Seasonal Markers: Seven Series of Magdalenian Images and Their Symbolic Use

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ABSTRACT

This article presents results from an extensive review of the figurative images engraved on different classes of Middle and Upper Magdalenian artifacts made from organic materials. Seven of the recurrent subjects identified reveal a clear focus on selected anatomical and behavioral characters only displayed by the corresponding species at a well-defined time of the year, referred to here as a biological season. These seasonal characters were regularly emphasized by the image-makers in direct and indirect ways, including image framing, selective stylization, and the omission or reduction of other features. These findings are explained with a new theory inspired by selected remarks found in the writings of the late Alexander Marshack. Unlike existing theories on the meaning of Paleolithic art, the one presented here is directly based on the archaeological evidence and can only be applied to selected series of images, whose definition relies on the newly introduced concept of recurrent subjects. While future research will likely extend its application to additional examples and series, it could never become another general theory because at least two series falling outside its scope are known.

INTRODUCTION

This article presents seven series of figurative images created in the Magdalenian cultural period on several classes of artifacts defined here as portable objects. Two of these, the winter ibex and bison with display hair series, can be considered original discoveries, while the remaining five were previously discussed by different authors at different times but will be described more in detail here based on significantly or considerably revised and extended selections of representative images. These images will act as supporting evidence to establish that the Magdalenians represented the corresponding subject time and again, pointing to a wider cultural significance compared to rare or unique subjects. Following the introductory sections, this article will feature six sections—including one dealing with the two wild horse series—presenting results from an extensive review of the evidence under consideration, with complete descriptions for selected images, leading to a final section addressing the interpretation of the recurrent subjects identified. The symbolic meaning of all subjects will be addressed with a new theory inspired by a recurring theme in the research of Alexander Marshack (1991, 1995). This theory is directly based on the archaeological evidence presented here, rather than ethnographic comparison with Holocene cultures. Without evidence of a direct link, ethnographic analogy between cultures so far apart in time and space does not seem justified or scientifically sound.

Magdalenian images have traditionally been studied from the point of view of art history. Based on the assumption that the concept of "style" can still be applied so far back in time, stylistic studies have used formal analysis while looking for evidence of regional variations, stylistic evolution, and correspondences between the images created on natural features and archaeological artifacts. But seeing these images as "art" is limiting and misleading (Conkey and Soffer 1997: 2–3) because we should not assume that their primary function was aesthetic but ask questions about how they were used and why they were made (Conkey 1990: 165). This study looks at the same evidence in a different way. Rather than art, Magdalenian images are seen as visual creations from a culture belonging to a different geological epoch, one in which the images were an essential part of advanced symbolic activities. Direct archaeological evidence supports the notion that Magdalenian images were symbolic (Castelli 2010: 151), even though the task of decoding them can be an extremely difficult one due to the very limited contextual information available. When studying a culture beyond the last geological boundary—without knowing to what extent its heritage was lost, preserved, or transformed in early Holocene cultures—it is essential to avoid all forms of bias. To this aim, the evidence presented here will be set in the context of the natural environment in which the Magdalenian culture developed, drawing on relevant knowledge from the earth and life sciences. The line of research this study belongs to relies on close inspection of the evidence from the extensive archaeological record of the final Pleistocene with reference to current knowledge of paleoclimates and paleoenvironments.

Following this approach, the first step will be to more accurately describe the subjects represented in individual

images, what can be referred to as content analysis. This will in turn allow for the identification of recurrent subjects, a concept central to this study. Recurrent subjects are here defined as subjects of which two or more instances have been identified with a high degree of confidence on two different portable objects, where the degree of confidence is determined by how complete, naturalistically accurate, and detailed the images being described are. Two may seem like a small number but consider the following. Many artifacts from organic materials may have been damaged and eventually lost due to a combination of human action and natural causes, or simply lie still unearthed, which makes the current inventory only a subset of all the artifacts fashioned and engraved in Magdalenian times. Therefore, any two images of the same subject found on these artifacts are possibly, even likely, representative of a more extensive series that originally included additional examples, some of which may be discovered at some point in the future. Recurrent subjects should be important to us because their frequency tells us that they were important to the Magdalenians, or at least were culturally significant across time and space, and can therefore reveal aspects of their world view.

The subjects of Magdalenian figurative images have traditionally been listed by biological taxon at the species, family, or higher level. For example, the images in the first plate would be classified as "red deer" or "cervid." For studies dealing with large numbers of images, especially images found on cave walls where details can be difficult to read or missing, this is a convenient system that allows researchers to include and statistically evaluate images for which only a tentative species or family determination can be put forward, but one leading to results that do not accurately or effectively reflect the archaeological evidence. This is particularly evident in ibex images that could belong to one of the two closely related series discussed in this study or to a different series with its own meaning and use (Castelli 2010: 151–152). The recurrent subjects listed in this study are never as indefinite as "ibex" because not only did the Magdalenians represent selected wildlife species but they focused on individuals of a given sex and age class to highlight selected anatomical features and behavioral displays. Not all these elements are present in every image, but every element present is always consistent with every other one as part of a naturalistically accurate representation. Everything is selective and everything is consistent. Due to the fragmented or damaged state of many artifacts, there will always be incomplete images that can be described only tentatively, but the more accurately we define recurrent subjects based on the best preserved and more detailed examples, the more effectively we will be able to recognize them in images that are more difficult to read.

The central sections of this article share a similar format. Each section opens with relevant biology and paleobiology notes, followed by a new or revised definition of the recurrent subject represented, and a general overview of the images selected as supporting evidence. For subjects already known to be recurrent, even if this exact term was not used, these selections regularly include images not previously recognized as being part of the corresponding series. At the same time, several examples described in the literature as part of a series were left out as they were not considered convincing enough, or more likely to represent a different subject. The images discussed in these sections are meant to demonstrate the intention of the Magdalenians to represent the corresponding subject, establishing it as a recurrent one, rather than being a complete inventory of all the instances that can be found in the archaeological record. For each series, only the clearest examples were included here, but there are many more examples that are likely to, could possibly, or that it cannot be ruled out that they were meant to represent the same subject. For images that are now incomplete or difficult to read, less artistically accomplished renditions, and even confidently executed images with a high degree of stylization, descriptions can become overly complex without leading to definite results, which would be of no use here.

The next step will be to address the possible significance of each recurrent subject based on the evidence collected. While a given subject could be represented in different styles, as can be seen in the examples illustrating each series, selected anatomical features and behavioral displays were regularly emphasized by the image makers in direct and indirect ways. These biological characters are likely to have been culturally relevant to the Magdalenians for a significant length of time within the combined Middle and Upper Magdalenian time frame.

MATERIALS AND METHODS

The findings presented in this article are the results of an extensive review of the figurative images created on Middle and Upper Magdalenian portable objects, defined here as artifacts made from organic materials including bone, antler, and ivory. These artifacts have traditionally been allied with engraved artifacts made from lithic materials and collectively referred to as *art mobilier*. This definition will not be used here as it brings together archaeological materials with completely different physical properties, which hardly seems useful or justified. Engraving was the most common technique used on all classes of portable objects, occasionally combined with low-relief carving, while full-round carving is only known from a few classes like batons and spear-throwers. Note that, for convenience, *bâtons percés* will be referred to here as batons and *lissoirs* and *spatules* as polishers. The visual creations carved and engraved on portable objects can be classified into three categories, namely figurative images, geometric motifs regarded as symbolic or decorative, and geometric elements informally referred to as signs. The present study will only deal with figurative images, that is, images considered to be representational or naturalistic regardless of whether the subject represented could be determined or not, or the degree of confidence in that determination.

The review materials consisted of artifact photographs, tracings, and drawings collected from print and online sources. Printed sources included illustrated books, exhi-

bition catalogs, collection catalogs, research articles, conference papers, and thematic monographs. Online sources included picture libraries linked to museum websites (Table 1) or web portals (Table 2). For artifacts of special interest, additional photos retrieved from museum archives or taken specifically for this project were kindly made available by the representatives of selected institutions (see Acknowledgments). With two exceptions, all the line art illustrations published here are original tracings from photographs based on the materials collected. Produced with a fully digital workflow, these tracings consist of a combination of manually traced lines or marks and photographic layers, an hybrid technique first developed to more accurately reproduce exceedingly fine or complex engravings and then extended to areas where adding volume and shading was required. All tracings in the same figure, or plate, are in relative scale to each other, but unfortunately a significant margin of error should be assumed because the scaling process relied on the measurements obtained for each artifact and the numbers reported by different sources rarely match.

The two exceptions are two early tracings created by renowned prehistorian Henri Breuil for artifacts whose current location is unknown or could not be determined. These are the only two artifacts missing a museum code and inventory number in the artifacts table (Table 3). When creating his artwork, Breuil tended to enhance the artistic quality of the original images with the addition of what were considered to be missing parts or through the adjustment or omission of fine details. To what extent did these issues affect the tracings reprinted here? The current location of the artifact pictured in the first (see Figure 6a below) is unknown but we can tell from the description left to us by Breuil that the images engraved on its surface were devoid of fine details and unremarkable to his eyes (more details in Castelli 2010: Table 1, Table 3). This means that he may have not deemed these particular images worthy of improvement, and at the same time they were not detailed enough in the first place to allow for significant changes, which confirms the impression of a rather straightforward and essentially accurate rendition. Note that this is a fully unrolled tracing of the engraved images but not the artifact borders. The accuracy of the second tracing (see Figure 13i below) is more difficult to assess. This author believes that Breuil traced an earlier drawing published by Émile Cartailhac, rather than a photograph or the actual artifact, which is less than ideal. Still, while the series of marks found within and around the head outline may have been significantly different from what we see—in number, orientation, and especially shape—the rest of the image should be more accurately rendered and reliable enough.

ENVIRONMENTAL SETTING

The Magdalenian culture developed in the final Pleistocene within a refugial area of Western Europe, roughly corresponding to the Atlantic Europe biogeographic region. At the Last Glacial Maximum (LGM), this area was enclosed by a combination of physical and climatic boundaries consisting of the Cordillera Cantabrica and Pyrenees mountain chains to the south, the Western Alps to the east, and an extensive permafrost zone surrounding the northern ice sheets. According to current climate models, the Alps and Pyrenees were covered by extensive ice caps, while the central plains extended to the continental shelf, with the coastline advanced to the west and dotted with islands.

The landscape and climate of this region, which will be here referred to as the Magdalenian region, would change dramatically over the following deglaciation, a combination of gradual processes and sudden events that eventually reshaped the landscape and climate into the Holocene environment with which we are familiar. The cultural sequence is not as well defined as the environmental sequence, but based on current estimates this transformation began in the Lower Magdalenian and it was well under way in the Upper Magdalenian when, around 14,700 years ago, a sudden and intense warming event opened the way to almost two thousand years of climate variability and geological instability. This eventually led to the return of full glacial conditions (Younger Dryas) which lasted for more than a thousand years before being brought to an end by a second warming event as sudden and intense as the first. Marking the boundary between the Pleistocene and Holocene geological epochs, this event was followed by relatively mild and stable climate conditions, essentially the same in which every Holocene culture would develop and we still live today.

RESULTS

BELLING RED DEER

As observed in the remaining wild populations of the Scottish highlands, red deer (*Cervus elaphus*) stags return to the home ranges of hinds, the species mating grounds, in early fall (Clutton-Brock et al. 1982: 52–53, 105). By that time, they will have shed their velvet revealing fully developed, sharp–pointed antlers while their neck has become larger and covered by a thick mane (Clutton-Brock et al. 1982: 105–106). From early to mid or late fall, stags fill the air with deep, roaring sounds that attract females and warn off rivals, a behavior known as belling or bugling. These sounds can be heard for miles around when two stags engage in a roaring contest—which can last several minutes or longer (Clutton-Brock et al. 1982: 129). In the act of belling, red deer stags throw back their antlers to assume a characteristic stance, with the neck stretching forward and the head pointing upwards.

