscopically at magnification ranging from 0.75 to 80X using a stereoscopic microscope Leica S8APO with fibre optic lighting. We recorded metric data in three general categories: (1) the dimensions of the ornaments (maximum length, width and thickness of the entire

Fig. 2. Selection of Upper Palaeolithic and Mesolithic ornaments from Vela Spila.

and fragmented artefacts); (2) the dimensions of the perforations (maximum length and width); and (3) the location of the perforations on the shells and red deer canines, with regard to the distance of the perforations from the artefacts' extremities.

Our technological and functional analysis of the Vela Spila ornaments builds upon previous analyses of prehistoric shell and osseous ornament production as described in recent publications (e.g. Bonnardin, 2007, 2009; d'Errico and Vanhaeren, 2002; Vanhaeren and d'Errico, 2001, 2003a, 2003b, 2005). Experimental replicas of archaeological ornaments made on modern specimens of *Cyclope neritea*, *Glycymeris* sp. and *C. rustica* marine shells were used to test the technological and functional attributes we observed in the archaeological assemblage. Evaluation of taphonomic alteration to the archaeological ornaments is based on observations by Driscoll and Weltin (1973), Claassen (1998) and d'Errico et al. (2005). The nature and distribution of use-wear traces and residues on well-preserved shells and teeth were recorded and plotted in a similar way to the polar coordinates systems used for reconstructing the functions of flint artefacts (Van Gjin, 1990). In particular, we divided the perforated holes of ornaments into 4 sectors (A/B/C/D) and recorded the location of use-wear traces and residues with regards to these zones (Fig. 5). We also recorded any evidence of use-wear, taphonomy, or residue located on the lips and the dorsal and ventral surfaces of gastropod shells.

6. Results

6.1. The Late Upper Palaeolithic: materials and techniques

The Late Upper Palaeolithic ornament assemblage is comprised of 7 perforated *Cervus elaphus* atrophic canines, and various species of perforated marine gastropods including *Cyclope neritea* ($N = 2$), *Nassarius gibbosulus* ($N = 7$), and *C. rustica* ($N = 2$), as well as *Glycymeris* sp. bivalves ($N = 5$) (Fig. 2). *Cervus elaphus* canines are "atrophic" as their natural morphology is smaller in size than what would be expected for a canine in an animal of this size. The preservation of the Late Upper Palaeolithic marine gastropod and bivalve artefacts is, in general, poor. Almost all of the marine shells have significant surface exfoliation and the perforations on three of the *Nassarius* sp. ornaments are worn and enlarged by post-depositional processes. The red deer canines are in better condition, although one of them, #21, appears to have been polished by post-depositional water movement.

Technological analysis of the mode of perforating the red deer canines uncovered some variability across the assemblage. One red deer canine (#19) demonstrates the early stages of perforation—grooving and thinning through the root are apparent—but the perforation was not finished (Fig. 3). All but one of the teeth (#18) preserve evidence of this initial preparatory gesture. On each of the six fully-perforated canines, a bifacial drilling technique was used to perforate the tooth through its root (Fig. 3). Experimental comparison demonstrates that the holes of at least four of the six perforated teeth were created manually as they show an asymmetric profile as well as a particular arrangement to the striations inside the hole.

To quantify the location of the perforation, we built an index for measuring the distance of the perforation from the distal aspect of the tooth as a ratio of the overall width of the tooth at this position. Analysing this data reveals some variability in the placement of the perforation. We quantified their placement as a ratio of distance to the distal and proximal surfaces of the tooth to create an index value. The range for this index is between 0.30 and 0.49, with most of the perforations being positioned slightly closer to the distal aspect of the root. A related index was calculated to measure the vertical positioning of the perforation. The perforations on three

