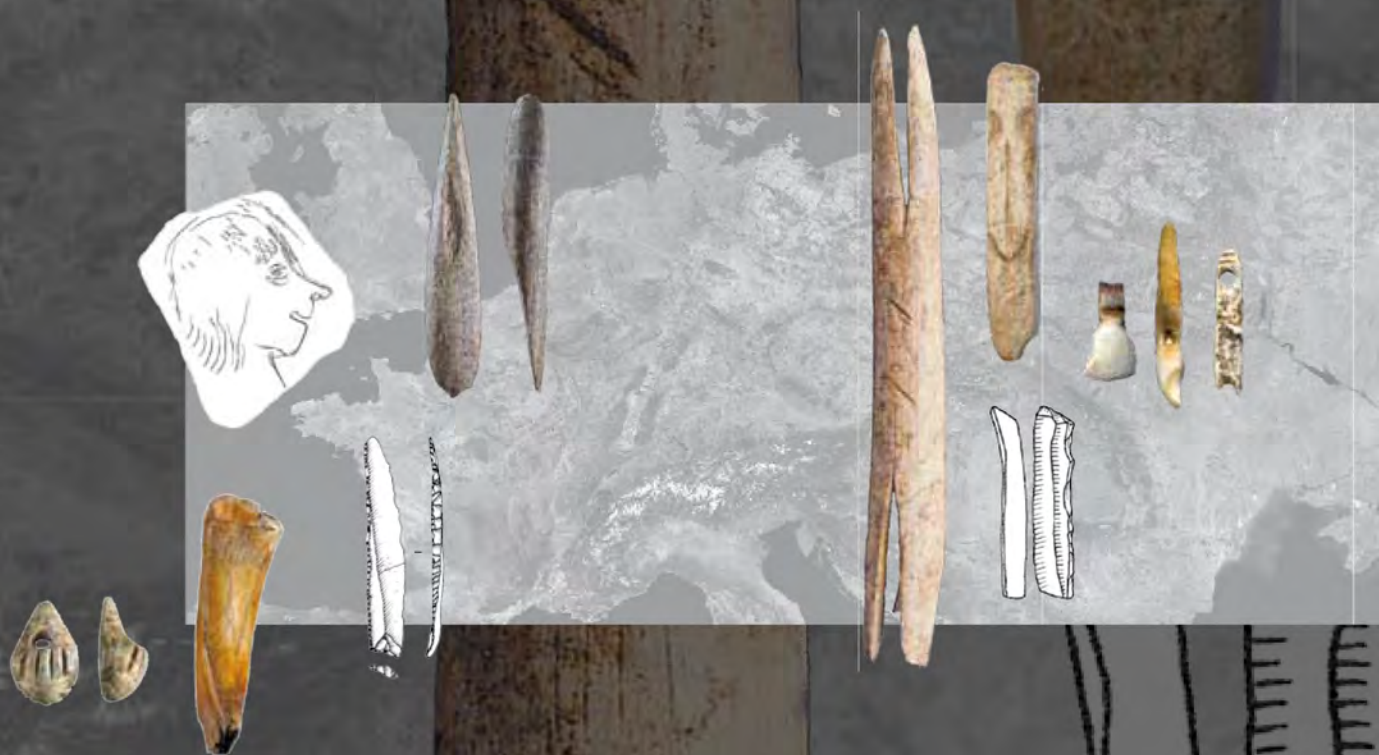


L'ESSOR DU MAGDALÉNIEN  
ASPECTS CULTURELS, SYMBOLIQUES  
ET TECHNIQUES DES FACIÈS  
À NAVETTES ET À LUSSAC-ANGLES

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 POŁTOWICZ-BOBAK



# L'ESSOR DU MAGDALÉNIEN



SÉANCES DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE

8

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*L'essor du Magdalénien. Aspects culturels, symboliques  
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## Eastern borders of the Magdalenian ‘à navettes’

### Maszycka cave in Lesser Poland (Southern Poland)

Stefan Karol KOZŁOWSKI, Thomas TERBERGER, Dariusz BOBAK,  
Jörg ORSCHIEDT and Marta POŁTOWICZ-BOBAK

**Abstract:** Magdalenian ‘à navettes’ is the first trace of the Magdalenian presence on the territory of the eastern part of Central Europe, which is far ahead of the main phase of the Magdalenian settlement in these areas. It is represented by only one site—Maszycka Cave, located approximately 20 km north of Kraków, in Southern Poland, in the valley of the small river Prądnik. It is located on its left bank, about 65 m above the current floor of the valley. It is a small, bright, well-lit cave with a wide entrance and the main chamber. The entrance of the cave faces S–SW. The settlement included the main chamber at the entrance, the terrace and a small chamber located at the back of the cave.

Maszycka Cave was researched by Godfryd Ossowski in 1883 then by S. K. Kozłowski in the years 1962–1966. The last field season was launched in 2013. The excavations were aimed at finding the old debris heaps that had been made in the course of Ossowski’s fieldworks.

Particularly important is the fact that the assemblage from Maszycka Cave is quite complete. The only missing are the smallest artefacts which were not collected owing to the research methodology used in the 19th century. The entire assemblage consists of 292 lithic artefacts, 98 bone items and one pendant.

Speaking of bone implements, reindeer antlers were mainly used for the production, rarely mammoth tusks and bones of horses and large ruminants. The most numerous are the different types of points (45 items), including different types of *sagaies* (36 items) mainly the forms with a single bevel base. As for the specific types, it is worth mentioning a series of eight *navettes* made from reindeer antlers, one item of *bâton percé* in a phallic shape and a richly carved rib. The *navettes* found in Maszycka Cave perfectly correspond to the forms known from the French sites, not only in terms of forms and treatment but considering their ornamentations.

Stone inventory from the excavations carried out by G. Ossowski and S. K. Kozłowski consists of 292 artefacts (fig. 10), including 2 precores, 11 cores (fig. 11) and 59 tools typical for Magdalenian. The recent fieldworks, conducted in 2013, have led to the identification of old debris heaps. Considering two square meters of the surface, the researchers have found more than 200 small flakes and chips, including burned items as well as shells and their fragments, small fragments of animal bones and probably human bones. Most controversial are the finds of shells, whose relation to the settlement has not yet been confirmed.

The vast majority of artefacts (about 95%) is made of local Jurassic flint located near Kraków. Only about 5% of the raw material came from further distance. These raw materials come from different areas (fig. 14). Imports of stone raw materials determine the possible range of exploited territory and may also be an important indication that allows us to reconstruct migration routes. While the presence of western provenance of raw materials is easy to explain, the imports of flint from the south and especially from the east and north-east constitute an important and interesting contribution to the study discussing the range of expansion regarding the earliest groups of the Magdalenian population in Central Europe. These raw materials indicate the territories which were exploited, or at least they were within the range of interests of the Magdalenian group from Maszycka Cave. In the case of Volhynian flint, which outcrops are located in areas never occupied by Magdalenian population, we do not know whether its presence is the evidence of physical presence of a hunting group from Maszycka cave in the areas far east, or if it is a result of any relationship with the Eastern Gravettian community penetrating the areas located west from their territories.

Specific finds from Maszycka Cave are human remains. Z. Kapica, the researcher who studied the bones, has identified 16 individuals, including women and children. According to J. Orschiedt the discussed group is not so numerous, but the presence of women and children was confirmed. Some of the bones indicated the performance of intentional human actions.

A series of <sup>14</sup>C dates obtained from animal bones, human bones and bone products allowed us to establish fairly accurate the Magdalenian settlement within a period of about 15,000 uncalibrated years BP (i.e. 19,000–18,000 cal BP). Thus it is possible to conclude that the materials of Maszycka Cave are not younger than the Magdalenian settlement ‘à navettes’ in France, but they fit well within the time period which was established by the existence of faciès ‘à navettes’. The episode of the settlement recorded in Maszycka Cave cannot be treated as a survival of this tradition in the East at the time when it had already disappeared in the original areas, or as a result of shifts

in its later (final?) period of settlement. Date comparison also indicates that the expansion of the Magdalenian population towards east must have been relatively fast.

Maszycka Cave is the only such an early, undoubtedly Magdalenian site in the eastern part of Central Europe, while lying on the eastern border of the areas occupied by Magdalenian ever (Połtowicz-Bobak, 2013). Regarding the Magdalenian settlement that took these territories on a regular basis there is approximately (over?) 1,000 years break (Bobak et al., 2013). As for the other sites belonging to Magdalenian ‘à navettes’, the Maszycka Cave is far more than 1,000 km in a straight line (fig. 16), but chronologically it fits perfectly in the period of facies functioning within the areas of France.

Continuous and structured settlement as for the east areas of Central Europe by the Late Magdalenian population will take place about 1000 years later.

**Keywords:** Magdalenian ‘à navettes’, Maszycka cave (Poland), lithic tools, bone tools, human bones.

**Résumé :** Le Magdalénien « à navettes » a été identifié en Europe centrale mais n’est représenté que par un seul site – la grotte de Maszycka, localisée au Sud de la Pologne, à 20 km au nord de Cracovie, dans la vallée de la rivière Prądnik. La grotte est de dimension modeste, claire et bien illuminée. L’occupation s’est concentrée dans la chambre principale et sur la terrasse, à l’entrée orientée au sud-ouest.