Marshack (1972) drew attention to a series of images showing an adult deer male, or stag, in the act of belling. The examples he presented included the image engraved on a baton from Les Hoteaux (Figure 1b) showing a red deer stag with the antlers thrown back and an open mouth, which he effectively described as a "long-antlered, head-high stag in its full-throated autumn rutting bellow" (Marshack 1972: 185). The powerful neck covered by a thick hanging mane is a secondary sexual character consistent with the behavior depicted, and so are the sharp-pointed

TABLE 1. LIST OF MUSEUMS

CODE	NAME	INSTITUTION/HISTORICAL BLDG	CITY	STATE/REGN/DEPT	COUNTRY	WEBSITE	PICTURE LIBRARY
AA	Musée départemental d'histoire et d'archéologie	abbaye d'Arthous	Hastingues	Landes	France	http://arthous.landes.fr [4]	
BM	British Museum		London		UK	https://www.britishmuseum.org [4]	
LMA	Logan Museum of Anthropology	Beloit College	Beloit	Wisconsin	USA	https://www.beloit.edu/logan	
MA	Musée d'Aquitaine		Bordeaux	Gironde	France	http://www.musee-aquitaine-bordeaux.fr [4]	
MAA	Museo Arqueológico de Asturias		Oviedo	Asturias	Spain	https://www.museoarqueologicodeasturias.com	
MAAP	Musée d'art et d'archéologie du Périgord		Périgueux	Dordogne	France	https://www.perigueux-maap.fr	
MAH	Museum zu Allerheiligen	former Allerheiligen monastery	Schaffhausen		Switzerland	https://www.allerheiligen.ch	
MAHG	Musée d'art et d'histoire de Genève		Genève		Switzerland	http://institutions.ville-geneve.ch/fr/mah	
MAN	Musée d'archéologie nationale [1]	château de Saint-Germain-en-Laye	Saint-Germain-en-Laye	Yvelines	France	https://musee-archeologienationale.fr	RMN Grand Palais Base Joconde
	Museo Arqueológico Nacional		Madrid		Spain	http://www.man.es	CER.ES
MB	Musée Bégouën	château de Pujol	Montesquieu-Avantès	Ariège	France	http://cavernesduvolp.com	
MBAC	Musée des beaux-arts de Carcassonne		Carcassonne	Aude	France	https://www.carcassonne.org [5]	
MC-MHNL	Musée des Confluences [2]		Lyon		France	https://www.museedesconfluences.fr	
MCHM	Musée de Cahors Henri-Martin		Cahors	Lot	France	https://cahorsagglo.fr [5]	
MDA	Musée départemental de l'Ariège	château de Foix	Foix	Ariège	France	https://musees-occitanie.fr [6]	
MDW	Musée Despiau-Wlérick [3]		Mont-de-Marsan	Landes	France	http://www.montdemarsan.fr [5]	
MH	Musée de l'Homme	Muséum national d'histoire naturelle	Paris		France	http://www.museedelhomme.fr	
ML	Musée Labenche		Brive	Corrèze	France	http://www.museelabenche.fr	
MN	Musée archéologique	ancien palais des archevêques	Narbonne	Aude	France	http://www.musees-narbonne.fr [6]	
MNCIA	Museo Nacional y Centro de Investigación de Altamira		Santillana del Mar	Cantabria	Spain	http://www.mecd.gob.es/mnaltamira	CER.ES
MNCN	Museo Nacional de Ciencias Naturales		Madrid		Spain	https://www.mncn.csic.es [4]	
MNHN	Muséum national d'histoire naturelle		Paris		France	https://www.mnhn.fr	
MNP	Musée national de préhistoire		Les Eyzies-de-Tayac	Dordogne	France	https://musee-prehistoire-eyzies.fr	RMN Grand Palais
MNS	Musée national suisse		Zurich		Switzerland	https://www.nationalmuseum.ch [4]	
MP	Musée de la préhistoire		Le Mas-d'Azil	Ariège	France	https://www.le-mas-dazil.fr [5]	RMN Grand Palais
MuPAC	Museo de Prehistoria y Arqueología de Cantabria		Santander	Cantabria	Spain	https://www.museosdecantabria.es [6]	
MRAL	Musée régional de préhistoire Amédée Lemozi	centre de préhistoire du Pech Merle	Cabrerets	Lot	France	http://www.pechmerle.com	
MRB	Musée de Brou	monastère royal de Brou	Bourg-en-Bresse	Ain	France	http://www.monastere-de-brou.fr	
MSC	Musée Sainte-Croix		Poitiers	Vienne	France	https://www.poitiers.fr [5]	
MVB	Musée d'histoire naturelle Victor Brun		Montauban	Tarn-et-Garonne	France	http://www.museum.montauban.com	
PMAE	Peabody Museum of Archaeology and Ethnology	Harvard University	Cambridge	Massachusetts	USA	https://www.peabody.harvard.edu [4]	
RM	Rosgartenmuseum		Konstantz	Baden-Württemberg	Germany	http://www.rosgartenmuseum.de	

[1] Formerly Musée des antiquités nationales.
[2] Holds collections from the earlier Musée d'histoire naturelle de Lyon, also known as Musée Guimet.
[3] Holds collections from the earlier Musée Dubalen.
[4] Website including, or directly linking to, a picture library devoted to the museum's collections.
[5] Official city website with one or more pages for this museum.
[6] Website for two or more museums.

TABLE 2. ONLINE PICTURE LIBRARIES.

LIBRARY	DETAILS	WEB PORTAL	ADDRESS
CER.ES	Red Digital de Colecciones de Museos de España		http://ceres.mcu.es
Base Joconde	Collections des Musées de France	POP	https://www.pop.culture.gouv.fr/
RMN Grand Palais	Agence photo de la Réunion des Musées nationaux		https://www.photo.rmn.fr
RMN Grand Palais	Official 3D reproductions of the French national museums' collections	Sketchfab	https://sketchfab.com/francecollections/collections

antlers that alone would place this image firmly in the red deer mating season, when antlers have already lost their velvet but before they are shed.

The Les Hoteaux image was the only example from portable objects presented by Marshack, but the final remark in his account suggested there may be more (Marshack 1972: 185). In the course of the review of Magdalenian figurative images that the present study is based on, this was found to be definitely the case, as evidenced in the first plate (see Figure 1) and associated photographs (Figures 2 and 3). The examples collected here show a stag with an open mouth and almost always include long, sharp-pointed antlers as in the image from Les Hoteaux, although a full neck mane is only present in the examples from Laugerie Basse (Figure 1i) and possibly Lortet (Figure 1l). Primary sexual characters are occasionally added to complete the picture, without any emphasis, as in the examples from Lortet (Figure 1e, Figure 1l), possibly Gourdan (Figure 1m), and maybe La Madeleine (Figure 4). This feature is missing from the Les Hoteaux image, but it should be noted that the lower end of the body and limbs are only sketched out, and the image itself does not fully extend around the cylindrical surface of the baton like the one from Lortet (see Figure 1e). This is why the tracing presented here is only partially unrolled, only showing the sides where the rendition is accurate and complete.

Lines of belling red deer stag images are not rare. In the first tube from le Mas-d'Azil (Figure 1c), we do not see the muzzle, but the overall posture is indicative of a belling behavior. What is more, this image is in the same style as the images on another tube from the same site, and while the two fragments are not part of the same artifact (Fritz in Thiault and Roy 1996), they are likely to represent the same subject. The subject of the third image on the baton from Lortet has been described as looking back in fear or calling but it is more likely to be yet another red deer stag in the act of belling, only with the head turned sideways (see Figure 1e). Of the second image on the same artifact, we only see velvet-free antlers and primary sexual characters, but it is possible it represents the same behavior, while of the first we only see the hind legs. The two images on a baton from La Madeleine, of which only the first is pictured here (see Figure 4), are difficult to read due to the conditions of the artifact surface, but the details of the mouth and overall stance indicate that they belong to this series.

The full-figure images forming a line on the baton from Gourdan (see Figure 1m) have traditionally been described as belling red deer stags. Crémades (1992) performed a detailed technological analysis of the engravings on this artifact, but eventually concluded that the surface was too altered to confirm anything but the length of the antlers (Crémades 1997a: 57–58). Every image, however, shows long antlers almost touching the tail, an outstretched neck, and raised head, which are consistent with the original description. The overall stance, from hind legs to upper body, seems to convey a forceful tension directed forward and upward. More significantly, the details of an open mouth seem to have been preserved at least in the first image from the left, as shown in the tracing published here, and the same is true for the head image engraved on the reverse side (see Figure 1m inset).

Due to the lack of antlers, the red deer image engraved on a pendant from Lortet (Figure 5) has traditionally been described as a hind. Within the scope of this study, this would make it a rare, if not the only example of a hind in the act of bellowing or bleating. While this is possible, rare and unique subjects deserve special attention. Close inspection revealed that the antlers are not completely missing. A short curving line departing from the head outline, not far from the eye, and the faint trace of another line suggest the intention to add antlers, which would make it an incomplete stag image. It is not uncommon for horns and antlers to be shortened or reduced in size to fit within the limited space available on the surface of portable objects. The reading proposed here is that the limited engraving space did not allow its maker to extend the antlers in any significant way, but this image was still meant to represent a belling red deer stag, and to anyone familiar with the subject represented, it would have been easily recognizable even in this form.

The following images are likely to represent the same subject but for different reasons could not be illustrated here. The image on a baton with an unusual shape from La Vache was described by Crémades (1997b: 462) as a "cerf brâmant en automne" and the same behavior was recognized in this image by Bertrand (in Clottes and Delporte 2003: 267). In his description of the image at one end of the tube from El Torre, Altuna (2000: 21) drew attention

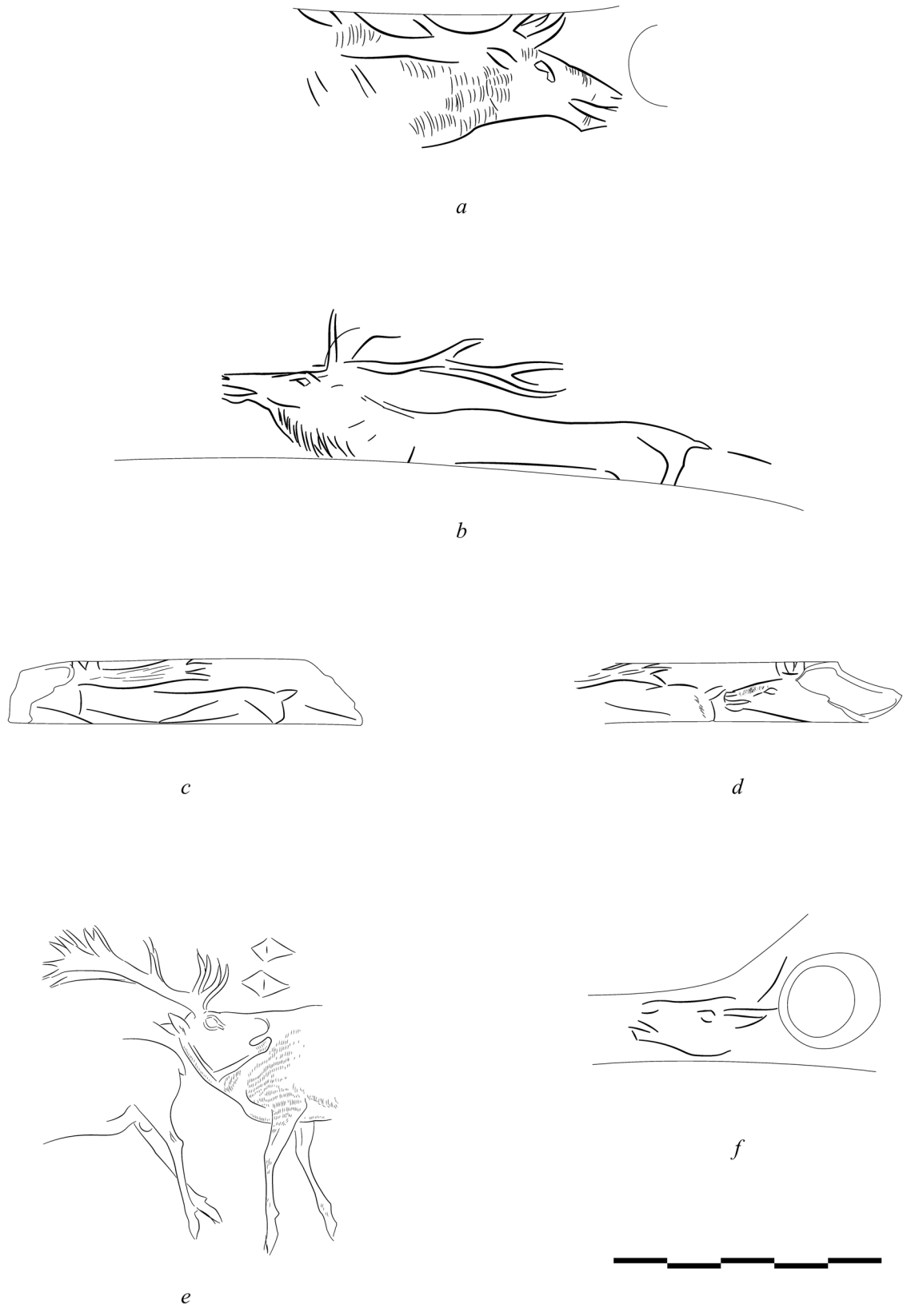

Figure 1. Belling red deer stag images. On this page: a. La Madeleine (MAN 8.161), b. Les Hoteaux (MRB 945.232), c. Mas-d'Azil (MAN 47.356), d. Mas-d'Azil (MAN 47.355), e. Lortet (MAN 47.082), f. Raymonden (MAAP Pr. F. 806); see facing page for continuation.

g

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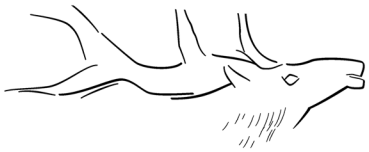

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Figure 1 (continued). Belling red deer stag images. On this page: g. La Madeleine (MAN 56.878 on loan to the MNP), h. Abri Morin (MA 88.47.52), i. Laugerie Basse (MH 38.189.1361), j. Mas-d'Azil (MAN 47.165), k. Laugerie Basse (MAN 54.472 LB), l. Lortet (MAN 47.186), m. Gourdan (MAN 47.351) with reverse side inset.