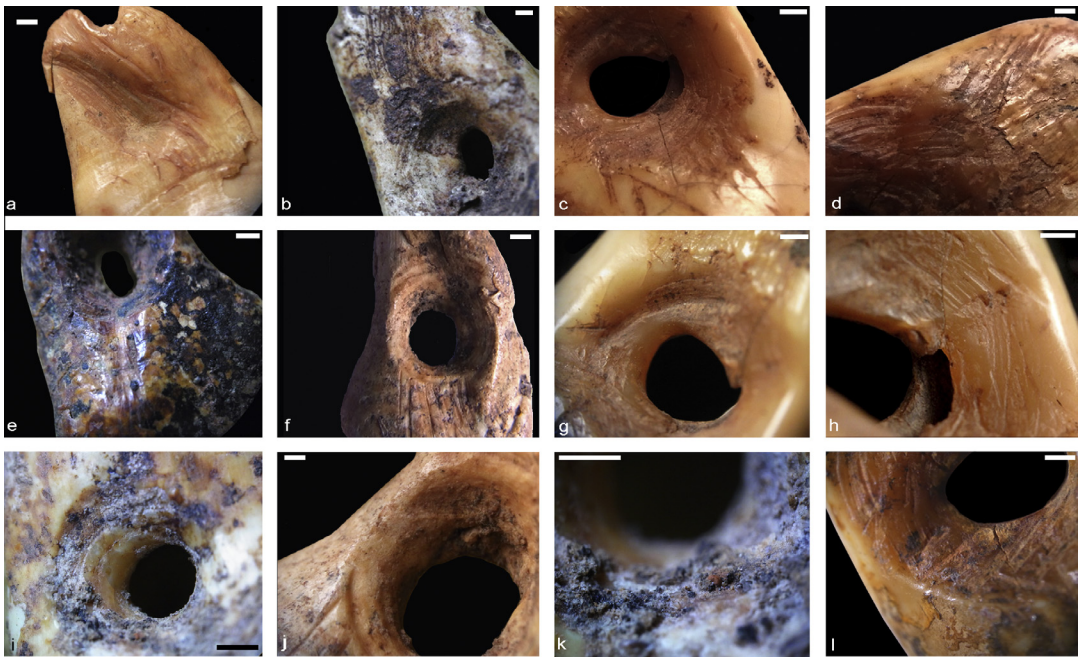

Fig. 3. Technological, use-wear and residues traces on red deer canines: (a) early stages of perforation: grooving and thinning through the root; (b) rotation traces; (c) grooving and rotation traces; (d) grooving and rotation traces on the root; (e) grooving and rotation traces; (f) grooving and rotation traces; (g and h) rounding traces on the lateral side of perforation and on the side of the root; (i) rounding traces on the lateral side of the perforation; (j) rounding traces on the lateral side of the perforation; (k) close-up on a red concretion; (l) red residues and technological striations. Scale bar is 1 mm. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

of the canines are closer to the base of the root, near the junction between the root and the crown, with index values between 0.43 and 0.50. The other four are closer to the top of the root, with index values between 0.59 and 0.66. These minor differences in the placement of the perforation create distinct aesthetic effects and introduce an element of diversity in an assemblage that initially seems materially and technologically uniform. Use-wear traces (discussed in more detail below) suggest that the teeth were used as personal adornments and suspended as beads. Thus, these differences in the placement of the perforations would have had a tangible influence on the perception, engagement with, and use of these ornaments throughout their life histories.

The perforated marine shells from the Late Upper Palaeolithic sequence at Vela Spila are poorly preserved, fragmented, and heavily exfoliated on their surfaces (Fig. 2). Ten of the gastropods feature dorsal perforations. Traces of ochre were tentatively identified on one *Cyclope* specimen and two *Nassarius* specimens. One of each of the *Cyclope*, *Nassarius* and *Columbella* shells we studied lacks a perforation; however, the presence of these marine species at Vela Spila suggests intentional collection for purposes beyond subsistence, as they are not the most appealing marine food sources due to their unpalatable taste. The five *Glycymeris* sp. bivalves were perforated through the umbo. Due to taphonomic alteration, no use-wear or residue analyses could be conducted to reconstruct how Upper Palaeolithic shell ornaments were used. The presence of perforated examples of each marine shell species in Upper Palaeolithic horizons at the site suggests that each marine shell, whether ultimately perforated or not, was intentionally collected and transported to the cave, probably for the purpose of transforming them into ornaments. During the Upper Palaeolithic, the coast was considerably further from Vela Spila than it is today. The time necessary to travel to the coast and collect these specimens that were not likely crucial food sources offers strong evidence of social cooperation and communal effort in activities beyond strict subsistence.

6.2. The Mesolithic: materials and techniques

The material diversity that defines the Upper Palaeolithic ornaments at Vela Spila is absent in the overlying Mesolithic horizons: only *C. rustica* shells were transformed into ornaments during the Mesolithic (Fig. 2). In general, Mesolithic ornaments are better preserved than the late Upper Palaeolithic specimens, although many artefacts are exfoliated ($N = 220$) or have surface pitting ($N = 153$). A chipped lip ($N = 50$) and/or broken apex ($N = 39$) were also common in this assemblage.

Technological analysis of the archaeological assemblage and experimental comparison indicate that the Mesolithic ornaments were likely perforated through indirect percussion from the exterior surface (Fig. 4) and the size and morphology of these perforations are quite uniform (primarily quadrangular/oval in shape).

