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HIDDEN LANDSCAPES OF THE EARLIEST IRON AGE: EXCAVATIONS AT KAKLINIŠKĖS 7 REVEAL AN OVERLOOKED SETTLEMENT PHASE IN SOUTHERN LITHUANIA

ROKAS VENGALIS,[1*] KAROLIS MINKEVIČIUS,[2] MANTAS VALANČIUS[1] AND GYTIS PILIČIAUSKAS[1]

[1] Lithuanian Institute of History, Archaeology Department, Tilto St. 17, 01101 Vilnius
[2] Vilnius University, Faculty of History, Archaeology Department, Universiteto St. 7, 01513 Vilnius

Keywords

The Earliest Iron Age, pottery, unenclosed settlements, agriculture

Abstract

The article presents the data from Kakliniškės 7 settlement site, discovered and excavated in 2020 during the construction of the gas pipeline. The rich and representative collection of pottery and archaeobotanical material gathered in the site have provided valuable data on the hitherto unknown 4th century BC in Lithuania. Pottery such as that found at Kakliniškės 7 has not previously been identified, and is therefore referred to here as Kakliniškės Ware. These are pots with slightly curved walls, rounded shoulders and vertical rims, featuring a striated surface topped with an additional coarse layer. The defined attributes of this new type of pottery have allowed the identification of the same ware in other settlement and burial sites in southeastern Lithuania and the Trans-Nemunas region. All of these settlement sites share some common features; most likely they are the sites of short-lived farmsteads belonging to highly dispersed settlements. Such data allow us to hypothesise a hitherto unidentified cultural group that briefly spread in southern Lithuania in the 4th century BC. This challenges the prevailing model of a static cultural development and a homogeneous material culture in the 1st millennium BC in all of eastern Lithuania. Our data show that the cultural situation here was much more dynamic than previously thought.

Introduction

Archaeological material from the 1st millennium BC in eastern Lithuania, southeastern Latvia and northwestern Belarus has previously been attributed to the Early Striated Ware culture (Graudonis 1967; Mitrofanov 1978; Luchtanas 1992b; Grigalavičienė 1995; Medvedev 1996; Egoreichenko 2006). This whole period was thought to be very stable in a cultural sense. The only changes were seen at the turn of the 2nd and 1st millennia BC, with the emergence of enclosed hilltop settlements, and around the turn of the era, with the transformation of the Early Striated Ware culture (henceforth ESWC) into the Late Striated Ware culture (henceforth LSWC). The very long period between these events was not discussed in terms of any transformation, and was presented as a whole, without distinguishing between individual phases. The essential features of the ESWC were considered to be the pottery with a striated surface and the enclosed hilltop settlements. Unenclosed settlements were thought to be typical only before the appearance of hilltop settlements. There was little evidence of unenclosed settlements contemporaneous with hilltop settlements (Luchtanas 1992b, p. 61; Egoreichenko 2006, p. 18).

In the above-mentioned studies, the chronology of the ESWC was based on the typology of bone/antler and rare bronze items. The few available conventional ^{14}C dates with huge error intervals did not contribute to the refinement of the typological dating (Egoreichenko 2006, pp. 54–56). Characteristically, the focus has been on dating

* Corresponding author. E-mail: rokasven@gmail.com

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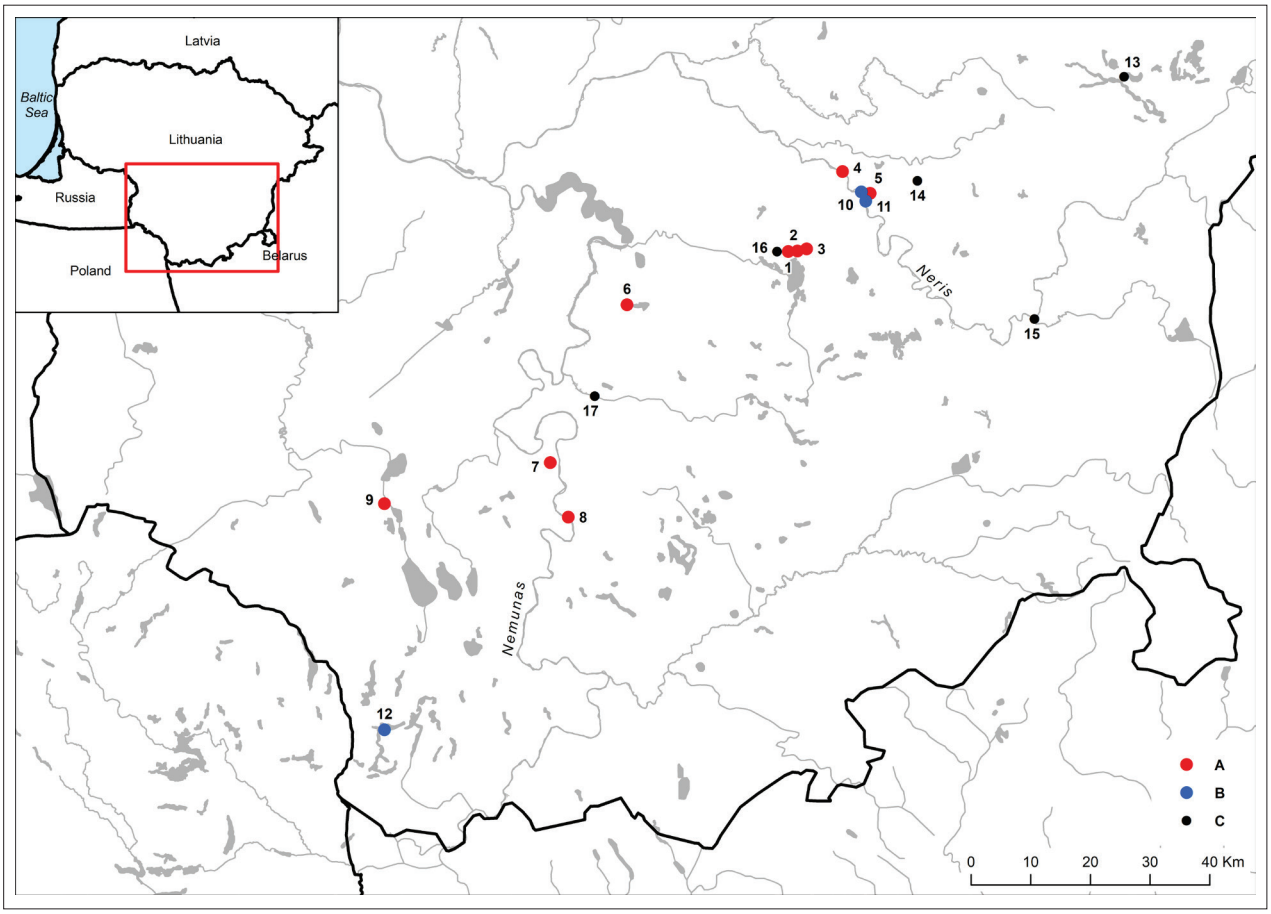

Figure 1. Sites mentioned in the article: A — settlements with Kakliniškės Ware (1. Kakliniškės 6, 7 and 8; 2. Migūčionys; 3. Žebertonys 4 and 5; 4. Ardiškis 2; 5. Kernavė; 6. Vilūnai 5; 7. Panemuninkai 3; 8. Alytus; 9. Skituriai 2); B — burial sites with Kakliniškės Ware (10. Kernavė; 11. Semeniškiai; 12. Paveisininkai); C — other settlements, dating from the Late Bronze Age and the Earliest Iron Age (13. Baluoša; 14. Žalioji; 15. Vilnius; 16. Mijaugonys; 17. Grikapėdis). Drawing by R. Vengalis.

the emergence and abandonment of hilltop settlements, while the periodisation of their evolution has not been addressed. This was probably not considered a relevant issue because of the aforementioned belief in the stagnant nature of the culture.

However, new data are starting to shatter this model of a long period of cultural stagnation. An increasing number of unenclosed settlements (Merkevičius 2018) and few pile dwelling settlements (Pranckėnaitė 2014) were recently attributed to this period. This suggests that the settlement patterns in the 1st millennium BC were much more complex than is traditionally believed. When the hilltop settlements of the ESWC in northeastern Lithuania started to be dated by AMS ^{14}C, it became clear that all dates are focused on the period ca. 800–400 cal BC, or the so-called Hallstatt plateau in the calibration curve (Podėnas 2020). Thus it seems that these settlements were not as long-lasting as was thought in the 20th century.

The misdating of hilltop settlements has also led to inaccuracies in pottery typology and chronology. ESWC pottery that appeared to be dated to ca. 800–400 BC had previously been presented as existing throughout the 1st millennium BC and as having remained unchanged over time (Grigalavičienė 1995, p. 204; Egoreichenko 2006, pp. 25–28). However, today, narrowing the dating of this pottery opens up uncertainties regarding pottery used before 800 BC and after 400 BC. Therefore, previously held beliefs about other cultural aspects, such as the settlement pattern, subsistence and economy in these centuries, are now also challenged.

The studies of agricultural development present similar problems. There is a relatively substantial amount of information on agriculture from the 8th to the 5th century BC and the beginning of the 1st millennium AD, and significant differences between these periods are recognised (Minkevičius 2020). However, the Earliest Iron Age is still completely unknown archaeobotanically. This is one of the main gaps in the study of agricultural development in Lithuania. The complete absence of data from the 4th to the 1st century BC has so far prevented a more detailed inquiry into both the nature and the development of agriculture, its impact on the lifestyle of communities and landscape. Moreover, the Late Bronze Age archaeobotanical material is largely limited to the assemblages from the fortified settlements, which makes it difficult to have a

well-founded discussion about the coexistence of several different agricultural systems.

The 2020–2021 archaeological research on the route of the gas pipeline interconnecting Poland and Lithuania (GIPL) has provided an excellent opportunity to try and answer these questions. In southeastern Lithuania,[1] the short-term settlement site of Kakliniškės 7, dating back to the 4th century BC, was discovered and investigated. Until now, this period has been completely obscure, with no single reliably dated archaeological site identified as such. In this paper, we present the results of the investigations of this settlement, focusing on the typological and petrographic studies of the pottery, the archaeobotanical analysis of the charred plant remains, and the AMS ^{14}C dating. The pottery collection from Kakliniškės 7, which is representative and reliably dated, has provided the basis for the identification of a new pottery type, which can now be used as a chronological indicator of the 4th century BC at other sites, even those not radiocarbon dated. We have identified Kakliniškės-type pottery in several other archaeological sites, including settlements and burials. The available radiocarbon dates from these sites are very similar, which allows us to speak of the identification of a distinct settlement phase. The data presented here also provide a basis for a discussion on the need to rethink the periodisation of the 1st millennium BC as a whole.

1. Kakliniškės 7 settlement site

1.1. Landscape and field research

Kakliniškės is located in southeastern Lithuania (Fig. 1), outside the northern boundary of the town of Elektrėnai (24.654°E 54.793°N). The landscape is non-urbanised, with grassland and arable fields predominating. Geomorphologically, the area belongs to the Vievis undulating limnoglacial plain, folded at the bottom of a glacial lagoon (Guobytė 2001). The topsoil is predominantly sandy, in some places gravelly. Limnoglacial clays are buried very shallowly under the sand (in the immediate vicinity of Kakliniškės 7 at a depth of 1–2 m). Although the surface soil is permeable to water, the shallow clay has led to the formation of marshes even in slight depressions. Today, the natural moisture balance has been altered by drainage and irrigation, but maps made in the first half of the 20th century reveal the existence of large waterlogged areas. The deeper depressions in the terrain were filled with many lakes, almost all of which are now completely overgrown (Fig. 2). There are no major rivers here, only the small Prakusa stream. In the past, there were numerous small streams, but these have now deteriorated due to irrigation. In this paper, we use the term 'Kakliniškės micro-region' to refer to the area shown in Figure 2, which is characterised by more pronounced undulations and the abundance of palaeolakes in the Vievis undulating limnoglacial plain.

Archaeological sites in this micro-region are quite abundant, however, until 2020 only a few 1st millennium AD burial mounds and a couple of settlement sites were known. The archaeological map has been considerably enriched following the 2020 survey at the construction site of the GIPL pipeline. Archaeological survey has been carried out along the entire pipeline route. The topsoil layer in a strip 8–10 m wide was removed mechanically and the archaeologists monitoring the work recorded the presence of any undisturbed archaeological layers, sunken features or other artefacts beneath the topsoil. If archaeological findings were discovered, excavations were carried out in that location.

The gas pipeline crossed the Kakliniškės micro-region in the east–west direction (Fig. 2). This micro-region was characterised by an unusually high number of newly discovered archaeological sites. The density of archaeological sites here was one of the highest along the entire 164 km length of the pipeline, with 18 sites along a 6.7 km segment. The settlement sites discovered were of very different periods, ranging from the Mesolithic to the 16th century AD. The focal place of the micro-region during prehistory was apparently the Kakliniškės 4 site, located on the southern shore of the largest lake, at the outlet of a stream (Fig. 2.VI). This site is characterised by a thick archaeological layer with finds from almost all archaeological periods. This suggests that the site was repeatedly returned to, with possible continuous occupation from the 3rd to the 14th century AD. All other archaeological sites, including those analysed in this article, are very different to Kakliniškės 4. They have far poorer archaeological traces, usually showing only one or two episodes of occupation. In such areas, the unploughed archaeological layer is very sparse, or more often non-existent, with only sunken features surviving. Some of these sites with only a single occupation episode were remote from water bodies. It can be assumed that their inhabitants must have used groundwater, which could have been accessed by digging quite shallow wells.

One of these sites with traces of single occupation was Kakliniškės 7 (Fig. 2.II). It was located on flat terrain, distant from water bodies. The nearest water body was no less than 300 m from the site. Sherds of hand-made pottery were found in this area during the survey of pipeline construction. Further excavations were carried out by shovelling the surface and sieving all removed soil through 5 mm mesh sieves. When the outlines of the sunken features became apparent, they were recorded and excavated, also

[1] In this article, southeastern Lithuania refers to the region between the Nemunas and Neris Rivers, including the left bank of the River Nemunas and the right bank of the River Neris.

