Part I – The Lower & Middle Palaeolithic

7 Late Middle Palaeolithic artefacts and archaeo-stratigraphical dating of the bone gravels (Knochenkiese) in Central Westphalia and the Ruhrgebiet (Germany)

Michael Baales

Abstract: During the last hundred years or so the southern Munster embayment and the Ruhr region (North Rhine-Westphalia) produced several Late Middle Palaeolithic lithic assemblages from a distinct river sediment known as the Knochenkiese (Bone gravels). Within these sediments that form a major part of the early lower river terraces of Emscher, Lippe, Ems and their tributaries numerous Upper Pleistocene animal remains of the mammoth steppe fauna were located. Furthermore, at Warendorf-Neuwarendorf a right Neanderthal parietal bone was uncovered from a sediment also named as the Knochenkiese. The Knochenkiese lithic assemblages from Bottrop, Herne, Wadersloh, and Warendorf-Neuwarendorf are assigned to the early Keilmessergruppen (Micoquian). In 2008 at Hamm-Uentrop a further Middle Palaeolithic lithic implement was located within the Knochenkiese. However, this distinctive broad blade fragment may instead be the remnant of a site with Late Middle Palaeolithic blades destroyed by erosion of the river Lippe. Bearing in mind all the known geo- and biostratigraphical as well as archaeological information concerning these deposits there are good arguments for placing the Knochenkiese within OIS 4. Furthermore, this result supports the ‘long chronology’ for the Late Middle Palaeolithic Keilmessergruppen as proposed by O. Jöris in 2004.

Keywords: Late Middle Palaeolithic, Keilmessergruppen, blade industry, Upper Pleistocene Knochenkiese, Westphalia, Western Germany.

Introduction
The oldest evidence for human presence in Westphalia (Fig. 1) and its adjacent regions only dates to around 200 ka (Saalian), insofar as any indications for dating are available. Whether a handaxe from Bad Salzuflen (Lippe district: Pollmann, 2002: Fig. 25: no. 7) in eastern Westphalia is even older (Lower Palaeolithic?) on morphological grounds remains unclear, since there are no geostratigraphical arguments to support this view. Furthermore, the generally problematic pebble finds recovered from extraction pits exploiting Lower to Middle Pleistocene gravels (Schmude, 1992a, 1992b, 1996) are not considered here (Baales et al., 2000).

To date, the oldest archaeological find from our region remains a lithic object 8.3 cm in length recognized as an elongated flake of brownish flint (perhaps Cretaceous flint from the Meuse catchment area) which was found in 1926 during excavation of a wharf close to the River Emscher at Essen-Vogelheim (Hopp, 2006). This lithic specimen was found below Saalian sediments and, following the description of Ernst Kahrs (1928), lay on an ancient land surface within a package of alluvial loess (Schwemmlöss). This was situated below Saalian / Drenthe till, dating the find to OIS 6 (Krbetschek & Eißmann, 2008: 171). Around the location of the lithic find Kahrs recognized bone remains (some determined as Panthera leo spelaea) with possible anthropogenic traces and burnt material (early Neanderthal hearth remains?), the interpretation of which remains, however, vague.

Based on their typological appearance (Günther, 1988a) and the fact that Saalian gravels were identified at the find locality, a few bifacial quartzite tools from Velen (Borken district), which is situated in the western part of the Munster embayment (Münsterländer Tieflandsbucht), also appear to date into the Saalian.

However, any further suggestions of a pre-Weichselian age for archaeological material from Westphalia remain even more vague and dated sites or find layers of this age which have been investigated by modern methods are
totally missing. By contrast, several late Middle Palaeolithic finds or assemblages associated with a distinct geological context can be quite precisely dated by geochronology to within the Weichselian. Lithic materials discovered in the southern Westphalian upland caves are especially relevant for this question.