Le site a été fouillé par G. Ossowski en 1883, puis par S. K. Kozłowski entre 1962 et 1966. En 2013, de nouvelles fouilles ont été réalisées. La reprise des recherches a également permis d’apporter un complément, notamment par l’étude du mobilier issu des fouilles Ossowski..

La plupart des artefacts magdaléniens proviennent de la couche lœssique, associée parfois à des colluvions sur la partie haute. L’ensemble comprend 292 pièces lithiques et 99 pièces osseuses. Les outils osseux sont produits en bois de renne, plus rarement en ivoire de mammoth, os de cheval et autres ruminants. Les plus fréquents sont les pointes (45 exemplaires), dont 36 sagaies pour la plupart à biseau simple, puis les navettes (8 exemplaires), un bâton percé à extrémité phallique et une côte gravée. Sur les 292 artefacts lithiques provenant des fouilles d’Ossowski et de Kozłowski, on compte 13 nucléus et 59 outils typiques du Magdalénien. Au cours des fouilles de 2013, ont été mis au jour 200 artefacts, esquilles, fragments d’éclats et de lames, dont certains brûlés, ainsi que des fragments organiques.

L’ensemble lithique est dominé par la matière première locale, un silex jurassique. Moins de 5 % proviennent de sources éloignées issues de différents horizons – à l’ouest, à l’est et au sud. Les importations en silex tracent le chemin de migration probable et l’étendue des territoires exploités par le groupe de Maszycka.

Des ossements humains ont également été découverts. Z. Kapica, qui a fait l’analyse anthropologique, a déterminé 16 individus, dont des femmes et des enfants. Selon J. Orschiedt, ce nombre est peut-être un peu plus restreint mais la présence des femmes et d’enfants est confirmée. Les informations concernant la présence de traces de manipulations sur les ossements sont confirmées aussi.

Une série des datations <sup>14</sup>C sur os humains et animaux ainsi que sur industrie osseuse permet de déterminer l’âge d’occupation du site aux environs de 15000 BP (19000-18000 cal. BP). Les résultats sont équivalents à ceux des sites français. Ces occupations semblent coexister dans le même laps de temps. On ne peut donc pas traiter l’occupation de Maszycka comme un épisode postérieur aux processus qui ont eu lieu à l’Ouest de l’Europe. La comparaison des dates montre que l’expansion à l’est a dû être relativement rapide.

La grotte de Maszycka est le seul site magdalénien de cet âge dans la partie orientale de l’Europe centrale. De plus, elle est localisée près de la frontière orientale du Magdalénien dans son expansion maximale. L’occupation de Maszycka est antérieure de 1000 ans aux autres occupations magdaléniennes. L’occupation permanente intervient donc plus tardivement. Sur le territoire polonais, cette migration viendra par la vallée du Danube, la Moravie et la Porte de Moravie, puis la Silésie (Śląsk) jusqu’à la Pologne orientale.

**Mots-clés :** Magdalénien ‘à navettes’, grotte de Maszycka (Pologne), outillage lithique, outillage osseux, ossements humains.

THE EMERGENCE and development of the Magdalenian complex is certainly one of the most interesting processes that took place at the end of LGM and early Late Pleistocene. Hypotheses regarding the origins and dynamics of the earliest phases of development have been described in some detail in recent years (e.g. Fourloubey, 1998; Ducasse and Langlais, 2007; Langlais et al., 2010; Ducasse, 2012; Debout et al., 2012; Maier, 2015). These findings relate to a number of specific issues, including the appearance of subsequent phases and cultural facies. However, the issue considering the Magdalenian ‘à navettes’ is the least-known problem of earlier phases of this taxonomic unit. It is represented by only eight sites, including seven ones uncovered on the territory of France, located in the quite limited area.

In the light of the research on the Magdalenian complex in Central Europe, and therefore on the eastern border of its range and functioning, the problem of the

Magdalenian ‘à navettes’ is of particular importance. This facies is the first trace of the Magdalenian presence on the territory of the eastern part of Central Europe, which is far ahead of the main phase of the Magdalenian settlement in these areas, and what is more it is represented by only one site—Maszycka Cave near Kraków, in Southern Poland (figs. 1 and 2).

Maszycka Cave is one of the most famous Palaeolithic sites in Poland. Its importance lies not only in the fact that it is one of the first settlement evidence after the LGM, but also, and perhaps mainly in the fact that it contained an entire collection of stone and bone inventories. Moreover, there were numerous, very important finds such as skeletal remains of both animal and human origins.

Maszycka cave is located in the southern part of Poland, approximately 20 km north of Krakow, in the valley of the small river Prądnik, on its left bank, about 65 m above the current floor of the valley (fig. 2). It is a small,



**Fig. 1** – Location of the site on the map of Europe.

*Fig. 1* – Localisation du site sur la carte de l'Europe.

bright, well-lit cave with a wide entrance and the main chamber (fig. 3). The entrance of the cave faces S–SW. In front of the cave, there is a terrace which used to be about 8 meters long during the period of its occupation. The settlement included the main chamber at the entrance, the terrace and a small chamber located at the back of the cave (Kozłowski et al., 1995).

The first studies in Maszycka Cave were conducted by a geologist, Gotfryd Ossowski in 1883 (Ossowski, 1884 and 1885). He explored almost the entire content of the cave. Due to the fact that the studies were carried out according to the methodology implemented of these days, the researchers collected only the larger stone and bone artefacts, and a series of animal and human bones, without small remains including microliths and teeth.

Subsequent field studies were carried out on the terrace in front of the cave by S. K. Kozłowski in the years 1962–66 (Kozłowski, 1963 and 1969). In the course of these excavations, the researchers discovered less numerous products belonging to the same group as the one occupying the

area inside the cave. The last field season was launched in autumn 2013. The excavations were aimed at finding the old debris heaps that had been made in the course of studies conducted by G. Ossowski and their re-studying (Bobak et al., 2013). These works are currently at an early stage and they will continue in the coming years.

On the basis of the description prepared by G. Ossowski, it is possible to draw the conclusions that the Magdalenian artefacts discovered in the cave came mainly from loess layer (layer C by Ossowski), and a small part of them was found in the located above loess and clay deposits, displaced by solifluction (fig. 4).

Most of the Magdalenian remains, found within the terrace in the course of S.K. Kozłowski studies, were deposited in a relatively thin (5–10 cm) layer of displaced loess colluvium in the proximal part to the cave gently moved towards the Prądnik valley together with cultural content.

Considering the analysis, particularly important is the fact that the complex coming from Maszycka Cave is quite complete. The minor artefacts are missing

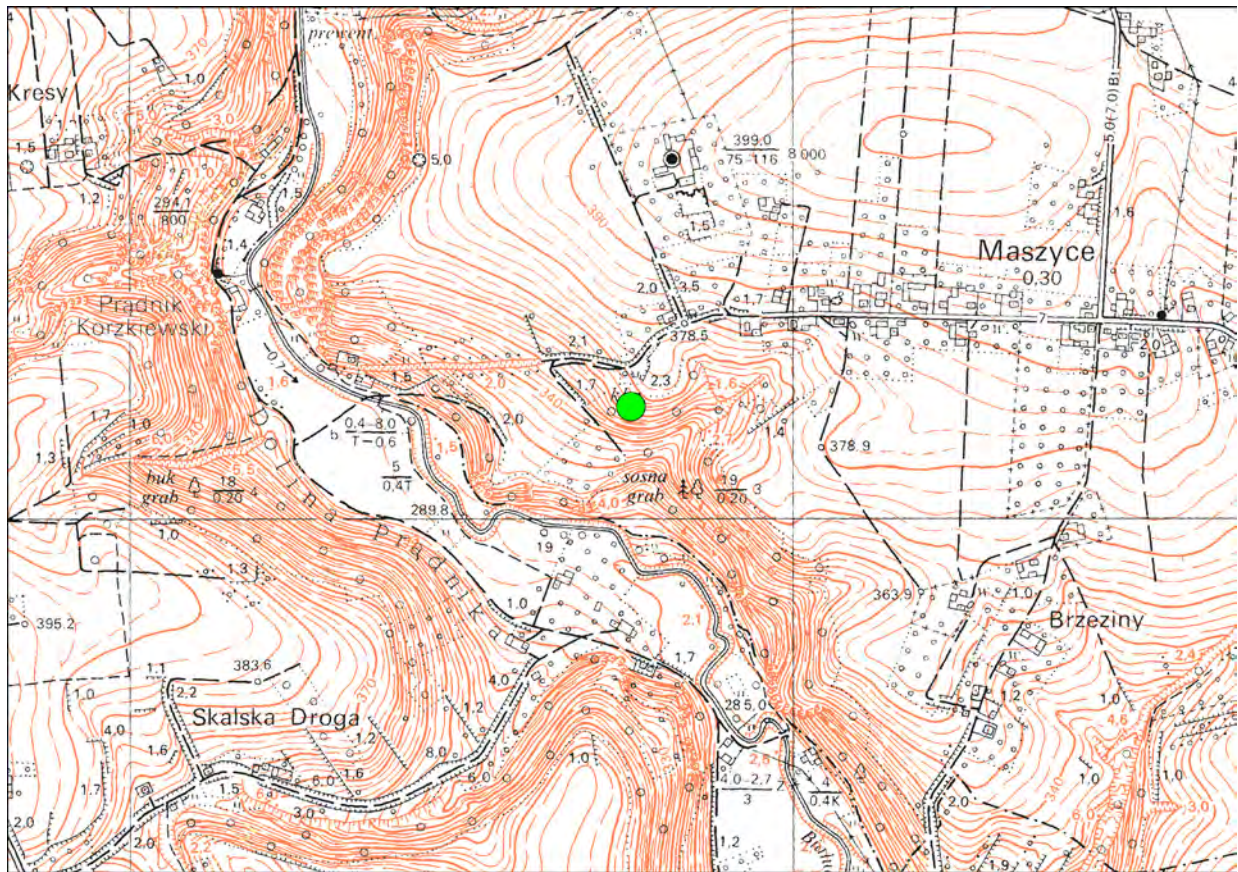


Fig. 2 – Topographic situation of the site (after Bobak et al., 2013).  
 Fig. 2 – Situation topographique du site (d'après Bobak et al., 2013).