TABLE 3. ARTIFACT DETAILS.

ARTIFACT						*DISCOVERY*				*CALIBRATED RADIOCARBON DATES*	
FIGURE	**TRACING**	**MUSEUM**	**INV. NO.**	**MATERIAL**	**CLASS**	**MAIN SITE**	**LOCATION**	**CHAMBER**	**LAYER/LEVEL**	**CONVENTIONAL MS**	**AMS**
1a	035	MAN	8.161	red deer (?) antler	baton	La Madeleine					
1b	040	MRB	945.232	reindeer antler	baton	Les Hoteaux			f–g		15,100–15,600 ya (g)
1c	151	MAN	47.356	bone	tube	Le Mas-d'Azil	rive gauche				
1d	027	MAN	47.355	bone	tube	Le Mas-d'Azil	rive gauche				
1e	025	MAN	47.082	reindeer (?) antler	baton	Lortet				X`X1`x`	
1f	137	MAAP	Pr.F.806	reindeer (?) antler	baton	Raymonden					
1g	062	MAN	56.878	bone	ciseau	La Madeleine				14,100–15,800 ya (F7)	
1h	060	MA	88.47.52	bone	tube	Abri Morin			AIII		13,100–15,600 ya (AIII-AIV)
1i	088	MH	38.189.1361	bone		Laugerie Basse					
1j	022	MAN	47.165	bone	tube	Le Mas-d'Azil	rive gauche				
1k	084	MAN	54.472 LB			Laugerie Basse					
1l	042	MAN	47.186	bone		Lortet					
1m	029, 030	MAN	47.351	reindeer antler	baton	Gourdan					
4	073	BM	Palart.306	reindeer (?) antler	baton	La Madeleine					
5	051	MAN	47.349	bone	polisher/pendant	Lortet					
6a				reindeer antler	baton	La Madeleine					
6b	102	MAN	86.719	bone		Isturitz		grande salle	II		14,200–18,100 ya
6c	078	MAN	47.347	bone	tube	Lortet					
6d	011	MAN	47.286	reindeer antler	point (*demi-ronde* type)	Lortet					
6e	010	MAN	83.353	bone	polisher	La Vache		salle Monique	3	15,000–15,300 ya	15,900–17,100 ya (1–4)
6f	061	MDA	989-1-106	bone		Massat					
6g	103	MNP	96-3.1	bone		Les Eyzies	grotte Richard				
6h	050	MSC	D2014.0.2.1	bone		Le Chaffaud	grotte intermédiaire				
6i, k	015, 032	MAN	46.487	bone	pendant	Le Mas-d'Azil	rive droite				
6j	104	MAN	51.451	bone		Aurensan					
7	014	MAN	47.025	reindeer antler	spear-thrower	Le Mas-d'Azil	rive droite (?)				
9	105	LMA	12571	reindeer antler	point	Lacave	grotte de Jouclas				
10a,b	045, 106	BM	Palart.508	bone		Bruniquel	grotte du Courbet				
10c	019	MAN	47.308	bone		Gourdan					
10d	023	MAN	47.300	bone		Gourdan					
10e	020	MAN	48.692	bone		Brassempouy	grotte du Pape	grande galerie			
10f	017	MAN	48.119	bone		Le Mas-d'Azil	rive droite				
11a	150	MAAP	Pr.F.875	reindeer antler	point	Raymonden					
11b	128	MAH	8506	reindeer antler	baton	Kesslerloch					
11c	125	MAN	47.361	bone	polisher/pendant	Mas-d'Azil					
11d	126	MAN	47.098	bone	polisher	Arudy	grotte d'Espalungue				14,300–17,500 ya
11e	127	MAN	52.416	red deer antler	baton	Teyjat	abri Mège				
11f	124	MAN	47.036	bone	compressor (?)	Gourdan					

TABLE 3. ARTIFACT DETAILS (continued).

		ARTIFACT				*DISCOVERY*				*CALIBRATED RADIOCARBON DATES*	
FIGURE	**TRACING**	**MUSEUM**	**INV. NO.**	**MATERIAL**	**CLASS**	**MAIN SITE**	**LOCATION**	**CHAMBER**	**LAYER/LEVEL**	**CONVENTIONAL MS**	**AMS**
13a	031	MAN	48.202	bone		Lortet					
13b	108	MAN	86.669, 86.670	bone		La Vache		salle Monique	4, 3	15,000–15,600 ya	15,900–17,100 ya (1-4)
13c	033	MAN	84.772	bone		Isturitz		grande salle	II		14,200–18,100 ya
13d	043	MAN	86.696	bone	polisher (?)	Isturitz		salle Saint-Martin	SI		16,600–17,400 ya (SI/Eω)
13e	037	MAN	84.745	bone		Isturitz		grande salle	II		14,200–18,100 ya
13f	028	MAN	74.867	bone		Isturitz					
13g	038	MAN	84.742	bone		Isturitz		grande salle	II		14,200–18,100 ya
13h	018	MAN	55.338	bone		Lourdes	grotte des Espélugues			15,100–16,600 ya	
13i				reindeer antler		Bruniquel	grotte du Courbet				
13j	111	PMAE	81573	bone		Lourdes	grotte des Espélugues			15,100–16,600 ya	
13k	036	MAN	84.746	bone		Isturitz		grande salle	II		14,200–18,100 ya
13l	044	MAA	6985	bone		Las Caldas		Sala II	VII	14,800–15,900 ya	
13m, n	026, 164	MH	38.189.1720	bone		Laugerie Basse	abri des Marseilles				
15	052	MAN	83.068	bone	polisher	La Vache		salle Garrigou			
16	109	MB	3031	bone	rondelle	Enlène		salle du Fond, entrée	3-d	14,700–15,800 ya (3-e)	
17a	087	MA	88.47.21	bone	tube	Abri Morin			AIV		13,100–15,600 ya (AIII-AIV)
17b	048	MAAP	Pr.A.1901	bone		Laugerie Basse	abri classique				
17c	034	MAN	31.717	bone		Massat	grotte du Ker				
18a	053	MAN	83.356	reindeer antler		La Vache		salle Monique	1	14,200–14,700 ya	15,900–17,100 ya (1–4)
18b	047	BM	Palart.550	ivory	large carving	Bruniquel	abri Montastruc				
19a	068	RM	U 1	reindeer antler	baton	Kesslerloch					14,000–17,800 ya
19b	161	MAN	21.563	bone		Corgnac	grotte de Saint-Front				

The tracing number is only an internal production code assigned to all original tracings. The artifact class was assumed to be undetermined or unknown, and is therefore missing, for pieces referred to in the original sources by way of their raw material, alone or combined with other physical properties (e.g., *côte, lame osseuse*). Based on the information in Pion (2000: 160–161) the stratigraphic position of the Les Hoteaux baton was inferred to be either layer f or g. The single artifact from La Madeleine with dating information in this table was originally assigned to a layer marked simply as "*supérieure*," but based on the associated industries, this was later identified as layer F, level 7 ("F/7") of the revised stratigraphy (Bouvier 1973).

Figure 2. A close-up view of the baton from Raymonden (MAAP Pr. F. 806) engraved with a belling red deer stag image, among others. This artifact is part of the Féaux collection, as indicated by the letter F in the inventory number. Collections Ville de Périgueux, Musée d'art et d'archéologie du Périgord (photograph by Andrea Castelli).

to the open mouth and the "larmier notable, caractère que montrent les cerfs quand ils brament." Three images on an artifact from Le Courbet with clearly open mouths and outstretched heads have traditionally been described as reindeer but with their brow and bez tines the antlers can only belong to red deer. The image on a tube from the same site has also been described as a reindeer (Cook and Welté 1995: 91–93) but shows the same behavior in a similar style. More belling red deer stag images only known from early tracings and drawings can be found on artifacts from the Bruniquel, Les Eyzies, and Laugerie Basse collections.

LOW STRETCHING IBEX

Following that of red deer, the ibex mating season begins in the late fall and lasts well into wintertime. When approaching a doe for courtship, ibex bucks lower their head and extend their neck out to flick their tongue or bleat like a calf—a common ungulate behavior known as a low stretch (Guthrie 2005: 68). Wilhelm Rätzel (1965: 289), a Swiss-born archaeologist based at Johannes Gutenberg University in Mainz, Germany, was the first to recognize this behavior in a series of ibex images found on three different artifacts, including the baton from La Madeleine engraved with a line of three bucks with outstretched heads and conspicuous beards (Figure 6a). This description is confirmed by the raised tail and what appears to be an open mouth seen in at least one of the images (de Sonneville-Bordes and Laurent 1968: 417).

Rätzel (1965: 288, 290–291) also identified tongue-flicking in two of the ibex images included in the same study. The first is engraved on the back side of a pendant (Figure 6i) and the second carved along the shaft of a spear-thrower (Figure 7) both from le Mas d'Azil. They are two full-figure images, but one of the tracings published here is limited to the head and horns found on the right side of the artifact, which is the best preserved. Both examples were featured

Figure 3. Tube from the Abri Morin (MA 88.47.52) engraved with a belling red deer stag image. Musée d'Aquitaine, Bordeaux (photograph by Andrea Castelli).

Figure 4. The first of two full-figure images engraved on a baton from La Madeleine (BM Palart.306).

in a more recent and extensive inventory of tongue-flicking ibex images, along with four more found on portable objects and as many as nine found on a variety of rock surfaces, all but one dated to the Magdalenian (Sacchi 2008). The additional examples on portable objects include the images from Isturitz (Figure 6b) and Lortet (Figure 6d) discussed below.

These two series of ibex images have been described at different times by different authors but they are not completely distinct from one another. In addition to a tongue out, the image on the Lortet baton shows a deep curve of the neck line and a forward pointing head that make it one of the best examples of a low stretching behavior (see Figure 6d). We do not see the neck in the image from Isturitz, only a series of tiny marks that may or may not represent the neck mane, but the head is stretching out in the same way (see Figure 6b). Because the buck is shown with an open mouth, it is more likely to be bleating than tongue-flicking but, as we have seen, both behaviors can be associated with a low stretch display. The image on a tube from Lortet is somewhat rough and sketchy but the head and neck are clearly stretching forward and upward, making it another unmistakable image of the same behavior (Figure 6c). The weathered and partly missing surface of the Le Chaffaud fragment makes it difficult to tell if the buck is bleating or has a tongue out, but from what we can see of the head, neck, and shoulders, it is definitely in a low stretch position (Figure 6h). The image from La Vache also seems to show the head stretching forward (Figure 6e), and so do the images from Les Eyzies, which also have an open

Figure 5. Bone pendant from Lortet (MAN 47.349).

