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Some weapons to take away: The spread of decorated projectile points across Magdalenian societies

Des armes à emporter : La diffusion des armatures décorées dans les sociétés magdaléniennes

Waffen zum Mitnehmen: Die Verbreitung von dekorierten Projektilköpfen in Magdalénien-Gesellschaften

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Abstract: This paper presents a consideration on the spread of decorated weapon tips across Magdalenian societies. Based on a comprehensive review of the ten types of decorations identified on weapon tips from south-western France, the comparative analysis of their distribution shows their value to document both short and long distances relationships, depending on the types of decorated weapons. The distribution maps indeed highlight widespread cultural markers, such as the points and half-round rods with protuberances, coexisting with local and interregional types, the diffusion areas of which partly overlap. Some types with only limited distribution suggest local identities, especially in the cases of the points and half-round rods decorated with spirals and circles from the western Pyrenean Middle Magdalenian and the points and large bevelled rods with macrocephalic horses or fish-shaped patterns from the Upper Magdalenian of Dordogne. While the Pyrenean area retains the main sets for the decorated weapons from the Middle Magdalenian and therefore appears to have had a significant influence during this period, the decorated weapons from the Upper Magdalenian seem to originate from different areas. They tend to be essentially concentrated in different areas (*Capra* in frontal view along the Cantabrian coast, macrocephalic horses and fish-shaped patterns in Dordogne), supporting higher regional disparities. Furthermore, reduced evidence for links with the Cantabrian coast during the Upper Magdalenian also supports an evolution of the exchange networks in the course of the Magdalenian.

Keywords: Magdalenian, Portable art, Osseous industry, Weapon tip, Engraving, Spread.

Résumé : Les armes, ayant connu une diffusion particulièrement dynamique dans de nombreuses sociétés de par le monde, font partie des objets qui ont généralement une place importante dans les réseaux d'échanges. En complément de la forme et de la manufacture des armes, leurs décors sont étroitement liés aux pratiques esthétiques et symboliques de certaines populations et, par conséquent, susceptibles d'apporter un éclairage original sur les relations entretenues par les occupants de différents sites et de différentes zones géographiques. Cet article propose une réflexion sur la diffusion des armatures décorées à travers les sociétés magdaléniennes. Nous y présentons les caractéristiques des dix types de décors identifiés sur les armatures avérées (pointes de sagaie) et présumées (baguettes demi-rondes, grandes pointes et grandes pièces biseautées) du Magdalénien moyen et supérieur du sud-ouest de la France. L'analyse comparative des cartes de répartition montre leur valeur pour documenter des relations à courtes et longues distances, selon les types d'armatures décorées. Elle fait en effet ressortir de véritables marqueurs culturels à large diffusion, tels que les pointes et baguettes demi-rondes à

tubérosités, qui coexistent avec des types d'armatures ornées moins répandus, diffusés à des échelles locales ou inter-régionales dont les aires de répartition se superposent partiellement. Tandis que les décors inter-régionaux indiquent des relations plus ou moins soutenues entre différentes zones, les types d'armatures ornées à diffusion plus limitée suggèrent des identités locales. C'est notamment le cas des pointes et baguettes demi-rondes à décor spiralés du Magdalénien moyen des Pyrénées occidentales et des pointes et grandes pièces biseautées à chevaux macrocéphales ou motifs pisciformes du Magdalénien supérieur de Dordogne.

Cette étude suggère une évolution des réseaux d'échanges au cours du Magdalénien. Alors que l'aire pyrénéenne retient les séries les plus importantes pour les types d'armatures décorées du Magdalénien moyen et paraît donc avoir exercé une large influence à cette période, les décors du Magdalénien supérieur semblent provenir des différentes zones. Une tendance à la concentration de certains types de décors dans certaines zones (Caprinés en vue frontale sur la côte cantabriques, chevaux macrocéphales et motifs pisciformes en Dordogne) conduit à envisager des disparités régionales plus marquées au Magdalénien supérieur. Les relations entre le sud-ouest de la France et la côte cantabrique semblent en outre s'estomper à cette période si l'on en juge par la plus faible présence des décors partagés par rapport au Magdalénien moyen.

Mots-clés : Magdalénien, Art mobilier, Industrie osseuse, Armature, Gravure, Diffusion.

Zusammenfassung: Dieser Aufsatz präsentiert Überlegungen zur Verteilung dekorierte Waffenköpfe in Magdalénien-Gesellschaften. Eine umfassende Begutachtung identifizierte zehn Dekorationstypen bei Waffenköpfen aus Südwest-Frankreich. Eine vergleichende Analyse ihrer Verbreitung zeigt ihren Wert bei der Dokumentation von Beziehungen über kurze und lange Distanzen, abhängig vom Typus der verzierten Waffen. Die Verbreitungskarten machen weit verbreitete kulturelle Marker sichtbar, wie beispielsweise die Spitzen und Halbrundstäbe mit Noppenverzierung, die mit lokalen und interregionalen Typen koexistieren und deren Verbreitungsgebiete sich teilweise überlappen. Einige Typen verzierter Waffen mit begrenzter Verbreitung deuten lokale Identitäten an. Dies gilt insbesondere für die Spitzen und Halbrundstäbe mit Spiral- und Kreisornamentik des Mittleren Magdalénien der westlichen Pyrenäen sowie die Spitzen und Stäbe mit abgeschrägter Basis mit makrozephalen Pferden oder fischförmigen Mustern des Späten Magdalénien der Dordogne. Während die dekorierten Waffen des Mittleren Magdalénien hauptsächlich aus den Pyrenäen stammen und daher einen signifikanten Einfluss dieser Region während dieser Zeit nahelegen, scheinen die dekorierten Waffen des Späten Magdalénien aus verschiedenen Bereichen zu stammen. Sie tendieren dazu, sich im Wesentlichen in verschiedenen Bereichen zu konzentrieren (Capra in Frontalansicht entlang der kantabrischen Küste, makrozephaler Pferde und fischförmige Muster in der Dordogne), was die Interpretation höherer regionaler Unterschiede unterstützt. Außerdem wird auch die Interpretation einer Evolution der Austauschnetzwerke im Verlauf des Magdalénien durch den verringerten Nachweis von Beziehungen mit der kantabrischen Küste während des Späten Magdalénien gestützt.

Schlüsselwörter: Magdalénien, Mobile Kunst, Knochenindustrie, Waffenspitze, Gravierung, Verbreitung.

INTRODUCTION

WEAPONS in general have been subjected to a particularly dynamic spread in numerous societies across the world. They stand amongst the most emblematic objects playing a significant role in exchange networks, and their diffusion areas happen to expand over long distances that may even extend beyond the cultural (and linguistic) territory of a given population (Boas, 1899; Wiessner, 1983; Bush, 1985; Lemonnier, 1987; Bosc-Zanardo et al., 2009). In addition to the shape and manufacture of the weapons, their decorations reflect the aesthetic and symbolic behaviours of each population and can, therefore, highlight relationships maintained by occupants of different sites and distinct geographic areas. Within the ethnographic record, decorations on projectile points are generally rare; the shafts and foreshafts present most of the paintings, engravings, and occasionally sculptures, as well as some patterns created by ligatures, feathers and other additional materials. With only the projectile tips and few foreshafts made of lithic and osseous materials being preserved in Magdalenian settlements, we are deprived of significant parts of the composite weapons (Bertrand, 1999; Pétilion, 2006). However, numerous Magdalenian osseous points, half-round rods and barbed points show decorative and/or symbolic patterns (e.g. Baulois, 1980; Julien, 1982; Feruglio, 1992; Lucas,

2014a), suggesting an original development of decorations on projectile tips in these societies. The decorations are mainly performed by engraving, with occasional embossed designs; and some rare remnants of colourants at the bottom of incisions, including alternating red and black pigments, indicate the deliberate colouration of some engravings (Buisson et al., 2003; Lucas, 2014b).

CORPUS AND METHODS

The following synthesis on the spread of decorated weapons is based on collections from south-western France directly studied by the author as part of a PhD (Lucas, 2014a) and post-doctoral research, including over 600 pieces from 11 sites (Espalungue, Saint-Michel, Isturitz, Duruthy, Grand Pastou, Dufauré, Brassempouy, Courbet, Montastruc, La Madeleine, and Laugerie-Basse). Building up from there, an extensive literature review has been conducted in order to record pieces showing similar decorations across Europe. As ever, the bibliographic data remains incomplete, with some site's collections more exhaustively published than others, and should be regarded as a state of research likely to be augmented by future publications and discoveries. Moreover, critical decisions have been made for the selection of the objects regarded as weapon tips and the types of

decorations presented in this paper, as well as for the quantitative basis of their diffusion analysis.

Weapon tips

The corpus retains widely recognised projectile points as well as presumed ones, i.e. objects for which use as part of weapons is not as well ascertained yet (fig. 1). Palaeolithic osseous projectile points are defined as elongated objects with a penetrating distal tip, usually pointed, a shaft without clear angle change, and a base shaped in different ways for their hafting (Delporte et al., 1988; Bertrand, 1999; Pétilion, 2006). Their use as a projectile can be confirmed by characteristic impact damages, such as distal crushing, distal splitting, and distal bevelled breaks, reproduced during experimental shooting sessions (notably Pétilion et al., 2016). Such characteristic use-wear and use-breaks have been documented on Magdalenian bevel-based points, fork-based points and point-based or thin-based points (Pétilion, 2006), including some decorated ones (Lucas, 2014a; here: fig. 1.1). In addition, the specific shape and functional features of Magdalenian barbed points or harpoons reasonably place them within the scope of weaponry (Julien, 1982; Pétilion, 2009; Ickerodt, 2013; here: fig. 1.2), and their use and recuperation patterns are consistent with this function (Langley, 2014 and 2015). However, many decorations appear on large points, half-round rods, and large bevelled rods, for which a function as projectile tips has been less well demonstrated so far:

- While the dimensions of the better characterised projectile points range from 7–12 mm in maximal width and 6–9 mm in maximal thickness (Bertrand, 1999), some fragments of points are significantly larger (up to 20 mm in width and thickness; fig. 1.4). Some of these large points show ancient bevelled breaks on the mid-section (Lucas, 2014a), possibly resulting from a violent use even if such breaks on the mesial part cannot be regarded as diagnostic of a use as projectile in the actual state of the experimental record.

- Half-round rods (fig. 1.3) are elongated osseous artefacts with a semi-circular cross-section, usually showing a convex upper face and a flat lower face which is often engraved with adherence striations (Feruglio, 1992). Altogether, their assembly with a twin half-round rod, their ends fitting within the range of proximal and distal ends documented on projectile points, their similar longitudinal grooves and decorations, and the presence of numerous ancient bevelled breaks on the mid-sections support an interpretation as weapon tips (Feruglio, 1992; Feruglio and Buisson, 1999; Lucas, 2014a; Langley et al., 2015; Feruglio and Averbouh, 2016). Nevertheless, this hypothesis would benefit from testing through advanced functional analyses, especially as some half-round rods may have been parts of foreshafts instead of projectile points.

- ‘Large bevelled rods’ as a term refers here to a fairly homogeneous category of antler objects normally showing a particularly thick (>10 mm) sub-square cross-section with one end shaped into a double bevel (fig. 1.5). As the

opposite end often presents clear compression and flaking due to percussion, these objects have been regarded either as chisels, or wedges (Deffarge et al., 1977; Allain and Rigaud, 1986; Pétilion, 2006), or as large points reused as chisels after breakage (Saint-Périer, 1936; Sacchi, 1990). In most cases, the engraved decoration is truncated and overlapped by the percussion damage at the straight end (Lucas, 2012 and 2014a). The engravings must therefore have extended beyond the current proximal end of the chisel, which occasionally shows evidence of a bevelled break. In addition, several pieces present parallel lines roughly engraved on the bevelled end that are similar to the adherence striations documented on numerous projectile points, as well as partly converging edges reminiscent of some rare pointed examples (*ibid.*). Furthermore, large bevelled rods have been engraved on their lateral faces with decorations similar to those on Upper Magdalenian points. The evidence suggests these were initially large decorated points, before being reused as chisels following a break.

