Notae Praehistoricae, 32/2012 : 73-88

The Neolithic and Mesolithic Cave site "Blätterhöhle" in Westphalia (D)

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1. Introduction: Late Upper Palaeolithic and Mesolithic sites in Westphalia

In the second half of the 19th century, archaeological finds from Westphalian caves set off Stone Age research in Westphalia. Particularly the Balver Cave and other sites in the Hönne Valley have been repeatedly studied since the 1860s. At the beginning of the 19th century large parts of the cave sediments were used as phosphate fertiliser for nearby fields (Rothe, 1983). Therefore, only few finds at the entry of the cave were made during excavations in the Balver Cave in the 1930s. The published description of these excavations at the Balver Cave by Klaus Günther (1964) focuses on the Middle Palaeolithic finds. Little is known about the Upper Palaeolithic layers, the Mesolithic settlements and the Holocene use of the cave. For example, a human skull cap excavated in 1939 was surprisingly dated to the early Mesolithic with a date of 9160 ± 50 BP, 8385 ± 67 calBC (GrA-19538; Kindler *et al*., 2005; calibration by Calpal online v. 1.5). However, there are not many finds from this time period (Hülsken *et al*., 1991), because the upper layers were already missing when the first archaeological excavations started. The small number of finds that can be typologically defined suggests that settlement remains from this period had been present. In the other parts of Westphalia, there are only some surface finds that date to the Middle and Upper Palaeolithic (Baales *et al*., 2007: 26-35; Günther, 1988: 14-16). The situation is much better regarding the finds from the late Upper Palaeolithic: there are finds from the Federmesser culture from the Balver Cave and the Feldhof Cave in the Hönne Valley, from the Martins Cave near Iserlohn and finds from different open air sites. Unfortunately, those cave sites were excavated early and thus destroyed (Baales *et al*., 2007: 31; Günther, 1988: 14).

Finds from the Ahrensburger culture have been made in Hohlenstein near Rüthe-Kallenhardt, a cave that was excavated in the 1920s and 30s (Baales, 1996), and some open air sites also date to this period (Taute, 1968; Schwabedissen, 1954; Baales, 1996; Günther, 1988; Baales *et al*., 2007: 31-32). However, as with the Federmesser culture there are no finds with stratigraphical context from modern excavations. In addition, the majority of the finds at the Westphalian Museum for Archaeology, regional museums and private collections have not yet been studied.

Compared to the Palaeolithic sites, the number of Westphalian Mesolithic sites is much larger, but there are also only a few modern studies of Mesolithic sites. As for the late Upper Palaeolithic, several Mesolithic open air sites have been discovered by honorary members of the Office for the Preservation of Ancient Monuments during the last 30 years (Sönnecken, 1985). In the Mittelgebirge region there are more than 70 sites in the Siegerland and Sauerland areas. In addition, finds from the lower and middle Lenne are known, but only those from the Siegerland have been studied (Kleinfeller, 1994). Excavations of Mesolithic open air sites are very rare. For example, the excavations of the sites Wittig near Netphen (Frank, 1986), Oelde, Kr. Warendorf (Stapel, 2005) and the most recent excavation of Westerkappeln-Brennesch (Stapel, 2010) should be mentioned. Mesolithic cave finds are rare and their stratigraphical context unknown since – as mentioned above – the archaeological layers were often destroyed or damaged prior to excavation. Collections

such as the Late Mesolithic artefacts from the 1887-cleared Bilstein Cave near Warstein are singular (Baales, 2007). The only attempt of a systematic classification of the Mesolithic sites in North Rhine-Westphalia to date (Arora, 1976; *Idem*, 1979) is therefore mainly based on finds from open air sites, but the validity of its chronological and cultural-historical interpretations is now disputable (Drafehn *et al*., 2003; Baales & Koch, 2010).