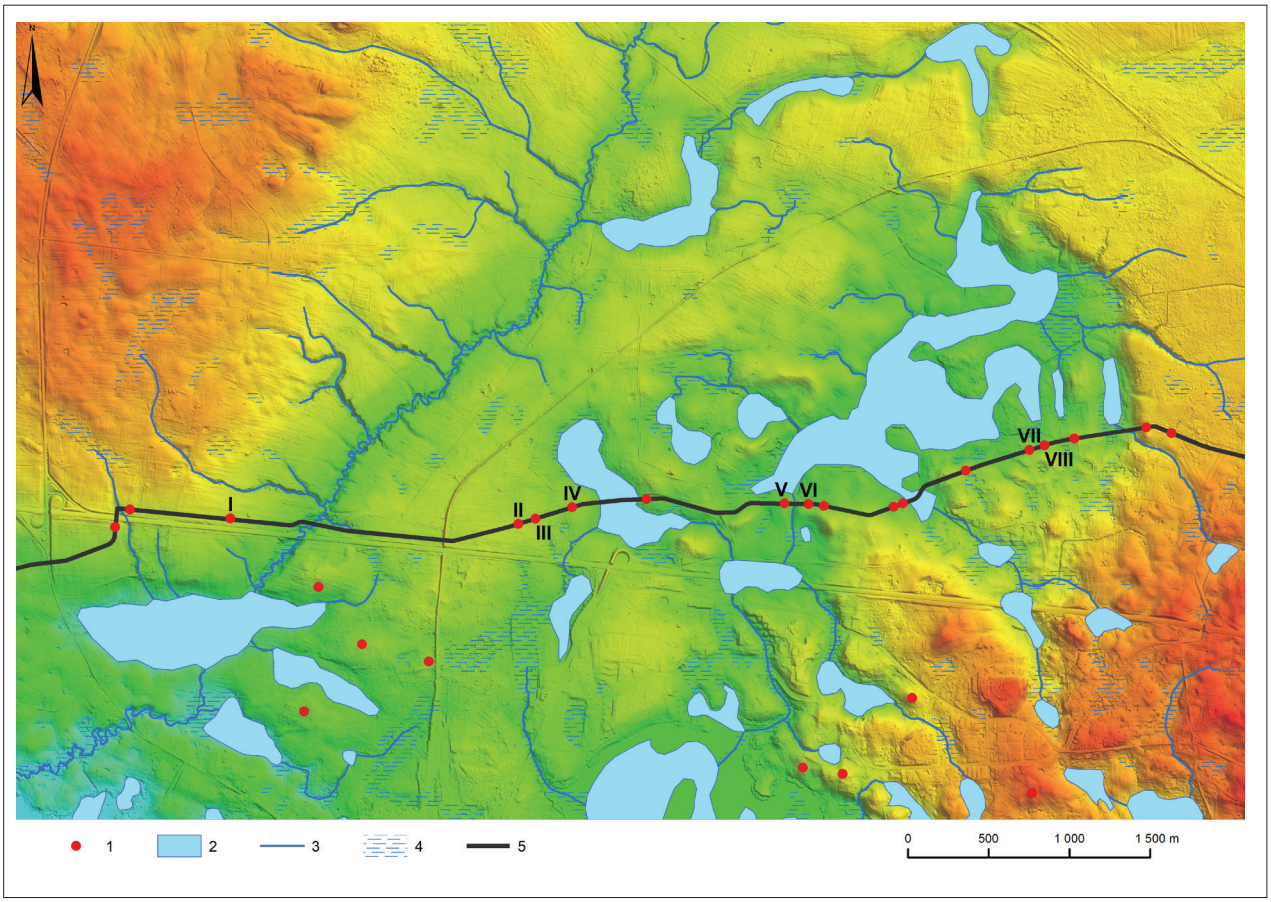

Figure 2. Palaeolandscape of the Kakliniškės micro-region: 1. known archaeological sites; 2. ancient lakes; 3. streams; 4. marshy, waterlogged areas; 5. GIPL pipeline. Sites mentioned in the article: I — Mijaugonys 1; II — Kakliniškės 8; III — Kakliniškės 7; IV — Kakliniškės 6; V — Migūčionys 1; VI — Kakliniškės 4; VII — Žebertonys 5; VIII — Žebertonys 4. Drawing by R. Vengalis.

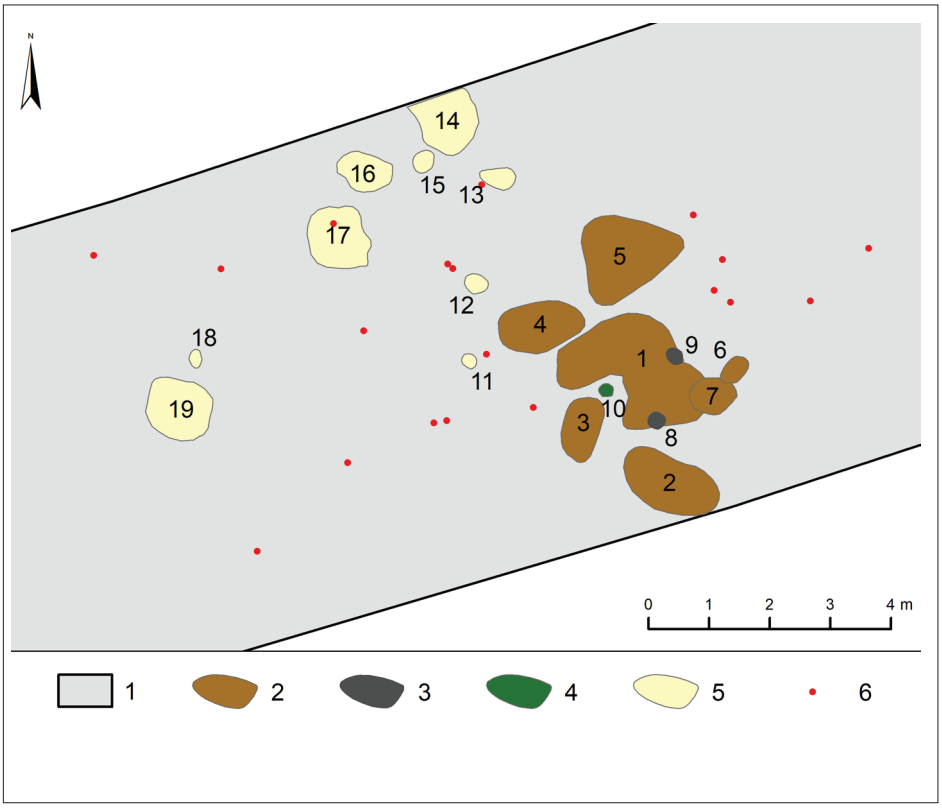

Figure 3. Plan of the area investigated at Kakliniškės 7: 1. excavated area; 2. storage or rubbish pits; 3. postholes; 4. stone cairn; 5. features of natural origin; 6. archaeological finds (only those found in the archaeological layer are marked). Drawing by R. Vengalis.

by sieving the entire quantity of soil. Samples were taken from 12 features for archaeobotanical analysis.

1.2. Archaeological layer and features

In Kakliniškės 7, an 8 m wide strip was removed mechanically. Underneath the plough layer, a brownish/brownish-yellow fine sand with isolated finds of hand-made pottery was exposed. This was a low-intensity archaeological layer, only 21 archaeological finds were recovered in the 14 x 8 m area (Fig. 3). After the layer was stripped down to a depth of about 5 cm, the sterile yellowish fine sand and the outlines of the sunken features were exposed.

A total of 19 features were documented — 18 pits and one stone pile. All features were found within a 10 m diameter area (Fig. 3). Nine features (11–19) were probably of natural rather than archaeological origin. This is indicated by their blurred, irregular outlines and the whitish sandy inclusions in their fills, which are characteristic of tree throws. The archaeobotanical samples from these features were almost devoid of cultural plant remains, and there were archaeological finds in only two of them (Table 1). The natural features were also spatially separated from the archaeological ones, forming a separate group 0.5–4 m to the northeast of them (Fig. 3). Similar clusters of natural features were also found further from Kakliniškės 7 along the GIPL route. Two pits of uncertain origin with abundant charred deposits, but no archaeological finds, were recorded ca. 20 m to the W, and a group of six similar pits ca. 30 m to the E, only one of which contained a few fragments of hand-made pottery.

The archaeological origin of Features 1–10 is indisputable. All of these features were clustered in a 5 x 4 m area (Figs. 3 and 4). Features 8 and 9 are classified as postholes. Both are ca. 30 cm in diameter, round-bottomed, with dark grey or black fine sand fillings. Posthole 9 was only exposed at the bottom of Feature 1. Features 1–7 are pits of undetermined purpose. They are oval in shape, 0.5–1.8 m in diameter, 15–50 cm deep, and round-bottomed or flat-bottomed in cross-section (Fig. 4; Table 1). The shape and cross-section of Feature 1 suggest that it may be interpreted as three to four overlapping pits with no distinct individual outlines. The pits were filled with fine sandy soil of varying shades of light grey, containing isolated chipped or heat-cracked stones and abundant archaeological finds. Feature 10 was a stone pile consisting of six cracked stones tightly stacked in a single layer (Fig. 4). The stones were 6–13 cm in diameter and among them was a fragment of a stone tool with a polished facet.

The pits were rich in archaeological finds (Table 1). The most abundant finds were pottery sherds, while flint flakes, fragments of clay plaster and other finds were much

Table 1. Quantity of finds in the sunken features of the Kakliniškės 7 settlement site.

Feature	Field No.	Interpretation	Pottery sherds	Flint flakes	Clay plaster pieces	Stone tools	Iron items	Calcined bones	Cultivated plant grains/l
1	339-11/12	storage or rubbish pit	406	6	36			1	203/40
2	339-7	storage or rubbish pit	97	2		3			16/20
3	339-15	storage or rubbish pit	40	1	8				9/20
4	339-14	storage or rubbish pit	135	3	12	1			3/20
5	339-13	storage or rubbish pit	128	2	3	1	1		218/20
6	339-8	storage or rubbish pit	1						15/20
7	339-9	storage or rubbish pit	48	2	1	1			328/20
8	339-10	posthole	19			1			7/20
9	339-16	posthole							-
10	339-26	stone cairn				1			-
11	339-18	natural	32		4				-
12	339-19	natural							-
13	339-20	natural							1/10
14	339-21	natural	29						1/20
15	339-22	natural							0/15
16	339-23	natural							-
17	339-24	natural							-
18	339-25	natural							-
19	339-17	natural							1/20

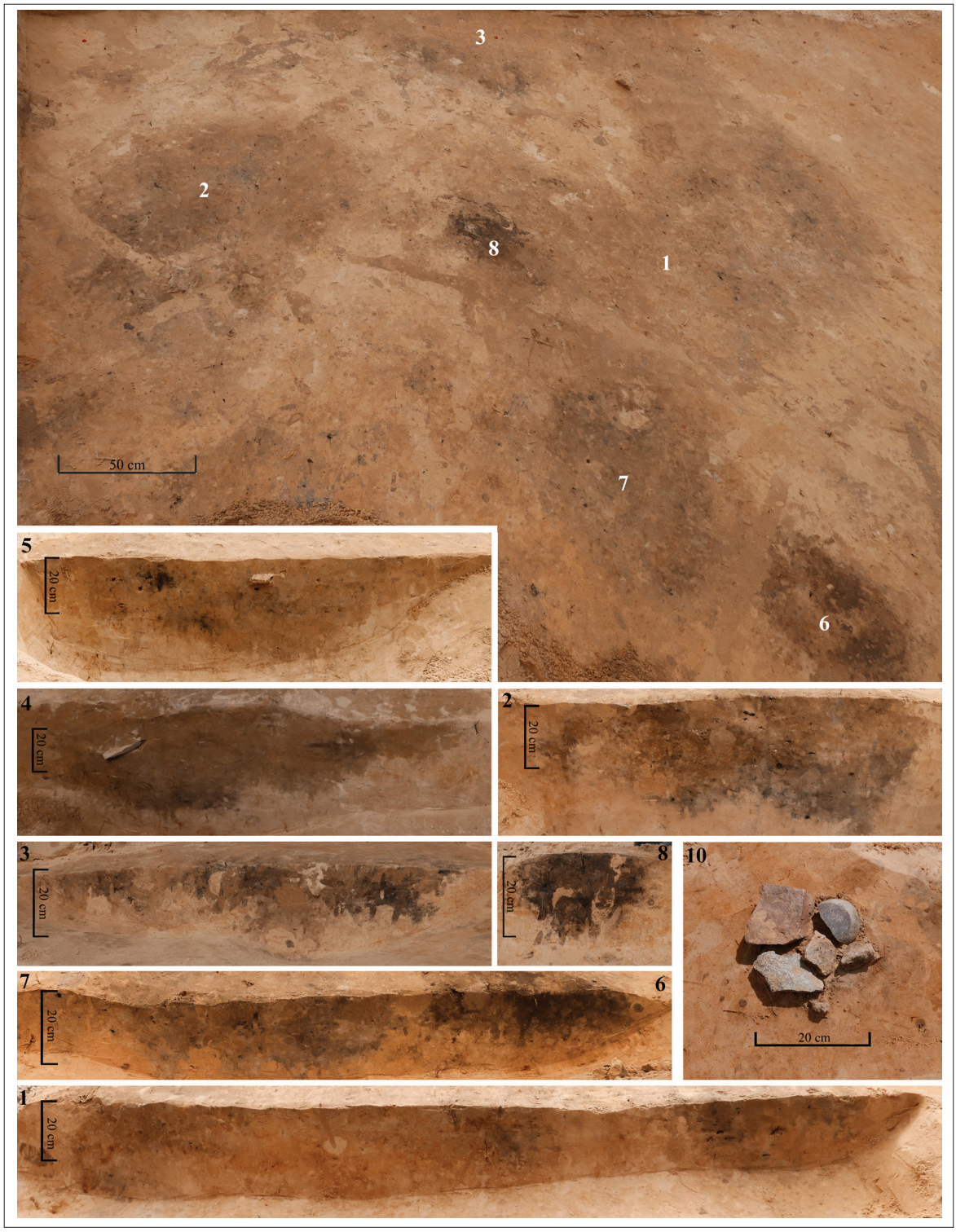

Figure 4. Sunken features and their sections at Kakliniškės 7. The numbers in the images correspond to the feature numbers. Photographs by R. Vengalis and L. Gaižauskas.

less frequent. The majority of the pottery sherds recovered from all features show signs of having been overheated after the vessels had been broken (see the next section for more details). Although a number of sherds could be refitted, it was not possible to reassemble the larger parts of the vessels (Fig. 5). The filling of the pits was relatively light in colour, with low amounts of charcoal (Fig. 4), so it is unlikely that they were fire pits where pottery sherds could have been overheated. This process must have occurred in other places, and the pits were filled with waste collected elsewhere. Of course, this could have been the last function of these pits; they were probably dug for other purposes of which we have no record. The similar composition and characteristics of the finds from the different pits suggest that the fills of the pits probably formed at the same time.

1.3. Pottery

A total of 955 pottery sherds (4185 g) were collected at Kakliniškės 7. As mentioned above, a significant number of sherds show signs of post-depositional overheating. This is indicated by the yellowish-brown, fully oxidised old breaks, while the fresh cuts have a grey colour, which is indicative of incomplete oxidation during firing or a reducing firing environment. The inner surface of some of the sherds is cracked and showing signs of heat distortion. Some of the refitting sherds are different in colour and cracking. Post-depositional overheating resulted in partial vitrification of the clay, which has led to good preservation of the pottery. There are a number of larger sherds (5–15 cm), which are firm, not crumbling, with very little post-depositional surface abrasion. These characteristics make the collection quite representative and allow a relatively detailed description of the vessels used in this settlement.

