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La Société préhistorique française, fondée en 1904, est une des plus anciennes sociétés d'archéologie. Reconnue d'utilité publique en 1910, elle a obtenu le grand prix de l'Archéologie en 1982. Elle compte actuellement plus de mille membres, et près de cinq cents bibliothèques, universités ou associations sont, en France et dans le monde, abonnées au *Bulletin de la Société préhistorique française*.

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- d'information et de documentation scientifiques – Le *Bulletin de la Société préhistorique française* comprend, en quatre livraisons de 200 pages chacune environ, des articles, des comptes rendus, une rubrique d'actualités scientifiques et une autre sur la vie de la Société. La diffusion du bulletin se fait par abonnement annuel. Les autres publications de la SPF – Mémoires, Travaux, Séances, fascicules des Typologies de la Commission du Bronze, Actes des Congrès, Tables et index bibliographiques ainsi que les anciens numéros du *Bulletin* – sont disponibles au siège de la Société préhistorique française, sur son site web (avec une réduction de 20 % pour les membres de la SPF et téléchargement gratuit au format PDF lorsque l'ouvrage est épuisé) ou en librairie.
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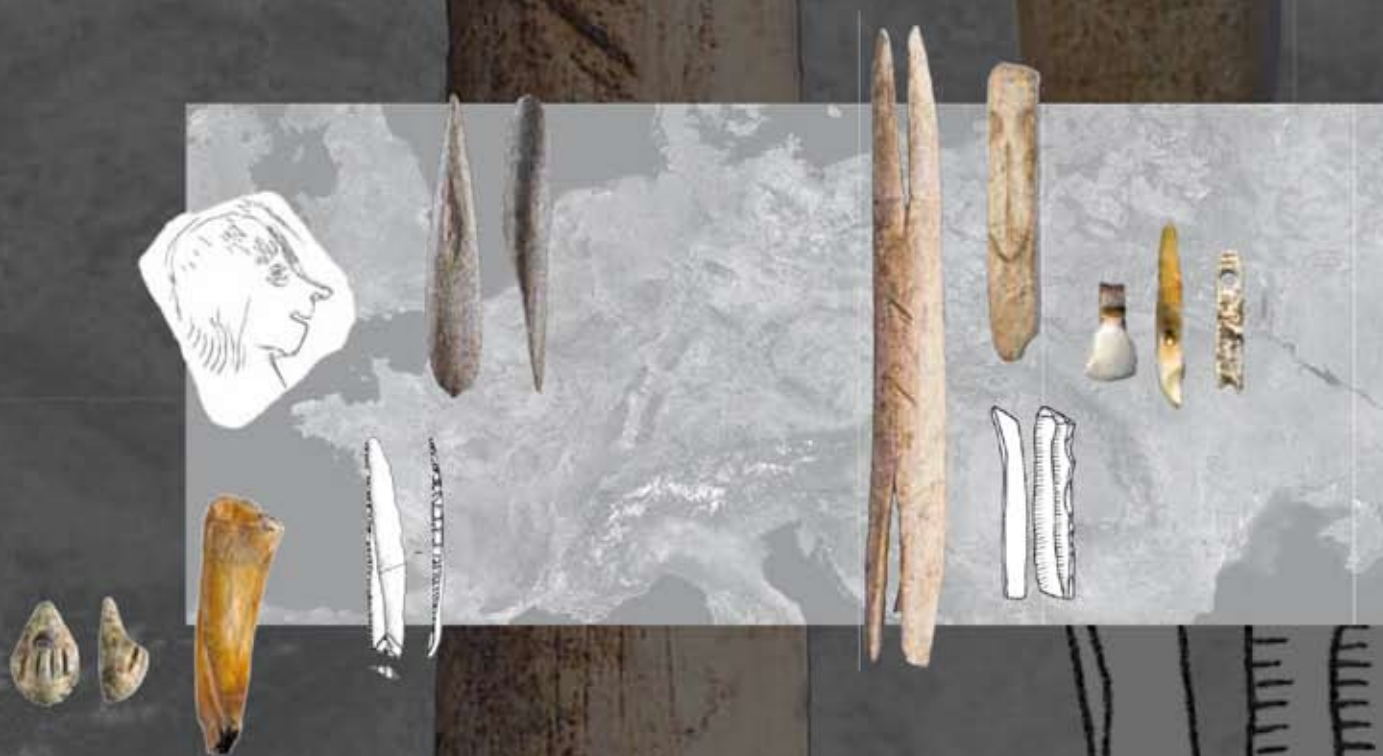
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# L'ESSOR DU MAGDALÉNIEN ASPECTS CULTURELS, SYMBOLIQUES ET TECHNIQUES DES FACIÈS À NAVETTES ET À LUSSAC-ANGLES

ACTES DE LA SÉANCE  
DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE  
BESANÇON  
17-19 OCTOBRE 2013

Textes publiés sous la direction de  
Camille BOURDIER, Lucie CHEHMANA,  
Romain MALGARINI et Marta POLTOWICZ-BOBAK



SÉANCES DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE

8

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Société préhistorique française

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2017

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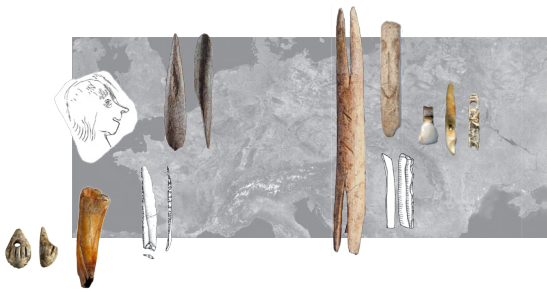
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*L'essor du Magdalénien. Aspects culturels, symboliques et techniques des faciès à Navettes et à Lussac-Angles*  
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## Munzingen

### A Magdalenian site in the Southern Upper Rhine plain (Germany)

Clemens PASDA

**Abstract:** During 1914–15 a large Magdalenian site was excavated at Munzingen (County Breisgau-Hochschwarzwald, Germany). In the light of recent results on the early part of the Magdalenian of France, the presence of reindeer antler points at Munzingen might well indicate the presence of a Lower Magdalenian that dates to approximately 20–18 ka cal. BP. This interpretation is supported by five of the nine reliable radiocarbon dates, the presence of woolly rhinoceros and the loess cover. Characteristic lithic artefacts may support this interpretation as well, but as so often, there remain some doubts.

**Keywords:** Magdalenian, Lower Magdalenian, Middle Magdalenian, open-air site, excavation in 1914–15, loess, chronostratigraphy, typology.

**Résumé :** Entre 1914 et 1915, un grand site magdalénien a été fouillé à Munzingen (arrondissement de Breisgau-Hochschwarzwald, Allemagne). D'après les résultats des recherches actuelles sur le Magdalénien en France, les sagaies de Munzingen semblent indiquer la présence d'un Magdalénien inférieur (ca 20–18 ka cal. BP). Cinq des neuf dates <sup>14</sup>C sûres, la présence du rhinocéros laineux et la couverture lœssique conforteraient cette interprétation. Les outils lithiques peuvent également la supporter, mais leur discussion n'est pas sans contradiction.

**Mots-clés :** Magdalénien, Magdalénien inférieur, Magdalénien moyen, site de plein-air, fouilles en 1914 et 1915, lœss, chronostratigraphie, typologie.

The stones found in nature, like facts,  
are endlessly numerous, wild and complex.

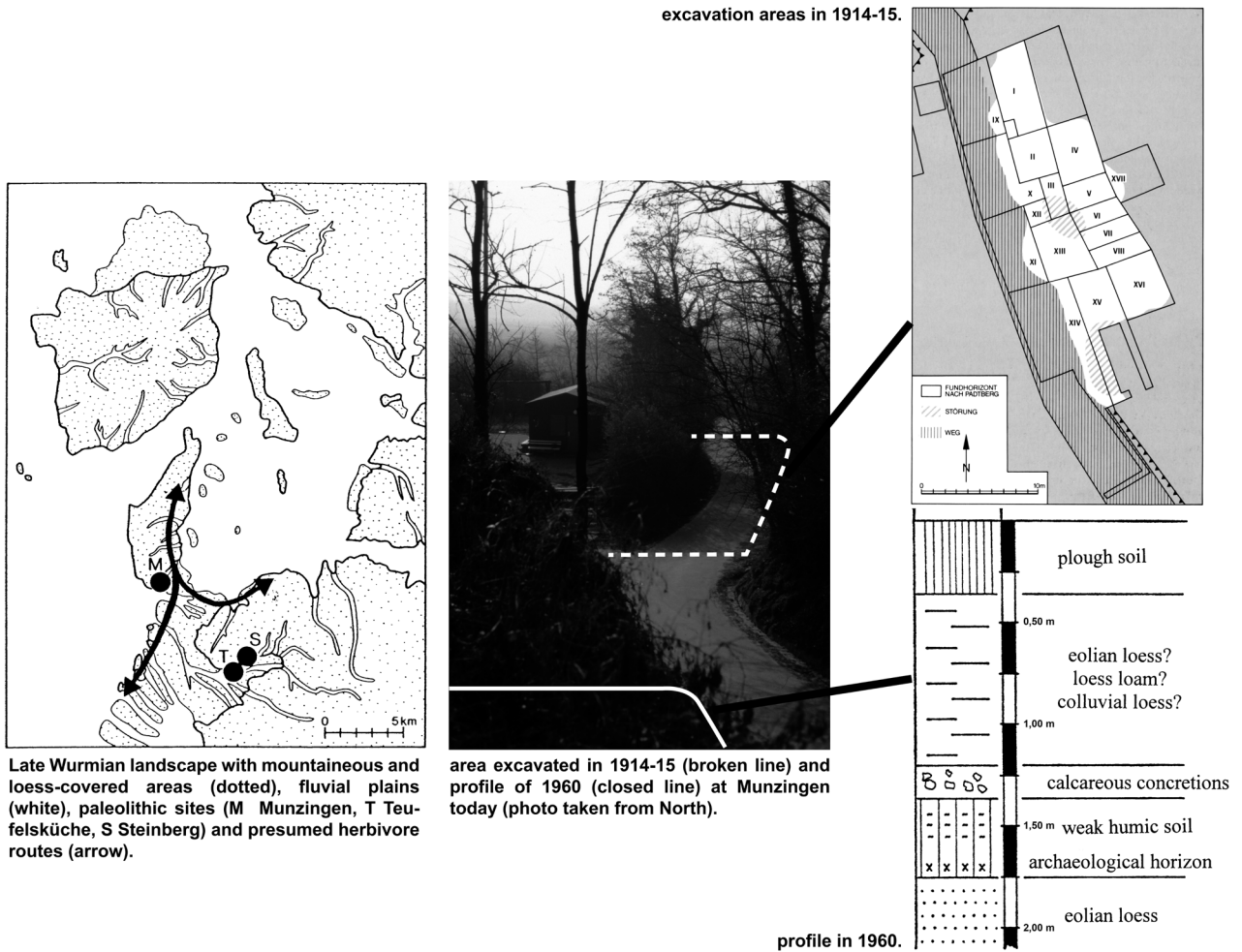
Bernd Heinrich in *The homing instinct* (Boston, 2014, p. 16).