Although we can assume that the Mittelgebirge region was used intensively during the Mesolithic because of hundreds of open air sites (Drafehn *et al*., 2003; Gehlen, 2003), there have been hardly any modern excavations conducted in the whole region. There are no known cave stratigraphies in this region apart from the one that is expected in the Blätterhöhle and its rock shelter. Only the rock shelter excavations by Klaus Grote (1994) in the Göttinger Forest at the northern border of the Mittelgebirge and the comprehensive excavations by Jiří Svoboda (2003; 2006) in the sandstone area of northern Bohemia close to the Elbe Sandstone Mountains allow deeper insights into Mesolithic life in the Mittelgebirge northern to the southern German Escarpment Landscape. There are only comprehensive studies of some Mesolithic sites in the Northern German Lowlands such as Duvensee (e.g. Bokelmann, 1991; *Idem*, 1999; Bokelmann *et al*., 1981; *Idem*, 1985; Holst, 2007; *Idem*, 2008; *Idem*, 2010), in Lower Saxony (Gerken, 2001a; *Idem*, 2001b), in Brandenburg (Cziesla, 2009), especially in Friesack (Gramsch, 2001; *Idem*, 2006; Gehlen, 2009), in Saxony (Geupel, 1985; *Idem*, 1987; Liebermann, in press) and in the Baltic Sea area (Lübke, 2002; *Idem*, 2004). In southwestern Germany our knowledge of the Mesolithic is based on the excavations of caves and rock shelters at the upper Danube (Taute, 1971; *Idem*, 1975; *Idem*, 1978), open air sites at the Feder Lake (Henauhof) and in Rottenburg-Siebenlinden (e.g. Kind, 1997; *Idem*, 1999; *Idem*, 2006; Kieselbach *et al*., 2000; Jochim, 1993). Particularly the works at the latter site have made an important contribution to our knowledge of the Mesolithic in southern Germany. In other parts of Germany there are only very few modern excavations of Mesolithic sites (e.g. Cziesla, 1992; Gerken, 2001a; *Idem*, 2001b; Heinen, 2001; *Idem*, 2005) and many excavation results have not yet been sufficiently published (Drafehn *et al*., 2003; Gehlen, 2003; Schönweiß & Graf, 1988). This applies particularly to the sites in Bavaria. The results of the excavations of the Blätterhöhle at the northern margin of the Sauerland are not only an important contribution to the current state of knowledge about the Mesolithic in Westphalia, but also geographically connect the areas in southern and northern Germany, on which Mesolithic research has focused to date (cf. Street *et al*., 2002).

2. The discovery of a new cave site

In 2004 speleologists of the society Arbeitskreis Kluterthöhle e.V. explored a gap in the so-called Weißenstein, a Devonian limestone mountain in the East of the town Hagen, which had been known since 1983. The exploration revealed that this was a large cave that was completely filled with sediment and whose known length is ca. 60 m. The cave was explored and measured by creating a narrow channel that was just large enough for crawling. When this channel was dug into the cave sediments, several human and faunal remains were found, which were handed over to the Office for the Preservation of Ancient Monuments and the town Hagen for scientific studies. After the discovery the entrance of the cave was protected from pot hunters by a metal door, which was secured by an alarm system (Orschiedt *et al*., 2008).

3. Excavations inside the cave

After a preliminary analysis of the finds in 2005, excavations in the cave and rock shelter were conducted from 2006 to 2009 (Fig. 1). Already after the first days of the excavation

Fig. 1 – The excavations inside the cave were difficult because of the narrowness of the cave (Wippermann/Historisches Centrum Hagen).

in 2006 it was discovered that the upper layers of the cave sediments had been disturbed by burrowing animals. All the finds to that date therefore originated from disturbed layers. In addition to this, some ceramic sherds and several human remains were found.

An intact layer, which included charcoal, stone artefacts and faunal and human remains, was discovered only in spring 2008, because of the difficult and cramped conditions. The stone artefacts that have been found to date can be attributed to the early, middle and late Mesolithic. The bedrock has not been reached in any part of the cave. Results from drilling suggest that the sediments of the cave are much deeper than the excavated layers.

4. Neolithic human remains from the Upper level

In the upper layer inside the cave, which has been partly removed by the exploration of the speleologists, several human skeletal remains were found. Radiocarbon dates revealed a Late Neolithic use of the cave in addition to the early Mesolithic dates (Orschiedt & Gröning, 2007; Orschiedt *et al*., 2008; Orschiedt, 2008; Orschiedt *et al*., 2010). The Neolithic dates suggest that human bodies were placed inside the cave and/or in the entrance area between 5145 ± 30 BP (KIA-45007) and 4405 ± 30 BP (KIA-28842) (3922 ± 60 calBC and 3020 ± 61 calBC). This practice has not yet been recorded within this area. Archaeological Material belonging to the Neolithic however is rare or absent. There are no identifiable lithics and only a few pottery fragments that might be attributed to the Late Neolithic. Any detailed attribution to any known cultural context however failed due to the fragmentation and the absence of characteristic decoration motives.