Traces of rounding and striations were identified primarily on the upper sectors of the perforations of Mesolithic *C. rustica* (A/B zones) (Figs. 5 and 6a–g). The placement and degree of development of these traces suggest that these ornaments had extended use lives that included suspension. Faceting was identified on the ventral convex surfaces of four *C. rustica* shells as well as on the dorsal surfaces in the A and B zones of the perforations (Fig. 6e–g); the locations of this flat faceting suggests that these ornaments may have been embroidered on clothes. We did not identify ochre residue on any Mesolithic ornaments. While perforated *C. rustica* found at the site were probably decorations from garments that were lost during everyday activities, the unperforated specimens (a total of 43 of the 338–12.7%) and other freshly perforated beads without evidence of use-wear may represent a reserve of "raw material" collected and prepared for future use.

There is no discernible difference in the average dimensions of the perforated and non-perforated artefacts; the average dimensions of the unperforated shells are $8.84 \times 13.25 \times 7.59$ mm, whereas the average dimensions of the perforated specimens are $8.78 \times 13.25 \times 7.51$ mm. These metric data suggest craftspeople

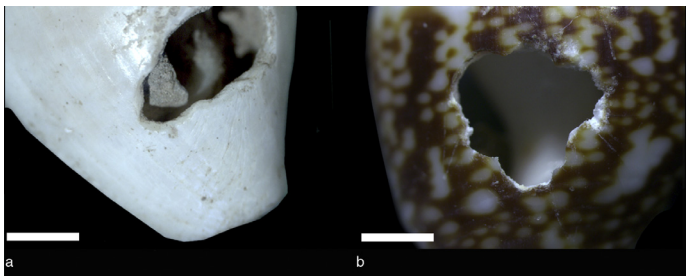

Fig. 4. Technological traces on Mesolithic ornaments: (a) microscopic striations on archaeological *Columbella rustica*; (b) microscopic striations on experimental *Columbella rustica* produced by indirect percussion from the outside using a flint tools and a pebble. Scale bar is 1 mm.

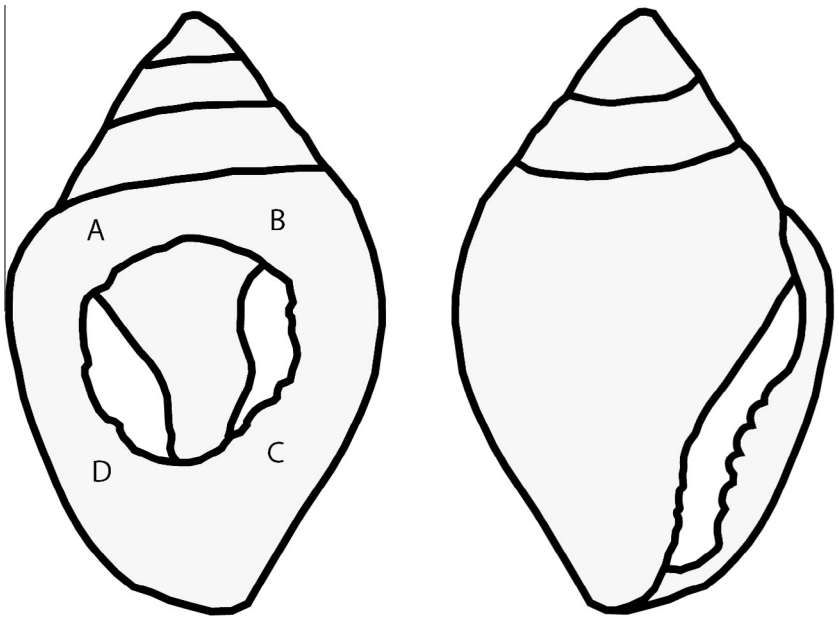

Fig. 5. Dorsal (a) and ventral surfaces of *Columbella rustica* with different sectors described on the perforations.