The rich inventories of the Balve Cave (Hönne valley, Märkischer district) are of particular interest, representing an impressive collection of Middle Palaeolithic Micoquian (Keilmessergruppen, henceforth referred to as KMG) material recovered in 1939 from the lower levels of a huge fissure within the limestone cave (Günther, 1964). Following early descriptions of the sedimentological situation, after emptying of the cave began in the 1830s, this fissure was originally covered by a distinct block layer which should represent the first Weichselian glacial maximum during OIS 4 (Jöris, 2004: 98-99). Among the Balve Cave KMG material are typical Pradnik bifacial knives (Pradnik Keilmesser) (Jöris, 1992) which, following Jöris (2001, 2004), date the assemblages to well before the first glacial maximum (i.e. older than c. 65 ka BP).

Recently, the first radiometric dates have become available for the Volkringhausen Cave which is also situated in the Hönne valley close to the Balve Cave. Uncovered in 1928 the small KMG inventory here (Tinnes, 1988) is claimed...
on the basis of two AMS measurements of faunal material to belong to the final phase of the Middle Palaeolithic, around 40 ka calBC (Tafelmaier, 2011). However, for me it remains questionable whether those AMS results date the KMG occupation at all - since as is normal, it is uncertain if the small assemblage represents only one distinct occupational phase - or in fact dates a younger episode of use of the cave. Since the datings of around 40 ka calBC are close to the current limit of radiocarbon methodological reliability we may anyway have to interpret the dates as showing, at best, a minimum age.

Apart from these cave assemblages several late Middle Palaeolithic open air inventories from Westphalia and the Ruhr region provide arguments for their age by analysis of their geological context.

The Knochenkiese-Schneckensande-Komplex ('bone gravels/snail sands complex') in Westphalia and the Ruhr region

One of the best known geological features of the Upper Pleistocene record in Westphalia and the Ruhr region are the bone gravels (Knochenkiese) in the southern Munster embayment, which form a major part of the early lower river terraces there. During the last hundred years or so, the documentation of several, in some cases large, sections near the River Lippe and the small Emser river (located between the Lippe to the North and the Ruhr to the South) has revealed the Knochenkiese sometimes more than 10 m below the present land surface. Especially the large canal construction projects of the early 20th century (Rhine-Herne and Wesel-Datteln Canal) along the Emser and the Lippe provided major insights into the Weichselian geological record of this region.

Sometime during an earlier phase of the Weichselian the above mentioned rivers and their tributaries started to erode large parts of the surrounding landscape by developing extensive braided river systems, resulting in major lower terrace gravel and sand plains. In geological profiles of the region the following sequence is generally recorded (Kahrs, 1925; Brunnacker, 1982; von Koenigswald & Walder, 1995: Knochenkiese-Schneckenkiese-Komplex; Herget, 1997: 74-81). Above basal Cretaceous marls (sometimes covered by a weathered clayey horizon or Saalian gravels: von Koenigswald & Walder, 1995: 52) are found a few decimetres of fine grained gravels accumulated at the lower river terrace after the decline of river energy. Together with larger pebbles and ‘Baltic’ Cretaceous flint (both of which are Saalian erratics) numerous Upper Pleistocene animal remains (nomen est omen) are found incorporated within the Knochenkiese (Heinrich, 1987; von Koenigswald & Walder, 1995; Lanser, 2006: 86-87).

The Knochenkiese themselves are regularly covered by several metres of fluvial and / or aeolian sands and silts, which historically were designated as snail sands (Schneckensande; today often designated as sand-silt complex or Sand-Schluft Wechselfolge; cf. Herget, 1997: 79) after the countless number of incorporated terrestrial and aquatic molluscs. These sediments merge at the top into late Weichselian aeolian dune sands or are covered by clay or peat.

While the Knochenkiese and Schneckensande around the Emser and Lippe were mainly exposed by large scale construction work they become accessible further to the north solely by sub aquatic sand dredging. Countless Pleistocene animal remains and, on several occasions, Middle Palaeolithic lithic material were regularly made accessible by these activities.