The archaeological investigations in the cave as well as on-going micromorphological analysis revealed that to upper part of the stratigraphy is completely disturbed by bioturbation mostly caused by badgers (Fig. 2). The upper sediment is characterised by a high amount of humus, large pieces of charcoal, faunal and human remains. All AMS measurements of these have revealed only Late Neolithic dates.

During excavation in 2011 and 2012 and during the opening of the original entrance area, several Neolithic human remains were found just before and inside the entrance area of the cave. This raises the question whether these remains were originally placed in the entrance or close behind and have been transported inside the cave by natural causes like bioturbation or flowing water. Further excavation of the entrance area might reveal more details of the taphonomic process involved.

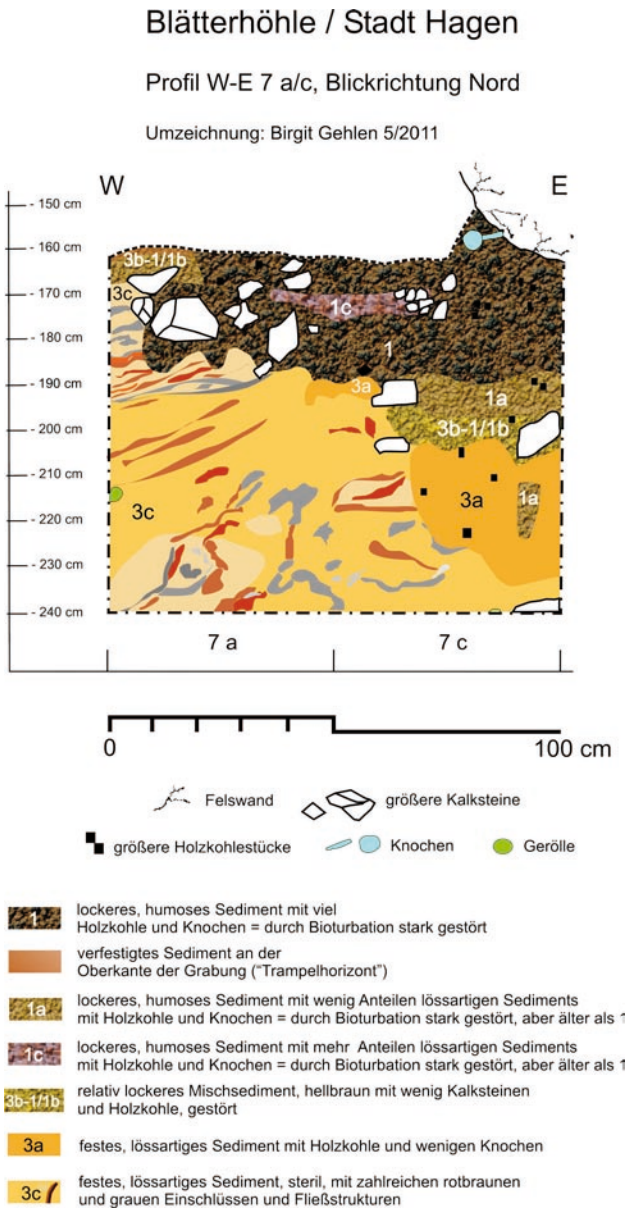


Fig. 2 – Stratigraphy inside the cave. The profile shows the upper disturbed level (sediment 1) with Late Neolithic human remains, the original cave filling (sediment 3c) as well as slightly disturbed sediments containing Mesolithic human remains below 200 cm (Drawing: Gehlen).