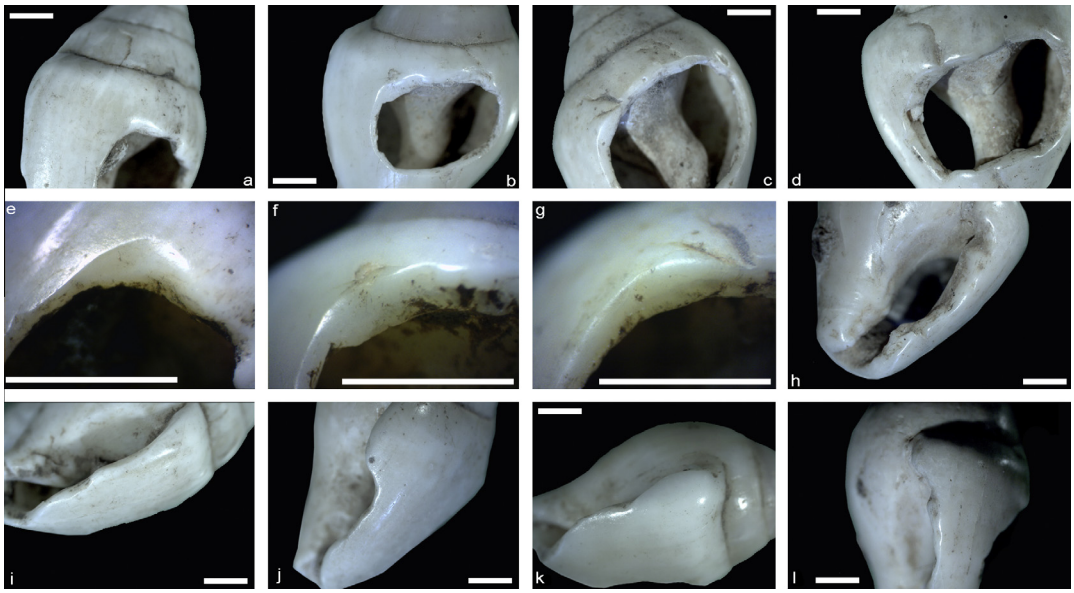

Fig. 6. (a–d) Faceting identified on the A and B zones of the perforations of *Columbella rustica*; (e–g) close-up of faceting identified on the A and B zones of the perforations; (h–l) rounding and modification of the profile of the lip of *Columbella rustica*. Scale bar is 1 mm.

did not select shells for perforation on the basis of their size (either preferring the smaller or the larger specimens).

7. Discussion

Most Late Pleistocene and Early Holocene sites from the Adriatic side of the Italian Peninsula, Dalmatia, Istria, and Greece have yielded ornaments, which have only recently begun to be intensively researched (Cristiani, 2012, Stiner, 2010; Douka et al., 2011; Perlès and Vanhaeren, 2010; Komšo and Vukosavljević, 2011). Only a small number of these sites (e.g., Biarzo Rockshelter (Italy), Pupićina (Croatia), Franchthi and Klisoura Caves (Greece)) preserve the long and continuous stratigraphic sequences spanning the Pleistocene—Early Holocene, which are necessary to observe transformations in ornament traditions and technologies; Vela Spila's exceptional stratigraphy allows us the unusual opportunity to trace such diachronic changes in the southern Mediterranean from soon after the LGM to the beginning of the Holocene.

The Late Upper Palaeolithic ornaments from Vela Spila show some similarities to broadly contemporaneous ornamental traditions elsewhere in Europe, particularly in the presence of red deer canine and marine shells ornaments. In Istria and northern Croatia, red deer canine ornaments were excavated at Šandalja II and Pupićina (Karavanić, 2003; Komšo and Vukosavljević, 2011; Komšo, 2006) (Fig. 7), and similar ornaments were also recovered from Cuina Turcului and Climente II (Danube Gorges) (Margarit, 2008). On the other side of the Adriatic, red deer canine ornaments were also found at many Late Upper Palaeolithic sites in Italy, such as Biarzo, Dalmeri and Tagliente Rockshelters, Paglicci and Romanelli Caves (Cristiani, 2012, 2009; Gurioli, 2006) (Fig. 7). With regards to the marine shell ornaments, Vela Spila compliments the regional picture, with particular similarities to the assemblage from Paglicci Cave. The use of *N. gibbosulus* shells suggests stronger similarities or connections with sites along the Balkan Adriatic coast than with the Italian peninsula where they are less abundant in the archaeological record. Although these materials were repeatedly appropriated to make ornaments across the region, they likely held different meanings in the distinct environmental and social contexts where they were used. While red deer are abundant in the unmodified faunal remains and bone tools from Vela Spila, suggesting this material might have been readily available in this location, marine shells (*Glycymeris*, *Nassarius*, and *C. rustica*), which can be found easily on the rocky and sandy shores along the Adriatic coast, were imported from a greater distance from the site. Vanhaeren and d'Errico (2005) and Gamble (1999: 95) have both noted that exotic materials were often attributed with special meaning or significance during the Palaeolithic. If this correlation between social meaning and rarity was upheld at Vela Spila, the red deer canines might have had a different value than the less local marine shells which would have been imported to the site from several kilometres away, and which were not collected for subsistence purposes.