The Knochenkiese north of the Emser and Lippe as a late Middle Palaeolithic find horizon

Near Haltern (Recklinghausen district) quarrying at several large scale gravel and sand pits (today the Halterner and Hullerner lakes) produced numerous flint materials. These are mostly characterized by bifacial tool types so far interpreted as representing various Late Middle Palaeolithic technocomplexes (Günther, 1988b). Although all were originally interpreted as being incorporated in the Knochenkiese of the Stever River (a tributary of the Lippe), parts of the material may have been simply dredged up with Knochenkiese material and could in fact represent younger finds.

Further to the North, near Coesfeld-Gescher (Coesfeld district: Schloesser, 1998), Greven-Bockholt (Steinfurt district) and Munster-Gittrup (Schloesser, 1992, 2007), three further small assemblages containing a bifacial component – at Greven-Bokholt together with
the remains of a pelvis and a femora of *Bison priscus* both bearing possible anthropogenic impact marks – were exposed again by sub aquatic sand dredgers. These came from gravels of the River Ems and the Berkel stream, which were again designated *Knochenkiese*. And even more to the east, but still within the Ems valley, at Harrewinkel-Greven (Gutersloh district) mammoth remains and a further small bifacial lithic assemblage were collected during sand dredging (Günther, 2007).

Two extraction pits - the Kottruper lakes - are situated within the upper Ems region near Warendorf-Neuwarendorf (Warendorf district). During the 1990s technological advances allowed the recommencement of sand and gravel extraction from greater depths than had previously been possible, again turning up thousands of Pleistocene animal remains and several dozen flint artefacts from both lakes (Lanser, 1998; Rüschoff-Thale, 1998, 2004: 5-6, 2006). The find horizon of these materials is again identified as *Knochenkiese* (Rüschoff-Thale, 2004: 3). Remains of *Stephanorhinus kirchbergensis* and *Mammuthus trogontherii* identified within the animal collection (Lanser, 1998) might derive from secondary contexts or suggest that older gravels had also been extracted. However, the dominant species represented are typical elements of the mammoth steppe fauna; together with woolly mammoth and woolly rhinoceros, reindeer, musk-ox and cave lion are also present. The lithics again show a distinct bifacial component (Rüschoff-Thale, 1998, 2004: 7-8). The extraction of sand and gravels continues to the present-day, proving a depth of the *Knochenkiese* of at least 5 m. Additional lithic artefacts were collected by Josef Gora, among
them several Levallois flakes and bifacial tools (Fig. 2).

Of special interest is a bone fragment from Lake 1, which was found in 1995 by Gora, determined two years later as a right Neanderthal parietal bone (Czarnetzki & Trellisó Carreño, 1999; Rüschoff-Thale & Klostermann, 2000; Rüschoff-Thale, 2004: 5-6) and thus the oldest Westphalian human remain identified so far. However, the available information on its stratigraphic situation (a final report is not yet published) is judged to be too vague to allow a precise dating of this important find (Jöris, 2004: footnote 336; Street et al., 2006: 573).

Middle Palaeolithic finds from the Emscher and Lippe Knochenkiese

The best known Westphalian Knochenkiese find-spots for Middle Palaeolithic lithic and faunal remains are situated in the Emscher valley (Schmitz, 1995). The Emscher is located south of the Lippe and both rivers are a little to the North of the Westphalian uplands and drain the southern Munster embayment into the Rhine valley to the west. During OIS 6 the whole area was covered by the early Saalian / Drenthe ice sheet (Skupin et al., 1993), while during the ice sheet collapse the river systems evolved again due to melt water drainage.

As mentioned above, the large scale construction work of the Rhine-Herne Canal in the early 20th century first gave access to the Knochenkiese and Middle Palaeolithic finds located several meters below the present surface. Following this, further finds have been made during remodelling of the Canal since the 1960s. Apart from a number of individual finds, the sites of Herne, Bottrop and Essen-Dellwig are of major interest and will be presented here briefly and discussed regarding their relevance in the context of the chronology of the Knochenkiese (Fig. 3).