A petrographic analysis of six sherds was carried out to characterise the fabric (Figs. 5.2, 6; 6.1, 2, 8 and 7.3). Standard 30 µm vertical thin sections were made from the selected samples according to Humphries (1992) and Quinn (2013, p. 23). They were examined through a Leica DM750P polarising microscope with x40, x100, x200 and x400 magnification options. Mineral temper could be clearly distinguished from natural inclusions by the pronounced bimodality in the frequency histograms of particle sizes. The distinct lack of particle sizes between 0.03 and 0.125 mm allowed particles smaller than this range to be assigned to natural inclusions and larger particles to temper. For the characterisation of the composition of the fabric, particles larger than 0.1 mm were counted on high resolution macroscopic photographs of fresh cuts. Meanwhile, particles of 0.01–0.1 mm were counted in x100 microphotographs of a 0.5 x 0.5 mm area of thin sections. All photographs were scaled and manually vectorised, which allowed accurate calculation of the diameter and area of each particle in a 2D section. The quantity of particles is given as a percentage of the area they occupy in the analysed section of the sherd.

The petrographic analysis revealed that the quantities and size frequencies of the natural non-plastic particles in the clay matrix are very similar for all samples. The clay is almost devoid of sand particles, only silt is present (Fig. 8). Fine (0.008–0.015 mm) and medium (0.015–0.031 mm) silt dominate in all samples, with very small amounts of very fine and coarse silt particles. The total silt content of the clay matrix in the samples ranged from 5.7% to 11% (median: 7.3; IQR = 5.9–9.6). Thus it can be concluded that the same clay source was probably used for the production of the vessels.

The pottery fabric was prepared by enriching the clay with mineral and organic temper. Mineral temper was produced by overheating and crushing rocks. The minerals identified in the petrographic samples were mainly simple and polycrystalline quartz, plagioclase, microcline, highly altered feldspar and myrmekite. Pieces of volcanic rock consisting of several different minerals were also common, e.g. quartz and biotite; quartz, epidote, apatite and olivine; olivine and plagioclase, which has begun to alter to sericite (Table 2). This combination of minerals, although different in all the samples, suggests that granite boulders were most commonly used for temper. Only in sample PS5 might the temper have been produced from a different rock.

The thin sections exhibited quite intense porosity of the fabric. The shapes of the pores were circular, oval and elongated, so it is evident that they are not cracks formed during drying of the vessel before firing. Most of the pores are small, with a median diameter of 0.07 mm (IQR = 0.05–0.13). Larger pores were also present, almost always elongated, about 0.2–0.5 mm wide and up to 3 mm long. Both coarse and fine pores are supposed to be the result of the burning of organic temper.

The quantities and size frequencies of mineral and organic temper vary considerably between samples (Table 2). Preliminarily, three types of fabric can be distinguished. Samples PS1, PS2 and PS3 can be classified as the first type. These samples are characterised by unsorted mineral temper, with all particle size groups between 0.5 and 5 mm representing a similar proportion of the fabric. No coarse particles (>2 mm) were observed in the sample PS1, but they were present in the fabric, as can be seen on the surface of the sherd. The total amount of mineral temper in these samples ranges from 15% to 23%. The amount of organic temper varies. All three samples contained coarse pores, but only samples PS1 and PS2 had abundant fine pores.

Sample PS1 shows signs that the vessel may have been moulded from several different fabrics, not intermixed. This is suggested by the areas of different colours in the fresh cut (Fig. 9). The different colours, especially the grey shades, could be caused by different levels of oxidation during firing, but in that case the shades should be evenly distributed, with more oxidation in areas closer to the surface and less in the core. PS1 shows no regularity and the different shades must be caused by the different amounts of microscopic organic particles in the clay matrix. More importantly, the different shade zones in the section are represented by different temper: the light grey zone is characterised by sparse, medium-sized mineral temper and abundant, mostly fine pores; the dark grey zone is represented by dense, mostly coarse mineral temper and virtually no pores; and the brownish zone is restricted to sparse mineral temper (Fig. 9).

Figure 5. Pottery from Kakliniškės 7. Field numbers: 1. 182; 2. 175; 3. 213; 4. 181; 5. 183; 6. 184. The numbers of the thin section samples are marked in red. Photographs by R. Vengalis.

Figure 6. Pottery from Kakliniškės 7. Field numbers: 1. 151; 2. 214; 3. 192; 4. 188; 5. 168; 6. 190; 7. 169; 8. 217; 9. 178; 10. 174; 11. 154; 12. 196; 13. 219. The numbers of the thin section samples are marked in red. Photographs by R. Vengalis.

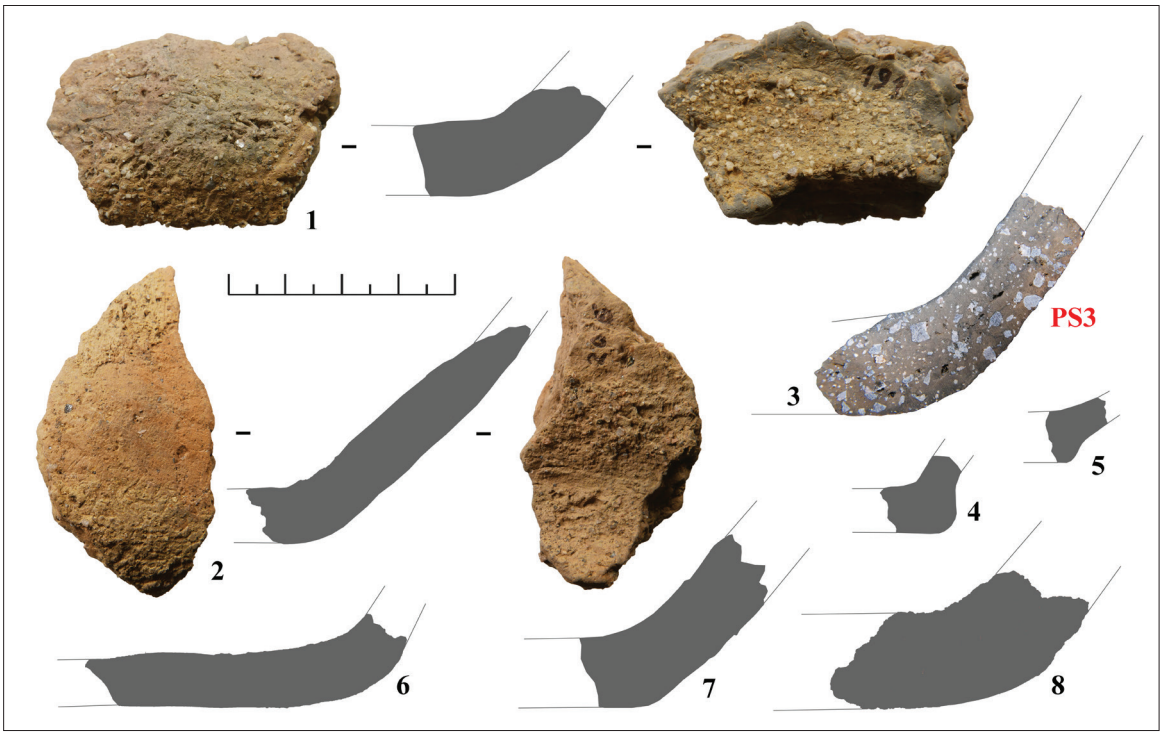

Figure 7. Pottery from Kakliniškės 7. Profiles of vessel bases. Field numbers: 1. 191; 2. 206; 3. 207; 4. 230; 5. 208; 6. 218; 7. 172; 8. 173. The numbers of the thin section samples are marked in red. Photographs by R. Vengalis.

Table 2. Results of the petrographic analysis of Kakliniškės 7 pottery samples. * "+" indicates that the minerals are in the same rock particle.

Sample	Field No. of the sherd	Size of the thin-section (cm²)	Composition of the fabric (%)										Mineral composition of temper*	Figure
			Clay matrix			Mineral temper						Pores (organinic temper)		
			Clay	Silt	Total	0.1-0.5 mm	0.5-1 mm	1-2 mm	2-3 mm	3-5 mm	Total			
PS1	151	3,3	74,6	8,2	**82,8**	2,0	4,9	6,9	1,0	-	**14,8**	**2,4**	quartz; plagioclase; myrmekite. Aditional layer: Ø 0.05-0.15 mm - quartz; Ø 0.75-1 mm - microcline, plagioclase, sanidine	5:1
PS2	217	3,0	76,0	4,6	**80,6**	1,7	3,1	4,2	3,2	3,3	**15,5**	**3,9**	quartz; myrmekite; amphibole+quartz	5:8
PS3	207	7,8	71,3	4,5	**75,8**	2,2	3,9	6,6	7,0	3,4	**23,1**	**1,2**	Ø 2-5 mm - quartz, polycrystalline quartz; Ø < 2 mm - plagioclase, microcline, olivine+biotite+quartz+microcline+other (feldspars alterating to sericite)	6:3
PS4	184	2,7	71,8	6,7	**78,5**	0,8	0,9	3,8	7,3	7,4	**20,2**	**1,3**	quartz, plagioclase, highly altered feldspars, plagioclase+quartz+biotite	4:6
PS5	214	2,6	73,7	9,1	**82,8**	0,7	1,3	2,5	6,8	4,1	**15,5**	**1,7**	quartz+epidote+apatite+olivine; olivine+plagioclase (alterating to sericite)	5:2
PS6	175	2,0	90,3	5,8	**96,1**	0,1	0,6	2,1	1,1	-	**3,9**	**0,1**	quartz; quartz+biotite	4:2

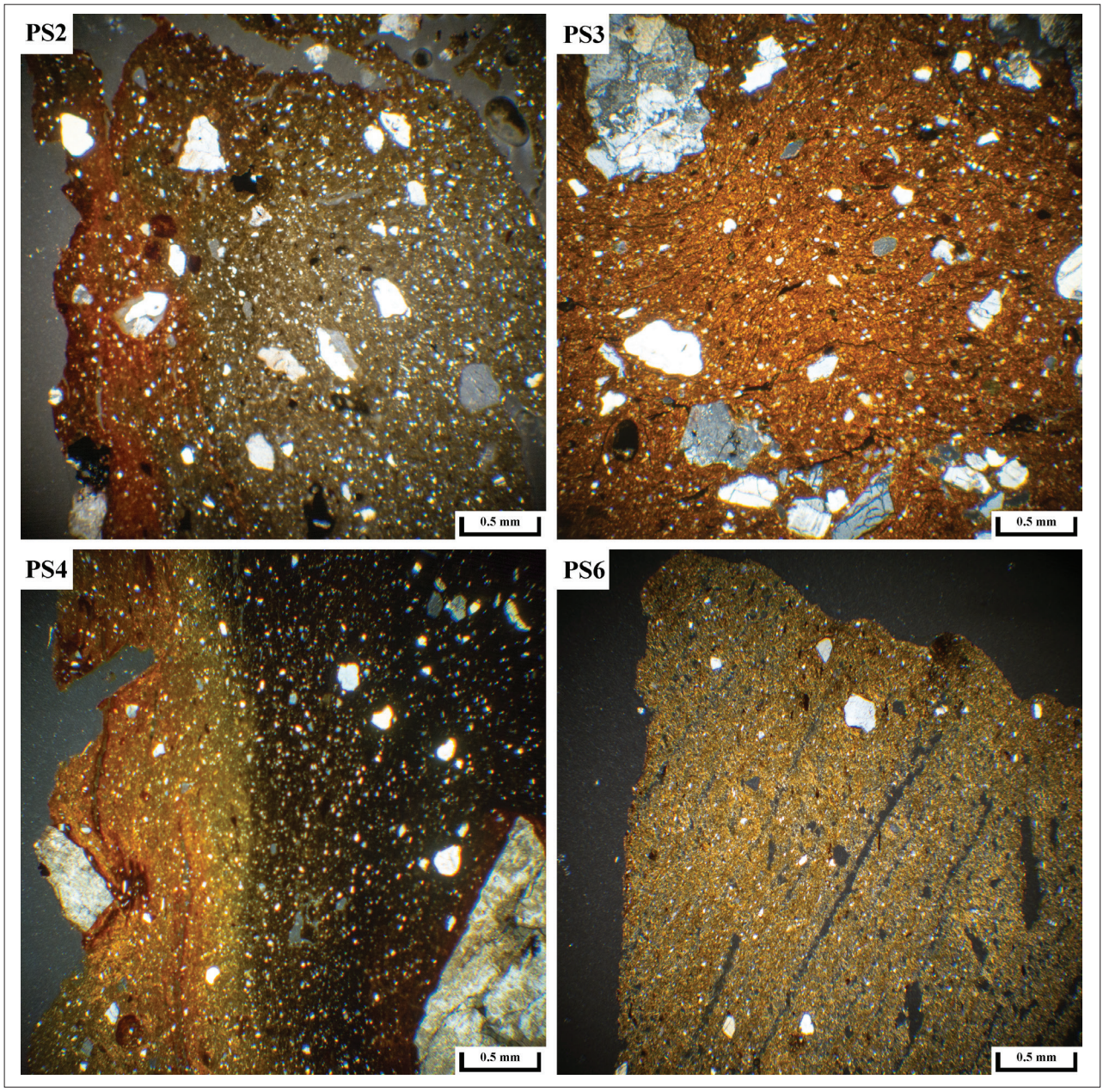

Figure 8. Micrographs of pottery thin sections (XPL). Photographs by M. Valančius.

Samples PS4 and PS5, which are characterised by sorted mineral temper particles, were classified as the second type of fabric. They are dominated by coarse mineral particles, 2–5 mm in size, with relatively few smaller particles. The total amount of mineral temper is similar to that of the first type, 20.2% and 15.5% respectively. The pores are sparse and mainly coarse, with only a few fine ones. The third type is represented only by sample PS6, which stands out clearly from the others. This sample is almost devoid of temper, containing only 3.9% mineral temper and 0.1% organic temper represented by pores.

To sum up, the petrographic analysis showed that the pottery of Kakliniškės 7 was made of silty clay, which was enriched with coarse 2–5 mm crushed granite and a small amount of organic temper. Similar, possibly the same, clay was used for the production of the different vessels, but the recipes for the fabrics differ. A more reliable classification of the fabrics would therefore require a larger-scale study. It seems likely that several differently prepared fabrics could have been used for the moulding of a single vessel. The pottery collection also contained a few sherds of a completely different fabric. No petrographic analysis has been carried out on them, but the difference is apparent macroscopically: the fabric is rich in sand and completely devoid of crushed granite (Fig. 6.12, 13). The thickness (4 mm) and the curvature of the walls indicate that these were small vessels, suggesting that the different fabric was chosen for some specific purpose.