The use of *C. rustica* during both the Late Upper Palaeolithic and the Mesolithic at Vela Spila suggests some degree of material and technological stability in ornament production across the environmental Pleistocene–Holocene and techno-cultural Palaeolithic-Mesolithic transitions. This continuity over time is echoed across much of the southern Mediterranean region in the persistent use of the same gastropod shell (e.g., at both Franchti and Klissoura Caves in Greece). However, the relative paucity of ornaments found in the Upper Palaeolithic occupation horizons at Vela Spila is markedly contrasted with the massive quantitative increase and shift towards material homogeneity and exclusivity associated with the Mesolithic occupation at this site. The Mesolithic assemblage of ornaments from this site constitutes one of the largest from southeastern Europe. Even more significantly, this rise of ornament frequency is accompanied by an almost total loss in diversity, with *C. rustica* becoming the dominant species. Although *C. rustica* are present in Upper Palaeolithic horizons, in Mesolithic horizons, this gastropod species is the principal, if not exclusive, means of non-verbal and visual communication at the site. While the limited resolution of the radiocarbon chronology currently available at the

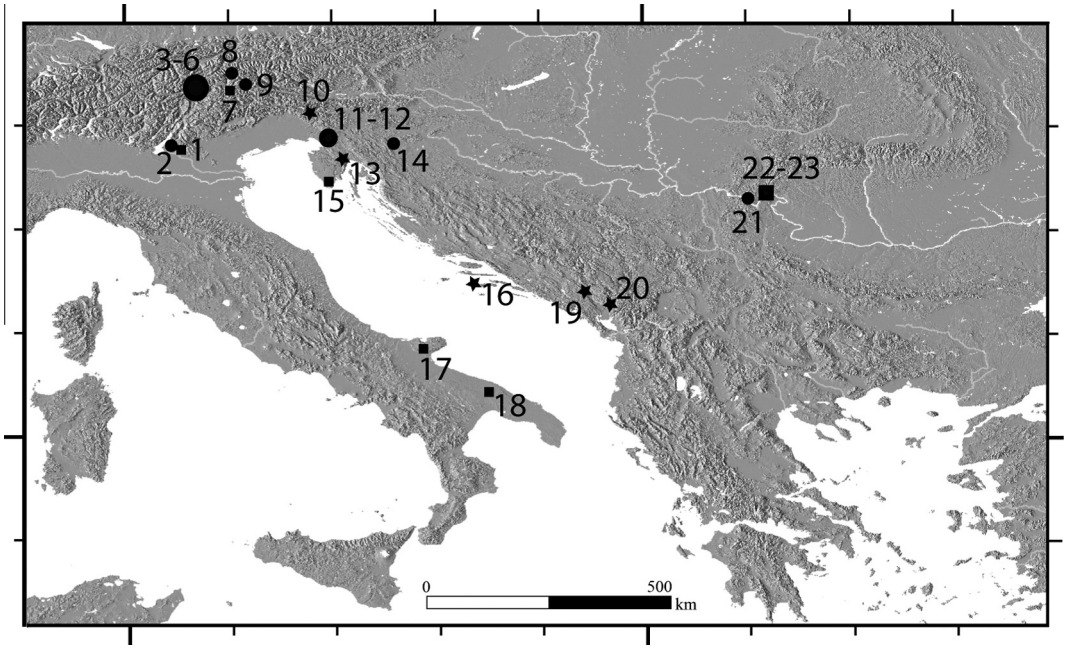

Fig. 7. Sites with Palaeolithic and Mesolithic stratigraphies cited in the text. The *square* identifies Palaeolithic sites. The *circle* identifies Mesolithic occupations; the *star* identifies sites with both Palaeolithic and Mesolithic occupations. 1: Tagliente Rockshelter (IT); 2: Soman Rockshelter ; 3:Romagnano-Loc III (IT); 4:Gaban Rockshelter (IT); 5: Pradestel Rockshelter (IT); 6: Vatte di Zambana (IT); 7: Dalmeri Rockshelter (IT); 8: Plan de Frea (IT); 9: Mondeval de Sora (IT); 10: Biarzo Rockshelter (IT); 11: Edera cave (IT); 12: Ciclami cave (IT); 13: Pupićina Cave (HR); 14: Zala Cave (HR); 15: Šandalja (HR); 16: Vela Spila (HR); 17: Paglicci Cave (IT); 18: Romanelli Cave (IT); 19: Crvena Stijena (ME); 20: Vruća Cave (ME); 21: Vlasac (SRB); 22: Climente II (RO); 23: Cuina Turcului (RO); 24: Klissoura Cave (GR); 25: Franchti Cave (GR).

site makes it impossible to draw direct temporal links between the increase in *C. rustica* and the Pleistocene–Holocene environmental transition, our data from Vela Spila indicate that this crucial change in foragers' symbolic vocabulary occurred at any time within the first two millennia of the Holocene at this site.

