KRIEVU KALNS HILL-FORT: NEW DATA ON THE LATE BRONZE AGE AND PRE-ROMAN IRON AGE IN WESTERN LATVIA

ANDREJS VASKS, VANDA VISOCKA, LINAS DAUGNORA, AIJA CERIŅA, LAIMDOTA KALNIŅA

Abstract

The article examines the results of the 2012 and 2013 archaeological excavations of Skrundas Krievu kalns hill-fort, situated in western Latvia. Krievu kalns was listed as a site in the 1920s, but it was not regarded as a hill-fort. During a site inspection, striated pottery was discovered, and this indicated that it might be numbered as a Late Bronze Age and Pre-Roman Iron Age habitation. Excavations revealed the site to be a hill-fort that was fortified in the 11th to the ninth century BC with a palisade made of vertical timbers. In the eighth to the fifth century BC, the defences were moved outwards, thus enlarging the living area. There was possibly even later a third fence. Krievu kalns may be classed as a Late Bronze Age hill-fort with striated pottery, reflecting the characteristic Bronze Age cultural traditions of western Latvia.

Key words: Krievu kalns, hill-fort, buildings, finds, Late Bronze Age, Pre-Roman Iron Age.

DOI: http://dx.doi.org/10.15181/ab.v26i0.2024

Introduction

Of the 85 hill-forts in Latvia that have been archaeologically investigated, only 14 are in western Latvia.[1] This statistic indicates that the hill-forts of western Latvia have been researched to a much smaller degree than the equivalent sites in other parts of the country. More extensive excavations have been undertaken at the hill-forts of Talsi, Beltes (Padure) and Matkule, while the others have been investigated on a smaller scale. Most of these hill-forts were inhabited in the Late Iron Age and at the beginning of the Middle Ages (Talsi, Padure, Puze, Sabile, Tukums and Pabērzkalns hill-forts). As in the rest of the east Baltic, the establishment of fortified living sites in present-day Latvia began in the Late Bronze Age and the Pre-Roman Iron Age, as isolated hills or promontories were selected for this purpose. In the western part of Latvia, habitation from this period has been identified on Matkule hill-fort (Mugurevich 1966) and Beltes (Padure) hill-fort (Vasks et al. 2011), but occupation on these sites continued in the Middle and Late Iron Age. Accordingly, it has not always been possible to separate archaeological evidence of the early period of habitation from later evidence. On Paplaka hill-fort, the remains of a sunken structure were uncovered (Vasks 1978), which yielded a mean 14C date of 273 cal BC. Accordingly, the structure is considered to be from the Pre-Roman Iron Age. On this hill-fort, too, judging from the small number of finds (mainly potsherds), habitation continued in the Early and Middle Iron Age, but the archaeological evidence of the earliest Iron Age structures was readily distinguishable from later evidence. The only hill-fort currently known to have been occupied only in the Late Bronze Age and earliest Iron Age, i.e., in the first millennium BC, with no habitation in later periods, is Smārdes Milzukalns. The cultural layer of the hill-fort was excavated in ten test-pits, and although the total excavated area was not large (36 square metres), and only a few finds were obtained (bone tools, amber, stone and bronze, along with striated pottery), they did constitute an artefact assemblage characteristic of the Late Bronze and the earliest Iron Age (Urtāns 2013, 146–169). Overall, it must be said that archaeological data on living sites from this period in western Latvia is still very scanty, and insufficient for an understanding of possible cultural differences.

Therefore, in order to obtain new evidence of living sites from this period in the western part of Latvia, attention was focussed on sites where separate finds (primarily striated pottery) had been collected, which could indicate habitation in the first millennium BC. One such site was Skrundas Krievu kalns, which had yielded examples of such pottery, along with a saddle quern, kept in the collections of the Archaeology Department of the National History Museum of Latvia. In order to obtain a more comprehensive picture of this living site, in the frame of the field course 'Archaeology of Latvia' in the Faculty of History and Philosophy of the University of Latvia, Andrejs Vasks undertook excavations here in 2012 and 2013, in collaboration with the young archaeologists Inga Doniņa (2012) and Aija Ērkšķe (2013) (Doniņa et al. 2014).

[1] The area of present-day Latvia west of the Lielupe basin.