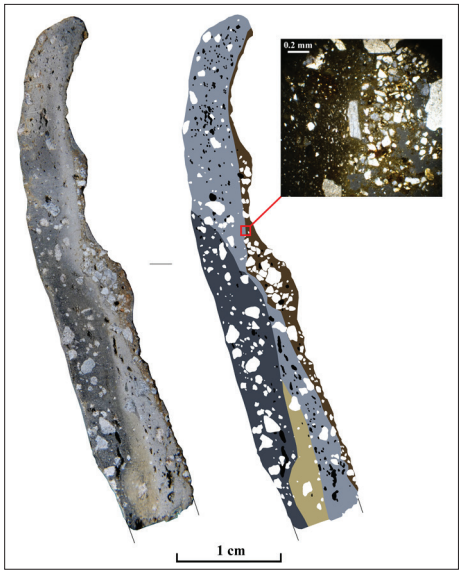

Figure 9. Possible combination of different fabrics in sample PS1 and the micrograph of the applied surface layer (XPL). Photographs by R. Vengalis and M. Valančius.

All the pottery is hand-made and the walls of the vessels are formed of coils. Only two sherds show signs of coil joining. One of them was a rim, so it is clear that the upper coil was attached to the lower one from the outside. The overlaps of the coils were 1.5 and 2 cm wide. Unfortunately, such data are too fragmentary to suggest that this was the only or predominant method of joining the coils.

The forms of all the vessels were very similar, with rounded walls and slightly pronounced shoulders. A rounded transition from the base to the walls is characteristic as well (Fig. 7.1–3, 6–8). The walls form a very obtuse angle with the base, with a median angle of 127° (IQR = 124–136°, n = 8). Such obtuse angles indicate that the diameter of the bases was proportionally much smaller than that of the orifices.

From the base to the shoulder, the walls were slightly curved. The maximum diameter of the vessel is at the shoulders, and there is a slight narrowing again above the shoulders towards the orifice (Figs. 5 and 6). The shoulders are not very prominent, and the direction of the walls changes gradually at the shoulders. The necks of the vessels are bent in the opposite direction, outwards, but also slightly, just enough to make the rims vertical. The lip of the rim is usually flattened, with a bulge formation on the outer side. The thickness of the walls varies within the same vessel, with the bases 10–17 mm thick, the walls near the base 8–17 mm, the walls near the shoulders 8–10 mm and the necks thinned to 4–7 mm. There is little information on the sizes of the vessels. The diameter of the orifice could only be determined for two pots: 20 cm (Fig. 5.4) and 15 cm (Fig. 5.5).

Besides the pots, two other ceramic items were found. The first is the small vessel already mentioned, made of an unusual fabric (Fig. 6.12, 13). The second is a lid or a plate (Fig. 6.9). It is a flat, disc-shaped object with a gentle, approx. 3 mm high, rim around the perimeter. It is 9 mm thick and must have been between 15 and 20 cm in diameter.

The surface treatment was carried out in two stages, using different techniques. Initially, the surface was smoothened with a bunch of grass or straw, making it continuously striated. The striations are mostly horizontal but vary in intensity. On the inner surfaces, only the necks are horizontally striated, the rest of the walls being plain. In a second stage, the vessels were coated with an additional layer to form a coarse surface. The fabric of the additional layer was different from that of the vessel itself. Approximately 70%–80% of it was composed of crushed granite and only 20%–30% of clay (Fig. 9). The granite particles are unsorted, ranging in size from 0.05 to 3 mm. The additional layer does not cover the walls completely, and there are significant areas where it is absent (Fig. 5). Excluding very small sherds, the coarse surface is present in 87% of the sherds, the remainder lacking it. Therefore, a small proportion of the vessels may not have been covered with an additional layer (Figs. 5.2 and 6.3, 10, 11). In two cases, the additional layer was also observed on the inner surface of the sherds, covering the junction between the base and the walls (Fig. 7.1, 2).

Some of the pots were decorated with impressed pits (Figs. 5.1, 5 and 6.3–7). The pits are irregular in shape, about 5 mm in diameter, and are pressed through almost the entire thickness of the wall (in the inner side a bulge is created). The decoration is located on the necks above the shoulders, 2–4 cm below the orifice. The pits are arranged in a single row, every 3–4 cm. Other decorations were not present in Kakliniškės 7 pottery.

Kakliniškės 7 pottery is characterised by similar vessel shapes, surface treatment and ornamentation. This indicates that they are contemporaneous, marking a single episode of occupation. The pottery also differs quite significantly from the pottery types distinguished so far. It is undoubtedly a new, hitherto unrecognised, type of pottery, which we have called Kakliniškės Ware.

1.4. Other finds

A total of eight stone artefacts were found at Kakliniškės 7. One of them can be identified as a fragment of a saddle quern stone. It is a 12 x 10 x 9 mm granite piece with one polished concave plane. The other planes were fractured. There were five other granite artefacts. All of them are broken, preserving only fragments of flat or slightly enveloped planes. These are supposed to be the upper quern

Figure 10. Stone artefacts from Kakliniškės 7: 1. upper quern stone (field no. 159); 2. sharpener/polisher (field no. 225). Photographs by R. Vengalis.

stones (Fig. 10.2). The remaining two stone items are of sandstone. They are also broken, with fragments of flatly smoothed planes. Sandstone tools were probably used as sharpeners/polishers (Fig. 10.1).

There was also one fragment of an iron item, a bar with a rectangular cross-section (63 x 11 x 4 mm). Unfortunately, it is badly corroded and therefore unidentifiable, at least until it is restored. The total number of flint finds was 17 (12 g). These are small flakes removed by bipolar percussion, only one of which was retouched. As many as 13 of these finds were severely overheated. There were also 64 fragments of clay plaster, weighing a total of 115 g. The fragments are small and the primary surfaces are not preserved. Bone material is not preserved, except for one small unidentified calcined fragment.

1.5. Archaeobotanical data

Fourteen soil samples of 10 to 20 litres (245 litres in total) were collected for the analysis of plant macrofossils. The samples were taken following a probabilistic sampling protocol (d'Alpoim Guedes, Spengler 2014), from 14 features, including eight archaeological and four natural pits. Samples were processed using a machine-assisted flotation tank powered by the municipal water supply. The floating fraction was collected using steel sieves with a mesh size of 300 µm. Heavy fraction and small artefacts were retrieved using a glass-fibre net with 1.4 mm aperture. Dried material was sorted and examined under a binocular microscope with x10 to x120 magnification. Plant macrofossils were identified using botanical atlases and descriptions

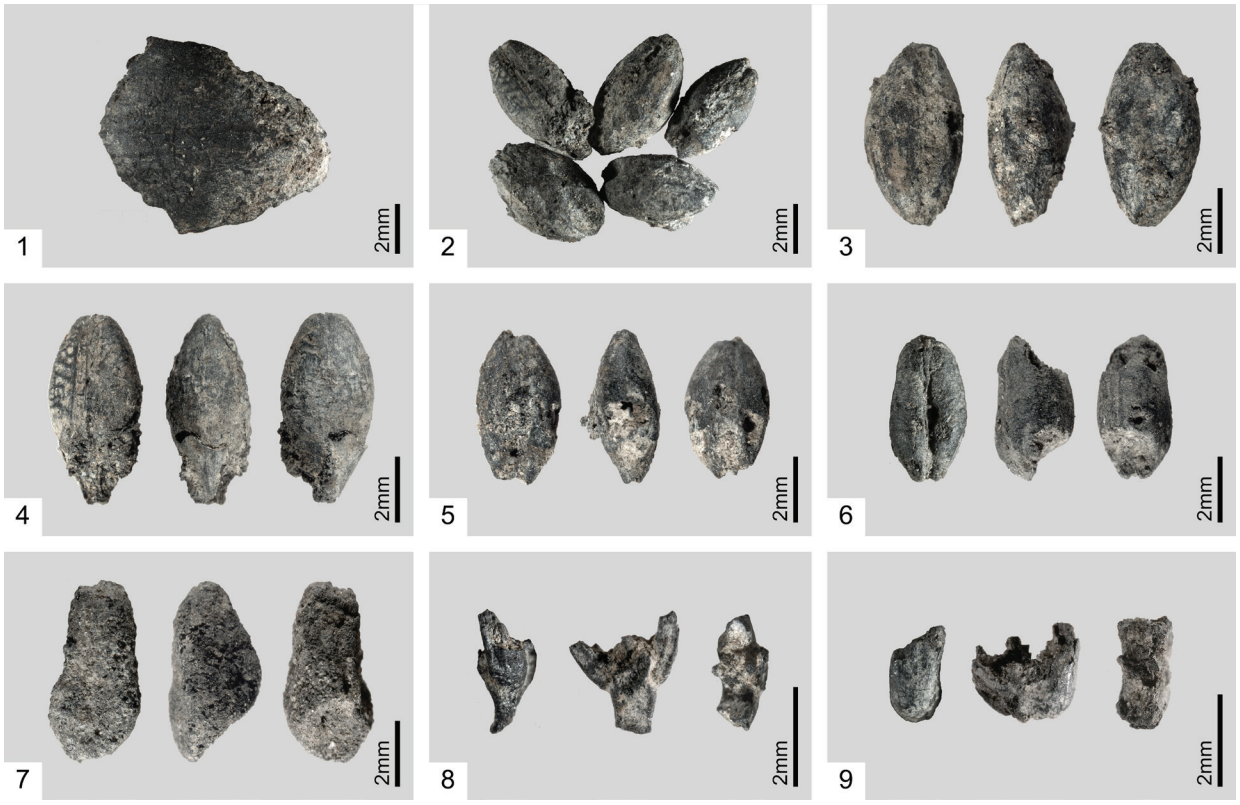

Figure 11. Charred plant macrofossils from Kakliniškės 7 settlement: 1. *Corylus avellana* (hazelnut) shell fragment; 2–5. *Hordeum vulgare* var. *vulgare* (hulled barley) grains; 6, 7. *Triticum dicoccon* (emmer) grains; 8, 9. *Triticum dicoccon* (emmer) glume base fragments. Photographs by K. Minkevičius.

Table 3. Charred plant macrofossils from Kakliniškės 7 settlement. * marks weed/ruderal taxa.

Sample			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Feature			2	2	6	7	8	1	1	5	4	3	19	13	14	15
Field No.			339 (7)	339 (7)	339 (8)	339 (9)	339 (10)	339 (11)	339 (12)	339 (13)	339 (14)	339 (15)	339 (17)	339 (20)	339 21)	339 (22)
			bot-tom	top												
Sample volume (l)			10	10	20	20	20	20	20	20	20	20	20	10	20	15
Taxon	**type of remains**															
Cultivated plants																
Hordeum vulgare var. *vulgare*	grain		-	-	2	-	-	5	17	20	-	1	-	-	-	-
Hordeum vulgare L.	grain		1	2	2	29	5	8	26	42	1	-	-	-	-	-
Hordeum/*Triticum* sp.	grain.		-	-	1	-	-	-	-	-	-	-	-	-	-	-
Panicum miliaceum L.	grain		1	1	-	-	-	1	-	-	-	-	-	-	-	-
Triticum dicoccon Schrank ex Schübl.	grain		-	1	-	14	-	1	5	10	-	-	-	-	-	-
Triticum dicoccon Schrank ex Schübl.	glume base fr.		-	-	-	1	-	1	-	1	-	-	-	-	-	-
Triticum spelta L.	grain		1	-	-	11	-	1	-	-	-	-	-	-	-	-
Triticum sp. (hulled)	grain		2	3	-	93	-	12	37	44	2	3	1	1	-	-
Triticum sp.	grain		-	1	1	12	-	1	4	4	-	-	-	-	-	-
Cerealia	grain fr.		-	2	9	167	2	18	66	97	-	5	-	-	-	-
cf. Fabaceae (cult.)	seed fr.		-	1	-	1	-	-	-	-	-	-	-	-	-	-
Wilds plants																
Corylus avellana L.	shell fr.		2	-	-	4	1	5	4	-	-	1	-	-	-	-
Echinochloa crus-galli (L.) P.Beauv.*	fruit		-	-	-	-	-	-	-	1	-	-	-	-	-	-
cf. *Echinochloa* sp.*	fruit		-	-	-	-	-	-	-	-	-	1	-	-	-	-
Euphorbia helioscopia L.*	seed		-	-	-	-	-	-	-	1	-	-	-	-	-	-
Fallopia convolvulus L.*	fruit		-	-	-	1	-	1	-	-	-	-	-	-	-	-
Rubus idaeus L.	fruit		-	-	-	-	-	-	-	-	-	-	-	-	1	-
Indet.	fr.		-	-	-	-	-	-	-	-	-	1	-	-	-	-

Table 4. AMS ^{14}C dates from the settlement sites with Kakliniškės Ware.

No.	Site	Context	Sample	Lab. code	^{14}C date BP	^{14}C date cal BC 2σ	References
1	Kakliniškės 7	Feature 7	*Alnus* sp. charcoal	FTMC-UU26-57	2306 ± 28	409–232	This study
2	Kakliniškės 7	Feature 1, S side	charred *Hordeum vulgare*	FTMC-UU26-21	2195 ± 26	361–173	This study
3	Kakliniškės 7	Feature 1, N side	charred *Triticum* cf. *dicoccon*	FTMC-UU26-22	2199 ± 26	362–176	This study
4	Kakliniškės 6	Feature 337-4	*Alnus* sp. charcoal	FTMC-UU26-61	2256 ± 28	393–207	This study
5	Kakliniškės 8	Feature 340-7	*Alnus* sp. charcoal	FTMC-UU26-48	2210 ± 33	379–176	This study
9	Migūčionys	Feature 323-1	*Quercus* sp. charcoal	FTMC-UU26-71	2181 ± 28	363–153	This study
7	Žebertonys 5	Feature 307-1	charred *Cerealia*	FTMC-RO56-17	2371 ± 28	540–291	This study
8	Ardiškis 2	Feature 1	charcoal	UBA-33207	2383 ± 36	733–391	This study
9	Ardiškis 2	Horizon 6	charcoal	FTMC-SJ39-12	2415 ± 28	744–401	This study
10	Vilūnai 5	Potsherd No. 4204	foodcrust	FTMC-UU26-35	2543 ± 33	801–546	This study
11	Skituriai 2	Feature 1	charcoal	FTMC-ZL85-1	2311 ± 30	414–229	Masiulienė et al. 2022

of plant remains (Grigas 1986; Latałowa 1999; Cappers et al. 2012; Neef et al. 2012) and comparative collections of fossil and modern plants. Archaeobotanical taxonomy follows Zohary et al. (2012).

