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Vilūnai 5: A Stone Age and Early Metal period site in the western part of Kalviai Lake valley (southern Lithuania)

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Keywords

Hunter-gatherers, lithic technology, ceramics, prehistoric landscape, Kalviai Lake

Abstract

In 2020, extensive archaeological research was carried out in the western part of the Kalviai Lake valley. New sites were identified, one of which was named Vilūnai 5. It is a sandy open-air site located on a fluvioglacial hill. The archaeological investigations have shown that the site was probably visited by people as early as the Final Palaeolithic, but the most intensive episodes of occupation are seen in the Mesolithic, Subneolithic and Neolithic periods, as well as the beginning of the Metal period. This paper aims to present the results of these excavations. It provides data on the flint and non-flint lithic artefacts and ceramic finds. Although the site does not contain preserved organics, and therefore much data concerning human activity is absent, this paper aims to integrate the Vilūnai 5 site and its archaeological material into the overall context of Stone Age sites around Kalviai Lake's shores.

Introduction

Southern Lithuania has an abundance of Stone Age sites. The numerous lakes and the river system favoured the settlement and mobility of hunter-gatherer communities, while the local resources allowed people to adapt to the local ecosystems. One such favourable place was likely to have existed at Lake Kalviai in the northern part of southern Lithuania. A number of Stone Age sites are known on its shores, but no large-scale research has been carried out here (Šatavičius 2014). In 2020, construction work began on an international gas pipeline between Poland and Lithuania in the territory of Lithuania. Archaeological surveys were carried out along its entire route, which often developed into more in-depth fieldwork (Kuncevičius et al. 2021; 2023). Its route also crossed the western part of the Kalviai Lake valley, where three new sites dating to various phases of the Stone Age, the Early Metal period and even later chronological stages were previously discovered (Šatavičius 2014). Prior to these works, flint finds were made on the soil surface, indicating possible new unknown sites. One of them was identified in the adjacent village of Vilūnai and later named as Vilūnai 5. Its excavation has yielded multi-period archaeological material, most of which consists of artefacts left behind by the hunter-gatherers and early pastoralist communities. The site is an open-air sandy site, which unfortunately did not reveal any preserved organics. In any case, however, it offers further evidence of prehistoric human habitation around the lake and shows continuity of human activities here during prehistory and so merits discussion. Thus, in this paper, we present for the first time the archaeological investigation at the Vilūnai 5 site and its results.

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1. Research background

Vilūnai 5 is located in the western valley of Lake Kalviai (54.714882; 24.232162) (Fig. 1). The study area is situated at the boundary of the southern Lithuanian glaciation phase. The terrain is rich in plains formed by a glacial basin, indicating the presence of a large glacial lake, which was drained to form a smaller body of water. The bed of Kalviai Lake was formed in a channel bed. The landscape in the lake's western valley is characterised by fluvioglacial hills, some of which may have been peninsulas or islands when the lake water still existed in this area. Most of the valley is now overgrown. The Lapainia River and the Melnyčėlė stream are situated in the area.

Around the lake, there are prehistoric sites and single finds, such as stone and flint ground axes (Brazaitis and Piličiauskas 2005; Kurilienė 2009). The closest larger Stone Age and Early Metal period sites are known at Darsūniškis and Lapainia, both located ca. 6.5 km westwards on the right bank of the Nemunas River (Rimantienė 1974). Surveying of prehistoric sites around Kalviai Lake's shores began in the late 20th century, with the start of systematic fieldwork. The results of the research were mainly published in short report papers (Girininkas 1996; Šatavičius 2000; 2002; 2006a; 2006b; 2010). At the beginning of the 21st century, larger-scale research was conducted at the Kalviai 1 site (Šatavičius 2000; 2002). An area of 80 m^2 was excavated, which represented the largest archaeological investigation conducted in the area prior to 2020. All other sites have been subject to small-scale test pitting or only surface collection. A total of 15 prehistoric sites are currently known around the lake shores. A summary of studied prehistoric sites is given in the table below (Table 1).

Stone Age sites in Vilūnai village were first recorded during a survey in 1995. Two sites with flint and non-flint lithic finds and pottery were found, which were named Vilūnai settlement and site (Girininkas 1996). The Vilūnai settlement was found on a ploughed hill on the left bank of the Lapainia River. One 1 x 1 m test pit was excavated, but the majority of finds were found in ploughed soil. A total of 62 flint and other rock finds were found, some of which were attributed to various types of tools: scrapers, cutting tools, inserts and ground axes. Some flint blades are retouched, showing wear on the edges. On the basis of the artefact types, Vilūnai settlement was dated to the 4th–3rd millennium BC (Girininkas 1996).

Approximately 100 m to the south of the Vilūnai settlement, more archaeological finds were discovered on the adjacent hill. The site was named as Vilūnai site (Girininkas 1996). Only an assemblage of finds from the ploughed surface was collected. It was dominated by flint finds — flakes, blade fragments, scrapers and a fragment of core — but also included a fragment of a clay whorl and pottery.

Another site in Vilūnai yielding flint finds was discovered in 1998. It was located in the southwestern part of the western valley, on an elevation covered with pine trees, next to the Melnyčėlė stream. It is about 900 m away from the Vilūnai site recorded in 1995. Finds from the surface and test pits were attributed to the Mesolithic, but Iron Age pottery was also identified (Šatavičius 2014).

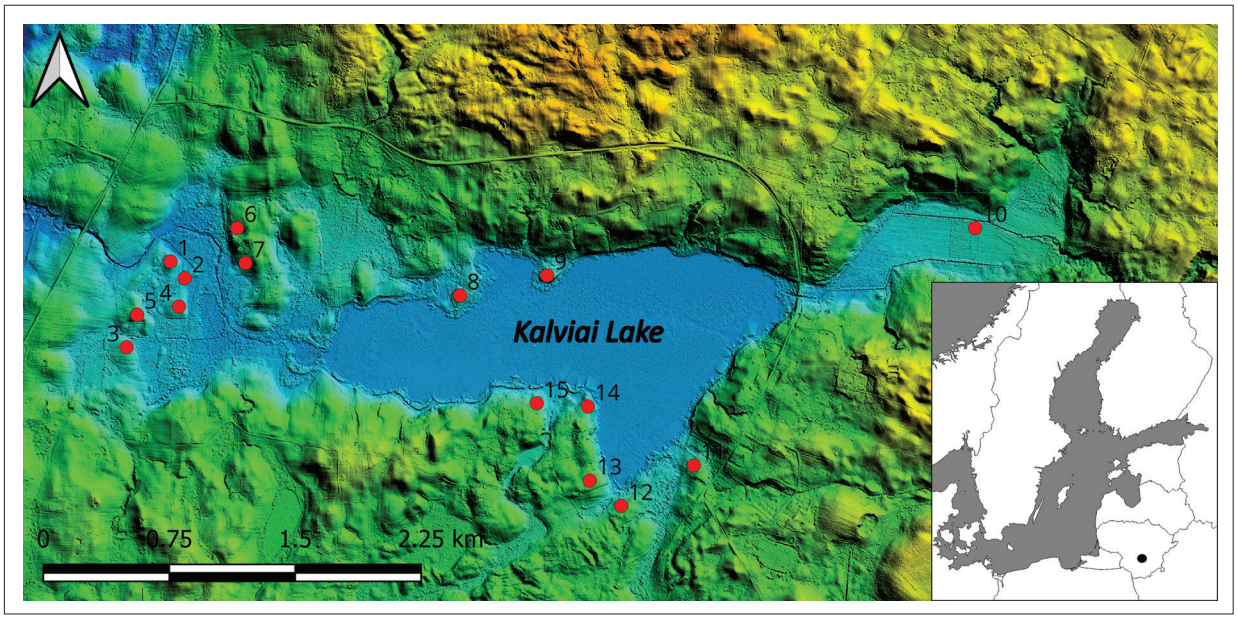

Figure 1. Geographical location of Kalviai Lake and currently known Stone Age sites on its shores: 1. Vilūnai 1; 2. Vilūnai 2; 3. Vilūnai 3; 4. Vilūnai 4; 5. Vilūnai 5; 6. Šventininkai 1; 7. Šventininkai 2; 8. Būtkiemis 1; 9. Būtkiemis 2; 10. Basonys 1; 11. Kalviai 5; 12. Kalviai 4; 13. Kalviai 1; 14. Kalviai 2; 15. Kalviai 3. Compiled by Rimkus.

Table 1. Summarised data of previously excavated sites around Kalviai Lake's shores.

Site	Researcher and excavation year	Artefact types	Chronology[1]	Dating method	Reference
Basonys 1	A. Girininkas (1995); E. Šatavičius (1996–2005)	Lithics, pottery	Neolithic and Bronze Age	Typology	Girininkas 1996; Šatavičius 2014
Būtkiemis 1	A. Girininkas (1995); E. Šatavičius (1999-2002)	Lithics, pottery	Neolithic	Typology	Girininkas 1996; Šatavičius 2014
Būtkiemis 2	E. Šatavičius (1996)	Lithics, pottery	Neolithic, Bronze Age and Iron Age	Typology	Šatavičius 2014
Kalviai 1	A. Girininkas (1995); E. Šatavičius (1999–2000)	Lithics	Final Palaeolithic and Mesolithic	Typology	Girininkas 1996; Šatavičius 2014
Kalviai 2	E. Šatavičius (1999)	Lithics	Final Palaeolithic and Mesolithic	Typology	Šatavičius 2014
Kalviai 3	E. Šatavičius (1999)	Lithics	Mesolithic and Neolithic	Typology	Šatavičius 2014
Kalviai 4	E. Šatavičius (1999)	Lithics	Final Palaeolithic, Mesolithic and Neolithic	Typology	Šatavičius 2014
Kalviai 5	E. Šatavičius (1999)	Lithics	Mesolithic and Neolithic	Typology	Šatavičius 2014
Šventininkai 1	E. Šatavičius (1994);	Lithics	Mezolithic	Typology	Šatavičius 2014
Šventininkai 2	A. Girininkas (1995); E. Šatavičius (1999); D. Kontrimas (2015); A. Žilinskaitė (2020)	Lithics, pottery, animal bones, amber	Mesolithic and Neolithic	Typology	Girininkas 1996; Šatavičius 2014; Žilinskaitė et al. 2021
Vilūnai 1	A. Girininkas (1995)	Lithics, pottery	Mesolithic and Neolithic	Typology	Girininkas 1996
Vilūnai 2	A. Girininkas (1995)	Lithics, pottery	Bronze and Iron Ages	Typology	Girininkas 1996
Vilūnai 3	E. Šatavičius (1998)	Lithics, pottery	Mesolithic, Iron Age and Medievel	Typology	Šatavičius 2014
Vilūnai 4	D. Kontrimas (2015); G. Piličiauskas (2020); T. Rimkus (2020); R. Vengalis (2015–2016)	Lithics, pottery animal bones, wood, amber	Final Palaeolithic–Bronze Age	Typology, AMS	Kontrimas 2016; Piličiauskas et al. 2021; Rimkus et al. 2021b; Vengalis et al. 2016
Vilūnai 5	G. Piličiauskas (2020); T. Rimkus (2020); G. Zabiela (2020)	Lithics, pottery, amber	Mesolithic–Bronze Age	Typology, AMS	This study; Piličiauskas et al. 2021; Rimkus et al. 2021a; Zabiela et al. 2021

[1] In this category, the Neolithic is not linked in detail to the hunter-gatherers or pastoralists in some of these published works. It is distinguished on the basis of types of pottery or lithic tools. The chronology of the sites was therefore based on the chronology mentioned in these references.