**I**N 1874 the first Magdalenian artefacts have been found in loess deposits approximately 600 m southwest of the village of Munzingen near Freiburg im Breisgau (fig. 1). Artefacts occurred on an area of some 25,000 m<sup>2</sup> (Kind, 2008) but, unfortunately, the loess deposits had been disturbed due to several factors like erosion since prehistoric times, Neolithic settlement, medieval quarrying and well construction, wine-growing, road construction and the creation of two modern sports arenas. However, during his excavation of 1914–15, August Padtberg, then a student at the University of Freiburg im Breisgau,<sup>(1)</sup> collected around 20,000 stone artefacts, thousands of rocks and many faunal remains on a surface area of about 200 m<sup>2</sup> (table 1).

#### STRATIGRAPHY, ROCKS AND HEARTHES, FAUNA, ENVIRONMENT AND HUNTING, LITHIC RAW MATERIAL AND MOLLUSKS

**A**ccording to Padtberg's observations, the artefacts occurred in a dark and red to brownish, humic horizon that was covered by silty sediments of 0.8 to 2.3 m thickness (fig. 1). The results of this large excavation were published in 1925 and Munzingen was assigned to an 'Early Magdalenian' (Padtberg, 1925, p. 69). Today, beside some rocks, only ca. 4,200 lithic artefacts, ca. 160 organic artefacts and ca. 260 faunal remains have survived of the excavated material. Because the excavation was performed without sieving of the sediment, small lithics (< 1 cm), backed bladelets and burin spalls are underrepresented. Nevertheless, the reinvestigation of





**Fig. 1** – Munzingen (map, recent photo of excavated area, excavations plan of 1914–15 and stratigraphy).  
*Fig. 1* – Munzingen (carte, photo récente de l’aire fouillée, dessin des fouilles 1914-1915 et stratigraphie).

Year	Name	Goal	Lithics	AH	Comment
1874	A. Ecker	First excavation	ca. 300	–	Disturbed context
1894	G. Steinmann	Stratigraphy	few	+	
1902	O. Schoetensack	Stratigraphy	few	+	
1910	J. Bayer, G. Steinmann	Stratigraphy	few	+	
1914–15	A. Padtberg	Large excavation (30 × 10 m)	ca. 20,000	+	Large Magdalenian site
1933–44	G. Kraft	Several excavations	single	–	Late Holocene context
1960	E. W. Guenther, L. F. Zotz	Stratigraphy	few	+	
1976–77	G. Albrecht	Salvage excavation (6–7 m <sup>2</sup> )	ca. 1,500	–	In loess
2007	C.-J. Kind	Salvage excavation	some	–	In loess

Note: AH = archaeological horizon as defined by Padtberg (1925, p. 24), + present, – not present.

**Table 1** – Excavations at Munzingen.  
*Tabl. 1* – Fouilles à Munzingen.

these finds resulted in a reconstruction of Magdalenian life in the late Würmian Upper Rhine plain (Pasda, 1994). Many rocks from local outcrops nearby have been imported to be used in a typical Magdalenian fashion where repetitive use of stone-covered fires (Leesch,

1997, p. 170–175; Plumettaz, 2007) resulted in a ‘pave-ment-like’ (Padtberg, 1925, p. 49) distribution of rocks. At least six hearths may have been present where bones and willow have been burnt. Remains of reindeer dominate the faunal assemblage whereas bones of horse,

woolly rhinoceros, mountain hare, wolverine and red fox constitute just 10% of all identified specimens. These animal species may indicate the local environment during GS-2.1b/GS-2.1a (table 2) as a grassland with alpine and steppe herbs and maybe some dwarf shrub (Leesch et al., 2012b), with high seasonality, a mean July temperature of around 9°C and very cold winters (Lotter et al., 2012, p. 109). Due to dentition of reindeer, a warm season occupation seems the most likely. The hunting area may have been not that far away as presence of all skeletal parts from reindeer, horse and rhinoceros indicate. Munzingen is situated at a topographical bottleneck, where the loess-covered hills narrow to end between large fluvial plains (fig. 1). Therefore, the site may be ideal to intercept migrating herds, an interpretation which may be also supported by the presence of both juvenile and adult individuals of reindeer, horse and rhinoceros.

Around 57 kg of lithic artefacts were excavated by Padtberg (1925, p. 54). This does not indicate a prolonged stay at the site as, in comparison, on the 400 m<sup>2</sup> of the Magdalenian site of Monruz, which was in use during a rather short period of time, ca. 77 kg lithic artefacts were recovered (Cattin, 2012, fig. 14). The lithic raw material pattern in Munzingen does not differ from younger Magdalenian sites nearby (Pasda, 1998b, fig. 28d): the best lithic raw material, a white or brown-red Jurassic hornstone was used most often (63%), despite being only available ca. 20–40 km away in the foothills of the most southern part of the Upper Rhine plain (Kaiser, 2013). A wide variety of lithic materials from regional (< 20 km) outcrops were also used, among which Triassic shelly hornstone predominates (23%). Exotic lithic raw material is apparently not present, yet some lithics were possibly imported from a distance of up to 50 km, but here are more detailed studies necessary. A connection with regions far away

is indicated by the presence of four mollusk shells. Two pierced *Cyrena semistriata* were imported from the Basin of Mayence, which is situated ca. 200 km to the north and a single pierced *Nucella lapillus* was imported from the Atlantic coast, situated > 500 km far away. In addition, in a salvage excavation in 1976–77 (table 1), a single *Homalopoma sanguineum* was found, which has been imported from the Mediterranean Sea, maybe from the mouth of the river Rhône, more than 500 km away (Alvarez Fernández, 2001 and 2002). All mollusk species present at Munzingen have been very rarely used in other Magdalenian sites in South Germany and Switzerland (Pasda, 1998b, table 50).

### Chronology: the <sup>14</sup>C dates

After Worldwar II, the age of Munzingen has been rarely discussed (e.g. Sonneville-Bordes, 1968) and recent salvage excavations by the Landesdenkmalamt Baden-Württemberg did not rediscover the archaeological horizon described by A. Padtberg (table 1). However, the interpretation as ‘Early Magdalenian’ was reinforced when the first <sup>14</sup>C date became available (Hahn, 1981a and 1981b). In the 1990s, many more <sup>14</sup>C dates were obtained but their wide range, from the late Würmian well into the early Holocene (table 2), led to the interpretation that “Munzingen (...) is a Magdalenian site of unknown age” (Housley et al., 1997, p. 32). However, this reading was not accepted by German archaeologists (e.g. Kind, 2003; Street et al., 2012) since radiocarbon dating of bones from old excavations regularly yields aberrant dates (Leesch and Müller, 2012a). For example, OxA-4789 (tabl. 2, no. 12) may indicate a Holocene reindeer, ca. 3,000 years after its disappearance in South France (Langlais et al., 2012, p. 142) and in the Jura mountains (Drucker et al., 2012).<sup>(2)</sup>

	Lab no.	<sup>14</sup> C yrs BP	2σ cal. BP	δ <sup>18</sup> O episode	Excavation year	Area
1	OxA-4785	16060 ± 140	19559–19191	GS-2.1b	1914–15	II
2	H4156-3373	15870 ± 135	19307–18955	GS-2.1b	1914–15 (+1874?)	–
3	ETH-7499	15700 ± 135	19103–18800	GS-2.1b	1914–15	–
4	OxA-4786	15670 ± 140	19074–18767	GS-2.1b	1914–15	II
5	OxA-4783	15400 ± 130	18801–18540	GS-2.1b	1914–15	I
6	OxA-4784	14510 ± 110	17836–17546	GS-2.1b / GS-2.1a	1914–15	I
7	OxA-4788	14270 ± 120	17546–17198	GS-2.1b / GS-2.1a	1914–15	XIII
8	ETH-7500	13560 ± 120	16528–16157	GS-2.1a	1914–15	IV
9	OxA-4820	13230 ± 110	16245–15554	GS-2.1a	1914–15	XIV
10	OxA-4787	12370 ± 100	14662–14073	GI-1e / GS 1d	1914–15	XIII
11	H4738-4660	12130 ± 130	14147–13787	GI-1d / GI-1c3	1976–77	–
12	OxA-4789	9080 ± 80	10377–10178	Preboreal	1914–15	XIV

Notes: H4156-3373 and H4738-4660 are <sup>14</sup>C dates made on bulk samples of many single undetermined bone fragments, all other dates are made by accelerator mass spectrometry on single reindeer bones; calibration according to Reimer et al. (2009) with OxCal v3.10; Greenland ice core climatostratigraphy by Rasmussen et al. (2014); see figure 1 for areas as documented by Padtberg (1925, fig. 2).

**Table 2** – List of <sup>14</sup>C dates of Munzingen.  
**Tabl. 2** – Liste des dates <sup>14</sup>C de Munzingen.

Also, OxA-4787 and H4738-4660 (tabl. 2, nos 10 and 11) are too young for the presence of woolly rhinoceros (Markova et al., 2013, p. 12; Stuart and Lister, 2012, p. 9) and too young to explain an aeolian accumulation of a > 80 cm thick loess cover (Antoine et al., 2009, p. 2968; Frechen et al., 2003) on top of the archaeological horizon (fig. 1). When taking into account the first nine dates (table 2), Munzingen is dated into the cold part of the Late Würmian (GS-2.1b/GS-2.1a). The first five dates, obtained by different laboratories, are very close to each other, between 19.5–18.5 ka cal. BP. Dates 6 and 7 indicate a younger time period of 17.8–17.2 ka cal. BP, which may be the start of ‘Heinrich event 1’, a time with a drop in temperature and increased aridity, but also with changes in the atmospheric radiocarbon content, resulting in a  $^{14}\text{C}$  age plateau (Hemming, 2004; Reimer et al., 2009; Stanford et al., 2011). In contrast, the last two dates (table 2, nos. 8 and 9) indicate a third, even younger time period of 16.5–15.5 ka cal. BP.

It is impossible to show exactly which reason is responsible for presence of three different time periods (Pasda, 1998a). The archaeological investigation indicates a rather short human occupation at Munzingen since—like in well preserved Upper Magdalenian sites like Pincevent IV20 (Bodu, 1996; Enloe and David, 1992), Monruz (Cattin, 2012; Plumettaz, 2007) or Champréveyres (Cattin, 2002; Leesch, 1997)—refitting of stone artefacts (e.g. fig. 2, no. 12; fig. 3) and animal bones, as well as the spatial distribution of distinct lithic raw material units, demonstrate connections over the whole excavated area (Pasda, 1994). However, because of the focus in 1914–15 on the highly visible, dark and red horizon, it cannot be ruled out that faint horizons of flint and bone scatters in loess above or below this horizon were not recognized. When plotting the nine reliable radiometric dates on the excavation plan, three of the four younger (< 18.0 ka cal. BP) dates derive from the southern part of the excavation area (table 2, areas XIII and XIV). This might indicate the presence of one or two younger horizons in this zone. But this interpretation remains open to debate since chemical preservation of bones after excavation (Padtberg, 1925, p. 31) and/or contamination by infiltration with calcareous substances (Padtberg, 1925, p. 25) can also be responsible for measuring very different  $^{14}\text{C}$  ages.

To sum up, radiometric data from Munzingen indicate an age in GS-2.1b/GS-2.1a with three sub stages of which the oldest and, by number of dates, the most pronounced level may be connected with the northern part of the excavation area. In the following section the discussion of lithic and organic artefact types will be used to give further information on the archaeostratigraphic position of Munzingen.

