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AN ATTEMPT TO LINK A LITHIC COMPLEX WITH THE LATE PALAEOLITHIC *RANGIFER TARANDUS* ANTLER AXE FROM THE PARUPĖ SITE IN NORTHERN LITHUANIA

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Keywords

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Abstract

The recent intensification of AMS ^{14}C assays of bone and antler artefacts in the east and southeast Baltic region has revealed a number of reindeer (*Rangifer tarandus*) antler axes, and their prevalence in the Late Palaeolithic osseous toolkit. One of the oldest, dating from 11 221–11 048 cal BC, was discovered in 2014 in the village of Parupė, on the left bank of the River Nemunėlis, in northern Lithuania. Until now, no such organic implements discovered in the region in question have been associated with any Late Palaeolithic taxonomic group, but at the location of the antler axe at Parupė between 2015 and 2019, three concentrations of numerous lithic findings have been identified, whose typological and technological features allow for the consideration of their possible association with the dated axe. In this paper, we present three concentrations of lithic finds (sites 1–3) at Parupė village, providing their technological and typological data, and their possible chronology and taxonomy, reflecting the Late Palaeolithic and Early and Late Mesolithic. We conclude that the moderate lithic complex from site 1 should be associated with Late Palaeolithic technology, and can possibly be linked with the antler axe.

Introduction

The present state of research, chronology and taxonomy of the Late Palaeolithic[1] in the east Baltic region is based largely on typological classifications of lithic tools, in particular hunting implements. Their types and technological features were mostly compared to similar archaeological material found in adjacent north European areas. Thus, in the east Baltic region, including Lithuania, several different Late Palaeolithic cultural groups have been distinguished, whose names are still used in scientific literature (e.g. Rimantienė 1971; Zaliznyak 1995; Butrimas and Ostrauskas 1999; Šatavičius 2005; 2016; Kolasau 2018). In all cases, however, there are shortcomings and complexities in ascribing certain lithic assemblages to a particular taxonomic group. First of all, most of the lithic material comes from open-air sandy sites located on riverbanks and lake terraces, where often multiple settlement episodes, sometimes even from an entirely different prehistoric period, took place. As a result, the archaeological material from such sites is mixed, and only on particular occasions (e.g. when there are features or particular concentrations) can it be distinguished into separate narrow chronological stages and taxonomic groups (for a discussion, see Rimkus et al. 2020). These cases also limit the possibility of absolute dating, when organics are sampled from unreliable contexts, or not detected at all due to poor preservation. Therefore, the attribution of Late Palaeolithic implements

[1] In this paper, Late Palaeolithic is considered as the period that includes shoulder points, arch-backed points and tanged point complexes dated to before the end of the GS-1, ca. 10 500 cal BC (for a discussion on Late Palaeolithic periodisation and taxonomical variability in Lithuania, see Šatavičius 2016; Ivanovaitė, Riede 2018); whereas Final Palaeolithic is associated with tanged point complexes (Ahrensburgian and Swiderian) at the end of the GS-1 and the beginning of the Preboreal.

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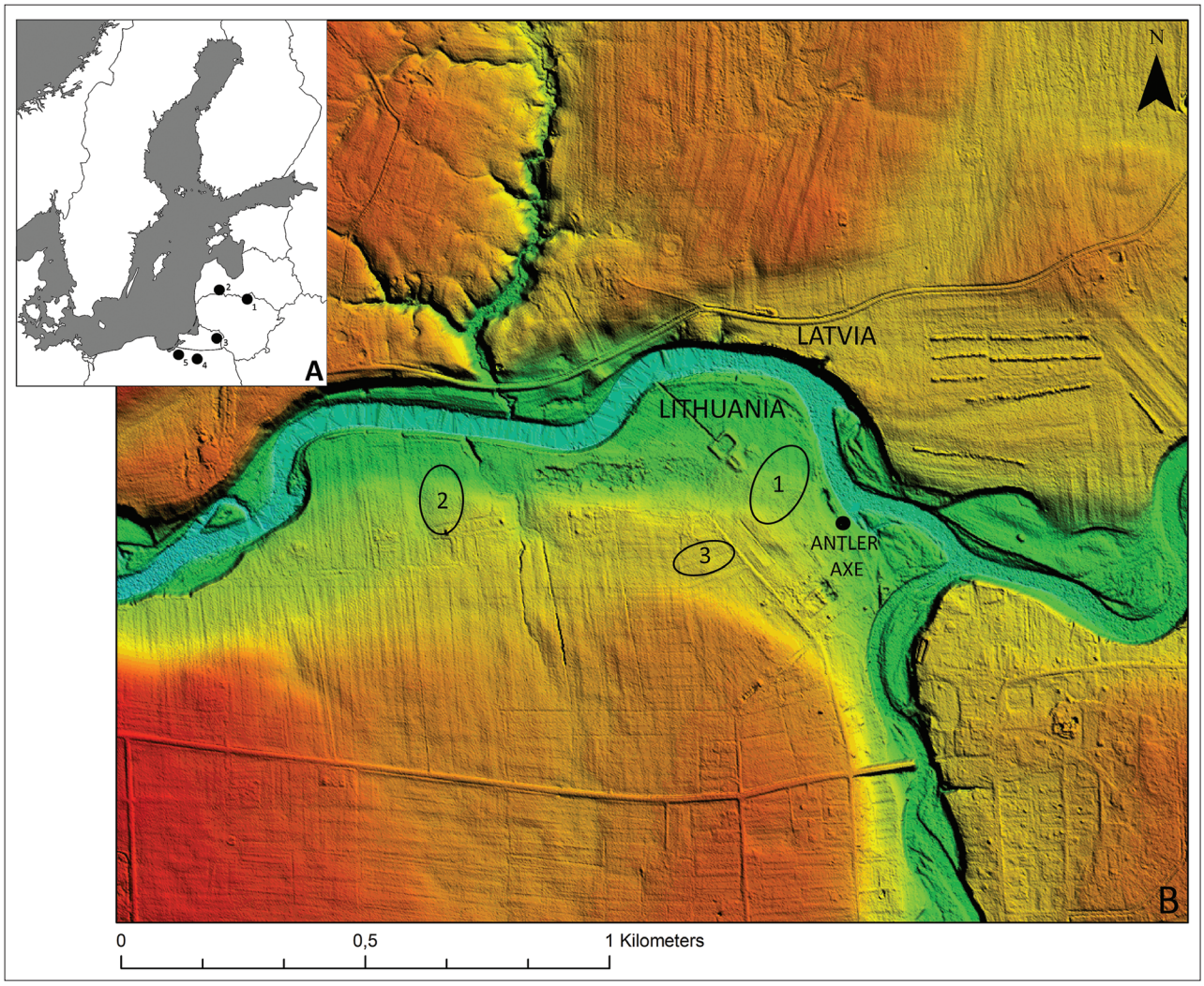

Figure 1. Locations of reindeer antler axes in the east and southeast Baltic region (A), and sites 1–3 with lithic finds and the location of the antler axe at Parupė, northern Lithuania (B). 1. Parupė; 2. Mellupite; 3. Dobrowolsk; 4. the River Krutynia; 5. Morąg (drawing by T. Rimkus).

to individual taxonomic assemblages is often difficult, and confuses the cultural periodisation of this period.