These sites were later numbered: the Vilūnai settlement discovered in 1995 was renamed as Vilūnai 1, the original site as Vilūnai 2, and the third location as Vilūnai 3.

The discovery of the Vilūnai 4 site is connected to the beginning of the construction of the international gas pipeline link in 2020. The surveys involved visual surface inspection, preceded by landscape analysis and the selection of the most promising areas for archaeological finds. The surveys identified 12 new sites, including a site in Vilūnai, which was subsequently named Vilūnai 4 during the excavation that followed (Vengalis et al. 2016). The initial archaeological surveys here produced a collection of flint finds dating back to the Final Palaeolithic and Mesolithic.

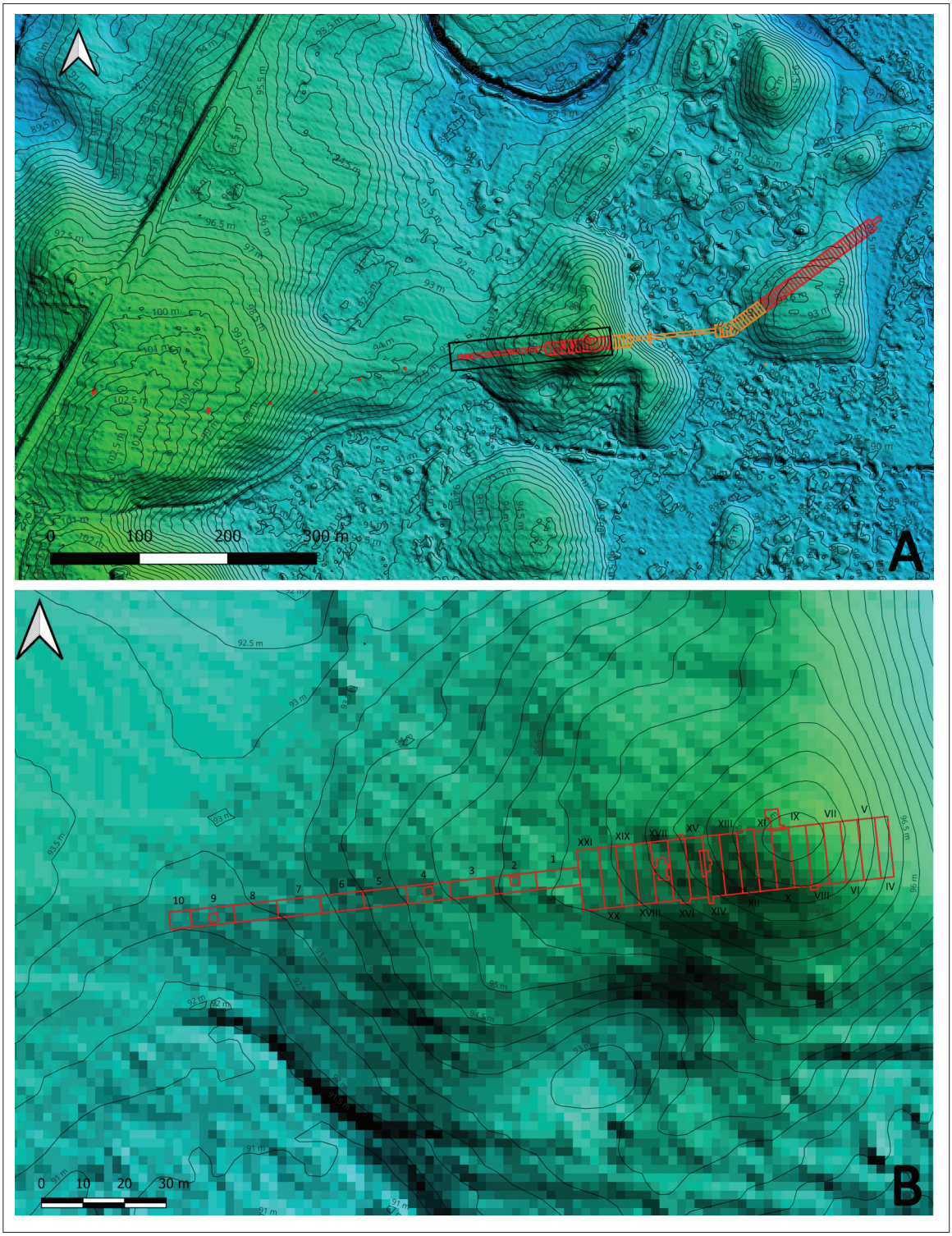

Figure 2. A. General excavation plan of Stone Age sites in Vilūnai. Rectangle marks location of large-scale excavation trenches in Vilūnai 5 site. Red trenches were excavated by the researchers from Klaipėda University, orange by Lithuanian Institute of History. B. Trenches 1–10 and IV–XXI excavated in Vilūnai 5 site. Compiled by Rimkus.

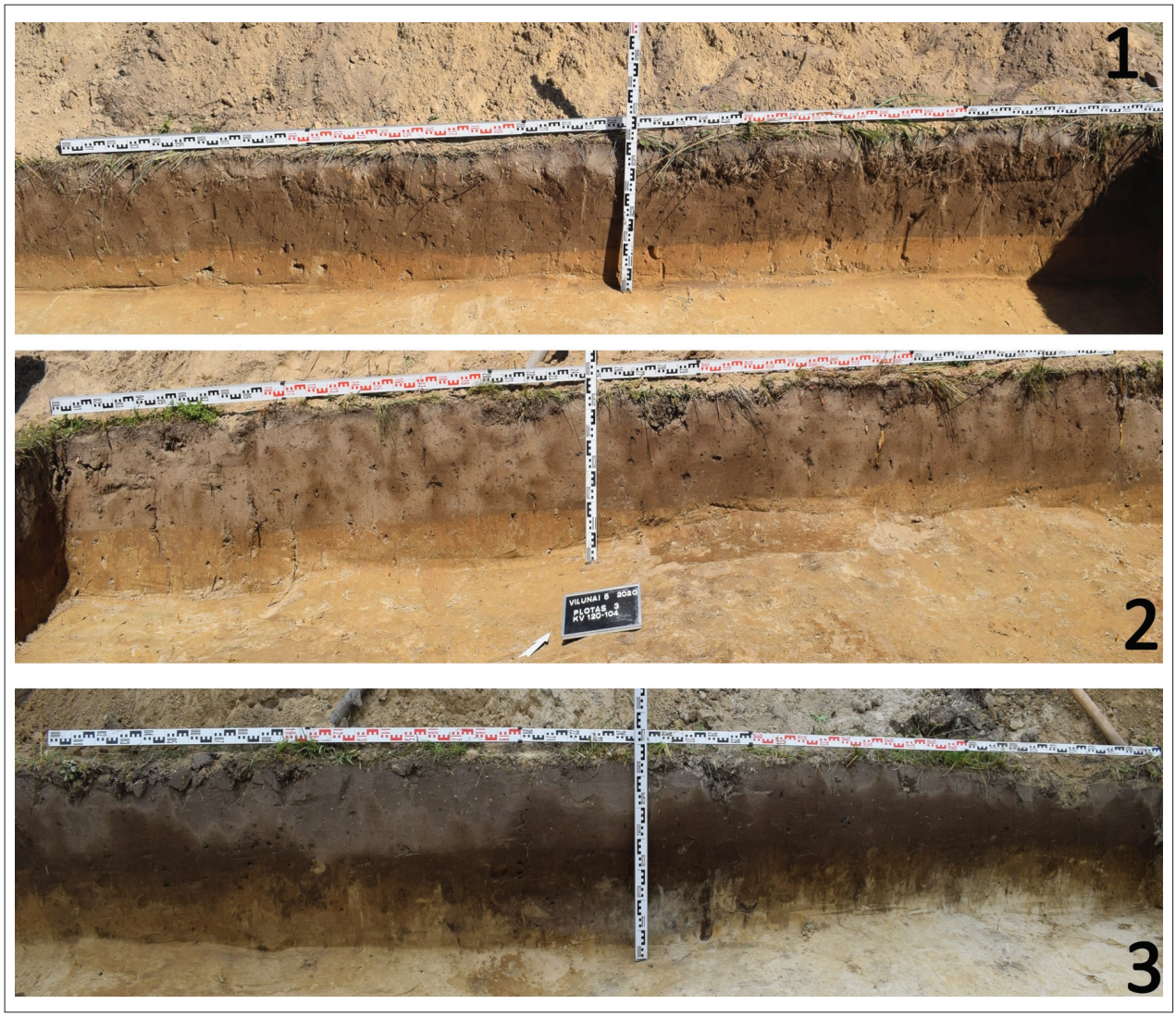

Figure 3. Examples of stratigraphy at the site: 1. Trench 1; 2. Trench 3; 3. Trench 8. Photographs by Rimkus.

In 2015, the first archaeological investigations were carried out at the Vilūnai 4 site, in the course of which 13 1 x 1 m test pits were investigated. This revealed that in the western area of the hill, under the ploughed layer, there was a 15–25 cm thick layer with lithic finds. In other parts of the hill, the cultural layer had been destroyed by years of agricultural activity. Some of the flint finds were attributed to the Final Palaeolithic (Kontrimas 2016). In 2020, a large-scale excavation was carried out here, during which material from various Stone Age and Bronze Age periods was found (Piličiauskas et al. 2021; Rimkus et al. 2021b).

The Vilūnai 5 site was identified in 2020 (Piličiauskas et al. 2021; Zabiela et al. 2021). It is located on a sandy upland in the western valley of Lake Kalviai, ca. 180 m from Vilūnai 3 and ca. 250 m from Vilūnai 4. The initial survey here revealed a semi-conical blade core. Subsequent test pitting identified more flint finds and pottery. The pipeline crossed the site and therefore archaeological investigations were carried out in order to fully investigate the area.

2. Archaeological excavation

Prior the excavation at the site, surface finds indicated the potential presence of a Stone Age site, as well as a post-medieval burial ground. Therefore, three 2 x 5 m trenches and three 2 x 2 m test pits were investigated. Flint and other lithic artefacts and small pottery fragments were found.

Large-scale field investigations followed.[2] The trenches were numbered from IV to XXI and from 1 to 10 (Fig. 2). A total area of 1373.65 m^2 was investigated. Archaeological finds were found in the turf layer, which was between 5 and 25 cm thick in the different study areas. Underneath this, greyish sand up to 20–30 cm thick was recorded in different areas, and underneath this layer, yellowish sand up to 10–20 cm thick was found. Fine, whitish sand with no archaeological finds was reached in these trenches at a depth of between 60 and 70 cm from the ground sur-

[2] The eastern part of the Vilūnai 5 site was excavated by researchers from the Lithuanian Institute of History (Piličiauskas et al. 2021), the results of which are not discussed in this study.