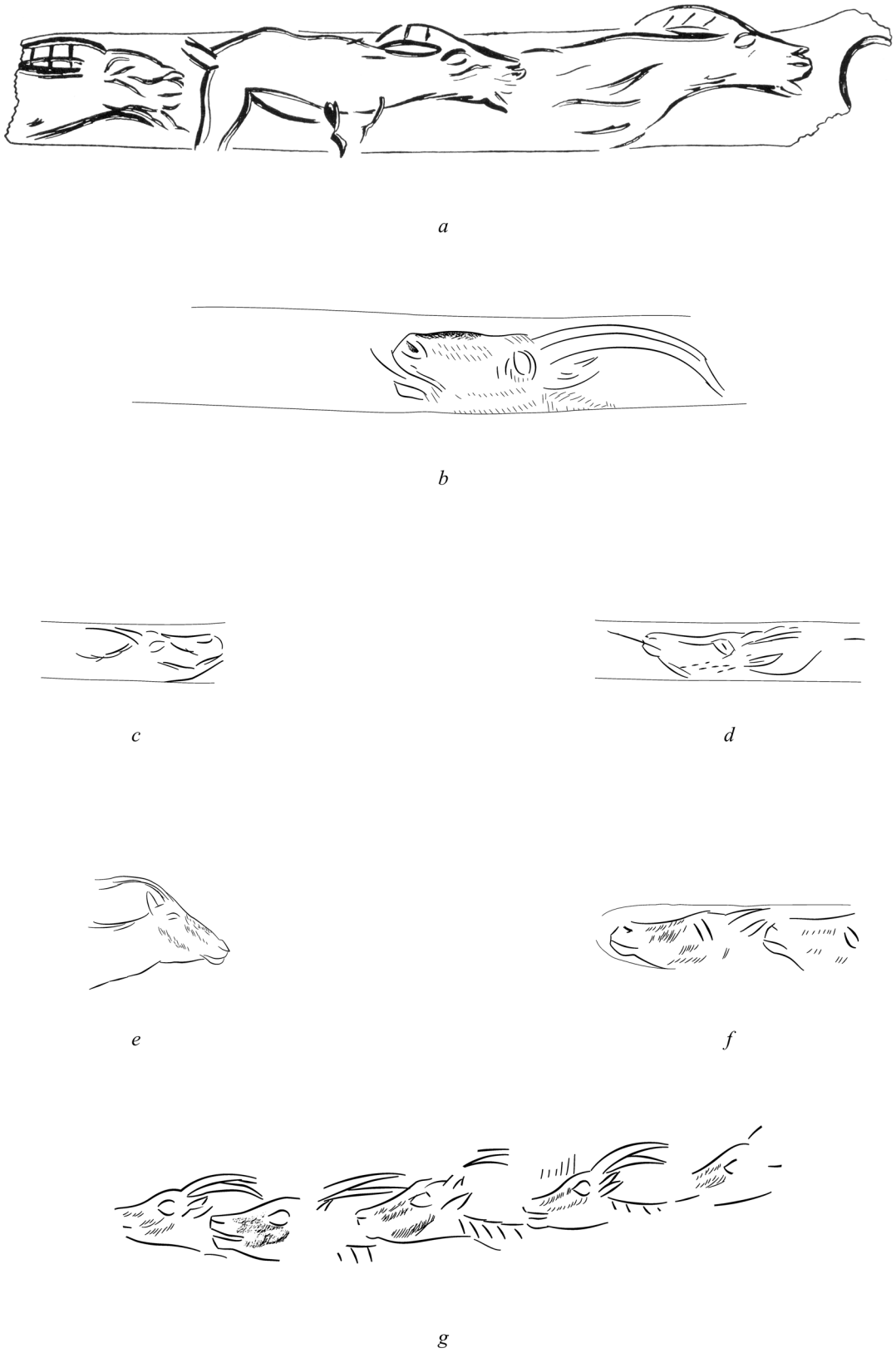


Figure 6. Low stretching ibex and winter ibex images. On this page: a. La Madeleine (see Materials and Methods), b. Isturitz (MAN 86.719), c. Lortet (MAN 47.347), d. Lortet (MAN 47.286), e. La Vache (MAN 83.353), f. Massat (MDA 989-1-106), g. Les Eyzies (MNP 96-3.1); see facing page for continuation.

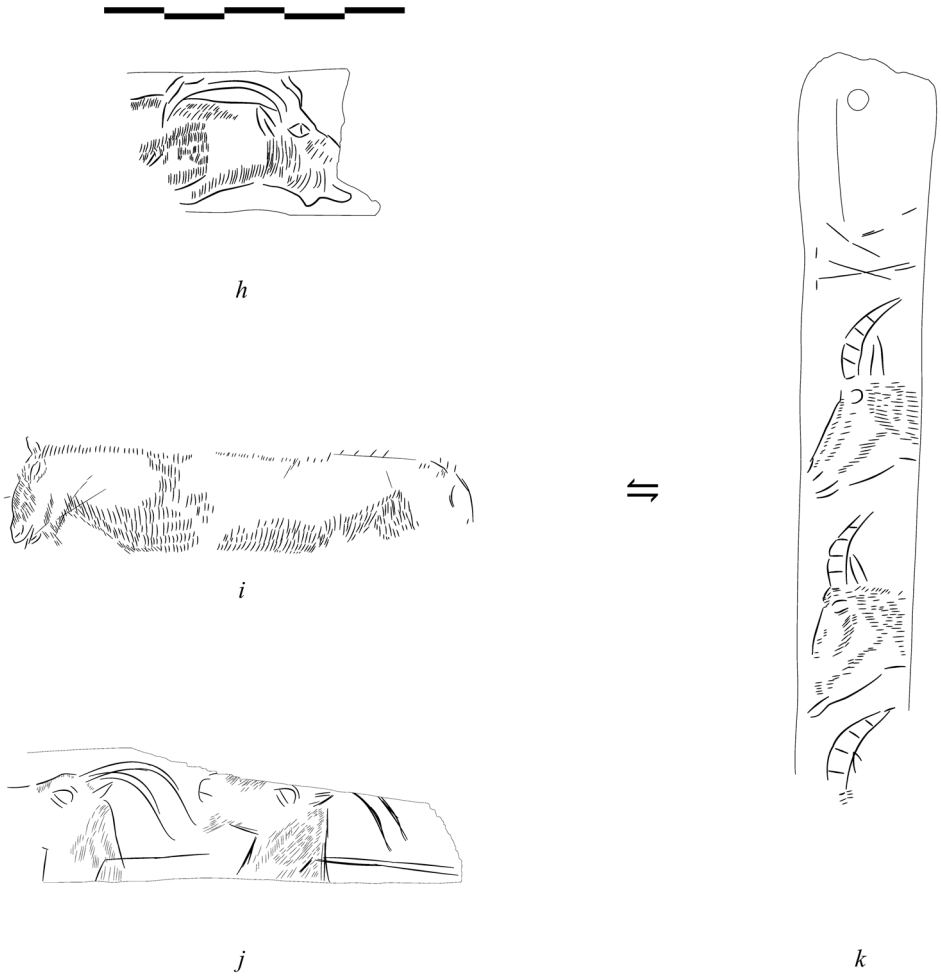


Figure 6 (continued). Low stretching ibex and winter ibex images. On this page: h. Le Chaffaud (MSC D2014.0.2.1), i. Mas-d'Azil (MAN 46.487), reverse side, j. Aurensan (MAN 51.451), k. Mas-d'Azil (MAN 46.487).

mouth indicative of bleating (Figure 6g).

WINTER IBEX

Two species of ibex are endemic to Europe. Saved from near extinction in the mid-19th century, the Alpine ibex (*Capra ibex*) still inhabits the Alps, while the Iberian ibex (*Capra pyrenaica*) recently became extinct in the Pyrenees but survives in the rest of the Iberian Peninsula. Unlike the Alpine species, which occupies a continuous range, the Iberian ibex evolved into four subspecies. Only the now vanished Pyrenean subspecies (*Capra pyrenaica pyrenaica*) falls within the geographic scope of this study. The common name Pyrenean ibex will be used in the rest of this article for this subspecies and the common ancestor of all Iberian

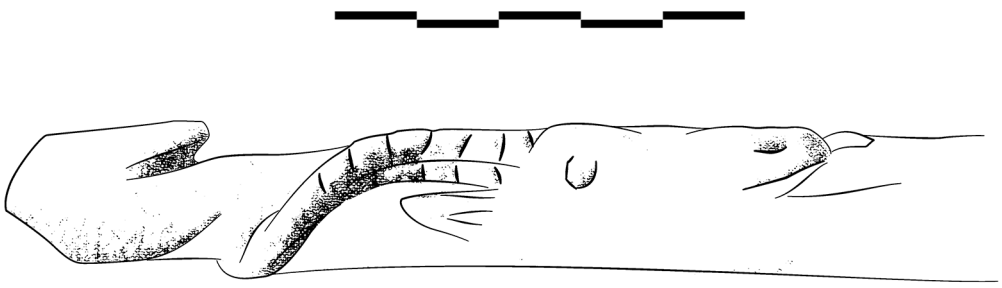


Figure 7. Reindeer antler spear-thrower from le Mas-d'Azil (MAN 47.025).

*Figure 8. Western Iberian ibex (*Capra pyrenaica victoriae*) buck in winter coat (photographs by Peter Spek in the Sierra de Gredos, November 2007, all rights reserved).*

ibex. From paleontological evidence, we know that in the Late Pleistocene, Pyrenean ibex were found all along the Pyrenees and Cordillera Cantabrica (Altuna and Apellániz 1976: 198–199). Recent paleogeographic data reveals that it also inhabited the Massif Central where, like its predecessor (*Capra caucasica praepyrenaica*), it was the "predominant" ibex species (Crégut-Bonnoure 2005: 211–213).

While the coat of Alpine ibex males, and the females of both species, is uniformly brown all year round, the winter coat of Iberian ibex males has a characteristic, contrasting pattern of black and brown hair (Figure 8). The darker, blackish areas include the beard, the top and sides of the muzzle, the shoulders, and the mane along the back of the neck, which continues into the dorsal stripe, a narrow strip running along the back. The neck mane may be short but is clearly visible when it stands erect, as frequently observed in the mating season. The extension of these dark areas is not the same every winter. They become more extensive year after year, and by the time the buck is ten or eleven years old they have turned into an almost continuous cover, leaving only a few areas of brown coat in between, especially at the lower end of the sides of the muzzle and at the sides of the neck. This coat pattern is well documented in the subspecies currently inhabiting the western (Losa Huecas 1989) and southern (Fandos 1991) mountain ranges of the Iberian Peninsula, and according to earlier sources it was at least as prominent in the Pyrenean subspecies.

The full-figure image from Le Mas d'Azil shows an open mouth and tongue out but no indication of a low stretching behavior (see Figure 6i). From an artistic point of view, this image could be seen as stiff or showing an unnatural stance. From the same point of view, the many series of short marks found within the ibex outline could seem somewhat random, as if they were an incomplete rendition of the winter coat, but that is not the case. The series of marks build a pattern that closely matches the dark hair in the winter coat of Pyrenean ibex bucks, especially in the muzzle, neck, and shoulder areas, showing that when creating this image its maker focused more on anatomy than behavior. The same coat pattern can be seen in what remains of the image from Le Chaffaud (see Figure 6h). Both images include a conspicuous beard that completes the winter coat pattern and confirms we are looking at an adult ibex male. The same is true for the images from Aurensan, with their finely engraved winter coat hair, including the dark band covering the top and sides of the muzzle (see Figure 6j). The series of short, slightly curved lines running parallel to the top outline in other images only showing the head and neck are likely to be more stylized renditions of the same dark hair band (see Figure 6b, 6e, 6f, 6g, and 6k) and so is the single row of large marks on the point from Lacave (Figure 9). When this decoration is missing, we still find one or more containing lines marking the lower boundary of the dark hair band (see Figure 6a, 6c, and 6d) in what can be seen as a highly stylized but still recognizable rendition of the same feature. The same may be true for the three series of short marks found further down, below the area where the dark hair band would be located, on the point from Lortet (see Figure 6d), but these are more difficult to read, and it is not even clear if they have a figurative value.