Late Pleistocene osseous finds are particularly rare in the east Baltic region. However, recent years of consistent AMS ^{14}C dating of prehistoric bone and antler artefacts have shown that such artefacts do exist (Meadows et al. 2014; Rimkus et al. 2019), and their dating has proven that they can greatly contribute to the chronology, periodisation and technological issues of the east Baltic Late and Final Palaeolithic. The dated cases have also revealed that one of the most prevailing Late Palaeolithic osseous artefacts in the region in question is reindeer (*Rangifer tarandus*) antler axes, also known as the enigmatic *Lyngby axes* (Müller 1897). They have been discovered in Latvia, Lithuania and the former East Prussia (today northeast Poland and the Kaliningrad oblast), and their absolute age falls between GI-1c – GI-1/Early Preboreal[2] (Zagorska et al. 2019; Girininkas et al. 2016; Philippsen et al. 2019). All of them were found as stray finds, and their attribution to a specific Late Palaeolithic cultural group is difficult. A similar tendency is also noticeable in northwest Europe, where the dating of such artefacts covers almost the entire Late Glacial, and according to their absolute age, they are attributed to several cultural groups (e.g. Clausen 2004; Riede and Edinborough 2012).

In 2014, on the left bank of the River Nemunėlis in the village of Parupė (northern Lithuania), only a few metres away from the border between Lithuania and Latvia, one such reindeer antler axe was found that was AMS dated to 11 221–11 048[3] cal BC (BETA-403383). The artefact was found as a single tool, without any other finds that could be attributed to the very end of the Late Pleistocene. Neither have they been found during small-scale

[2] For a chronology of Late Glacial chronozones in Europe, see Rasmussen et al. 2006, Fig. 1; Blockley et al. 2012, Table 1.

[3] All ^{14}C dates in this paper have been calibrated by OxCal v.4.4 (Bronk Ramsey 2017) and the IntCal20 atmospheric curve (Reimer et al. 2020).

archaeological fieldwork in the area. However, in 2015–2019, concentrations of knapped flint waste and tools were collected in the adjacent ploughed fields on the banks of the Nemunėlis, of which the typological-technological analysis suggests that some of these finds may indeed be attributed to the same age as the reindeer antler axe. In this paper, we argue that these lithics, in particular from site 1, which is concentrated close to the antler axe find location, although collected on the surface of ploughed soil, may contribute to the understanding of the early postglacial settlement of the east Baltic, and supplement the question what taxonomic group or groups used reindeer antler axe technology?

The Parupė site and its palaeoenvironmental setting

The dynamics of the last ice sheet in northern Lithuania is rather complicated. The cosmogenic dating of nine boulders of the north Lithuanian end moraine suggests that it was formed during 13.3±0.7 ^{10}BE kyr (Rinterknecht et al. 2006; 2008), but its radiocarbon dates from Latvia and Estonia are somewhat older, at 15.6–15.4 ka BP and 15.7–14.7 ka BP respectively (Karmazinienė et al. 2013, and the references therein). This discrepancy in end moraine dating between separate areas is explained by the short-term cooling events that occurred during the GI-1e and GI-1c warm intervals, and therefore may have produced inaccurate results to the cosmogenic dating (Rinterknecht et al. 2008). Pleistocene deposits in north Lithuania overlay Upper Devonian marl, limestone, gypsum and dolostones. Its landscape is characterised by kames, long and narrow palaeo-incisions, and uplifts (Karmazinienė et al. 2013).

The Parupė site (56°40'23" N, 24°76'45" E) is situated on the left bank of the River Nemunėlis, close to the confluence of the Nemunėlis and Apaščia, and the Lithuanian-Latvian border, in northern Lithuania (Fig. 1). It was discovered in 2014, when the reindeer antler axe was accidentally found by a local man in an irrigation canal. Geological studies, borings and test-pitting in the area allow us to assume that the investigated area was located at the very periphery of the glaciolacustrine basin, where it was probably very shallow. A one by two-metre-large and 1.5-metre-deep test-pit was excavated only 0.5 metres away from where the antler axe was found (Slah 2016). Judging from the clay and silt particles in the lower layer of the section of the test-pit sedimentation, conditions in this basin were rather calm, characteristic of the Late Glacial warm interstadial (Girininkas et al. 2016, p. 23). However, the upper layer in the section indicates that the next stage of the basin was characterised by intensive sand transport, most likely related to the regression of the basin water level and intensified erosion processes. These changes were related to an altered environment, suggesting harsh and dry climate conditions, probably caused by the GS-1 cooling event.

Samples taken for pollen analysis from the lower layers of the test-pit section contained only sporadic evidence of *Pinus*, *Betula* and *Polypodiaceae* (Girininkas et al. 2016, p. 24). But their quality and state of preservation do not allow us to judge their age and accumulation circumstances in the palaeobasin deposits. However, corings from the Ginkūnai and Lieporiai palaeolakes in northern Lithuania suggest that during the GI-1c, *Pinus* and *Betula* taxa prevailed in the area (Stančikaitė 2006; Stančikaitė et al. 2015). The lower layer of the test-pit at Parupė also contained plenty of microscopic charcoal; however, it is uncertain whether or not they originated here with the impact of the first human settlements. Unfortunately, there are no additional AMS ^{14}C dates corresponding to the Late Glacial from the layer where the antler axe was deposited.

The reindeer antler axe

The reindeer antler axe from Parupė was found in 2014, during the digging of an irrigation canal on the left bank of the River Nemunėlis. The axe is 45.3 centimetres long, its blade is 3.5 centimetres long, and its handle part is 4.9 centimetres in diameter (Fig. 2). When it was found, the axe was a whitish/light brown colour, originating from the

Figure 2. Both sides of the reindeer antler axe from Parupė, northern Lithuania (photograph by A. Girininkas).

Table 1. Directly dated reindeer antler axes from the east and southeast Baltic region. The weighted mean age was calibrated in the case of the Mellupite reindeer antler tool. Dates were calibrated by OxCal v4.4 (Bronk Ramsey 2017) and the IntCal20 atmospheric curve (Reimer et al. 2020).

Site	Lab. No.	^{14}C BP	cal BP (95.4%)	cal BC (95.4%)	Reference
Dobrowolsk (Grenzfelde), Kaliningrad	AAR-26648	11580±50	13576-13330	11627-11381	Philippsen et al. 2019
Krutynia River (Cruttinna-Fluss), Poland	AAR-26646	10045±40	11805-11343	9856-9394	Philippsen et al. 2019
Mellupite, Latvia	KIA-42245	10285±34	12440-11828	10491-9879	Zagorska et al. 2019
Morąg (Mitteldorf), Poland	AAR-26647	9840±45	11391-11189	9442-9240	Philippsen et al. 2019
Parupė, Lithuania	BETA-403383	11170±40	13170-12997	11221-11048	This study; Girininkas et al. 2016

aleurite sand where it was deposited, at approximately 1.5 metres deep. The antler tool, as well as the lithics from all three sites discussed in this paper, is currently kept in the National Museum of Lithuania.