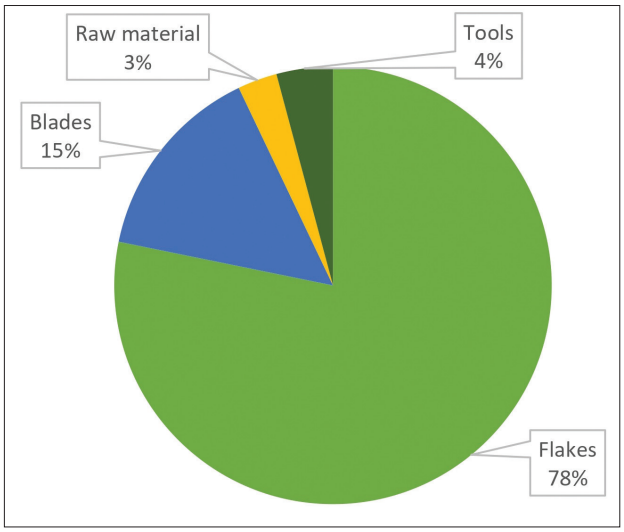

Figure 4. General number of flint finds. Compiled by Rimkus.

face (Fig. 3). The layers began to change as the excavations proceeded in a western direction, i.e. towards the hillside. Clay layers up to 15–30 cm thick were found beneath a layer of turf 5–15 cm thick in some trenches. All artefacts were found in the turf and greyish and yellowish sand layers. The number of archaeological finds was lower in the trenches towards the hillside compared with the trenches excavated on its higher part. All the sandy soils examined were sieved through a 5 x 5 mm sieve.

3. Artefact types

Archaeological investigations at Vilūnai 5 have mainly produced flint finds: various types of flakes and blades, and artefacts. There were also artefacts made from non-flint rocks. In addition to lithics, pottery has been found, the typological and technological characteristics of which are not limited to the Stone Age. A total of 4237 artefacts were identified (Table 2).

Table 2. Number of artefacts in each excavated trench.

Trench ID	Trench size (m)	Flint	Non-flint lithics	Ceramics
1	4 x 10	215	7	42
2	4 x 10	464	15	83
3	4 x 10	253	16	25
4	4 x 10	88	3	6
5	4 x 10	20	-	1
6	4 x 10	31	2	3
7	4 x 10	42	1	3
8	4 x 10	64	-	15
9	4 x 10	31	-	2
10	4 x 5	5	-	-
IV	14 x 3	118	5	1
V	14 x 4	76	6	-
VI	14 x 4	6	4	-
VII	14 x 4	18	5	-
VIII	14 x 4	8	1	-
IX	14 x 4	-	-	-
X	14 x 4	7	2	-
XI	14 x 4	7	1	-
XII	14 x 4	6	2	-
XIII	14 x 4	52	1	-
XIV	14 x 4	90	4	1
XV	14 x 4	75	-	-
XVI	14 x 4	255	9	15
XVII	14 x 4	335	3	1
XVIII	14 x 4	129	2	23
XIX	14 x 4	335	15	75
XX	14 x 4	395	16	118
XXI	14 x 5	393	19	134
Finds found in the excavated soil	-	31	-	1
Total		3549	139	549
	Overall amount	4237		

3.1 Flint

The largest number of archaeological finds at Vilūnai 5 were flints. They comprise various types of flakes, blades, pieces of raw material and implements (Fig. 4). The vast majority of the finds in all categories are covered with a whitish or bluish patina and bear heating marks.[3]

Flakes constitute the largest group of flint finds. These flakes are of various sizes and shapes and were formed during the processing of a piece of flint raw material, the shaping of a core or the further manufacture of a tool of the chosen type. This indicates the intensive use of flint raw material at the site and its processing. Usually, flakes are production waste, but they were also used to make various types of tools, very often attributed to domestic types (i.e. scrapers, cutting tools, axes).

The second largest group of flint finds is made up of blades. These are usually elongated and regular in shape, and of various lengths, widths and thicknesses. Blades were used most commonly for hunting tool manufacture, but also for various domestic tasks, such as cutting, scrap-

[3] There is no evidence that it can be linked to intentional human-related flint heating.

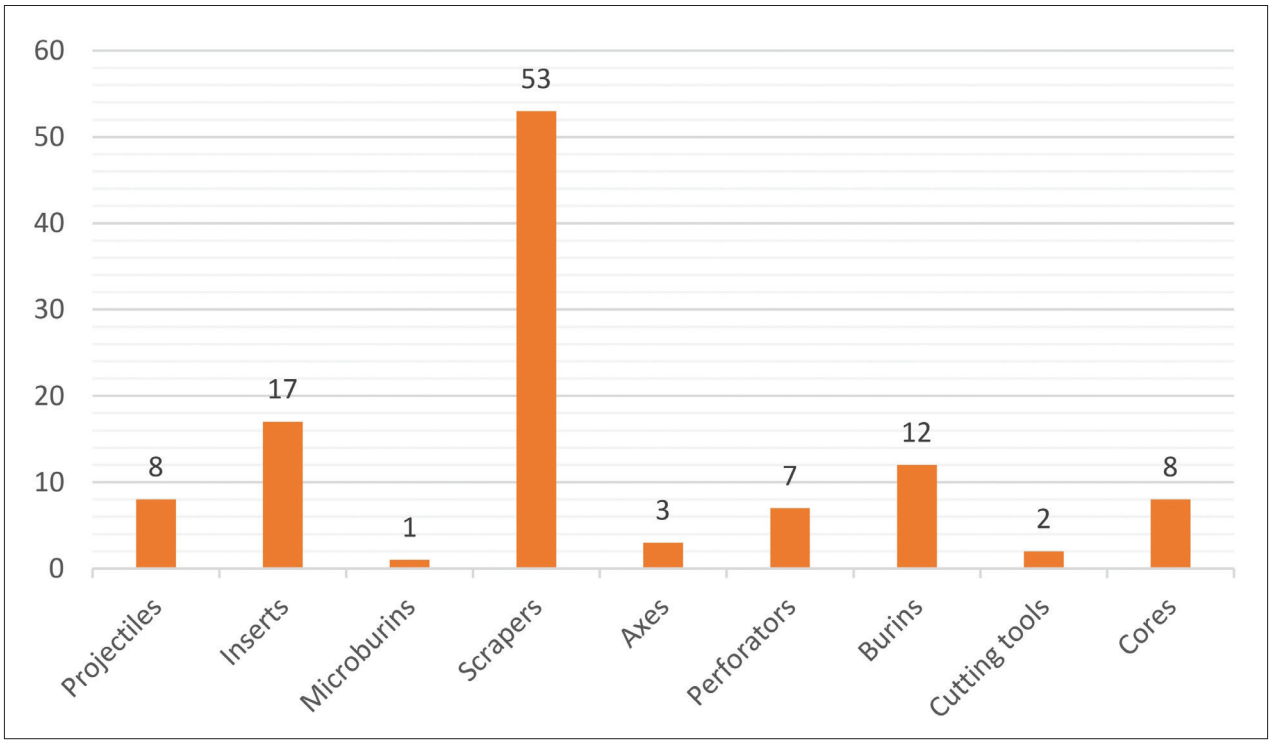

Figure 5. Types of flint. Compiled by Rimkus.

ing and perforating. However, both flakes and blades were adapted in various periods of the Stone Age to the prevailing technology and technological traditions of the flint industry at that time. For example, while blades were the dominant toolmaking technology in the Baltic region in the Final Palaeolithic, Mesolithic and Early Subneolithic (Damlien et al. 2018; Sørensen 2018; Berg-Hansen et al. 2019a), flakes and larger blades became more prevalent in toolmaking during the Mid-Subneolithic and the Neolithic (Apel 2012; Berg-Hansen et al. 2019b).

Among the finds, there were also various sized flint nodules. They were interpreted as raw material with no signs of human processing. These are not broken pieces, but it is possible that they were later used for shaping into cores.

The tool category consists of only 147 artefacts (Fig. 5) and represents only 4% of the total number of archaeological finds from the site. There are nine types of tools, which will be discussed in more detail below. The tools have been categorised on the basis of their visual typological and technological characteristics.

3.1.1 Projectiles

Eight artefacts were classified as arrowheads (Fig. 6). Three distinct types of arrowheads could be identified. The first is lanceolates (Fig. 6. 1 and 2). Two points were found, which are made of narrow blades using the microburin technique. The first is smaller and triangular in shape. Retouch can be seen on one of its sides as well as on its base. The second is made of a narrow and long blade — 41 mm long, 10 mm wide and 3 mm thick — and is covered with a bluish patina. Its tip is broken off, with only the remaining microburin facet visible.

Another category of arrowheads is associated with three trapezoidal points (Fig. 6. 3–5). These are usually made of blades, although there are also pieces made of flakes. Their edges are straight or oblique, and sometimes the base is retouched. Trapeziums were made either by using a microburin technique or by breaking the blade in the usual way and retouching the fracture points in the same way. In Lithuanian archaeology, attempts have been made to distinguish types of trapezoidal points (Rimantienė 1996; Rimkus 2019), but it would still take a considerable amount of research to do it in detail. The emergence of trapeziums in Lithuanian territory is associated with the end of the Mesolithic, around the 7th millennium BC (Rimantienė 1996; Ostrauskas 1999; Girininkas 2009; Zabiela et al. 2023, pp. 68–69). However, their technology was also used in the Subneolithic, but possibly to a much lesser extent, as the blade technology started to decline compared to the Mesolithic. The appearance of trapezium points in other Baltic region areas is also associated with the end of the Mesolithic (Vang Petersen 1984; Bokelmann 2000).

One of the trapeziums is a possible fragment as one of its edges is retouched in an oblique manner, the base is smooth and the edge shows wear marks (Fig. 6. 4). The other edge of the fragment is broken off, which makes it rather difficult to decide whether it was a trapezoidal point at all. However, the above-mentioned retouch on the

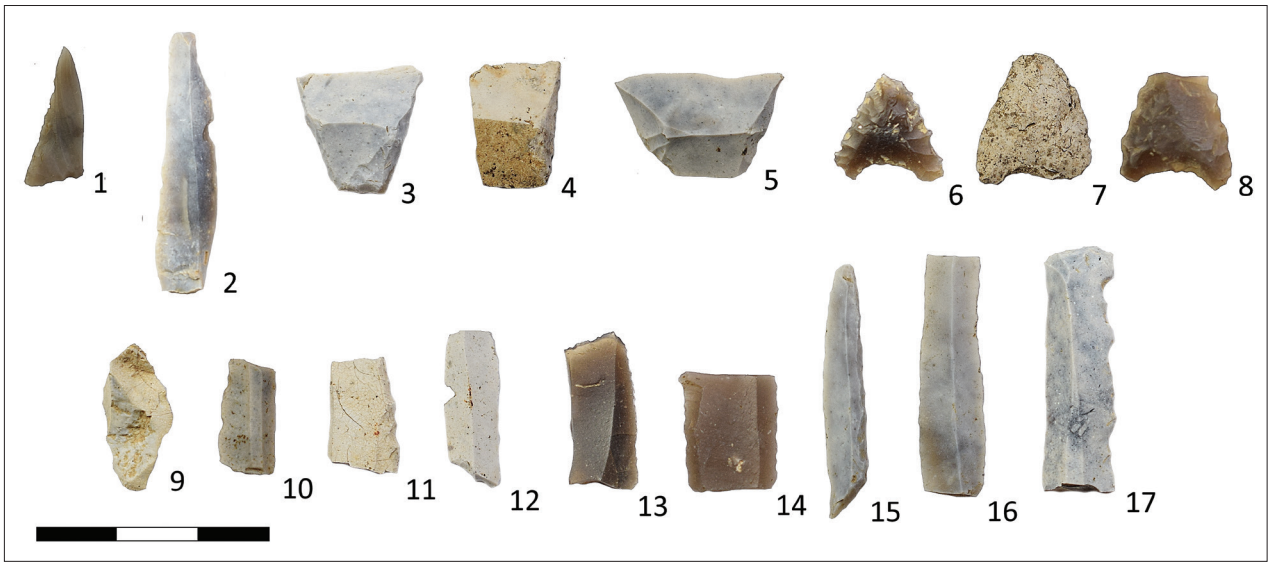

Figure 6. Flint artefacts identified at Vilūnai 5 site: 1. and 2. Lanceolates; 3.–5. Trapeziums; 6.–8. Triangular points; 9. Microburin; 10.–17. Inserts. Photograph by Rimkus.