WINTER AND SUMMER HORSES

The task of selecting a living form to use as reference in studies of Magdalenian representations of wild horses is anything but straightforward. New archaeological evidence and genetic studies on the origins of domesticated horses have yet to clarify our views on their wild ancestors. Different authors have turned to either Przewalski's horses, the horses known as tarpans, or several domestic breeds regarded as primitive. Przewalski's horses (*Equus przewalskii*) have long been considered the last, truly wild living species or subspecies of wild horses, which would make it the only reliable choice. Their status has recently been challenged with the notion that they may only be feral (Gaunitz et al. 2018) but a careful reassessment of the archaeological and paleontological evidence from Botai and related sites has found no evidence that they were ever domesticated in the first place (Taylor and Barrón-Ortiz 2021). They may

Figure 9. Engraved point from Lacave (LMA 12571).

be only distantly related to the species or subspecies of wild horses that lived in the Magdalenian region, but their adaptations to similar environmental conditions confirms Przewalski's horses as a suitable choice. The taxonomic status of the extinct horses known as tarpans is still uncertain (Grubb 2005) and so is that of various breeds developed in the last century to recreate their appearance (Castelli 2010–2016). They may eventually be matched to one of the yet unidentified ghost populations whose existence was inferred in recent genetic studies (Fages et al. 2019) but with only limited, mostly indirect information on their anatomy and behavior they could hardly serve as a reference species. In the future, one or more northern European breeds may come to be seen as a reliable option to be considered alongside Przewalski's horses, should we learn that they are directly related to the wild horses that inhabited the Magdalenian region.

The longer, thicker hair of Przewalski's horses' heavy winter coat begins to grow in early fall and is shed in early spring. The account compiled by Groves (1994: 44–45) includes details on one of its most noticeable features:

> "The hair in winter is markedly longer than in summer. On the cheeks and posterior half of the lower jaw it forms a "beard" 5–8 cm long in winter, which almost disappears in summer. . . . The timing of the spring shedding seems to depend on ambient temperature. . . . The sides of the face . . . are [among] the first areas to molt [but the] angle of the jaw [and the] throat retain their winter hair longest."

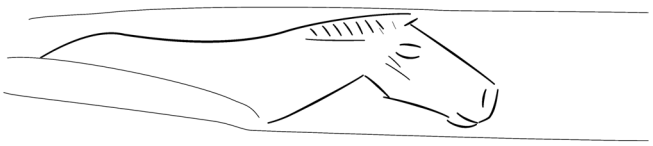
Schmid (1973: 24) remarked that seasonal coat variations like the ones observed today in Przewalski horses may have been present, and even more marked, during the last glaciation. She concluded that Magdalenian images of wild horses were likely to reflect these seasonal variations—rather than the coat patterns of different species or subspecies, as previously thought—thus representing individuals of the same species in their winter or summer coat. But one of these two forms was much more commonly depicted than the other, as first realized by Guthrie (1984: 45) when he noted that "the long winter pelt which gives the animal its characteristic . . . appearance is the familiar pattern in Palaeolithic art." These findings were confirmed in the present review. The long muzzle hair that looks like a beard can be seen in several images of wild horses engraved on portable objects (Figure 10). There can be no more accurate and effective description for the subject represented in this series than the term "winter horse" introduced by Schmid (1984: 155–157) and later adopted by Marshack (1991; 1995).

Schmid also introduced the term "summer horses" to describe images of wild horses in a summer coat. Whether images of this subject are actually found on Magdalenian portable objects proved difficult to determine. Marshack (1995: 34) believed that showing anatomical features that would otherwise be hidden by the winter coat was an indirect way to represent the summer coat. This may be true for several images found on portable objects showing a clean, neatly delineated lower muzzle profile, as can be seen in the corresponding plate (Figure 11) and associated photograph (Figure 12). While these images are clearly distinct from winter horse images, it is true that the absence of winter coat features alone is not evidence enough of the intention to represent a summer coat (Crémades 1997a: 37–38). There is, however, a second clue supporting this conclusion. The images from Kesslerloch (Figure 11b), Arudy (Figure 11d), and the Abri Mège (Figure 11e) are filled in with many series of tiny marks that are significantly different from the longer, sometimes slightly curved lines used to render the winter coat in winter horse and winter ibex images alike. A similar decoration can be seen in the image from le Mas-d'Azil (Figure 11c), while the single coat feature added to the two remaining examples is the neck mane, rendered as a series of straight marks with an enclosing line in the image from Raymonden (Figure 11a) and as a simple outline in the one from Gourdan (Figure 11f) without considering the lightly engraved marks added to this last image. When combined with the lack of winter coat features, this decoration could be read as a stylized rendition of the short summer coat, suggesting that we are looking at images intentionally meant to represent a summer horse.

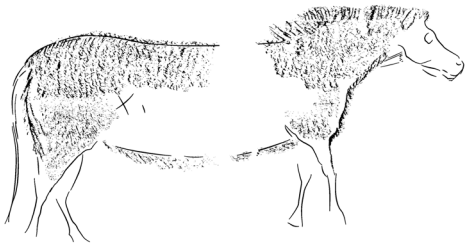
BISON WITH DISPLAY HAIR

We have seen how Guthrie drew attention to images of wild horses in their winter coat. The familiar pattern in bison images, on the other hand, is the thick hair extend-

Figure 10. Winter horse images. a. Le Courbet (BM Palart.508), b. Le Courbet (BM Palart.508), reverse side, c. Gourdan (MAN 47.308), d. Gourdan (MAN 47.300), e. Brassempouy (MAN 48.692), f. Mas-d'Azil (MAN 48.119).



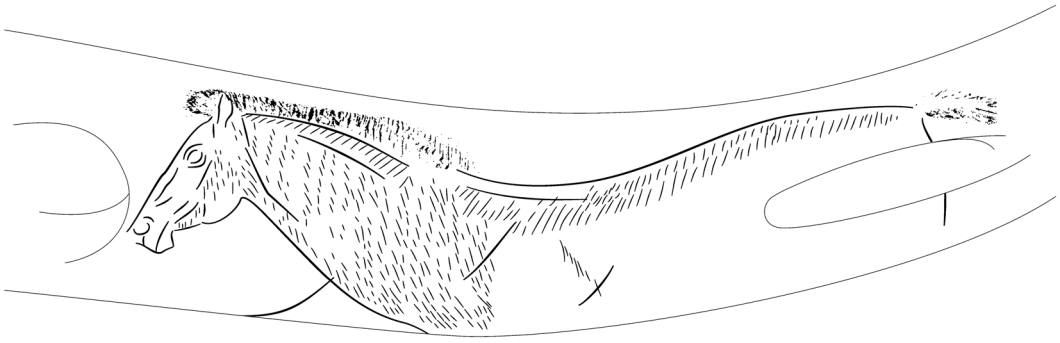
a



b

c

d



e

f

Figure 11. Possible summer horse images. a. Raymonden (MAAP Pr. F. 875), b. Kesslerloch (MA 8506), c. Mas-d'Azil (MAN 47.361), d. Arudy (MAN 47.098), e. Abri Mège (MAN 52.416), f. Gourdan (MAN 47.036).

Figure 12. Reindeer antler point from Raymonden (MAAP Pr. F. 875) engraved with a possible summer horse image. Collections Ville de Périgueux, Musée d'art et d'archéologie du Périgord (photograph by Andrea Castelli).

ing from the hump to the head, forming a ruff between the horns and down on the forehead, as well as the beard and throat mane. This pattern can be seen in many bison images found on portable objects (Figure 13). To Guthrie (1984: 45), its meaning was obvious:

> "Bison pictured in Palaeolithic art appear in their seasonal prime; in *B. bison* this occurs in late summer and autumn. After this the long beard and mane hairs begin to break off and the contrasting crests are blurred with the growth of winter hair."

What Guthrie is describing is a coat feature of adult bison bulls. The North American wood bison grows two humps of contrasting colored hair in the cervical and posterior thoracic areas (Guthrie 1984: 44). Along with the beard, the thick, dark hair covering the head and neck stands out from the lighter-colored thoracic hump (Figure 14). Known as display hair, this coat feature reaches its greatest development in the mating season, which for wood bison roaming the northernmost areas of their current range, in northwest Canada, extends from mid-summer to early fall (Blood 2000). The hair between the horns can be lost by shearing when bulls fight one another or shed at the end of the mating season. The wood bison (*Bison bison athabascae*) is one of the two subspecies of bison currently living in North America, both descended from the extinct steppe bison (*Bison priscus*) that inhabited Eurasia in the Late Pleistocene (Anderson in Martin and Klein 1989: 77). They have the northernmost distribution.

Display hair is the single stylized feature in this series of bison images. With a few exceptions like the images on the Laugerie Basse artifact (Figure 13m, 13n), where slightly curved lines are used to a more realistic and naturalistically accurate effect, this coat feature was always rendered as multiple series of straight marks filling the display hair area. The highest degree of stylization can be seen in images with multiple, orderly arranged series of tiny marks filling up areas delimited by enclosing lines (Figure 13g, 13j, and 13k). The rest of the image, including the head outline, horns, and muzzle features, is almost never stylized. This differentiation cannot be perceived in the tracing of the Bruniquel image (Figure 13i) but it is possible that the slightly curved rendition of display hair marks seen in Breuil's tracing was simply the result of his reading, correctly, the series of straight marks added within and along the head outline as a representation of coat features and improving, as he was known to do, on their appearance. The actual number of marks in each series may have also been different from what we see, but the number of series and their position are likely to have been accurately reproduced in his tracing. Note that one of the Isturitz images (see Figure 13k) has an additional series of widely spaced marks running along the head outline whose interpretation will not be addressed here.

The bison image engraved on a polisher from La Vache (Figure 15) was described by Marshack (1972: 174) as a bull with "mouth open and tongue out as though bellowing" and therefore likely an image of the corresponding mating season. The seasonal meaning revealed by Marshack is confirmed by multiple series of display hair marks found between and beyond the horns. This would hold true even if the behavior depicted turned out to be tongue-flicking, which unlike bellowing is commonly represented in Magdalenian bison images—although in most cases only secondarily, that is, by adding a tongue to an existing bison image with or without an open mouth. An unrecognized example of this modification may be the low-relief carving from La Madeleine known as *bison se léchant* (not pictured here), a piece that may have broken off from a weighted spear-thrower. This image, which is also finely engraved, shows a bison bull with fully developed display hair, the head turned sideways, and a tongue out in what is more likely to be another representation of a seasonal behavior, either bellowing or tongue-flicking, rather than the only known image of a bison licking its flank.

The bison rondelle from Enlène (Figure 16) is one of the rare artifacts in this class to be engraved with a figurative image. This is a small, stylized image showing the outline of a bison bull with the display hair beyond the horns in evidence. The series of marks used to render this feature are aligned to the edge decoration, which seems intentional. This is the single anatomical feature added to the full-figure outline. More images of bison with display hair can be found on yet more artifacts from Isturitz (Saint-Périer collection) and Laugerie Basse (Vibraye collection).

LOW STRETCHING AND SCENTING REINDEER

This section deals with images of adult reindeer males showing three distinct but related behaviors. It is a more diverse set, bringing together findings from different authors and including images from a series of image associations, one of the few for which there is objective evidence that it

was meant to represent a true scene. Two full-figure—although now fragmentary—reindeer images from the Abri Morin (Figure 17a) and Laugerie Basse (Figure 17b) were described as a bull in a low stretch display by Guthrie (2005: 69) and Rätzel (1964: 57), respectively. Details like the large neck visible in the first image and the conspicuous mane in the second one support the view, first proposed by Rätzel, that this is a mating season behavior. From observations of wild caribou, we know that males approach females from behind with outstretched necks. The same behavior may be represented in one of the images from Massat (Figure 17c) which is even more fragmentary. In this line of reindeer images, we see the head of a male, closely following a female, which in turn appears to be following another male. Guthrie (2005: 69) drew attention to the stance of the female, pointing out that the hind legs—stretching far back—and raised tail are consistent with what could be observed in a communication episode in which the male is testing for estrus a fluid produced by the female. This interpretation, which implies that the association between at least these two images was meant to represent a true scene, is confirmed by the close proximity of the male to the female, its outstretched head, and possibly parted lips.

The Massat example was first described as a true scene by Nougier and Robert (1974) as part of an extended series of image associations that the authors described as representations of "pre-mating" courtship behaviors. The article moved from a recently discovered artifact—part of the Robert collection from the site of La Vache—engraved with a line of two reindeer images (Figure 18a). The intention to represent a true scene is even more evident in this image association. What we see is a male with fully developed, tilted back antlers following a female. Nougier and Robert (1974: 18–19) remarked that the bull, with its head and neck raised upwards, open nostrils, and exposed genitals is not only following the female, whose tail is raised to expose her own genitals, but testing her scent in a characteristic courtship behavior. The male barren ground caribou in rut is said to adopt a characteristic stiff-legged gait, lay back his antlers, raise his muzzle, and sniff at the female while curling up his nose. The males of several mammal species curl back their lips to take in the scent of females in a behavior known as *flehmen* response or lip curl. Whether the bull in this image association has an open mouth or curled lips is difficult to tell, but the long mane hanging from its thick neck—two secondary sexual characters—confirm the scene as taking place in the mating season. The hind legs position seems to indicate readiness to mate (Guthrie 2005: 54). A unique artifact from the Abri Montastruc, one of the Bruniquel rock shelters, can be seen as a larger, three-dimensional rendition of the same scene (Figure 18b), underscoring its cultural significance. This is the largest known Magdalenian portable object to be carved in full round.