The axe is made from an adult male reindeer antler. Its manufacture technique does not differ much from other identical Late Palaeolithic finds in northwest and northeast Europe (e.g. Clausen 2004; Fischer et al. 2013a). The antler was processed by cutting and re-shaping its different parts: the bez tine, brow tine, pedicle, burr and back tine. Microscopic analysis showed that the artefact's surface has many multi-directional cut marks, incised during the axe's manufacture, and also suggested at least one possible function related to woodworking (Girininkas et al. 2016). The artefact was dated to 11 221–11 048 cal BC (BETA-403383), which corresponds to the GI-1b – GI-1a interstadial. The find was handed to the research laboratory and sampled before it was transferred to the museum; therefore, the artefact was sampled before its contamination with conservants. The age obtained only shows the age of the antler itself; however, there is no doubt that such osseous implements are typical man-made tools, as examples from northern Europe indicate their extensive use during the Late Glacial (e.g. Rust 1943; Clausen 2004).

Currently, only five reindeer antler axes, including those from Latvia, Lithuania and the former East Prussia[4] (today northeast Poland and the Kaliningrad oblast) have been dated (Zagorska 2012; Girininkas et al. 2016; Philippsen et al. 2019). Their recent AMS evaluation indicates that in the east and southeast Baltic region, such tools were used during the GI-1c and GS-1, and most likely during the early stages of the Preboreal (Table 1). But their attribution to a particular taxonomic group is complicated. In a previous study by Girininkas et al. (2017), it was predicted that the sub-fossil reindeer antlers dated to before the last glacial maximum and with similar shapes to the eponymous Late Palaeolithic antler axes found in Lithuania could be the oldest man-made tools in the east Baltic. However, post-depositional factors have strongly affected these findings, and the clear absence of technological or any other traces of manufacturing does not yet make it possible to securely assert that these finds can be attributed to the tool category.

[4] For further information on reindeer skeletal remains and antler axes from the former East Prussia, see Groß 1939; Šturms 1970, Tafel 4.

Lithic concentrations

Site 1

The first lithic finds at Parupė, consisting exclusively of flint, were found to the west of the antler tool find spot, on the first and second terraces of the River Nemunėlis. All of them were collected on the surface of two ploughed fields, in an area of roughly 0.14 square kilometres. A total of 436 flint finds were collected in this area, thus it was called site 1. The finds consist mainly of flint knapping and tool manufacturing debris, and the tools themselves. The tool category includes scrapers (18), cores (ten), perforators (four), burins (two), inserts (three), tanged points (two), microburins (two), and a lanceolate point (Table 2). Part of the tool-kit is made of high-quality flint, which has physical features characteristic of the Cretaceous flint that occurs naturally in the mid- and upper reaches of

Table 2. The diagnostic lithic tool types identified at sites 1 and 2.

Site 1								
Scrapers	Burins	Perforators	Inserts	Tanged points	Cores	Trapezes	Lanceolate	Microburins
18	2	4	3	2	10	-	1	2
Site 2								
3	-	-	-	-	2	1	-	-

the River Nemunas (Baltrūnas et al. 2006). There is also knapping waste and tools made from poor-quality flint found locally in northern Lithuania. It is found in the form of small pebbles, usually ten to 30 centimetres in diameter, which occur in the dolomite powder interlayer layers, and is of relatively poor quality for making lithic tools (Hughes et al. 2011). No AMS ^{14}C data are available at any of the sites, and their chronology is based only on the typo-technological lithic features. The blade technology, cores and tanged point suggest that the lithic assemblage at site 1 should presumably be dated to the Late Palaeolithic and Early Mesolithic.

Site 2

Site 2 is located on the first and second terraces of the Nemunėlis, in the westernmost part of the area. The small assemblage of scattered flint finds was collected here on the ploughed surface, in an area of roughly 0.18 square kilometres. Only 44 finds in total were gathered. Most of them consist of flakes and blades, and tools make up only a small part of the entire collection. Three types of tool were identified at site 2: scrapers (three), cores (two), and a trapeze (Table 2). Both local (from dolomite interlayers) and imported (Cretaceous) flint raw material was used here. Based on the typology and technology of the cores, blades and one trapeze, site 2 can presumably be dated to the end of the Mesolithic.

There is also a very small assemblage of three flint flakes and one knapped pebble at site 3, which is located on the highest terrace of the Nemunėlis. It lacks diagnostic tool types to describe its supposed chronology; however, more lithic finds could occur here in the future.

Lithic technology

During the analysis of the lithic finds from site 1, two larger groups of tools were discerned that may belong to the Late Palaeolithic or Early Mesolithic. This is assumed on the basis of the typological and technological features of the finds, which allowed for at least the preliminary determination of their possible chronology, since there are currently no possibilities to conduct radiocarbon analysis. At least two blade truncations which resemble the microburin technique were ascribed to the Late Palaeolithic find group (Fig. 3.1–2). These are not classic Mesolithic microburins with a fracture facet used for the manufacture of microliths, and technologically they rather resemble the twin-notched microburins characteristic of the various tanged point complexes in Latvia, Poland and northeast Germany (Schild et al. 2014; Sobkowiak-Tabaka and Winkler 2017; Berg-Hansen et al. 2019; Groß et al. 2019). It is noticeable that one end of the blade was retouched, and then it was broken on the retouched part. However, the fracture facet was not formed obliquely, as is observed in Early Holocene lithic technology, but this truncation technique was used for blade tool manufacturing, most likely for inserts. Mainly fragments of blades, resembling the Late Palaeolithic and Early Mesolithic periods, were found at site 1, moreover, making it difficult to assign them to a specific occupation phase. The statistics of their size distribution would indicate that only a small proportion of the blades and fragments of them exceed 24 to 30 millimetres in length, and only a few of them are wider than 20 millimetres (Fig. 4). Also, a small number of thicker blades are visible, making them clearly distinguishable from narrow blade technology. However, a comparison of size and examples from the site evidently shows that there are much larger blades, with knapping technology particularly characteristic of the Late Palaeolithic (Fig. 3.3). Household tools, scrapers and burins, for example, are made from large flakes. Two end-scrapers stand out clearly by their size and technique (Fig. 3.4–5). Their sides were retouched on both edges, which most likely formed narrow tangs, apparently for hafting techniques. The cutting edges of the burins are formed by the pressure technique on the corners of the flakes. One burin is a double-type tool: dihedral at one end and an angle burin at the other (Fig. 3.6–7). The cores are very fragmented, or completely exhausted. Interestingly, two types of core were identified: single and opposite platform cores (Fig. 3.8–11). The wear of platforms and knapping fronts suggests that the blades were most likely formed by direct percussion. The core platforms were formed by direct striking, and were not additionally prepared. The most characteristic Late Palaeolithic tool type found at site 1 is the tanged point (Fig. 3.12). It is made from a massive irregular blade with

