ERICK ROBINSON · LIEN LOMBAERT · JORIS SERGANT · PHILIPPE CROMBÉ

ARMATURES AND THE QUESTION OF FORAGER-FARMER CONTACT ALONG THE NORTH-WESTERN FRINGE OF THE LBK

THE SITE OF VERREBROEK-»AVEN ACKERS« (EAST FLANDERS, BELGIUM)

A central question of research into the prehistoric transition to agriculture in Europe has been the role of indigenous Mesolithic foraging societies in the spread of the Early Neolithic Linearbandkeramik culture (LBK) across temperate Europe (Quitta 1960; Ammerman / Cavalli-Sforza 1971; Ammerman / Cavalli-Sforza 1973; Zvelebil 1986; Lüning / Kloos / Albert 1989; Tillmann 1993; Price / Gebauer / Keeley 1995; Whittle 1996; Gronenborn 1999; Zvelebil 2004). Throughout much of this region taphonomic processes have limited the available evidence for investigating the possible role of forager-farmer contact to lithic and ceramic technologies. Lithic armatures have been cited as evidence for the role of indigenous Mesolithic traditions in the formation and spread of the LBK (Newell 1970; Rozoy 1971; Huyge / Vermeersch 1982; Belland / Blouet / Leesch 1985; Gronenborn 1990; Ducrocq 1991; Thévenin 1992; Löhr 1994; Jeunesse 2002; Gehlen 2006; Heinen 2006; Allard 2007). Emphasis on armatures has ranged from focus on specific armature types (e.g. *armatures évoluées*, »Danubian armatures«) to individual attributes on armatures (e.g. *retouche inverse plate*, lateralization). Interpretations of these armature types and attributes are based on their presence in the Late Mesolithic long before the appearance of LBK farming populations west of the Rhine river valley.

For decades northern France and Belgium have been the proposed source regions for the so-called transitional or evolved armature types and attributes which were later adopted by the LBK during the acculturation of indigenous Mesolithic foragers (Rozoy 1971; Huyge / Vermeersch 1982; Belland / Blouet / Leesch 1985; Gronenborn 1990; Ducrocq 1991; Thévenin 1992; Jeunesse 2002). A central problem for research in this region has been the almost complete absence of reliable radiocarbon dates for firmly establishing the presence of these armature types and attributes before the appearance of the LBK in the region. Recent excavations at the sealed wetland site of Verrebroek-»Aven Ackers« (prov. Oost-Vlanderen/B) (fig. 1) have provided for the first time a secure date for a Late Mesolithic armature industry predating the appearance of the LBK in the region by just a few centuries (Sergant / Wuyts 2006; Sergant et al. 2007; Crombé

Fig. 1 Sites mentioned in text: **1** Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B). – **2** Weelde-»Paardsdrank« (prov. Antwerpen/B). – **3** Liège-»Place Saint-Lambert« (prov. Liège/B). – **4** Modave-»Trou Al'Wesse« (prov. Liège/B). – **5** Godinne (prov. Namur/B). – **6** Remouchamps (prov. Liège/B). – **7** Castel (dép. Somme/F). – **A** Hesbaye LBK. – **B** Hainaut LBK within the context of the Rhine-Meuse-Scheldt culture area (dotted line).

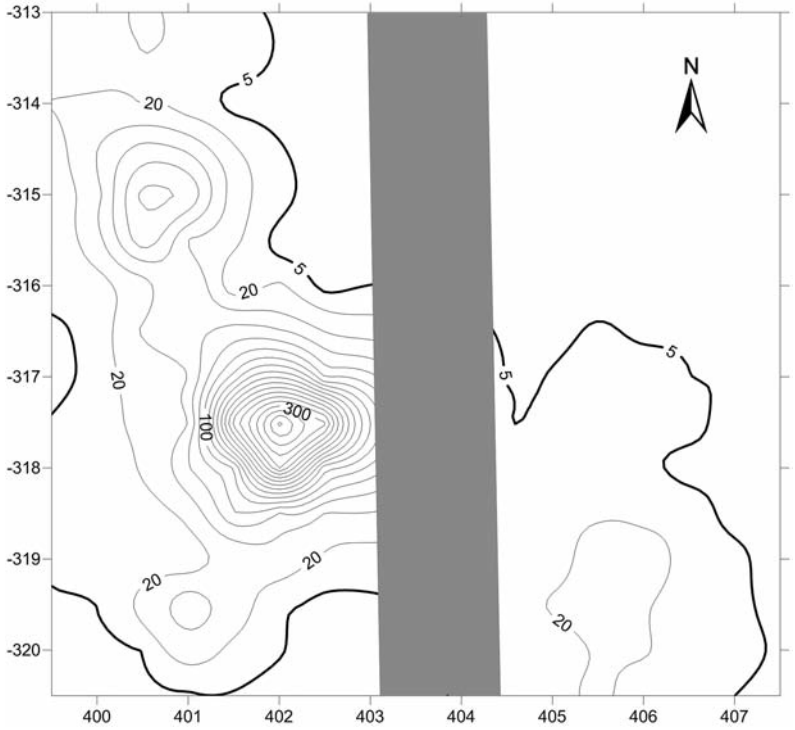

Fig. 2 Verrebroek- »Aven Ackers« (prov. Oost-Vlaanderen/B). Total assemblage (grey: medieval ditch). – (Illustration Vakgroep Archeologie, Universiteit Gent).

et al. 2009). The date and the associated armature industry yield important information on the question concerning the role of armatures as evidence for contact and cultural transmission between later Mesolithic and LBK societies.

In this paper we present the site of Verrebroek-»Aven Ackers« in the context of a larger project recently carried out comparing Late-Final Mesolithic and LBK armature industries in the region between the Paris Basin and the Rhine-Meuse delta (Robinson 2008; 2009; 2010). Results from the latter project and from the analysis of Verrebroek-»Aven Ackers« suggest a revision of interpretations of the role of armatures as evidence for contact and cultural transmission between later Mesolithic foragers and LBK farmers.

VERREBROEK-»AVEN ACKERS«

The site of Verrebroek-»Aven Ackers« is located in the sealed cover sand field of the »Scheldepolders« in north-western Belgium, close to the Antwerp harbor area. Salvage excavations were conducted in 2006 (Sergant / Wuyts 2006) and 2007 (Sergant et al. 2007) by Universiteit Gent in collaboration with Archeologische Dienst Waasland on three small cover sand dunes sealed by peat and alluvial clay. Three trenches were excavated revealing traces of Mesolithic (all phases) and Neolithic occupation. This paper will focus on a small Late Mesolithic lithic concentration found in the south-western part of a trench excavated in 2007.