These are some of the most frequently engraved objects. Large pieces are over-represented amongst the decorated points (Lucas, 2014a), 40 to 60% of the half-round rods are decorated (Feruglio and Averbouh, 2016), and first assessments suggest over 60% of the large bevelled rods are decorated (Lucas, 2014a). This may be in accordance with the larger investment dedicated to their production. The latter, as remarkable presumed weapons, are therefore integrated to the present study.

Types of decorations

Functional features and decorations do not necessarily spread along the same paths, as the practicalities of the former are irrelevant to the diffusion of decorations. Engravings possibly designed for improving the manufacturing process, the assembly, or the efficiency of the weapons, rather than for decorative or symbolic purposes, have therefore been excluded from the study. For instance, this paper does not take into account the deep, straight, longitudinal grooves (including those with thin curved incisions at the bottom of the groove) engraved on projectile points and half-round rods, even when their functional role for the insertion of bladelets or poison remains hypothetical. Many engraved barbed points are not treated here either, due to the difficulties in distinguishing potential functional adjustments from decorations on this type of object (Julien, 1982 and 1999). A number of engravings on Magdalenian barbed points underline the shape of the object, such as the arcs engraved on the barbs and various incisions on the shaft, which may or may not be related to the making and use of the barbed points. Further research will be necessary in order to determine their role before we can put forward additional types of decorations on barbed points.

For the purpose of this paper, the corpus only retains weapons with well-defined types of decorations that stand out because they are based on complex analogies clearly indicating contacts beyond any possible coincidence.

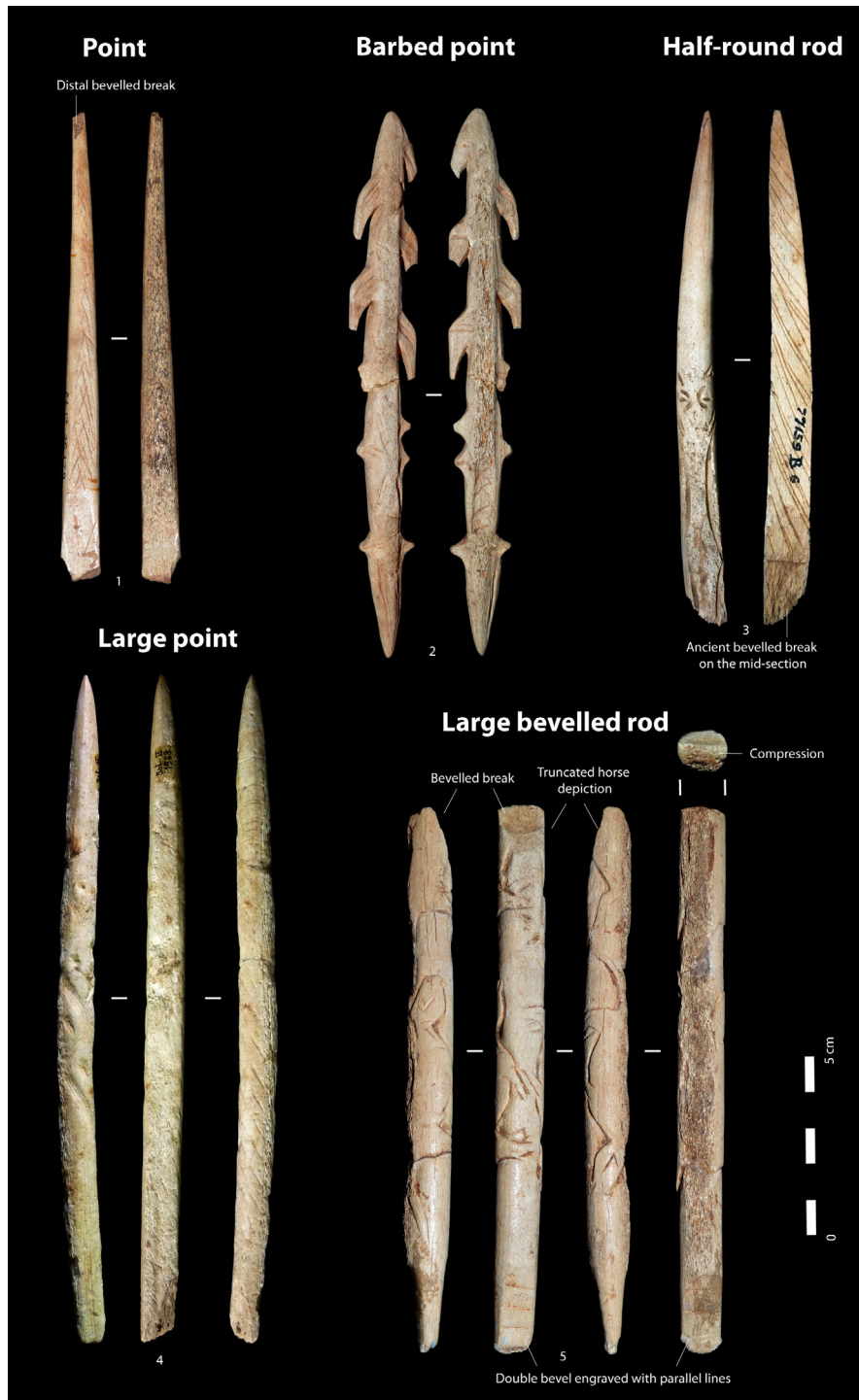


Fig. 1 – The types of weapon tips. 1: Double bevel-based point from Courbet engraved with a criss-cross pattern (BM Palart.497); 2: Barbed point from Courbet engraved with arcs and convergent dashes (BM 1864,1226.1483); 3: Fragment of half-round rod from Isturitz with arcs and ‘trefoils’ (MAN 77159 B6); 4: Fragment of large point from Isturitz with a lateral zigzag, intermediate dots and a longitudinal line (MAN Ist II 1933); 5: Large bevelled rod from La Madeleine with macrocephalic horses (BM Palart.339). Photographs: C. Lucas.

Fig. 1 – Les types d’armatures décorées : 1 : Pointe à biseau double du Courbet gravée d’un quadrillage (BM Palart.497) ; 2 : Pointe barbelée du Courbet gravée d’arcs de cercle et de tirets convergents (BM 1864,1226.1483) ; 3 : Fragment de baguette demi-ronde à arcs et « trèfles » d’Isturitz (MAN 77159 B6) ; 4 : Fragment de grande pointe à zigzag latéral d’Isturitz (MAN Ist II 1933) ; 5 : Grande baguette biseautée à chevaux macrocéphales de La Madeleine (BM Palart.339). Clichés : C. Lucas.

Abb. 1 – Typen von Waffenköpfen. 1: Spitze mit doppelt abgeschrägter Basis von Courbet mit Kreuzmuster-Gravur (BM Palart.497); 2: Widerhakenspitzen von Courbet mit gravierten Bögen und konvergenten Strichen (BM 1864,1226.1483); 3: Fragment eines Halbrundstabs aus Isturitz mit Bögen und „Kleeblättern“ (MAN 77159 B6); 4: Fragment einer großen Spitze aus Isturitz mit lateralem Zickzack, unterbrochen von Punkten und einem Strich in Längsrichtung (MAN Ist II 1933); 5: Großer abgeschrägter Stab aus La Madeleine mit makrozephalen Pferden (BM Palart.339). Photographien: C. Lucas.

As highlighted in previous studies, such analogies must integrate a set of characteristics including different types of features:

‘L’analogie devra porter non sur un caractère isolé, mais sur un ensemble de caractéristiques appartenant à des domaines différents (thématique, conventions formelles, technique, choix du support, fonction, etc.)’ (Sauvet et al., 2008, p. 74).

While the presence of similar patterns is an essential starting point, the types of decoration are further characterised by their location on comparable areas of the objects, their organisation, their regular associations with other signs or figures, and their distinctive technical and stylistic features. In particular, the decorations based on universal, basic patterns (e.g. parallel dashes, zigzags, sinuous lines, chevrons) are only included when several peculiarities can be put forward. Aside from the ten standardised types of decorations presented hereafter, Magdalenian art on weapons further includes a great variety of decorations not treated in this paper.

Quantities and diffusion analysis

Once the types are defined, any reflection on spread mechanisms relies on quantities (e.g. Fritz et al., 2007; Sauvet et al., 2008; Rivero, 2010; Bourdier, 2012; Fuentes et al., 2019; Man-Estier and Paillet, 2019). The highest quantities of typical decorated objects highlight the sites with larger productions and may be indicative of source areas. Furthermore, the quantities of comparable objects or concepts in other areas feed into the discussion about the nature and intensity of the maintained relationships.

Unfortunately, most Magdalenian projectile tips made of osseous materials are found in a fragmented state, notably due to use and post-depositional breaks, leading to considerable quantitative issues (Lucas, 2014a). The number of documented pieces, usually including few complete objects and many fragments of various sizes, may actually differ significantly from the original number of objects, also depending on object sub-types (raw material, shape and dimensions, use) and archaeological deposits (post-depositional processes). Previous assessments indicated larger differences in this regard for thin and elongated artefacts, for which the number of pieces will have been considerably higher than the recorded minimum number of objects. This is notably the case for some half-round rods and long points, mainly represented by relatively short fragments compared to the length of the rare complete objects (*ibid.*). Comparing numbers of pieces, which remains the only quantity available in most cases, is therefore inevitably biased, especially when considering distinct sub-types of weapon tips from different sites.

Consequently, fine statistical analyses are not suitable for this data, and conclusions should not be drawn from small quantitative differences. For this reason only three broad ranges have been distinguished on the maps presented in this paper: >30 published pieces (largest outstanding sets), 10-30 published pieces (substantial sets),

and <10 published pieces (small sets). Although the divisions in between these three ranges are arbitrary, they emphasize the renowned major sites, such as Isturitz or Le Mas d’Azil caves.

Chrono-cultural framework

A remarkable increase in decorations on weapon tips occurred during the Middle and Upper Magdalenian as part of the general increase of portable art on lasting materials and cave art that is a core feature of this period (Sacchi, 2003; Fritz, 2010). Recent research on the Magdalenian from south-western France has established a finer division of the Middle and Upper Magdalenian where each of these phases is divided into two sub-phases (e.g. Langlais et al., 2012 and 2016; Barshay-Szmidt et al., 2016). In this model, the Early Middle Magdalenian (~19,000-17,500 cal. BP) is characterised by the presence of truncated and scalene backed bladelets in high proportions, deep scaled retouch on blade edges, Lussac-Angles points and *navettes*, and notably includes sculpted rock-shelters and primary burials. Then, the Late Middle Magdalenian (~18,000-16,000 cal. BP) is marked by the development of half-round rods and narrow backed bladelets produced on flake edges, also including the first barbed points and a wealth of portable and cave art. The Early Upper Magdalenian (~16,500-15,000 cal. BP) is characterised by numerous fork-based points and long points on small blades, associated with pointed truncated backed bladelets and scalene triangles. In continuity, the Late Upper Magdalenian (~15,500-14,000 cal. BP) is notably distinguished by the full development of barbed points and new types of lithic points including foliate (Laugerie-Basse type) and tanged (Teyjat type) points.