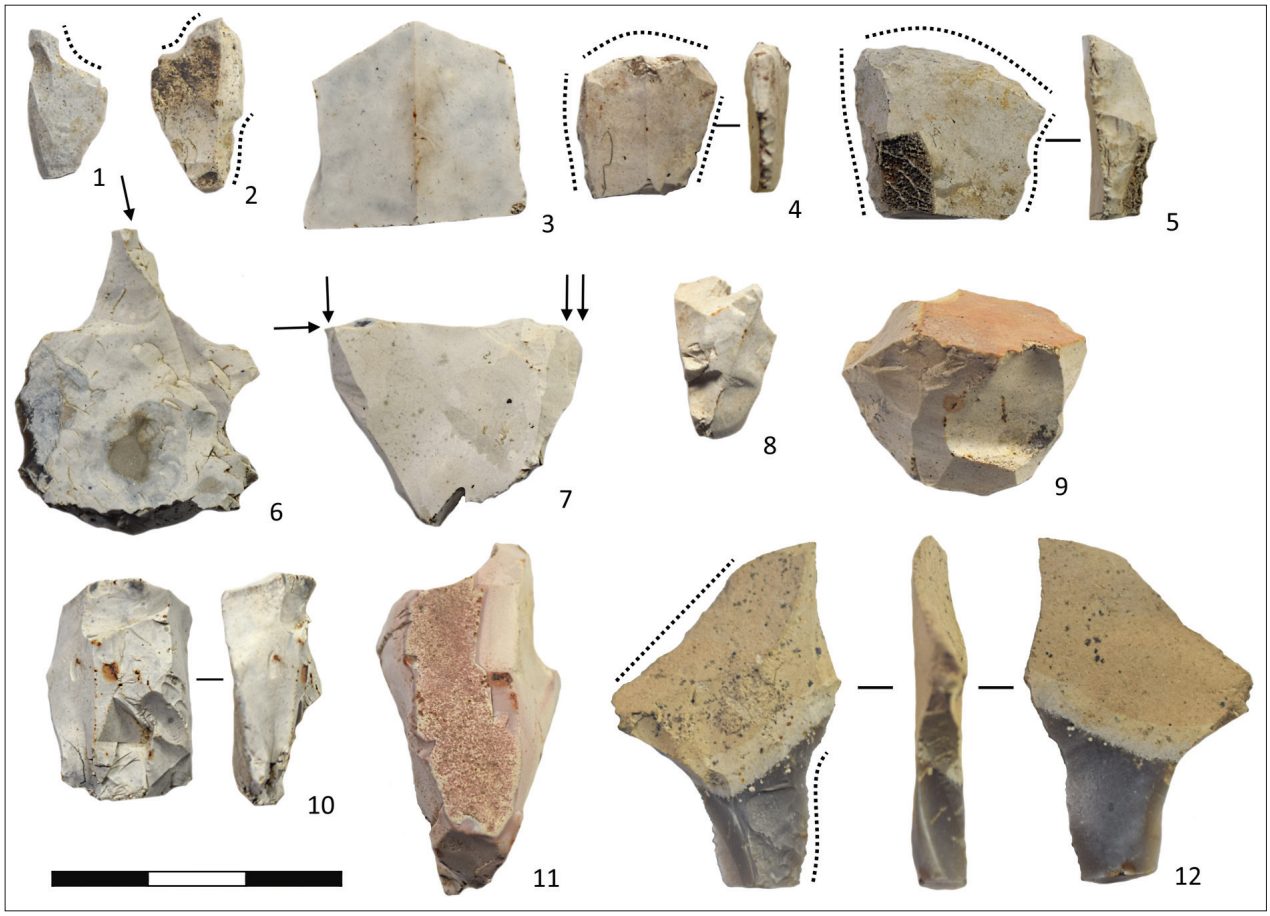

Figure 3. Typical Late Palaeolithic lithic tool types from site 1: 1–2. microburins; 3. a large blade fragment; 4–5. scrapers; 6. angle burin; 7. dihedral burin; 8–11. core fragments; 12. tanged point. Dotted lines mark retouched parts (photograph by T. Rimkus).

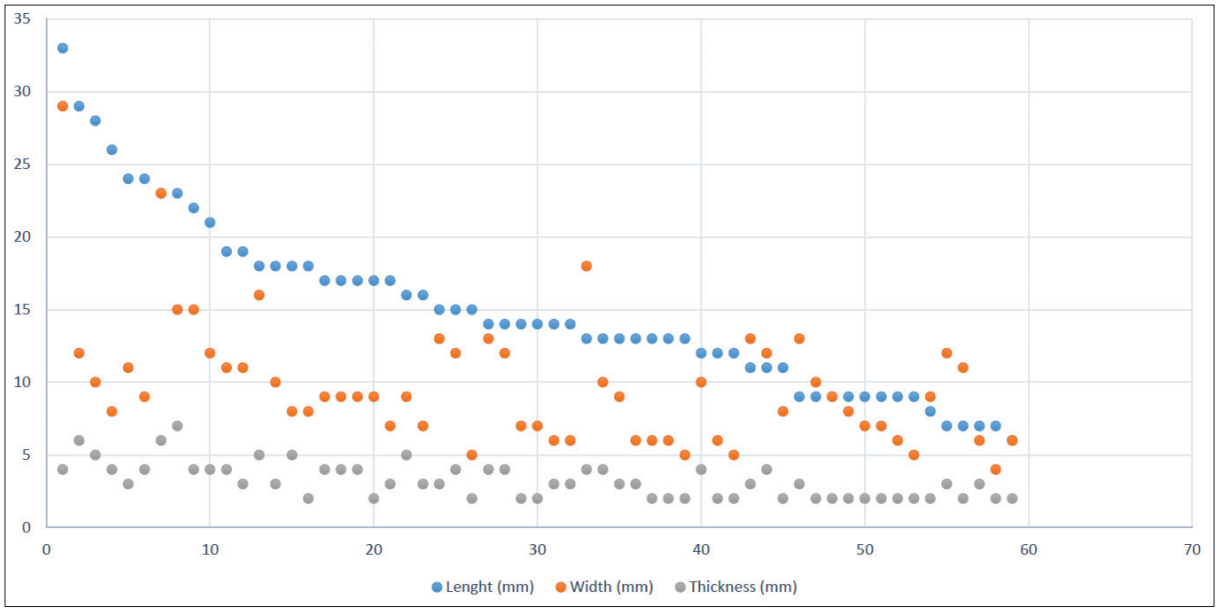

Figure 4. The distribution of blades and pieces of them at site 1 (compiled by T. Rimkus).