5. Mesolithic human and wild boar remains

Remarkable finds are a human skull cap of a 25-35 year-old man dating to the early Mesolithic with a determination of 9390 ± 35 BP, 8677 ± 43 calBC (KIA-24689) (Fig. 3) as well as three skulls of wild boar found in close vicinity to the early Mesolithic skull cap (Fig. 4). All skulls were located in an area of up to 1.5 m in a chamber-like extension of the narrow cave channel. The boar skulls are almost complete crania, but interestingly the canines and the lower jaws are missing. The skulls can also be attributed to the early Mesolithic with radiocarbon dates from 9000 to 9300 BP and 8500 to 8200 calBC. The oldest date so far comes from a small bone fragment of the skull of a subadult individual found in a deeper level. The date of 9700 ± 30 BP, 9210 ± 29 calBC (KIA-45012) marks the oldest known postglacial human remain from Central Europe.

The investigations to date suggest that these human remains and the boar skulls were deliberately placed in the cave, but whether this happened at the same time is not known. This finding is important because burials as well as human remains from the early Mesolithic in Europe have rarely been documented (Grünberg, 2000; Orschiedt *et al.*, 2008). In addition to the human skull cap, a minimum of three individuals from the early Mesolithic could be identified: a ca. 8 year-old child (individual 2) and two adults, one between 20 and 30 years old (individual 1) and the second between 40 and 50 years old (individua 3). And further remains of a skull and the postcranial skeleton, which probably belong to these three individuals, have been found in the undisturbed sediments that have also been attributed to the early Mesolithic, based on radiocarbon dating.

In addition to the finds from within the cave, human remains have also been found in front of the cave. The skull cap of individual 3 dated to 9275 ± 45 BP, 8506 ± 77 calBC (KIA-37511) and the tibia fragment of another adult dated to 9355 ± 40 BP, 8638 ± 56 calBC (KIA-37516) were found in the disturbed layers close to the second cave entrance. Both finds can therefore be attributed to the early Mesolithic. Additional but not yet dated human remains such as vertebrae, teeth and phalanges and the complete ulna of a child have been found in front of both cave entrances. Those skeletal remains were probably carried by animals and it can be assumed that there are more human remains to be found in the areas of the cave entrances. Human remains from the early Mesolithic and the Preboreal are rare, but there are some finds from Belgium that can be interpreted as parallels because of their archaeological contexts. Two of these sites are the Grotte Margaux and the Abri des Autours near Dinant (Namur). The human remains from these sites date to the 9th millennium calBC, based on several radiocarbon dates and are thus contemporary with the finds from the Blätterhöhle (Cauwe, 1998a: 11-80; *Idem*, 1998b: 11-13; *Idem*, 2001: 50-52). Another less well studied site is the cave Malonne-Petit Ri which is also near to Namur in Belgium (Cauwe, 1998a: 86-87). This site was destroyed by a stone quarry and studied in the 1960s, but without any documentation.

Fig. 3 – The early Mesolithic skull cap that was dated to an age of 8700 years. This is the oldest direct evidence for an anatomically modern human in Westphalia (Orschiedt/Historisches Centrum Hagen).

Fig. 4 – The second wild boar skull, which was directly associated with the early Mesolithic skull cap (Wippermann/ Historisches Centrum Hagen).

The site yielded isolated remains of four individuals that have been radiocarbon dated to 9270 ± 90 BP (OxA-5042) and 8410-8100 calBC. Another site comparable to the Blätterhöhle is the cave site Aveline´s Hole in Somerset, England. Skeletal remains of a minimum of 21 individuals of both sexes and all age groups have been found at this site during early excavations. However, their context is largely unknown because of the excavation methods used and insufficient documentation. The remains of a minimum of 18 individuals date to the time period between 8460 and 8140 calBC (Schulting, 2005).