The last image discussed in this section has historical significance. In the late 1960s, it inspired Swiss archaeologist Hans-Georg Bandi, who was working in the field at St. Lawrence Island, to connect with American naturalist W. O. Pruitt Jr., a specialist in arctic caribou behavior. Ten years later, Bandi was among the organizers of an international meeting that featured contributions from earth and life scientists like Schmid (1984) and Guthrie (1984) whose involvement in Paleolithic art studies, like Pruitt's, would continue over the years. Discovered as early as 1874, the reindeer bull engraved on a baton from Kesslerloch (Figure 19a) was traditionally described as a grazing reindeer. The male, however, is in motion, pacing with an upright tail and wide-open nostrils close to the ground, while the mouth is not open. This was pointed out by Schmid (1973: 23) who went on to conclude that a more accurate designation was "seeking reindeer," which is how this piece had been referred to in official records of the Rosengarten Museum from as early as 1957 (von Blanckenhagen 1957) and it still is today (Benkö, personal communication) When we also consider the fully developed antlers and long hanging mane, overall the subject of this image is best described as a reindeer bull in the mating season (Rätzel 1964 in Schmid 1973: 23). Following a different line of research, Bandi (1968: 16–17) noted similarities between the behavior represented in this image and the threat position of caribou bulls, concluding that the individual represented is shown in an aggressive stance, threatening an off-scene rival. Years later, he offered a more tentative description allowing for the possibility that the male is following the trail of a female (Bandi et al. 1984: 29), which corresponds to the description given by Schmid. Whether the bull is shown in a threat display or following the scent of a female, the seasonal meaning of this image is the same. More recently, Guthrie (2005: xii) remarked that the bull has lost all its fat reserves but not yet shed its antlers and therefore must be in the late stages of rut, which confirms and narrows down the meaning proposed by Rätzel. The rarely published image engraved on a tiny plaquette from Corgnac (Figure 19b) looks like a less detailed, incomplete rendition of the same subject, suggesting that the Kesslerloch image may have also been part of a series.

DISCUSSION AND CONCLUSIONS

The series discussed in this study reveal a focus on selected characters and behaviors. The images in the belling red deer stag, low stretching ibex, and reindeer bull series are consistent and effective representations of mating season behaviors displayed by adult males of the corresponding species. The more detailed and realistic examples include anatomical characters pointing to the sex and age class of the individuals represented. The remaining four series emphasize coat features only displayed for part of the year, being the cold season, for the winter ibex and winter horse series, late summer, for the bison with display hair series, or the warm season, for the summer horse series.

These characters and behaviors were emphasized in direct and indirect ways. Indirect ways include framing and omission of other features. Many belling red deer stag images, for example, are framed to draw attention to the length of the antlers (see Figure 1g), the characteristic head and neck posture (see Figure 1m inset and Figure 5), or both (see Figure 1a, 1b, 1h, 1i, and 1j). The rest of the figure

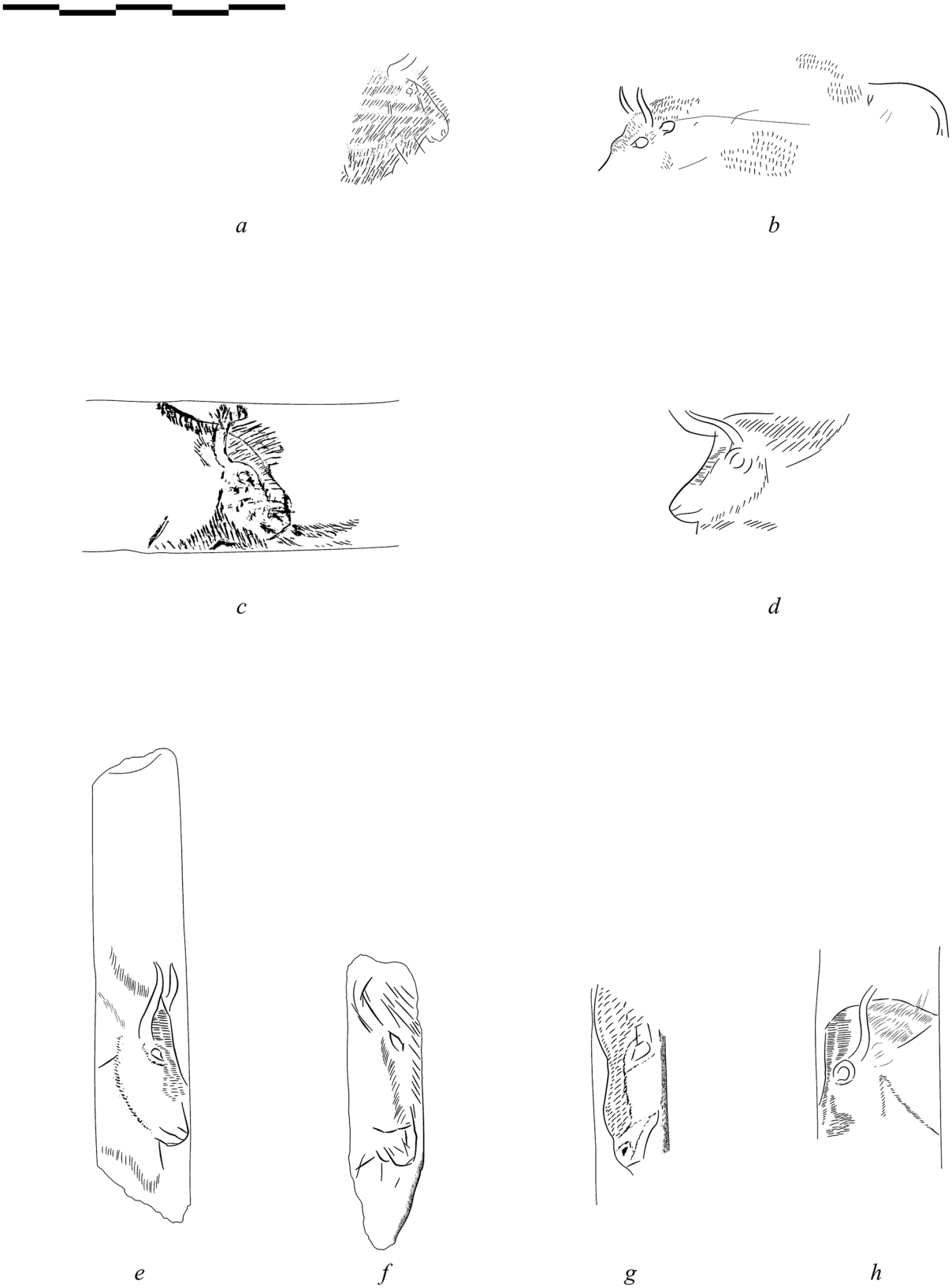


Figure 13. Images of bison bulls with display hair. On this page: a. Lortet (MAN 48.202), b. La Vache (MAN 86.670), c. Isturitz (MAN 84.772), d. Isturitz (MAN 86.696), e. Isturitz (MAN 84.745), f. Isturitz (MAN 74.867), g. Isturitz (MAN 84.742), h. Lourdes (MAN 55.338); see facing page for continuation.

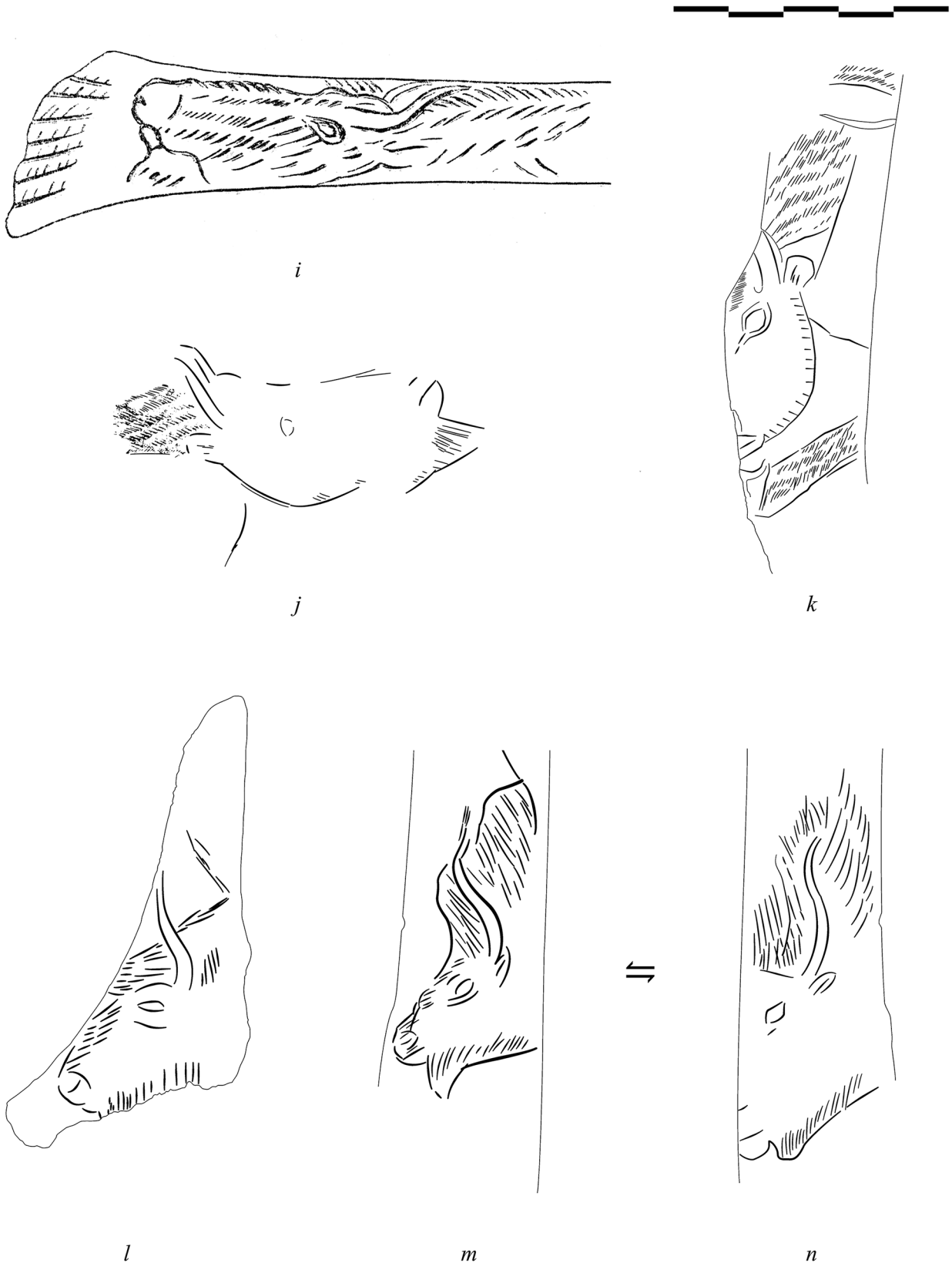


Figure 13 (continued). Images of bison bulls with display hair. On this page: i. Bruniquel (see Materials and methods), j. Lourdes, (PMAE 12-17-40/81573), k. Isturitz (MAN 84.746), l. Las Caldas (MAA 06985), m. Laugerie Basse (MH 38.189.1720), n. Laugerie Basse (MH 38.189.1720), reverse side.