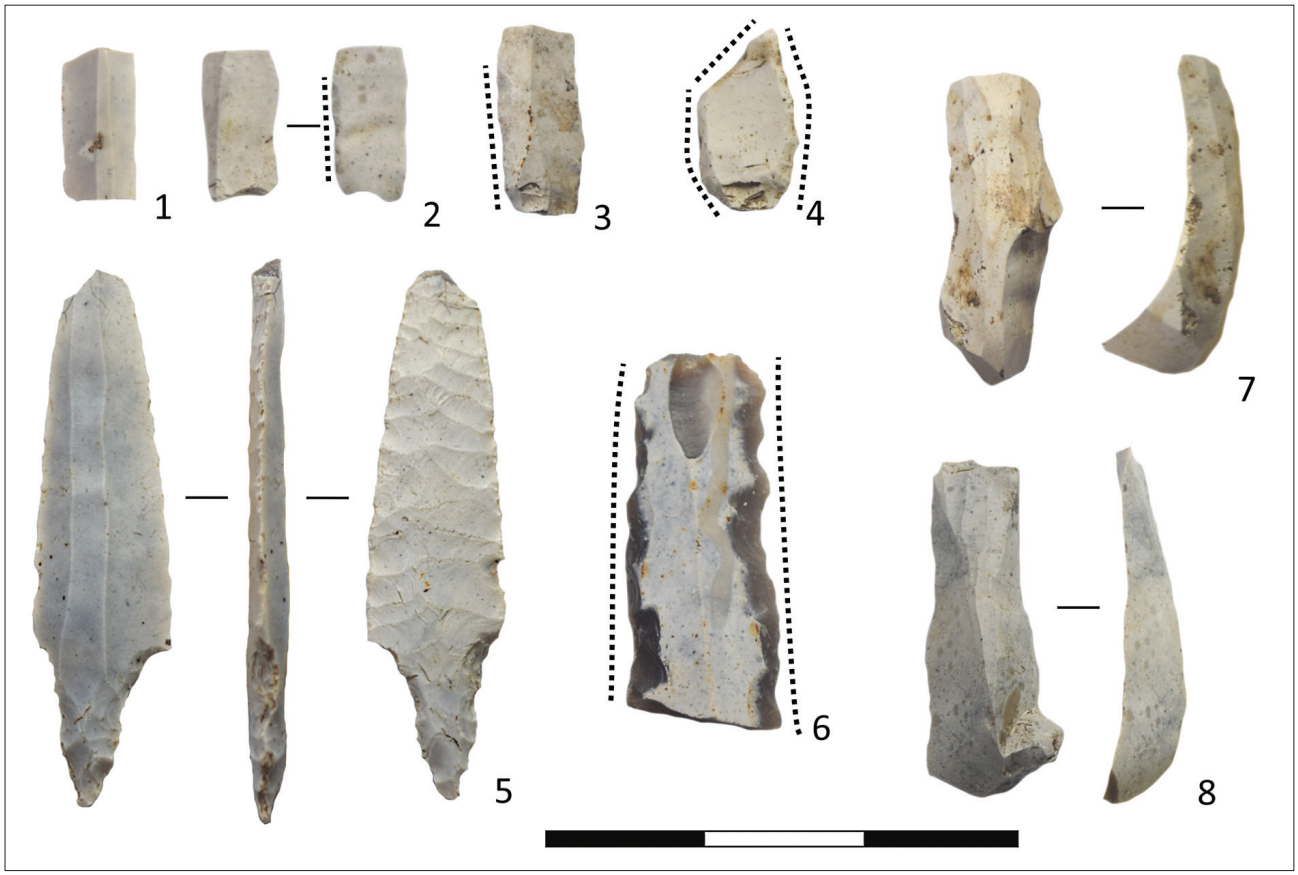

Figure 5. Typical Early Mesolithic lithic tool types at site 1: 1–3. inserts; 4. lanceolate; 5. Pulli-type tanged point; 6. blade with heavy working traces; 7–8. blades from conical cores. The dotted lines mark retouched parts (photograph by T. Rimkus).

a wide shaped U-shaped tang. The wide remnant of the core's platform and the pronounced bulb at the proximal end of the projectile suggest that the blank for this tool was most likely formed by direct percussion. The tang is retouched only on the right-hand edge on the dorsal side of the artefact. The left-hand edge is formed by a fracture. The tip was also shaped by retouching. One of its edges was obliquely retouched towards the left-hand edge. No retouch was detected on the ventral side of the projectile. This type of tanged point in northern Europe is often attributed to Bromme culture, a technology that is believed to have existed in the east Baltic as well (Šatavičius 2004; 2016, pp. 19–20).

Another chronologically distinct group of finds at site 1 belongs to the Early Mesolithic. This is evident by the technique of narrow and long blades, one representative tanged point, and fragments of conical cores. In the east Baltic region, this technique and the tools made by it are attributed to Early Mesolithic Pulli culture, or to the post-Swiderian complex (Ostrauskas 2000; Ksenzov 2006; Zagorska 2019). At site 1, inserts of long and narrow blades were produced, with retouched or unretouched edges (Fig. 5.1–3). One specimen had an edge retouch on the ventral side of the blade (Fig. 5.2). However, it is apparent that in the Early Mesolithic, inserts were also used with unretouched edges, as is demonstrated at the Early Mesolithic Zvejnieki II site in Latvia, where there are slotted bone points with intact inserts (Zagorska 1993; Damlien et al. 2018). One lanceolate point should be attributed to the microlithic tool group (Fig. 5.4). Its entire perimeter at the edges is retouched, the tip is shaped by the microburin technique, and its fracture is retouched. More tools were also produced from regular blades, such as one example with heavy working traces on its edge (Fig. 5.6), and also technologically the most exceptional find, a Pulli-type tanged point. Only its tang on the dorsal side is retouched flatly, whereas on the ventral side its entire surface is completely retouched by the same type of retouch (Fig. 5.5). This hunting gear technique is typical of Pulli culture in the east Baltic region, but on the other hand, we still do not know an exact parallel of the Pulli-type arrowhead found at Parupė with the entire surface retouched on its ventral side. In most cases, such points are retouched flatly only in the areas of the tips and the tangs, and examples of when the ventral side is retouched halfway are also known (e.g. Ostrauskas 2002), but the example of such a Pulli-type projectile from Parupė is the only specimen so far known to us. The blade technology at site 1 is also supple-

Figure 6. Typical Late Mesolithic lithic types at site 2: 1. trapeze; 2. scraper; 3. semi-conical core; 4–7. blades. The dotted lines mark retouched parts (photograph by T. Rimkus).

mented by two curved blades, whose shapes would imply that they were formed from conical cores (Fig. 5.7, 8).

Lithic technology and the tool types at site 2, on the contrary, differ from the finds at site 1. The difference is evident by one very regular transverse arrowhead, of which various types in the east Baltic presumably emerged at the end of the Middle Mesolithic/beginning of the Late Mesolithic (Fig. 6.1) (Girininkas 2009; Šatavičius 2016; Rimkus 2019a). Only one fragment of a semi-conical core was identified, and it seems that it was used for narrow blade technology (Fig. 6.3). The blades themselves are long, narrow and slightly curved, with two to four negatives left by previous narrow blades (Fig. 6.4–7). Only three scrapers, all made from flakes, were identified at site 2 (Fig. 6.2). The transverse arrowhead and blade technology clearly suggest that lithic technology in this area differs, if we compare it with the finds from site 1, and it was probably occupied much later, most likely in the second half of the Mesolithic.