Although different chrono-cultural subdivisions are in use in other areas, such as Cantabrian Spain (Straus and Langlais, 2020) or Central Europe (Maier et al., 2020), this paper refers to the phasing for south-western France when applicable. A fine chronological attribution is not always possible, as many of the objects presented hereafter come from early excavations with poor stratigraphic resolution, and very few decorated pieces have been directly dated. In this context, the chronological attribution of each type of decorated weapon tips is primarily based on the most reliable archaeological layers, which have been selected when recent analyses and dating support a relative homogeneity of their assemblages.

DECORATED WEAPON TIPS FROM THE MIDDLE MAGDALENIAN

In south-western France, there are five established types of decorations on weapon tips attributed to the Middle Magdalenian. The weapon decorations with protuberances, with spirals and circles, with converging curves, with arcs and ‘trefoils’, and with complex diamond signs have spread over different areas, varying from a local sector

(extending over <200 km) to a widely extended zone across Europe (~1,500 km long).

Points and half-round rods with rows of trapezoidal protuberances

The main type of decoration on weapon tips from south-western France is constituted of trapezoidal (or triangular) protuberances organised in longitudinal rows generally edged by longitudinal lines (fig. 2A). The protuberances, first sketched by preparatory oblique incisions, are outlined in relief by localised scraping of intermediary areas and on some pieces by the longitudinal grooves immediately adjacent on their edge (Rivero, 2010; Feruglio and Averbouh, 2016). While this pattern is rarely found on other objects, rows of trapezoidal protuberances appear on a number of points and half-round rods of highly variable size (5 to 20 mm in width and 5 to 15 mm in thickness), mainly showing pointed or thinned bases designed for insertion in a hollowed hafting mechanism (Lucas, 2014a).

At least five complete (or almost complete) examples of points with protuberances are known at Laugerie-Basse (MAN 48637B, MAN 48637C, MAN 48637D, and MAN 53971; Chollot-Varagnac, 1980) and Isturitz (refitting MAN Ist II 1934 / MAN Ist Ea 1914 77159 A8; Lucas, 2014a), with lengths varying from 96 to 220 mm. On these objects and many other fragments of points, there is a single, central row of protuberances, more or less clearly outlined, and often edged on each side by one or two longitudinal lines that happen to curve outwards at one end of the decoration (fig. 2A.3). On points, they are rarely associated with other geometric patterns, including zigzags, sinuous lines, chevrons, and parallel lines, whereas the half-round rods tend to show more associations. Three half-round rods with protuberances from Laugerie-Basse (MNP 1992-13-7; Cleyet-Merle et al., 2014, and BM Palart.209; fig. 2A.1) and La Madeleine (MAN 54479; Chollot-Varagnac, 1980) still retain the full decoration and measure 135 to 206 mm in length, although the actual ends of the rod are missing on the longest piece. Half-round rods generally present two symmetrically reversed rows of protuberances, often well outlined and edged on each side by one to three longitudinal lines, which are sometimes interrupted by double or triple converging dashes. In several cases, one end of the decoration is covered by longitudinal parallel lines, and other geometric patterns are regularly inserted in various locations, notably including zigzags, sinuous lines, chevrons, converging dashes and parallel dashes (fig. 2B). Due to these richer associations and the extra-care in the making of the protuberances, the decoration generally appears more elaborate on half-round rods than on points.

With over 250 pieces documented on 35 sites (Saint-Périer, 1936; Chollot-Varagnac, 1980; Feruglio, 1987; Sacchi, 1990; Braun, 2005; Rivero, 2010; Lucas, 2014a; Feruglio and Averbouh, 2016; Pfeifer, 2017; Fuentes et al., 2019; fig. 2C), the decoration with protuberances is largely predominant on Magdalenian weapon tips. This decoration occurs widely in a zone that

extends ~1,500 km, from Cova Oscura de Ania, in Asturias (Spain), to Kesslerloch, in Thayngen (Switzerland). Two points with protuberances are even documented further away, at Balcarka and Pekárna, in the Moravian karst in the Czech Republic (Pfeifer, 2017). The largest sets come from Isturitz (127 pieces; Lucas, 2014a) and Le Mas d'Azil (at least 39 published pieces; Chollot-Varagnac, 1980) in the Pyrenean area. Other substantial sets at Duruthy, Les Espéluques, and Enlène also support a Pyrenean origin. Nevertheless, the collections from Laugerie-Basse (with at least 23 pieces) are only partly published and might form another large set in Dordogne. Numerous pieces from south-western France come from archaeological layers attributed to the Late Middle Magdalenian (e.g. Isturitz layer SI/E ω , Duruthy layer 4, Enlène layer 3, Gazel layer 7). Moreover, the direct radiocarbon dating of a fragment of a half-round rod with protuberances from Isturitz has given an age of $13,605 \pm 65$ BP (Szmíd et al., 2009), placing it in the Late Middle Magdalenian occupations. While the decreasing number of pieces clearly support a diffusion of the weapon tips with protuberances to the east, the age of the easternmost examples remains unsure as they come from archaeological layers attributed to the Upper Magdalenian before evidence of an earlier reoccupation of Central Europe was put forward (Maier, 2015; Maier et al., 2020).

Points and half-round rods covered with spirals and circles

Other types of decorations on weapon tips are much more localised, in particular the famous spirals, circles and other rounded patterns (Feruglio and Buisson, 1996; Rivero, 2010; Fuentes et al., 2019; fig. 3A). This type of decoration is deeply engraved on wide (>12 mm) points and half-round rods, mostly with bevelled bases, while such rounded patterns are extremely rare on other objects (Lucas, 2014a).

The most complete point with this type of decoration, recently discovered at Ezkutza cave (Azpeitia, Spain), has a single bevelled base and measures 215 mm in length while the distal tip is missing (Barandiarán et al., 2019). On this example and other fragments of points (fig. 3A.3), the rounded patterns tend to be organised in two close rows, covering most of the upper and lateral faces but leaving a thin strip along the middle of the upper face. They are mainly constituted of circles inserted in ovate and fusiform shapes, notably associated with spirals, circles with inner arcs and radiating lines, sinuous lines, or parallel lines. The rare entire half-round rods with spirals and circles do not show a pointed distal end, but it appears to have been reshaped after engraving, like on the longest examples from Isturitz and Lespugue. The one from Isturitz (MAN 86729; fig. 3A.1) has a laterally bevelled base and measures ~190 mm in length to the opposite straight end, on which a striated concavity partly obliterates the decoration of the upper face. A similar concave end can be observed on the example from Lespugue, likewise ~190 mm long, which has a thinned base (Saint-Périer, 1929).

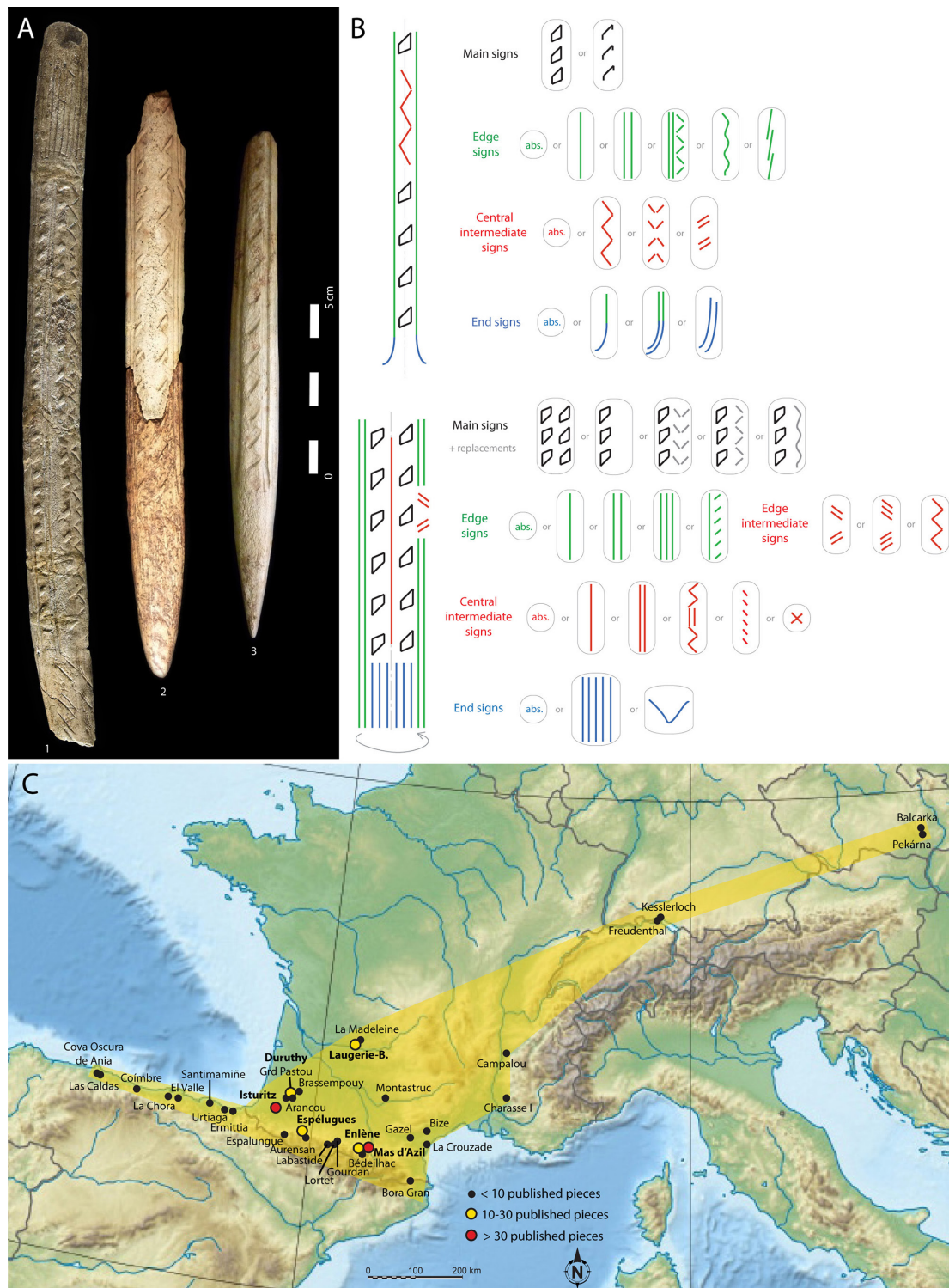


Fig. 2 – Points and half-round rods with trapezoidal protuberances. A) Examples of half-round rods with protuberances from Laugerie-Basse (1: BM Palart.209; photograph: © Trustees of the British Museum) and Isturitz (2: MAN refitting Ist II 1931 / Ist II 1934; photograph: C. Lucas) and point with protuberances from Isturitz (3: MAN Ist II 1934; photograph: C. Lucas); B) Associations identified on the points (top) and half-round rods (bottom) with protuberances from the western Pyrenees (Lucas, 2014a); C) Distribution map.

Fig. 2 – Pointes et baguettes demi-rondes à tubérosités. A) Exemples de baguettes demi-rondes à tubérosités de Laugerie-Basse (1 : BM Palart.209 ; cliché : © Trustees of the British Museum) et d'Isturitz (2 : MAN raccord Ist II 1931 / Ist II 1934 ; cliché : C. Lucas) et de pointe à tubérosités d'Isturitz (3 : MAN Ist II 1934 ; cliché : C. Lucas) ; B) Associations répertoriées sur les pointes (en haut) et les baguettes demi-rondes (en bas) à tubérosités des Pyrénées occidentales (Lucas, 2014a) ; C) Carte de répartition.