Figure 14. North American bison in mid-summer with sizable, if not yet fully developed, display hair. This individual seems to show intermediate features between plains and wood bison (photograph by Mike Molloy on July 15, 2014, at Waterton Lakes National Park, Canada. First published at www.justournature.com, all rights reserved).

could be only sketched out, as in the Les Hoteaux baton (not visible in the tracing published here, which is only half-unrolled), or missing (see Figure 1a and 1i). Framing is used to the same effect in the two ibex series discussed in this article, drawing attention to the outstretched neck (see Figure 6c), the details of the mouth (see Figure 6b), or both (see Figure 6h), while the horns are always significantly reduced in size—which is why many of these images were previously described as female or young ibex (see for example de Sonneville-Bordes and Laurent 1968: 414). Note that the full-figure winter ibex from Isturitz does have an added horn, but this is not shown in the tracing published here because it was considered a secondary addition, the result of image reworking for a different use (see Castelli 2010: 143). Like many belling red deer stag images, the second image in the line from La Madeleine (see Figure 6a) seems to have incompletely drawn legs, while in the first image little is shown beyond the head and neck. Various framing solutions are used to bring front and center the display hair between and beyond the horn of bison bulls (see Figure 13b–13n). Like the ibex image from Isturitz, the bison image on the La Vache polisher is centered on the open mouth with tongue out (see Figure 15).

Direct ways were only used to emphasize coat features. We have seen that the band of dark hair on the top and sides of the muzzle, part of the Pyrenean ibex winter coat, is typically rendered as multiple series of fine, slightly curved lines. This feature, however, can take more stylized forms ranging from a few series of straight marks (see Figure 6b) to a simple outline delimiting the corresponding area (see Figure 6a, 6c, and 6d). While mostly naturalistically accurate in winter horse images, coat hair is either missing or highly stylized as a multiple series of tiny marks in the images identified as possible summer horse images, and we have already seen that display hair is regularly stylized as one or more series of marks in bison images. To anyone familiar with the species represented, the selective stylization of a single feature can hardly go unnoticed as it makes the target feature effectively stand out from the rest of the image, confirming its cultural significance and key role in image use.

For all their long history, studies on the meaning of Paleolithic art still have to answer the first, fundamental question. Why are only selected wildlife species represented time and again? For a long time, we expected to find a correspondence between species represented and species hunted, due to their role in human sustenance and survival, but the results of a careful and comprehensive review of the evidence were inconclusive at best (Delporte 1984, 1990; Delporte in Crémades 1997). The lack of evidence for this and other proposed explanations led Sieveking (1987a: 16) to remark that "the animals selected are not an inventory of

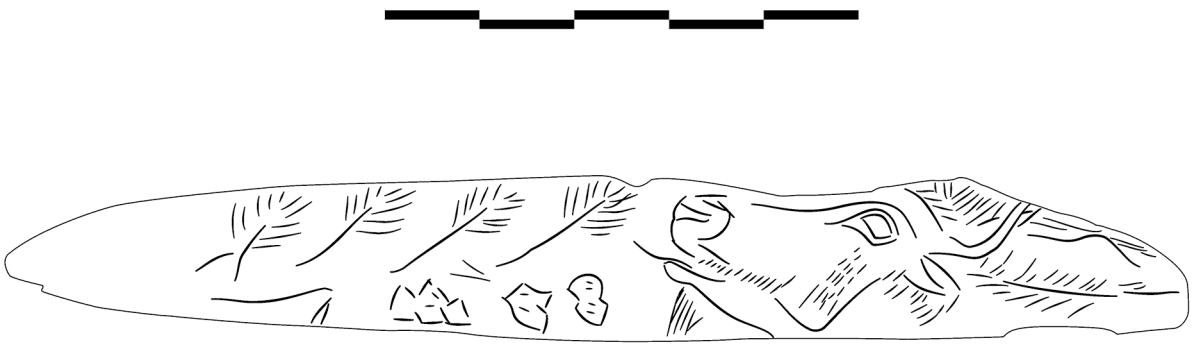


Figure 15. Front side of the polisher from La Vache (MAN 83.068).

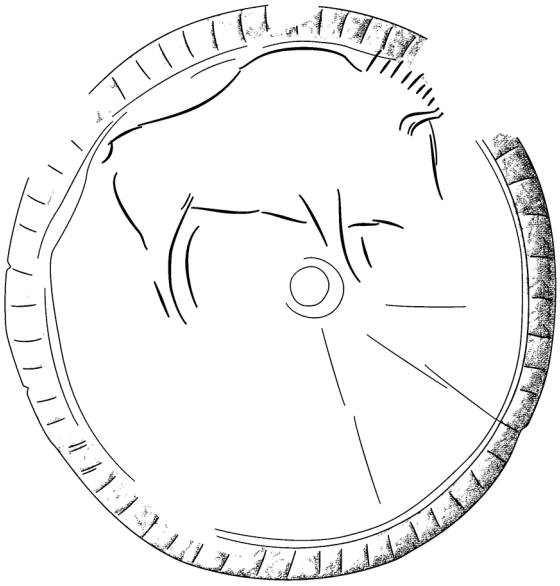


Figure 16. The bison rondelle from Enlène (MB 3031).

food species, or a record of the environment[, and] they do not obey the definition of totems". For the recurrent subjects discussed in this article, the answer is simple given that the behaviors and coat features that the Magdalenians focused on are only or more prominently displayed by the species selected, which leads to a better question. Why the focus on coat features and behaviors displayed only for a limited time of the year? If these characters and behaviors are the key to understanding how the images in these series were used, and why they were created, what could be their cultural significance?

The first thing to note is that the periods of time pointed to by the features and behaviors selected are of varying length but always associated with specific climate and environmental conditions that regularly returned every year. Therefore, the best way to describe these features and behaviors is to refer to them as seasonal, a term introduced by Marshack who was greatly impressed—and rightfully so—by what he referred to as "seasonal images" like the belling red deer stag from Les Hoteaux. "The art is often so strong, and the examples so numerous, that one practically hears the ancient . . . belling and bellowing of the males, year after year," signaling the end of summer and the arrival of the fall season (Marshack 1972: 184–185). We should realize that, in this context, "seasonal" does not refer to the four astronomical seasons with which we are familiar. The season evoked by the images in the belling red deer series is a biological one, defined by anatomical and behavioral changes belonging to a biological cycle that this wildlife species goes through every year. Unlike the seasons determined by astronomical cycles, biological seasons are not virtually fixed in time, they can overlap one another, and taken together they need not extend for a full solar year. This does not mean, however, that they are a less accurate or evolved means to track climate variability, only a different one. In fact, their flexibility may have been an advantage in a time of intense environmental variability and constant climate change like the last deglaciation. The seasonal transformations that large mammals go through every year are triggered by environmental changes influencing their physiology and behavior. While ultimately driven by regularly occurring astronomical events, the onset of these changes can be anticipated or delayed due to a combination of factors ranging from global climate change to regional climate variability and local environmental conditions. As a result, seasonal characters and behaviors may reappear earlier or later than expected, but always following or anticipating actual climate conditions experienced locally, which makes them accurate indicators or predictors if observed and recognized early on.

Not only did Marshack draw attention to the belling red deer series but he went on to address the key question of the cultural significance of seasonal characters and behaviors. Based on the fact that the behaviors represented are only displayed during a well-defined time of the year, he proposed that seasonal images acted as markers for the corresponding time of the year, signaling the return of familiar environmental conditions and climate (Marshack 1991: 382–386, 1995: 30). These seasonal markers would have helped the humans who traveled across the region, following herds or collecting resources, to time their movements and reconvene at familiar times and places with the rest of the group, or different groups to come together (Marshack 1991: 382–386, 1995: 30). Based on this, the

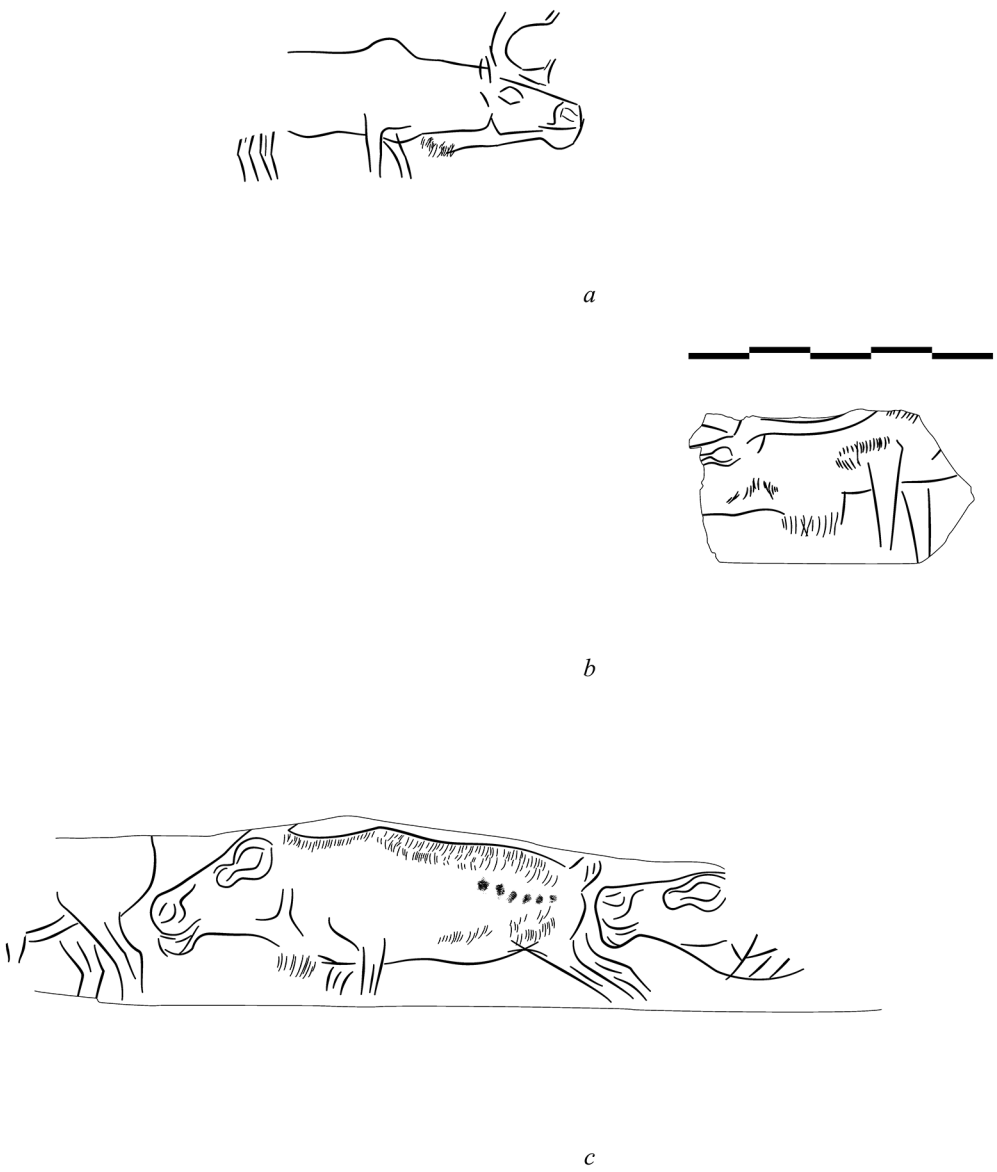
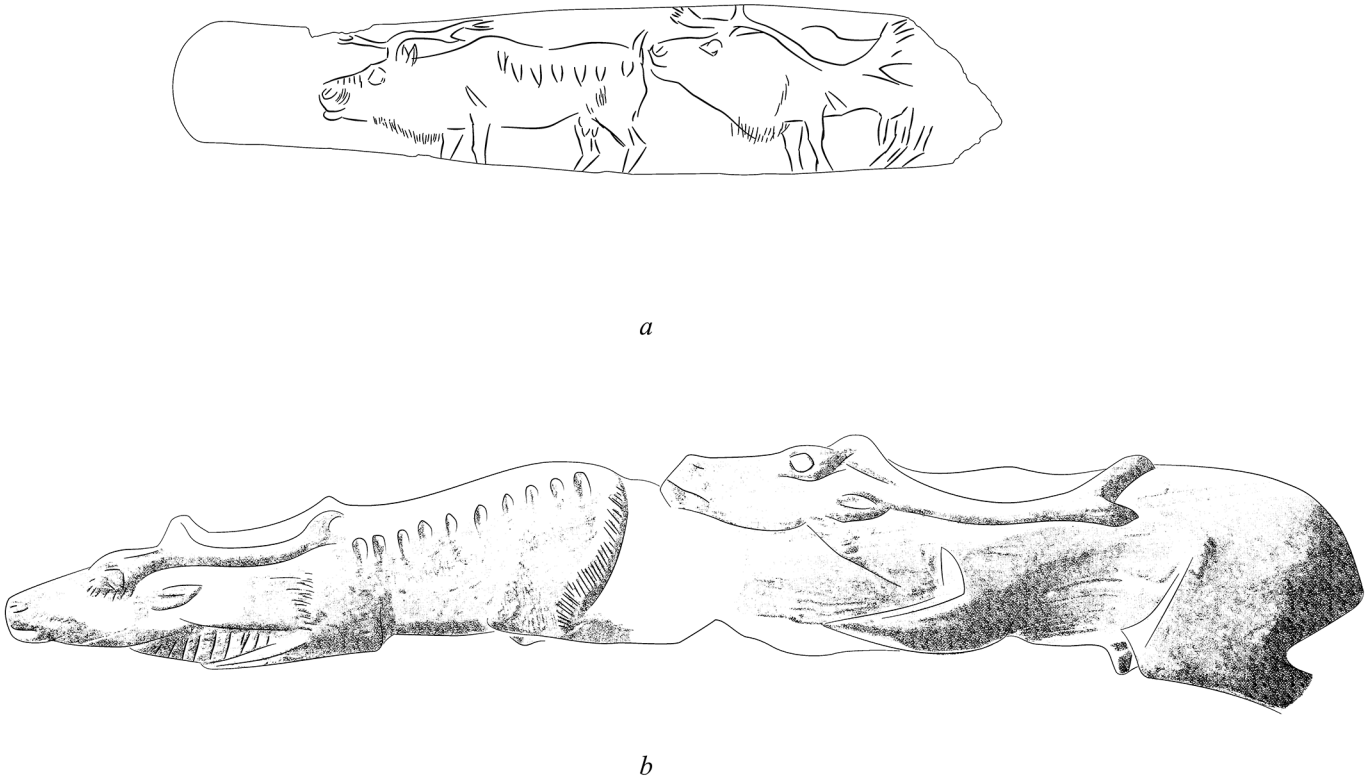