Figure 7. Flint inserts found at Vilūnai 5 site. Photograph by Rimkus.

other edge might suggest that the other, broken, edge was also symmetrical.

One of the trapeziums is fully preserved (Fig. 6. 3). Both of its sides and the base have been retouched. The third trapezoidal point found at the site is also fully preserved (Fig. 6. 5). Both sides remain unretouched and it displays the use of the microburin technique.

The last type of identified arrowhead is the triangular type (Fig. 6. 6–8). It is the most common form of arrowhead in Lithuania occurring in Neolithic–Early Bronze Age sites (Brazaitis 2004; Piličiauskas 2012). These are made of flakes and their entire surface is retouched. The points at Vilūnai 5 are small — between 12 and14 mm long, 11–14 mm wide and 2–3 mm thick. Only one point was found fully preserved (Fig. 6. 6). Another identical point was

also found, but its tip was broken off (Fig. 6. 8). Its base is concave. The third point is covered with a whitish patina, and its edges are heavily damaged, but the base of the tip appears to be slightly concave (Fig. 6. 7).

3.1.2 Microburins

Only one microburin has been found at Vilūnai 5. It is poorly preserved (Fig. 6. 9). However, it provides evidence of the microburin technique being conducted at the site.

3.1.3 Inserts

There were 17 pieces of inserts found at the site (Figs. 6. 10–17; 7). All of them are made of narrow blades. Most of the inserts are only fragments, so it is difficult to judge their final form. Nevertheless, the majority of the pieces appear to be simple inserts with some or no retouch on the sides, but displaying clear signs of use on one of the edges. On the fully preserved rectangular blades, the retouch on the side and, in one case, on the base, appears to have been formed by pressing from the dorsal to the ventral side or vice versa. The three blades are irregular triangles, the bases of which were formed by the microburin technique. Some of the blades do not have regular retouch on the sides, but they still show wear on the edges. It is therefore likely that they were also used as inserts, but without additional retouching.

Inserts were commonly used as a parts of composite tools technology, for example, for slotted bone points. Although none of the prehistoric sites from Kalviai Lake contain such points, they were widespread in the Baltic region during the Mesolithic (e.g. Manninen et al. 2021; Rimkus et al. 2023; Knutsson et al. 2024).

3.1.4 Scrapers

There were 53 scrapers found at Vilūnai 5 (Fig. 8). An examination of their technological features shows that most of them are made of various shapes and sizes of flakes, but a few specimens were produced from blades too. Each of them has a slight curve on one of the ends, which has been retouched or heavily used. Many of the scrapers have retouched sides, presumably for its handling during the work. One of the scrapers has double working edges formed at the upper and lower ends. With this scraper, the individual was therefore able to perform the task more efficiently, as it was not necessary to renew the edge immediately after it became blunt.

3.1.5 Axes

Three flint items have been found that are attributed to axes (Fig. 9). Two of them are made of larger flakes, which have been reduced on both sides to give the axe its shape, butt and the working edge (Fig. 9. 1 and 2). Both of these

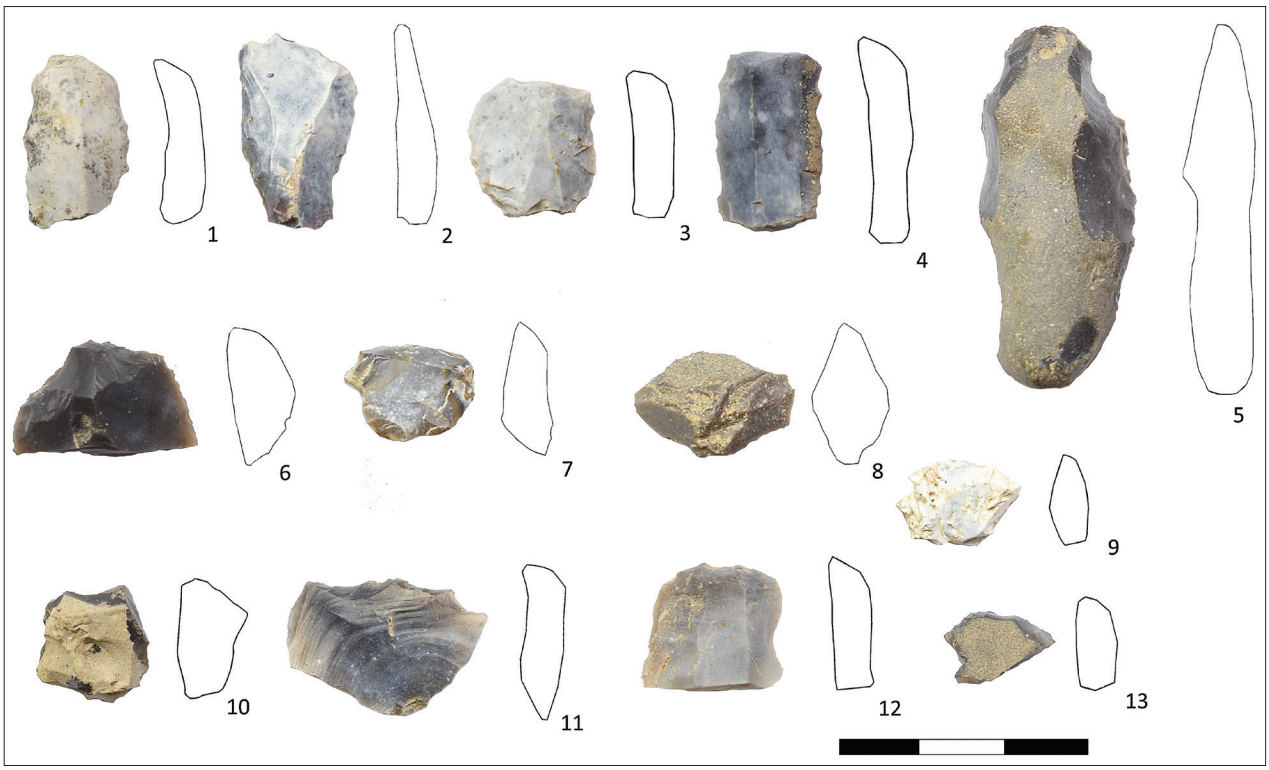

Figure 8. Flint scrapers. Photograph by Rimkus.

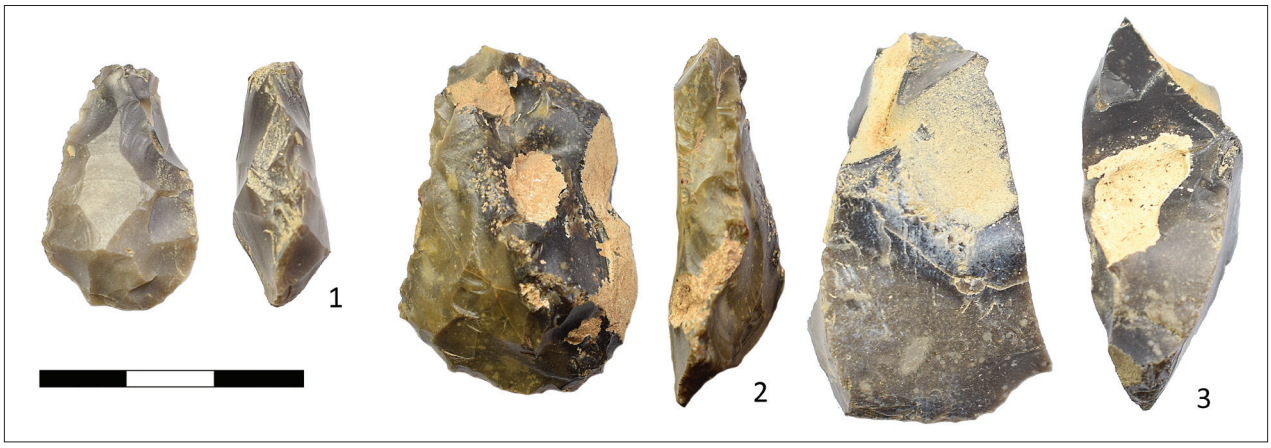

Figure 9. Flint axes. Photograph by Rimkus.

can be associated with the Late Mesolithic chronology, as it is believed that this was the period when this axe technology and shape was most common (Rimantienė 1971; 1996; Girininkas 2009).

The third artefact found at Vilūnai 5 does not have the technological features of the flint axes discussed above (Fig. 9. 3). It is a large, light-grey colour flint, which has the characteristic shape of an axe. Its sides are symmetrical, the working edge line is asymmetrical and the axe itself tapers towards the butt. Interestingly, the working edge shows wear with small, and sometimes coarse, flaking. Therefore, this may have been the preform of an axe, but the used edge would suggest that it is plausible that this may have been the final form of the tool.

3.1.6 Cutting tools

Although more than 500 blades have been found during the excavation, only two of them have very pronounced wear on their edges. It was therefore decided to classify them both as cutting tools. The first one is the middle part of a blade — 40 mm long, 13 mm wide and 7 mm thick. One of its edges shows heavy wear, probably caused by cutting a harder material (Fig. 10. 1).

The second specimen has only the lower fragment of the blade (Fig. 10. 2). It is a 32 mm long, 18 mm wide and 4 mm thick fragment. Most likely it was a proximal part of a tool. This is presumed because both sides of the blade are partially retouched. The end of the piece itself is also worked, with a tapering shape formed by retouch. These features would suggest that this end was worked in this way for better handling of the tool. On one of the sides, near the truncation, signs of use can be seen.

3.1.7 Perforators

Seven objects were found which were classified as perforators (Fig. 10. 3–9). Almost all of them are made of various sizes of flakes, but only one of them can be classed as a blade blank. There is no uniform form among the pieces, but there are some technological features that overlap. The finds in this group are characterised by a pointy end which has been specially retouched or shows significant wear. Some of the artefacts have additional retouching elsewhere on the tool. Almost all the perforators found at Vilūnai 5 have a triangular blade shape. All the edges are regular, converging in parallel to a single point (Slah 2019). The dating of the perforators is uncertain, but it is likely that they could be associated with the Mesolithic and Subneolithic periods.

3.1.8 Burins

A total of 13 finds have been categorised as burins (Fig. 11). Most of them are made of blades, but only a few examples can be attributed to flakes. However, all have their cutting edges formed in one or two directions. Two types can be distinguished: angle and dihedral burins (e.g. Sørensen 2017). Angle burins are the predominant type. They are made from blades, the edges of which were transformed into the cutting parts.