Horizontal and vertical distribution

The Late Mesolithic assemblage was located in a well-preserved podzol soil and had a maximum vertical distribution of 60 cm. The majority of the artefacts (92%) were situated in the upper 20 cm of the soil, corresponding to the E-horizon. The cluster has not been totally excavated because the western part was

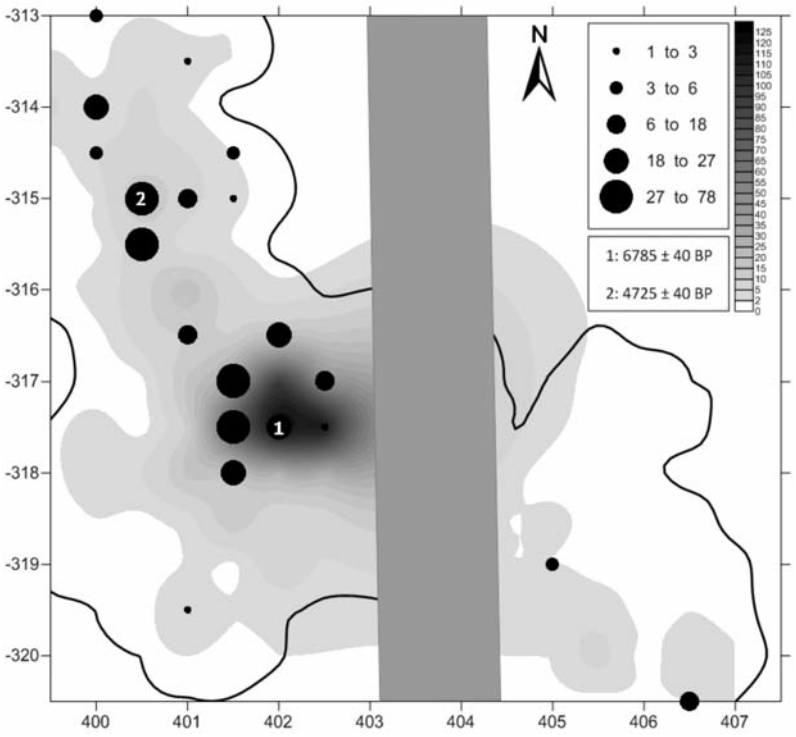

Fig. 3 Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B). Heavily burned artefacts (grey) and charred hazelnut shells (black, in µg). – **1-2** dating samples. – (Illustration Vakgroep Archeologie, Universiteit Gent).

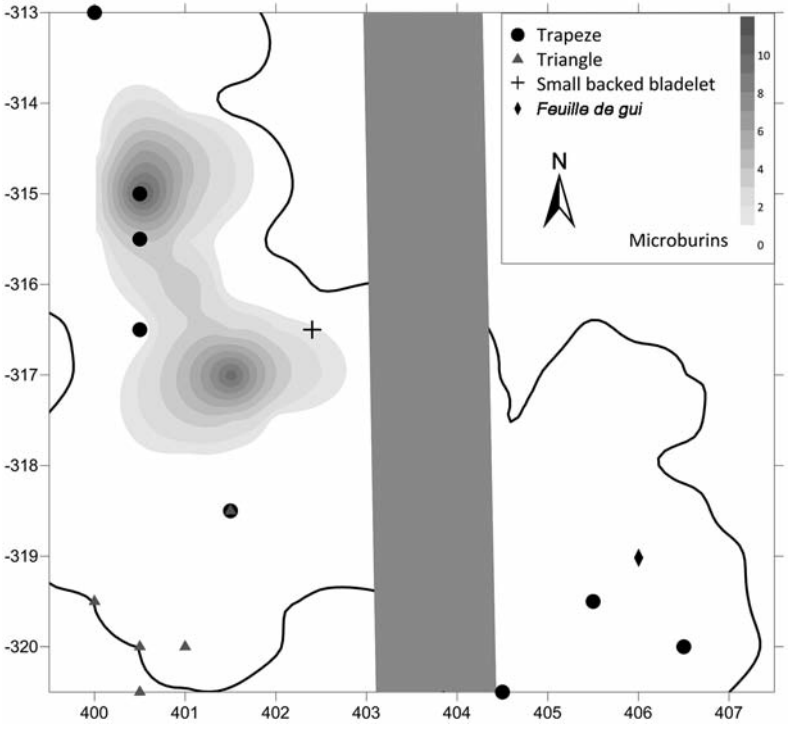

Fig. 4 Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B). Microburins and microliths. – (Illustration Vakgroep Archeologie, Universiteit Gent).

situated beyond the trench. Furthermore, it was partially destroyed by a medieval ditch and several wind throw features. Nevertheless, we can assume that the main part of the assemblage was retrieved. The cluster was excavated in 50×50 cm squares and in layers of 10 cm and was subsequently wet sieved on a 2-mm mesh.

The limits of the concentration have been defined on the basis of minimum five artefacts per 0.25 m^2. This results in a surface of approximately 32.25 m^2 (fig. 2) showing two clear peaks or subclusters: a dense one

(1081 artefacts/m^2) more or less in the centre of the concentration and a second much less dense one north-west of the first (the mean find density is 137.9 artefacts/m^2). In the latter a high frequency of overheated, heavily burned artefacts as well as a limited amount of charred hazelnut shells (3.41 g) were found, possibly indicating a former hearth (Sergant / Crombé / Perdaen 2006) (**fig. 3**). Spatially linked to this surface-hearth two dense clusters of microburins occur (**fig. 4**). However, the microliths, mainly consisting of trapezes, are scattered across the area, except for four triangles that cluster in the southern periphery. The fact that these triangles are made in a flint type which does not occur elsewhere within the concentration most likely testifies of an earlier (hunting?) activity at this spot. Similarly, some badly preserved grog and plant-tempered pottery sherds, recovered from the contact between the overlying peat and the cover sand deposits in the periphery of the cluster, clearly indicate activities in later times, as confirmed by a radiocarbon date (cf. below).

Raw materials

The raw material consists mainly of flint, in particular of different types of high quality medium fine-grained flint. These types of flint are clearly imported on the site and originate from outcrops in the Hainaut region in the loamy southern part of Belgium and the Picardie region in northern France, situated respectively c. 80-200 km from the site of Verrebroek. Some artefacts are made of gray fine-lined Ghlin-flint (determination by P. Allard). Others resemble the matt dark greyish to brown flint with white granules, possibly originating from the region of Spiennes (prov. Hainaut/B) and a very fine-grained dark gray to black flint that resembles Obourg-flint. Another frequently used raw material is a matt dark gray white speckled flint.
The presence of cortex on artefacts is one aspect in determining in which form this flint was imported on the site. On 28.4% of the artefacts >1 cm, cortex is present on the dorsal side. This high percentage of cortex together with the presence of five cores and ten rejuvenation artefacts, suggests that the raw material was imported most likely as partially prepared cores. Furthermore, in some of the preparation artefacts the Ghlin-flint is recognized.
Besides flint, three blade fragments are made of Wommersom quartzite, of which the outcrop is situated in the loess area approximately 80 km to the south-east. The limited number of artefacts indicates that this exotic raw material, contrary to those in flint, was not knapped on the site.

typology	4 501	%
chips	3 049	67.74
tools	45	1.00
artefacts with use traces	15	0.33
flakes	742	16.49
blade(let)s	427	9.49
cores	5	0.11
rejuvenation	10	0.22
microburins	78	1.73
accidents de taille	4	0.09
debris	100	2.22
chips with retouches	26	0.58

Tab. 1 General typological inventory from Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B).