Figure 17. Low stretching reindeer bull images. a. Abri Morin (MA 88.47.21), b. Laugerie Basse (MAAP Pr. A. 1901), c. Massat (MAN 31.717).

symbolic meaning of belling red deer stag images would be "the season of the belling red deer stag," or "the mating season of red deer," or simply "the red deer season," which should correspond to a time of the year going from the end of summer to early or mid-fall.

The seasonal meaning of six of the seven recurrent subjects discussed in this study falls between late summer and the end of winter (Table 4). Images of bison bulls with display hair, belling red deer stags, and low stretching ibex point to biological seasons that follow one another in time. Whether on their own or associated with a female image, images of reindeer bulls in a courtship behavior have a similar seasonal meaning as belling red deer stag images, while seeking reindeer images seem to evoke the peak of the reindeer mating season or its final stage. The meaning of winter ibex images extends in time well beyond the Pyrenean ibex mating season, roughly covering the same length of time as winter horse images. These two series may indicate that the Magdalenians recognized a long cold season, beginning some time in the fall and ending in late winter or early spring. Images of summer horses would be evocative of spring and summer, and so would be any images of wild horses in the mating season, for example, pregnant mare images. This subject has not been discussed here as it seems



a

b

Figure 18. Two image associations representing the same true scene with different techniques. a. La Vache (MAN 83.356), b. Bruniquel (BM Palart.550).

to be far more prevalent on cave walls, but it is worth mentioning the likely example described by Marshack (1972: 192–195) on a baton from La Marche.

Many of the images discussed so far are found as part of image associations. With one exception (see Figure 15), these associations can all be classified as lines of images, which is not unexpected given that, of the four types listed by Delporte (1975: 126–129), lines are by far the most common on Magdalenian portable objects. While examples featuring different images are not uncommon, lines are typically formed by the repetition of the same image, framed in full figure or head only. When the repeated image consists of an individual in motion, lines are often described as if they represented different individuals walking in line, running, or swimming, and by extension a migrating or crossing herd. This interpretation, however, does not hold when the image shows an individual exhibiting a seasonal behavior. Lines of belling red deer stags (for example, see Figure 1d and 1m) and low stretching ibex (see Figure 6a and 6g) are not observed in nature and cannot be interpreted as true scenes. But if they cannot represent different individuals at the same moment in time, they may represent the same, or rather a generic individual of that species at different times. In this view, the individuals would be following one another in time, not space, evoking the return of the same biological season, year after year. If that is their underlying theme, every line of seasonal images could be read as a specific number of biological seasons, and by extension a specific number of years. This is also true for lines of winter ibex (see Figure 6f, 6g, 6j, and 6k) and winter horse images (see Figure 10a and 10b), which evoke the return of the cold season and could be read as a specific number of "winters" or years, but not lines showing a reindeer bull following a female (see Figure 17c and Figure 18a and 18b), which are exceptional in many respects. While the meaning of this recurrent image association is remarkably complex (Castelli 2019) on a first level they were meant to be read as representations of courtship behavior and can therefore be interpreted as true scenes with a seasonal meaning. Similarly, two lines featuring ibex images (see Figure 6a and 6k) may have an additional layer of meaning due to the addition of winter rings, which like every other horn feature are not seasonal characters, to the horn outline (for more on this, see Castelli 2010: 152).

The distinction between low stretching ibex and winter ibex series, discovered at different times by different authors, may be to some extent artificial. While the symbolic meaning of winter ibex images extends well beyond the mating season, the winter coat of Pyrenean ibex being displayed for a considerably longer time than mating season

a

b

Figure 19. Seeking reindeer images. a. Kesslerloch (RM U 1), b. Corgnac (MAN 21.563).

TABLE 4. MAGDALENIAN SEASONAL IMAGES

RECURRENT SUBJECT/SERIES	DEFINITION	REFERENCES	BIOLOGICAL SEASON	SYMBOLIC MEANING
Belling red deer	An adult red deer male (stag) in the act of belling, a behavior also known as bellowing, bugling, and roaring.	Marshack 1972	red deer mating season	early to mid-fall
Low stretching ibex	An adult Pyrenean, or possibly Alpine, ibex male (bull) in a low stretch display, with or without a flicking tongue.	Rätzel 1965	ibex mating season	late fall to mid-winter
Pyrenean ibex in winter coat (*winter ibex*)	An adult Pyrenean ibex male (bull) in its characteristic winter coat.	Castelli 2010	cold season	fall and winter
Wild horses in winter coat (*winter horses*)	A wild horse with a fully grown winter coat.	Schmid 1973; 1984	cold season	fall and winter
Wild horses in summer coat (*summer horses*)	A wild horse with short coat hair as can be inferred by anatomic details, if not directly shown.	Schmid 1973; 1984	warm season	spring and summer
Bison with display hair	An adult steppe bison male (bull) with partially or fully developed display hair.	Guthrie 1984; this study	bison mating season	late summer
Low stretching and scenting/seeking reindeer	An adult reindeer male (bull) in a low stretch display, scenting a female, or following a trail.	Rätzel 1964; Nougier and Robert 1974; Bandi 1968; 1968–69; et al. 1984	reindeer mating season	early to mid-fall

The definitions listed here were not taken from the sources referenced but compiled as part of this project. Images of belling red deer stags (*cerfs bramants*) have been known for a long time but it was Marshack (1972) who drew attention to their frequency and possible significance. Images of horses in a winter coat were likely recognized before but it was Schmid (1973; 1984) who draw attention to this series and coined the highly effective terms *winter horses* and *summer horses*. Only briefly mentioned by Guthrie (1984), the bison with display hair series was first described and documented in the present study. The low stretching ibex and low stretching reindeer subjects were first described by Rätzel (1964) but seem to have remained unknown until Guthrie (2005). The female scenting behavior was first recognized by Nougier and Robert (1974) while describing a series of reindeer image associations whose discovery they credit Breuil with. The reindeer following a trail image was identified in even earlier sources but not discussed more in detail until Bandi (1968; 1968–69; et al. 1984).

behaviors, these two biological seasons overlap to a significant extent. The same is true for the corresponding series of images, with many examples showing a combination of winter coat features and mating season behaviors (see Figure 6), which may indicate that in the eyes of the Magdalenians these two series were one and the same, at least for some time. That is, they may have begun as two distinct series and then gradually merged, or the other way around.

Winter ibex images are also remarkable for the stylization of the dark band on the top and sides of the muzzle. This can be seen in the images from Isturitz (see Figure 6b), La Vache (see Figure 6e), Massat (see Figure 6f), Les Eyzies (see Figure 6g), and Le Mas d'Azil (see Figure 6k) where this winter coat feature is rendered as one or more series of fine lines, distinct and even far apart from each other, which is unexpected in otherwise realistic, naturalistically accurate images. Why keep on adding more when a single series, or two or more adjoining series, would more accurately represent this feature? The first thing to note is that at least two examples (see Figure 6f and 6g) show slight inconsistencies in the style and position of the additional series, as if they were added at different times, maybe by different hands. This clue to image use suggests that each row may have been meant to be symbolic for a winter season, with additional rows indicating successive winter seasons. If series were added from top to bottom, this symbolic activity would have mirrored the corresponding biological process, as the dark hair covering the top and sides of the muzzle would not only return every year but extend further down as the individual grows older, and the dark areas grow larger. Therefore, considering that this natural process takes more than ten years to complete, it is also possible that the multiple dark bands decoration was meant to evoke the length of time that the Pyrenean ibex dark winter hair would need to reach its full extension, or "many winters," rather than only a few winters.

More recurrent subjects have been described as seasonal in the literature but were not included here because not enough evidence could be collected to confirm that they were intentionally created to evoke a specific time of the year, or that their use extended significantly across time and space. What follows are preliminary accounts on two of these subjects.

Because they are rarely seen in winter, it has been suggested that bears were associated with the summer season (Crémades 1997b: 463), although a more accurate definition of the seasonal meaning of this subject would be a long biological season including at least part of spring and fall. The idea that a species had a seasonal meaning in itself only due to its presence in the landscape is an interesting one—already found in Marshack (1972) to address the symbolic meaning of relatively rare subjects like migratory birds and freshwater fish—but if bear images could be used to represent a biological season even without any seasonal characters or behaviors, emphasized or not, what evidence can tell us that this was their intended meaning? How can we tell if these images were meant to represent a summer bear and not a powerful bear, for example, or maybe a friendly bear?

For the following subject, the issues were at an earlier stage. Several images on portable objects have been described as red deer hinds. This looked like a promising series, but in every instance studied more closely as part of this research, validating the original descriptions proved difficult. The possibility that the subject represented was an antlerless stag, like in the image engraved on the pendant from Lortet, or a reindeer could never be excluded, to the effect that this could not be confirmed as a recurrent subject. Without a single image that could be confidently described as a red deer hind, or additional examples providing evidence on which characters their makers focused on, there was no way to verify the seasonal meaning proposed for this subject.

The images of belling red deer stags discussed in this article are far from being a complete inventory of every occurrence found on Middle and Upper Magdalenian portable objects. The total number of images in this series would be difficult to estimate as there are many examples only showing one or two of the characters typically combined in the clearest representations (see Figure 1). While some are found on fragmentary artifacts where additional characters may have originally been present, most of them could simply be the product of a more economical, less artistically minded approach. From a purely naturalistic point of view, even images only showing long but sharp-pointed antlers are perfectly accurate and completely unambiguous representations of a red deer stag in the mating season, and that may be exactly what they were meant to be, but this reading requires familiarity with the frequency of representation and cultural significance of the belling behavior. Without this context and given that antlers can be seen as the most distinguishing character of this species, one could wonder if the same images were not simply meant to represent a "red deer." Similar considerations apply to the other series discussed in this study.

The theory presented here offers a new perspective for future research aimed at reevaluating the current archaeological record. New studies devoted to individual subjects could lead to more extensive lists of images, beginning with the additional examples listed in the main sources referenced but not included here. More examples can be found in various sources of image descriptions where seasonal characters are often incorrectly described, described in vague or uncertain terms, or correctly described but without recognizing their significance. What we have learned by focusing on recurrent subjects can be especially useful to improve our understanding of images so far considered to represent rare or unique subjects, and to better address the meaning of any association featuring one or more images of these subjects. This new perspective can lead to significant revisions in image descriptions at every level, from the species of the individual represented to the anatomical characters and behaviors displayed. And, of course, new or existing archaeological evidence could also reveal additional subjects with a seasonal meaning, extending even more the application domain of the theory presented in this

study. It is important to keep in mind, however, that this theory could never become a general one, applicable to every series of figurative images that reached us from Magdalenian times, let alone non-figurative creations, but will always co-exist with additional, complementary theories.

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