Credit is due to Ernst Kahrs, formerly the director of the Ruhrlandmuseum Essen, who first recognized the potential for recovering Palaeolithic material during the large scale construction work taking place in the river valleys of his region. In the summer of 1911 he learned of lithic finds uncovered within the Knochenkiese during construction of Rhine-Herne Canal lock (Schleuse) VI in Herne. Over a few m² he subsequently recognized several artefacts of northern erratic ('Baltic') Cretaceous flint some 13 m below the present surface (Kahrs, 1925, 1928; Bosinski, 1967: 35,
Figure 4. Herne, ‘Schleuse VI’. Late Middle Palaeolithic flint tools: handaxe (top), side-scraper (lower left), and the largest Herner Spitze, a Levallois flake which shows unifacial retouch on its dorsal side (lower right) (photo Stadtbildstelle Essen & A. Müller, Olpe).
111-112; Schmitz, 1988, 1995; Baales, 2006). Significant in this small assemblage of only 19 flint artefacts is a small handaxe measuring 10.7 cm in length (Fig. 4: top) which later became an important object for the discussion of whether the “handaxe culture” could be found east of the Rhine (Schwabedissen, 1970: 61). Besides this object, a few more bifacial artefacts were recognized, together with side scrapers (Fig. 4: lower left) and two large Levallois flakes measuring 13.3 cm (Fig. 4: lower right) and 10 cm in length respectively, which show unifacial retouch on their dorsal side and were once labelled as ‘Herner points’ (Herner Spitzten: Bosinski, 1967: 35). Within this material, which is described as appearing very fresh and unrolled, Ralf W. Schmitz (1995: 72-73) counted at least thirteen worked nodules (Werkstücke) of ‘Baltic’ flint, thus demonstrating that the assemblage was at most only partly collected. Furthermore, beside the lithic elements, the site also delivered a few animal remains, among them the mandible of a young woolly mammoth and several bone splinters which perhaps represent fracture waste due to marrow consumption by Neanderthals or animals.

However, after this first success and despite continuation of constructing work no further find localities were subsequently recognized within the Knochenkiese. A limiting factor may have been that only a few persons were involved in Kahrs’ project, which may have led to missing other sites which were perhaps destroyed unrecognised.

It was Arno Heinrich, the former head of the Museum for Ur- und Ortsgeschichte in Bottrop, who between 1963 and 1975 first took the renewed chance to recover new material during widening of the Rhine-Herne Canal near Bottrop (Heinrich, 1987: 131). Here, the Knochenkiese were brought to light by sub aquatic dredgers and then displaced through a pipeline from a floating pump station onto a large depositional site at which Heinrich and his co-worker collected some 7,000 animal remains and 364 lithic artefacts. Since the artefacts were only recovered when the dredgers were working in a distinct area of the channel it is supposed that an in situ site within the Knochenkiese was destroyed and that the discovered material probably represents a single inventory (Heinrich, 1987, 1990).

The Bottrop lithic assemblage is composed of three small handaxes (Fig. 5 & 6: no. 1), atypical Keilmesser-like bifacial tools (Fig. 6: no. 3), some bifacial scrapers (Blattförmige Schaber, Fig. 6: no. 2) and several side-scrapers (Fig. 7: nos. 2, 4 & 5). Levallois reduction concepts are shown by several typical cores, flakes and waste material (Fig. 7: nos. 1, 3 & 6-7). Altogether some twenty ‘Baltic’ Cretaceous flint nodules could be identified (Schmitz, 1988, 1990a, 1995; Stapel, 2006a). Within the faunal material several objects with probable anthropogenic deep scars and chop marks were recognized and are discussed as forming part of the Late Middle Palaeolithic assemblage (Schmitz, 1988, 1995) and which are now believed to be of a recent and/or natural origin.