Unretouched artefacts (knapping waste)

The knapping waste includes 67.7% chips, 16.5% flakes, 9.5% blade(let)s, and 2.2% debris (**tab. 1**). The relative high percentage of blade(let)s reveals the importance of blade production at this site. The technology aimed at the production of small regular blade(let)s, or Montbani style blades (Rozoy 1968a, 370), by means of indirect percussion. The mean length of the complete (micro)blades (n = 126) is 2.22 cm, the mean width is 0.82 cm and the mean thickness is 0.26 cm. Only a few exceed a 5 cm length and can be classified as blades (**fig. 5**).
Five cores were recovered from the site: two cores with one striking platform, one with opposite striking platforms, one with three striking platforms, and a core fragment. They all have rather

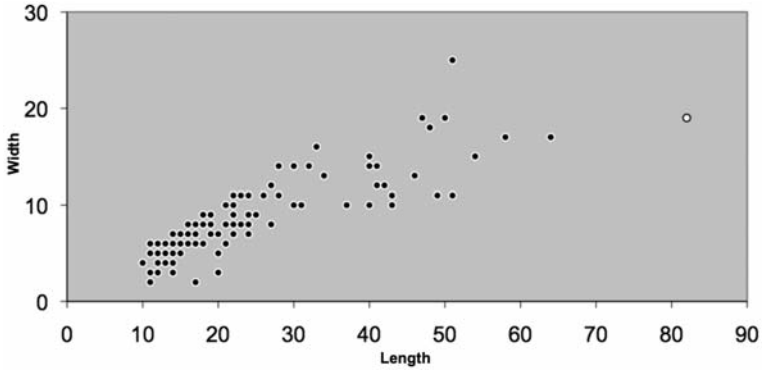

Fig. 5 Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B). Dimensions (in mm) of complete unretouched blade(let)s (grey) and of a complete Montbani blade (white). – (Illustration Vakgroep Archeologie, Universiteit Gent).

small dimensions and are fully exhausted. The rejuvenation artefacts consist of two core tabular flakes, two crested blades, and six core side flakes. The core tablets are large compared to the cores.

The amount of knapping waste typical for the production of microliths is high on this site. One particular problem during the analysis was that the microburins were easily confused with other waste material showing some similarities. Following the definition by Jean-Georges Rozoy (1968a, 382-390) a total of 77 microburins were determined, all showing a clear notch and an oblique ventral fracture beginning in the notch. One Krukowksi microburin was determined, characterized by a retouch on the same side as the fracture. Four artefacts had a ventral fracture, but instead of a clear notch the retouched edge was straight. They were defined as *accidents de taille*. A last category are chips with retouch (n = 26); they also have retouches on the dorsal side, but are not snapped.

Within the category of the microburins, distal microburins are represented the most (50.6%), followed by proximal microburins (29.9%), undetermined microburins (13.0%) and microburins opposite a fracture (6.5%). When orientated with notch and fracture upwards, 76 out of 77 microburins have a left lateralization. Left lateralized proximal and left lateralized distal microburins create right lateralized trapezes, which is in full agreement with the lateralization of the trapezes (cf. below).

A last category are the artefacts displaying very small discontinuous retouches that might correspond to use-wear traces (n = 15).

Retouched artefacts (toolkit)

The complete absence of common tools – except for one *burin dièdre* and twelve retouched blade(let)s and flakes – is notable and possibly indicates a specialized toolkit (tab. 2). Furthermore, the toolkit is dominated by a limited spectrum of microliths, i.e. trapezes, triangles, one *feuille de gui*, and a fragment of a small backed bladelet (fig. 6).

The retouched blade(let)s represent 26.7% of the toolkit and are dominated by notched types (three broken above notch, two broken in notch, one with one notch), followed by simply retouched bladelets, one bladelet with distal retouch, one bladelet with oblique, and one with transverse truncation. The retouched flakes (4.4%) are represented by one flake with oblique truncation and one simply retouched flake. Two regular blades were identified, showing a typical irregular retouch, known as a Montbani retouch (Rozoy 1968b, 360-361).

The microliths represent almost half of the toolkit with 48.9% and are dominated by trapezes. Eight trapezes and three trapeze fragments were found at the site (24.4% of the toolkit). The typical dark gray white speckled flint was used for six of the trapezes and the gray fine-lined flint was used for two. Another fragment was made of a brown coarse-grained flint and two trapezes were too burned to identify. Typo-

tools		45	%
retouched flakes		2	4.4
	flakes with oblique truncation	1	
	simply retouched flakes	1	
retouched blade(let)s		12	26.7
	bladelets broken above notch	3	
	bladelets broken in notch	2	
	bladelets with one notch	1	
	bladelets with distal retouch	1	
	bladelets with oblique truncation	1	
	bladelets with transverse truncation	1	
	simply retouched bladelets	3	
burins		1	2.2
	burin dièdre	1	
triangles		5	11.1
	isosceles triangles	4	
	triangle fragments	1	
trapezes		11	24.4
	asymmetrie trapezes	1	
	rectangular trapezes	2	
	rhombic trapezes	5	
	trapeze fragments	3	
microliths with flat retouch		1	2.2
	feuille de gui	1	
backed bladelets		1	2.2
	small backed bladelets	1	
microlith fragments		4	8.9
tool fragments		6	13.3
Montbani blades		2	4.4

Tab. 2 Tool typology from Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B).

logically, the trapezes consist of five rhombic trapezes, two rectangular and one asymmetric; all right lateralized. In terms of dimensions, only complete lengths of undamaged trapezes were included. The mean length of the trapezes is 1.800 cm (three out of eigth, standard deviation = 0.1000), the mean width is 1.125 cm (eigth out of eigth, standard deviation = 0.1488) and the mean thickness is 0.238 cm (eigth out of eigth, standard deviation = 0.0518). Technologically, the small and large truncations of all trapezes were fully retouched; there was no evidence for a *piquant trièdre*. None of the trapezes show a flat ventral retouch on the small truncation.

Another category of microliths is represented by triangles. Typologically, the triangles consist of four, but probably five (one fragment) isosceles triangles. Their position (southern periphery of the concentration) and different raw material (beige fine-grained flint) suggest they are residual artefacts of a probably older event. The same situation is plausible for the presence of the *feuille de gui* (gray coarse-grained flint). Perhaps, its presence is connected with one of the adjacent lithic clusters belonging to the Middle Mesolithic (Crombé et al. 2009).

Finally, four retouched artefacts could only be determined as microlith fragments, while six other were classified as undetermined tool fragments.

Radiocarbon dating

Two samples (**tab. 3**) consisting of single fragments of carbonised hazelnut shells were submitted for ^{14}C dating to the Radiocarbon dating laboratory in Brussels (Crombé et al. 2009). The first sample originates