Abb. 2 – Spitzen und Halbrundstäbe mit trapezoidalen Noppen. A) Beispiele von Halbrundstäben mit Noppen aus Laugerie-Basse (1: BM Palart.209; Fotografie: © Trustees of the British Museum) und Isturitz (2: MAN refitting Ist II 1931 / Ist II 1934; Fotografie: C. Lucas) sowie von Spitzen mit Noppen aus Isturitz (3: MAN Ist II 1934; Fotografie: C. Lucas); B) An den Spitzen (oben) und Halbrundstäben (unten) mit Noppen aus den westlichen Pyrenäen identifizierte Assoziationen (Lucas, 2014a); C) Verbreitungskarte.

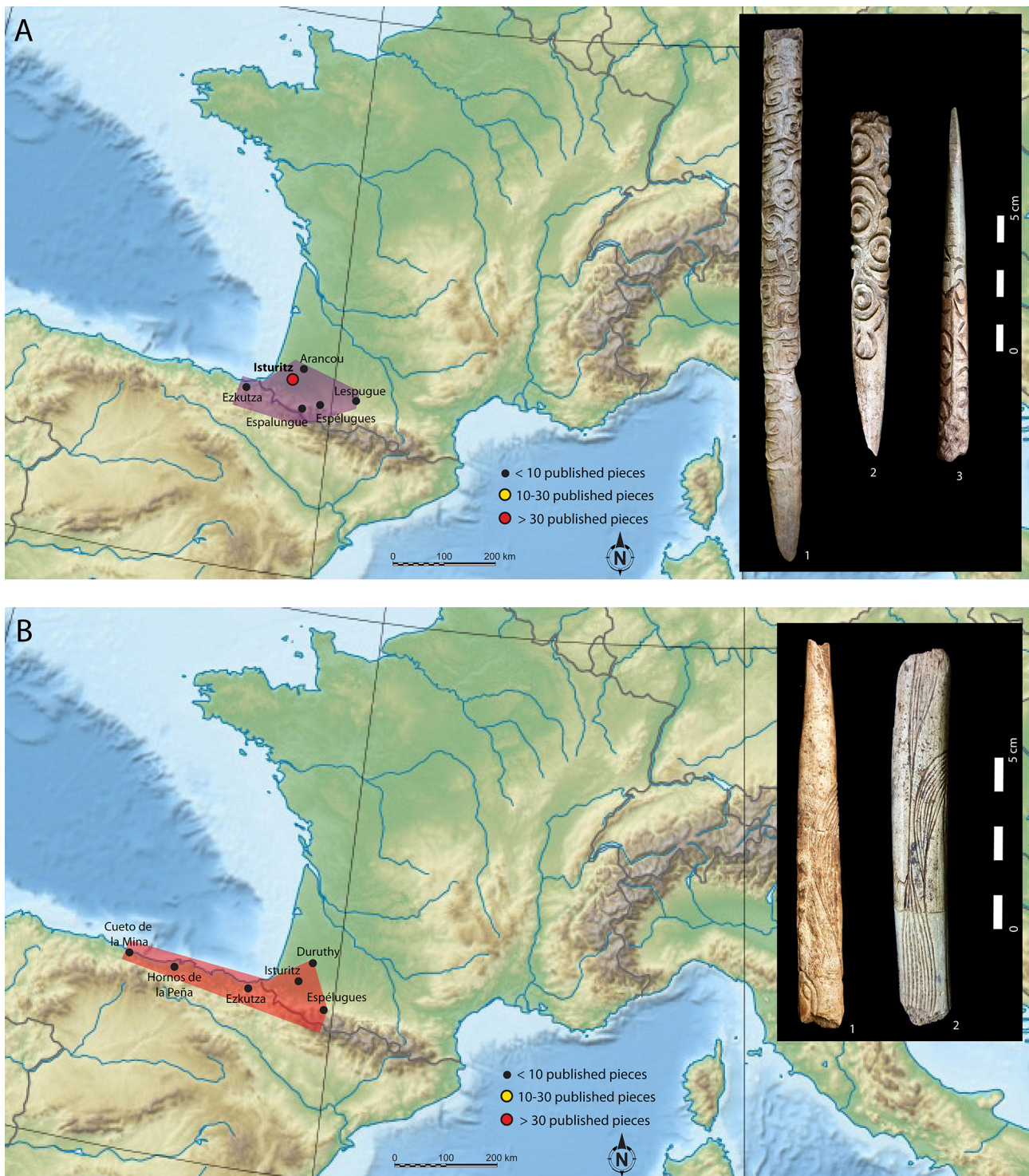


Fig. 3 – Localised decorations from the Middle Magdalenian. A) Distribution of the points and half-round rods with spirals and circles. Examples of half-round rods (1: MAN 86729; 2: MAN 86731) and point (3: MAN Ist II 1935) from Isturitz (photographs: C. Lucas); B) Distribution of the half-round rods with clusters of curves. Examples from Isturitz (1: MAN 84751; 2: MAN Ist II 1934; photographs: C. Lucas).

Fig. 3 – Décors locaux du Magdalénien moyen. A) Répartition des pointes et baguettes demi-rondes à spirales et cercles. Exemples de baguettes demi-rondes (1 : MAN 86729 ; 2 : MAN 86731) et de pointe (3 : MAN Ist II 1935) d'Isturitz (clichés : C. Lucas) ; B) Répartition des baguettes demi-rondes à faisceaux de courbes. Exemples d'Isturitz (1 : MAN 84751 ; 2 : MAN Ist II 1934 ; clichés : C. Lucas).

Abb. 3 – Verbreitung der Dekorationen des Mittleren Magdalénien. A) Verteilung der Spitzen und Halbrundstäbe mit Spiralen und Kreisen. Beispiele für Halbrundstäbe (1 : MAN 86729 ; 2 : MAN 86731) und Spitzen (3 : MAN Ist II 1935) aus Isturitz (Fotographien : C. Lucas) ; B) Verteilung der Halbrundstäbe mit Kurvenbündeln. Beispiele aus Isturitz (1 : MAN 84751 ; 2 : MAN Ist II 1934 ; Photographien : C. Lucas).

Like most half-round rods with spirals and circles, these pieces show particularly wide grooves leaving thin sculpted reliefs on the upper face. The resulting decoration is rather indivisible, being formed of a covering framework of spirals and meanders enfolding the associated concentric circles, circles with inner arcs and radiating lines, sinuous lines, etc. Due to these intricate patterns and their making, the decoration with spirals and circles also appears more elaborate on half-round rods than on points.

Despite an early identification and outstanding characteristics (Saint-Périer, 1929), this type of decorated weapon tip is only attested in the western part of the Pyrenean area so far. The one large set comes from Isturitz layers SI, II and E (31 pieces) while a few strikingly similar examples are documented at Ezkuzta, Arancou, Espalungue, Les Espélugues, and Lespugue (Saint-Périer, 1929 and 1936; Feruglio and Buisson, 1996; Chauchat, 1999; Rivero, 2010; Lucas, 2014a; Fuentes et al., 2019; Barandiarán et al., 2019). In addition, the rounded pattern deeply engraved on a fragment of a half-round rod from Hornos de la Peña in Cantabria (Spain), is morphologically and technically quite similar and therefore possibly derives from the decoration with spirals and circles (Saint-Périer, 1929; Feruglio, 1998; Rivero, 2010). It is however inserted into a different, perhaps figurative, decoration with deep curved lines and more superficial parallel dashes. The other pieces still fit within a local area extending over less than 200 km in each direction and are therefore characteristic of the western Pyrenean area, where two fragments of points are documented in a layer attributed to the Late Middle Magdalenian (Isturitz layer SI/E ω). While most of the examples come from more heterogeneous Middle Magdalenian layers, their grouping in Isturitz layer II and at the entrance of Lespugue cave, as suggested by René de Saint-Périer (Saint-Périer, 1929 and 1936), supports a short chronological span of their use.

Half-round rods with clusters of curves

Another 'western' decoration from the Middle Magdalenian consists of clusters of curves diverging from an origin line. This peculiar pattern is only known on 11 pieces, which are all fragments of half-round rods (Saint-Périer, 1936; Sauvet et al., 2008; Rivero, 2010; Lucas, 2014a; Barandiarán et al., 2019; fig. 3B). The almost complete example from Ezkuzta measures 181 mm in length and both of its ends seem pointed or thinned (Barandiarán et al., 2019), while other pointed fragments are documented at Isturitz (fig. 3B.1) and Cueto de la Mina. The engraved clusters of curves cover large parts of the upper face, where they appear variously associated with interlocked chevrons (Ezkuzta), lateral notches (Duruthy), or an indeterminate pattern with protuberances and engraved ocular shapes possibly forming a cervid head (Isturitz; fig. 3B.1). Even if the clusters of curves are well-identifiable, they remain so rare that their absence cannot be regarded as significant, while there are only six pieces at Isturitz and one or two pieces on the other sites, namely Duruthy, Les Espélugues, Ezkuzta, Hornos de la Peña, and Cueto de la

Mina. They are thus documented in the western Pyrenees and also further west on the Cantabrian coast. Their attribution to the Late Middle Magdalenian is notably supported by the example from Duruthy layer 4.

Half-round rods with arcs and 'trefoils'

The dynamism of exchanges along the Pyreneo-Cantabrian axis is also attested by a decoration associating arcs with small signs formed of three converging dashes that are usually named 'trefoils' (Saint-Périer, 1936; Feruglio, 1987 and 1992; Lucas, 2014a). This type of decoration occurs on narrow half-round rods with thinned or pointed ends and standardised dimensions, normally ranging between 10 and 13 mm wide and 5 to 7 mm thick. They are not small but instead particularly elongated as attested by the most complete examples, such as the entire object constituted of two half-round rods found still joined in Isturitz cave and measuring ~370 mm in length (MAN 74879; Passemard, 1916; fig. 4A). Each half-round rod is engraved with two symmetrical rows of arcs and 'trefoils' opening toward the edges, where they face the similar patterns of the twin half-round rod in order to form lateral patterns (fig. 4B). On the middle part of the decoration, the arcs tend to dominate, they are sometimes doubled or completed by inner parallel dashes, and associated with transversal dashes, 'trefoils' or sets of dashes, and 'trefoils' regularly inserted into the main sequence of arcs. At the ends, the composition usually starts or ends with a sequence of 'trefoils', now and then associated with transversal and oblique dashes, while the other end may show more opened arcs that are shorter than the middle ones.

Half-round rods with arcs and 'trefoils' are documented on 16 sites, from Valdavara, in Galicia, to Boran Gran, in the Eastern Pyrenees, with northern examples at Courbet cave, in the Aveyron valley (Saint-Périer, 1936; Chollot-Varagnac, 1980; Feruglio, 1987 and 1992; Rivero, 2010; Lucas, 2014a; Sauvet, 2019; fig. 4C). The largest set comes from Isturitz (41 pieces) and there is another significant set at the Mas d'Azil (at least 14 published pieces) confirming their Pyrenean origin, while only a few pieces are known from the other sites. The attribution of this specific decoration to the Middle Magdalenian is notably supported by the large number of pieces in Isturitz layer II/E and one example excavated more recently from the Middle Magdalenian layer of Abauntz (Utrilla and Mazo, 1996). Nevertheless, it has been suggested that this type of decoration may have survived and evolved toward shorter arcs during the transition to the Upper Magdalenian (Feruglio and Averbouh, 2016).