Results and discussion

Systematic AMS ^{14}C and the occurrence of reindeer antler axes in European Late Glacial studies (Eriksen 1999; Clausen 2004; Goslar et al. 2006; Brinch Petersen 2009; Fischer et al. 2013a; Cziesla 2018) suggest that they were used across the wide north European region, and the age of this antler tool technology falls between GI-1c and GS-1 oscillations, and the very beginning of the Preboreal. Based on recent AMS ^{14}C data, the same chronological model could be applied if we examine them in the east and southeast Baltic region (Girininkas et al. 2016; Philippsen et al. 2019; Zagorska et al. 2019). Furthermore, no considerable chronological differences between axes can be observed in the wider regional context, as the examples from Dobrowolsk and Parupė are contemporaneous in absolute age with the oldest specimens from northwest Europe, for instance Klappholz LA-63 and Mikkelsmossen (for a comparison of age, see Fischer et al. 2013a, Fig. 15; Clausen 2004, Table 1) (Fig. 7). It is apparent that the technological tradition of reindeer antler axes persisted for a long time, and it was not a tool specific only to one taxonomic group. From a manufacturing point of view, there is little difference between these artefacts in the north European region, yet their function is still unclear, although it may have the potential to reveal certain possible interregional technological differences in axe manufacture.

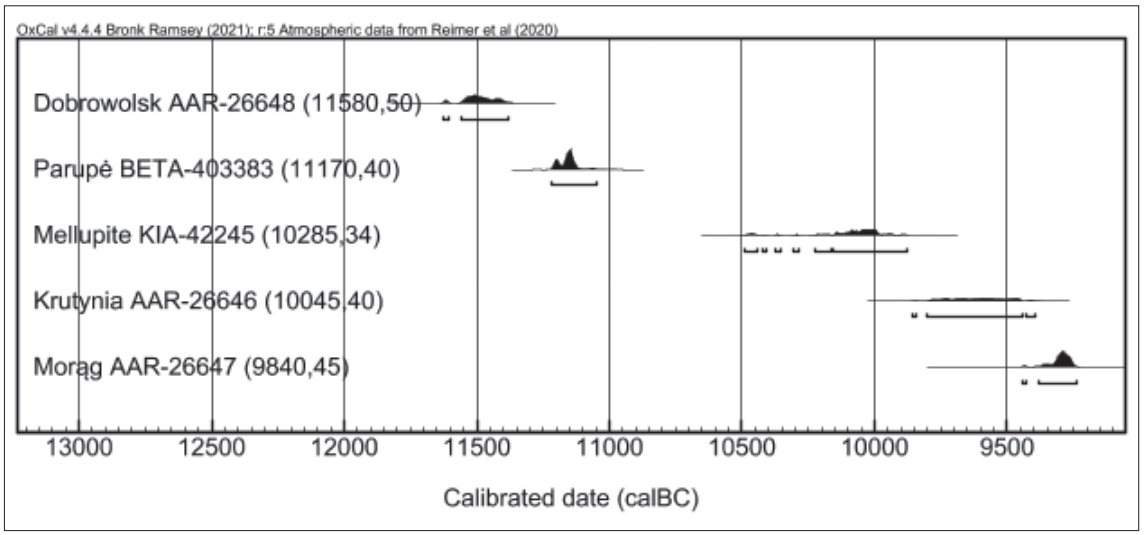

Figure 7. Calibration plot of dated reindeer antler axes from the east and southeast Baltic region. The artefacts' 14C ages were taken from Table 1. The dates were calibrated by OxCal v4.4 (Bronk Ramsey 2017) and the IntCal20 atmospheric curve (Reimer et al. 2020).

The question of Bromme culture finds in Lithuania emerged in the second half of the 20th century, when large tanged points from south Lithuanian Stone Age sites, mainly Derežnyčia, Duobupis 1B, Ežerynas (9, 15, 16 and 17), Maskauka and Mergežeris 8, were attributed at that time to the so-called Baltic Magdalenian group distinguished by Rimantienė (1971). The intensification of Stone Age site excavations and the re-evaluation of older material at the end of the 20th century provided new archaeological material and insights into Late Palaeolithic technology in Lithuania, including large collections of various tanged point types. This led to the initial division of the Baltic Magdalenian group into particular taxonomic groups, whose technological features resembled the classic Late Palaeolithic cultures of northwest Europe (Šatavičius 2005; 2016). Thus, Bromme culture was distinguished as one of the Late Palaeolithic taxonomic units of which archaeological material occurred in northern, southern and central Lithuania (Šatavičius 2004). However, this was all based only on the types and technology of lithics found in an open-air sandy site, and this concept sorely lacked finds from secure and homogenous contexts, or with radiocarbon data. The shortage of data has recently prompted discussions questioning the technological features and similarities between them of Late Palaeolithic taxonomic groups between the east and west Baltic regions, which also applies to Bromme culture (Ivanovaitė and Riede 2018; Ivanovaitė et al. 2020).

Similar research questions arise when it comes to lithic implements from Parupė site 1. The large tanged point with a U-shaped tang clearly bears similarities with the eponymous Bromme culture projectiles (e.g. Andersson and Knarrström 1999; Fischer 2012), but the lack of radiocarbon data does not allow us to talk about its absolute age. Based on the dating of Late Palaeolithic assemblages in northwest Europe, Bromme culture is ascribed to the GI-1b/1a and the beginning of the GS-1 (Brinch Petersen 2009; Fischer et al. 2013b; Buck Pedersen 2014, Table 1; Riede 2017, Table 2). Although the tanged point found at site 1 and its associated flint tools complex may not represent its absolute age, the reindeer antler axe found nearby falls within the dating range of Bromme culture in northwest Europe. If we assume that the tanged point might be directly related to the axe itself, then it would be quite realistic if some of the lithic complex at site 1 is related, and dated to around 11 200–11 000 cal BC. It is clear that the flint technology at site 1 not only has similarities, but also differences, compared to the referenced Bromme culture lithic finds from the west Baltic region, especially if we compare the preparation of cores. Site 1 lacks regular single platform cores for long and wide blades, and on the contrary, the cores at Parupė are very fragmented, or entirely exhausted. One of the key arguments when we compare lithic technology from northern Lithuania with eponymous Bromme culture finds must be the lack of local high-quality flint raw material, which could have had a crucial impact on technological development on the northern fringes of the east Baltic during the Stone Age. However, Cretaceous flint and fragments of blades, and their size attributes, would indicate that the people who settled at site 1 were able to produce wide and thick blades, which, if we add tanged points, would possibly indicate technological links with Bromme culture.