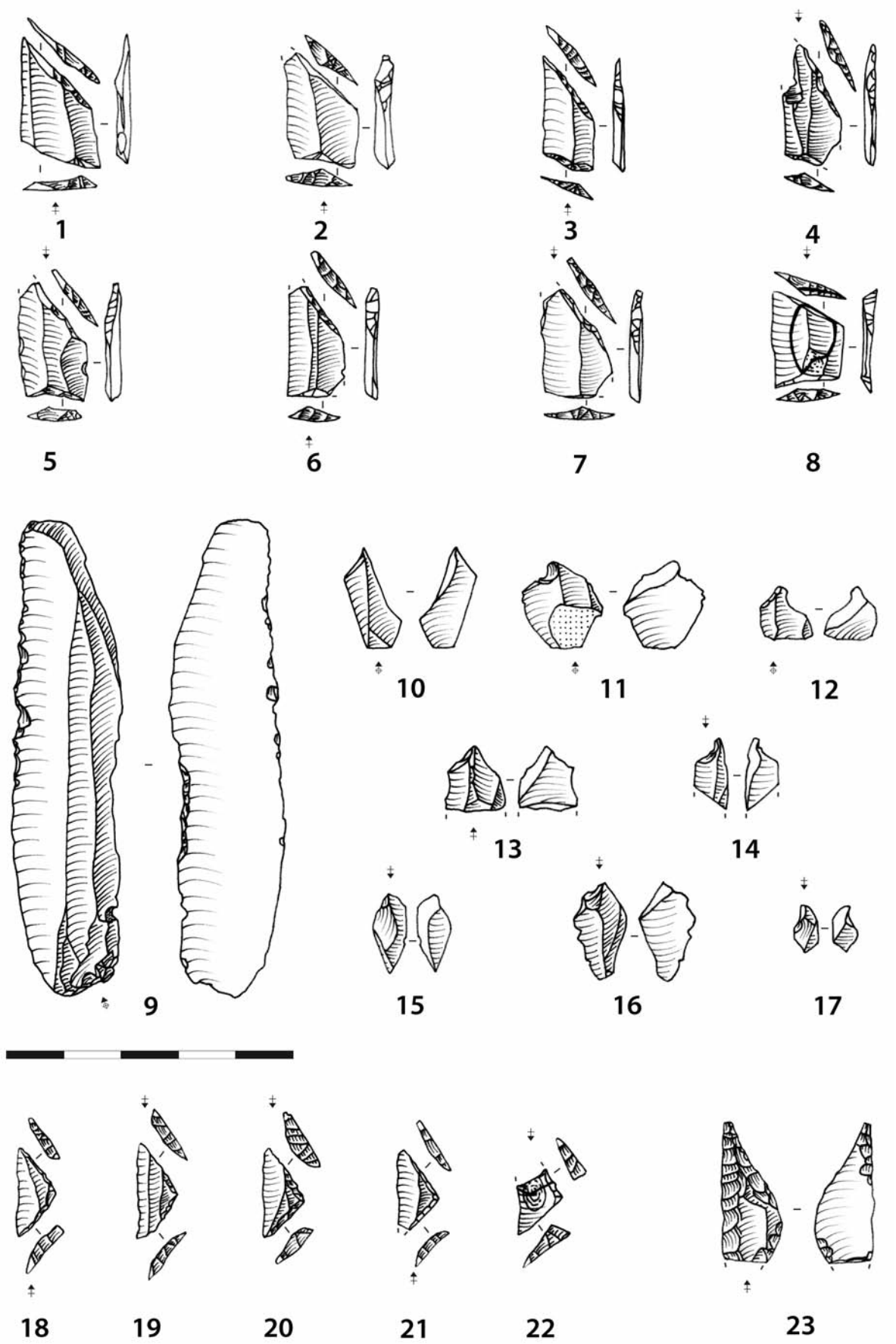

Fig. 6 Examples of tools and debitage from Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B): **1-8** trapezes. – **9** Montbani retouched blade. – **10-17** microburins. – **18-22** triangles. – **23** *feuille de gui*. – (Drawings Vakgroep Archeologie, Universiteit Gent).

sampling area	sample code	BP date	cal BC date (68.2%)	cal BC date (95.4%)
402 317 (3A)	KIA-37 694	6785 ± 40 BP	5715 BC (63.6%) 5655 BC 5650 BC (4.6%) 5645 BC	5740 BC (95.4%) 5620 BC
400 315 (1A)	KIA-37 695	4725 ± 40 BP	3630 BC (26.5%) 3580 BC 3540 BC (16.1%) 3500 BC 3430 BC (25.6%) 3380 BC	3640 BC (58.6%) 3490 BC 3470 BC (36.8%) 3370 BC

Tab. 3 Radiocarbon dates from Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B).

from the presumed surface-hearth situated in the centre of the lithic concentration. The obtained date of 6785 ± 40 BP situates the occupation within the second quarter of the 6th millennium cal BC and is fully in agreement with the supposed Late Mesolithic age based on the tool-typology. The second sample was retrieved from the north-western sector of the lithic concentration at the spot which yielded a few grog and plant-tempered pottery fragments. The younger age of this pottery is confirmed by the dating of this sample, which goes back to the middle and second half of the 4th millennium cal BC (4725 ± 40 BP).

Discussion

The small lithic assemblage excavated at Verrebroek-»Aven Ackers« displays all characteristics typical of the Late Mesolithic as known from the Rhine-Meuse-Scheldt culture area (Gob 1984; Vermeersch 1984; Crombé / Cauwe 2001; Verhart / Arts 2005). The main characteristics are the presence of trapezes and a regular blade(let) debitage of Montbani style, some of which display a typical irregular (Montbani) retouch. Despite the presence of a few »anachronic« finds, such as four to five small triangles and potsherds all excavated at the periphery of the cluster, the studied assemblage looks very homogeneous in all aspects (typology, technology, and raw materials). Judging by the specific tool composition and the rather low find-density, this small concentration probably results from a short-term ephemeral occupation focusing on a small range of activities. The predominance of microliths and the nearly total absence of common tools – such as scrapers, borers, and burins – hint at hunting related activities like the preparing of hunting equipment. Other activities might also be represented among the retouched artefacts as well as some unretouched artefacts. Indeed, microwear analyses on Early and Final Mesolithic (Swifterbant culture) lithics from nearby sites, such as Verrebroek-»Dok 1« and Doel-»Deurganckdok-sector B« (prov. Oost-Vlaanderen/B; Beugnier / Crombé 2005; Beugnier 2007), have proven that these implements were often used for plant processing activities, mainly splitting and scraping of siliceous plants, for making objects.

The relative dating based on techno-typological attributes is further strengthened by one of the radiocarbon dates, which situates the assemblage in the second quarter of the 6th millennium cal BC. Next to a date from Weelde-»Paardsdrank 5« (prov. Antwerpen/B) in the Campine area (Huyge / Vermeersch 1982), this is one of the first reliable radiocarbon dates for the Late Mesolithic in the sandy lowlands of Belgium (**tab. 4**). Although numerous ^{14}C dates are available (cf. Gob 1990; Crombé 1999; Crombé / Perdaen / Sergant 2005) nearly all have been from samples of charcoal which are generally unreliable or doubtful. A lot of dates have been performed on charcoal found dispersed in the soil without a clear spatial connection with the lithic artefacts. Others have been yielded from charcoal samples retrieved from features, such as charcoal patches and pits, of which the anthropogenic origin is unclear or questionable. Therefore, it is

site	stratigraphie	lab. no.	BP	standard deviation	method	dating material
Godinne-»Abri de Chauveau«	layer MG-MR	LV-1615	7350	75	conven.	human bones
Remouchamps-»Station Leduc«	top 15 cm of late glacial alluvial deposits	LV-1401	6990	90	conven.	scattered hazelnut shells
Weelde-»Paardsdrank 5«	Bir & BC-horizon of podzol	LV-959	6990	135	conven.	hazelnut shells from two distinct clusters
Modave-»Trou Al'Wesse«	layer 4b-δ	LV-1751	6650	70	conven.	undetermined bones
		Beta-251056	6890	40	ams	auroch bone with butchery traces
		Beta-251057	6910	40	ams	burnt bones
Liege-»Place St-Lambert secteur SDT«	unité 3.3	OxA-8996	7970	80	ams	phalanx of horse
		OxA-8995	6485	80	ams	pelvis of bovid
		OxA-10509	6405	50	ams	undetermined bones
		OxA-8942	6360	55	ams	metacarpal of horse
		OxA-8941	6220	45	ams	calvarium of red deer
Liege-»Place St-Lambert secteur DDD«	unité VIIB	OxA-8943	7745	60	ams	calcaneus or red deer
		OxA-4781	7850	75	ams	metatarsal of red deer

Tab. 4 Radiocarbon dates from the Late Mesolithic of Belgium.

believed that lots of charcoal dates do not date human activities but are rather connected with natural events, such as forest fires. This probably also explains why numerous dates of Late Mesolithic assemblages gave aberrant results (for recent overview see Crombé / Perdaen / Sergant 2005); as a matter of fact a lot of Late Mesolithic assemblages are dated on charcoal to the 5th and 4th, even 3rd millennium cal BC, which is much too young with respect to the typological dating. To avoid or reduce these problems, dating carbonised nutshells seems to be a better strategy in dating Mesolithic sites in unstratified cover sand deposits (Crombé / Groenendijk / Van Strydonck 1999; Crombé et al. 2009). Especially when found in connection with structured or non-structured surface-hearths (Sergant / Crombé / Perdaen 2006), as is the case at Verrebroek, these food residues may yield much more reliable dates compared to charcoal.