The samples contained 825 charred plant macrofossils (Table 3). The majority of these were cultivated plants (97.1%, n=801), which were absent in only two features of natural origin (Nos. 14 and 15). The identified plants belong to four taxa — *Hordeum vulgare*, *Panicum miliaceum*, *Triticum dicoccon* and *Tr. spelta* (Fig. 11). Wheat constituted the main component (61.9%, n=268), dominated by the hulled species (91.4%, n=245). Thirteen *Tr. spelta* grains were identified, as well as 31 *Triticum dicoccon* grains and three glume base fragments. *Hordeum vulgare* grains (37.2%, n=161) represented a slightly smaller share of the cultivated plants, among which one variety, *Hordeum vulgare var. vulgare*, was identified (n=41). *Panicum miliaceum* grains made up only a very small portion of the identified crops (0.7%, n=3).

Among the wild taxa, few macrofossils of weeds and/or ruderal species were found. These include *Echinochloa crus-galli* (n=1) and *Fallopia convolvulus* (n=2) fruits, and *Euphorbia helioscopia* seed. Several remains of woodland species were discovered, which included *Corylus avellana* shell fragments (n=17) and *Rubus idaeus* fruitlet. However, these species may also be associated with human habitation areas as well as supplementary food sources. Therefore, despite their affinity for the anthropogenic environment, the small number of finds and narrow diversity of wild species prevents examination of the settlement's environment in any greater detail.

1.6. Chronology

The abundance of pottery and archaeobotanical material indicates that the features investigated at Kakliniškės 7 contain waste typical of an area of domestic activity. Therefore, these features may be associated with a homestead, despite the fact that no traces of buildings were identified. The homogeneity of the pottery and the compact distribution of the features suggest that they are the remains of a single occupational episode. There are no signs of re-occupation of the site. This is confirmed by the AMS ^{14}C dates, which were obtained from two charred cereal grains and one charcoal. Both grains came from Feature 1, but from different parts of it, belonging to different pits. The charcoal was from Feature 7 and came from an alder (*Alnus sp.*).[2] Dates for Kakliniškės 7 and the other new dates presented in this article were provided by the Mass Spectrometry Laboratory, Centre for Physical Sciences and Technology, Vilnius (Lithuania). The standard acid-alkali-acid (AAA) pre-treatment was used for the charred plant remains. In this study, all radiocarbon ages were calibrated using the OxCal v4.4.4 software and IntCal20 atmospheric curve (Bronk Ramsey 2009; Reimer et al. 2020). Calibrated dates are presented at 95.4% probability.

The dates obtained from the two grains are almost identical: ca. 360–170 cal BC. The charcoal date is slightly earlier: 409–232 cal BC (Table 4). However, such a difference in dates does not necessarily indicate that the features sampled have different chronologies. The charcoal date may be biased by the old wood effect, i.e. the age

[2] All charcoal samples were identified microscopically by Kęstutis Peseckas.

difference between the formation of the dated tree ring and its burial. To avoid this, we have specifically chosen charcoal of short-lived species for dating, but due to the steepness of the calibration curve in this time period, even a slight old wood effect leads to a date that is statistically inconsistent with the others.

The radiocarbon dates indicate that the Kakliniškės 7 settlement site was inhabited sometime between the 4th and 3rd centuries BC. As mentioned above, settlement sites of this period in eastern and southern Lithuania were unknown until now, because there were no dates for this period and there was no awareness of the type of pottery being used at that time. With the typological definition and radiocarbon dating of the Kakliniškės Ware, it is now possible to look for settlement horizons from this period in the material of other sites.

2. Kakliniškės Ware in the settlement sites of SE Lithuania and the Trans-Nemunas region

References to coarse slipped pottery from the 1st millennium BC in Lithuania date back to the literature of the mid-20th century. Daugudis (1966) distinguished two groups of pottery with an additional layer applied on the surface: early (finely coarse, with thin additional layer), used at the end of the 1st millennium BC to the first half of the 1st millennium AD, and late (roughly coarse, with thick additional layer),[3] which he dated from the 5th to the 8th century AD. He believed that the earliest appearance of the coarse slipped pottery occurred in the Trans-Nemunas region and southeastern Lithuania, where this tradition was introduced from northwestern Poland. Characterising the early coarse slipped pottery, he emphasised the similarity of its vessel forms to those of the LSWC pottery. Grigalavičienė described the development of the coarse slipped pottery in a similar way, but she considered the thickness of the additional layer to be the main feature separating the two groups. Therefore, she attributed vessels of very different shapes to the early coarse slipped pottery (Danilaitė 1967).

The Iron Age pottery of the Trans-Nemunas and other regions of Lithuania has not been studied more extensively since the appearance of these works. Meanwhile, the development of pottery in northeastern and southeastern Lithuania is much better understood today. In these regions, it is possible to distinguish three types of coarse slipped pottery with thin additional layer, attributed to different periods and stylistically quite distinct from each other. Most of the pottery stored in the museum collections is late coarse slipped pottery, which is not earlier than rusticated pottery, as Grigalavičienė thought, but later. These are thick-walled, bucket- or barrel-shaped pots with straight or slightly inwardly inclined necks. Such pottery dates back to the 7th to 8th centuries AD (Vengalis 2007; 2009). A very different type of pottery is found in the LSWC settlement sites dating from the 3rd/2nd century BC to 2nd/3rd century AD. This pottery, as Daugudis has noted, is very similar to the striated pottery used at that time — the striations are visible beneath the additional layer, and the ridges have been formed on the shoulders of the vessels. This pottery is rare, with only occasional sherds being found even in the most extensively excavated settlement sites of the LSWC. It is not a distinct type of pottery, but only a rare variant of surface treatment of LSWC pottery (Vengalis 2007, p. 124; Vengalis and Vėlius 2019, p. 84; Vengalis et al. forthcoming). The third type of the coarse slipped pottery would be the Kakliniškės Ware identified in this paper.

On the basis of the distinctive features of the Kakliniškės 7 pottery, we have identified settlement sites in SE Lithuania and the eastern Trans-Nemunas region where Kakliniškės Ware has been found. The material from Kakliniškės 7 shows that not all Kakliniškės Ware was coarse slipped — a small part of it is just striated. However, where ^{14}C dates are unavailable, only coarse slipped pottery is suitable for the reliable identification of Kakliniškės Ware, as the striated surface is more difficult to distinguish from other types.

2.1. Settlement sites in the Kakliniškės micro-region

In 2020, during the survey of the GIPL pipeline route, in addition to Kakliniškės 7, another five archaeological sites with traces of occupation from the same period were discovered in the Kakliniškės micro-region: Kakliniškės 6 and 8, Migūčionys, Žebertonys 4 and 5. All of them were located along the route of the GIPL pipeline on a stretch of only 3.5 km (Fig. 2).

Kakliniškės 6 and 8 sites are located in close proximity to Kakliniškės 7, about 200 m to the east and 100 m to the west, respectively (Fig. 2.II, IV). At the Kakliniškės 8 site, three sunken features of anthropogenic origin with archaeological finds were detected. They were scattered over an area of 35 x 8 m. The finds were scarce: 23 sherds of hand-made pottery (44 g) and one flint flake. The pottery was very fragmented and of an unidentifiable type. One charcoal from each of these features was dated by AMS ^{14}C. One date obtained was of the same period as Kakliniškės 7: 379–176 cal BC (Table 4). The remaining two dates were from the 15th century AD to the present day. Therefore, these two features are late, but the presence of hand-made pottery indicates that, although no

[3] Also referred to in literature as 'pottery with a rough surface' or 'rusticated pottery'.

Figure 12. Pottery from Žebertonys 5. Field numbers: 1. 191; 2. 206; 3. 207; 4. 230; 5. 208; 6. 218; 7. 172; 8. 173. Photographs by R. Vengalis.

archaeological layer has been recorded at the site during the survey, it was once present.

At the Kakliniškės 6 site, 11 sunken features were identified, distributed over an area of 90 x 8 m. The shape, cross-sections and fill of the pits suggest that some of them may be of natural origin, probably tree throws. Archaeological finds were recovered from nine features, including natural ones. A total of 121 sherds of hand-made pottery (213 g), seven flint flakes (7 g) and six pieces of clay plaster (21 g) were collected. Most of the pottery was very fragmented and unclassifiable. Three features contained coarse slipped pottery of Kakliniškės Ware, but only six sherds were identified. A further ten sherds had a striated surface — they were thin-walled, and there was a profiled S-shaped neck. The vessel shapes were similar to the Kakliniškės Ware. In two features, striated pottery was found together with a coarse slipped pottery. Charcoals from three features were dated by AMS ^{14}C. The results are similar to those obtained at Kakliniškės 8: one date is contemporaneous with Kakliniškės 7, and two are from historical times — 13th to 17th century. The Earliest Iron Age date of 393–207 cal BC (Table 4) was obtained from a feature containing coarse slipped as well as striated pottery.

The Migūčionys site is located 1.3 km to the east of Kakliniškės 6 (Fig. 2.V). Here, in an area of 50 x 10 m, very fragmentary remains of the archaeological layer and 23 sunken features were observed. The majority of the features and finds date from the 5th to the 14th century AD. Coarse slipped pottery (18 sherds, most from a single vessel) and similar striated pottery (7 sherds) was found in three features, which did not contain later finds. One feature with striated pottery was dated by AMS ^{14}C to 363–153 cal BC (Table 4).

The Žebertonys 5 site is located 1.5 km to the east of Migūčionys (Fig. 2.VII). The archaeological layer has not been preserved here, only three sunken features have been uncovered, scattered over an area of 15 x 10 m. The largest number of finds was in Feature 307-1: 75 pottery sherds (338 g), one flint flake, one piece of clay plaster and four animal bones. The other features contained only a few pottery sherds. The pottery assemblage also included some larger sherds, all of which are attributed to Kakliniškės Ware (Fig. 12). The zooarchaeological material contained bones of a hare, a bovine, a large cyprinid fish, probably a bream, and an unidentified bird species.[4] All the features were sampled for archaeobotanical analysis. Four macrofossils of seeds of cultivated plants were found in Feature 307-1. Only one grain of *Panicum miliaceum* was identified to species. No remains of cultivated plants were found in the other features. Charred *cerealia* grain from Feature 307-1 was dated by AMS ^{14}C. The date obtained is slightly earlier than the dates of the other mentioned sites in the

[4] Identified by Giedrė Piličiauskienė.

Kakliniškės micro-region — 540–291 cal BC (Table 4). Charred hazelnut shell and pine charcoal were selected for dating from the other two features. Both of these dates are late, 11th–13th century AD, and do not match the typological dating of the finds.

The Žebertonys 4 site is located 100 m to the east of Žebertonys 5 (Fig. 2.VIII). Three sunken features containing archaeological finds were uncovered here. According to the shapes, cross-sections and fills, the anthropogenic origin of only one pit is beyond doubt. The other features are more typical of tree throws. A total of 19 sherds of hand-made pottery (37 g), two flint flakes and one calcined bone fragment were collected. The pottery is fragmented, but a couple of sherds can be attributed to Kakliniškės Ware without much uncertainty. Charcoals from two features were dated by AMS ^{14}C, but both of them were much later than the archaeological finds, dating to the 11th–13th centuries AD.

Research in 2020 along the route of the pipeline has shown that the Kakliniškės micro-region was quite intensively settled in the first half of the Earliest Iron Age. Nowhere else along the 165 km long GIPL pipeline route were such accumulations of settlement sites from this period found. The material from all the sites listed here is very similar in the sense that in each case archaeological traces are very scarce. No substantial archaeological layer has survived, and only a few sunken features with a small number of finds have been found. Radiocarbon dating shows that even these features are mostly unrelated to ancient settlement structures. Some of them are of natural origin, others are pits dug out in later times. These sunken features indicate only that at the time of their formation, the archaeological layer of the Earliest Iron Age was still present. Intensive ploughing in recent centuries has destroyed the archaeological layer and only remnants of it have survived in the sunken features. Such features may be related to forest fires, possibly slash-and-burn farming, and therefore charcoal may have been introduced both from the archaeological layer and from a later forest fire. This is also suggested by the ^{14}C dates. The dates of the charred grains of cultivated plants always coincide with the typological dating of the finds, while the probability of selecting a sample related to the archaeological layer is considerably reduced when dating charcoal or charred hazelnut shells. In the settlements discussed, as many as seven out of ten charcoal samples appeared not to be associated with an archaeological context, but rather with later events, most likely forest fires (see also Piličiauskas et al. 2022).

2.2. Ardiškis 2 settlement site

The Ardiškis 2 settlement site is located about 15 km northeast of the Kakliniškės micro-region (Fig. 1). It is located in the valley of the Neris River. The settlement site is extensive, with archaeological traces in an area of about 800 x 100 m, bounded by the valley slopes and the river. Most of the site has evidence of occupation from various periods, including the Stone Age, the 1st millennium AD and the early 2nd millennium (Vengalis 2014). The archaeological layer of the middle of the 1st millennium BC was found only in one part of the site, which has been the most extensively investigated. A total area of about 140 m^2 was excavated here in 2014–2018 (Vengalis 2015; 2019; Vėlius and Vengalis 2018).

The area is located on the periphery of the first terrace, next to the slope of the upper terrace. At the foot of the slope there is a natural ditch about 20 m wide and up to 1–2 m deep. It is probably the valley of a small, now defunct, stream, partially filled with peat and soil ploughed from the higher ground. Excavations were carried out on the slope of this ditch and on the flat terrace next to it. An archaeological layer of peat up to 70 cm thick has been preserved on the slope of the ditch. It contained sherds of hand-made pottery, flint flakes, overheated pebbles and a few very fragmentary animal bones. Due to the acidic soil, the preservation of the finds was very poor: the pottery was very fragile and many of the sherds had completely disintegrated. The archaeological layer on the flat terrace has been completely eroded by ploughing, and only the sunken features have survived. Nine features were found, but most of them are probably of natural origin.

Over 800 pottery sherds (2.5 kg) were collected in the archaeological layer and features. There were three types of pottery, but only two of them are relevant for this article: coarse slipped pottery and thin-walled striated pottery. The third type, thick-walled striated pottery, is much earlier, dated by radiocarbon dating to the 9th century BC (unpublished date). The coarse slipped pottery was the most abundant (Fig. 13.1–6). The attributes of this pottery allow it to be assigned to Kakliniškės Ware. The necks are mostly S-shaped with an upright rim. However, there were also a few straight-profile, I-shaped necks (Fig. 13.3). The additional layer applied on the outer surface is thin and even, with abundant admixture of crushed granite. Before the application of this layer, the surface was striated. The inner surface is plain. The walls are about 7 mm thick. Although no petrographic analysis has been carried out, macroscopically it is apparent that the fabric of this pottery contains abundant sandy admixtures, which is unusual in the Kakliniškės Ware from the other sites. In contrast, the crushed granite temper is similar, dominated by coarse particles of 3–5 mm. Some sherds contain finer particles along with the coarse ones, while others only contain coarse ones.