Much further to the northeast in the Lippe valley, two lithic assemblages were collected, this time again during sub aquatic dredging in two gravel pits near Lippstadt (Soest district). The rich Wadersloh (Warendorf district) bifacial assemblage, which is comparable to a small lithic collection found during sand dredging further to the east near Lippstadt-Lipperode, was recovered together with Pleistocene faunal remains during extraction of the Knochenkiese from a depth of approximately 10 m. Unfortunately only little information is available for this interesting material so far (Schlösser, 1998; Otten et al., 2010: 564) which is mostly in a fresh condition with refitting of some anciently broken pieces being possible. Some artefacts stained with chalk suggest the possibility that the assemblage was displaced from the basal Knochenkiese which were in contact to underlying Cretaceous marls and thus represent a hitherto undisturbed in situ context (Schlösser, 1998). Wadersloh reveals a bifacial component with different handaxes, Keilmesser, atypical Keilmesser and bifacial scrapers. Together with artefacts demonstrating Levallois reduction concepts this material is comparable to that from Herne and Bottrop. Furthermore, as in the case of Bottrop, Lippstadt-Lipperode delivered one herbivore rib bearing highly possible anthropogenic deep scars (photo in Schlösser, 1998: 38).

The last site to be mentioned came to light in 1980 during the destruction of Rhine-Herne Canal lock III at Essen-Dellwig. Altogether, eleven scattered lithic artefacts were collected...
Figure 5. Bottrop.
Late Middle Palaeolithic handaxes (source Heinrich, 1987).
Figure 6. Bottrop Late Middle Palaeolithic flint tools: 1) Handaxe, 2) Blasformiger Schaber, 3) Keilmessер-like bifacial tool (source Heinrich, 1987).
which are believed to come from the Knochenkiese of the ‘Old Emscher’ (Lanser, 1982: 42; Schmitz, 1995: 118). The few finds, made on several nodules of ‘Baltic’ flint and one of black lydite, were collected from somewhat separated locations around the lock and perhaps represent two different occupation events (Schmitz, 1995: 119-120 & 122). Typo-technologically relevant are a Levallois blade with a length of 5.3 cm, the proximal fragment of an elongated Levallois flake, a side-scraper on a broad flake and an elongated outre passé flake (Kernfüß), 6.5 cm in length and with a facetted striking platform (Fig. 8).

**Hamm-Uentrop: a new Late Middle Palaeolithic Knochenkiese find locality in the Lippe valley**

Today there are only few possibilities left to gain access to the Knochenkiese. The time of large scale construction projects, such as were carried out during the early 20th century, is (fortunately) over. Nowadays most material – if
at all – comes from small scale pits exploited by sub aquatic dredging. Moreover, whenever new construction work in the valleys of the Emscher and Lippe is carried out, the intensive use of large dredgers prevents us from recognizing new sites of relevance, unless several lucky events conspire to coincide with each other...

In mid February 2008 a large pit was excavated by several large dredgers south of the present Lippe River during the construction of a new hard coal-fired power plant at Hamm-Uentrop (Fig. 9). During this process a worker recognized a large bone on the shovel of an excavator. This lucky chance was improved on by a subsequent phone call which reached the responsible archaeologists of the *Landschaftsverband Westfalen-Lippe* (LWL) at Olpe. They were ultimately confronted by

---

**Figure 8.** Essen-Dellwig: Late Middle Palaeolithic flint artefacts: 1) Levallois blade, 2) elongated outre passé flake, 3) side-scraper, 4) proximal fragment of an elongated Levallois flake (source Lanser, 1982).
a large pit dug down through the Pleistocene deposits onto Cretaceous marl. Above the marl the classical lower terrace stratigraphy of Weichselian sediments was present, with Knochenkiese at the base (Fig. 10) followed by several meters of sandy layers with numerous mollusc remains (Schneckensande). These were divided by gravel bands or peat lenses and topped by a package of silt, clay and peat, the latter perhaps all of Holocene age.