One of the fragments has the cutting edges formed at the upper part of the blade on each of its opposite angles. Two further such double burins have cutting edges at opposite angles in their upper and lower parts. One of the brownish patina burins has a cutting edge formed in the oblique direction (Fig. 11. 12).

The other type is the dihedral burin. One of them has additional retouching on one of the sides, right next to the cutting edge.

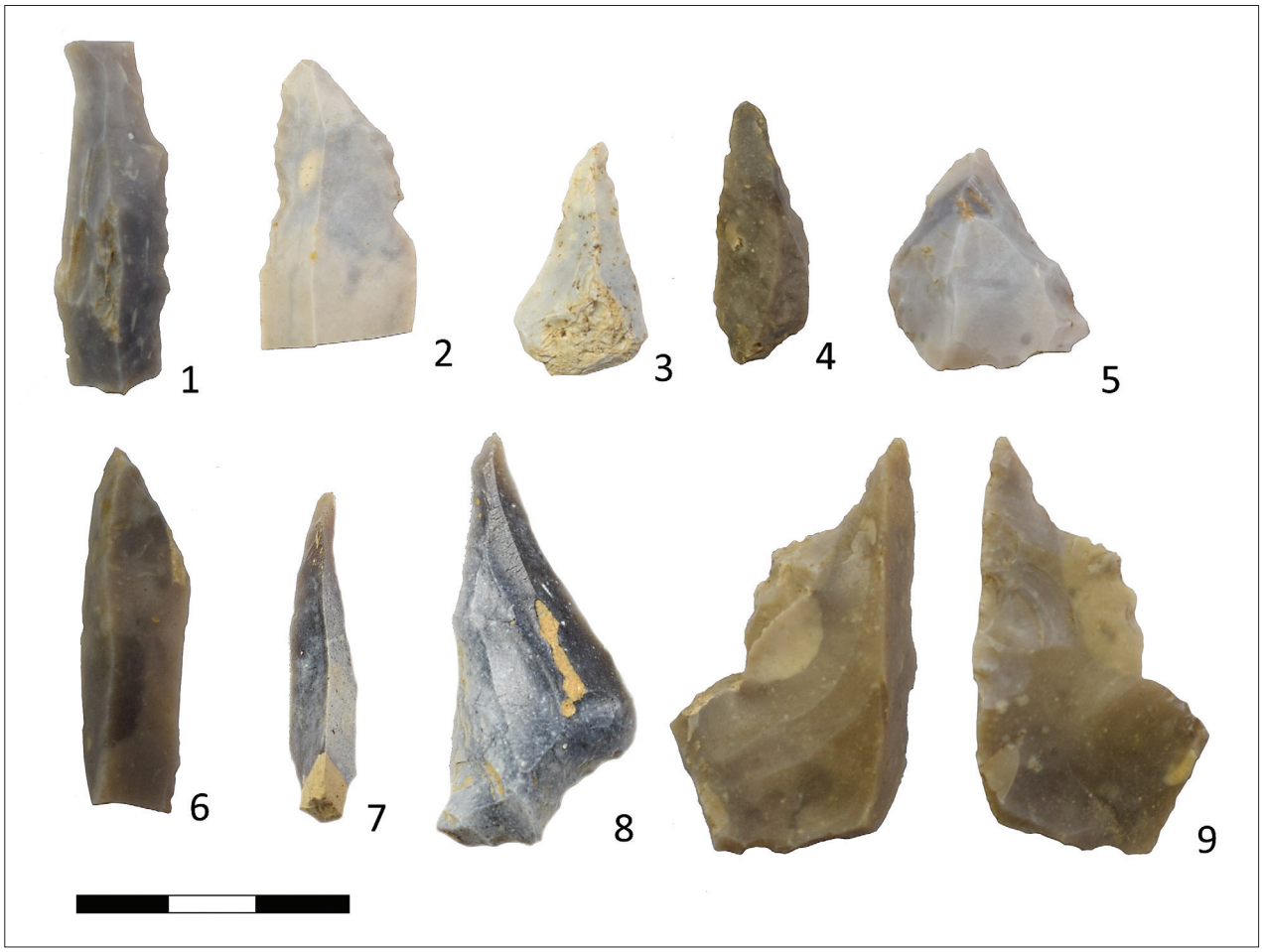

Figure 10. Blades with wear on the edges (1) and (2) and perforators (3–9). Photograph by Rimkus.

It is difficult to attribute the discovered burins to any particular Stone Age phase. It is very likely that they are distributed among separate stages throughout the Mesolithic, Subneolithic and possibly Neolithic. Some could also belong typologically to the Final Palaeolithic (Fig. 11. 7 and 8).

3.1.9 Cores

There were 13 cores identified (Fig. 12 and 13). These are mostly regular single platform cores used for the production of regular short blades, but a few conical and semi-conical cores used for narrow blades were also present. Only two conical cores have been found, but both are only fragments. One has a rounded lower part and the other a fragment of similar shape. Both were intended for the production of narrow and long blades.

One of the cores should be classified as a semi-conical type (Fig. 12. 7). It is likely that it was exploited using a pressure technique (Rimkus et al. 2020).

Four cores can be classified as double platform types. However, at least three of them are different from the classic Final Palaeolithic opposite platform cores. It seems likely that the knapping from one platform exhausted the core and at the other end of the site a new knapping front was formed, changing its direction. The two platforms were operated on different fronts, not opposite each other, so this differs from the Final Palaeolithic core processing. These cores can most likely be dated to the Mesolithic and Subneolithic.

Only one core from this collection is more similar to the Final Palaeolithic Swiderian cores (Fig. 12. 8). One of its platforms has been exploited more intensively and is completely exhausted. The other one is better preserved, suggesting that it was not the main one (Grużdź 2018). Also, the core indicates that both platforms were used on the same knapping front, opposite each other, which would suggest technology that predates the Mesolithic. Therefore, this fragment can be assigned to the Final Palaeolithic. This piece, and two previously mentioned burins, would be the only technologically diagnostic artefacts from this period at the site.

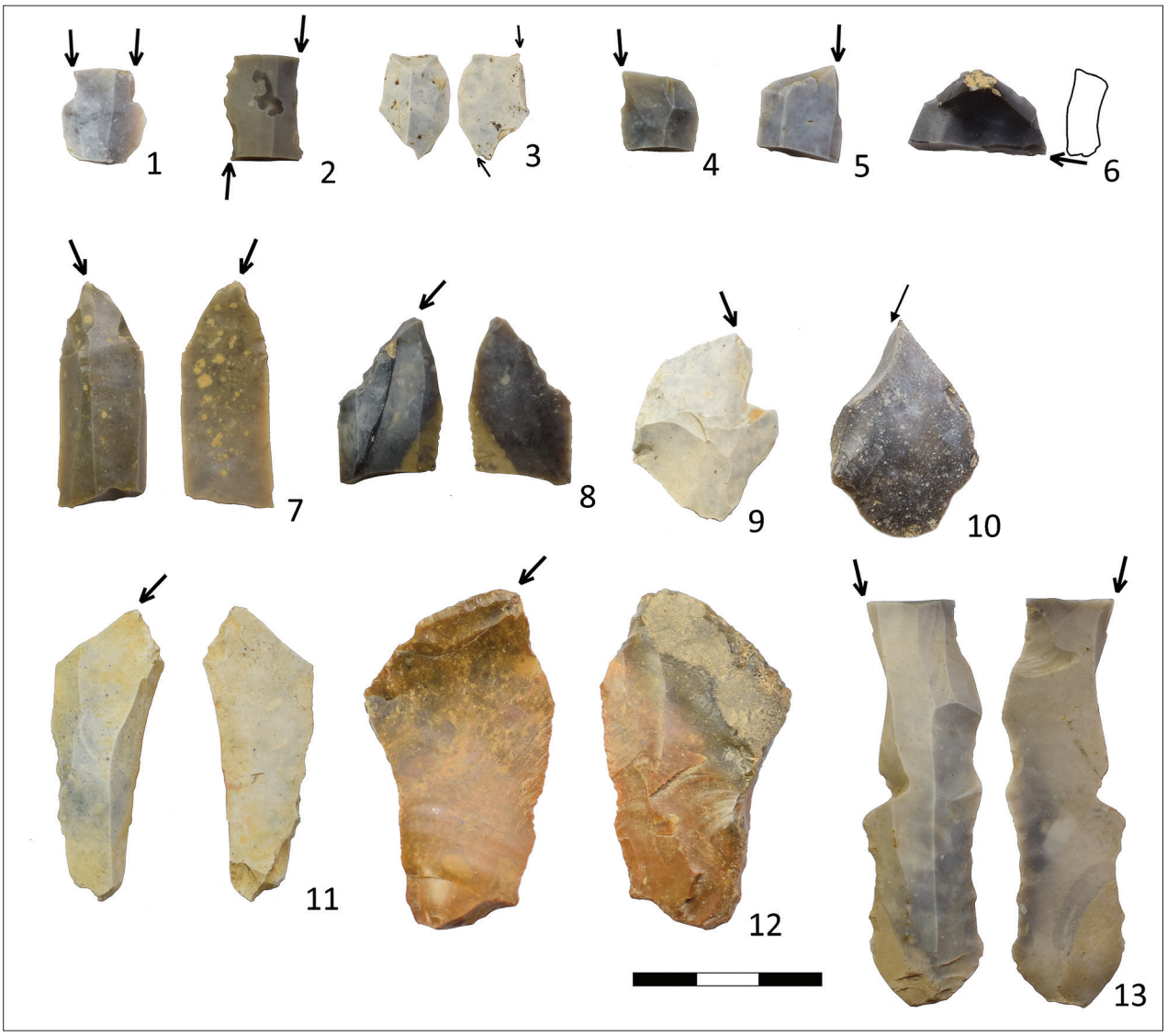

Figure 11. Flint burins. Photograph by Rimkus.

3.2 Non-flint lithic artefacts

A total of 141 non-flint lithic artefacts have been identified, but only 20 of them can be linked to a particular tool type. The 121 unclassified artefacts are of various sizes, and are mainly burnt granite, sandstone, quartz and quartzite rocks. Of the artefacts identified to tool type, hammerstones, axes and waste from their manufacture, as well as rocks with smoothed surfaces and one core from a stone axe hole perforation are discussed below.

3.2.1 Hammerstones

Six hammerstones have been found in total (Fig. 14). All are classified as granite, and are round or nearly round in shape. They were not necessarily intended for the preparation of the blades but were very suitable for the formation of cores or larger flakes. The ends of the pieces show varying levels of wear, formed by contact with other hard rock. Hammerstones are distributed throughout the Stone Age in Lithuanian territory, which makes it difficult to assign them to a specific chronology (Rimkutė 2012; Šatavičius 2012). The general chronology of the site would tentatively date them to the Mesolithic and Subneolithic, and possibly to the Neolithic, but the previously discussed core would suggest that there is a possibility that they could be dated to the Final Palaeolithic as well.

3.2.2 Axes

Four axes and manufacturing waste from one of them were found. The axes are large, between 75 and 144 mm long, 52–95 mm wide and 22–35 mm thick. Two are made from coarse-grained granite (Fig. 15. 1 and 2) and one from sandstone (Fig. 15. 3). None of these three specimens show any signs of polishing.