Another type of pottery had a striated surface (Fig. 13.1–6). The striations are irregular, usually vertical or

Figure 13. Pottery from Ardiškis 2 with coarse slipped (1–6) and striated (7–11) surface. Field numbers: 1. 2017/47; 2. 2017/30; 3. 2018/37; 4. 2017/62; 5. 2018/27; 6. 2018/17; 7. 2018/1; 8. 2018/42; 9. 2018/13; 10. 2018/4; 11. 2018/5. Photographs by R. Vengalis.

diagonal. On the inner surface, only the neck is striated. The shapes of the pots are similar to those of the Kakliniškės Ware, with a curved wall, rounded shoulders and a vertical rim (Fig. 13.10, 11). The walls are 7–8 mm thick, the necks are thinned to 3–4 mm. The fabric differed from the coarse slipped pottery in having significantly less sand in the macroscopic view. The temper is 3–4 mm diameter crushed granite particles. One sherd was decorated with parallel cordons of triangular cross-section (Fig. 13.8).

The issue of the possible simultaneity of coarse slipped and thin-walled striated pottery is important to the subject of this article. In all the sites discussed above, along with the pottery with a coarse surface, pottery with a striated surface, identical in all other respects, was found. At Ardiškis 2, the neck profiles of the striated pottery are also identical to those of the coarse slipped pottery. For this reason, it could be assumed that both of these types can be attributed to the Kakliniškės Ware. However, at Ardiškis 2 the distributions of both of these types were different. In the archaeological layer on the slope of the ditch, there was a predominance of coarse slipped pottery, but there was also a presence of striated pottery. In contrast, in the sunken features on the flat terrace, only striated pottery was found. Attention should also be paid to the clay used for pottery making, which differed quite significantly between the two types. The selection of different clays is not usual for contemporaneous pottery from the same site. Another important argument is the sherd of striated pottery decorated with cordons. Such pottery has recently been found at several other sites: Grabijolai-Žemaitiškės 2 (Vengalis 2014), Vilnius Castle Hill (Kontrimas 2020), Mijaugonys and Kakliniškės 3 (Piličiauskas et al. forthcoming a). At these sites, the cordon-decorated pottery with a striated surface is thin-walled, the neck profiles are also similar to the pottery from Ardiškis 2, but no coarse slipped sherds of Kakliniškės Ware have been found alongside it. This pottery is slightly earlier than the Kakliniškės Ware, according to the radiocarbon dates from Mijaugonys and Vilnius: ca. 800–400 cal BC (Šmigelskas 2018; Motuzaitė Matuzevičiūtė et al. 2020; Piličiauskas et al. forthcoming a). Taken together, these arguments suggest that it is likely that the coarse slipped and striated pottery at Ardiškis 2 are not contemporaneous. In other words, the pottery with a striated surface does not belong to Kakliniškės Ware and is likely to be earlier.

To specify the chronology of the striated and coarse slipped pottery, two charcoals were dated by the AMS ^{14}C method. A date of 733–391 cal BC was obtained for charcoal from a sunken feature that contained striated pottery exclusively (Table 4). As no pure contexts with coarse slipped pottery were found, an attempt was made to date it on the basis

of charcoal found in the archaeological layer on the slope of the ditch. In this context, the predominant pottery was coarse slipped, but there were also striated sherds. The date obtained is very similar to the first: 744–401 cal BC (Table 4). The two dates are not statistically significantly different ($T = 0.456$, $T'(5\%) = 3.841$, $\nu = 1$), but since they fall within the Hallstatt plateau of the calibration curve, they may actually represent two chronologically distant events. Therefore, it is not possible to say whether this date is really related to the coarse slipped pottery or whether it is nevertheless associated with the striated pottery.

2.3. Other settlement sites

The Kernavė archaeological site is located in the Neris River valley, about 5 km southeast of Ardiškis 2. It is a large archaeological site of about 180 ha, with traces of occupation and burials from different periods. Although around 19,000 m^2 have been excavated in various places, very few finds of Kakliniškės Ware have been identified. Aside from in graves (more on these in the next section), it has been found in only two locations. On the edge of the upper terrace of the valley near the Kriveikiškis hillfort, five sherds of this type of pottery were found in a prospective trench (Vengalis and Vėlius 2019, p. 99). A few more sherds were found in another location — the Mindaugas Throne hillfort. The hillfort seems to have been established only in later times, and in the Earliest Iron Age it would have been an unenclosed settlement on a natural promontory separated from the upper terrace by ravines (Vengalis and Vėlius 2019, pp. 88–95). Meanwhile, in the valley, where traces of occupation from all other prehistoric periods are clustered, not a single sherd of Kakliniškės Ware has been found.

One sherd of Kakliniškės Ware was found in Vilūnai 5, about 30 km to the southwest of Kakliniškės. An area of about 400 m^2 was excavated at this site and an archaeological layer with vertically intermixed finds from various periods, mainly Mesolithic and Early Bronze Age, was discovered (Piličiauskas et al. forthcoming a). Only one sherd of coarse slipped pottery was recovered, but the characteristic profile of the neck leaves no doubt that it should be classified as Kakliniškės Ware. The foodcrust from this sherd has been dated by AMS ^{14}C to 801–546 cal BC (Table 4). The date is much earlier than the other dates related to Kakliniškės Ware, suggesting the presence of aquatic contents in the foodcrust and that the resulting date is biased by the freshwater reservoir effect.

Another two sites with finds of Kakliniškės Ware are located near the Nemunas River (Fig. 1). The first one, Panemuninkai 3, was investigated in 2020 during the construction of the aforementioned GIPL pipeline. An archaeological layer covering an area of 25 m in diameter was found here. The layer was between 15 and 50 cm thick and contained vertically intermixed archaeological finds from different periods. These included ca. 40 sherds of coarse slipped pottery of the Kakliniškės Ware. A further 40 sherds of this pottery, including some larger ones, were found in a sunken feature located approximately 5 m from the area of the archaeological layer (Šatavičė 2021). Another site is the Alytus settlement, located about 10 km to the south of Panemuninkai 3. An area of approximately 150 m^2 was excavated in 2015–2016. An archaeological layer 30–60 cm thick with very numerous (>9000) finds from different periods was uncovered (Kontrimas 2016; 2017). The predominant pottery was from the 1st and early 2nd millennia AD, but there were also several dozen sherds of Kakliniškės Ware.

The westernmost settlement with identified Kakliniškės Ware is Skituriai 2. This site was investigated in 2021, during the construction of the GIPL pipeline (Masiulienė et al. forthcoming). An archaeological layer covered an area of approximately 20 m in diameter. The unploughed archaeological layer was 5–30 cm thick and was dominated by 11th- to 14th-century wheel-turned pottery. Together with this, 13 sherds of Kakliniškės Ware were found. Underneath the archaeological layer there were some sunken features, two of which contained a larger quantity of Kakliniškės Ware — 64 and 41 sherds, without any wheel-turned pottery. The majority of these sherds appear to belong to three vessels. No rims were found, only wall fragments. Charcoal from a sunken feature with coarse slipped pottery was dated by AMS ^{14}C. The date obtained is 414–229 cal BC (Table 4).

Only the settlement sites investigated by the authors of this article are described here, as well as a few other sites the researchers of which discussed with us the typology of the pottery they found. Based on these data alone, and without a special review of the pottery collections in the museums, the number of settlement sites with Kakliniškės Ware is already relatively high — nine. The question therefore arises as to how much of this type of pottery may have been found at other sites and remained unidentified. There are no hints in the literature about pottery of this type found at other settlement sites. In the articles on coarse slipped pottery by Daugudis (1966) and Grigalavičienė (Danilaitė 1967), all the finds mentioned should be attributed to LSWC and late coarse slipped pottery. The atlas of Bronze Age and Earliest Iron Age settlements compiled by Merkevičius does not mention a single settlement site in eastern Lithuania where coarse slipped pottery has been found (Merkevičius 2018). The annual bulletin 'Archaeological Research in Lithuania', which publishes summarised results of all the excavations carried out in Lithuania, also does not make any reference to pottery that could be attributed to Kakliniškės Ware. However, we would suggest that the probability of finding Kakliniškės

Ware in museum collections among unpublished material from long-term settlement sites is rather high. Since this type has not been distinguished so far, many researchers may have misclassified such sherds as rusticated pottery of the 1st millennium AD. The additional layer applied to the surface is sometimes very slight, so that such pottery could have been labelled as striated pottery as well. Gathering information on all such finds in museum collections would be an extremely difficult task, and would require a review of the material from all the settlements with striated and coarse slipped pottery. We have not undertaken this task in the course of this study, but it is hoped that in the long term the map in Figure 1 can be considerably expanded, both by new excavation data and by the reassessment of old excavation finds held in the museums.

3. Kakliniškės Ware in burial sites

Kakliniškės Ware is also encountered in burials. Burial sites from the 1st millennium BC are very scarce in the Trans-Nemunas region and eastern Lithuania. Only three have been investigated so far: Kernavė, Semeniškiai and Paveisininkai (Fig. 1). All of them contained urns with a coarse slipped surface. There are more burials from other sites mentioned in the literature, but either they were unearthed by non-archaeologists, without documentation, or only scattered finds from heavily disturbed or presumed burials were found during archaeological excavations (Merkevičius 2014).

Excavations at the Kernavė burial site exposed 27 graves. Most of them were concentrated in an area 40 m in diameter, with one discovered some 70 m away from the main cluster. There were four types of graves: 1) cremation graves in small pits; 2) cremation graves in urns; 3) cremation graves covered by stone cairns; and 4) inhumation graves (Luchtanas 1992a; 1994b; 1996; 1998). The burial site was in use for a long period of time, from the 10th to the 2nd century BC according to the available ^{14}C dates. There were five graves in the urns, four of which had a striated surface and one with a coarse slipped surface. The latter was found in grave 7. The shape and the profile of the neck of this urn are identical to those of the Kakliniškės Ware (Fig. 14.1). The additional layer applied to the surface was thin and not continuous, with some areas with a plain surface remaining. The inner surface was plain. The urn was 28 cm high, with a base diameter of 13 cm, an orifice of 22 cm. The thickness of the walls at the neck was 6 mm.

The Semeniškiai burial site is located right next to the Kernavė burial site, just 650 m to the S. This burial site was severely disturbed in the 3rd century AD by the construction of the burial mounds in the same location. The fills of the ditches and grave pits of the mounds contained fragments of urns and cremated bones from the completely destroyed graves of the 1st millennium BC. After an area of more than 700 m^2 was excavated, only one intact and two disarranged cremation graves were found in this burial site (Baltramiejūnaitė and Vengalis 2010). One urn and most of the sherds from the dismantled graves can be attributed to Kakliniškės Ware. The best-preserved urn was found in grave 6.1. It was exposed just below the ploughsoil, was broken and tipped on its side, and some of the sherds had been ploughed up to 1 m to the side. Only a few cremated bones were found next to the urn,

Figure 14. Kakliniškės Ware urns from Kernavė (1) and Semeniškiai (2) burial sites. Photographs by R. Vengalis.

and the rest may have got into the ploughsoil and disintegrated. The outer surface of the urn is coarse slipped, with an additional layer evenly covering the entire surface (Fig. 14.2). The inner surface is horizontally and diagonally striated. The height of the vessel is 26.5 cm, the diameter of the base is 11 cm and the orifice is 21 cm.

The Paveisininkai burial site is located in the southern part of the Trans-Nemunas region (Fig. 1). The burial site is located on a hill where a fortified settlement was established in later centuries. A total of 27 graves have been found at this burial site. As in Kernavė, the graves were of different types, however, here as many as 15 graves were found in urns (Kulikauskas 1970). As in other burial sites, some of the urns had a coarse slipped and some a striated surface. There were eight urns with a coarse slipped surface. These urns were of different shapes — there were pots of different sizes, and a bowl, however, the profiles of the necks are consistent with Kakliniškės Ware. They were decorated in a similar way to the pottery from Kakliniškės 7, with a row of pits on the neck, but in this case the pits were larger in diameter. One grave with a striated urn (No. 12) yielded an AMS ^{14}C date of 793–544 cal BC (Piličiauskas 2012). However, the differing burial types and surface treatment of the urns suggest that the Paveisininkai burial site, like Kernavė, may have been in use for a long period of time, and that the urns with a coarse slipped surface would have to be of a later date than this.

Currently, none of the graves with an urn with a coarse slipped surface at any of these burial sites has been dated. The available dates from the graves with striated urns indicate an earlier period than the Kakliniškės Ware, i.e. the 8th to 6th century BC (Piličiauskas 2012). However, the fact that the coarse slipped urns are attributable to Kakliniškės Ware is not in doubt and it can be assumed that the graves with them would be later than these dates.

4. Chronology of Kakliniškės Ware

Calibrated radiocarbon dates from the sites with Kakliniškės Ware indicate quite wide age intervals due to the plateaus in the calibration curve. In order to obtain a more precise dating, Bayesian modelling was applied using the OxCal v4.4.4 software tools. Only those dates that can be reliably associated with Kakliniškės Ware were included in the model. They were combined into a single phase and the aim of the modelling was to determine the beginning, end and duration of this phase. The boundaries of the phase were refined using ^{14}C dates from earlier (ESWC) and later (LSWC) sites where no Kakliniškės Ware was found.

The model is based on the assumption that Kakliniškės Ware represents a distinct chronological phase in the evolution of pottery, i.e. that there was a certain period when exclusively this ware was in use. This is confirmed by the material from the settlement sites discussed above: no other chronologically close pottery types, e.g. those typical of the ESWC and LSWC settlements, were found together with Kakliniškės Ware anywhere. Therefore, the existing data reliably indicate that the settlements in question represent episodes of occupation in which Kakliniškės Ware was the only type of pottery in use at the time. However, another possibility should be considered here, namely that the fortified settlements of the ESWC and the unenclosed settlements with Kakliniškės Ware may have existed at the same time, but were inhabited by separate communities with different cultural traditions and making different pottery. In such a case, the results of the model presented here would be misleading. However, we would consider that this possibility is very unlikely. Even if several distinct communities coexisted in the same region, it is likely that they would still interact with each other, which would be reflected at least in the presence of occasional finds of foreign pottery, but no such finds are recorded. Moreover, the unmodelled ^{14}C dates also show that chronologically the settlements with Kakliniškės Ware do not clearly overlap with the ESWC or LSWC phases, but tend to be focused in the intermediate period.

The Kakliniškės Ware phase in the model is represented by the dates given in Table 4, excluding those that are at all questionable. The dates from Ardiškis 2 are not included because of concerns that they may represent an earlier phase; the Kakliniškės 8 site exhibited only very fragmented sherds of an unidentifiable type; and the Vilūnai 5 date is excluded due to the presumed influence of a freshwater reservoir.