Points and half-round rods with complex diamond signs

In addition, several fragments of points and half-round rods are engraved with complex diamond signs constituted of two overlapping diamonds followed by two converging dashes at each end (Sauvet, 1990; fig. 5). This peculiar pattern has been mainly identified on fragments

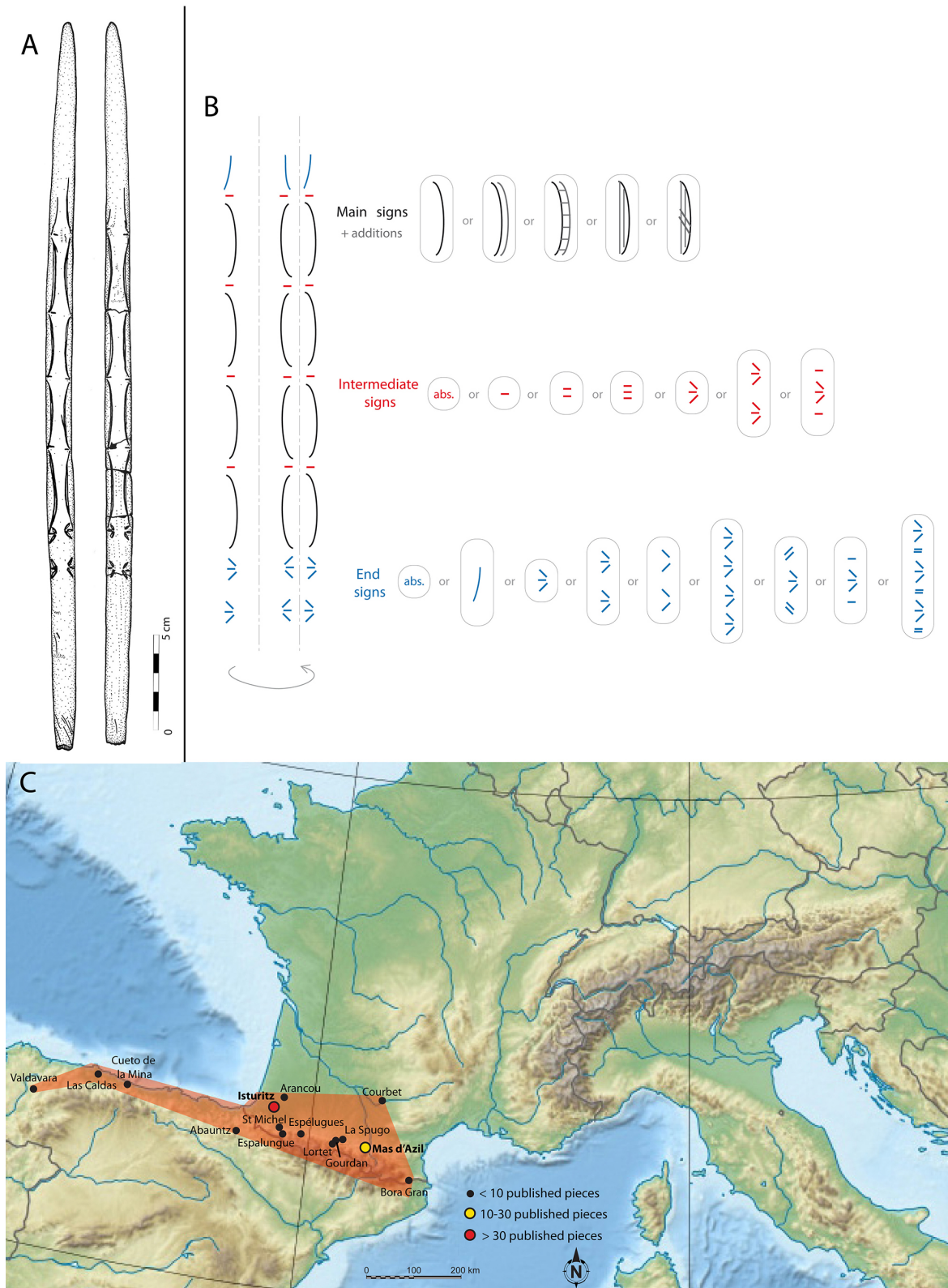


Fig. 4 – Half-round rods with arcs and ‘trefoils’. A) Complete object constituted of two half-round rods found still joined in Isturitz cave (MAN 74879; drawing: C. Lucas); B) Associations identified on the half-round rods with arcs and ‘trefoils’ from the western Pyrenees (Lucas, 2014a); C) Distribution map.

Fig. 4 – Baguettes demi-rondes à arcs et « trèfles ». A) Objet entier constitué de deux baguettes demi-rondes accolées d’Isturitz (MAN 74879 ; relevé : C. Lucas) ; B) Associations répertoriées sur les baguettes demi-rondes à arcs et « trèfles » des Pyrénées occidentales (Lucas, 2014a) ; C) Carte de répartition.

Abb. 4 – Halbrundstäbe mit Bögen und „Kleeblättern“. A) Komplettes Objekt bestehend aus zwei Halbrundstäben, die in der Isturitz-Höhle noch im Verbund gefunden wurden (MAN 74879; Zeichnung: C. Lucas) ; B) Identifizierte Assoziationen an den Halbrundstäben mit Bögen und „Kleeblättern“ von den westlichen Pyrenäen (Lucas, 2014a) ; C) Verteilungskarte.

of points and half-round rods, however, the small number of pieces documented so far does not allow a general characterisation of the objects and their decoration. Amongst the longest examples, two fragments of a large half-round rod from Courbet (BM Palart.464 and 465; fig. 5) show the repetition of complex diamond signs, widely spaced-out and associated with intermediary patterns formed of crossed curving lines. The few weapon tips with complex diamond signs occur in the central Pyrenees (Lespugue, Gourdan, Lortet, Mas d'Azil), in the Aveyron valley (Courbet), and in Dordogne (La Madeleine; see Breuil, 1913; Chollot-Varagnac, 1980; Sauvet, 1990). Moreover, identical complex diamonds signs are engraved on a rib bone from Laugerie-Basse, where they are also widely spaced-out (Chollot-Varagnac, 1980). As all these pieces were found during early excavations, their preliminary attribution to the Middle Magdalenian (Breuil, 1913) has yet to be confirmed.

DECORATED WEAPON TIPS FROM THE UPPER MAGDALENIAN

The Upper Magdalenian of south-western France is marked by the additional presence of large bevelled rods and barbed points, as well as by numerous engravings

positioned on the lateral faces of points instead of on their upper face (Saint-Périer, 1936; Sacchi, 1990; Lucas, 2014b). The decorations with lateral zigzags, with *Capra* in frontal view, with macrocephalic horses, and with fish-shaped patterns comply with this lateral position, while another type of decoration, with notched grooves, ovate reliefs and braided patterns, is closely associated with the half-round rods. These five types of decorations have spread over distinct areas, partly overlapping, and varying from a rather local sector (~200 km) to extended zones covering large parts of south-western France and sometimes stretching out to the Cantabrian coast.

Points and large bevelled rods with lateral zigzags

The lateral zigzags deeply engraved on points and large bevelled rods (fig. 6A) can be regarded as a type of decoration based on complex analogy due to the peculiarity of both their position on the lateral faces and their engraving technique. The engraving of wide (usually ~3-4 mm in width) and deep grooves with a flared cross-section, without leaving clear lips at the surface of the object, may have been designed for the insertion of coloured mixtures, as some pieces from La Vache and Isturitz still retain remnants of alternating red and black pigments at the bottom of these grooves (Buisson et al., 2003; Lucas, 2014b).



Fig. 5 – Distribution of the points and half-round rods with complex diamond signs. Examples of half-round rods showing complex diamond signs associated with crossed curving lines from Courbet (1: BM Palart.465; 2: BM Palart.464; photographs: C. Lucas).

Fig. 5 – Répartition des pointes et baguettes demi-rondes à signes losangiques complexes. Exemples de baguettes demi-rondes du Courbet présentant des signes losangiques complexes associés avec des lignes courbes croisées (1 : BM Palart.465 ; 2 : BM Palart.464 ; clichés : C. Lucas).

Abb. 5 – Verteilung der Spitzen und Halbrundstäbe mit komplexen Diamant-Symbolen. Beispiele von Halbrundstäben aus Courbet zeigen komplexe Diamant-Symbole in Verbindung mit sich kreuzenden Kurvenlinien (1: BM Palart.465; 2: BM Palart.464; Fotografien: C. Lucas).

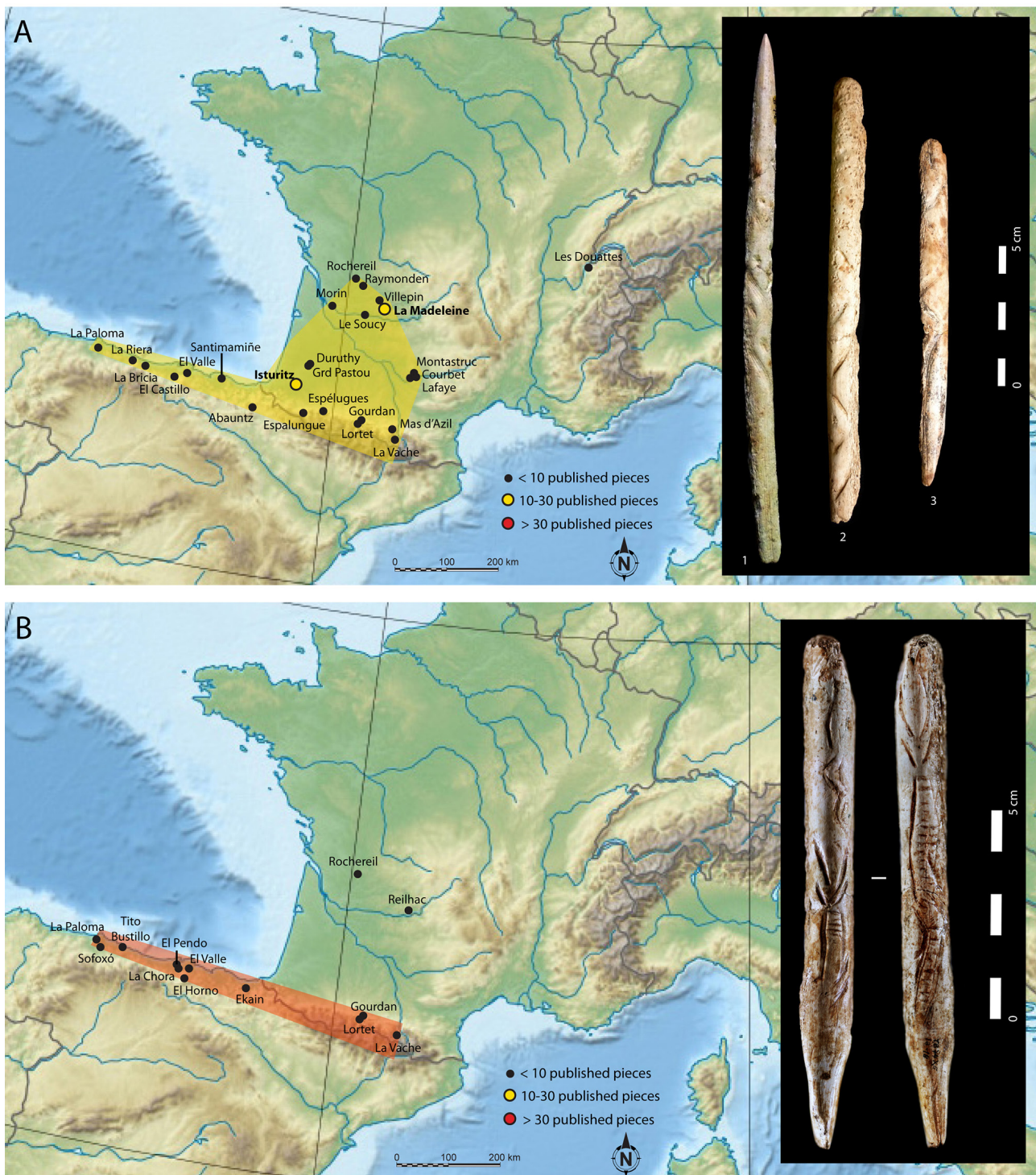


Fig. 6 – Upper Magdalenian decorations indicating contacts with the Cantabrian coast. A) Distribution of the points and large bevelled rods with lateral zigzags. Examples of point (1: MAN Ist II 1933) and large bevelled rods (2: MAN Ist I 1934; 3: MAN 86499) from Isturitz (photographs: C. Lucas); B) Distribution of the points and large bevelled rods with *Capra* in frontal view. Example of large bevelled rod from Tito Bustillo (photographs: O. Rivero; Rivero et al., 2014).