### CHRONOLOGY: THE LITHICS AND ANTLER TOOLS

Of course, Munzingen does not show any relation to the Badegoulian since it is much younger than the

Badegoulian in Switzerland (Leesch et al., 2012b, p. 197) and Southern France (Ducasse, 2012). Moreover, lithics as well as organic artefacts differ from Badegoulian artefacts (Ducasse, 2012; Leesch and Bullinger, 2013; Pétillon and Ducasse, 2012) since, for example, the Magdalenian groove technique (Ducasse et al., 2011, p. 141; Langlais et al., 2010, p. 18–20) is well present at Munzingen by 70 antler cores and manufacture debris. Munzingen does not even show an ambiguous relation to the well-dated, 15.8–14.7 ka cal. BP old Upper Magdalenian sites of Monruz and Champréveyres in Switzerland—to which Teufelsküche, a small rockshelter site near to Munzingen (fig. 1), may be attributed—because no antler points with double beveled base, no obvious long borers, no Lacan-like burins and no small female figurines manufactured of jet are present (Leesch et al., 2012b). Additionally, rectangles, which may characterize a later phase of this Upper Magdalenian in Switzerland (Leesch et al., 2012b, p. 197), are not present among the lithics excavated at Munzingen in 1914–15, although one rectangle was found during the 1976–77 excavations (fig. 8, no. 15).

In general, Munzingen does not show a relation with Birseck-Ermitage and Kesslerloch in Switzerland (Leesch, 1997, p. 28–29; Leesch et al., 2012, p. 197 and 203) and with the 18–16 ka cal. BP old Middle Magdalenian in France (Angevin and Surmely, 2013; Langlais, 2007, p. 762; 2008; 2010, p. 127–129 and 2011, p. 719; Langlais et al., 2010 and 2012; Primault et al., 2007b, p. 751–755) since no triangle, no scalene bladelet, no microburin, no *navette*, no *baguette demi-ronde*, no Lussac-Angles antler point and no antler point with a single bevel is present. On the contrary, heavy retouch on blades, flakes and tools occurs at Munzingen (table 3; fig. 4, no. 12; fig. 5, nos. 1, 2 and 5) and at some Middle Magdalenian sites, like Canecaude (Langlais, 2010, p. 177) or Arlay (David, 1996, p. 171–172). However, concerning lithic artefacts, Munzingen (table 3) and Arlay (Cupillard and Welté, 2006; David, 1996, p. 169–176), which is situated only 200 km to the southwest, share some characteristics like the dominance of the burins over endscrapers and the occurrence of many backed bladelets and lateral retouched blades. However, at Arlay dihedral burins dominate among the different burin types and concerning organic artefacts, Arlay is characterized by *navettes* and antler points with grooves and double beveled bases, both often decorated, which are not present at Munzingen. At Munzingen, two thirds of the lateral retouched blades and flakes were recovered in the southern part of the excavated area, where most of the < 18 ka cal. BP dates were obtained. Whether this indicates a Middle Magdalenian occupation in this zone remains difficult to judge. However, it has to be emphasized that heavy lateral retouch is also present at Upper Magdalenian sites, for example at Champréveyres, where only some blades and end scrapers have a distinct lateral retouch (Cattin, 2002, pl. 13, nos. 7 and 11–13; pl. 14, no. 3; pl. 18, nos. 1 and 8–10; pl. 20, no. 21). Therefore, the attribution of Munzingen to the Middle Magdalenian is still a matter of debate.

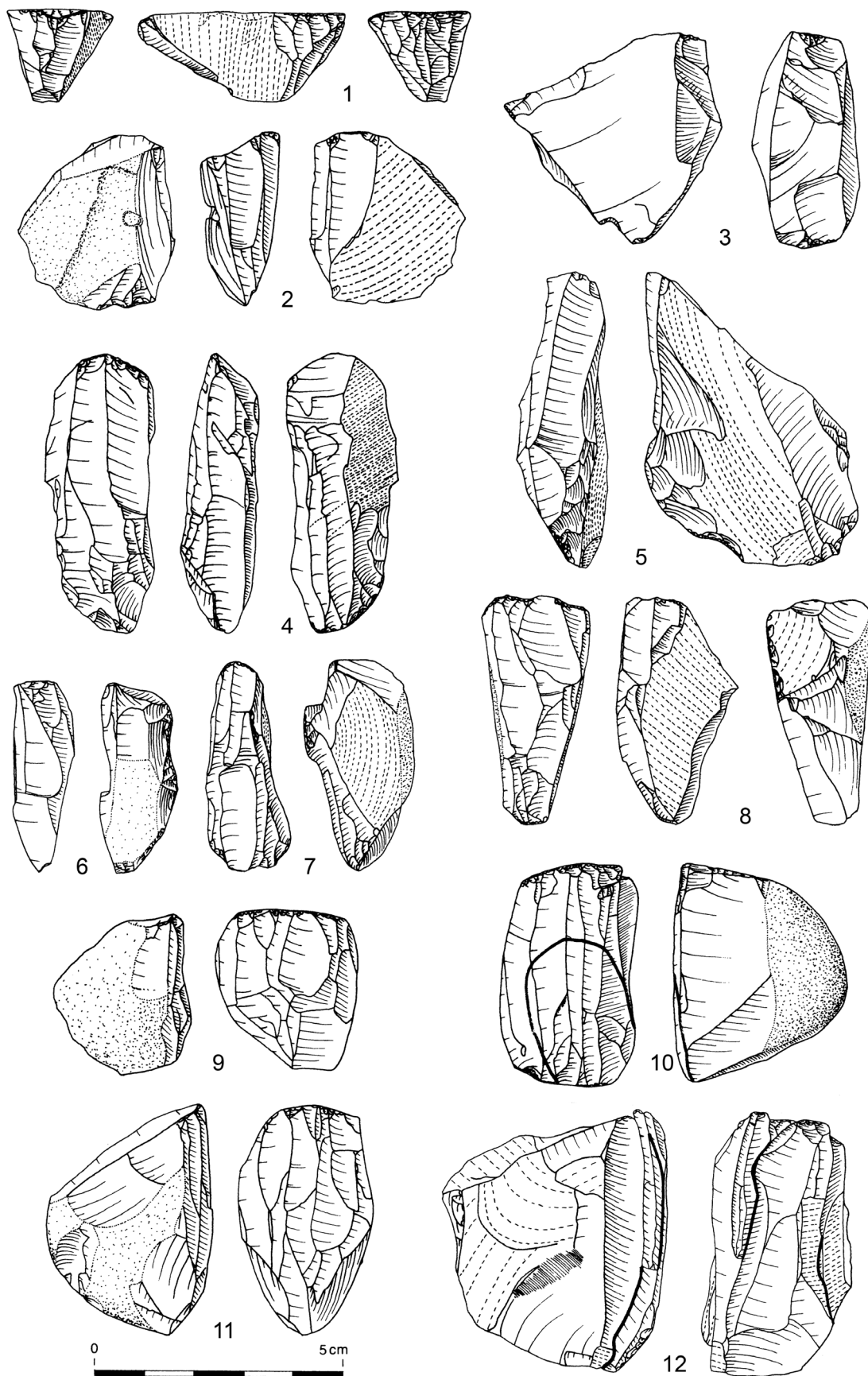


Fig. 2 – Munzingen (excavations 1914–15). Cores.

Fig. 2 – Munzingen (fouilles 1914-1915). Nucleus.

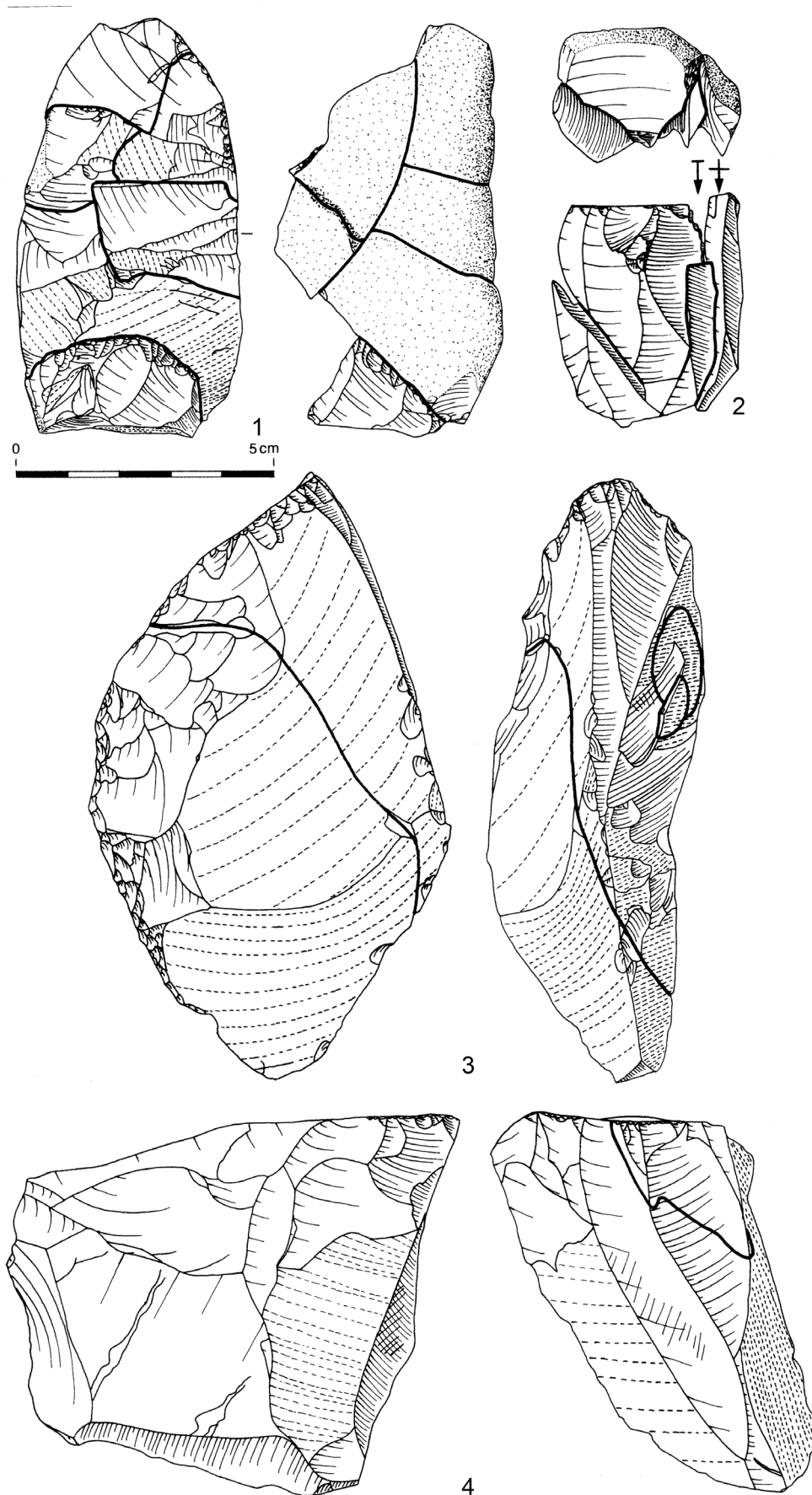


Fig. 3 – Munzingen (excavations 1914–15). Cores.  
 Fig. 3 – Munzingen (fouilles 1914-1915). Nucleus.