which, as mentioned above, were not collected owing to the research methodology used in the 19th century, but bigger artefacts were probably almost all collected. Therefore, it is possible to trace the occurrence and the range of each main category of artefacts. Looking at the assemblage, it is possible to notice the differences in frequency regarding particular groups of inventory uncovered at Maszycka Cave and a standard distribution of the artefact occurrence with reference to the Magdalenian sites (see table 1 according to S. K. Kozłowski et al., 1995, table 1, p. 122). Noteworthy is the large number of bone tools, exceeding the number of flint tools as well as the high rate of tools with regard to the entire chipped inventory is worth mentioning. It could be result of the research method. The same research method used by the scholars following the research standards of the nineteenth century, does not allow us to recreate the original layouts nor identification of immovable structures such as hearths.

### ARCHAEOLOGICAL SOURCES

The assemblage consists of 292 artefacts manufactured by chipping technique, and 98 bone items and one pendant.

Speaking of bone implements, reindeer antlers were mainly used for the production, rarely mammoth tusks and bones of horses and large ruminants. In one case, it may be a bone of a bird. The most numerous are the different types of blades (45 items), including different types of *sagaies* (36 items): with a double bevel base and a rectangular cross-section, with a single bevel base and a rectangular cross-section, with a single bevel base and a triangular cross-section, and a double bevel base and a slope (fig. 5-7: 1). There are predominantly the forms with a single bevel base. As for the specific types, it is worth mentioning a series of eight *navettes* (fig. 7, nos. 2-9 and 8-9)—distinctive and extremely rare tools, which are also a facies determinant at the same time; one item of *bâton percé* in a phallic shape and a richly carved rib (fig. 5, no. 1). The products are accompanied by fabricators, polishers, one *baguette demi-ronde*, awls (7 items) as well as semi-finished products and unspecified bones (antlers) with traces of processing. A significant part of the tools is complete or only slightly damaged (Kozłowski and Sachse-Kozłowska, 1995).

The most interesting finds include *navettes* represented by eight items (fig. 7, nos. 2-9). Therefore, it is not a very large, but significant collection of the tools, also in comparison with the other sites (except for a very rich collection coming from La Garenne cave).



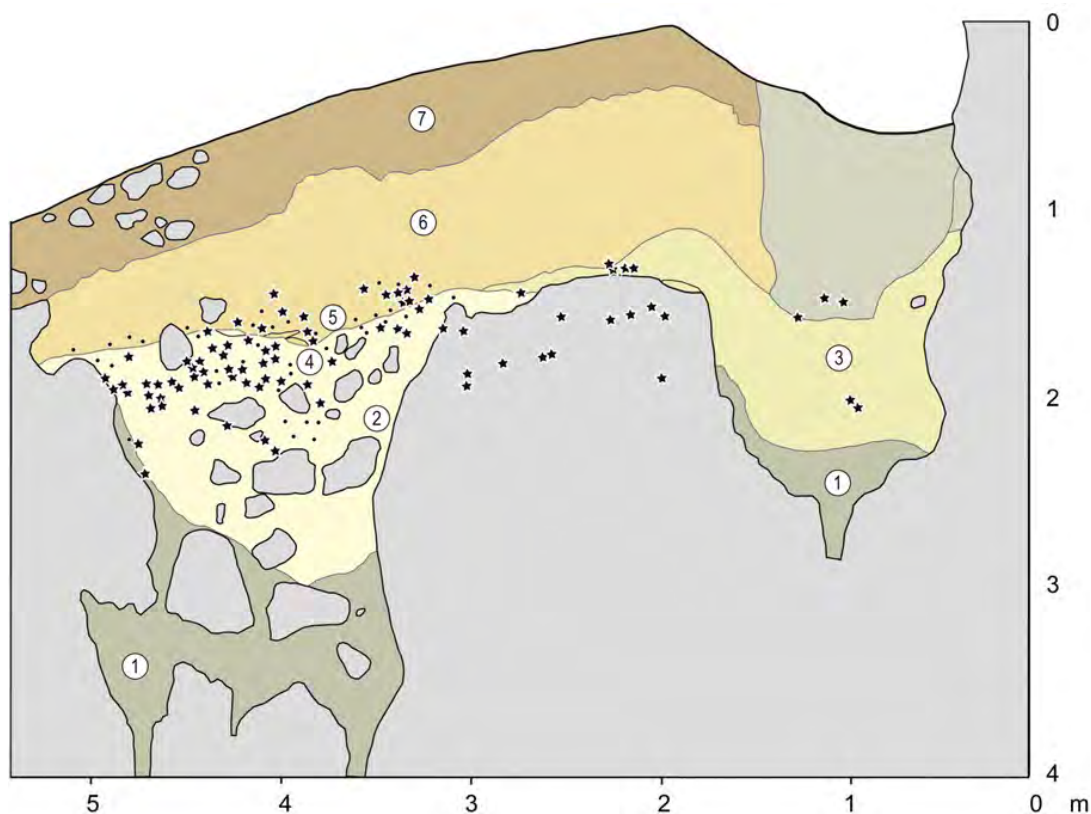
**Fig. 3** – Maszycka Cave (photo M. Połtowicz-Bobak).  
**Fig. 3** – *La grotte Maszycka* (cliché M. Połtowicz-Bobak).

Five items are preserved almost in their entirety (Kozłowski and Sachse-Kozłowska, 1995). Four *navettes* have preserved both split ends, the others—only one end; what is more three fragments of the 'tongues' (*languettes*). The *navettes* from Maszycka Cave have never been thoroughly examined by specialists who are experts in bone inventories. However, based on previous observations, it is possible to determine their basic features (Allain et al., 1985).

Tools were made from reindeer antlers. They are straight, or very seldom slightly bended, with oval or rectangular cross-sections. Characteristic treatments forming a surface have been noticed such as smoothing or cutting (noticeable due to scratches) in order to receive the needed shape. Notches (*fîtes*) are always formed by means of oblique notches (*incisions*) on preforms and sometimes additionally smoothed on an external surface. The longest preserved tool was 16.7 cm long; other items preserved in whole or almost entirely were between 11 and 13.5 cm.

One of the best preserved object was made from a simple preform, with an oval cross-section. The external surfaces are smooth, polished intentionally, and the ends are simple, with rounded edges (Allain et al., 1985, figs. 49 and 50; here: fig. 7, no. 3).

Another example bears the marks of cutting associated with the formation of ends. The surfaces are smoothed and partially flattened. There are grooved decorations visible on the surface (Allain et al., 1985, figs. 51 and 52; here fig. 7, nos. 2 and 8). The product is rel-



**Fig. 4** – Stratigraphy of the site (after S. K. Kozłowski et al., 2012).  
**Fig. 4** – *Stratigraphie du site* (d'après S. K. Kozłowski et al., 2012).

	Standard sites	Maszycka
Flint to bone ratio	Old excavations (Andernach, Kniegrotte, Schussenquelle, Petersfels): 4-9,5 × New excavations (Felsställe IIa, Teufelsbrücke, Gönnersdorf): 22-38 ×	0,74 ×
No. of retouched tools	Gönnersdorf: 4855; Kniegrotte: 1302; Petersfels: 1464; Teufelsbrücke: 1464	59
No. of occupations	many	one
General structure	German Magdalenian, new excavations (Gönnersdorf, Teufelsbrücke):	
Cores	0.1-1%	4.5%
Flakes	70-74%	33.6%
Blades	3-13%	36.8%
Tools	7-12%	20.4%
Indexes:	French Middle Magdalenian:	
End-scrapers	5.7-24.3%	31%
Burins	15.5-36.7%	12%
Retouched blades	0-7.8%	19%
Strategic reserve	none	present (passive cores and tools)
Bone/antler handles	exceptional	present
Index of sagaies	Gönnersdorf: 33%; Teufelsbrücke: 37%; Andernach: 38%; Felsställe: 40%; Petersfels: 45%; Kniegrotte: 57%	46%
Complete sagaies	Gönnersdorf :7%; Kniegrotte: 7.5%; Teufelsbrücke: 10.4%; Petersfels: 14.4%	50%
Indexes of:	Kniegrotte, Petersfels:	
Batons	4-10%	1.2%
Needles	18-23%	1.2% (?)
Awls	13-15%	9%
Complete bone/antler tools	10-15%	54%

**Table 1** – Comparison of the artefacts distribution regarding the Magdalenian sites and Maszycka Cave (after S. K. Kozłowski and E. Sachse-Kozłowska, 1995).