In northeast Europe, Late Palaeolithic archaeological material is often directly compared with taxonomic groups identified in northwest Europe in terms of cultural terminology. However, there are also sub-regional terms that reflect certain differences between the archaeological

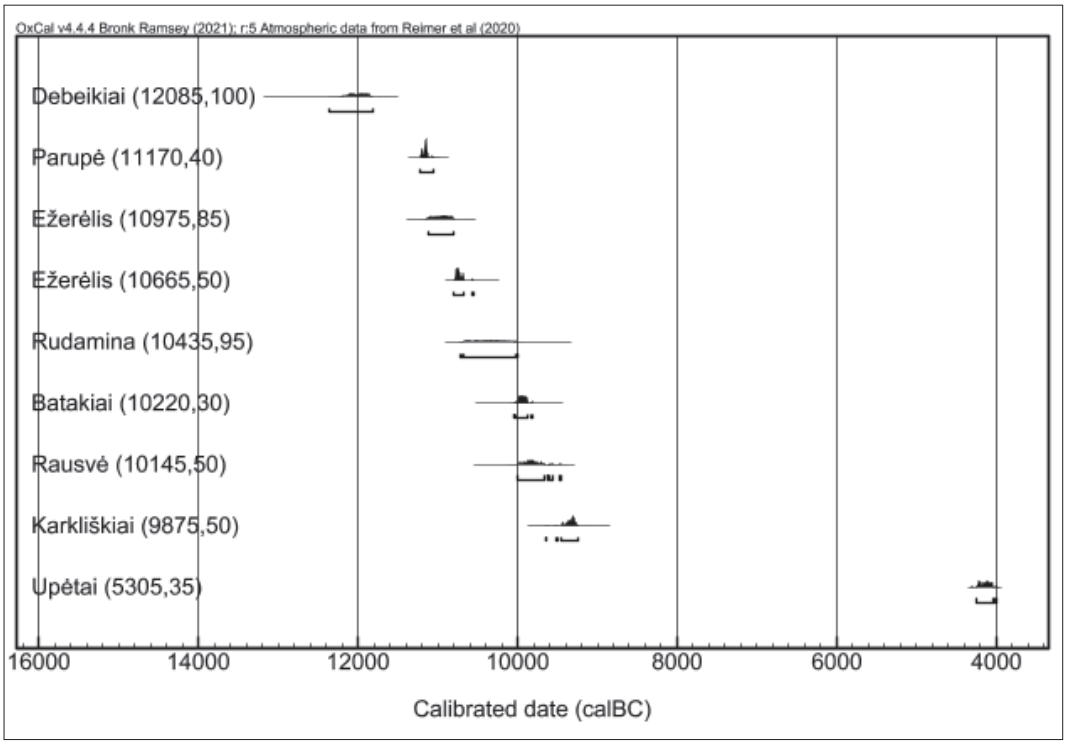

Figure 8. Calibration plot of dated reindeer skeletal remains in Lithuania. The dates were calibrated by OxCal v4.4 (Bronk Ramsey 2017) and the IntCal13 atmospheric curve (Reimer et al. 2020). The 14C ages were taken from Ukkonen et al. 2006, Table 2; Sommer et al. 2014, Appendix S1; Girininkas and Daugnora 2015, Table 10; Rimkus 2019b, Table 2.

material found in different areas. As a consequence, Bromme culture finds, with presumable slight technological differences in eastern Poland, northwest Ukraine, Belarus and Lithuania, are often called Perstunian culture, Lyngby culture, the Baltic Magdalenian group, Old Tanged Point Complex, or Grensk culture (e.g. Rimantienė 1971; Szymczak 1987; Zaliznyak 2006; Schild 2014; Kolasau 2018). These regional differences are not clearly defined in terms of dating, due to the lack of reliable data from the tanged point key sites found in northeast Europe. As a consequence, this confuses the cultural terminology, and raises discussions (for a discussion, see Sauer and Riede 2019; Ivanovaitė and Riede 2020). Another complicating feature is that most classic Bromme-type lithic tools are found in open-air sandy sites, where it is difficult to distinguish a lithic complex specific to a particular phase of occupation. Addressing and solving these issues would also help to understand potential interregional differences in Bromme culture technology. On the contrary, as has already been mentioned, it could have been impacted by the lack of local raw material. We believe that the latter case should also apply to the Late Palaeolithic flint technology found at site 1 in the village of Parupė. Nonetheless, the scarce local choice of flint raw material and the long distance to the main resources in the Upper Nemunas basin indicate that a technological similarity with classic Bromme culture artefacts was still maintained; however, the fragments of exhausted cores imply that flint was utilised maximally, and the absence of larger nodules is evident by the minority of larger blades. Although there is currently insufficient data on both Bromme culture technology in the east Baltic region and radiocarbon data on the lithic finds at site 1, due to the technological features of the finds, we currently suggest associating the Parupė reindeer antler axe with the small Late Palaeolithic lithic complex with eponymous tanged point, and treating them as artefacts that were used by the same community. Therefore, with the latter lithic concentration, we support further discussion on Late Palaeolithic technological and taxonomical variability in northeast Europe.

The dating of the reindeer antler axes from Parupė and Dobrowolsk also sheds some light on the initial settling of the east Baltic after the area became free from the last ice sheet. The dates would point to between ca. 11 600 – 11 100 cal BC, meaning that hunter-gatherers were already familiar with this deglaciated territory during the GI-1c$_1$ interstadial. However, the dating of reindeer skeletal remains from Lithuania would suggest that these animals grazed here much earlier than the dates of the mentioned antler axes would indicate. The radiocarbon dating of one antler sample from Debeikiai in northeast Lithuania was to 12 350 – 11 807 cal BC (Ukkonen et al. 2006, Table 2), whereas afterwards the dating of other reindeer remains in Lithuania shows their continuity until the Early Preboreal (Fig. 8). However, there is a lack of evidence of human habitation during the GI-1d and GI-1c$_{2/3}$ oscillations; the already-dated antler axes, the typology and technology of lithics from Parupė site 1, and the shoulder points from

south Lithuanian Stone Age sites, might suggest further potential for studies on the earliest hunter-gatherer settlements in Lithuania.

The eponymous Pulli finds at Parupė site 1 show that the bank of the Nemunėlis was also probably settled later, at the beginning of the Early Holocene. The long and narrow blade technology, finely retouched tanged point, inserts and probably one lanceolate, indicate the clear lithic technique of Pulli, of which numerous sites have been located in the east Baltic (e.g. Ostrauskas 2000). There is currently no evidence that the Pulli technocomplex used reindeer antler axes in the Early Mesolithic. If we take a closer look at the archaeological material from the Pulli site at Pärnu Bay (southwest Estonia), we will see that the flint inventory there was already transformed, and a typical Mesolithic flint processing technique is noticeable. The same can be said of bone and antler implements (David 2005), and the zooarchaeological composition of the hunted fauna, which show that there were no reindeer among the hunted game at the beginning of the Holocene, which apparently moved further north, and the bone material is dominated mostly by forest animals (Lõugas 2017, Table 4.1). The same situation can be observed in the lower layer of the Zvejnieki II site in northern Latvia (Zagorska 2019). The continuity of settlement on the banks of the Nemunėlis is also evident from the lithic finds at site 2, which should be attributed to the later part of the Mesolithic, with the emergence of transverse arrowheads, and that most certainly bears no relation to the reindeer antler axe.