As shown by recent research results on the 20.5–18.0 ka cal. BP old Lower Magdalenian in France (Ducasse et al., 2011, p. 141; Langlais, 2010, p. 127–129), with investigations on sites like Abri Gandil (Langlais et al., 2007), Petit-Cloup-Barrat (Ducasse et al., 2011), Scilles cave (Langlais et al., 2010) or Taillis-des-Coteaux (Primault et al., 2007a), blade and microblade production was important (Ducasse et al., 2011, p. 141). This is also the case at Munzingen, since blades and bladelets dominate among blank types (63%) and were selected for tool production. Because cores with negatives of flakes are rare (fig. 2, no. 2; fig. 3, no. 1), most often exploitation of cores stopped before exhaustion, when removal of blades was no more possible. To produce blades, large frost sherds (fig. 2, no. 5; fig. 3, no. 3) and large chunks (fig. 3, no. 4) were used. Some blade cores were used as bladelet cores in a later phase of the *chaîne opératoire* (fig. 2,

nos. 5, 10 and 12; fig. 3, no. 3), but primary production of bladelets was also performed on small frost sherds (fig. 2, nos. 2, 7 and 8), small nodules (fig. 2, nos. 6 and 9–11) or small blocks (fig. 2, no. 12). When the shape of the core was ideal, no preparation was done (fig. 2, no. 1; fig. 3, no. 1). Preparation is present on the foot (fig. 2, nos. 2, 8 and 12), on one flank (fig. 2, nos. 4 and 7), on one foot and on one side (fig. 2, no. 5) or on the back of the core (fig. 2, no. 6; fig. 3, no. 3).

Among the artefacts excavated in 1914–15, no microbladelets are present, which is probably due to non-sieving. However, cores and tool-like cores indicate that microbladelets were produced at Munzingen like in the French Lower Magdalenian (Bazile and Boccaccio, 2007, p. 792; Ducasse and Langlais, 2007, fig. 4; Ducasse et al., 2011, p. 120 et 141; Langlais et al., 2007, p. 354–357 and 2010, p. 15; Primault et al., 2007a, p. 19) from thick and long flakes (fig. 2, no. 3), from some cores looking like carinated scrapers (fig. 2, no. 1), from transversal and Corbiac burins (fig. 5, no. 7; fig. 6, no. 1) and from prismatic burins (fig. 6, no. 3).

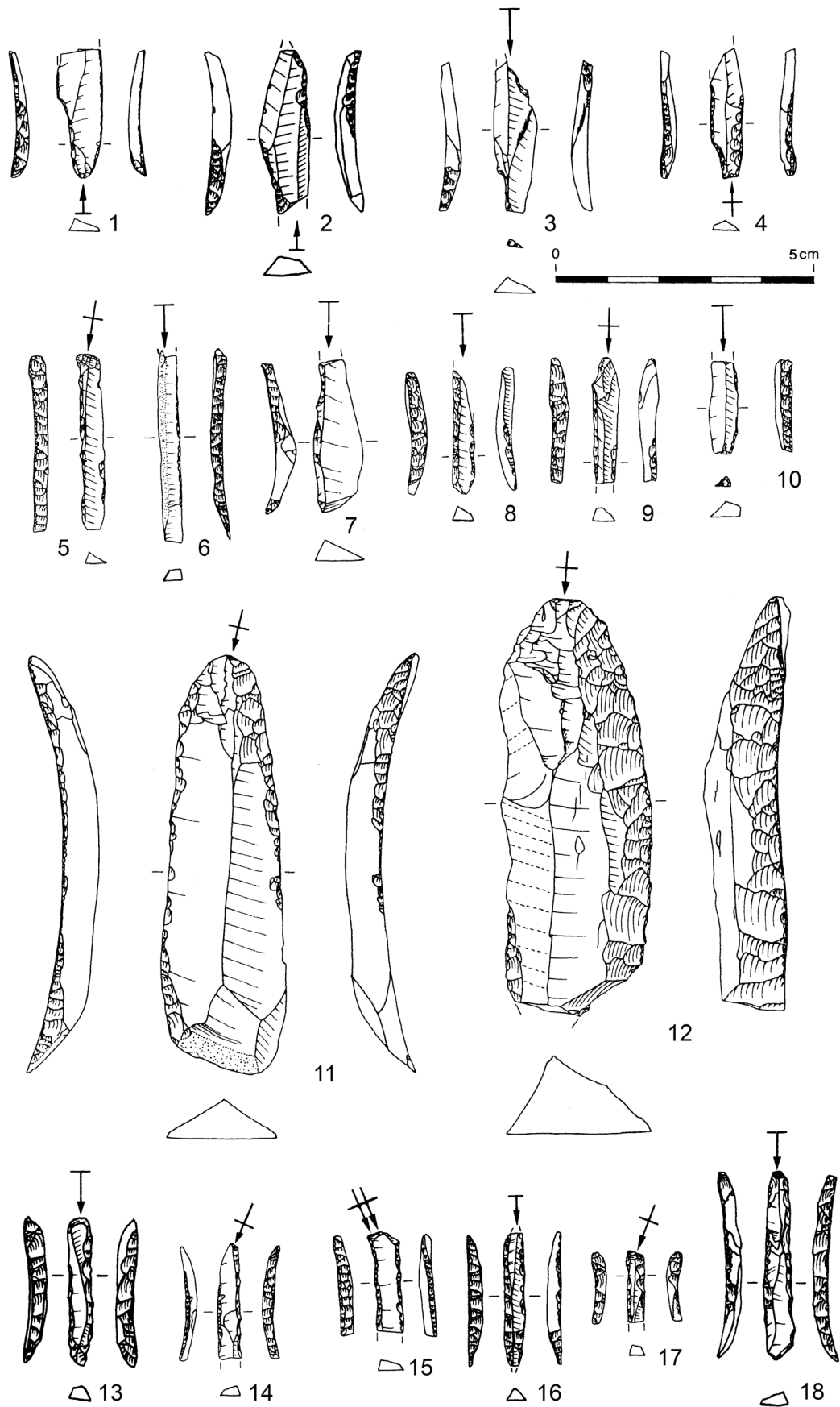
As at other Magdalenian sites (Leesch 1997, p. 22 and 79), due to non-sieving at the 1914–15 excavations, the number of backed bladelets is low at Munzingen. However, like in the French Lower Magdalenian (Bazile et al., 1989, p. 72; Ducasse et al., 2011, p. 114; Langlais et al., 2007, p. 350; Primault et al., 2007a, p. 19), simple backed bladelets dominate at Munzingen, often of 3–4 cm in length and with a straight profile (fig. 4, nos. 5–7). Only few bilateral retouched bladelets occur (fig. 4, nos. 8, 14 and 16), with one side often not backed completely (fig. 4, nos. 9, 15 and 17–19). Some truncated backed pieces (fig. 4, no. 10) and single denticulated backed bladelets occur. Narrow backed pieces occur also but none has a pronounced pointed edge (fig. 4, nos. 14 and 17). Some backed bladelets are fragmented by impact fractures (fig. 4, no. 8). As mentioned above, bladelets for backing were detached from bladelet cores but manufacture debris (fig. 4, no. 7) indicates also the use of curved blades for modification of backed bladelets. However, it has to be emphasized that according to backed bladelets alone, Munzingen does not indicate a Lower Magdalenian: first, denticulated backed bladelets, backed bladelets with truncation, and pointed bladelets with bilateral backing also occur at the Upper Magdalenian sites Champréveyres (Cattin, 2002, pl. 1–4) and Monruz (Cattin, 2012, fig. 17). Second, the slender appearance of backed bladelets at Munzingen (fig. 4) may be misleading because their width is the same as in Champréveyres (Cattin, 2002, fig. 51). Also, both arguments do not allow the slender, bilateral backed bladelets with faint points of Munzingen (fig. 4, nos. 14, 16 and 19) to be identified as Epigravettian points (Bazile, 2011; Bazile and Boccaccio, 2007).

Another distinct type of the French Lower Magdalenian is a thin, asymmetric and twisted, 15–30 mm long bladelet with a natural point, a faint retouched, straight back on the right side and a sharp, convex edge on the left side that was produced from asymmetric and

Lithic types	N
<b>Burins</b>	<b>120</b>
Burin on truncation	34
Dihedral burin	33
Double burin	18
Burin on break	15
Burin on unmodified edge	15
Undetermined burin	5
<b>Lateral retouched pieces</b>	<b>120</b>
Lateral retouched blade	83
Lateral retouched flake	24
Other lateral retouched blank	5
<b>Backed pieces</b>	<b>73</b>
Unilateral backed bladelet	47
Bilateral backed bladelet	6
Backed bladelet with truncation	12
Denticulated backed bladelet	3
Shouldered point	5
<b>Endscraper:</b>	<b>64</b>
Single endscraper	57
Double endscraper	7
<b>Splintered pieces</b>	<b>51</b>
<b>Borer</b>	<b>41</b>
Borer, bec	36
Point	5
<b>Truncations</b>	<b>42</b>
Single truncation	36
Double truncation	6
<b>Combinations</b>	<b>27</b>
End scraper-burin	21
End scraper-truncation	2
End scraper-point	2
End scraper-borer	1
Truncation-splintered piece	1
<b>Total</b>	<b>530</b>

**Table 3** – Lithic tool and armature types excavated 1914–15 at Munzingen.

*Tabl. 3* – Types d'outils lithiques fouillées en 1914–1915 à Munzingen.



**Fig. 4** – Munzingen (excavations 1914–15). 1–4: shouldered point; 5–10 and 13–18: backed bladelet; 11 and 12: lateral retouched blade.  
*Fig. 4* – Munzingen (fouilles 1914-1915). 1-4 : pointes à cran ; 5-10 et 13-18 : lamelles à dos ; 11 et 12 : lames retouchées.