**Table 1** – *Comparaison de la repartition des artefacts entre les sites magdaléniens de la région et de la grotte de Maszycka (d'après S. K. Kozłowski et E. Sachse-Kozłowska, 1995).*

atively stocky (the length to width ratio is 6.65 (Allain et al., 1985, figs. 51 and 52).

It is necessary to indicate another artefact with a quadrangular cross-section with two notches (*fûtes*), which has external surfaces smoothed by the use of scraping, and some places with traces indicating the incisions. One end is additionally decorated by means of transverse, fairly deep incisions (Allain et al., 1985, figs. 57 and 58; here: fig. 7, no. 4). A large part of *sagaies* is decorated similarly.

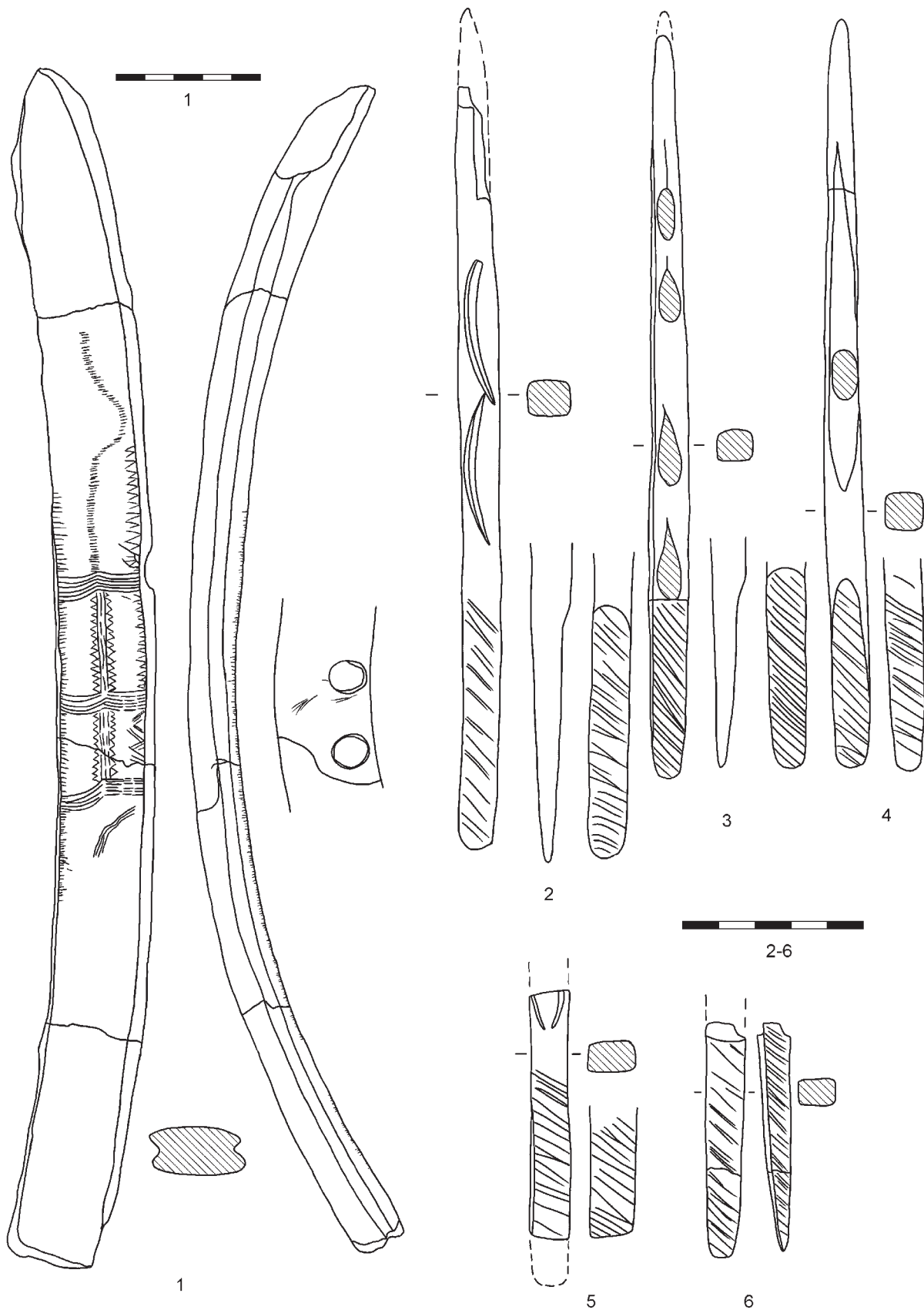
The *navettes* found in Maszycka Cave perfectly correspond to the forms known from the French sites, not only in terms of forms and treatment but considering their ornamentations.

Other artefacts accompanying the above tools are typical Magdalenian forms found at the sites of other Magdalenian facies. Worth mentioning is a *bâton percé* of a phallus shape, the only one found in Maszycka Cave, richly and carefully decorated with a grooved ornament, analogous to the finds from La Garenne (Allain et al., 1985). However, there are no needles, relatively well represented in other Magdalenian sites where bone inventories are preserved, including the sites with *navettes* (La Garenne, Arlay, Laugerie Haute; Allain et al., 1985). It may result from the nineteenth-century methods used then, which did not provide objects of a small size. Two

*navettes* and some *sagaies* are decorated. Apart from the grooved ornaments characteristic for the whole Magdalenian in the form of geometric patterns, there are also relief ornaments (*décor en cupules*) having phallus-like shape or tear-like forms (fig. 5, nos. 2, 4 and 6; fig. 7, no. 2). These are the original motifs, characteristic for the discussed facies; analogies are known, e.g. from La Garenne Cave (Allain, et al., 1985).

Stone inventory coming from the studies carried out by G. Ossowski and S. K. Kozłowski consists of 292 artefacts (fig. 10), including two precores, eleven cores (fig. 11) and 59 tools (fig. 12). The cores are mostly large objects in the phase of full operation or waste material. They are only single platform cores, with prepared sides and backs and prepared platforms. Striking surfaces in most cases were located on a narrow plane. Large, slender shapes of both cores and received preforms (fig. 13) are distinctive.

Regarding the tools, they include common forms, typical for Magdalenian. As for the overall structure of the tools, the largest group consists of end scrapers (18 items)—they are slender, made from blades, sometimes with additional lateral retouches (fig. 12, nos. 1, 3, 5, 6 and 8). The second largest group are retouched blades (11 items; fig. 12, nos. 7, 11 and 12). Less numerous are burins (7 items), including truncation and dihedral burins



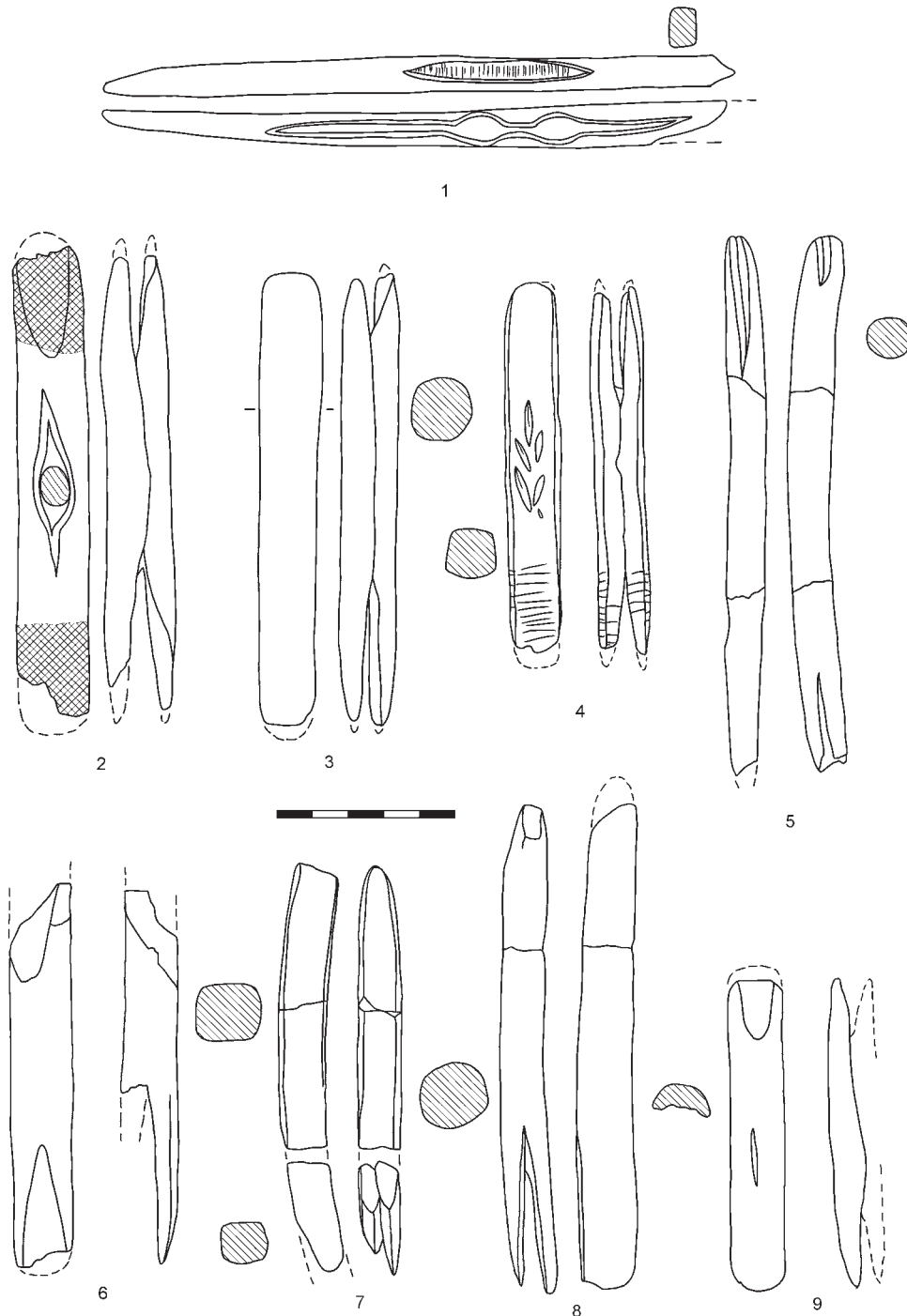
**Fig. 5** – 1 : decorated rib; 2-6: sagaies (after Kozłowski et al., 1995).