Within the 40 to 50 cm thick greyish Knochenkiese me and my colleague Eva Cichy uncovered a compact round bone which was revealed to be a woolly mammoth astragalus (Fig. 11). The large bone which had attracted attention to the site was a woolly mammoth femur, without the epiphysis identified as that of a young individual (Fig. 12: top). The tip of a woolly mammoth tusk completed the recovered remains of this Weichselian mega herbivore. Furthermore, dredging also recovered a humerus fragment of Equus and the scapula of a woolly rhinoceros (Fig. 12). Woolly mammoth, woolly rhinoceros and horse represent important elements of the so called mammoth steppe fauna. The steppe conditions present during the sedimentation of the Knochenkiese and Schneckensande are also shown by the analysis of several pollen samples taken from all defined (sub) horizons, which all indicate the open grassy environment typical during Weichselian stadials, with shrubs of Betula nana and Salix polaris type (Baales et al., 2010).

Controlling the entirety of the profiles exposed within the construction pit resulted in an unexpected find from the Knochenkiese. This was a flat worked lithic object identified as blackish ‘Baltic’ Cretaceous flint. Although flint chunks occur regularly within the Knochenkiese here, this object caught my attention immediately. After cleaning, the lithic specimen was revealed to be the 5 cm long medial fragment of a blade with sub parallel edges and a single dorsal ridge (Fig. 13); a new Westphalian Neanderthal findspot had been located. Furthermore, the relatively broad blade fragment appears not to be the random result of just any knapping event but must be interpreted as the intended product of a specialized knapping process; this particular Neanderthal knapper had “blades on his mind”.

Figure 9. Hamm-Uentrop. Construction work for a new power plant near the Lippe in February 2008 (photo M. Baales).
By analysing the age of the different NW European late Middle Palaeolithic technocomplexes it seems to have become clear that those assemblages with a major blade proportion mainly date into an older period of the early Weichselian (cf. Conard, 1992, 2001: Fig. 2; Locht, 2002) around OIS 5c (Brøstrup, c. 90 ka BP: Jöris, 2004). The few lithic artefacts (blades or elongated blanks) found at Essen-Dellwig, which may represent Neanderthal activities near the shore of the former Emscher River (Lanser, 1982: 42; Schmitz, 1995: 123), might be assigned to the same Early Weichselian technocomplex.

In contrast to this, assemblages such as Bottrop, Herne and Wadersloh with a distinct bifacial component (handaxes, Keilmesser or Keilmesser-like tools and bifacially retouched scrapers [Blattförmige Schaber]) are today believed to represent a somewhat younger period within the Early Weichselian. Since the 1960s, inventories like Bottrop und Herne had been interpreted as representative of Gerhard Bosinski’s Lebenstedter Gruppe of the Saalian

**Figure 10.** Hamm-Uentrop. Drawing of the profile with the Knochenkiese and Schneckensande (Sand-Schluff-Wechselfolge) layers above Upper Cretaceous marls (drawing A. Müller, Olpe).
Figure 11. Hamm-Uentrop. Situation of the basal Pleistocene layers above the Upper Cretaceous marls soon after the uncovering of a mammoth astragalus within the upper part of the Knochenkiese (photo E. Cichy, Olpe).

Figure 12. Hamm-Uentrop. Upper Pleistocene mammal remains. At the top a mammoth femur without epiphysis, and at the bottom (from left to right) a humerus fragment of Equus, tip of a mammoth tusk, scapula of a woolly rhinoceros, and a mammoth astragalus found in situ (cf Fig. 11) (photo H. Menne, Olpe).

However, only a few years later it became clear that these bifacial assemblages indeed date to within the Weichselian (Veil et al., 1994; Schmitz, 1995: 124) and they are now interpreted as forming part of the initial technocomplex of the familiar Weichselian Micoquian / Keilmessergruppen sequence or KMG-A (Königsmessergruppen sequence or KMG-A (Königsmessergruppen, Saale-Lebenstedt inventory type: Jöris, 2004: 105-106). With respect to this interpretation, the chronologically older Bottrop U/Th dates for the mammoth molars can be easily discounted, since they in fact date *Mammuthus trogontherii* (Schmitz, 1990a), a species which was no longer present here during the Weichselian. This determination also proves the presence of older faunal material subsequently incorporated within the Knochenkiese or derived from Saalian gravels below them (see below).