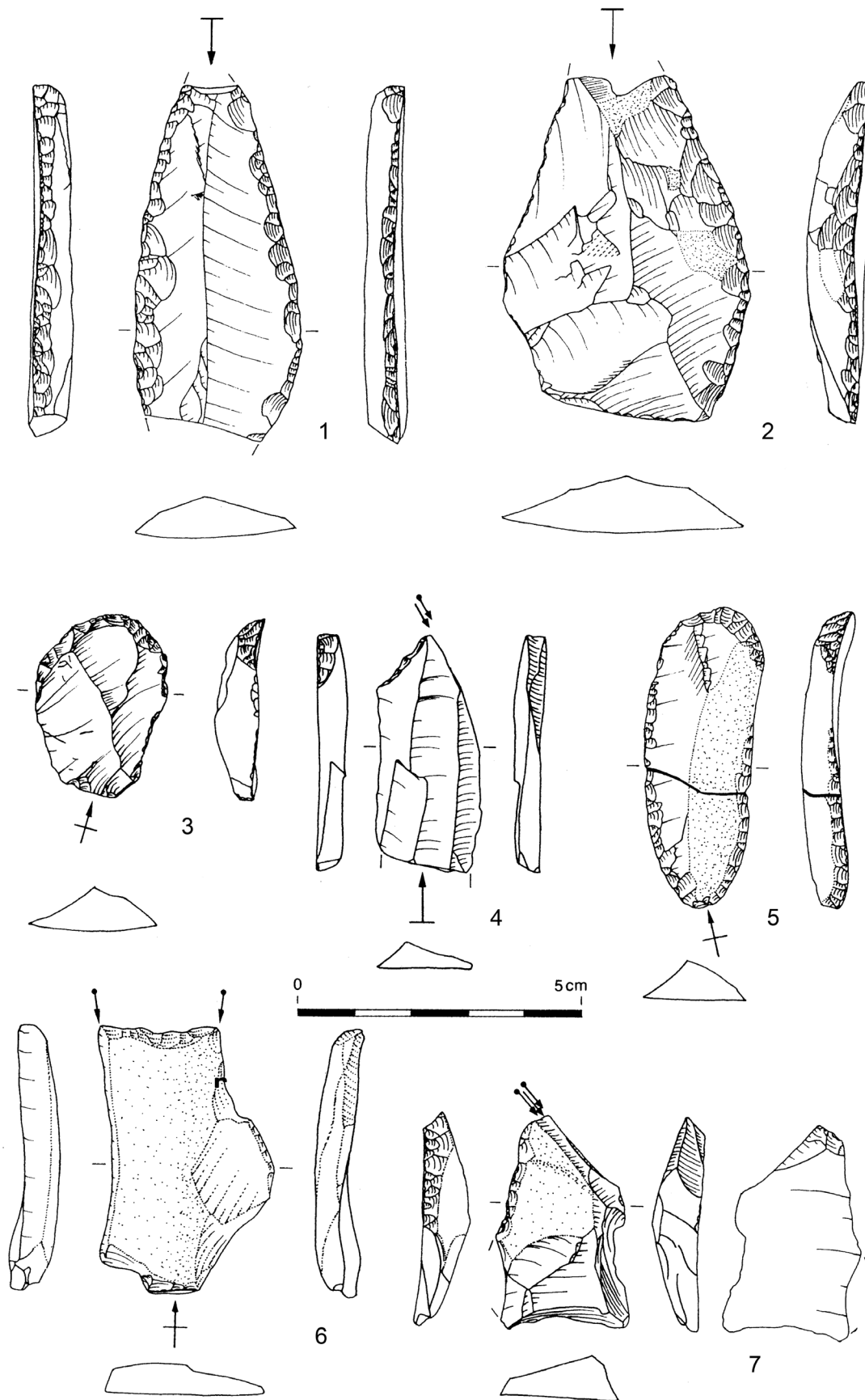


Fig. 5 – Munzingen (excavations 1914–15). 1: lateral retouched blade; 2: lateral retouched flake; 3 and 5: endscraper; 4, 6, 7: burin.  
 Fig. 5 – Munzingen (fouilles 1914-1915). 1 : lame retouchée ; 2 : éclat retouché ; 3 et 5 : grattoirs ; 4, 6, 7 : burins.



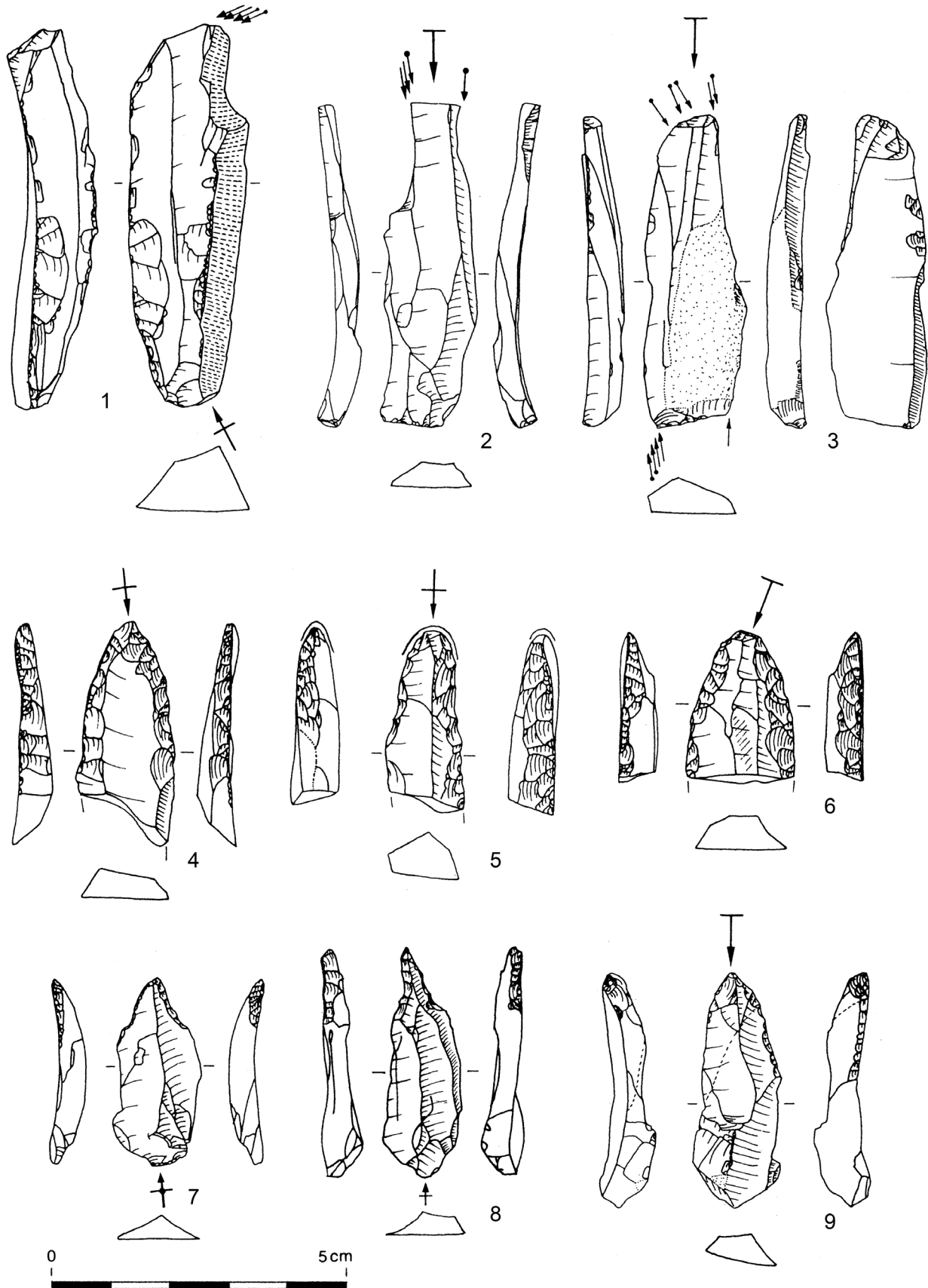


Fig. 6 – Munzingen (excavations 1914–15). 1–3: burin; 4–6: point; 7–9: borer.  
 Fig. 6 – Munzingen (fouilles 1914-1915). 1-3 : burins ; 4-6 : pointes ; 7-9 : perçoirs.

convergent blanks (Bazile and Boccaccio, 2007, p. 792; Ducasse et al., 2011, p. 114–15 and 141; Langlais, 2011, p. 719; Langlais et al., 2007, p. 351 and 2010, p. 12–15). This type is not present among the tools excavated by Padtberg as no sieving was performed during the excavation in 1914–15. However, during the 1976–77 salvage excavation, many fragments of small backed bladelets (fig. 8, nos. 1, 5, 7–9, 12 and 14), some with an unmodified convex edge (fig. 8, nos. 2, 4 and 6), some with a retouch on the ventral side (fig. 8, nos. 3–4 and 10–11), have been found due to sieving. Beside this, during the 1976–77 excavations also tiny cores (fig. 8, no. 17), flakes used as cores (fig. 8, no. 16) and bladelet cores (fig. 8, no. 18) have been recovered but these lithics occur 10–20 m far away in loess and not in the distinct archaeological horizon of the 1914–15 excavations. Also, it has to be emphasized that at the Upper Magdalenian site Champréveyres comparable, tiny fragments of backed bladelets have been found due to sieving, some with retouch on the ventral face, others with alternating retouch, some with an unmodified, convex edge (Cattin, 2002, pl. 2–4). This prevents from taking the lithics of the 1976–77 excavations as pure evidence of the presence of a Lower Magdalenian at Munzingen.

Another distinct tool type of the Lower Magdalenian in France is the shouldered point (Langlais, 2010, p. 719), which occurs at Abri Gandil, c. 20 (Langlais et al., 2007, p. 347–350) and Fontgrasse (Bazile, 2006; Bazile and Boccaccio, 2007, p. 792). At Munzingen, fragments of four to five backed pieces have the shape of shouldered points (fig. 4, nos. 1–4). These artefacts were recognized by R. R. Schmidt (1912, p. 68) and Padtberg (1925, p. 61) already. However, in contrast to the shouldered points of Abri Gandil and Fontgrasse, where retouch is present on one side only, the base of the presumed shouldered points of Munzingen is situated on the ‘left’ side (fig. 4, nos. 1–4), whereas the tip is an oblique truncation on the ‘right’ side (fig. 4, nos. 2–3). Comparable points occur in another archaeostratigraphic context in the Salpêtrière cave in the Languedoc (Boccaccio, 2005, fig. 24, no. 5; fig. 28, nos. 3 and 5; fig. 30, nos. 4 and 12) and in the Paina cave near Venice in Italy (Broglia et al., 1993, fig. 4). Although these Munzingen artefacts have the shape of shouldered points they may represent only manufacture debris of backed bladelets (fig. 4, no. 2) or borers (fig. 4, no. 1) or are edge-damaged (fig. 4, nos. 3–4).

Just like at Munzingen, burins dominate at most Lower Magdalenian sites in France (Ducasse et al., 2011, p. 111; Langlais et al., 2010, p. 12). In contrast to Munzingen, burins and endscrapers occur in the same amount at Abri Gandil, c. 20, and Fontgrasse, the only sites with shouldered points (Bazile and Boccaccio, 2007, p. 792; Langlais et al., 2007, p. 347). Again in contrast to Munzingen, where burins on truncation (fig. 5, no. 4 and 6; fig. 6, no. 3) and dihedral burins occur in the same number, the dihedral burin is the most common burin type in the French Lower Magdalenian (Bazile

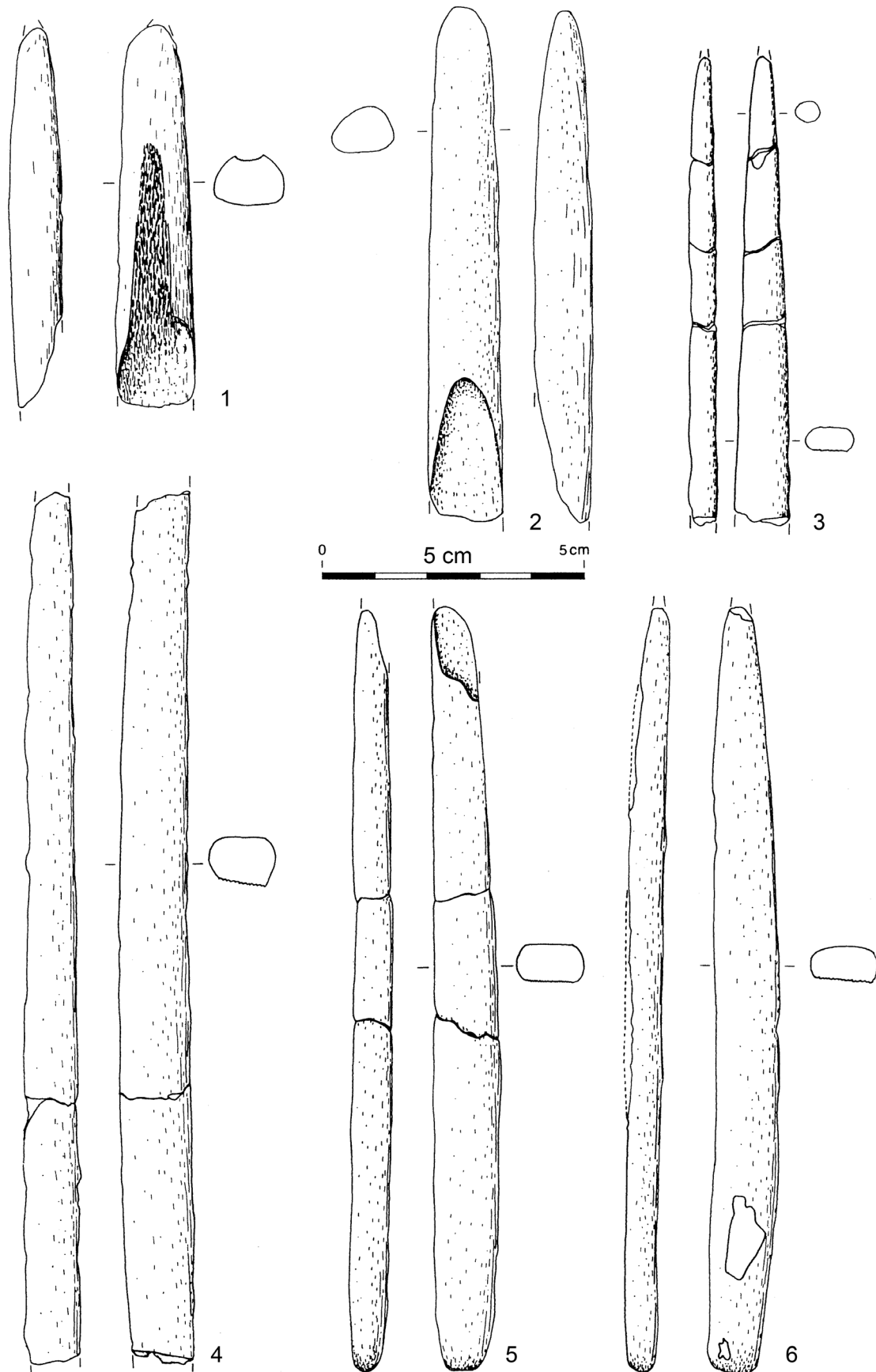
et al., 1989, p. 72; Ducasse et al., 2011, p. 111; Langlais et al., 2010, p. 12).