Fig. 6 – Décor du Magdalénien supérieur indiquant des contacts avec la côte cantabrique. A) Répartition des pointes et grandes baguettes biseautées à zigzag latéral. Exemples de pointe (1 : MAN Ist II 1933) et de grandes baguettes biseautées (2 : MAN Ist I 1934 ; 3 : MAN 86499) d'Isturitz (clichés : C. Lucas). B) Répartition des pointes et grandes baguettes biseautées à caprinés en vue frontale. Exemple de grande baguette biseautée de Tito Bustillo (clichés : O. Rivero ; Rivero et al., 2014).

Abb. 6 – Dekorationen des Späten Magdalénien, die Kontakte zur kantabrischen Küste belegen. A) Verteilung von Spitzen und großen abgeschrägten Stäben mit lateralen Zickzack-Muster. Beispiel einer Spitze (1 : MAN Ist II 1933) und große abgeschrägte Stäbe (2 : MAN Ist I 1934; 3 : MAN 86499) aus Isturitz (Fotographie: C. Lucas); B) Verteilung der Spitzen und großen abgeschrägten Stäbe mit *Capra* in Frontalansicht. Beispiel eines großen abgeschrägten Stabes aus Tito Bustillo (Fotographien: O. Rivero; Rivero et al., 2014).

The lateral zigzags made of such grooves mainly occur on thick pieces (>10 mm) with a double bevelled base, especially the large bevelled rods and a few points (Lucas, 2014a). If the large bevelled rods are indeed recycled broken points, there are very few, if any, complete objects, at least in their originally intended shape. Amongst the longest pieces, a 185 mm long fragment from Isturitz (MAN Ist II 1933; fig. 6A.1) combines the thick sub-square cross-section that is typical of the large bevelled rods with a pointed end. The longitudinal zigzags have been engraved on one or both lateral faces, sometimes ending with a long curve on the bevelled end (fig. 6A.3). In several cases, they are associated with longitudinal lines, transversal dashes, sinuous lines, oblique parallel lines, intermediary dots, ovate shapes, crosses, or various other patterns.

Identified at 24 sites, the points and large bevelled rods with lateral zigzags are largely spread in the Aquitaine basin and on the Cantabrian coast (Breuil and Saint-Périer, 1927; Saint-Périer, 1936; Deffarge et al., 1977; Chollet-Varagnac, 1980; Corchón Rodríguez, 1986; Sieveking, 1987; Sacchi, 1990; Clottes and Delporte, 2003; Lucas, 2012 and 2014a). In addition, an eastern example recently found at Les Douattes, in Haute-Savoie, suggests they may have spread as far as the Alps (Malgarni and Lucas, 2015). There are at least two significant sets at Isturitz (18 pieces), in the western Pyrenees, and at La Madeleine (at least 13 published pieces), in Dordogne, and their source area is unknown yet. When their stratigraphic position is reliable, the points and large bevelled rods with lateral zigzags occur in Upper Magdalenian layers (e.g. Morin layers BI and AIV, La Vache layers 1 to 4, Les Eglises layer 8, Duruthy layer 3, Grand Pastou recent excavation; see Deffarge et al., 1977; Clottes, 1983; Sacchi, 1990; Clottes and Delporte, 2003; Dachary et al., 2020). Their existence during the Middle Magdalenian is therefore uncertain, even unlikely, but they already appear in the Early Upper Magdalenian together with fork-based points (Isturitz layer I/F1).

Points and large bevelled rods with *Capra* in frontal view

On the lateral faces of the same types of objects (points and large bevelled rods), there are also schematic representations of *Capra* depicted in frontal (or dorsal) view with a rather triangular head on top of which sit double oblique lines marking the ears and horns (Corchón Rodríguez, 1986; González-Sainz, 1989; Utrilla, 1990; Fano Martínez et al., 2005; Sauvet et al., 2008; Rivero et al., 2014; fig. 6B). The representations are often completed by a schematic depiction of the body, which may be sketched by a single sinuous line, by two lines and transversal dashes, or a bit more detailed and partly turned in profile (Corchón Rodríguez, 1986). Identical depictions of *Capra* in frontal view appear on the base of a few barbed points (Julien, 1982), as well as on other objects (including perforated batons, ribs, and pressure flakers; González-Sainz, 1989; Rivero et al., 2014), and on cave walls (González-Sainz, 1993). On weapon tips, there are

either single *Capra* depictions (such as on the complete barbed point from Rochereil; Julien, 1982, p. 111) or several of them, usually placed above each other on the lateral faces of large bevelled rods. They do not show recurrent associations with other animal depictions but can be surrounded by various linear geometric patterns.

Weapon tips with *Capra* in frontal view are documented mainly on the Cantabrian coast – at La Paloma, Sofoxó, Tito Bustillo, El Pendo, La Chora, El Valle, El Horno and Ekain –, in the central Pyrenees – at Gourdan, Lortet and La Vache – and, to a lesser extent, in Dordogne and Lot – two barbed points from Rochereil and Reilhac – (Corchón Rodríguez, 1986; González-Sainz, 1989; Utrilla, 1990; González-Sainz, 1993; Barandiarán, 1996; Clottes and Delporte, 2003; Fano Martínez et al., 2005; Sauvet et al., 2008; Rivero et al., 2014; here fig. 6B). While none of these sites provides a large set of weapon tips with *Capra*, the high concentration of depictions of *Capra* in frontal view (including those on other objects and cave walls) on the northern coast of Spain supports a Cantabrian origin (Corchón Rodríguez, 1986; Sauvet et al., 2008; Rivero et al., 2014). There is also a significant concentration of these figures in the central Pyrenees, becoming less numerous to the north (ibid.). The better characterised depictions of *Capra* in frontal view are attributed to the Upper Magdalenian, and the direct radiocarbon dating of a perforated baton with two *Capra* heads from El Pendo has given an age of 13,050 ±150 BP that is consistent with this chronology (Barandiarán, 1988; Utrilla, 1990; Fano Martínez et al., 2005; Sauvet et al., 2008). Like the decoration with lateral zigzags, the depictions of *Capra* in frontal view show maintained relationships between the Cantabrian coast and south-western France, which are not currently attested by the other decorations on weapons of the Upper Magdalenian.

Points and large bevelled rods with macrocephalic horses

Another decoration, still on the lateral faces of points and large bevelled rods, consists of rows of horses showing a peculiar, homogeneous style, termed ‘macrocephalic’ due to their excessively large heads measuring a quarter to a third of their body length (Apellaniz, 1990; Man-Estier and Paillet, 2014 and 2019; fig. 7A). These horses normally appear to be galloping thanks to the oblique position of their unfinished limbs, which seem to project them forward, and their long raised tail extending diagonally (Cook, 2013). In some cases, stallions can be identified as their sex is indicated, while other figures without sexual attributes could be mares, but both stallions and potential mares tend to present a rounded belly. Internal details suggestive of the coat, the musculature and even the skeleton have been variously engraved. On the head, the ears are rarely depicted, whereas the eye, usually large and ovate, the mouth, the nostril, and the zygomatic line are depicted (Apellaniz, 1990). The style is moreover characterised by the angular shapes of the horse drawings, formed by a succession of light curves and pronounced angles.

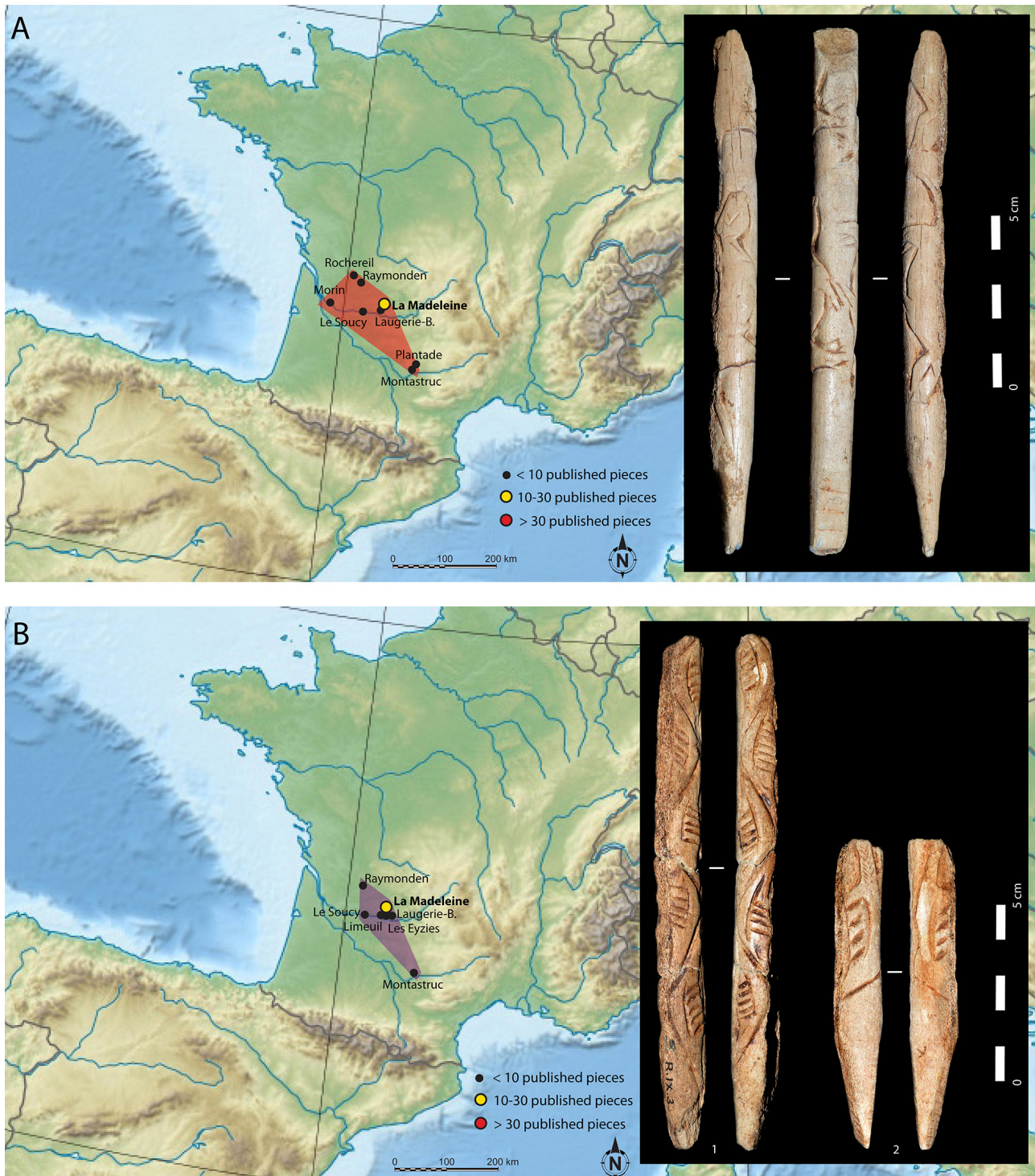


Fig. 7 – Localised decorations from the Upper Magdalenian. A) Distribution of the points and large bevelled rods with macrocephalic horses. Example of large bevelled rod from La Madeleine (BM Palart.339; photographs: C. Lucas); B) Distribution of the points and large bevelled rods with fish-shaped patterns. Examples of large bevelled rods from La Madeleine (1: BM Palart.356; photographs: C. Lucas) and Montastruc (2: BM Palart.572; photographs: C. Lucas).