The beginning of the Kakliniškės Ware phase was refined using dates covering the period ca. 700–400 cal BC and obtained from sites or contexts where no Kakliniškės Ware was found (Table 5). The dates were also limited to SE Lithuania, the same region in which the Kakliniškės Ware finds are present (Fig. 1). On the basis of these criteria, we were able to select dates from four settlement sites: Vilnius Castle Hill, Ardiškis 2, Mijaugonys and Žalioji. The context of the Mijaugonys date is clear: the settlement was short-term and contained a single type of pottery — thin-walled with a striated surface and decorated with parallel cordons of triangular cross-section (Piličiauskas et al. forthcoming). Three further dates used are from Vilnius Castle Hill (Šmigelskas 2018; Motuzaitė Matuzevičiūtė et al. 2020). The chronology of this hillfort is broad, but these dates mark the earliest phase of its occupation, which includes thin-walled pottery with a striated surface and triangular cross-section cordons, similar to the Mijaugonys pottery. Although the dates come from intermixed contexts, the other finds there (LSWC pottery, rusticated pottery) are much later and certainly not related to these dates. No Kakliniškės Ware was found in the hillfort, so these dates

Table 5. The ^{14}C dates used in the model, representing phases earlier and later than the Kakliniškės phase.

No.	Site	Sample	Lab. code	^{14}C date BP	^{14}C date cal BC/AD 2σ	References
1	Mijaugonys	charred hazelnut shell	FTMC-UU26-8	2396 ± 28	725–397 BC	Piličiauskas et al. forthcoming a
2	Vilnius Castle Hill	charred *Triticum aestivum/durum*	UBA-42391	2534 ± 36	799–542 BC	Motuzaitė Matuzevičiūtė et al. 2020
3	Vilnius Castle Hill	charred *Triticum spelta*	UBA-40925	2487 ± 26	773–517 BC	Motuzaitė Matuzevičiūtė et al. 2020
4	Vilnius Castle Hill	cattle bone	RAD-8-2017-6	2454 ± 41	757–412 BC	Šmigelskas 2018
5	Žalioji	charcoal	Vs-2028	2470 ± 50	770–416 BC	Piličiauskas 2012
6	Baluošos	charcoal	Poz-56364	2245 ± 35	394–201 BC	Kuncevičius et al. 2015
7	Baluošos	charcoal	Poz-56363	2165 ± 35	361–57 BC	Kuncevičius et al. 2015
8	Kernavė Aukuras Hill	charcoal	FTMC-44-9	2066 ± 48	337 BC – 62 AD	Vengalis et al. 2020b
9	Grikapėdis	charcoal	FTMC-KV66-9	2221 ± 26	382–199 BC	Šatavičė and Šatavičius 2021

can be reliably included in the model as marking a phase preceding that of Kakliniškės Ware. Another date comes from the already discussed Ardiškis 2 site. It was obtained from a sunken feature, which contained solely thin-walled striated pottery, of the same type as the pottery from Mijaugonys and Vilnius Castle Hill. The fourth site included in the model is Žalioji unenclosed settlement (Piličiauskas 2012). The thick-walled pottery with a striated surface found here differs from the pottery of the other three sites and is more similar to the pottery of the hillforts of northeastern Lithuania. The pottery from Žalioji probably belongs to a separate phase from the thin-walled striated pottery. However, since the aim of this model is to define only the chronology of the Kakliniškės Ware, the date of Žalioji is grouped together with other dates earlier than Kakliniškės Ware.

The oldest published dates of the LSWC settlement sites were selected for the refinement of the end of the Kakliniškės Ware phase. The LSWC culture spread around the 3rd century BC in northeastern, southeastern Lithuania and the Trans-Nemunas region. The pottery of this culture is well known from the numerous fortified and unenclosed settlement sites and can be distinguished very clearly from other types of pottery. Based on this, we have also included dates from the Baluoša fortified settlement, situated slightly to the north of the known area of distribution of the sites with Kakliniškės Ware. This site was dated by two charcoal samples taken from an archaeological layer where only LSWC pottery was found (Kuncevičius et al. 2015, p. 112). In southeastern Lithuania, we could find only two published dates suitable for this phase of the model. The first one is from the Kernavė Altar Hill hillfort. Here, charcoal from a borehole has been dated (Vengalis et al. 2020b), but excavations in the vicinity of the borehole have shown that there is no layer earlier than the LSWC at this area of the hillfort (Luchtanas 1994a). Another date is from Grikapėdis unenclosed settlement, where a rich LSWC layer was found (Šatavičė and Šatavičius 2021). There are more published dates from LSWC settlements, but the rest are later and are not relevant for the refinement of the end of the Kakliniškės Ware phase.

These dates were grouped into three sets, assigned to the Kakliniškės Ware phase and to phases earlier and later than it. The model was generated using the OxCal v4.4.4 software functions Sequence, Phase, Boundary and Interval (Bronk Ramsey 2009). The dates were calibrated using the IntCal20 atmospheric curve (Reimer et al. 2020). Modelling of the dates allowed the intervals to be narrowed quite significantly (Fig. 15). The start of the Kakliniškės Ware phase is estimated by the function Boundary at 458–387 cal BC. The end with the same function is found at 363–258 cal BC. The phase duration is indicated by the function Interval to have been a minimum of 43 years and a maximum of 172 years. Thus the currently available data allow the Kakliniškės Ware phase to be defined as ca. 410–320 cal BC (based on the medians of the start and end of the phase).

5. Settlement pattern and subsistence

All the sites with Kakliniškės Ware are unenclosed settlements, and no such finds are known from the hillforts so far. These settlement sites also share other important com-

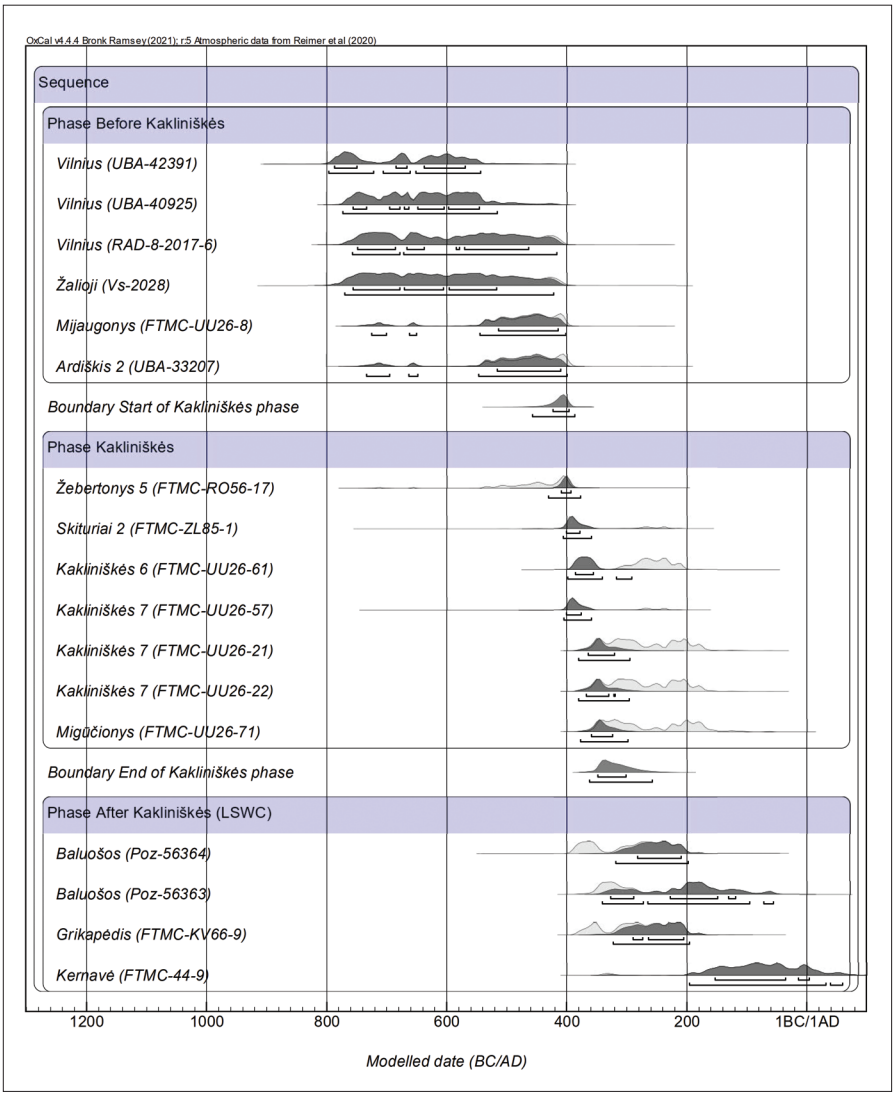

Figure 15. Modelled ^{14}C dates and Boundaries of Kakliniškės phase.

mon features: in all of them, this period (the 4th century BC) is represented by very scarce archaeological traces, which are found in a small cluster of a few dozen metres in diameter. There is scant or no archaeological layer, sunken features are few, and finds are rare. This suggests that the landscape may have consisted of dispersed settlements made up of scattered isolated farmsteads. The archaeological sites probably indicate the locations of such individual farmsteads. These farmsteads have not formed an intensive archaeological layer, have not accumulated a lot of waste, and not many pits have been dug, and therefore it can be assumed that places were not inhabited for a long time. The farmsteads were probably relocated frequently.

In all these respects, settlement sites with Kakliniškės Ware significantly contrast with both the preceding ESWC and the subsequent LSWC settlements, which are characterised by thick archaeological layers with a large number of finds, and fortified settlements as the dominant settlement type. Such distinctions lead to the hypothesis that they may have been the result of important differences in the subsistence practices of these communities.

The data from the Kakliniškės 7 settlement provided especially important information for this question. Until now, the entire Earliest Iron Age in Lithuania has been completely unknown archaeobotanically, so the new material from well-preserved and reliably dated contexts is crucial for examining the subjects of the development and nature of agriculture during the second half of the 1st millennium BC.

The composition of crop remains found at Kakliniškės 7 suggests certain similarities with the material from the Late Bronze Age settlements in Lithuania. Samples are dominated by three cereal taxa: hulled wheats (~57%), barley (~37%) and broomcorn millet (~1%). In comparison, at Kukuliškiai fortified settlement these crops account for ~13%, 66% and 14%, respectively, and at Luokesa 1 lake settlement for 36%, 1% and 48% of the identified crop macrofossils (Pollmann 2014; Minkevičius et al. 2020).

In the archaeobotanical assemblages of the less studied Mineikiškės and Garniai 1 fortified settlements, barley grain accounts for 33%, broomcorn millet for 44% and 67% of the crops, respectively (unpublished data, analysed by Minkevičius).

The most remarkable difference between the Kakliniškės 7 material and the Late Bronze Age settlements is the surprisingly low quantity of broomcorn millet. This could indicate a swift decline in the economic importance of the crop. Stable C and N isotope analyses of human skeletons from the Earliest Iron Age burials at Kernavė and Raginėnai show that millet did not constitute a significant portion of the studied individuals' diet (Simčenka et al. 2022). Moreover, a drop in the importance of millet is also evident in the Roman Iron Age sites such as Bilionys and Naukaimis-Gabrieliškės fortified settlements, and Bakšiai, Lieporiai and Skudeniai unenclosed settlements, where the amount of up to 5% of the total crop remains is recorded (Minkevičius 2020; Vengalis et al. forthcoming). However, without additional archaeobotanical assemblages dated to the Earliest Iron Age, it remains to be determined whether the Kakliniškės 7 material is indicative of a broader trend, or simply reflects the agricultural preference of the particular community.

Also, it is worth noting that the analysed samples are unlikely to reflect the entirety of the diet at Kakliniškės 7. Instead, these finds could have been deposited during a single event or a few separate episodes. Some insights could be drawn from the exceptionally low amount of food processing waste. Only isolated weed seeds and only 3 emmer glume base fragments were detected. Some of the waste, such as small weeds or rachis fragments, is easily separated by sieving and winnowing and is therefore usually removed shortly after harvest (Grabowski 2014). Furthermore, the relatively low number of wheat husks suggests that the archaeological context included grain that had already been de-husked. These species are typically stored in the form of semi-clean spikelets as the husks protect grain from fungi and pests, making it easier to store longer (Fuller and Lucas 2014; Stevens 2014). Also, dehusking is labour intensive and thus requires additional effort. This suggests that the finds from Kakliniškės 7 represent clean grain, prepared for consumption, and indicates that analysed assemblages should be associated with food preparation.

Finally, it is important to address the subject of the Earliest Iron Age agricultural systems. Archaeobotanical data from the 1st millennium BC in Lithuania have so far only presented evidence of the intensive form of agriculture, defined by the maintenance and prolonged use of the crop fields (Minkevičius 2020; Minkevičius et al. 2020). However, this model was based entirely on the Late Bronze Age fortified settlement data. The new material from unenclosed settlements presented in this paper suggests the possibility of alternative agricultural systems. It could be hypothesised that the apparent ephemerality of the farmsteads might indicate the presence of a slash-and-burn agriculture. This is an extensive form of cultivation which utilises planting on a fertile field, cleared by burning a woodland (Rowley-Conwy 1984). However, it also involves little to no further maintenance. Such a form of agriculture features high productivity and low labour input, but rapidly depletes natural resources and degrades the landscape (Jacomet et al. 2016). This means that every few years farmers are forced to relocate in search of new fields for cultivation. An analysis of weeds associated with the grain would help to test this hypothesis, as this could reveal the presumed duration of field cultivation. Unfortunately, the negligible quantity of weeds uncovered at Kakliniškės 7 provides little information. A more detailed answer to this question could also be presented by the stable C and N isotope analysis of the grains. $\delta^{13}C$ values in plants depend on photosynthesis and its limiting factors, such as sunlight and moisture deficiency (Mueller-Bieniek et al. 2019), while $\delta^{15}N$ values are related to the use of manure for field fertilisation (Fiorentino et al. 2018). Therefore, such analysis would provide a better understanding of both the technologies used and the natural conditions of the local environment.

6. Some remarks on cultural processes

New archaeological data from recently excavated unenclosed settlements show that a distinct phase of settlement can be distinguished in the 4th century BC in southeastern Lithuania and the eastern Trans-Nemunas region. These sites date to one narrow period and differ from settlements of other periods in terms of their pottery, settlement pattern, and most probably their economic model. The settlements and burial sites described here will be referred to as the Kakliniškės group.

The identification of the Kakliniškės group changes the picture presented in the archaeological literature of a static cultural context in eastern Lithuania throughout the 1st millennium BC (Luchtanas 1992b; Grigalavičienė 1995; Egoreichenko 2006; Girininkas 2013). The Kakliniškės group and its short period of existence suggest that cultural changes were quite intense, at least in southeastern Lithuania.