Further dating evidence on the Late Mesolithic in Belgium is available from the Meuse valley (**tab. 4; fig. 7**). Several sites yielding trapeze industries have provided radiocarbon dates, most of them performed on animal bones found in spatial relation with lithic assemblages. Although most dated contexts are affected by taphonomic problems – such as erosion, admixture of several occupation phases (Liège, Modave), and/or bioturbation – the dates can be used to a certain degree to achieve a general picture of the Late Mesolithic chronology in Belgium. The oldest dates so far come from two sectors at Liège-»Place Saint-Lambert« (prov. Liège/B), e.g. sector DDD and sector SDT (**tab. 4**). Three AMS dates go back as early as the first half of the 7th millennium cal BC and are associated with lithic assemblages dominated by microliths with flat retouch (mistletoe points, triangles, etc.) and a few backed bladelets; only a few trapezes are present (van der Sloot et al. 2003). In sector DDD the trapezes are typologically older, while in sector SDT the antecedent »evolved trapezes« (*flèches de Belloy*, LBK-like points) are present. In the latter case the trapezes most likely belong to a younger occupation phase, which is confirmed by four other dates going back to the second half of the 6th millennium cal BC. Still, even for sector DDD a mixture of different occupation events is not totally excluded, as also some sherds of LBK and Limburg pottery have been found in the same stratigraphic position as the lithics. Hence, the early appearance of trapezes in Belgium is still controversial and needs further radiocarbon support.

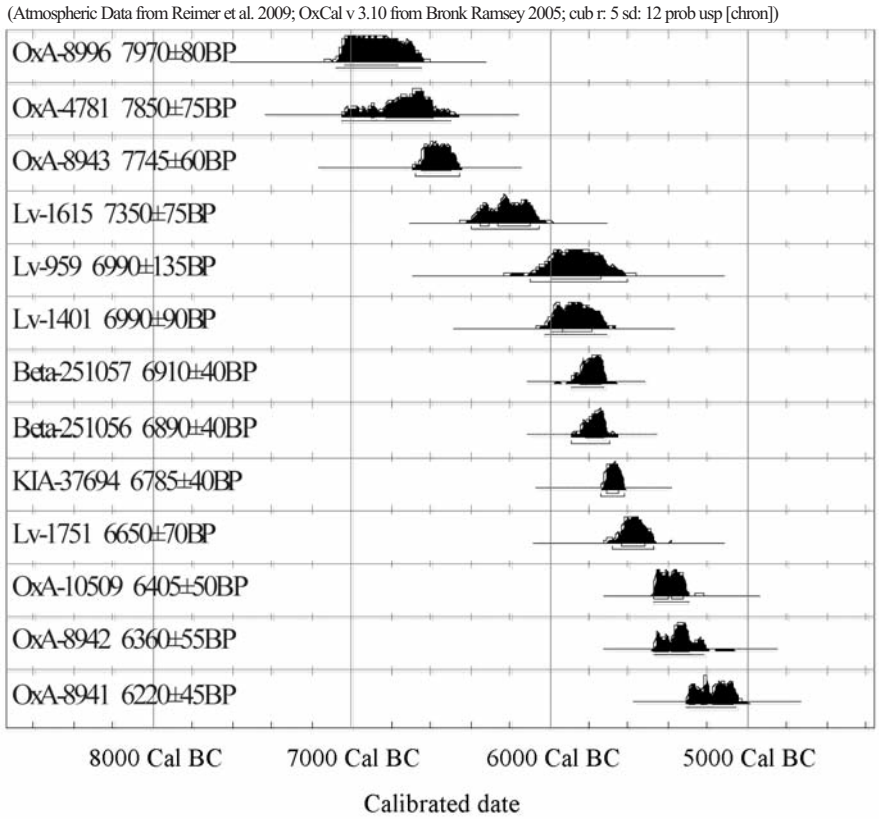

Fig. 7 Calibrated radiocarbon dates for the Late Mesolithic of Belgium (for site names see tab. 3). – (Illustration Vakgroep Archeologie, Universiteit Gent).

The first assemblages in which trapezes are well represented and sometimes even dominate clearly do not occur before the end of the 7th or the beginning of the 6th millennium cal BC (**tab. 4; fig. 7**). Four sites – Godinne (prov. Namur/B; Toussaint / Becker 1988), Remouchamps (prov. Liège/B; Gob / Jacques 1985), Weelde and Modave (prov. Liège/B; Miller et al. 2005; Miller et al. 2009) – have yielded altogether five dates, among which only two AMS, clustering around c. 7000 BP. The »associated« lithic industries on at least three sites combine trapezes, mainly rectangular and rhombic ones, with substantial numbers of »older« microlith types, mainly backed bladelets, crescents, scalene triangles, points with (un)retouched base, etc. It is very questionable whether these assemblages are homogeneous since most of these »older« microlith types, especially the latter three, occur only in very limited numbers in older assemblages, e.g. at Liège and in Middle Mesolithic assemblages (Crombé 1998). In fact, they are characteristic of Early Mesolithic assemblages dated between c. 8700 and 7400 cal BC (Crombé 1999; Crombé 2002; Crombé et al. 2009). On the other hand the dominating microlith type in late 8th and early 7th millennium cal BC assemblages, i.e. microliths with flat retouch, is missing (Godinne) or found only incidentally (Remouchamps, Weelde) within these sites. The site of Verrebroek-»Aven Ackers«, which is only slightly younger than these four sites, also lacked these »older« microlith types. It has been argued on the basis of raw material and spatial distribution that the few small isosceles triangles found are most likely linked to an older occupation event. Of course, the specific composition of the microlith toolkit at Verrebroek could also be related to the »special« function of the site, i.e. as an ephemeral hunting site. Nonetheless, one of the most interesting aspects of the Aven Ackers assemblage is in the context of the debate about possible interaction and technological transmission between late hunter-gatherers and the earliest farmers of the LBK who settled in the loess belt of middle Belgium around 5300 cal BC.