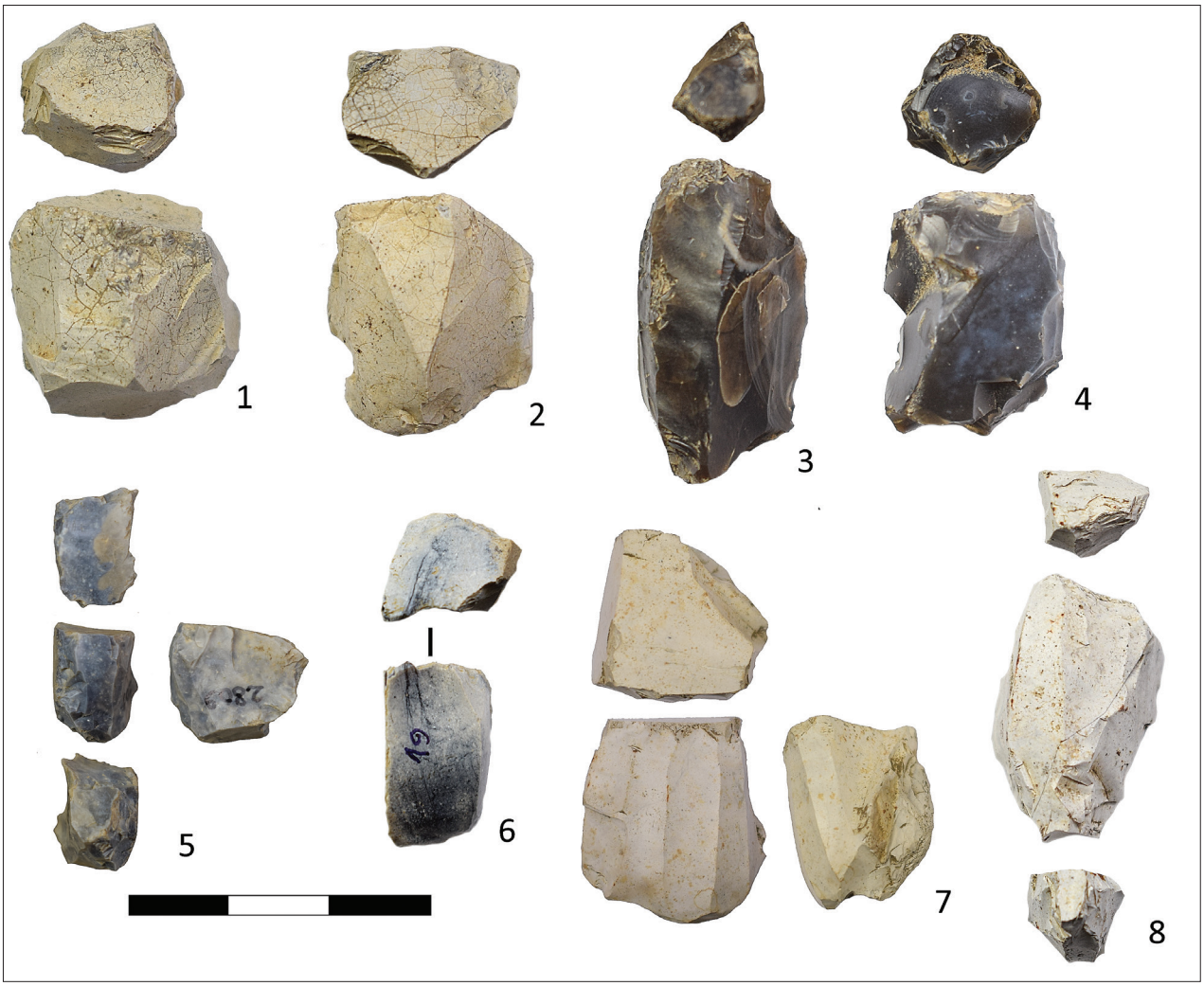

Figure 12. Flint cores. Photograph by Rimkus.

The sandstone axe is the largest of the three. It has been slightly modified by the chiselling of its surface in different parts. The axe edge is asymmetrical and shows the original cortical surface of the sandstone rock on one side. The edge seems to bear wear marks.

A fragment of a ground stone axe was found in trench XVI. It is a 75 mm long, 34 mm wide and 32 mm thick fragment lacking the butt part (Fig. 16. 2). It is not clear whether the axe was perforated or not as this part is broken off. The working edge is asymmetrical. The tool is made of fine-grained rock.

Production waste from the ground stone axes was found, namely a core from the hole perforation (Fig. 16. 1). Such finds have also been discovered along the gas pipeline route at the Late Bronze Age site of Tarbiškės (Piličiauskas et al. 2022). One of the largest assemblages of them is known from the collection of the priest and amateur archaeologist Juozapas Žiogas (Ostašenkovienė 2015).

3.3 Ceramics

A total of 549 pottery fragments were found. Most of them are small fragments that do not provide much information. The pottery at Vilūnai 5 is quite diverse in terms of technology and chronology, so it is difficult to draw broader conclusions from a visual examination of smaller fragments. In terms of technological features, there is evidence of hand-built, wheel-made, and possibly also wheel-turned, and glazed pottery. Hand-built pottery dominates the collection. There is varying sizes of crushed rock in the temper, from small to coarse, and some specimens also contain grog. Some fragments have cord impressions on the outer surface, some show striations and most have a smooth or rough surface.

3.3.1 Corded ware

Seven fragments have a cord impression (Fig. 17). These were found in trenches XIX and XXI. They are small frag-

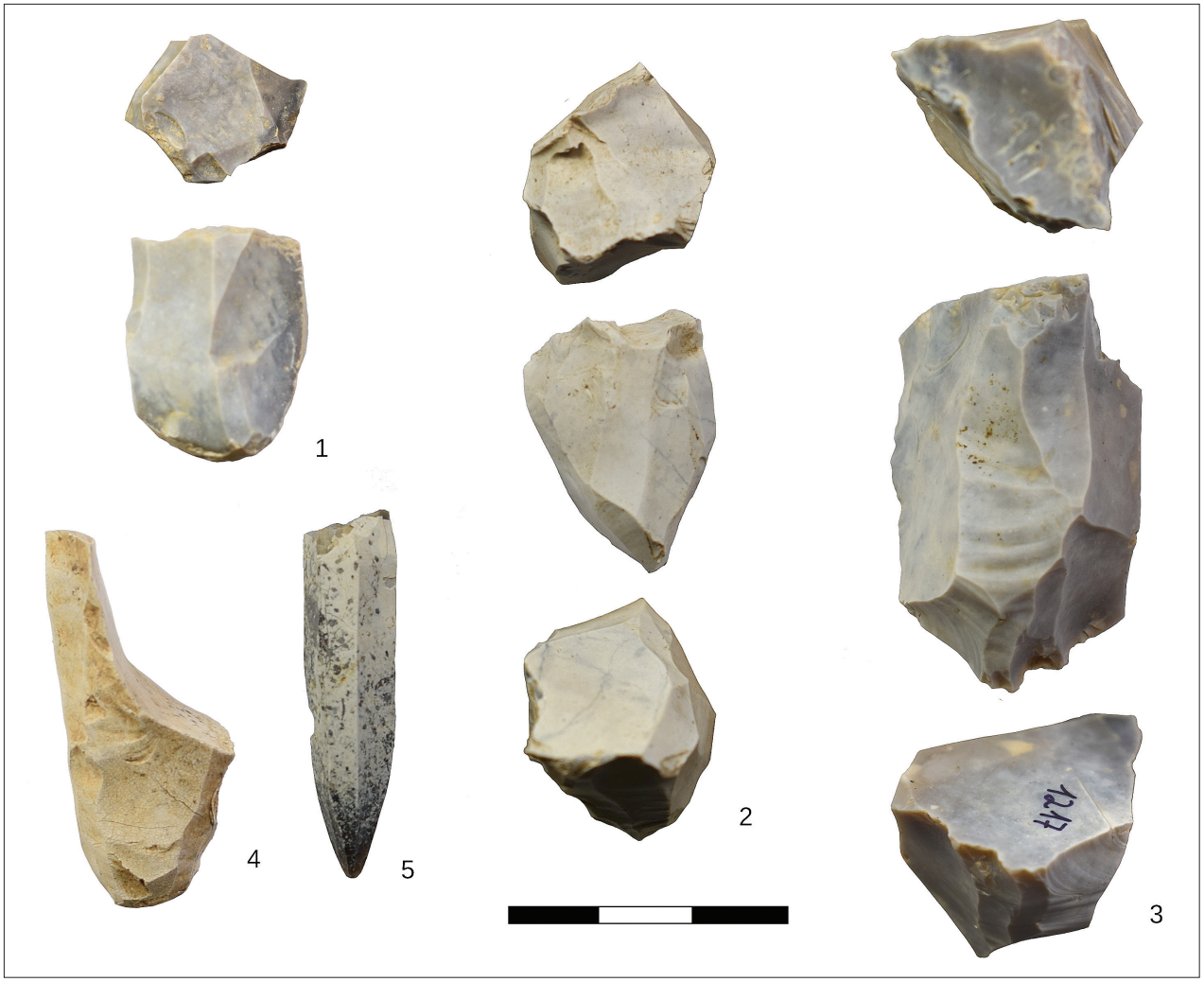

Figure 13. Flint cores. Photograph by Rimkus.

ments, between 16 and 37 mm in size, with one, two or three rows of horizontal cord impressions on the surface. One of the fragments has two rows of horizontal cord impressions and one dash in a near vertical position. Several fragments with visual evidence of grog and minerals in the temper are also potentially associated with this type of pottery, but they lack ornamentation on their surface. These fragments should be attributed to the Corded Ware culture, the chronology of which in the territory of Lithuania is placed in the 3rd millennium cal BC according to the latest research results (Piličiauskas 2018). These were pastoral societies, which per the available data brought the first domesticated animals in the southeastern Baltic region (Robson et al. 2019).

3.3.2 Striated pottery

Some of the pottery has striation on its surface (Fig. 18. 4–10). It is visible as a horizontal or slightly diagonal line formed on the outer surface of the object. The fragments have a reddish, yellowish or light brownish colour. The surface is rough, but fragments with a smooth surface also occur. Visual inspection of the pottery fracture sites suggests that its clay mass is dominated by coarse mineral temper, but sometimes there are slightly finer minerals in the temper as well. A more precise determination of the type of impurities would require petrographic analysis. A few sherds also date to the modern period (Fig. 18. 1–2).

Pottery with a striated surface has traditionally been associated with the Striated Pottery culture, and dates to between the 1st millennium cal BC and the 4th/5th century cal AD (e.g. Michelbertas 1986; Luchtanas 1992). However, new archaeological material and the research on it would indicate that the types and technologies of pottery at the end of the Bronze Age and the earliest Iron Age in Lithuanian territory are much more diverse (for more details see Urbonaitė-Ubė 2022; Vengalis et al. 2022; Valančius et al. 2024). This would present a much more complex picture of the pottery-making tradition, which could potentially alter the cultural understanding of this

Figure 14. Hammerstones. Photograph by Rimkus.

period. However, the striated pottery found at Vilūnai 5 has not been investigated in terms of its technological and petrographic aspects, and future research could provide more data on its production aspects.