Throughout the Mesolithic, *C. rustica* was ubiquitous across the Adriatic, in particular in the eastern Alpine area (e.g., Soman, Romagnano-Loc III, Gaban and Pradestel Rockshelters, Vatte di Zambana in the Adige Valley as well as and Edera, Ciclami and Azzurra Caves in the Trieste Karst (Boschian and Pitti, 1984). It is also found at high altitude sites (e.g., at Plan de Frea and Mondeval de Sora), across the eastern Adriatic and its hinterland (e.g., at Pupićina Cave in Istria, Zala Cave in the central Croatia, and Crvena Stijena (Basler, 1975; Komšo and Vukosavljević, 2011) (Fig. 6). Even sites located more than 400 km from the Adriatic shore preserve abundant quantities of *C. rustica* ornaments (e.g., in the Danube Gorges area of the Balkans (Borić et al., 2014). The exceptional quantity of *C. rustica* documented in the Adriatic region extends to the Pyrenees region and the Mediterranean coast of Spain (Alvarez Fernandez, 2006) during the Early Holocene. Significantly, some Mesolithic horizons from other Adriatic occupation sites preserve more diverse material repertoires, including freshwater gastropod ornaments (e.g., in Croatia Komšo and Vukosavljević, 2011), fish vertebrae (e.g., in the eastern Alpine region of Italy Borrello and Dalmeri, 2004), and fish teeth (e.g., in the Danube Gorges Cristiani and Borić, 2012). At Vela Spila, none of this material diversity is evident.

One practical explanation for the predominance in *C. rustica* in Mesolithic horizons at Vela Spila might be the relative proximity of the rocky Adriatic seashore, where *C. rustica* gastropods are abundant. Rising sea levels and the approaching shoreline would have made this species much more accessible during the Holocene than during the Pleistocene. Yet, the increased accessibility of *C. rustica* during the Mesolithic may not be the only reason it became the preferred material for making ornaments, not just at Vela Spila, but also in the whole region. Many other gastropod species, suitable for perforation, were equally present in the same ecosystem, yet they were not collected and modified. Thus, the targeted selection of *C. rustica* during the Mesolithic in the Adriatic seems to represent a concerted shift in the material strategies and socio-symbolic preferences related to the creation, expression and maintenance of local Mesolithic foragers' identity and social networks. An eco-functional explanation based on material availability seems limited and simplistic in this instance.

The total absence of any freshwater gastropod ornaments in Mesolithic horizons at Vela Spila is equally worth detailed consideration (Tables 1 and 2). *Theodoxus danubialis* and *Lytogliphus naticoides* are particularly conspicuously absent, as both species are well documented at many Mesolithic sites in the Adriatic region and in the hinterlands of the Balkans. *L. naticoides* was used by Late Pleistocene and Early Holocene foragers of the Julian Pre-Alps (e.g., at Biarzo Rockshelter), and during the Mesolithic at Pupićina Cave in Istria (Croatia), Zala Cave in central Croatia (Komšo and Vukosavljević, 2011), and at Vlasac in the Danube Gorges (Cristiani and Borić, 2014). Further afield, *L. naticoides* ornaments were found at Gravettian (Cârciumaru et al., 2010) and Epipalaeolithic sites in Romania (Boroneant, 1999) and at Mesolithic sites in northern Europe (Rähle, 1978; Eriksen, 2002). Doubtless, the presence of *L. naticoides* on both the Adriatic region as well as in the central Balkans since the end of the late Pleistocene reflects similar exchange networks and/or common norms of visual communication. As freshwater gastropods would have been available in the rivers close to Vela Spila, their absence at the site might suggest an intentional social exclusion of this species; people who occupied Vela Spila during the Mesolithic may have been part of different exchange networks than those occupying other sites in region. Yet, the intense focus on *C. rustica*, the presence of possible reserves of raw material (i.e., unperforated shells) and freshly perforated beads seem to suggest an interpretation of this aspect of the ornamental assemblage at Vela Spila as the results of a specialized activity.

A quantitative comparison of the dramatic rise in number of personal ornaments reinforces the significance of this increase in comparison to the relative densities in other categories of material culture. For instance, for the knapped stone industry, the LUP-F (7426.1/m^3) and LUP-G horizons (5712.2/m^3) yielded the densest lithic finds, while much lower densities are recorded in the later Upper Palaeolithic (horizons H and I). There is a slight rise in lithics in the earliest Mesolithic (A and B) but their frequency declines again, by 50%, in the later Mesolithic (C and D) horizons. In terms

Table 1
Presence of different raw materials used for producing ornaments in the Adriatic region and the Apennine peninsula.