*Fig. 5 – 1 : côte décorée ; 2-6 : sagaies (d'après Kozłowski et al., 1995).*



**Fig. 6** – *Sagaies* (the collection of the Archaeological Museum in Kraków, photo D. Bobak).

**Fig. 6** – *Sagaies* (collection du musée archéologique de Cracovie, cliché D. Bobak).



**Fig. 7** – Navettes (M. Połtowicz-Bobak, 2013, after S. K. Kozłowski and E. Sachse-Kozłowska, 1995).

*Fig. 7* – Navettes (M. Połtowicz-Bobak, 2013, d'après S. K. Kozłowski et E. Sachse-Kozłowska, 1995).

(fig. 12, nos. 4, 9, 10 and 13–15), retouched flakes (8 items), truncated blades (3 items; fig. 12, no. 2) and one piercer. Microliths, typical truncated bladelets and retouched base constitute only 11 items, which may be the result of the method used during the excavation of the nineteenth century (fig. 12, nos. 16–26). Most of the tools are made on long, slender blades. Considering the assemblage recorded by G. Ossowski, the lack of small flakes and chips is noticeable (Kozłowski and Sachse-Kozłowska, 1995; Połtowicz-Bobak, 2013).

In 2013 new field excavation was initiated in order to find and study the debris heaps created in the course of the research conducted by G. Ossowski (Bobak et al., 2013). These excavations have led to the identification of old spoil heaps. Considering two square meters of the surface, the researchers have found more than 200 small flakes and chips, including burned items as well as shells and their fragments, small fragments of animal bones and probably human bones. It has not been possible to identify another tools yet, although some of the small



**Fig. 8** – *Navette* (the collection of the Archaeological Museum in Kraków, photo D. Bobak).

*Fig. 8* – *Navette* (collection du musée archéologique de Cracovie, cliché D. Bobak).

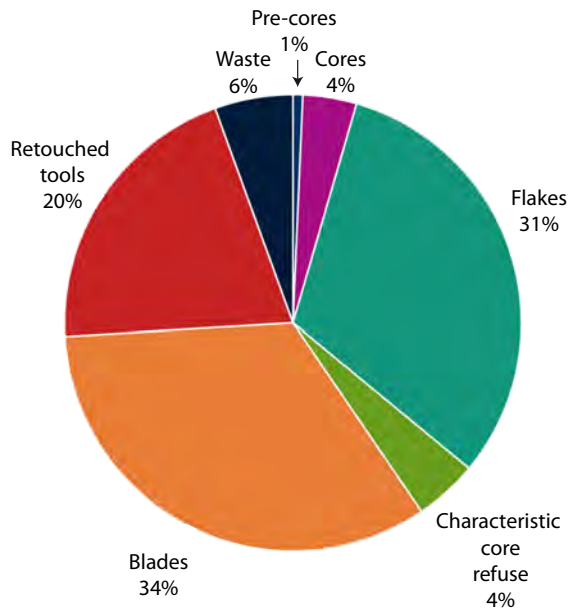


**Fig. 9** – *Navette* (the collection of the Archaeological Museum in Kraków, photo D. Bobak).

*Fig. 9* – *Navette* (collection du musée archéologique de Cracovie, cliché D. Bobak).

bone fragments probably indicate the signs of intentional action. What is more, a part of the core (?), and single fragments of larger flakes and blades have been identified. It is certainly a part of the Magdalenian complex. Most controversial are the finds of shells, whose relation to the settlement has not yet been confirmed. The uncovered materials are the missing artefacts in the overall structure of the inventory which have been expected. A relatively numerous amount of small pieces of burnt flints are the first material traces of hearths. Burning the fire inside the camp is obvious, and here it has been confirmed by the archaeological material for the first time. It is worth noting that among the fragments of burned objects there are no large pieces. Too small researched space of spoil heaps tested here and a relatively small number (so far) of the most recent research finds do not allow us to analyse it deeper.

The vast majority of artefacts (about 95%) is made of local Jurassic flint located near Kraków, exploited in the immediate vicinity of the site. Only about 5% of the raw material came from further distance, and some of them were represented by single items. These raw materials come from different areas (fig. 14). Considering the area located east and northeast from the site, it is necessary to mention chocolate and Volyn flint. Taking into account the southern areas, it was the origin of radiolarite, whose outcrop has been thought in the Pieniny. Two more radiolarite artefacts have been found during the search of the spoil heaps. Erratic flint came from the west, probably transported from Silesia, or perhaps from the area of the middle basin of the Danube, as well as one object of the so-called Plattensilex whose origins are believed to be in the valley of the Altmühl River in South Germany. The distance of the outcrop of this material to Maszycka



**Fig. 10** – The collection of stone inventory.  
**Fig. 10** – Répartition de l'ensemble lithique

cave is about 600 km (Kozłowski and Sachse-Kozłowska, 1995). Moreover, it has been found two flint artefacts of unknown provenance; their origins should also be sought outside the Polish territory, perhaps in areas located west from the site.

Imports of stone raw materials determine the possible range of exploited territory and may also be an important indication that allows us to reconstruct migration routes. While the presence of western provenance of raw materials is easy to explain, the imports of flint from the south and especially from the east and north-east constitute an important and interesting contribution to the study discussing the range of expansion regarding the earliest groups of the Magdalenian population in Central Europe. These raw materials indicate the territories which were exploited, or at least they were within the range of interests of the Magdalenian group from Maszycka Cave. In the case of Volyn flint, which outcrops are located in areas never occupied by Magdalenian population, we do not know whether its presence is the evidence of physical presence of a hunting group from Maszycka cave in the areas far east, or if it is a result of any relationship with the Eastern Gravettian community penetrating the areas located west from their territories (Połtowicz-Bobak, 2013). The evidence of such contacts could be noticeable in case of the rib decorated with geometric ornament. The possibility of contacts and overlapping influences has also been indicated by J. Wilczyński (2014) on the basis of technological analysis of assemblage coming from the Epigravettian site at Targowisko (Wilczyński, 2014). Unambiguous explanation of the problem is not possible today.

Specific finds from Maszycka Cave are human remains. Z. Kapica, the researcher who studied the bones, has identified 16 individuals, including women and children. Some of the bones indicated the performance of

procedures (intentional human actions), interpreted as effects of cannibalism. New studies, unpublished yet, carried by J. Orschiedt allow for verification of earlier finds. The analyses of J. Orschiedt have indicated that the discussed group is not so numerous; the presence of women and children was confirmed. The findings considering the presence of traces of human activity have been confirmed by the identification of cut marks, but the interpretation of their purpose and meaning is not obvious (Pettitt, 2011).