VERREBROEK-»AVEN ACKERS« IN THE CONTEXT OF FORAGER-FARMER CONTACT MODELS

The finds from Aven Ackers are very important for the considerations of armatures as evidence of contact and cultural transmission between indigenous Mesolithic foraging populations and LBK farmers. The question of the role of armatures as evidence for contact and cultural transmission has been one of the central questions focused on by researchers attempting to investigate the role of indigenous foragers in the spread of the LBK west of the Rhine during the last centuries of the 5th millennium cal BC (e.g. Newell 1970; Rozoy 1971; Huyge / Vermeersch 1982; Belland / Blouet / Leesch 1985; Gronenborn 1990; Ducrocq 1991; Thévenin 1992; Löhr 1994; Jeunesse 2002; Gehlen 2006; Heinen 2006; Allard 2007). Most interpretations have centred on certain typological and technological similarities between Late/Final Mesolithic and LBK armatures in proposing the hypothesis that armatures indicate the transmission of later Mesolithic traditions in the LBK. Recent extensive research has been carried out that compared the armature industries of both excavated (such as Weelde, Brecht-»Moordenaarsven« [prov. Antwerpen/B], Opglabbeek-»Ruiterskuil 1« and -»Ruiterskuil 2« [prov. Limburg/B], Verrebroek-»Dok« and -»Aven Ackers«, etc.) and surface scatter assemblages from the Late Mesolithic of Hainaut, Sandy Flanders, and the Kempen Plateau with excavated LBK sites from the Hesbaye (Darion-»Colia« [prov. Liège/B], Fexhe-le-Haut-Clocher [prov. Liège/B], Oleye-»Al Zèpe« [prov. Liège/B], Overhespen [prov. Vlaams-Brabant/B], Remicourt-»En Bia Flo II« [prov. Liège/B], Wange [prov. Vlaams-Brabant/B], Waremme-»Longchamps« [prov. Liège/B]) and Hainaut (Aubechies-»Coron Maton«) regions (Robinson 2009; Robinson 2010). The aim of this research was to quantify and examine whether there were important similarities between Late Mesolithic and LBK armatures, as has been hypothesized traditionally, and thus investigate the possible role played by armatures as evidence for forager-LBK contact and cultural transmission during the neolithization of Belgium.

The first similarity that has been noted is on the typological level, and is based on the similarity between Late/Final Mesolithic armature types that have been labelled »evolved« or »derived« armatures (e.g. asymmetric triangles, *flèches de Dreuil*, *triangles de Fère*) and the asymmetric triangles (»Danubian armatures«) that have been recorded from the northwesternmost LBK sites in northern France and the Benelux countries. The most widely noted hypothesis (e.g. Ducrocq 1991; Fagnart 1991; Rozoy 1991; Thévenin 1992; Ducrocq 2001) is that during the final phases of the Mesolithic trapezes were transformed into triangles by the removal of the small edge (or *petite base*: G.E.E.M. 1969), and through this process asymmetric trapezes developed into asymmetric triangles (or *flèches de Belloy*), rectangular trapezes developed into *triangles de Fère*, and rhombic trapezes developed into *flèches de Dreuil* (fig. 8). Christian Jeunesse (2002) has argued that these »evolved« armatures indicate that by the time of the appearance of the LBK in the region indigenous Mesolithic foragers were already on their way to being »neolithisized« and that these armature types were transmitted from the Mesolithic to the LBK through acculturation processes.

One of the problems in testing and validating the hypothesis of the typological relationships between Late/Final Mesolithic and LBK armatures has been the lack of secure radiocarbon dates that precede the LBK settlements of northern France and the Benelux countries. Without a large number of securely dated sites it is difficult to have a clear understanding of the actual evolution from trapezes to the »derived« or »evolved« triangles. The most widely recognized site for this transition to »evolved« armature types is Castel in the Somme basin (dép. Somme/F), which has produced a date of 6090 ± 95 BP (5300-4750 cal BC) (Ducrocq 2009). This site, however, does not undoubtedly precede the LBK settlement of the neighbouring Aisne valley, and it is therefore still difficult to determine with certainty whether »evolved« armatures played a major role in Late/Final Mesolithic armature industries before the appearance of the LBK.

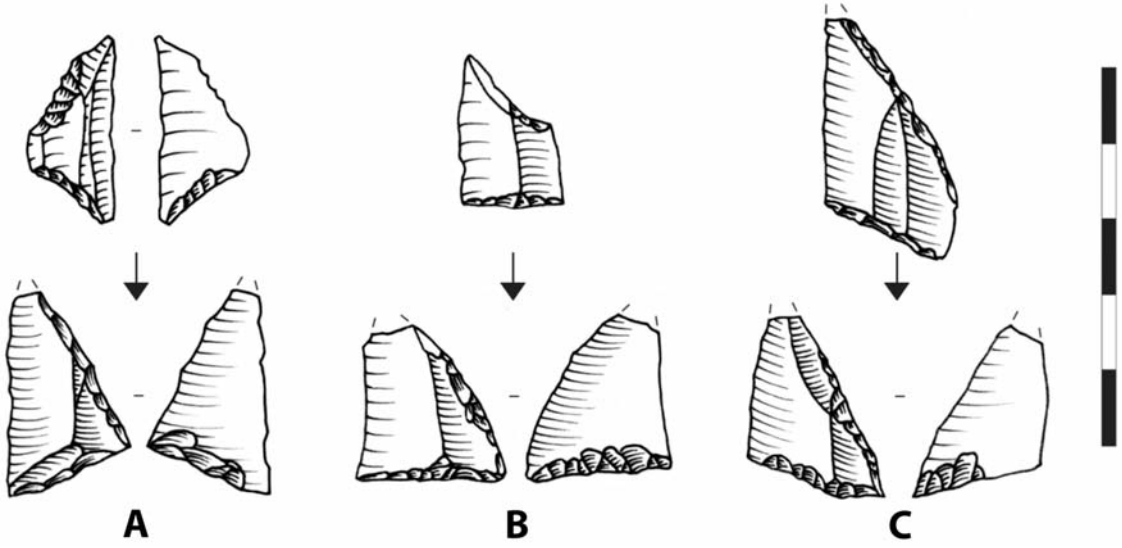

Fig. 8 Verrebroek-»Aven Ackers« (prov. Oost-Vlaanderen/B). Relationships between trapezes (top) and »evolved/derived« (bottom) armature types: **A** asymmetric trapeze/asymmetric triangle. – **B** rectangular trapeze/*triangle de Fère*. – **C** rhombic trapeze/*flèche de Dreuil*). – (Drawings Vakgroep Archeologie, Universiteit Gent).

Asymmetric triangles (»points of Danubian type«) were recorded at Weelde-»Paardsdrank 5« (Huyge / Vermeersch 1982), which does have a date that precedes the arrival of the LBK in the Hesbaye region; however, as mentioned above, there are doubts about the homogeneity of this assemblage due to the fact that the ^{14}C date was based on a bulk sample of hazelnut shells from two different samples in the lithic concentration that included a variety of earlier microlithic armature types. In consequence of the problems caused by different postdepositional processes on large sites such as Weelde, sites like Aven Ackers are an important contribution to the debate surrounding the dating of the introduction of »evolved« armatures due to its small size and likely single occupation phase. None of the three »evolved« armature types were recovered from Aven Ackers. The date from this site precedes the arrival of the LBK in the loess area of middle Belgium by nearly four centuries, and therefore suggests that the »evolved« armature types were not present in some, if not all, Late Mesolithic armature industries in this region before the appearance of the LBK.