4. Results Discussion

4.1 Lithic raw material

Prehistoric societies in Vilūnai 5 used the lithic raw materials available locally in this region for tool making. Due to its good knapping properties, flint was the dominant rock in their toolkit. The Baltic erratic flint is distributed in the basins of the Nemunas, Neris and Merkys Rivers in southern, southeastern and southwestern Lithuania (Baltrūnas et al. 2007), but its spread is not restricted to the territory of Lithuania; it extends into northwestern Belarus and northeastern Poland (Borkowski et al. 1995; Charniausky 1995). In the territory of Lithuania, flint extraction and processing sites were dated to the Stone Age as well (Ostrauskas 2000; Šatavičius 2012), but flint was undoubtedly also collected from the ground surface, eroded from river banks or lake shores. In the Kalviai Lake area, it is often found in the eroded gravel deposits.

The flint raw material found in the landscape may have been one of the factors behind the relatively dense distribution of Stone Age sites around the shores of the lake. While the ecological system of the lake itself certainly played an important role, the natural resources (flint in this case) must have been one of the criteria that allowed people to easily obtain lithic material and return to seasonal sites.

Non-flint rock types were also used to make stone tools. Most of them should be classified as granite and sandstone, but there was also gaize, quartz and, according to the external features of the stone axe perforation core, diabase. These are rocks available in the Nemunas basin, especially in the water-eroded areas. Although they were used less than flint because of their limited knapping properties, some tool types were made exclusively from them, for example, hammerstones or ground stone axes.

Figure 15. Stone axes. Photograph by Rimkus

Figure 16. Perforation core (1) and a fragment of ground stone axe (2). Photograph by Rimkus.

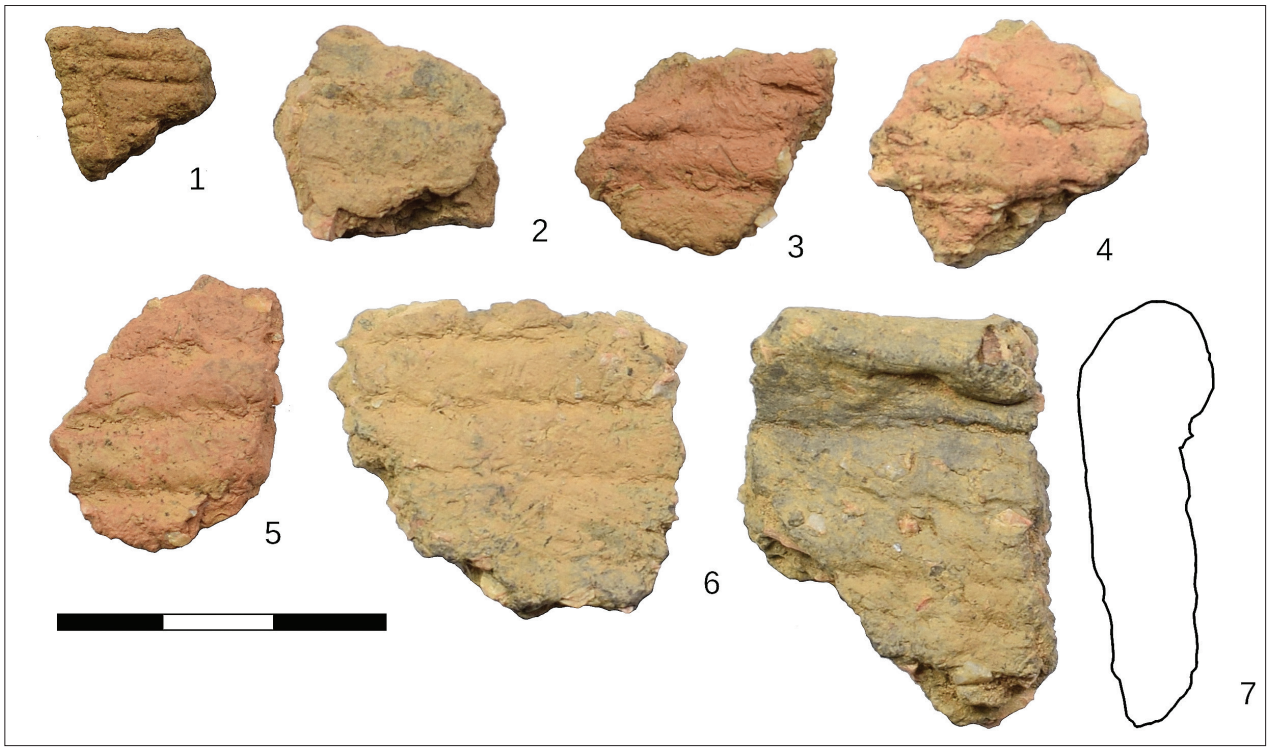

Figure 17. Fragments of corded ware pottery. Photograph by Rimkus.

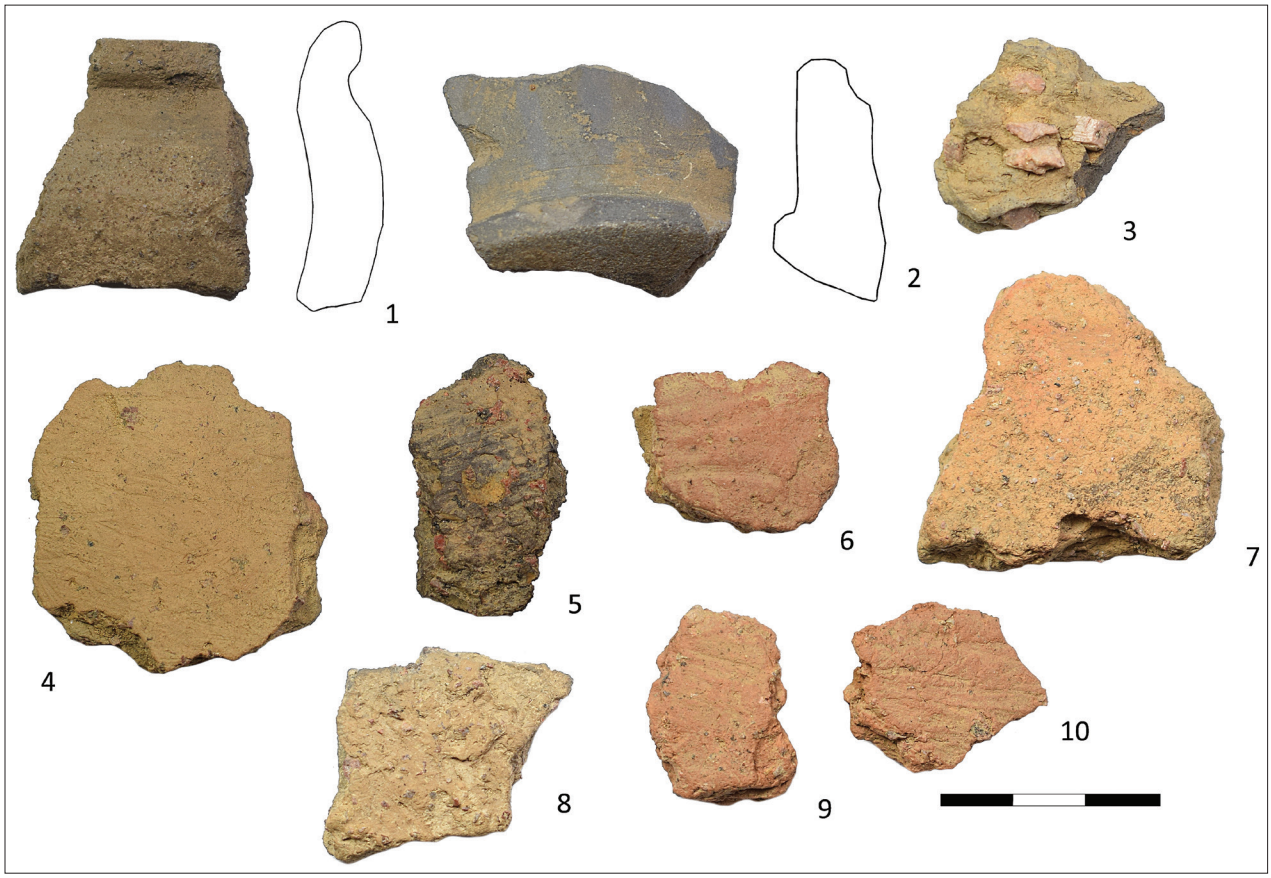

Figure 18. Pottery with striations on their surface (4–10). (1) and (2) represent wheel- made and probably wheel-turned pottery. No. 3 is difficult to distinguish as it is too fragmented. Photograph by Rimkus.

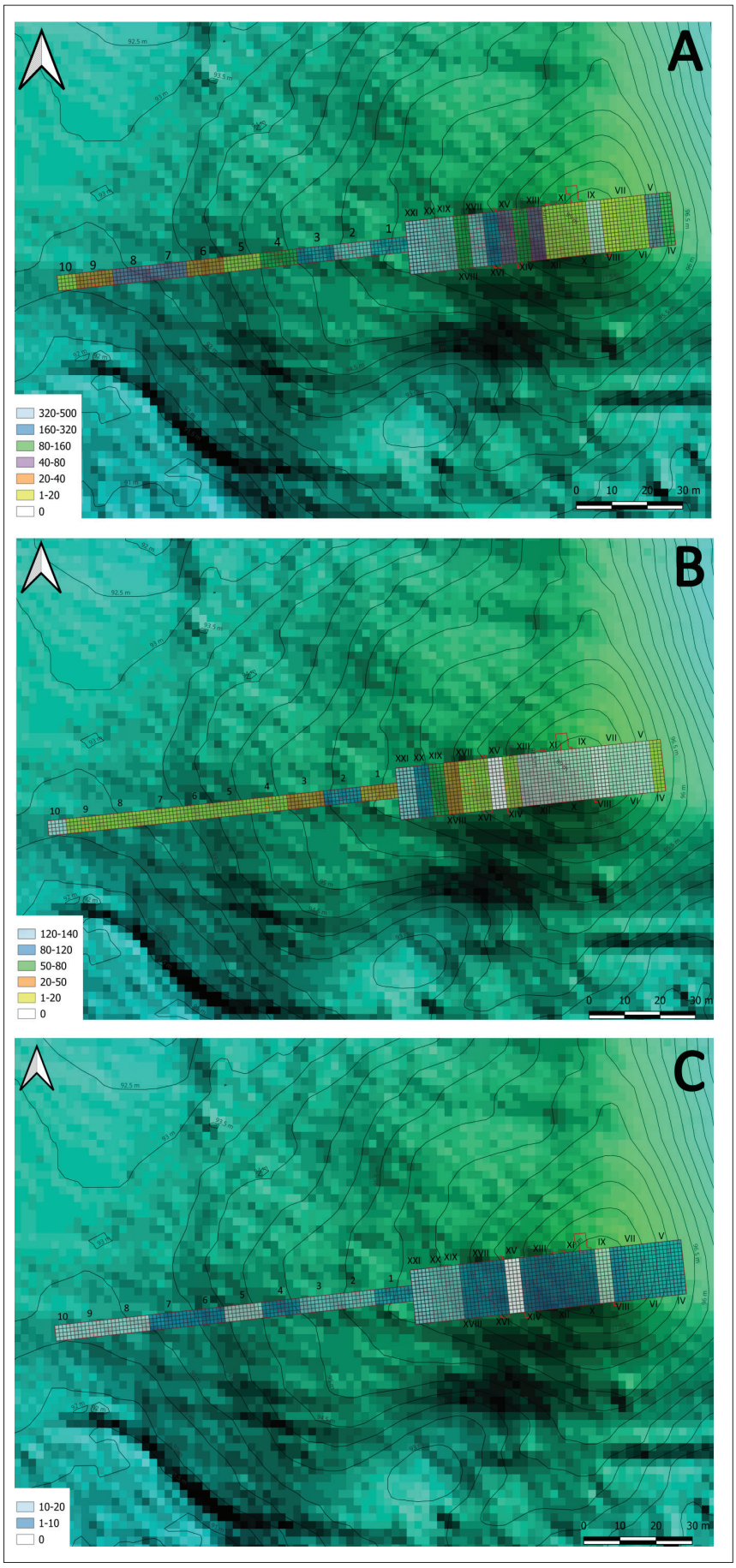

Figure 19. Main concentrations of flint (A), ceramic (B) and non-flint lithic artefacts (C). Compiled by Rimkus.