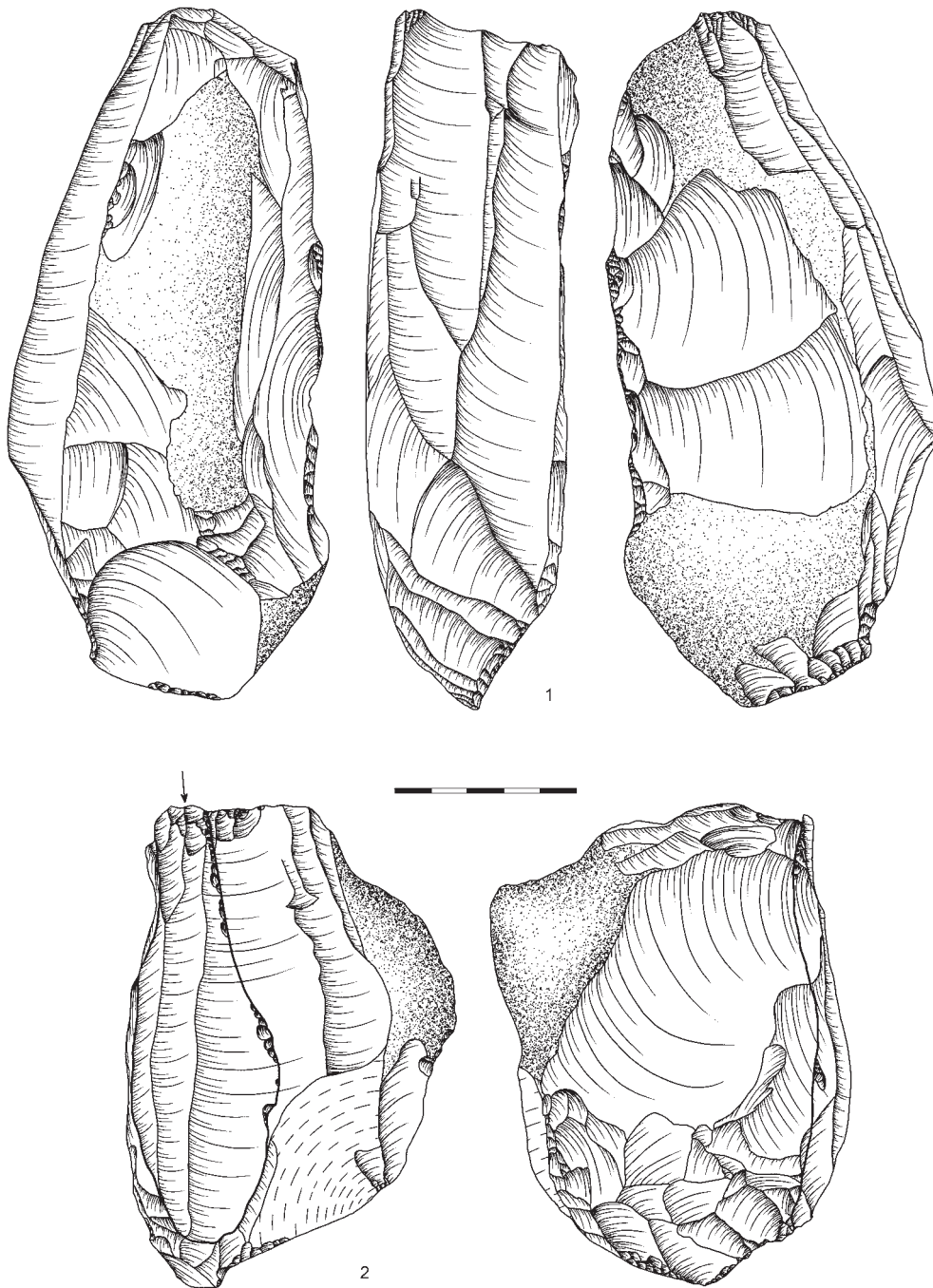
## CHRONOLOGY

A series of  $^{14}\text{C}$  dates obtained from animal bones, human bones and bone products (table 2) allowed us to establish fairly accurate the Magdalenian settlement within a period of about 15,000 years BP (i.e. 19,000–18,000 cal. BP). The first dates, obtained by the conventional method have provided a value  $15,490 \pm 310$  BP and  $14,520 \pm 240$  BP; other dates obtained in case of the AMS method in 2009 gave the results oscillating around 15,000 BP:  $14,855 \pm 60$ ,  $15,025 \pm 50$ ;  $15,015 \pm 50$ ;  $15,115 \pm 60$ . Dates were obtained from animal bones, bone tools (including *navettes*) and a human bone. They confirm both the early Magdalenian dating from Maszycka and the homogeneity of materials and their relationship with human remains (Kozłowski et al., 2012). The collection of dates includes a relatively wide range of time covering more than 1000 years radiocarbon. Calibration of radiocarbon dates, and then conducting the age modelling by means of Bayesian methods, allow us to narrow this period to about 600 years, i.e. the period between 18,574 and 17,987 cal. BP (Bobak and Połtowicz-Bobak, 2013-2014).

Dates of Maszycka Cave can be compared with the dates of other Magdalenian sites 'à navettes' (fig. 15). Based on available dates, it is possible to conclude that the materials of Maszycka Cave are not younger than the Magdalenian settlement 'à navettes' in France, but they fit well within the time period which was established by the existence of facies 'à navettes'. Thus, the episode of the settlement recorded in Maszycka Cave cannot be treated as a survival of this tradition in the East at the time when it had already disappeared in the original areas or as a result of shifts in its later (final?) period of settlement. Date comparison also indicates that the expansion of the Magdalenian population towards east must have been relatively fast.

## ANALYSIS AND SYNTHESIS

Materials from Maszycka Cave are today one of the most interesting and at the same time the most difficult to unambiguous interpretation regarding the traces of the Magdalenian settlement in Europe. Distinctive



**Fig. 11** – Cores (after S. K. Kozłowski and E. Sachse-Kozłowska, 1995).

**Fig. 11** – Nucleus (d'après S. K. Kozłowski et E. Sachse-Kozłowska, 1995).

features of bone inventory as well as the style of ornamentation can refer them to the Magdalenian 'à navettes'. Moreover, it is also the only solid evidence of such early Magdalenian settlement in this part of Central Europe. Apart from the discussed example here, the only Magdalenian site where the early date has been established is Munzingen in Germany (Pasda, 1998), however, the inventory uncovered there differs markedly from the material of the Maszycka Cave and it certainly does not belong to the Magdalenian 'à navettes'. The site at Targowisko, located in Southern Poland, which is similar to Maszycka finds considering  $^{14}\text{C}$  dating, is linked with

Epigravettian (Wilczyński, 2009 and 2014) as well as the site at Brno ul. Videňská in Moravia (Nerudová and Neruda, 2014).

Therefore, Maszycka Cave is the only such an early, undoubtedly Magdalenian site in the eastern part of Central Europe, while lying on the eastern border of the areas occupied by Magdalenian ever (Połtowicz-Bobak, 2013). Regarding the Magdalenian settlement that took these territories on a regular basis there is approximately (over?) 1,000 year break (Bobak et al., 2013). As for the other sites belonging to Magdalenian 'à navettes', the Maszycka Cave is far more than 1,000 km in a straight