Finally, one of the main arguments that supports a Lower Magdalenian date of Munzingen is presented by the 67 reindeer antler points (fig. 7). Points with a round or elliptic cross-section and a simple or pointed base, often very long, up to 30 cm, characterize the 20–18 ka cal. BP old Lower Magdalenian in France (Ducasse et al., 2011, p. 133 et 141; Langlais, 2010, p. 274; Langlais et al., 2007, p. 358–359 and 2010, p. 23; Pétilion et al., 2011, p. 1268–1269). Unfortunately, preservation is not good at Munzingen, yet no antler point shows a bevel or a groove, all indicate long points with pointed, massive or simple bases and rectangular (fig. 7, nos. 3–6) as well as rounded cross-sections (fig. 7, nos. 1 and 2). Characteristic breaks (fig. 7, nos. 1, 2 and 5) are being interpreted as impact fractures (Stodiek, 1993, p. 169). Maybe ‘pseudo-baguette demi-rondes’ (Ducasse et al., 2011, p. 141; Langlais et al., 2010, p. 21) are present as well, but fragmentation and bad preservation make identification of this Lower Magdalenian type difficult.

Like in the French Lower Magdalenian (Ducasse et al., 2011, p. 138 et 141; Langlais et al., 2010, p. 28), and also in the Swiss Upper Magdalenian (Leesch, 1997, p. 95–102), a perforated reindeer tooth and bone needle production is present at Munzingen. Besides, at Munzingen two *bâtons percés*, three smoothers made out of massive bones, a chisel-like antler rod, a pointed antler rod with a large perforated hole at its massive base, an unfinished pendant made of jet, and two fragments of mammoth ivory are present. Last but not least, like at Munzingen, the fauna in some Lower Magdalenian sites is also dominated by reindeer (Ducasse et al., 2011, p. 127; Langlais et al., 2010, p. 35; Primault et al., 2007a, p. 15). However, this argument does not need to support a high age within the Magdalenian since dominance of reindeer may be a regional and not a chronological pattern (Kuntz and Costamagno, 2011, p. 14).

## CONCLUSION

To conclude, Munzingen is a large Magdalenian site with distinctive lithic and organic artefacts that was excavated within a loess deposit. Since it was excavated a hundred years ago, no observations on fine stratigraphy are available and the correlation to the lithics of later salvage excavations cannot be easily assessed. However, when recent advances in research on the early part of the Magdalenian of France are taken into account, Munzingen can justifiably be assigned to the ca. 20–18 ka cal. BP old Lower Magdalenian on the basis of the reindeer antler points. This interpretation is supported by five of nine reliable radiocarbon dates, the presence of woolly rhinoceros and by the (aeolian?) loess cover. Characteristic lithic artefacts may support this attribution as well but, as always, their interpretation is not without ambiguity.



**Fig. 7** – Munzungen (excavations 1914–15). 1–6: antler point.

*Fig. 7* – Munzungen (excavations 1914–15). 1–6: antler point.

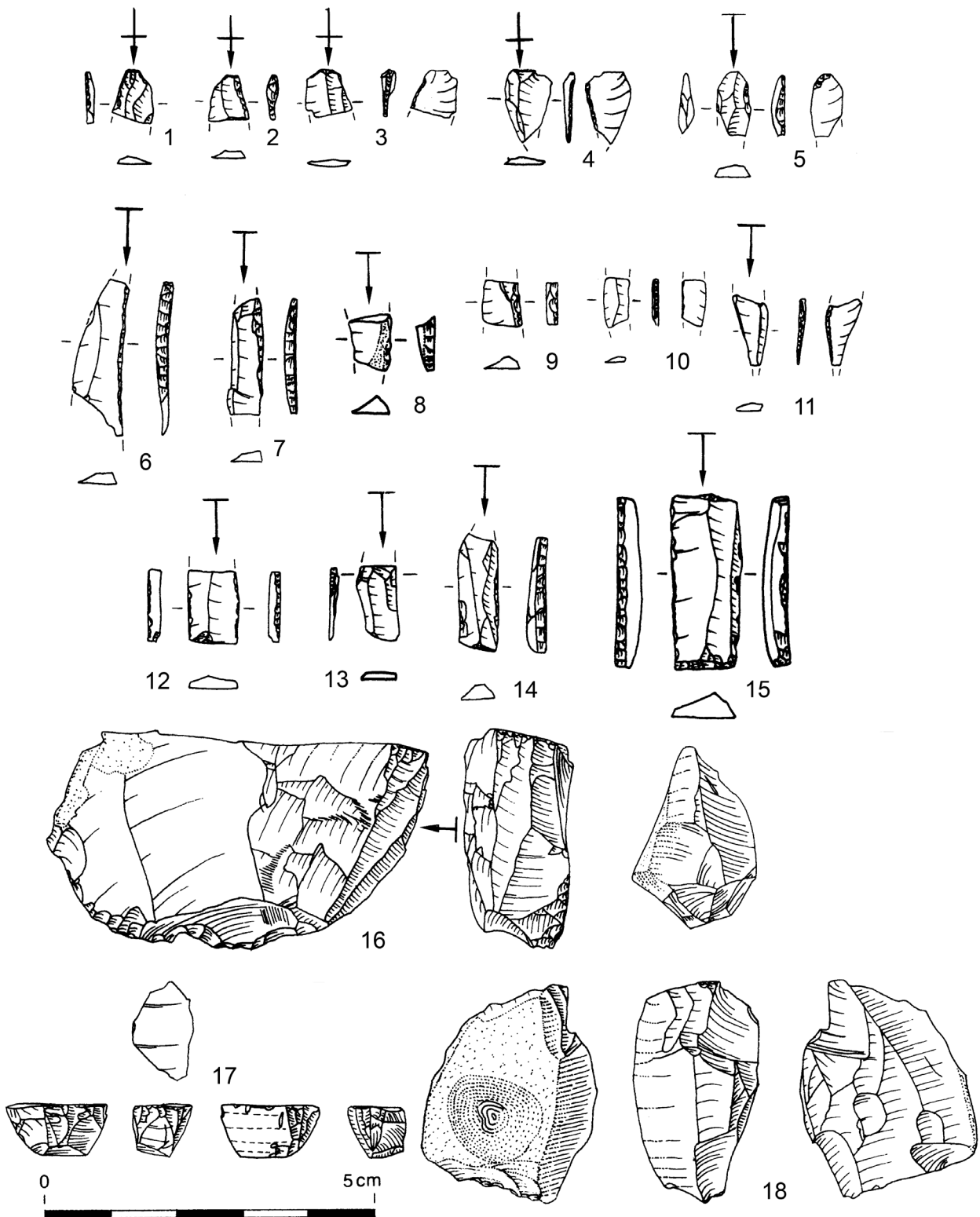


Fig. 8 – Munzingen (excavations 1976–77). 1–15: backed bladelet; 16–18: core.

Fig. 8 – Munzingen (fouilles 1976-1977). 1-15 : lamelles à dos ; 16-18 : nucleus.

## FINAL DISCUSSION

If Munzingen represents a 20–18 ka cal. BP old site, its geographic position at the eastern margin of the Lower Magdalenian landscape (Street et al., 2012, tabl. 1) has to be emphasized. Of course, demographic data are tentative but some estimations indicate ca. 7,000 individuals in France and Germany (Delpech, 1999, p. 36) or ca. 30,000 individuals in Europe (Bocquet-Appel et al., 2005). It is difficult to say which human lifeway is responsible for the presence of a distinct lithic and organic toolkit within a vast territory with a low population density and why this toolkit changed after some millennia. However, a glance on the late prehistoric and historic North American Arctic and Subarctic may widen our horizon of knowledge on hunter-gatherer lifeways in general: for example, the volcanic eruption around AD 900 along the Alaska-Yukon border may have been the cause of human emigration (e.g. Moodie and Catchpole, 1992) but also recent research has shown that this volcanic eruption separates two periods in the Southern Yukon, where hunting technology using throwing darts was abruptly replaced by bow and arrow, the preferred wood for projectile shafts shifted from birch to spruce, and the preferred armature for projectiles changed from stone to antler (Hare et al., 2012, p. 133). This may support the view that “environmental factors (...) are relevant for migration processes” (Widlok et al., 2012, p. 64). In contrast, it has to be emphasized that the history of some subarctic and arctic regions (see for example Csonka, 1995; Marshall, 1996; Pasda, 2014 or Sørensen, 2010) shows that it is much more complicated since “a complex mixture of rational and non-rational elements under a specific set of conditions” (Hill, 2013, p. 230) was responsible for cultural and technological changes often within one generation and with differences between neighbouring regions. These historic foragers had detailed information on landscape and humans on a continental scale as traded goods could traverse 1,600 km within a year (Hill, 2013, p. 95), linking “people in a region of some 300,000 km<sup>2</sup> into a single communication system” (Burch, 1975, p. 9) with vast networks of orally transmitted trails (Aporta, 2009 ; Burch, 2005, p. 215–219). Therefore, foragers were capable to cover enormous distances by foot within a short time period. For example, in spring 1771, a Chipewyan group walked more than 300 km in very rough country during 25 days (Burch, 1991, p. 443), in summer 1869, a group of Chipewyan, following the caribou migration, covered a distance of 500

km as the crow flies within 44 days, often in extremely difficult conditions (Burch, 1991, p. 443), or in 1854, a Gwich'in group walked around 2,400 km within five or six months as part of their ordinary annual movement (Hill, 2013, p. 7–8). Therefore, it is not surprising that, sometimes, these foragers changed their way of life with purpose. For example, in the 18th century a group of Athapaskan-speaking inland foragers travelled over the high-altitude glaciers of the St. Elias-Range to live at the Pacific coast to become complex Tlingit hunter-gatherers by adopting their language and customs (Cruikshank, 2005, p. 33–36). Another example is from Northwest Alaska where around 1880, a group of upper Kobuk Koyukon Indians voluntarily, without stress or crisis by war, famine, disease, or Western intrusion, decided to become Iñupiaq Eskimo (Hill, 2013, p. 127–146). When humans with a foraging lifeway of the historic past have not been driven by the environment but were active participants in the world, this may have been the case in prehistoric times as well. From this point of view, Munzingen is but one (Lower?) Magdalenian site in a 20–14.7 ka cal. BP old cultural landscape that connected the Upper Rhine plain with the Late Würmian mouth of the Rhône and the Pleistocene Bay of Biscay.