Fig. 7 – Décors locaux du Magdalénien supérieur. A) Répartition des pointes et grandes baguettes biseautées à chevaux macrocéphales. Exemple de grande baguette biseautée de La Madeleine (BM Palart.339; clichés : C. Lucas) ; B) Répartition des pointes et grandes baguettes biseautées à motifs pisciformes. Exemples de de grandes baguettes biseautées de La Madeleine (1 : BM Palart.356 ; clichés : C. Lucas) et Montastruc (2 : BM Palart.572 ; clichés : C. Lucas).

Abb. 7 – Verbreitung der Dekorationen des Späten Magdalénien. A) Verteilung der Spitzen und großen abgeschrägten Stäbe mit makrozephalen Pferden. Beispiel eines großen abgeschrägten Stabes aus La Madeleine (BM Palart.339; Fotografien: C. Lucas); B) Verteilung der Spitzen und großen abgeschrägten Stäbe mit fischförmigem Muster. Beispiel eines großen abgeschrägten Stabes aus La Madeleine (1: BM Palart.356; Fotografien: C. Lucas) und Montastruc (2: BM Palart.572; Fotografien: C. Lucas).

They are outlined in relief by deep dissymmetrical incisions and/or scraping of the surrounding surface, while incisions of variable depths and profiles have been used for the treatment of the different internal details. These macrocephalic horses are normally depicted in rows where several individuals follow each other without associations with other animal species, except some cases of juxtaposition with fish.

Rows of macrocephalic horses have been documented on at least 43 pieces, which are mostly large bevelled rods and points (32 pieces), but this type of decoration is not specific to weapon tips as it appears on a significant number of perforated batons (10 pieces; see Man-Estier and Paillet, 2014). The only complete point with macrocephalic horses from Laugerie-Basse (MAN 53916) has a double bevelled base, is ~300 mm long and displays a total of 14 horses, distributed on both lateral faces and not associated with any other figures. The other pieces rarely show associations, one exception being a fish-shaped pattern on a large bevelled rod from la Madeleine (BM Palart.336; Sieveking, 1987).

Weapon tips with rows of macrocephalic horses are mainly documented in Dordogne and Gironde, where all the perforated batons with this decoration come from (Apellaniz, 1990; Tosello, 2003; Sauvet et al., 2008; Man-Estier and Paillet, 2014 and 2019). The main set is the one from La Madeleine (at least 12 published pieces), while smaller sets are found at Morin, Le Soucy, Laugerie-Basse, Raymondien, and Rochereil. Further south, a couple of comparable examples are documented at Montastruc (BM Palart.570; Sieveking, 1987) and Fontalès (MHNMON 865-706; Ladier, 2016). These two examples from the Aveyron valley show strikingly similar features to the macrocephalic horses (e.g. oblique position of limbs and tail, zygomatic line on the face, outline in light relief) despite their smaller heads. In addition, a bird bone tube engraved with a row of horses from Le Mas d'Azil (MAN 49164), in the central Pyrenees, has been regarded as potentially derivative from the macrocephalic horses presented above, due to the clearly disproportionate heads of the engraved horses, which do not meet all the other stylistic features, notably presenting more rounded outlines (Man-Estier and Paillet, 2019). Considering only the most characteristic examples, the rows of macrocephalic horses remain a rather local decoration, originating from Dordogne/Gironde, with limited spread into the Aveyron valley, that is to say over ~200 km. They are found in Upper Magdalenian layers (e.g. La Madeleine layer F, Morin layers BI, AIV, AIII and AII; Man-Estier and Paillet, 2014 and 2019).

Points and large bevelled rods with fish-shaped patterns

The fourth type of decoration observed on the lateral faces of points and large bevelled rods presents fish-shaped patterns (fig. 7B). Several processes of schematisation of fish are known in the Upper Magdalenian art (Breuil and Saint-Périer, 1927), the main one notably leading to ovate and fusiform patterns, often filled with

parallel dashes and interlocked chevrons, as clearly illustrated on a long bevelled piece from Petersfels (Mauser, 1970). While the ovate and fusiform patterns are widely distributed and often difficult to identify as fish (instead of geometric signs), the fish-shaped patterns retained here follow a different, original set of conventions. These schematic depictions of fish are usually readily identifiable thanks to their almost rectangular (or trapezoidal) body filled with a set of transversal dashes backing onto a light curve, which underlines the upper outline, and their caudal appendage (Breuil and Saint-Périer, 1927; Man-Estier and Paillet, 2014). In some cases, the caudal fin follows a small, angular anal fin, is filled with interlocked chevrons and has a flared end with five or six rays (*ibid.*). However, numerous schematic examples only show a relatively thin and pointed caudal appendage, and those without any caudal fin remain difficult to identify as fish-shaped patterns. The most characteristic examples are often outlined in relief by deep dissymmetrical incisions and/or scraping of the surrounding surface, and the internal parallel dashes are normally formed of short, deep and wide incisions.

Such fish-shaped patterns are mainly engraved on points and large bevelled rods (27 pieces / 30 at La Madeleine; Man-Estier and Paillet, 2014) and rarely on other objects, although they appear occasionally on perforated batons. They happen to be organised in simple rows, following each other in the same direction, in opposite directions (head to head – fin to fin), or even interlocked in opposite directions (fig. 7B.1). There is no complete example of a point with this decoration, but their association with other motifs seems rare despite a case of association with a macrocephalic horse (BM Palart.336) and another with a zigzag (BM. Palart.352), both from La Madeleine. The points and large bevelled rods with these fish-shaped patterns are essentially documented in Dordogne, where the main set comes from La Madeleine (at least 27 published pieces), and small sets have been identified at several sites, namely Laugerie-Basse, Les Eyzies, Le Soucy, Raymondien, and Limeuil (Saint-Périer, 1927; Man-Estier and Paillet, 2014). Further south, the presence of only three pieces with identical fish-shaped patterns at Montastruc (BM Palart.572-574; Sieveking, 1987; fig. 7B.2), in the Aveyron valley, indicates a rather local distribution, which is strikingly similar to that of the depictions of macrocephalic horses. In addition to their association with macrocephalic horses, the presence of fish-shaped patterns at sites that do not appear to have been occupied before the Upper Magdalenian (e.g. Le Soucy and Limeuil) supports their attribution to this phase.

Half-round rods with notched grooves, ovate reliefs and braided patterns

The dominant decoration on half-round rods from the Upper Magdalenian is constituted of pairs of notched grooves, which are made of small consecutive notches delineating a central relief (Feruglio, 2003; Feruglio and Averbouh, 2016; fig. 8). Some variations are perceptible in the decorations with notched grooves, but they are

nonetheless regularly associated with incised curved lines and two distinctive patterns appearing in light relief due to dissymmetrical incisions. Firstly, small ovate reliefs, usually organised in rows, are associated with notched grooves on at least four pieces from La Vache (Clottes and Delporte, 2003), two pieces from La Madeleine (Capitan and Peyrony, 1928), one piece from Gourdan (Piette, 1907; fig. 8.2) and one piece from Montastruc (BM Palart.613; Sieveking, 1987). Secondly, twisted braided patterns are associated with notched grooves on at least five pieces from La Vache (Clottes and Delporte, 2003) and two pieces from La Madeleine (Braem, 2008; Feruglio and Averbouh, 2016). Rarely found in clearly different contexts, these two patterns can therefore be regarded as usually constitutive of the decoration with notched grooves. While the notched grooves normally appear on the central part of the composition, the braided patterns (and associated curves) tend to be localised toward the ends, and the ovate reliefs appear either at the ends or in the middle, in between pairs of notched grooves (Feruglio, 2003). The three patterns can be seen together on a long fragment from La Vache (MAN 83641-L40), but the braided pattern is not represented on the almost complete half-round rod with notched grooves and ovate reliefs from La Vache (refitting MAN 83642-L18 / MAN 83643-L18 / MAN 86790), which measures

282 mm in length (Clottes and Delporte, 2003). Most of the fragments only show limited portions of the decoration with notched grooves, whereas various associations with other geometric patterns and animal depictions can also be observed.

The main set of half-round rods with notched grooves documented so far is the one from La Vache (at least 22 pieces with notched grooves and 6 additional fragments showing ovate reliefs or braided patterns; Clottes and Delporte, 2003). A few pieces with pairs of notched grooves are known from 12 other sites, at Urtiaga, Lortet, Gourdan, Le Mas d'Azil, Bèdeilhac, Les Églises, Montastruc, Courbet, Laugerie-Basse, La Madeleine, Teyjat, and Fontarnaud (Cartailhac, 1903; Piette, 1907; Capitan and Peyrony, 1928; Beltrán et al., 1967; Leroi-Gourhan, 1971; Chollot-Varagnac, 1980; Sieveking, 1987; Gonzalez Sainz, 1989; Sacchi, 1990; Feruglio, 2003). In addition, small fragments of half-round rods with braided patterns or small ovate reliefs that might have been part of a comparable decoration are also present at Les Espéluques and Longeroche (Chollot-Varagnac, 1980; Man-Estier, 2017). Currently, specimens with this type of decoration appear more numerous in the central Pyrenees, which is the probable source area from where they would have spread to the Aveyron valley, Dordogne, and Gironde, while there is a western example at Urtiaga, in



Fig. 8 – Distribution of the half-round rods with notched grooves, ovate reliefs and braided patterns. Examples of half-round rods showing notched grooves (1) and notched grooves associated with ovate reliefs and curves (2) from Gourdan (drawings: Piette, 1907).

Fig. 8 – Répartition des baguettes demi-rondes à rainures crantées, reliefs ovalaires et motifs tressés. Exemples de baguettes demi-rondes présentant des rainures crantées (1) et des rainures crantées associées à des reliefs ovalaires et des lignes courbes (2) de Gourdan (relevés : Piette, 1907).

Abb. 8 – Verteilung der Halbrundstäbe mit eingekerbten Rillen, eiförmigen Reliefs und geflochtenen Mustern. Beispiele für Halbrundstäbe mit eingekerbten Rillen (1) und eingekerbten Rillen in Verbindung mit eiförmigen Reliefs und Kurven (2) aus Gourdan (Zeichnungen aus Piette, 1907).

Guipúzcoa (Spain). These data already indicate a rather large spread across south-western France, and additional examples might come to light in the future. They are found in Upper Magdalenian layers (e.g. La Vache layers 1 to 4, Les Eglises layer 4).

DISCUSSION

The distribution maps of these ten types of decorated weapons show some shared artistic concepts over long distances, while others appear much more limited in space. Their distribution areas only partly overlap, giving a complex picture, for which interpretation is not straightforward (fig. 9). Nonetheless, some general remarks can be formulated and contrasted with data coming from analysis of other proxies.

Middle Magdalenian movement

During the Late Middle Magdalenian, numerous points and half-round rods with rows of protuberances appear as an emblematic feature of the Pyrenean material culture. They may have spread from the Pyrenean area, which exhibits the majority of the examples, westward along the Cantabrian coast and north toward the Aveyron valley and Dordogne, and east toward to the Rhone valley, and then along the north side of the Alps until Moravia, to cover a broad area extending over 1,500 km. Due to the similarity of their technical and stylistic treatment as well as the graphic associations with peculiar signs throughout the whole area of distribution, they have been regarded as an ethnic marker indicating the cultural identity shared by several human groups (Fegulio and Averbouh, 2016; Fuentes et al., 2019). The weapon tips with protuberances seem to show a large expansion of Late Middle Magdalenian Pyrenean traditions and/or their extended zone of influence, probably witnessing an early incursion into Central Europe before the Upper Magdalenian. Their distribution area is almost identical to the one of the perforated disks engraved with radiating decorations, which are found as far east as Krizova cave (Fuentes et al., 2019), while further artistic similarities between south-western France and Moravia (Czech Republic) are attested by the presence of comparable decorated spatulas made of horse mandibles in Gazel and Pekárna caves (Pétillon and Sacchi, 2013). Even if they are not known in Moravia nor on the northern coast of Spain, the spear-throwers sculpted with horses seem to have followed the same north-eastern diffusion route to Kesslerloch (Switzerland) and even further north to Teufelsbrücke (Germany; see Welté, 2000; Cattelain, 2005).