Late Upper Palaeolithic									
General classification	Species	Southern Balkans		Istria and N. Croatia		Italy			
		Vela Spila	Crvena Stijena	Pupićina	Šandalja	Tagliente	Paglicci	Romanelli	Biarzo
Terrestrial Mammal	Red deer canines	X	X		X	X	X	X	X
Marine gastropods and bivalves	Cyclope neritea	X				X	X		X
	Columbella rustica	X		X		X	X		X
	Dentalium sp.					X			
	Nassarius circumcintus	X				X			
	Nassarius incrassatus								
	Glycymeris insubrica	X	X			X			
	Homolopoma sanguineum					X			
	Aphorrais sp.					X			
	Buccinum unidatum					X			
Freshwater gastropods	Lythogliphus naticoides			X					X
	Theodoxus danubialis			X					X

Table 2
Presence of different raw materials used of ornaments in the Adriatic region and the Central Balkans.

Mesolithic													
		Southern Balkans			Danube Gorges		Istria	Italy					
General classification	Species	Vela Spila	Crvena Stijena	Vruća Pecina	Vlasac	Schela Cladovei	Pupićina	Pozzo	Continenza/ Maritza	Pradestel, Romagnano, Gaban,Vatte di Zambana, Plan de Frea, Soman	Mondeval	Serratura	Biarzo
Terrestrial Mammal	Red deer canines				X			X	X		X		
Marine gastropods and bivalves	Cyclope neritea				X	X		X	X	X		X	
	Columbella rustica	X	X	X	X	X	X	X	X	X	x	X	X
	Dentalium sp.									X			
	Nassarius circumcintus											X	
	Nassarius incrassatus												
	Glycymeris insubrica							X	X			X	
	Homolopoma sanguineum												
	Aphorrais sp.												
	Buccinum unidatum												
Freshwater gastropods	Lythogliphus naticoides				X	X	X						X
	Theodoxus danubialis				X	X	X			X			X
Fish remains	Vertebrae									X			
	Ciprinidae pharyngeal teeth				X	X							

of material choice, the lithics echo the temporal shift in raw material selection and preferences, shifting from a preferred use of good quality, non-local lithotypes in the Upper Palaeolithic horizons to a predominance of lower-quality, local lithic raw materials during the Mesolithic (Čečuk and Radić, 2005). Such change in the selection and circulation of lithic raw materials at Vela Spila has also been documented elsewhere in the Balkans (e.g., Montenegro, Danube Gorges, Greece and Slovenia) since the early phases of the Holocene. This shift has been interpreted as a process of "cultural regionalization" associated with a decrease in mobility strategies of foragers in this area (Kozlowski, 2005; Mihailovic, 2007).

In contrast, the differences between the Pleistocene and Holocene faunal assemblages at Vela Spila are incongruent with the same temporal differences apparent in the ornamental assemblages. In particular, vertebrate remains from recent excavations of Late Upper Palaeolithic horizons weigh between 16,214 g/m^3 (in LUP-A horizon) and 90,638 g/m^3 (in LUP-F horizon). In comparison, these quantities are considerably lower in the Holocene as in the Mesolithic horizons the faunal g/m^3 varies from 677.0 (Meso-D) to 1537.8 (Meso-C). A sharp increase in fish remains corresponds with the lower numbers of terrestrial vertebrate remains found in Mesolithic horizons. Specialixed seasonal capture and processing of mackerel (*Scomber japonicus*) has recently been proposed during the Mesolithic occupation of the site, and it has been estimated that nearly half a tonne of mackerel was processed (Rainsford et al., 2014). The importance of specialized marine activities at Vela Spila during Holocene is also suggested in the osseous tool assemblage, where there is evidence suggesting the use of composite hooks for fishing (EC, unpublished data).

C. rustica beads were an unquestionably significant part of the socio-symbolic repertoire during the Mesolithic at Vela Spila. By focusing on *C. rustica*, Mesolithic local communities invented a new type of material culture to help them construct and express their identity and personhood, in which only one local material was repeatedly transformed into an ornament, elevating it as more meaningful than other species. The concurrent elevation of *C. rustica* and loss of interest in animal teeth as personal ornaments could be particularly significant. Following Mihailović (1999), ornament material choices and traditions may reflect an Early Holocene process of 'regionalization' in the Balkans. This phenomenon is also echoed in the lithic technology, where a decline in the high quality, non-local, lithic raw materials, a decrease in the complexity of the knapping technology, and in the repertoire and style of tool production is documented during the Mesolithic (Mihailovic, 1999, 2001). The materially-restrictive production of *C. rustica* shell ornaments during the Mesolithic at Vela Spila might further suggest an increased focus on grouping multiple individual or discrete ornaments together to create composite decorative objects (such as necklaces) or to decorate clothing.