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## NOTES

- (1) August Padtberg was born in 1877 in Osnabrück (Germany) and died in Brazil in 1948 (Rabuske, 1981). In 1896 he became a Jesuit and lived in Brazil from 1903–07 where he became a Brazilian citizen. In 1912–17 Padtberg studied at the University of Freiburg and published articles on archaeology and evolution. In 1925, he left the Jesuit order and emigrated to Brazil where he became employed by the National Museum working as an archaeologist, e.g. at Lagoa Santa, but also as a teacher and university professor.
- (2) According to other scholars, reindeer was also present in later times (Béreiziat, 2013, p. 99; Drucker et al., 2011).

## RÉFÉRENCES BIBLIOGRAPHIQUES

- ALVAREZ FERNÁNDEZ E. (2001) – L'axe Rhin-Rhône au Paléolithique supérieur récent : l'exemple des mollusques utilisés comme objets de parure, *L'Anthropologie*, 105, 4, p. 547–64.
- ALVAREZ FERNÁNDEZ E. (2002) – Perforated *Homalopoma sanguineum* from Tito Bustillo (Asturias): Mobility of Magdalenian Groups in Northern Spain, *Antiquity*, 76, p. 641–46.
- ANGEVIN R., SURMELY F. (2013) – Le Magdalénien moyen et la trajectoire historique des sociétés du XVI<sup>e</sup> millénaire av. J.-C. en France centrale, *Comptes rendus Palevol*, 12, 1, p. 57–68.
- ANTOINE P., ROUSSEAU D.-D., MOINE O., KUNESCH S., HATTÉ C., LANG A., TISSOUX H., ZÖLLER L. (2009) – Rapid

- and Cyclic Aeolian Deposition During the Last Glacial in European Loess. A High-Resolution Record from Nussloch, Germany, *Quaternary Science Reviews*, 28, p. 2955–73.
- APORTA C. (2009) – The Trail as Home: Inuit and Their Pan-Arctic Network of Routes, *Human Ecology*, 37, p. 131–46.
- BAZILE F. (2006) – Datations du site de Fontgrasse (Vers-Pont-du-Gard, Gard). Implications sur la phase ancienne du Magdalénien en France méditerranéenne, *Bulletin de la Société préhistorique française*, 103, 3, p. 597–602.
- BAZILE F. (2011) – De l'Épigravettien à l'ouest du Rhône?, *Paléo*, 22, p. 27–52.
- BAZILE F., BOCCACCIO G. (2007) – Du Solutrén supérieur au Magdalénien en Languedoc rhodanien. Ruptures et continuités, *Bulletin de la Société préhistorique française*, 104, 4, p. 787–96.
- BAZILE F., GULLERAULT P., MONNET C. (1989) – L'habitat paléolithique supérieur de plein air de Fontgrasse (Vers-Pont-du-Gard). Travaux 1983-1987, *Gallia Préhistoire*, 31, p. 65–92.
- BÉREIZIAT G. (2013) – Quoi de neuf à l'Est. Une séquence tardiglaciaire du Jura méridional revisitée : l'abri Gay à Poncin (Ain), *L'Anthropologie*, 117, p. 94–119.
- BOCCACCIO G. (2005) – *Les industries lithiques du Solutrén supérieur et du Salpêtrien ancien en Languedoc : ruptures et continuités des traditions techniques*, doctoral thesis, université Aix-Marseille 1 – université de Provence, Aix-en-Provence, 528 p.
- BOCQUET-APPEL J.-P., DEMARS P.-Y., NOIRET L., DOBROWSKY D. (2005) – Estimates of Upper Palaeolithic Meta-Population size in Europe from Archaeological Data, *Journal of Archaeological Science*, 32, p. 1656–68.
- BODU P. (1996) – Les chasseurs magdaléniens de Pincevent. Quelques aspects de leurs comportements, *Lithic Technology*, 21, p. 48–70.
- BROGLIO A., CHELIDONIO G., LONGO A. (1993) – Analyse morphologique et fonctionnelle des pointes à cran de l'Épigravettien ancien, in P. C. Anderson, S. Beyries, M. Otte and H. Plisson (eds.), *Traces et fonctions: les gestes retrouvés*, Liège, université de Liège (ERAUL, 50), p. 31–39.
- BURCH E. S. Jr. (1975) – Inter-Regional Transportation in Traditional Northwest Alaska, *Anthropological Papers of the University of Alaska*, 17, 2, p. 1–12.
- BURCH E. S. Jr. (1991) – Herd Following Reconsidered, *Current Anthropology*, 32, 4, p. 439–45.
- BURCH E. S. Jr. (2005) – *Alliance and Conflict: The World System of the Iñupiaq Eskimos*, Lincoln, University of Nebraska Press, 384 p.
- CATTIN M.-I. (2002) – *Hauterive-Champréveyres*, 13. *Un campement magdalénien au bord du lac de Neuchâtel : exploitation du silex (secteur 1)*, Neuchâtel, musée cantonal d'Archéologie (Archéologie neuchâteloise, 26), 2 vols., 418 p.
- CATTIN M.-I., with the collaboration of AFFOLTER J. and BEYRIES S. (2012) – *Le site magdalénien de Monruz*, 4. *La vie quotidienne à travers le travail du silex*, Neuchâtel, musée cantonal d'Archéologie (Archéologie neuchâteloise, 51), 315 p.
- CRUIKSHANK J. (2005) – *Do Glaciers Listen? Local Knowledge, Colonial Encounters, and Social Imagination*, Seattle, University of British Columbia Press, 312 p.
- CSONKA Y. (1995) – *Les Aharmiut. À l'écart des Inuits Caribous*, Neuchâtel, Victor Attinger, 501 p.
- CUPILLARD C., WELTÉ A.-C. (2006) – Le Magdalénien de la grotte « Grappin » à Arlay (Jura, France) : nouveaux regards, *L'Anthropologie*, 110, 4, p. 624–83.
- DAVID S. (1996) – La fin du Paléolithique supérieur en Franche-Comté : environnement, culture, chronologie, *Gallia Préhistoire*, 38, 1, p. 111–248.
- DELPECH F. (1999) – Biomasse d'ongulés au Paléolithique et inférences sur la démographie, *Paléo*, 11, p. 19–42.
- DRUCKER D. G., KIND C. J., STEPHAN E. (2011) – Chronological and Ecological Information on Late-Glacial and Early Holocene Reindeer from Northwest Europe Using Radiocarbon ( $^{14}\text{C}$ ) and Stable Isotope ( $^{13}\text{C}$ ,  $^{15}\text{N}$ ) Analysis of Bone Collagen: Case Study from Southwestern Germany, *Quaternary International*, 245, 2, p. 218–24.
- DRUCKER D. G., BRIDAULT A., CUPILLARD C. (2012) – Environmental Context of the Magdalenian Settlement in the Jura Mountains Using Stable Isotope Tracking ( $^{13}\text{C}$ ,  $^{15}\text{N}$ ,  $^{34}\text{S}$ ) of Bone Collagen from Reindeer (*Rangifer tarandus*), *Quaternary International*, 272-273, p. 322–32.
- DUCASSE S. (2012) – What is Left of the Badegoulian 'Interlude'? New Data on Cultural Evolution in Southern France between 23,500 and 20,500 cal. BP, *Quaternary International*, 272–273, p. 150–65.
- DUCASSE S., LANGLAIS M. (2007) – Entre Badegoulien et Magdalénien inférieur, nos cœurs balancent... Approche critique des industries lithiques du Sud de la France et du Nord-Est espagnol entre 19000 et 16500 BP, *Bulletin de la Société préhistorique française*, 104, 4, p. 771–85.
- DUCASSE S., CASTEL J.-C., CHAUVIÈRE F.-X., LANGLAIS M., CAMUS H., MORALA A., TURQ A. (2011) – Le Quercy au cœur du Dernier Maximum Glaciaire. La couche 4 du Petit-Cloup-Barrat et la question de la transition badegoulo-magdalénienne, *Paléo*, 22, p. 101–54.
- ENLOE J. G., DAVID F. (1992) – Food Sharing in the Paleolithic. Carcass Refitting at Pincevent, in J. L. Hofman and J. G. Enloe (eds.), *Piecing Together the Past. Applications of Refitting Studies in Archaeology*, Oxford, Archaeopress (British Archaeological Reports, International Series 578), p. 296–315.
- FRECHEN M., OCHES E. A., KOHFELD K. E. (2003) – Loess in Europe. Mass Accumulation Rates During the Last Glacial Period, *Quaternary Science Reviews*, 22, p. 1835–57.
- HAHN J. (1981a) – Zur Abfolge des Jungpaläolithikums in Südwestdeutschland, *Kölner Jahrbuch für Vor- und Frühgeschichte*, 15, p. 52–67.
- HAHN J. (1981b) – Abfolge und Umwelt der jüngeren Altsteinzeit in Südwestdeutschland, *Fundberichte aus Baden-Württemberg*, 6, p. 1–27.