By reference to Jöris’ (2004) arguments, his early KMG-A inventory still dates into the late Early Weichselian period (OIS 5a or Odderade and earliest part of OIS 4; [Greenland Interstadials 21 and 20]; Jöris, 2004: Fig. 20) making it some 75 ka BP in age. This clearly shows that the typical Knochenkiese of Westphalia and the Ruhr region were indeed formed during the early Weichselian. By extending the interpretation of the taphonomical and chronological relevance of the described late Middle Palaeolithic materials within the Knochenkiese even further, some arguments may be made to suggest an even more precise (but still very cautious) dating of these gravels.

Both assemblages from Bottrop and Herne are described as coming from a very limited area within the Emscher valley. Heinrich pointed to the fact that the Bottrop lithics occurred only when the sub aquatic dredger reached canal kilometre 13.65 (Heinrich, 1987: 131), while Kahrs also described the limited space covered by artefacts found at Herne (Kahrs, 1925, 1928; Schmitz, 1990b: Fig. 86).

Furthermore, the lithic specimens from both sites are described overall as fresh and unrolled in appearance (except for a few examples from Bottrop: Schmitz, 1990a: 109), an observation which also applies to the Wadersloh assemblages (see above), and which can be seen as evidence for only minor movement of the lithics of each assemblage within the Knochenkiese. At all three localities it can also be argued that the lithics were found towards the base of the Knochenkiese. Putting these arguments together it seems to me that all the assemblages derive from intact sites still in situ which had been established on drier spots within the braided river valley or along its slightly higher shoreline. Some time later all these sites were covered by the accumulation of the Knochenkiese sedimentation but were at most only slightly moved during this process.

The Hamm-Uentrop taphonomic situation seems to be completely different. The lithic artefact was found here within the Knochenkiese deposit and its edges are visibly battered. Together this suggests movement of the blade fragment by the former Lippe River over some distance during the Knochenkiese accumulation process.

Taking all this evidence together, one may cautiously suggest that the Knochenkiese were accumulated ‘shortly’ after the bifacial lithic sites of Herne, Bottrop and Wadersloh were abandoned. Intense erosion by the Emscher and Lippe rivers reworked older materials.
and displaced them into secondary positions, as seen in the case of the Hamm-Uentrop laminar lithic artefact. Taking into account the proposed climato-stratigraphical dating of the assemblages described above, the accumulation of the Knochenkiese deposit occurred during later OIS 4 and/or early OIS 3 at around 70 to 60 ka BP (Fig. 14).

Above the Knochenkiese are found the Schneckensande, which are themselves covered by various types of sediments, sometimes described as periglacial valley loess (Periglaziale...
Lössaue). Not far from the Palaeolithic site of Bottrop, north of the Rhine-Herne Canal near Bottrop-Welheim, a loamy horizon (bearing very rare Upper Pleistocene animal tracks: von Koenigswald (ed.), 1995) within these Perglaziale Lössaue was dated by TL to some 40 ka (Frechen, 1995). Geological investigations during the late 1990s at Warendorf-Neuwarendorf revealed a silt package with peat above the Knochenkiese (e.g. the find horizon) dated by radiocarbon to a minimum age of 33,740±1,360/-1,180 BP (Hv-23180; Rüschoff-Thale, 2004: 7) and giving a corrected minimum age of 36,609±1,807 calBC (www.calpal.de). Bearing in mind the problem of radiocarbon ages with uneven standard deviations, the dated silt package may nevertheless belong to the Upper Interpleniglacial close to Greenland Interstadial 8 (Les Cottes / Denekamp: cf Jöris & Moreau, 2010: 11). At both localities, the dates at least allow the interpretation that accumulation of the Weichselian Knochenkiese-Schneckensande complex was terminated by around 50 ka BP (Fig. 14).