4.2 Distribution of artefacts

The largest groups of archaeological finds at Vilūnai 5 are flint, pottery and non-flint lithic artefacts. An examination of their distribution reveals a fairly clear picture of where particular groups of artefacts were concentrated in the excavated area.

The flint finds from Vilūnai 5 made up the largest part of the finds group. Only one trench (No. IX) did not contain any, but the rest contained varying amounts. The highest concentrations are found in trenches 1–4 and XVI–XXI (Fig. 19. A). A similar situation can be seen in the analysis of the ceramic finds. Although their numbers are smaller compared to flint, their occurrence is also in this part of the site, between the trenches 1–3 and XVIII–XXI (Fig. 19. B).

The situation remains similar for the non-flint lithic finds. They are found in small numbers in almost the entire surveyed area, but the main concentrations are still seen in trenches 1–3 and XIX–XXI (Fig. 19. C).

In this distinct site area, there is a clear area of higher numbers of archaeological finds. The natural question would be: can we assume that this was the main area of prehistoric human activity? This is a very difficult question to answer, since it is a sandy-type site, where no radiocarbon data was obtained, and a typological distribution of artefacts would probably not be of much use, simply because the site has been damaged by long-term farming activities, natural processes and its use as a burial ground in much more recent times. It is therefore likely that these processes may have eroded most of the archaeological finds from the top of the hill downwards. Interestingly, in trenches IV and V, where the terrain begins to descend towards the former lake in the eastern direction, flint finds begin to increase again. Thus, the idea that the archaeological finds have been affected by erosion would have some validity here. Moreover, the main concentrations of archaeological finds do not contain any hearths, building structures or other features that would suggest that this may have been an active area of particular activities. This would probably require an extended survey in a north–south direction.

A clearer chronology in this main area of finds distribution cannot yet be established on the basis of archaeological artefact types alone. Artefacts typical of the Mesolithic, Subneolithic and Neolithic have been found there; a few could belong to the Final Palaeolithic. Trying to analyse which types of artefacts are more widespread here, and thus to decide on the dominance of a particular chronological phase, most likely would not provide a clearer picture, as many types of artefacts were used in all the Stone Age periods. In summary, Vilūnai 5 is one of the many sandy sites with a large number of archaeological finds, but analysis of their distribution does not lead to any broader conclusions with the current data.

4.3 Chronology

There are no AMS ^{14}C dates which could give a more detailed chronological depiction of human activity in the Stone Age. Moreover, the prehistoric artefacts and the layer with the finds are in many places heavily disturbed. Evidence of this could be one sunken feature found in trench XIX which yielded flint, non-flint lithic finds and pottery. It contained some features left by wooden stakes. A charcoal for radiocarbon dating was taken from one of them, but its date fell in the range 1656–1915 cal AD (183±28; FTMC-AF29-1)[4], thus showing modern human activity in the area.

The main indicator of the site chronology is the diagnostic types of the artefacts. A single opposite platform core and two burins would suggest that more finds dating back to the Final Palaeolithic are to be expected at this site. In the Kalviai Lake area, such finds are known from the Kalviai 1, Vilūnai 4 and Šventininkai 2 sites (Šatavičius 2014; Rimkus et al. 2021b; Žilinskaitė et al. 2021). Further data on the chronology is provided by the shapes of microliths, blades, flake axes, and conical and semi-conical cores. These finds would certainly indicate that people were active here during the Mesolithic and Subneolithic.[5] It is difficult to distinguish more narrow phases of these periods, as individual artefact types sometimes prevailed in the same periods. The Subneolithic, Neolithic and Bronze Age periods could all yield a fragment of a ground stone axe and a fragment of stone perforation core. Non-ground stone axes could also belong to these phases, but their chronology is very uncertain too. Triangular arrowheads can be assigned to the Neolithic and Early Bronze Age. Other types of artefacts (scrapers, perforators) have a long chronology and in many cases their shapes remained unchanged almost throughout the Stone Age.

Fragments of Corded Ware would indicate the presence of the first pastoralists here. This pottery has been found in very small quantities, but it is quite distinctive in its ornamentation and production technology. Some of the ceramics could be linked to the beginning of the Early Metal period, but their fragmentary state limits detailed conclusions. However, one radiocarbon date was obtained from a residue found on ceramics at Vilūnai 5, which was excavated by researchers from the Lithuanian Institute of History. It represents the period 801–546 cal BC, i.e. the

[4] Calibrated using OxCal v4.4.4 (Bronk Ramsey 2017) and the IntCal20 atmospheric curve (Reimer et al. 2020).

[5] In this paper the following chronological model is used: Final Palaeolithic: ca. 12,000–9000 cal BC; Mesolithic: ca. 9000–5000 cal BC; Subneolithic: ca. 5000–2900 cal BC; Bronze Age: ca. 1800–500 cal BC; the earliest Iron Age: ca. 500–1 cal BC.

Late Bronze Age (Vengalis et al. 2022). This would indicate that the site was also active in this period. Human activity in the Early Metal period around Kalviai Lake is also represented by a fragment of a pin found west of the Vilūnai 5 site (Bliujienė et al. 2021). Its analogues can be found in the burial mounds of western Lithuania dating back to the earliest Iron Age (Grigalavičienė 1995). In 2020, a more distant Vilūnai unfortified site was also investigated. It was radiocarbon-dated to the 1st century cal BC – 2nd century cal AD (Pranckėnaitė et al. 2021). Thus, long-lasting human activity around Kalviai Lake shores is evident.

Conclusions

Vilūnai 5 is one among 15 known archaeological sites on the shores of Lake Kalviai. All of them mainly date back to the Stone Age or the Early Metal period, but some also contain much younger artefacts. The available data show Vilūnai 5 was also visited by people for a long time, even after the Stone Age. At the moment, it is difficult to make conclusions about the activity of people at this site. However, the available hunting tools (microliths, inserts, triangular points) and domestic implements (scrapers, perforators, axes) would suggest that temporary (seasonal) settlements may have been established there. Fragments of pottery vessels from the Corded Ware culture would suggest that the site at some point was visited by the first livestock farming communities in the Neolithic. It is clear that this area in the landscape was a favourable location for a site. It is elevated at ca. 99.3 m a.s.l., and the lake water still existed nearby in different chronological stages. The hill was therefore one of the highest in the landscape in the western part of the lake valley, with the access to the water. Lake Kalviai is part of the Nemunas River basin and has a direct connection to the Nemunas via the Lapainia outlet. Thus, the location was also convenient for the mobility of the population, when many other areas could be reached by waterways.

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Abbreviations

Archaeol. Anthropol. Sci – Archaeological and Anthropological Sciences

Archaeol. Baltica – Archaeologia Baltica

Arch. Lituana – Archaeologia Lituana

Apolona – Archaeologia Polona

ATL – Archeologiniai tyrinėjimai Lietuvoje/Archaeological Investigations in Lithuania

FA – Fennoscandia Archaeologica

Lietuvos Arch. – Lietuvos Archeologija

Oxf. J. Archaeol – Oxford Journal of Archaeology

J. Archaeol. Sci. Rep. – Journal of Archaeological Science: Reports

J Archaeol Method Theory – Journal of Archaeological Method and Theory

Lithic Technol. – Lithic Technology

Dan. J. Archaeol – Journal of Danish Archaeology

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Vilūnai 5 – įvairialaikė akmens amžiaus ir ankstyvųjų metalų laikotarpio gyvenvietė Kalvių ežero vakariniame slėnyje (Pietų Lietuva)

Tomas Rimkus, Gintautas Zabiela

Santrauka

2020 m. Kalvių ežero vakariniame slėnyje vyko tarptautinio dujotiekio ruožo tarp Lenkijos ir Lietuvos statybos. Atliekant archeologinius žvalgymus ir žvalgomuosius tyrimus čia identifikuota nauja akmens amžiumi ir ankstyvuoju metalų laikotarpiu datuojama radimvietė, pavadinta Vilūnų 5 gyvenviete. Aplink ežerą žinoma 15 priešistorinių radimviečių (1 pav., 1 lentelė). Vakarinis ežero slėnis yra užpelkėjęs, čia esama fluvioglacialinių kalvelių, kurios praeityje galėjo būti ežero salos arba pusiasaliai. Gyvenvietėje iš viso ištirtas 1373,65 m^2 plotas, perkasos 1–10 ir IV–XXI (2, 3 pav.). Tarp radinių dominavo titnago, keramikos ir netitnaginių uolienų radiniai (4 pav., 2 lentelė). Iš visų titnago radinių dirbinių rasta tik 4 %, arba 147 vnt. (5 pav.). Aptikta medžioklės įrankių (lancetų, trapecijų, trikampių antgalių ir ašmenėlių), vienas mikrorėžtukas, kirvių, skelčių su pjovimo žymėmis, perforatorių, rėžtukų ir skaldytinių (6, 7, 9–13 pav.). Didžiausia dirbinių grupė yra gremžtukai. Jų identifikuota 53 (8 pav.). Tarp netitnaginių uolienų dirbinių nustatyta muštukų, akmeninių kirvių ir akmeninio kirvio su skyle kotui skylės išgrąža (14–16 pav.). Tarp keramikos dirbinių yra virvelinės keramikos dirbinių, taip pat ir brūkšniuotu paviršiumi, vėlesniais laikotarpiais datuojamos žiestos ir apžiestos keramikos (17, 18 pav.). Titnago, netitnaginių uolienų ir keramikos dirbiniai daugiausia koncentravosi perkasų 1–4 ir XVIII–XIX aplinkoje (19 pav.). Vilūnų 5 gyvenvietė yra plačiu chronologiniu laikotarpiu datuojama radimvietė. Joje gali būti finaliniu paleolitu datuojamų titnago dirbinių (skaldytinis ir rėžtukai), tačiau daugiausia dirbinių pasiskirstytų po atskirus mezolito ir subneolito laikotarpius. Neabejotinai matomas ir neolito laikotarpis su čia esančia virveline keramika. Dalis dirbinių datuojama ir ankstyvuoju metalų laikotarpiu.