- HARE P. G., THOMAS C. D., TOPPER T. N., GOTTHARDT R. M. (2012) – The Archaeology of Yukon Ice Patches: New Artifacts, Observations, and Insights, *Arctic*, 65, 5, p. 118–35.
- HEMMING S. R. (2004) – Heinrich Events: Massive Late Pleistocene Detritus Layers of the North Atlantic and Their Global Climate Imprint, *Reviews of Geophysics*, 42, 1, p. 1–43.
- HILL E., ed. (2013) – *Iñupiaq Ethnohistory: Selected Essays by Ernest S. Burch, Jr.*, Fairbanks, University of Alaska Press, 280 p.
- HOUSLEY R. A., GAMBLE C. S., STREET M., PETTIT P. B. (1997) – Radiocarbon Evidence for the Lateglacial Human Recolonisation of Northern Europe, *Proceedings of the Prehistoric Society*, 63, p. 25–54.
- KAISER M. J. (2013) – *Werkzeug – Feuerzeug – Edelstein. Die Silices des südöstlichen Oberheingebietes und ihre Nutzung von den Anfängen bis zur Gegenwart*, Stuttgart, Theiss (Materialhefte zur Archäologie in Baden-Württemberg, 95), 432 p.
- KIND C. J. (2003) – Die absolute Datierung des Magdalénien und des Mesolithikums in Süddeutschland, in J. M. Burdukiewicz, L. Fiedler, W.-D. Heinrich, A. Justus and E. Brühl (eds.), *Erkenntnisjäger. Kultur und Umwelt des frühen Menschen. Festschrift für Dietrich Mania*, Halle/Saale, Landesamt für Archäologie (Veröffentlichungen des Landesamtes für Archäologie, 57), p. 303–19.
- KIND C. J. (2008) – Neue Untersuchungen in der Magdalénien-Freilandfundstelle Munzingen, Stadt Freiburg, *Ausgrabungen in Baden-Württemberg*, 2007, p. 28–32.
- KUNTZ D., COSTAMAGNO S. (2011) – Relationship Between Reindeer and Man in Southwestern France During the Magdalenian, *Quaternary International*, 238, p. 12–24.
- LANGLAIS M. (2007) – Des identités qui se cherchent... Apport des industries lithiques à la question de l'origine du Magdalénien moyen dans le Sud-Ouest européen, *Bulletin de la Société préhistorique française*, 104, 4, p. 759–71.
- LANGLAIS M. (2008) – Chronologie et territoires au Magdalénien entre le Rhône et l'Èbre : l'exemple des armatures lithiques, in J.-M. Pétilion, M.-H. Dias-Meirinho, P. Cattelain, M. Honegger, C. Normand, and N. Valdeyron (eds.), *Recherches sur les armatures de projectile du Paléolithique supérieur au Néolithique*, proceedings of the 83rd Session, 15th UISPP Congress (Lisbon, 4-9 September 2006), *P@lethnologie*, 1, p. 220–49.
- LANGLAIS M. (2010) – *Les Sociétés magdaléniennes de l'isthme pyrénéen*, Paris, CTHS (Documents préhistoriques, 26), 336 p.
- LANGLAIS M. (2011) – Processes of Change in Magdalenian Societies in the Pyrenean Isthmus (20–16 ky cal BP), *Antiquity*, 85, p. 715–28.
- LANGLAIS M., LADIER É., CHALARD P., JARRY M., LACRAMPE-CUYAUBÈRE F. (2007) – Aux origines du Magdalénien « classique » : les industries de la séquence inférieure de l'abri Gandil (Bruniquel, Tarn-et-Garonne), *Paléo*, 19, p. 341–66.
- LANGLAIS M., PÉTILLON J.-M., BEAUNE S. A. de, CATTELAÏN P., CHAUVIÈRE F.-X., LETOURNEUX C., SZMIDT C., BELLIER C., BEUKENS R., DAVID F. (2010) – Une occupation de la fin du Dernier Maximum Glaciaire dans les Pyrénées : le Magdalénien inférieur de la grotte des Scilles (Lespugue, Haute-Garonne), *Bulletin de la Société préhistorique française*, 107, 1, p. 5–51.
- LANGLAIS M., COSTAMAGNO S., LAROULANDIE V., PÉTILLON J.-M., DISCAMPS É., MALLYE J.-B., COCHARD D., KUNTZ D. (2012) – The Evolution of Magdalenian Societies in South-West France between 18,000 and 14,000 cal. BP: Changing Environments, Changing Tool Kits, *Quaternary International*, 272–273, p. 138–49.
- LEESCH D. (1997) – *Hauterive-Champréveyres, 10. Un campement magdalénien au bord du lac de Neuchâtel : cadre chronologique et culturel, mobilier et structures, analyse spatiale (secteur 1)*, Neuchâtel, musée cantonal d'Archéologie (Archéologie neuchâteloise, 19), 270 p.
- LEESCH D., BULLINGER J. (2013) – Le Plateau suisse et le massif du Jura pendant le Paléolithique supérieur ancien. Paléoenvironnement et indices d'occupation humaine, in P. Bodu, L. Chehmana, L. Klaric, L. Mevel, S. Soriano and N. Teyssandier (eds.), *Le Paléolithique supérieur ancien de l'Europe du Nord-Ouest. Réflexions et synthèses à partir d'un projet collectif de recherche sur le Centre et le Sud du Bassin parisien*, proceedings of the conference (Sens, 15-18 April 2009), Paris, Société préhistorique française (Mémoire, 54), p. 385–94.
- LEESCH D., MÜLLER W. (2012a) – Neue Radiokarbondaten an Knochen, Zähnen und Geweih aus einigen Magdalénien-Fundstellen der Schweiz und ihre Bedeutung für die Stellung des Magdalénien innerhalb des Spätglazials, *Jahrbuch Archäologie Schweiz*, 95, p. 117–26.
- LEESCH D., MÜLLER W., NIELEN E., BULLINGER J. (2012b) – The Magdalenian in Switzerland. Re-Colonization of a Newly Accessible Landscape, *Quaternary International*, 272–273, p. 191–208.
- LOTTER A. F., HEIRI O., BROOKS S., VAN LEEUWEN J. F. N., EICHER U., AMMANN B. (2012) – Rapid Summer Temperature Changes During Termination 1a: High Resolution Multi-Proxy Climate Reconstructions from Gerzensee (Switzerland), *Quaternary Science Reviews*, 36, p. 103–13.
- MARKOVA A. K., PUZACHENKO A. Y., VAN KOLFSCHOTEN T., VAN DER PLICHT J., PONOMAREV D. V. (2013) – New Data on Changes in the European Distribution of the Mammoth and the Woolly Rhinoceros During the Second Half of the Late Pleistocene and the Early Holocene, *Quaternary International*, 292, p. 4–14.
- MARSHALL I. (1996) – *A History and Ethnography of the Beothuk*, Montreal, McGill Queen's University Press, 640 p.
- MOODIE D. W., CATCHPOLE A. J. W. (1992) – Northern Athapaskan Oral Traditions and the White River Volcano, *Ethnohistory*, 39, 2, p. 148–71.
- PADTBERG A. (1925) – *Das altsteinzeitliche Lösslager bei Munzingen nach eigenen Ausgrabungen*, Augsburg, Dr. Benno Filser (Monographien zur Urgeschichte des Menschen), 75 p.
- PASDA, C. (1994) – *Das Magdalénien in der Freiburger Bucht*, Stuttgart, Theiss (Materialhefte zur Archäologie in Baden-Württemberg 15), 238 p.

- PASDA, C. (1998a) – Der Beginn des *Magdaléniens* in Mitteleuropa, *Archäologisches Korrespondenzblatt*, 28, 2, p. 175–90.
- PASDA, C. (1998b) – *Wildbeuter im archäologischen Kontext. Das Paläolithikum in Südbaden*, Bad Bellingen, Folio, 179 p.
- PASDA, C. (2014) – Regional Variation in Thule and Colonial Caribou Hunting in West Greenland, *Arctic Anthropology*, 51, 1, p. 41–76.
- PÉTIILLON J.-M., DUCASSE S. (2012) – From Flakes to Grooves: A Technical Shift in Antlerworking During the Last Glacial Maximum in Southwest France, *Journal of Human Evolution*, 62, 4, p. 435–65.
- PÉTIILLON J.-M., BIGNON O., BODU P., CATTELAÏN P., DEBOUT G., LANGLAIS M., LAROU LANDIE V., P LISSON H., VALENTIN B. (2011) – Hard Core and Cutting Edge: Experimental Manufacture and Use of Magdalenian Composite Projectile Tips, *Journal of Archaeological Science*, 38, 6, p. 1266–83.
- PLUMETTAZ N. (2007) – *Le site magdalénien de Monruz 2. Étude des foyers à partir de l'analyse des pierres et des remontages*, Neuchâtel, musée cantonal d'Archéologie (Archéologie neuchâteloise, 38), 272 p.
- PRIMAULT J., GABILLEAU J., BROU L., LANGLAIS M., GUÉRIN S. and coll. (2007a) – Le Magdalénien inférieur à microlamelles à dos de la grotte du Taillis des Coteaux à Antigny (Vienne, France), *Bulletin de la Société préhistorique française*, 104, 1, p. 5–30.
- PRIMAULT J., GABILLEAU J., BROU L., LANGLAIS M., GUÉRIN S. (2007b) – La grotte du Taillis des Coteaux à Antigny (Vienne) : intérêts d'une séquence originale à la structuration des premiers temps du Magdalénien, *Bulletin de la Société préhistorique française*, 104, 4, p. 743–58.
- RABUSKE A. (1981) – *J. H. Augusto Padberg-Drenkpol. O honem que mediū o Brasil*, São Leopoldo, Brasil Instituto Anchieta de Pesquisas (Pesquisas História, 20), 125 p.
- RASMUSSEN S. O., BIGLER M., BLOCKLEY S. P., BLUNIER T., BUCHARDT S. L., CLAUSEN H. B., CVIJANOVIC I., DAHL-JENSEN D., JOHNSEN S. J., FISCHER H., GKINIS V., GUILLEVIS M., HOEK W. Z., LOWE J., PEDRO J. B., POPP T., SEIERSTAD I. K., STEFFENSEN J. P., SVENSSON A. M., VALLE-LONGA P., VINTEB B. M., WALKER M. J. C., WHEALEY J. J., WINSTRUP M. (2014) – A Stratigraphic Framework for Abrupt Climatic Changes During the Last Glacial Period Based on Three Synchronized Greenland Ice-Core Records: Refining and Extending the INTIMATE Event Stratigraphy, *Quaternary Science Reviews*, 106, 15, p. 14–28.
- REIMER P. J., BAILLIE M. G. L., BARD E., BAYLISS A., BECK J. W., BLACKWELL P. G., BRONK RAMSEY C., BUCK C. E., BURR G. S., EDWARDS R. L., FRIEDRICH M., GROOTES P. M., GUILDERSON T. P., HAJDAS I., HEATON T. J., HOGG A. G., HIGHEN K. A., KAISER K. F., KROMER B., MCCORMAC F. G., MANNING S. W., REIMER R. W., RICHARDS D. A., SOUTON J. R., TALAMO S., TURNER C. S. M., VAN DER PLICHT J., WEYENMEYER C. E. (2009) – IntCal09 and Marine09 Radiocarbon Age Calibration Curves, 0–50,000 Years cal BP, *Radiocarbon*, 51, p. 1111–50.
- SCHMIDT R. R. (1912) – *Die diluviale Vorzeit Deutschlands*, Stuttgart, Schweizerbartsche, 283 p.
- SONNEVILLE-BORDES D. de (1968) – Remarques statistiques sur le Magdalénien des sites de Munzingen et Oelberg près de Fribourg-en-Brisgau, Allemagne, *Quartär*, 19, p. 125–31.
- STANFORD J. D., ROHLING E. J., BACON S., ROBERTS A. P., GROUSSET F. E., BOLSHAWA M. (2011) – A New Concept for the Paleo-Oceanographic Evolution of Heinrich Event 1 in the North Atlantic, *Quaternary Science Reviews*, 30, p. 1047–66.
- STODIEK U. (1993) – *Zur Technologie der jungpaläolithischen Speerschleuder. Eine Studie auf der Basis archäologischer, ethnologischer und experimenteller*, Tübingen, Archaeologica Venatoria (Tübinger Monographien zur Urgeschichte 9), 276 p.
- STREET M., JÖRIS O., TURNER E. (2012) – Magdalenian Settlement in the German Rhineland – An update, *Quaternary International*, 272-273, p. 231–50.
- STUART A. J., LISTER A. M. (2012) – Extinction Chronology of the Woolly Rhinoceros *Coelodonta antiquitatis* in the Context of Late Quaternary Megafaunal Extinctions in Northern Eurasia, *Quaternary Science Reviews*, 51, p. 1–17.
- SØRENSEN M. (2010) – Inuit Landscape Use and Responses to Climate Change in Wollaston Forland-Clavering Ø Region, Northeast Greenland, *Danish Journal of Geography*, 110, 2, p. 155–74.
- WIDLÖK T., AUFGEBAUER A., BRADTMÖLLER M., DIKAU R., HOFMANN T., KRETSCHMER I., PANAGIOTOPOULOS K., PASTOORS A., PETERS R., SCHÄBITZ F., SCHLUMMER M., SOLICH M., WAGNER B., WENIGER G.-C., ZIMMERMANN A. (2012) – Towards a Theoretical Framework for Analyzing Integrated Socio-Environmental Systems, *Quaternary International*, 274, p. 259–72.

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