One of the most significant results from the extensive analyses of Late Mesolithic and LBK armatures was for armature typology. There was much more difference than similarity when it came to the overall composition of Late Mesolithic and LBK armature assemblages, with the LBK having a much more restricted variety of armature types (Robinson 2008; 2009; 2010). A very surprising result was the limited role played by »evolved« armature types in the total Late Mesolithic assemblage, with them comprising less than 10% of the total assemblage of 731 armatures from Hainaut, Sandy Flanders, and the Kempen Plateau. Based on these analyses, the two most important types for considerations of armatures as evidence of forager-LBK contact and cultural transmission were asymmetric trapezes and asymmetric triangles. The greatest difference between Late Mesolithic and LBK armatures was for asymmetric triangles. While over half of the total LBK armature assemblage was made up of asymmetric triangles, they comprised fewer than 9% of the Late Mesolithic assemblage (**fig. 9**). The greatest similarity between the types recorded for the Late Mesolithic and LBK assemblages was for asymmetric trapezes (**fig. 9**). These similarities indicate that trapezes did play a fairly important role in LBK armature technologies, and that due to just over 75% of LBK armatures in the Hesbaye and Hainaut regions being asymmetric triangles or trapezes, it seems very likely that trapezes

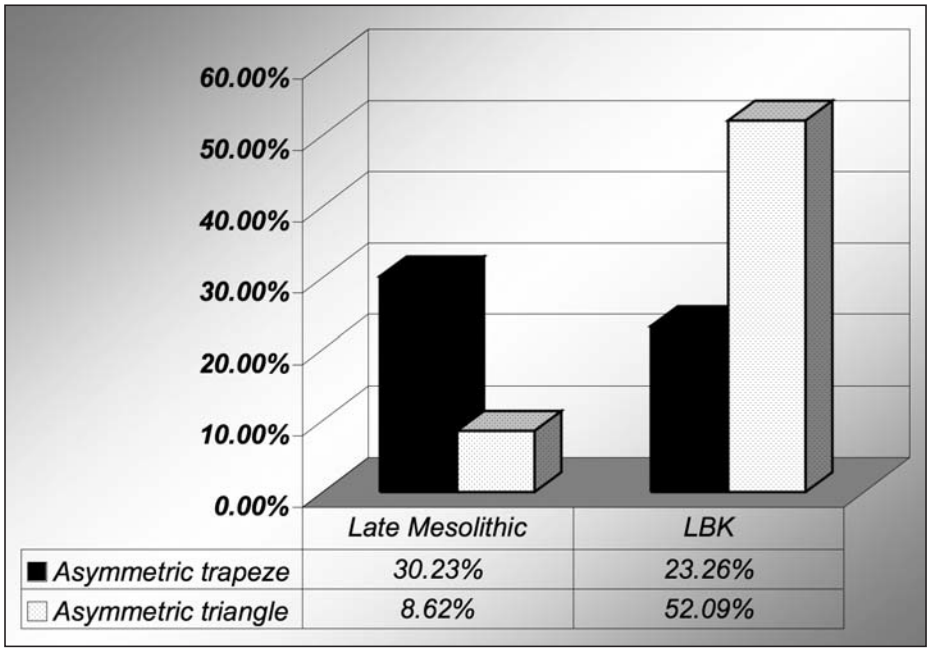

Fig. 9 Relative frequencies of asymmetric trapezes and asymmetric triangles in Late Mesolithic (n = 731) and LBK (n = 215) armature assemblages from the Scheldt and middle/lower Meuse river basins. – (Illustration Vakgroep Archeologie, Universiteit Gent).

might have been the initial form from which triangles were produced by the entire removal of the original small base (or *petite base*: G.E.E.M. 1969) through secondary retouch that caused the large and small truncations to meet and form a triangle. It has already been clearly proven that trapeze types were present in the LBK from its early phases (Gronenborn 1990; Gronenborn 1997), and the results from the extensive investigations in Belgium therefore confirm that during the latest phases of the LBK, along its north-western frontier, they continued to play an important role in LBK armature technologies.

The second similarity that has been widely recognized between Late Mesolithic and LBK armatures, and to which the site of Verrebroek-»Aven Ackers« makes a strong contribution, is the presence of flat ventral retouch on the small truncation (or *retouche inverse plate*). It has traditionally been hypothesized that this phenomenon was a development of hafting techniques during the final phases of the Mesolithic period (Rozoy 1991). In his evaluation of the possible geographical origins of this hafting technique J.-G. Rozoy (1991) focused on Belgium and the southern Netherlands, specifically what he labelled the »Limburgien« group. The presence of flat ventral retouch on armatures found on LBK sites has been interpreted by a large number of researchers as evidence of the continuation of Late Mesolithic traditions, and thus a major role played by indigenous foraging societies, in the LBK west of the Rhine river basin (Huyge / Vermeersch 1982; Belland / Blouet / Leesch 1985; Ducrocq 1991; Rozoy 1991; Thévenin 1992; Jeunesse 2002; Heinen 2006). As with the problems of »evolved« armatures, there have been a lack of sites with secure radiocarbon dates to confirm whether flat ventral retouch was in fact a major feature of Late Mesolithic armatures, and thus was something transmitted from Mesolithic to LBK. At Aven Ackers not a single armature had evidence for this hafting technique, and this site was dated to just a few centuries before the arrival of the LBK in the Hesbaye and Hainaut regions. This evidence suggests that possibly flat ventral retouch of the small truncation did not play much of a role, if one at all, in Late Mesolithic armature technology. The recent extensive study on Late Mesolithic and LBK armatures mentioned above has revealed major discrepancies between the presence of flat ventral retouch on armatures (Robinson 2009; Robinson 2010). This hafting technique is only present on 24.08% of Late Mesolithic armatures, whereas it is present on 52.56% of LBK armatures (**fig. 10**). Considering the evidence from Aven Ackers, and the much lower relative frequency of flat ventral

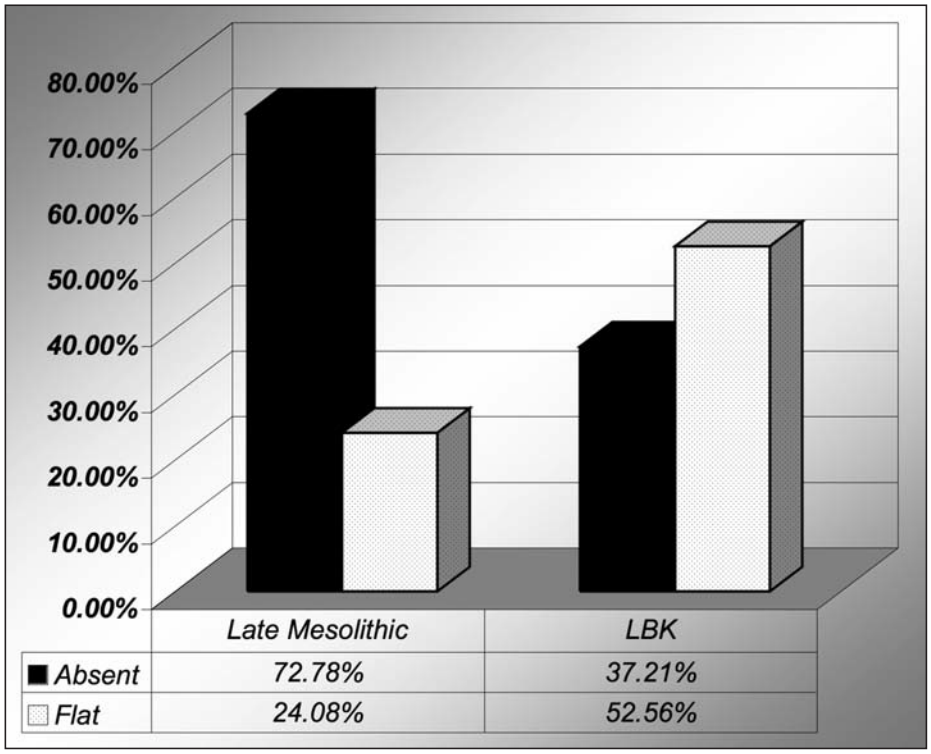

Fig. 10 Relative frequencies of flat ventral retouch of the small truncation in Late Mesolithic (n = 731) and LBK (n = 215) armature assemblages from the Scheldt and middle/lower Meuse river basins. – (Illustration Vakgroep Archeologie, Universiteit Gent).