The connection between ornaments and bodies is apparent in many ethnographically-known, historic, and prehistoric communities. Most of the pierced *C. rustica* in the Adriatic were excavated from dwelling sites, making it difficult to reconstruct the association of these artefacts with specific types of body decoration. However, a few Late Mesolithic burials in Italy (Continenza Cave, Abruzzo) and the Central Balkans (Vlasac, Danube Gorges) reveal that *C. rustica* was used to decorate garments (Borić, 2003, 2007; Srejovic and Letica, 1978). This interpretation is further supported by specific use-wear traces and patterns on *C. rustica* beads, observed both at Vela Spila and at other sites in the northern Adriatic (Cristiani, 2009), which suggest they were sewn onto clothing as *appliquès*. A similar hypothesis that formally-standardized ornaments might have been used as garment decoration has also been suggested for red deer canines and basket-shaped ivory beads found in Upper Palaeolithic contexts (White, 2007; Stiner et al., 2013), particularly in well-preserved burials (such as La Madeleine child burial in the Dordogne region of France and Sun-

gir burials in Russia) (Vanhaeren and d'Errico, 2001; and White, 1999). Closer to Vela Spila, at Vlasac, in the central Balkans, technological and use-wear analysis of hundreds of pharyngeal teeth found in Late Mesolithic burial contexts led to their interpretation as *appliqués* attached to clothing (Cristiani and Borić, 2012; Cristiani et al., 2014). This type of ornament is demonstrated in the ethnographic record, where small shells are frequently perforated and affixed to clothing to make a regular pattern or motif (Dubin, 1999). While the meaning or content of the message these local Adriatic shells might have carried remains unknown, the Mesolithic focus on *C. rustica* indicates a shift in the ways ornaments communicated social information, and the use of local shells to make *appliqués* worn on clothing seems particularly significant.

Following these interpretations, Vela Spila seems to have represented a crucial location in the Adriatic where raw material was collected to make symbolic ornaments that were distributed through the social landscape with the aim of creating and maintaining a regional identity and relationships (Chapman, 2000). As *C. rustica* has no nutritional value (Alvarez Fernandez, 2008), these shells were likely collected and intentionally brought to Vela Spila for non-subsistence purposes as an activity "embedded" in the procurement of other materials or food (following Binford, 1979 but see Seeman, 1994). These activities might have also represented key moments for local Mesolithic communities to entangle their lives, build memories, and make social life tangible, material, and permanent in the form of ornaments worn on clothing or close to the body (see also Carpenter [1966] for a similar assumption with regards to Eskimo's carved objects).

8. Conclusion

Vela Spila preserves one of the longest stratigraphic sequences of prehistoric occupation in the Balkans. The ornamental assemblage from the site is one of the largest and most important from southeastern Europe, allowing us to define Late Upper Palaeolithic and Mesolithic ornamental traditions and to trace their transformations over time. The specific material preferences and technologies used to manufacture red deer canine and marine shell ornaments illustrates that Vela Spila shares much in common with the systems of symbolic communication previously identified in other Late Upper Palaeolithic contexts in the Adriatic region and the Balkans.

Vela Spila's Late Palaeolithic ornamental repertoire is quantitatively small but characterised by material diversity, including the use of pierced red deer canines and a range of marine gastropods and bivalves, including *C. neritea*, *N. gibbolosus*, *C. rustica*, and *Glycymeris* sp. There is a clear change in the way meaning was conveyed and displayed through symbolic material culture corresponding with the Holocene and a shift to Mesolithic lifeways. The quantity of ornaments increases by a factor of ten in the Mesolithic, and *C. rustica*, a marine shell that was only sporadically used during the Late Upper Palaeolithic at Vela Spila, becomes the predominant choice for the production of ornaments. We argue that Mesolithic communities at Vela Spila inherited some aspects of the Palaeolithic ornamental tradition but redefined the role and significance of this shell in their symbolic behaviours, which led to this species gaining its singular importance. Moreover, our analysis has revealed that Vela Spila was a key locale for the acquisition and transformation of *C. rustica* shells into ornaments during the Mesolithic across the whole Adriatic region.

Our analysis has also identified the conspicuous absence of freshwater gastropods, such as *L. naticoides*, in both the Late Upper Palaeolithic and Mesolithic ornamental repertoires. This absence may indicate that Mesolithic communities who inhabited Vela Spila were not part of the exchange-routes shared amongst many foragers groups in the eastern Alpine area and in hinterlands of the Adriatic region from the Late Palaeolithic into the Mesolithic. At the same time, the absence of these freshwater species also seems to reflect an intentional choice to avoid collecting and modifying them, as they were readily available in the region. Thus, we are able to identify a specific symbolic repertoire and tradition that was shared by the Upper Palaeolithic and Mesolithic foragers who inhabited Vela Spila, distinguishing this site from the larger regional record.

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