Kakliniškės Ware has been found not only in the settlements, but also in all three investigated burial sites of the 1st millennium BC in southeastern Lithuania. In at least two cases, at Kernavė and Paveisininkai, the Kakliniškės group chose to bury their dead in burial sites that were established several centuries earlier. This is confirmed by radiocarbon dates. The interpretation of these burial sites

in the literature varies. Grigalavičienė attributed both Paveisininkai and Kernavė to the ESWC (Grigalavičienė 1995, p. 235). Luchtanas attributed only Kernavė to the ESWC, while he linked Paveisininkai to the people of the Elk and Suwalki lake settlements (Luchtanas 1992a; 1992b). Recently, ideas about the latenisation of part of the Lithuanian territory have been put forward — attempts have been made to associate the burial sites discussed here, together with the burial sites of the Lower reaches of the Nemunas River, with the influence of the Lusatian culture (Brazaitis 2008; Girininkas 2013). All of these interpretations were based on the assumption that the burial sites were short-term. However, the currently available dates indicate that they were used for a very long time, and therefore should not be interpreted in a straightforward way — burials from different periods may reflect different cultural traditions. Only some of the graves in these burial sites can be attributed to the Kakliniškės group, while most of them would be earlier and attributed to other cultural groups.

All the sites assigned to the Kakliniškės group — settlements and burials — are located in southeastern Lithuania, between the Neris and the Nemunas Rivers, and in the eastern part of the Trans-Nemunas region (Fig. 1). However, it is unlikely that this group was really limited to such a region. To the north of this area, in northeastern Lithuania, numerous fortified settlements are known, which are certainly attributable to the ECWC. Radiocarbon dates indicate that these settlements existed only ca. 800–400 BC (Podėnas 2020), and not up to the turn of the eras, as was assumed prior to the acquisition of these dates (Luchtanas 1992b; Grigalavičienė 1995; Egoreichenko 2006). Thus, the end of their existence coincides precisely with the beginning of the Kakliniškės phase. According to the currently available data, the Kakliniškės group does not overlap with the ESWC either chronologically or geographically. Although various authors have previously referred to the range of the ESWC as covering both northeastern and southeastern Lithuania, no definite sites of this culture are known south of the Neris River. No Kakliniškės Ware has yet been identified within the area of the ESWC settlements, but it is also not known what other pottery might represent the 4th century BC there. The direct transition between the ESWC and LSWC has always been presented as a fact beyond doubt, but with the drastic narrowing of the ESWC chronology to ca. 800–400 cal BC by radiocarbon dating, this no longer seems so clear. There is no doubt that the beginning of the LSWC must be pushed back from the previously accepted date of the turn of the eras to at least the 3rd century BC. This is also suggested by the dates from the settlements of this culture already mentioned (Fig. 15). However, it is not yet possible to prove that the formation of the LSWC dates back to the beginning of the 4th century BC. Therefore, the 4th century BC remains unknown in northeastern Lithuania, and it cannot be ruled out that it was also represented by the as yet undiscovered settlements of the Kakliniškės group.

The question of whether the area of the Kakliniškės group can be extended further westwards in the Trans-Nemunas region requires more detailed research. We have identified a few sites with Kakliniškės Ware in the eastern part of the Trans-Nemunas, but there are also finds of pottery with a coarse slipped surface in settlements further to the west. The main problem here is that the pottery of the Trans-Nemunas has not yet been studied in depth. Unlike in eastern Lithuania, we do not know exactly in which periods pottery with a coarse slipped surface was produced. The western Trans-Nemunas region borders on northeastern Poland, where pottery with such a surface was widespread throughout the 1st millennium BC and even in the 1st millennium AD. Therefore, pottery with a coarse slipped surface in the Trans-Nemunas region may not necessarily indicate sites of the Kakliniškės group, but may also belong to other periods and other cultural groups. Until a localised sequence of prehistoric pottery in the region is established, any attempt to classify the pottery of individual sites, which have not been radiocarbon dated, will inevitably lead to misinterpretations.

Pottery with a coarse slipped surface was also used in the 1st millennium BC in western Lithuania and in the region of the lower reaches of the Nemunas River. Here, such pottery can be found both in settlement and burial sites. Several available dates (Piličiauskas 2012; Minkevičius et al. 2020; Vengalis et al. 2020a) indicate that here pottery with a coarse slipped surface began to spread earlier than the Kakliniškės Ware in southeastern Lithuania. The differences between the coarse slipped pottery of this region and the Kakliniškės Ware are the predominance of thick-walled vessels and the greater variety of their forms. For these reasons, and because of the significant geographical distance, we do not, at least for now, associate the western Lithuanian pottery with Kakliniškės Ware. There may have been quite different cultural processes going on in this region at that time.

Regarding the origin of Kakliniškės Ware, it seems that it may have been formed by a convergence of the local and the western neighbours' pottery-making traditions. The pottery of Kakliniškės Ware shares similarities with earlier pottery with a striated surface found in the same area (Ardiškis 2, Vilnius Castle Hill). Meanwhile, the surface treatment must have been the result of influences from the west. In neighbouring regions in other directions, pottery with a coarse slipped surface was not common in the 1st millennium BC (Sperling 2014, p. 214; Visocka 2017). In view of the possible western influences on pottery production and thus on its style, the question arises as to whether these influences were limited to this or whether they could

have had a wider significance, i.e. whether they could have also affected the economy, the social order and the settlement system. However, there is still a lack of data to provide reliable answers to these questions. We can see that the settlement pattern of the Kakliniškės group was very different from that of the ESWC, but we do not know what the differences are in comparison with the settlements of southeastern Lithuania dating from 800–400 BC, for which data are still very scarce.

Conclusions

In 2020, the Kakliniškės 7 settlement site was discovered and excavated during surveys on the GIPL pipeline route. The extensive and representative pottery collection and archaeobotanical material from the sunken features, belonging to just one short phase of occupation, provided especially valuable data, allowing a new insight into the cultural situation in the 1st millennium BC in Lithuania. All the pottery belongs to a single type, the distinctive feature of which is a striated surface with an additional layer of coarsening. This type has not been distinguished so far, and such pottery has only been known from burial sites.

The definition of the Kakliniškės Ware and its attributes have allowed the identification of such pottery in other sites in southeastern Lithuania and the eastern Trans-Nemunas region. The modelling of radiocarbon dates obtained in different sites has allowed the dating of Kakliniškės Ware to be defined as ca. 410–320 cal BC. In all of the settlement sites, this period is represented by scarce archaeological traces, which are scattered in a small area. This suggests that these were unenclosed dispersed settlements, where farmsteads did not stay in one place for long and were often shifted to a new location. The frequent relocation may have been related to an extensive form of cultivation and could indicate the coexistence of several different farming strategies. However, the questions of whether and how the transformation of pottery we have observed is related to possible changes in other areas of culture cannot be addressed currently due to the lack of understanding of the Late Bronze Age and Earliest Iron Age in southeastern Lithuania.

The data presented in this paper challenge the recurrent claims in the literature that the cultural context in the whole of eastern Lithuania was very static throughout the 1st millennium BC, with no changes in material culture, social order, settlement pattern, or other cultural traits. Now it can be stated that the region cannot be considered homogeneous, either geographically or chronologically. Significant changes in human diet probably began before the start of the Roman Iron Age, as indicated by a sharp drop in millet consumption. New data show that the ESWC, which is undoubtedly represented by fortified settlements dating from around 800–400 BC in northeastern Lithuania, southeastern Latvia and northwestern Belarus, has been unjustifiably defined by a much broader region and chronological period. It seems that the settlements with Kakliniškės Ware represent different cultural traditions from the ESWC and indicate that, at least in southeastern Lithuania, the cultural situation in the 1st millennium BC was much more dynamic than has previously been assumed.

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Abbreviations

Archaeol. Baltica – Archaeologia Baltica

Arch. Lituana – Archaeologia Lituana

ATL – Archeologiniai tyrinėjimai Lietuvoje ... metais / Archaeological Investigations in Lithuania in ..., Vilnius

Lietuvos Arch. – Lietuvos archeologija

Veget Hist Archaeobot – Vegetation History and Archaeobotany

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NEPASTEBIMAS ANKSTYVOJO PRIEŠROMĖNIŠKOJO GELEŽIES AMŽIAUS KRAŠTOVAIZDIS: KAKLINIŠKIŲ 7 GYVENVIETĖS TYRIMAI, PADĖJĘ ĮŽVELGTI IKI ŠIOL NEIDENTIFIKUOTĄ APGYVENDINIMO ETAPĄ PIETŲ LIETUVOJE

ROKAS VENGALIS, GYTIS PILIČIAUSKAS, KAROLIS MINKEVIČIUS, MANTAS VALANČIUS

Santrauka

2020 m. atliekant tyrimus magistralinio dujotiekio vietoje, aptikta ir tirta Kakliniškių 7 gyvenvietė (2 pav.). Archeologiniai pėdsakai čia buvo gana menki – archeologinio sluoksnio beveik neišlikę, aptikti įgilinti objektai koncentravosi vos 10 m skersmens areale. Iš viso užfiksuota 19 objektų, kurių devyni greičiausiai yra gamtinės kilmės (3, 4 pav.; 1 lentelė). Visgi įgilintuose objektuose surinkta gausi ir reprezentatyvi, tik vienam trumpam apgyvenimo etapui priklausančios keramikos kolekcija, archeobotaninė medžiaga (11 pav.; 3 lentelė) ir kiti radiniai (10 pav.) suteikė itin vertingų duomenų, leidžiančių naujai pažvelgti į I tūkstantmečio pr. Kr. kultūrinę situaciją Pietryčių Lietuvoje. Visa keramika priklauso vienam tipui, kurio išskirtinis bruožas – brūkšniuotas paviršius su papildomai užteptu kruopėtumo suteikiančiu sluoksniu. Visų indų formos labai panašios – tai puodai gaubtomis sienelėmis ir nežymiai išreikštais peteliais (5–9 pav.; 2 lentelė). Šis keramikos tipas iki šiol nebuvo išskirtas, o tokios keramikos žinota tik iš kapinynų. Naujai išskirtas keramikos tipas pavadintas Kakliniškių tipu.

Kakliniškių tipo keramikos išskyrimas ir požymių apibrėžimas leido tokią keramiką identifikuoti ir kitose Pietryčių Lietuvos ir rytinėse Užnemunės gyvenvietėse. Tai Kakliniškės 6 ir 8, Migūčionys bei Žebertonys 4 ir 5 (12 pav.) tame pačiame mikroregione kaip ir Kakliniškės 7; Kernavė ir Ardiškis 2 (13 pav.) prie Neries; Vilūnai 5 Kruonio apylinkėse; Alytus ir Panemuninkai 3 prie Nemuno; Skituriai

2 rytinėje Užnemunės dalyje (1 pav.). Skirtingose gyvenvietėse gautų ^{14}C datų modeliavimas leido Kakliniškių tipo keramikos datavimą apibrėžti maždaug 410–320 cal BC (15 pav.; 4, 5 lentelės).

Kakliniškių tipo keramikos aptikta ir kapinynuose. Urnų kruopėtu paviršiumi, priskirtinų Kakliniškių tipui, buvo visuose trijuose tyrinėtuose Užnemunės ir Rytų Lietuvos I tūkstantmečio pr. Kr. laidojimo paminkluose – Kernavėje, Semeniškiuose ir Paveisininkuose (14 pav.).

Visose gyvenvietėse, kuriose aptikta Kakliniškių tipo keramikos, IV a. pr. Kr. atstovauja labai menkos archeologinės liekanos, paplitusios nedideliame areale. Tai leidžia kelti hipotezę, kad gyvenvietės buvo neįtvirtintos, išsklaidyto tipo, sodybos nutolusios viena nuo kitos ir vienoje vietoje ilgai nestovėjusios, dažnai perkeliamos į naują vietą. Šiais požymiais gyvenvietės su Kakliniškių tipo keramika labai skiriasi tiek nuo ankstesnių, ankstyvosios brūkšniuotosios keramikos kultūros, tiek ir nuo vėlyvesnių, vėlyvosios brūkšniuotosios keramikos kultūros, gyvenviečių, kurioms būdingi stori archeologiniai sluoksniai su dideliu kiekiu radinių, o dominuojantis gyvenviečių tipas – įtvirtintos gyvenvietės. Tokie skirtumai leidžia kelti hipotezę, kad jie galėjo būti nulemti svarbių skirtingų šiose gyvenviečių grupėse praktikuotų ūkio modelių.

Apie priešromėniškojo geležies amžiaus žemdirbystę Lietuvoje iki šiol duomenų beveik neturėjome. Todėl nauja gausi medžiaga iš gerai išlikusių ir patikimai datuotų kontekstų Kakliniškių 7 gyvenvietėje šiuo atžvilgiu suteikė itin reikšmingos informacijos. Čia surinkta kultūrinių augalų liekanų kolekcija leidžia įžvelgti tam tikrus skirtumus nuo Lietuvos vėlyvojo bronzos amžiaus įtvirtintų gyvenviečių medžiagos. Svarbiausiu skirtumu galima įvardyti mažą sorų skaičių – tuo ši kolekcija artima tirtoms romėniškojo laikotarpio gyvenvietėms. Minėtas gyvenviečių su Kakliniškių tipo keramika sodybų trumpalaikiškumas leidžia kelti hipotezę apie praktikuotą ekstensyvios formos žemdirbystę. Vis dėlto tokio spėjimo pagrindimas lieka ateities tyrimų uždavinys.

Straipsnyje pristatyti duomenys paneigia literatūroje besikartojančius teiginius, kad kultūrinė situacija visoje Rytų Lietuvoje ištisą I tūkstantmetį pr. Kr. buvo labai statiška, nekito nei materialinė kultūra, nei socialinė santvarka, apgyvenimo sistema ar kiti kultūriniai bruožai. Šiandien galima konstatuoti, kad regiono negalima laikyti homogeniška nei geografiniu, nei chronologiniu lygmenimis. Nauji archeologiniai duomenys rodo, kad ankstyvoji brūkšniuotosios keramikos kultūra, kuriai neabejotinai atstovauja tik apie 800–400 m. pr. Kr. datuotos Šiaurės rytų Lietuvos, Pietryčių Latvijos ir Šiaurės vakarų Baltarusijos įtvirtintos gyvenvietės, nepagrįstai buvo apibrėžiama gerokai platesniu regionu ir chronologiniu laikotarpiu. Panašu, kad gyvenvietės su Kakliniškių tipo keramika atstovauja kitoms nei minėtos kultūros tradicijoms ir rodo, kad bent jau Pietryčių Lietuvoje I tūkstantmečio pr. Kr. kultūrinė raida buvo kur kas dinamiškesnė, nei iki šiol manyta.