retouch on Late Mesolithic armatures, researchers must not rule out the possibility that this was an LBK development of hafting technology that might have been transmitted to Late/Final Mesolithic groups through contact (Robinson 2010). Greater clarification on this hypothesis can be made in the future by further investigation of the extent of flat ventral retouch on armatures, as Dirk Huyge and Pierre M. Vermeersch (1982) noted at the site of Weelde where the trapezes had different flat ventral retouch from the asymmetric triangles (»points of Danubian type«). Furthermore, J.-G. Rozoy (1991) proposed that flat ventral retouch was more frequent on asymmetric triangles compared to trapezes. However, the analyses of Erick Robinson (2010) have found that the extent and typological occurrence of flat ventral retouch do not consistently vary from type to type and are not clearly differentiated between asymmetric trapezes and asymmetric triangles. In both the Late Mesolithic and LBK flat ventral retouch is found all of the different types that were recorded, although these frequencies do vary somewhat from one type to the next. Despite the slight variance from one armature type to another, there is no clear distinction between the preference of flat ventral retouch on asymmetric trapezes compared to asymmetric triangles, in neither the total Late Mesolithic dataset nor the total LBK dataset. Therefore, at our current state of knowledge the best contribution can be made by experimental and microwear analyses in order to resolve the important issue of the relationship between flat ventral retouch and the hafting of armatures, as thus far there has not been any tests of the hypothesis that its presence on armatures indicates a development in hafting technique.

CONCLUSION

The site of Verrebroek-»Aven Ackers« has provided one of the only secure radiocarbon dates for the Late Mesolithic of the Rhine-Meuse-Scheldt culture area. The finds from this short-term occupation yield impor-

tant information not only on the lithic technological organization and composition of small, short-term occupations during the Late Mesolithic period, but also provide some key data needed for the investigation of the role of lithic armatures as evidence for forager-farmer contact along the north-western fringe of the LBK. The site precedes the LBK settlement of the Hesbaye and Hainaut regions by at least four centuries. Two of the most widely cited aspects of armatures that are referenced for interpreting them as evidence of the continuity of Late Mesolithic traditions in the LBK west of the Rhine river are not present, and call into question their efficacy as determinants of the direction of cultural transmission processes during the transition to agriculture in Northwest Europe. The finds from Verrebroek-»Aven Ackers« open up new questions concerning both the cultural contexts and origins of the evolution from trapezes to asymmetric triangles and the application of flat ventral retouch to the small truncation of armatures.

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Zusammenfassung / Abstract / Résumé

Pfeilbewehrungen und die Frage nach den Kontakten zwischen Wildbeutern und Ackerbauern am nordwestlichen Rand der Linearbandkeramik: die Fundstelle von Verrebroek-»Aven Ackers« (Ostflandern, Belgien)

Ein zentrales Problem bei der Frage, ob es zum Austausch von Pfeiltechnologien zwischen den spätmesolithischen Wildbeutern und den frühneolithischen Bauern gekommen ist, stellt das Fehlen einer absoluten Chronologie dar, die unser Wissen über den Ursprung besonderer technischer Merkmale absichert. Jüngere Ausgrabungen an der spätmesolithischen Fundstelle Verrebroek-»Aven Ackers« haben ein präzise datiertes Fundensemble von Pfeilbewehrungen zutage gebracht, das die Wissenschaft zu einer Neuinterpretation der Frage nach den Pfeilbewehrungen als Nachweis für eine Kulturübertragung zwischen Jägern/Sammlern und den frühesten Ackerbauern in Nordwesteuropa zwingt. Dieser Aufsatz untersucht die Rolle dieses bedeutenden Fundplatzes im weiteren Kontext und vergleicht die Pfeilbewehrungen des Spät- und Endmesolithikums und der Linearbandkeramik in Belgien und den südlichen Niederlanden.

Armatures and the question of forager-farmer contact along the north-western fringe of the LBK: the site of Verrebroek-»Aven Ackers« (East Flanders, Belgium)

A central problem in determining whether or not there was cultural transmission of armature technologies between Later Mesolithic foragers and Early Neolithic LBK farmers has been the lack of an absolute chronology that would consolidate knowledge of the origins of particular typo-technological attributes thought to have been transmitted. Recent excavations at the Late Mesolithic site of Verrebroek-»Aven Ackers« yielded a securely dated armature assemblage that forces scholars to reconceptualise the question of the role of armatures as evidence of cultural transmission between foragers and the earliest farmers of Northwestern Europe. This paper examines the role of this important site in the context of a larger study comparing the armature industries of Late/Final Mesolithic and LBK sites in Belgium and the southern Netherlands.

Armatures et la question du contact entre chasseurs-cueilleurs et agriculteurs
à la frontière nord-ouest du Rubané: le site Verrebroek-»Aven Ackers« (Flandre Orientale, Belgique)
Afin de déterminer s'il y a eu transmission culturelle d'armatures entre les chasseurs-cueilleurs du Mésolithique récent et les agriculteurs du Rubané, il manque une chronologie absolue qui consoliderait les connaissances des origines de certains attributs typo-technologiques particuliers qui auraient pu être transmis. Des fouilles récentes du site mésolithique récent à Verrebroek-»Aven Ackers« ont fourni un assemblage d'armatures soigneusement datées qui amènent les chercheurs à concevoir différemment le rôle des armatures en tant que traces de transmission culturelle entre chasseurs-cueilleurs et les premiers agriculteurs du nord-ouest de l'Europe. Cet article examine le rôle important de ce site archéologique dans le contexte plus large d'une étude comparant les industries d'armatures du Mésolithique récent et du Rubané grâce à des sites archéologiques en Belgique et au Sud des Pays-Bas.

Schlüsselwörter / Keywords / Mots clés

Belgien / Spätmesolithikum / Linearbandkeramik / Kontakte zwischen Wildbeutern und Ackerbauern / Pfeilspitze / Feuerstein
Belgium / Late Mesolithic / Linearbandkeramik culture / forager-farmer contact / arrow head / flint
Belgique / Mésolithique récent / Rubané / contacts chasseurs-cueilleurs-agriculteurs / pointe de flèche / silex

Erick Robinson
Lien Lombaert
Joris Sergant
Philippe Crombé
Universiteit Gent
Vakgroep Archeologie
Sint-Pietersnieuwstraat 35
B - 9000 Gent
erick.robinson@ugent.be
lien.lombaert@ugent.be
joris.sergant@ugent.be
philippe.crombe@ugent.be

Römisch-Germanisches Zentralmuseum
Forschungsinstitut für
Vor- und Frühgeschichte

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