6. Excavations of the rock shelter

A first sondage in August 2006 revealed a 1.5 m thick layer with lumps of rock from the now vertical rock wall, archaeological finds and a fireplace that can be dated to the early Mesolithic based on associated microliths. During the excavation a lump of rock of more than four metres in length and which had blocked the cave entrance could be uncovered. It belonged to the roof of the rock shelter that probably broke off after the late Mesolithic during the Atlantic period. Probably the broken off ceiling, which protected the layers underneath, lead to the excellent preservation of the finds in those layers. The stone artefacts suggest that there are not only early Mesolithic layers, but also layers that represent the transition from the late Upper Palaeolithic to the early Mesolithic. Additional microliths such as a facially retouched microlith (see Heinen, 2006 for dates) can be attributed to the middle Mesolithic between ca. 7400 and 6700 BC, others to the late Mesolithic from ca. 6700 BC. There is also evidence for the presence of humans during the middle Mesolithic because of radiocarbon dates from faunal remains (red deer and roe deer) with cut and blow marks. However, there are no radiocarbon dates for the fireplace that can be attributed to the late Mesolithic based on the stratigraphy. Since the classifiable artefacts were located in different layers, we can assume that the Rock shelter of the Blätterhöhle is the first example of a Mesolithic stratigraphy in Westphalia. During the excavations in the area of the broken off ceiling, a second entrance was unexpectedly uncovered. The entrance is 4 m broad and only 0.5 m has been exposed to date. During the excavation humic soil was removed that included archaeological as well as modern material. The entrance has been secured with a metal door until the excavations continue at a later stage.

7. Human activities at the rock shelter and cave site

The flint artefacts and hammer stones together with flakes and cores indicate the manufacture of stone tools. It is likely that the replacement of arrow points played a major role, as suggested by the finding of different micropoints. Cores from inside the cave, which were in a secondary position, are also related to these activities. The found faunal remains indicate that apart from a natural deposition, prey was taken apart and further processed at the site. In the Mesolithic layers, remains of red deer, roe deer, wild boar and beaver have been found. 153 pebbles from other regions, which are distributed like the flint artefacts and which are mainly present as flat elongated plates, also suggest that food processing took place at the site. This interpretation is also supported by macroscopic polish. Overall 11 hammerstones and four retouchers support the idea of stone tool manufacture at the site. Several flat pebbles show clear signs of use. Some parts have been broken off some of the larger pebbles, but it is unclear for which purpose. It can be assumed that pieces with a length of up to 15 cm were used as hand-held artefacts whereas the larger pieces from 20 to 40 cm were probably used as a base. Other artefacts seem to have been shattered during unknown activities or burst in a fire.

Overall three fireplaces have been excavated in the rock shelter of the Blätterhöhle. In addition to the detailed micromorphological analyses of the fireplaces, the AMS dating of charcoal from these fireplaces revealed preboral (fireplace 1) and boreal dates between 7600 and 7300 calBC (fireplace 2 and 3 as well as dates from the early Atlanticum about 7100 calBC (fireplace 2). In the area of the fireplaces an accumulation of flint and granite artefacts as well as faunal remains were found. The third fireplace directly in front of the back wall of the rock shelter, contained snail shells, fragments of river mussels and burned bones of larges frog species. Probably these are direct evidence for food processing. In the area around the fireplaces activities such as the preparation of food and the manufacture and processing of flint artefacts took place. According to the current state of knowledge, the Blätterhöhle and the area in front of the cave were used several times during the Mesolithic, but probably only for short periods of time.

8. Flint artefacts from the rock shelter and the cave

The excavations of the rock shelter between 2006 and 2009 yielded 160 flint artefacts. Apart from a few pieces of chert, these artefacts are made of Baltic flint.

Chips	*Flakes*	*Blades*	*Chunks*	*Cores*	*Nat. pieces*	*Burin-spalls*	*Unid. blanks*	*N blanks*
28 %	44 %	23 %	2 %	1 %	1 %	2 %	1 %	*160*

Tab. 1 – Blätterhöhle rock shelter: distribution of basic forms in percent.

Microliths	*End-retouched pieces*	*Scrapers*	*Lateral retouched pieces*	*Scaled pieces*	*N tools*
63 %	5 %	5 %	9 %	18 %	*22*

Tab. 2 – Blätterhöhle rock shelter: percentages of different tool types.