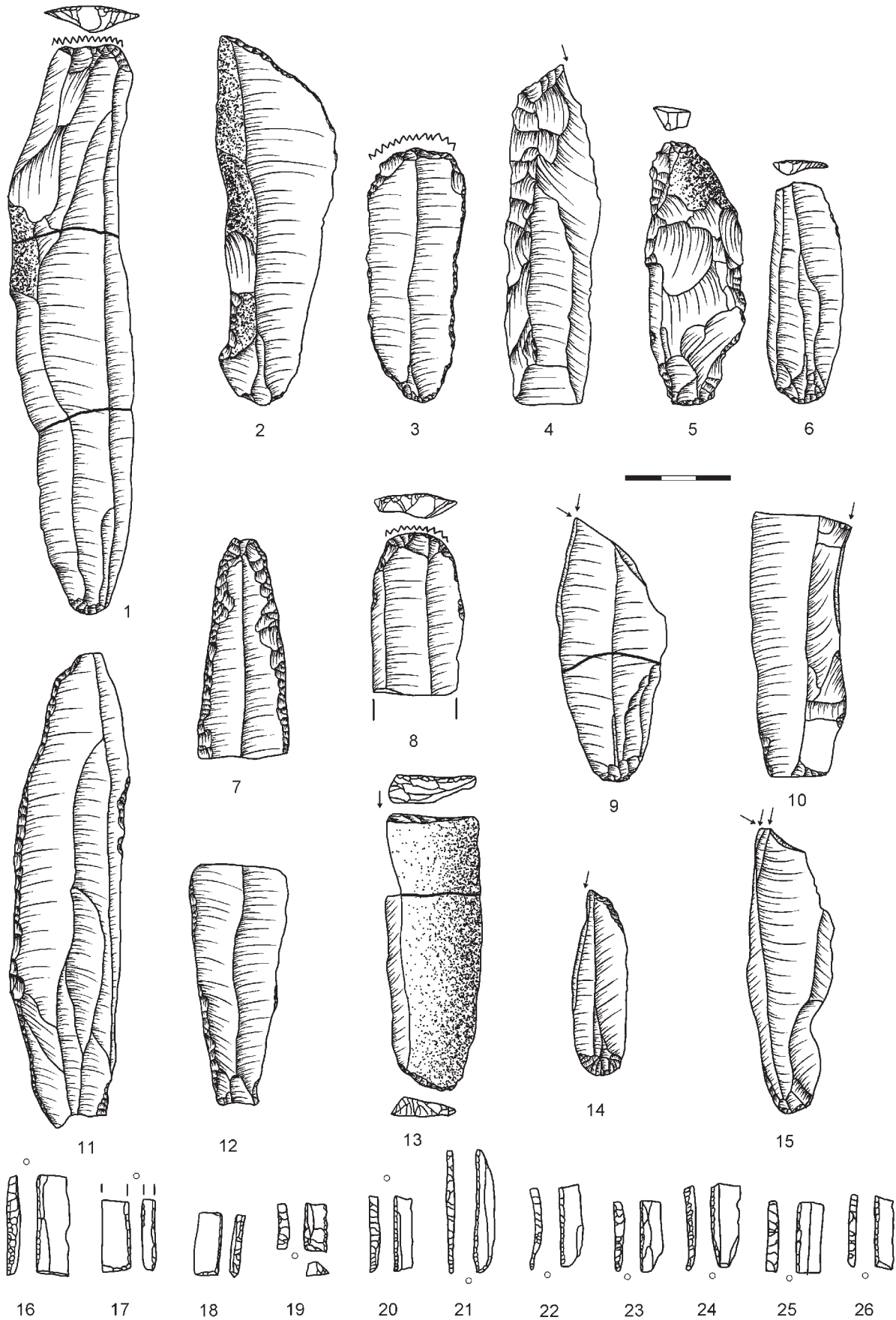
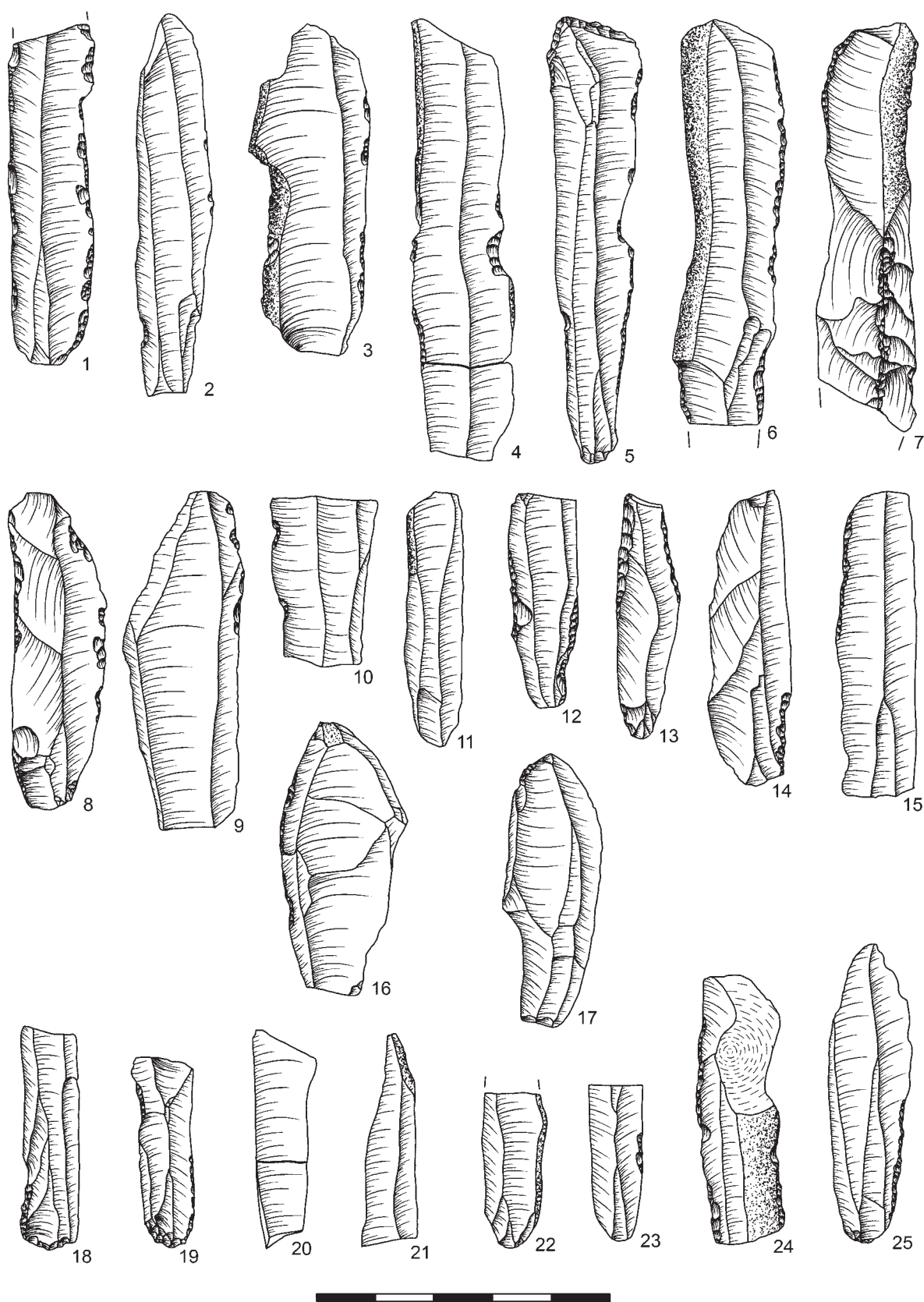


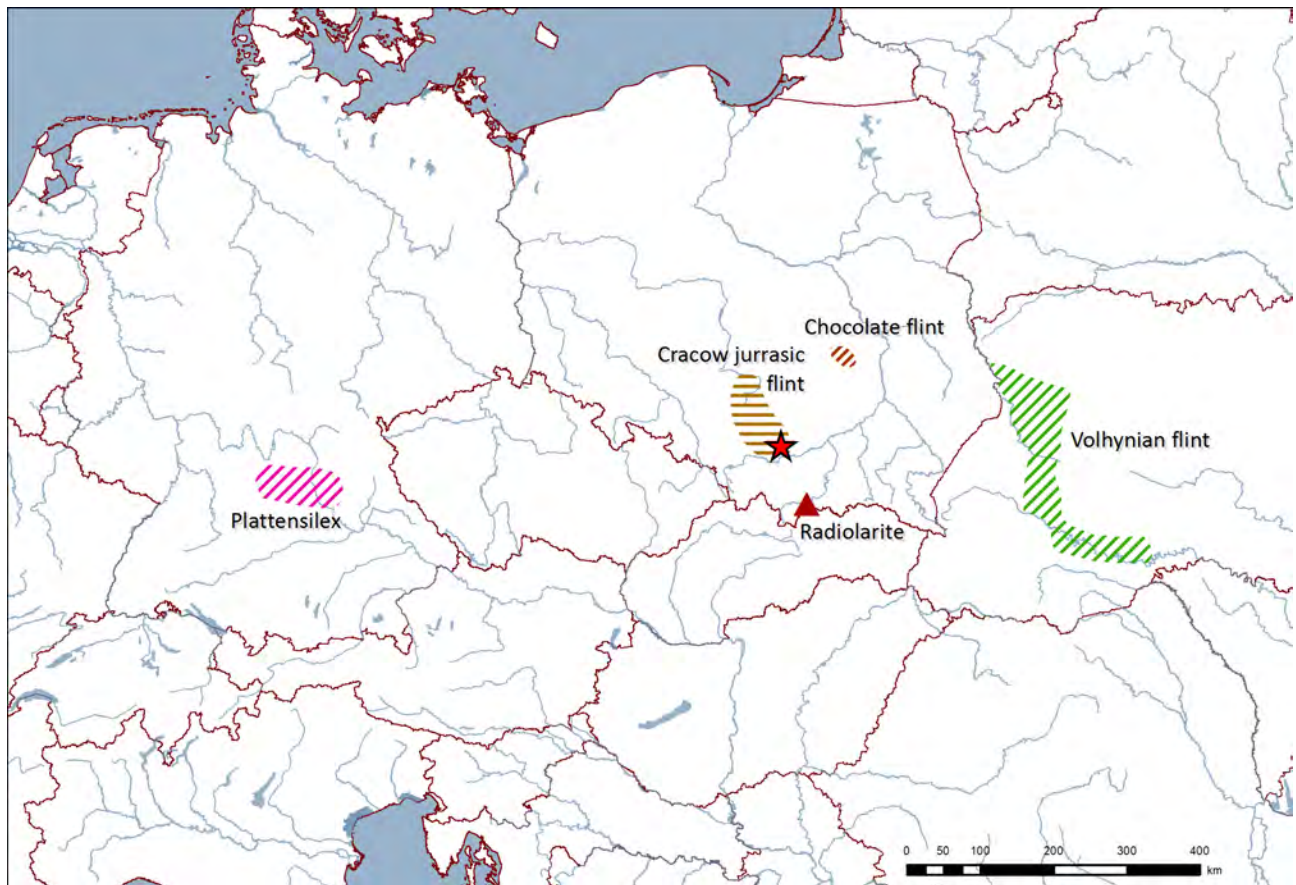
Fig. 12 – Tools (M. Połtowicz-Bobak, 2013, after S. K. Kozłowski and E. Sachse-Kozłowska, 1995).

Fig. 12 – Outils (M. Połtowicz-Bobak, 2013, d'après S. K. Kozłowski et E. Sachse-Kozłowska, 1995).



**Fig. 13** – Examples of blades (after S. K. Kozłowski and E. Sachse-Kozłowska, 1995).

*Fig. 13* – Lames (d'après S. K. Kozłowski et E. Sachse-Kozłowska, 1995).



**Fig. 14** – The origin of the raw materials used in Maszycka Cave

**Fig. 14** – L'origine des matières premières utilisées dans la grotte Maszycka

Method	Lab. no.	<sup>14</sup> C determinations	Calendar age (2 σ)	Layer	Material	Literature
<sup>14</sup> C-AMS	KIA-39225	14,855 ± 60	18,518–17,780	top of layer 2	antler, navette	Kozłowski et al., 2012
<sup>14</sup> C-AMS	KIA-39228	15,115 ± 60	18,565–18,162		human mandible	Kozłowski et al., 2012
<sup>14</sup> C	Ly-2453	14,520 ± 240	18,492–17,020		reindeer bone	Kozłowski et al., 1995
<sup>14</sup> C-AMS	KIA-39227	15,015 ± 50	18,541–18,013		human skull	Kozłowski et al., 2012
<sup>14</sup> C-AMS	KIA-39226	15,025 ± 50	18,544–18,017		antler, point	Kozłowski et al., 2012
<sup>14</sup> C	Ly-2454	15,490 ± 319	19,400–18,031		worked bone	Kozłowski et al., 1995

**Table 2** – <sup>14</sup>C Dates from Maszycka Cave.

**Table 2** – Dates <sup>14</sup>C de la grotte de Maszycka..

line (fig. 16), but chronologically it fits perfectly in the period of facies functioning within the areas of France.