Part of the rich animal collections found within the Knochenkiesemay represent reworked material, as described above. However, the material is composed predominantly of species of the well known mammoth steppe fauna, such as the woolly mammoth itself and others including woolly rhinoceros, horse, reindeer, bison, giant deer, musk ox and a variety of carnivores (von Koenigswald & Walders, 1995). Although larger pebbles (mostly older erratics) are found within the Knochenkiese(as at Hamm-Uentrop), the small grain size of these gravels makes it highly doubtful that all the animal remains merely represent fluvially dispersed animal carcasses. The composition of animal remains here may also be partly attributed to situations such as animal carcasses only slightly modified by carnivores and / or fluvial energy (von Koenigswald & Litt, 2006: 79; Lanser, 2006: 87). However, any kind of human impact can only rarely be demonstrated (as at Bottrop and Lippsstadt-Lipperode: Schmitz, 1990a, 1995; Schlösser, 1998) and is, unsurprisingly, entirely missing at Hamm-Uentrop.

As demonstrated for Bottrop and Warendorf-Neuwarendorf not all animal remains recovered from locations within the Knochenkiese are of Weichselian age (von Koenigswald & Walders, 1995). Within the collections animal species such as aurochs and roe deer may originally come from Eemian deposits subsequently incorporated into the Knochenkiese. Still older remains of Saalian age, such as Mammutthus trogontherii and saiga antelope, may at least in part come from earlier gravels subsequently covered by, and dredged out together with the Knochenkiese deposit, without any chance of distinguishing the two.

Final remarks
To sum up briefly, the Knochenkiese of southern Westphalia and the Ruhr region represent a distinct Upper Pleistocene fluvial deposit and a complex archaeological and palaeontological find horizon, which at least today permits a somewhat more detailed interpretation of its genesis and dating. It remains open whether further construction work in the Lippe and Emscher valleys will enable us to investigate new Knochenkiese-Schneckensande sections employing new scientific techniques, and possibly leading to the recognition of new Neanderthal sites such as the recently discovered site of Hamm-Uentrop.

Acknowledgments
I have to thank Marcel Niekus very much for inviting me to participate in this Festschrift dedicated to Dick Stapert. It is a pleasure for me to do so, having met Dick some time ago and learned that he is a very dedicated Palaeolithic researcher – and a nice guy too. Every Christmas since her birth I receive a pretty picture of Dick’s and Lykke’s little girl Hedda, just to prove to me how well she is evolving, and I always look forward to this! So, at least, thanks for that too and good luck, Dick! For correcting the text I have to thank very much an – however, well known – anonymous colleague; all shortcomings are of course my faults. I would like to thank Manfred Dölling (Krefeld) for some discussions and his hint on the 1997 J. Herget publication and Bernhard Stapel (Munster) for permission to publish Figure 2. For discussions and information I want to thank Josef Gora (Warendorf), Manfred Schlösser and Bernhard Stapel (both Munster) and Martin Walders (Bottrop).
Notes
1. LWL-Archäologie für Westfalen, Außenstelle Olpe, In der Wüste 4, D-57462 Olpe, Germany. Email: Michael.Baales@lwl.org.
2. Some aspects of this article were presented during the annual meeting of the Hugo Obermaier-Gesellschaft at Leipzig in 2010. Historically the eastern portion of the Ruhr Region (Ruhrgebiet) is part of Westphalia, while the western region forms part of the Rhineland; however I mention both regional entities together here.
3. A further Westphalian lithic assemblage containing some 10% blades was collected together with typical mammoth steppe faunal elements after sub aquatic sand dredging of Pleistocene sediments of the Berkel stream or its tributaries near Coesfeld-Stevede (Coesfeld district). Two burnt flints were TL-dated to 119,7±8,6 ka BP and 123,7±11,5 ka BP respectively (Stapel, 2006b).

References