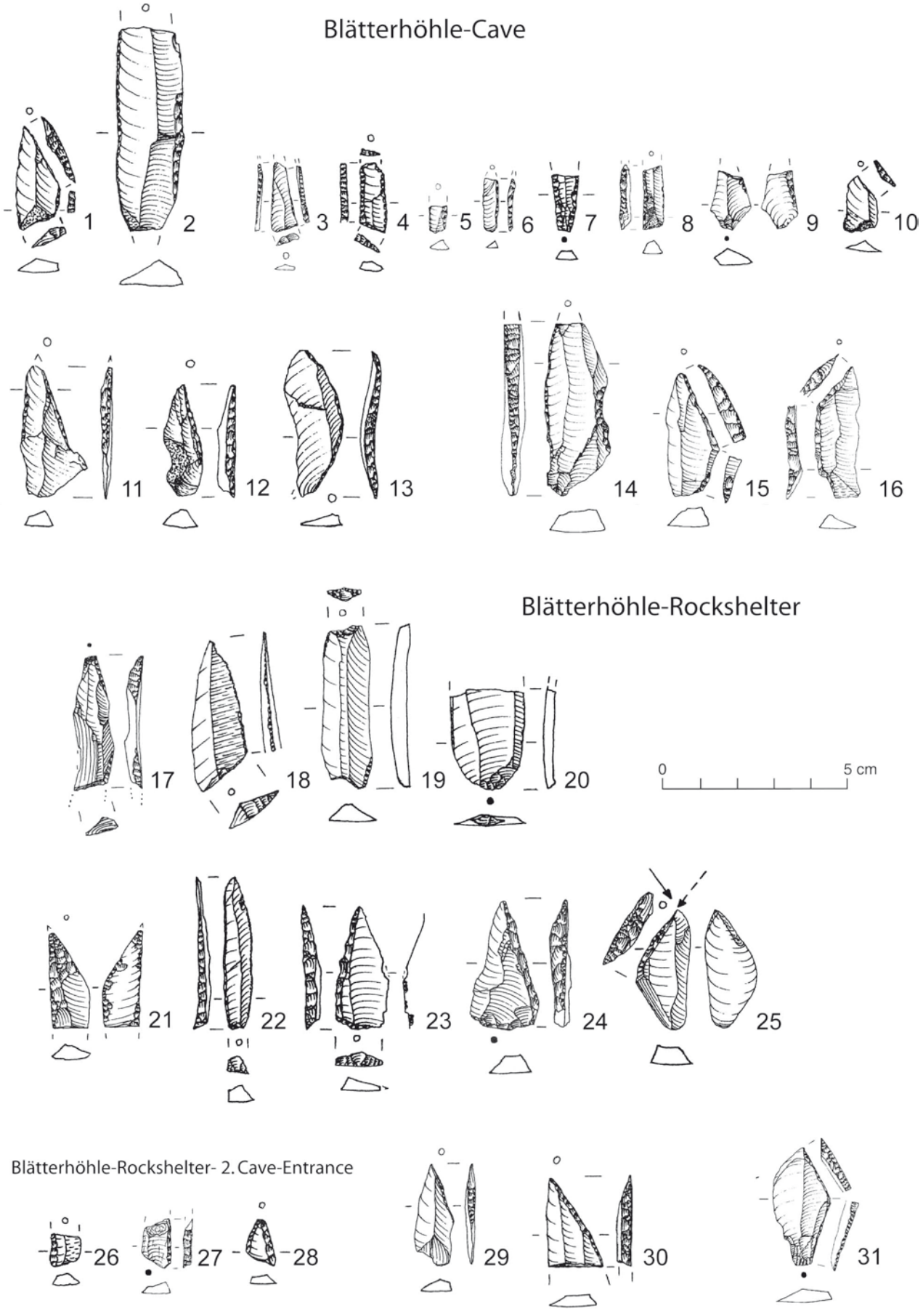
If it is possible to make assumptions based on the small number of classifiable flint artefacts, we can assume a similar distribution of basic forms in all four phases (Tab. 1). The majority of the tools are microliths (Tab. 2). The small number of artefacts and the distribution of tool types and basic forms, in which cores and debris are under-represented or not present, suggest that there have been only short visits during the four phases.

Based on the diagnostic stone tool forms, four time periods can be distinguished.
1) Late Mesolithic – retouched regular blades
2) Middle Mesolithic – micro backed knifes and bifacially retouched microliths
3) Early Mesolithic – micro points with retouched edges
4) Late Upper Palaeolithic or Earliest Mesolithic – uncommon backed point

Less than 50 % of the basic forms from the rock shelter can be stratigraphically assigned to the time periods (Fig. 5, Tab. 3).