Within these large networks, evidence of relationships along the Pyrenean and Cantabrian mountains is particularly numerous. Concerning the decorated weapons, a clear example is the distribution of the half-round rods with arcs and ‘trefoils’, essentially Pyrenean items, along the north coast of Spain, while their spread northwards

seems limited to a few examples at Courbet cave in the Aveyron valley. Less noticeable, the half-round rods with clusters of curves also attest to contacts between the western Pyrenees and the Cantabrian coast. The dynamics of the moves and exchanges along this Pyreneo-Cantabrian axis are further emphasised by the numerous artistic concepts shared by the inhabitants of both areas, notably including statuettes with hollowed eyes designed for inserting stones, spear-throwers sculpted with ibex, fish-shaped spatulas, sculpted bison limbs, or ‘claviform’ signs in cave art (Fritz et al., 2007; Sauvet et al., 2008; Rivero, 2010; Sauvet, 2019). Moreover, several marine species’ teeth, bones and depictions have spread along the same axis from the Atlantic coast to the central Pyrenees (Pétillon, 2017), while artefacts made of Chalosse flint are also found in significant quantities in the central Pyrenees and on some sites of the Cantabrian coast (Lacombe, 2005; Corchón Rodríguez et al., 2009; Chalard et al., 2010).

In this context, the western Pyrenean area might have played a significant relay role, considering its intermediary location and the large amount of artistic production in Isturitz cave (Rivero, 2010). Interestingly, the spread of the weapon tips covered with spirals and circles seems restricted to this area, extending over a distance of less than 200 km. Because of the remarkable technical and stylistic innovations of this decoration, they have been regarded as the possible work of itinerant artist(s) moving across the area (Feruglio and Buisson, 1996). Be that as it may, they support the existence of a local identity that could fit with a moving territory by its size and the potential complementarity of the available resources from mountain, plain, and littoral environments. Nevertheless, this is the only type showing such a limited distribution, and the existence of a western Pyrenean territory is otherwise only supported by a generally higher resemblance of the whole archaeological assemblages in this area (Dachary, 2009).

Perpendicularly to the Pyreneo-Cantabrian axis, north-south circulations are also attested during the Late Middle Magdalenian by several types of flint imported from over 200 km away (e.g. Bergerac flint, ‘grain de mil’ flint from Charentes) and regularly found in the form of tool blanks at sites along the Pyrenean foothills (Langlais et al., 2016). Although weapon tips with protuberances are well represented at Laugerie-Basse and present at La Madeleine, in Dordogne, a lack of sites with occupations from the Late Middle Magdalenian in the northernmost part of Aquitaine has been stressed by recent studies and interpreted as possibly witnessing a population gap (Barshay-Szmidt et al., 2016). This might explain the limited spread of Late Middle Magdalenian decorations toward the north.

Upper Magdalenian movement

During the Upper Magdalenian, the existence of extended networks across Europe is still attested, notably by the wide distribution of the schematic feminine figures of this period and some Atlantic shells, but evidence for contacts with the Cantabrian area seems to fade out (Fritz et al., 2007; Sauvet et al., 2008; Sauvet, 2019).

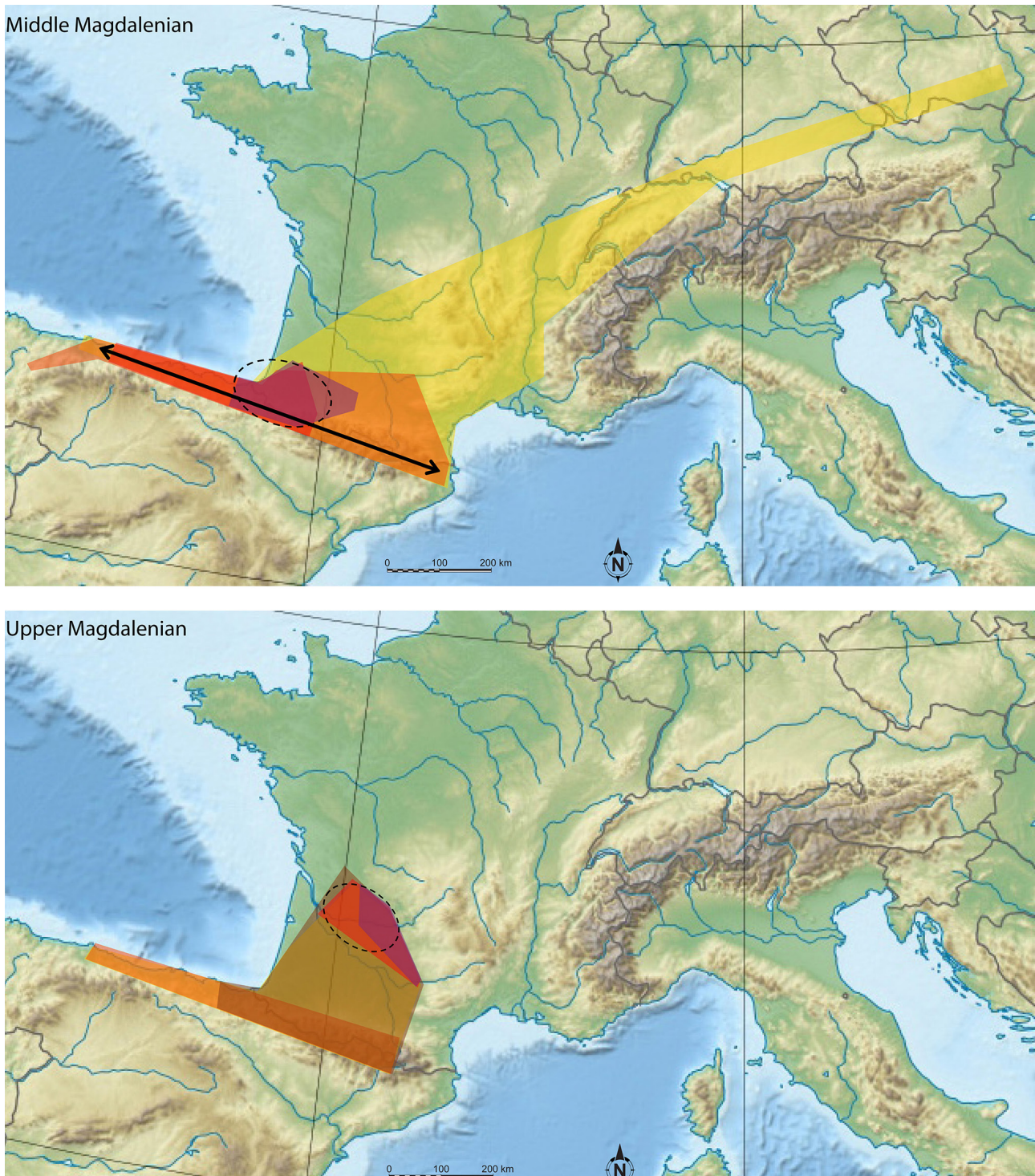


Fig. 9 – Synoptic distribution maps comparing the spread of decorated weapon tips in the Middle and Upper Magdalenian.

Fig. 9 – Cartes de répartition synthétiques comparant la diffusion des armatures décorées au Magdalénien moyen et supérieur.

Abb. 9 – Verteilungskarte mit Vergleich der Verbreitung der dekorierten Waffenspitzen während des Mittleren und Späten Magdalénien.

Maintained relationships with the Cantabrian coast are nonetheless still attested by the weapon tips with lateral zigzags, widely spread in the Aquitaine basin and on the Cantabrian coast, and the depictions of *Capra* in frontal view. The latter, probably originating from the Cantabrian area, mainly spread along the Pyreneo-cantabrian axis to the central Pyrenees, another mountain-

ous area where ibex were hunted (Langlais et al., 2012), while they tend to become less numerous and less characteristic to the north of Aquitaine. Even if their chronological attribution remains unsure, both of these decorations (lateral zigzags and *Capra* in frontal view) seem to appear in the Early Upper Magdalenian or during the transition between the Middle and Upper Magdalenian.

It is also the case of the undecorated fork-based points, the distribution of which similarly attests contacts between the Pyrenean area (where most of the examples come from) and the northern coast of Spain (Basque Country, Asturias) as well as the north of Aquitaine during the Early Upper Magdalenian (Pétillon, 2006).

However, the dominant decoration type on the half-round rods from the Upper Magdalenian of south-western France, the one with notched grooves, ovate reliefs and braided patterns, is currently not known on the Cantabrian coast. Predominantly represented in the central Pyrenees, this type seem to have spread mainly to the north, to the Aveyron valley and the north of Aquitaine, whereas its westward diffusion seems limited to one example in Urtiaga so far, thus contrasting with the spread of the Middle Magdalenian Pyrenean decorations.

In this context, a local identity seems to stand out in Dordogne, where most of the representations of macrocephalic horses and fish-shaped patterns come from. These two elaborate decorations are represented on the same types of objects (essentially large bevelled rods and perforated batons), where they are sometimes associated, and have strikingly similar distribution areas, focused in Dordogne (and Gironde for the macrocephalic horses) with a limited spread to the Aveyron valley. Another original feature of the Upper Magdalenian art of Dordogne is visible in the occasional tracing of a ground line below the feet of the animal depictions (Tosello, 2003; Fritz et al., 2007). To the south, the Aveyron valley may have played a pivotal role in the relationships between Dordogne and Pyrenees, as it appears to retain artistic concepts from both areas. Indeed, the schematic feminine figures, macrocephalic horses and fish-shaped patterns found in the Aveyron valley suggest Dordogne influences, while the half-round rods with notched grooves and ovate reliefs, the saiga antelope depictions (Cook and Lucas, 2018) and higher resemblances in the various decorations on weapon tips support significant Pyrenean influences at the same time.

CONCLUSION

The spread of decorated projectile tips across Magdalenian societies documents both short and long distance relationships, depending on the types of decorated weapons. The distribution maps indeed highlight widespread cultural markers (such as the weapon tips with protuberances) coexisting with possible local markers (weapon tips with spirals and circles, with macrocephalic horses, and with fish-shaped patterns) as well as interregional types, for which distribution areas only partly overlap. Consequently, they can bring precious clues to discuss local identities, exchanges networks, and cultural expansions. However, they do not give any simple answer to outline territories and understand mobility. In the future, we may still find some pieces outside of the current distribution areas; the hypotheses built from the spread of decorated weapons must then be regarded as working hypotheses that need to be tested in the light of other proxies in order to be validated.

In the meantime, the distribution of decorated weapons suggests significant changes throughout the Magdalenian period. During the Middle Magdalenian, the main types of decorated weapons identified in south-western France are particularly abundant in the Pyrenean area, which appears to maintain strong links with the Cantabrian coast via the western Pyrenees, while the dominant weapons with protuberances have widely spread to Central Europe. By contrast, some decorated weapons from the Upper Magdalenian tend to be essentially concentrated in different areas (macrocephalic horses and fish-shaped patterns in Dordogne, *Capra* in frontal view in Cantabria), supporting higher regional disparities across the Franco-Cantabrian area.

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