Speaking of the issues concerning the Magdalenian ‘à navettes’ it is important to ask the question why and which way the Magdalenian people got the land located so far away from the areas where the other sites of that facies are known. The answer for both these questions is very difficult or even impossible due to lack of sufficient data. There are no sites with *navettes* between France and Poland. However, the hiking route, apart from the intrusive, logical designation, it can be indicated by means of one Plattensilex artefact found in Maszycka Cave, and its origin can be found in the valley of the Altmühl river in Franconia in Southern Germany (Kozłowski and

Sachse-Kozłowska, 1995). One could argue that the hiking route was leading from the area of eastern France towards the Rhine and the Danube and then, on the north side of the Ore Mountains and the Sudetes to Silesia and Lesser Poland. As for such concept, the argument on spreading east the earliest Magdalenian settlements may be the site in Munzingen. However, it does not seem, that this earliest Magdalenian expansion was led by Moravia as it probably took place in the late Magdalenian. It can be indicated by both the lack of analogous and contemporary with Maszycka sites in Moravia and the lack of any links regarding raw materials between the areas where such contacts were visible in the subsequent Magdalenian periods.

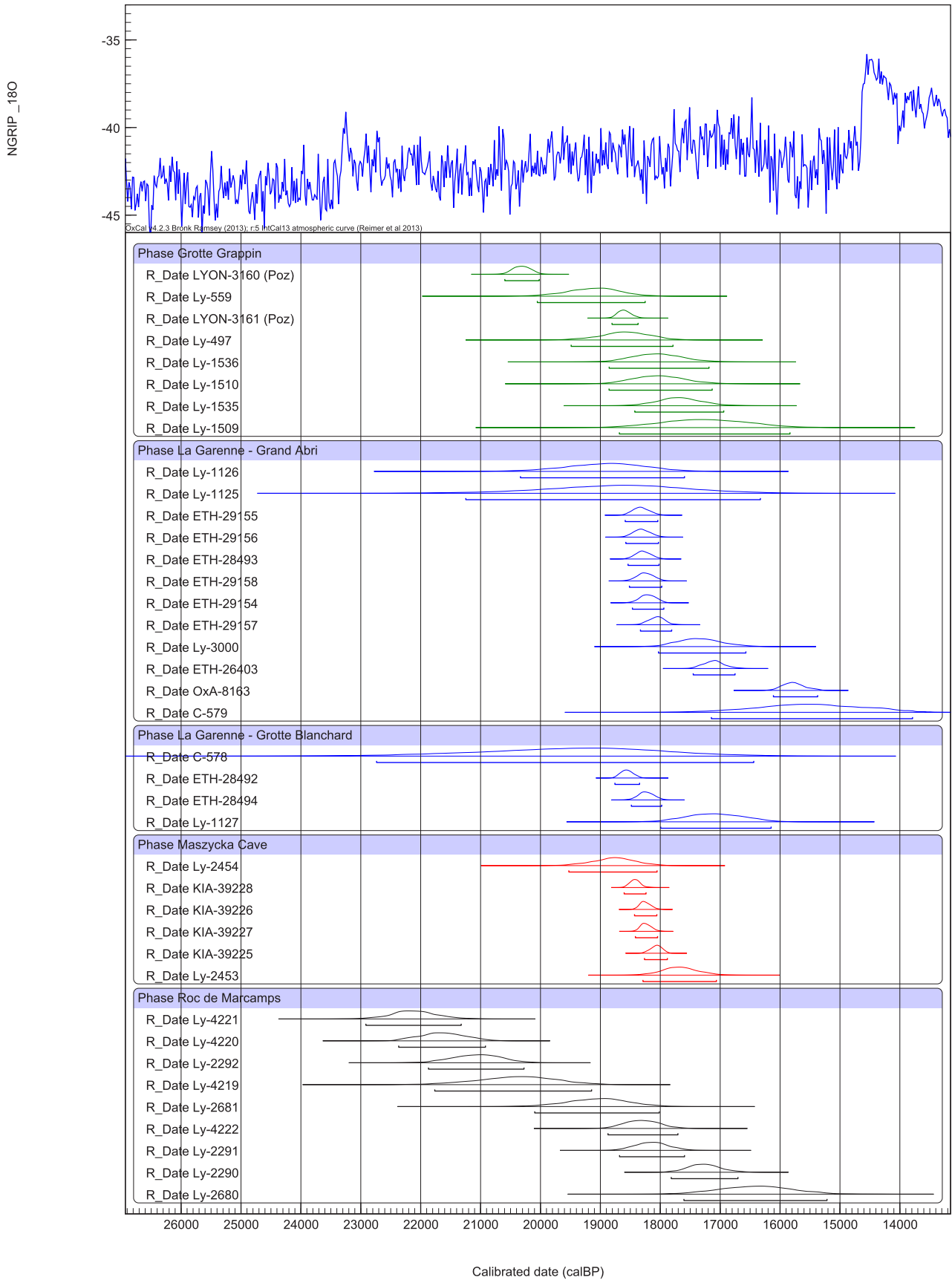


Fig. 15 – The chronology of the Maszycka Cave regarding other sites with navettes (CAD D. Bobak).

Fig. 15 – Chronologie de la grotte Maszycka au regard des autres sites du Magdalénien « à navettes » (DAO D. Bobak).



**Fig. 16** – The Magdalenian with *navettes* in Europe, 1: sites; 2: ice sheet range during LGM (ca. 20 000 BP). 1: Roc-de-Marcamps; 2: Grotte du Placard; 3: Grottes du Chaffaud; 4: La Garenne; 5: Laugerie-Basse; 6: Laugerie-Haute; 7: Grotte d’Arlay; 8: Maszycka Cave (after M. Poltowicz-Bobak, 2013).

*Fig. 16 – Le Magdalénien « à navettes » en Europe. 1: sites; 2 : expansion du glacier au LGM (environ 20 000 BP). 1 : Roc-de-Marcamps; 2 : grotte du Placard; 3 : grottes du Chaffaud; 4 : la Garenne; 5 : Laugerie-Basse; 6 : Laugerie-Haute; 7 : grotte d’Arlay; 8 : grotte de Maszycka (d’après M. Poltowicz-Bobak, 2013).*

On the other hand, it is not possible to answer the question about the reasons for the appearance of the Magdalenian site 'à navettes' in areas such far away from the home territories. It is evidence of the first Magdalenian appearance in Central Europe, which arrived immediately at the eastern outskirts of Magdalenian settlement.

The site in Maszycka Cave can be interpreted as a trace of the so-called 'pioneering phase' (Housley et al., 1997) of the Magdalenian settlement preceding the right reoccupation of this part of Europe. Central European lands, abandoned during long period of the LGM (Terberger, 2013), were interesting for the people coming from various refugia such as western and eastern areas and the first identification of further expansion took place over 1,000 years before the proper settlement of the area. Settlement dating established in Maszycka Cave corresponds to the onset of the Middle Magdalenian in France which indicates that the expansion of the population (?) of the Middle Magdalenian towards east followed very quickly.

The causes of these first attempts to go beyond the original territories lie in climate change and associated

changes in access to food. For the period of about 15 thousand uncalibrated years ago (i.e. about 18,000 cal BP) some changes took place, which result in the spread of wild game to a much wider area covering the territories situated to the north and east of the territories occupied by the Early Magdalenian community. Under conditions in which the acquisition of food could be easier, it was possible to take the risk to leave the relatively densely populated areas and penetrate new, previously unknown ones, but with prospects of access to new resources regarding wildlife and minerals (Binford, 1983; Jochim et al., 1999). In the western part of Central Europe crucial environmental change are observed: in Southern Germany in the place of the polar desert the steppe-tundra appears, vegetation grows and the range and content of the fauna increases, which allows to start the first penetration of these areas (Jochim et al., 1999). Polish areas as for the contemporary period with the settlement in Maszycka Cave, the phase of retreating ice sheet appears at the end of the Pomeranian stage. So it is still cold and dry period, as evidenced by the presence of the saiga also identified among the skeletal remains in

Maszycka Cave, but additionally a gradual warming and the increase in humidity are noticeable with reference to period between 15 and 14 thousand years BP (Madeyska, 1995 their further literature). It cannot be excluded that such a wide spread of this facies was made possible due to adaptation of communities to specific though harsh climatic and environmental conditions prevailing in large parts of Europe, as well as expertise in hunting for saïga (Allain, 1989). The suggested concept is of course only one of the attempts to explain the finds from Maszycka Cave; the attempt which in no way claims to be the only possible explanation for the emergence of the taxonomic unit in the areas of Lesser Poland.

Continuous and structured settlement as for the east areas of Central Europe by the Late Magdalenian population will take place about 1,000 years later. Considering Polish territories, this expansion will come from a slightly different way—through the valley of the Danube, Moravia and the Moravian Gate to spread then, reaching up to the line of the Vistula and San rivers in South-East Poland (Połtowicz-Bobak, 2013).

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