Horizon	*Chips*	*Flakes*	*Blades*	*Chunks*	*Cores*	*Nat. pieces*	*Burin-spalls*	*Unid. blanks*	*N blanks*
Late Mesolithic	6 %	44 %	31 %	13 %	6 %	-	-	-	*16*
Middle Mesolithic	25 %	40 %	35 %	-	-	-	-	-	*20*
Early Mesolithic	10 %	45 %	45 %	-	-	-	-	-	*20*
Late Upper Palaeolithic/ Earliest Mesolithic	-	70 %	30 %	-	-	-	-	-	*10*

Tab. 3 – Blätterhöhlerock shelter: percentage distribution of basic forms in each time period.


Blätterhöhle-Cave
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Blätterhöhle-Rockshelter
17
18
19
20
0
5 cm
21
22
23
24
25
Blätterhöhle-Rockshelter- 2. Cave-Entrance
26
27
28
29
30
31

Inside the cave 207 flint artefacts have been found. Of these 71 % (147 pieces) were excavated. The remaining artefacts were found during the initial speleological exploration of the cave when a tunnel was dug through the sediments. These artefacts therefore do not have a stratigraphical context. All stone artefacts seem to be Mesolithic and Late Upper Palaeolithic.

	Chips	*Flakes*	*Blades*	*Chunks*	*Cores*	*Nat. pieces*	*Burin-spalls*	*Unid. blanks*	*N blanks*
Cave (all)	24 %	44 %	20 %	6 %	4 %	>1 %	1 %	1 %	*207*
Excavation finds	14 %	45 %	26 %	7 %	5 %	-	2 %	1 %	*147*

Tab. 4 – Finds from inside the cave: distribution of basic forms in percent.

	Microliths	*Truncated pieces/scrapers*	*Burins/ scrapers*	*Scrapers*	*Lateral retouched pieces*	*Denticulated pieces*	*Scaled pieces*	*Unid. fragments*	*N tools*
Cave (all)	39 %	4 %	4 %	4 %	21 %	4 %	14 %	7 %	*28*
Excavation finds	39 %	4 %	4 %	4 %	26 %	-	13 %	9 %	*23*

Tab. 5 – Finds from inside the cave: distribution of the flint tools and unidentified fragments in percent.

In general, the distribution of basic forms in the cave differs from the one in the rock shelter by the presence of debris and cores (Tab. 4). The artefacts indicate at least partially a manufacture of artefacts on site. The majority of the tools are microliths, while the remaining tools are a mixture of different types (Tab. 5). Since most of the pieces lack a stratigraphic context, it is not possible to classify them in more detail.

The majority of the finds from the excavations also lack stratigraphic information. Only ca. 20 % were found in undisturbed sediments. However, the microlith and blade types can be roughly compared with those from the rock shelter (Fig. 5). Based on the absolute dates of Mesolithic site with comparable microlith types and based on the data from Blätterhöhle to date, we can assume the use of the cave and rock shelter during the following time periods:

1) Late Mesolithic (c. 5500 to 6500 calBC) – uncommon trapezium microlith (?) and regular blades;
2) Middle Mesolithic (c. 7500 to 6800 calBC) – micro backed knifes and long narrow triangle;
3) Early Mesolithic (c. 8900 to 8600 calBC) – micro points with retouched edges and segments;
4) Late Upper Palaeolithic/Earliest Mesolithic (c. 10000 to 9200 calBC?) – two backed points.

The preliminary attribution to a Late Upper Palaeolithic/Earliest Mesolithic layer however has to be confirmed by radiocarbon dates and further excavations.

Fig. 5 – (left page) Diagnostic flint artefacts from the Cave (1-16) and the rock shelter (17-31).
Cave: 1, 2 Late Mesolithic; 3-10 Middle Mesolithic; 11-13 Early Mesolithic; 14-16 Late Palaeolithic.
Rock shelter: 17-20 Late Mesolithic; 21-28 Middle Mesolithic (26-28 finds close to the second cave-entrance); 29, 30 Early Mesolithic; 31 Final Palaeolithic or Earliest Mesolithic. Drawing: Gehlen.