Conclusions

The attribution of dated Late Palaeolithic bone and antler organic implements to certain taxonomic groups with particular lithic complexes in the eastern Baltic area is one of the key research issues. Currently, only several groups of such a type of artefact are known here, including reindeer antler axes, bone harpoons, and one bone 'dagger'. However, the largest group of dated implements currently consists of reindeer antler axes, whose absolute age and technology are in parallel with the same tool types found in northwest Europe. Three sites with lithic concentrations found on the terraces of the River Nemunėlis at the village of Parupė in northern Lithuania still lack much information to securely link them to the antler axe found in the area. On the other hand, a typological and technological overview allowed for the investigation of their supposed chronology, their relation to the first inhabitants on the banks of the River Nemunėlis, and the observation of continuity of settlement during the Mesolithic. Most of the information was given by the finds from site 1, where one large tanged point evinces technological features close to Bromme lithic technology. In northwest Europe, this culture is dated to the GI-1b/1a and the beginning of the GS-1. The Parupė reindeer antler axe is also dated to within this period, with a calibrated age of 11 221–11 048 cal BC. The complex of lithic finds at site 1 is mixed with the later settling phase of the Early Mesolithic, which is evident from the eponymous Pulli point and narrow blade technology. Therefore, it is currently quite difficult to distinguish clearly certain lithic groups, with poor typological and technological features, attributable only to the Late Palaeolithic or Early Mesolithic occupation phase. However, considering the technological point of view, the complex of Late Palaeolithic lithics appears to be moderate at present, and besides tanged points, also includes core fragments, blades, microburins, burins and scrapers. The mixed archaeological material does not give a definite answer to whether the technology of classic Bromme culture could have existed in Lithuania, and only further research with larger and homogenous lithic concentrations would be able to confirm it. However, the complex of Late Palaeolithic flint artefacts distinguished at site 1, and its relative chronology, suggests that this particular lithic complex may be in accordance with the reindeer antler axe.

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Abbreviations

Archaeol. Baltica – Archaeologia Baltica

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BANDYMAS SUSIETI TITNAGO RADINIŲ KOMPLEKSĄ SU ŠIAURĖS ELNIO RAGO *RANGIFER TARANDUS* KIRVIU IŠ PARUPĖS RADAVIETĖS ŠIAURĖS LIETUVOJE

TOMAS RIMKUS, ALGIRDAS GIRININKAS

Santrauka

Šiame straipsnyje pristatomi titnago radiniai, aptikti trijose vietose Nemunėlio upės kairiajame krante, Parupės kaime, šalia Nemunėlio Radviliškio miestelio Šiaurės Lietuvoje. Identifikuotos trys radavietės, kuriose lokalizuoti pagal tipologinius-technologinius dirbinių ypatumus skirtingais laikotarpiais datuojami titnago radiniai (1 pav.). Radiniai aptikti šalia 2014 m. Nemunėlio pakrantėje rasto kirvio, pagaminto iš šiaurės elnio (*Rangifer tarandus*) rago ir datuojamo 11 221–11 048 m. pr. Kr. (2 pav.). Tokio tipo dirbinių žinoma daugelyje Šiaurės Europos regionų, jie datuojami vėlyvuoju ledynmečiu (1 lentelė). Todėl šiame straipsnyje, aptariant titnago dirbinių technologiją ir jų tipologiją, bandoma chronologiniu ir kultūriniu būdu susieti dalį titnago radinių su šiaurės elnio rago kirviu.

Pirmojoje radavietėje iš viso aptikti 436 titnago radiniai, iš kurių dirbinių kategorijai priskiriami perforatoriai, gremžtukai, rėžtukai, antgaliai, skelčių dalijimo atliekos, skaldytiniai ir ašmenėliai. Čia išskirtas vėlyvojo paleolito Bromės technokompleksui būdingų dirbinių kompleksas: mikrorėžtukai, stambios skeltės ir jų fragmentai, skaldytiniai, gremžtukai, rėžtukai ir vienas įkotinis antgalis (3; 4 pav.). Šioje radavietėje taip pat išskirtas ankstyvojo mezolito *Pulli* technologijos kompleksas, kuriam būdinga išvystyta siaurų ir reguliarių skelčių technologija, iš jų pagaminti ašmenėliai, lancetas, skaldytinių fragmentai ir įkotinis antgalis (5 pav.).

Antrojoje radavietėje, kuri yra kiek nutolusi nuo kirvio radimo vietos, rasti 44 titnago radiniai. Čia identifikuotas mezolito pabaigai priskiriamas titnago radinių kompleksas: gremžtukas, išlinkimą turinčios skeltės, pusiau kūginis skaldytinis ir trapecija (6 pav.). Trečioji radavietė yra aukštutinėje upės terasoje. Joje aptikti tik keturi titnago radiniai, kuriuos sudaro nuoskalos ir vienas skaldytas rieduliukas (2 lentelė).

Šiaurės elnio rago kirvių Šiaurės Europoje daugiausia žinoma iš Vokietijos, Pietų Skandinavijos ir Lenkijos. Rytinėje Baltijos regiono dalyje šiuo metu jų žinoma iš Lietuvos, Latvijos ir Kaliningrado srities (7 pav.). Daugelis jų žinomi tik kaip pavieniai radiniai, be aiškaus archeologinio konteksto. Todėl tiriant Parupės 1-ojoje radavietėje rastus titnago radinius, pasitaikė puiki galimybė bandyti susieti dalį jų su šiaurės elnio rago kirviu. Šioje radavietėje išskirtas vėlyvajam paleolitui būdingas titnago radinių kompleksas. Remiantis jų technologija nustatyta, kad skeltės buvo gaminamos atskeliant jas nuo vienagalių ir dvigalių skaldytinių, taip pat jas dalijant mikrorėžtukiniu būdu, kuris, remiantis mikrorėžtukine liekana, skiriasi nuo mezolitui būdingos technologijos. Taip pat čia aptikta ir dvigalių skaldytinių, kurių aikštelės smarkiai apskaldytos, nuo skaldymo likusios „kišenės“. Todėl manytina, kad skeltės buvo skaldomos tiesioginio smūgio technika. Čia aptiktas ir vienas stambus įkotinis antgalis, pagal analogijas būdingas Bromės kultūrai. Šios kultūros klausimas Lietuvos teritorijoje buvo gvildentas ir anksčiau. Deja, Parupėje aptiktas pavienių titnago radinių kompleksas, todėl jis Bromės kultūrai priskirtas ir su šiaurės elnio rago kirviu susietas tik remiantis tipologiniais ir technologiniais bruožais.

Parupėje ir Kaliningrado srityje aptikti šiaurės elnio rago kirviai žymi laikotarpį tarp 11 600 – 11 100 m. pr. Kr. Tai šiuo metu ankstyviausios radiokarboninės datos, siejamos su pirmųjų žmonių atėjimu į šias teritorijas. Tačiau Lietuvoje aptiktas šiaurės elnio ragas datuojamas apie 500 metų anksčiau negu šie dirbiniai (8 pav.), todėl didelė tikimybė, kad Lietuvos teritorija kartu su pirmaisiais sausumos žinduoliais žmonių galėjo būti apgyventa dar XII tūkst. m. pr. Kr. pradžioje.