9. Future prospects

Radar measurements by the Institute for Geophysics at the University of Cologne and the Ruhr-University-Bochum show that in the area in front of the cave there are sediment layers of several metres depth before the bedrock is reached (Bergers, 2006; Freund, 2011). The location of the cave and the rock shelter at a south-facing slope and in the area of the valley entrance in a shielded rock niche suggests that also late Upper Palaeolithic finds can be expected. The presence of such older layers is very likely because of this optimal topographic situation and the previous finds.

The excavations of the rock shelter and the cave are currently funded by a grant from the Deutsche Forschungsgemeinschaft (DFG). They offer the unique opportunity to study a newly discovered, fully sediment-filled site with modern methods that has not been damaged by previous excavations and thus possesses largely intact layers. Therefore, it will be possible to define a stratigraphic sequence for the area between the better known regions in southern Germany and the northern German lowlands for the late Upper Palaeolithic and the early post-glacial period.

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Abstract

The Blätterhöhle site in Hagen is a newly discovered cave site in North Rhine-Westphalia. The Cave was discovered during a speleological exploration in 2004. It was almost completely filled with sediments at the time of discovery. During the first small scale excavations by the speleologists, human skeletal remains were found in the upper levels which were disturbed by bioturbation. Since 2006 the archaeological excavations have brought to light more human remains of at least three Mesolithic and six late Neolithic individuals, animal bones and stone tools. The place in front of the cave was identified as a collapsed rockshelter. First radiocarbon dating and the typological analysis of the stone artefacts indicate that the cave and the space in front of it were used during the Mesolithic and the late Neolithic. In the Preboreal, the cave was used as a burial place. Between 8700 and 8200 calBC a human skull cap and further isolated human skeletal remains were buried in the cave together with 3 boar skulls. Neolithic human remains date between 3900 and 3000 calBC. In front of the cave, three fireplaces with activity zones were discovered within the first complete Mesolithic stratigraphy in the German Mittelgebirge area. A geophysical examination of the sediments in front of the cave revealed bedrock at 7 m depth. Therefore, we assume a high archaeological potential of the site, including the potential to reach glacial sediments.

Keywords: Blätterhöhle, Hagen (D), Westphalia, Late Neolithic, Mesolithic, German Mittelgebirge area, human remains, cave site, rock shelter, stratigraphy.

Résumé

Le site de Blätterhöhle à Hagen est un site rupestre nouvellement découvert en Rhénanie-du-Nord - Westphalie. La grotte a été découverte lors d'une exploration spéléologique menée en 2004. Elle était presque complètement remplie de sédiments au moment de sa découverte. Lors d'un sondage fait par les spéléologues, les restes d'un squelette humain ont été mis au jour dans les niveaux supérieurs, lesquels avaient été perturbés par une bioperturbation. Depuis 2006, les fouilles archéologiques ont mis en évidence davantage de restes humains, dont trois individus au moins datent du Mésolithique et six de la fin du Néolithique. La fouille a aussi révélé la présence de restes fauniques et d'outils en bois. L'espace devant la grotte a été identifié comme un abri sous roche éboulé. La première datation au radiocarbone et l'analyse typologique des artéfacts en pierre indiquent que la grotte et l'espace situé devant ont été utilisés pendant une période qui s'étend du Mésolithique jusqu'à la fin du Néolithique. À la période Préboréale, la grotte était utilisée comme un lieu d'inhumation. Entre 8700 et 8200 cal BC, une calotte crânienne humaine et, plus loin, les restes d'un squelette humain isolé ont été inhumés dans la grotte avec trois crânes de sangliers. Les restes humains néolithiques sont datés entre 3900 et 3000 cal BC. Dans l'abri couvert, trois foyers ainsi que des zones d'activités ont été découverts à l'intérieur de la première stratigraphie complète du Mésolithique dans la zone de moyenne altitude d'Allemagne. Un examen géophysique des sédiments de l'espace situé devant la grotte a révélé la roche en place à 7 m de profondeur. Par conséquent, nous supposons que ce site possède un grand potentiel archéologique incluant une possibilité d'atteindre des sédiments de l'Époque glaciaire.

Mots-clés : Blätterhöhle, Hagen (D), Westphalie, Néolithique final, Mésolithique, aire de moyenne montagne allemande, restes humains, site rupestre, abri sous roche, stratigraphie.

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