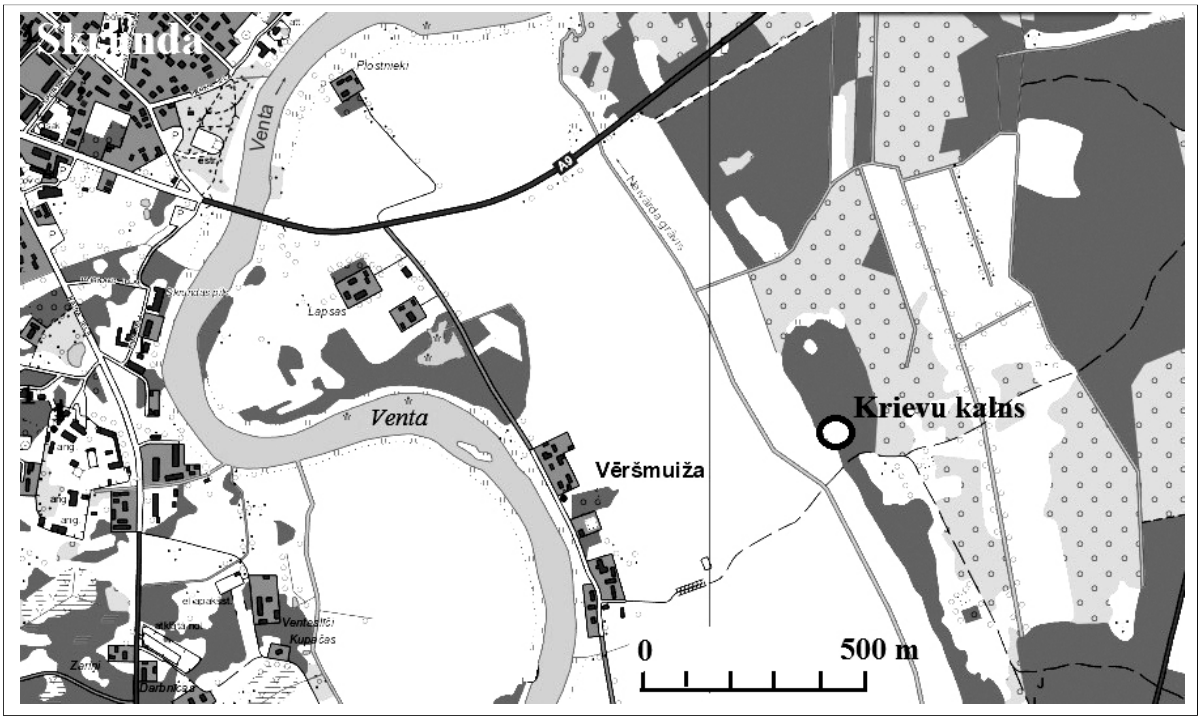


Fig. 1. The location of the Skrundas Krievu kalns hill-fort.

Krievu kalns hill-fort is located on the right bank of the River Venta, 600 metres from the river, and about two kilometres southeast of the town of Skrunda (Fig. 1). According to studies of the deglaciation of western Kurzeme (Juškevičs et al. 1997), which help us to understand the development of the landscape of the Venta Plain, including the Venta river valley, the hill-fort is a remnant of a glaciofluvial delta adjacent to the side of the Venta valley on the right bank of the river. The hill is elongated, almost triangular in layout. The steepest is the western slope, facing the former floodplain of the Venta, where the hill rises to a height of ten metres. On the other sides of the hill, the slopes are gentler, rising six to seven metres above the surrounding terrain. The plateau is gently sloping, with an approximate area of 850–900 square metres. Krievu kalns lacks the relief forms characteristic of hill-forts. The slopes are overgrown with forest, while the plateau was free of trees. The hill has been ploughed, as a result of which part of the cultural layer has been removed and re-deposited on the slopes. Silted-up trenches from the Second World War were visible on the western and southern slopes. A map in the work Das war Kurland. Die sechs Kurlandschlachten aus der Sicht der Divisionen by W. Haupt clearly indicates that the 912th Assault Gun Battery, with 25 guns, was stationed in the area around Skrundas Krievu kalns in the spring of 1945 (Haupt 1987). In the 1980s, a fire tower was built on the plateau, of which four concrete bases remain. There are various tales about the origin of the name Krievu kalns, meaning 'Russian Hill' in Latvian: the hill is said to have been piled up by Russian soldiers carrying soil in their helmets, or else the name comes from when the Russians fought the Swedes. It is said that from Krievu kalns, the Russian forces bombarded the Swedes on Nabagu kalns, located on the opposite bank of the Venta (Heniņš 2002, 71).

The first information about Skrundas Krievu kalns is provided by A. Bielenstein and K. von Löwis of Menar, on the basis of reports they had been sent, but they themselves did not visit the site or provide a description (Löwis of Menar 1922, 34). To check the information given by Löwis of Menar, in 1922 E. Brastiņš visited the site, and placed Krievu kalns in the category of 'Other sites registered as hill-forts', thus not recognising it as a true hill-fort (Brastiņš 1923, 134–135). In 1936, it was visited by E. Šturms, who observed a cultural layer with sherds of hand-formed pottery and animal bones, and described it as a prehistoric settlement resembling a hill-fort. His report of 2 December 1936 in the National History Museum of Latvia is supplemented with a plan of the hill, which, however, only partly corresponds to the real situation in the field. Further reports of archaeological finds on Skrundas Krievu kalns hill-fort were written by K. Rozītis, a member of the museum staff, in 1948 (Rozītis 1948). In the course of the survey work, he found potsherds, burnt rock, and burnt animal bones and teeth. In 1969, Krievu kalns was visited by Ē. Mugurēvičs, who noted that it has steep slopes, but no pronounced indications of fortification. He observed a cultural layer of 0.2 to 0.6 metres thick, containing hand-formed pottery with

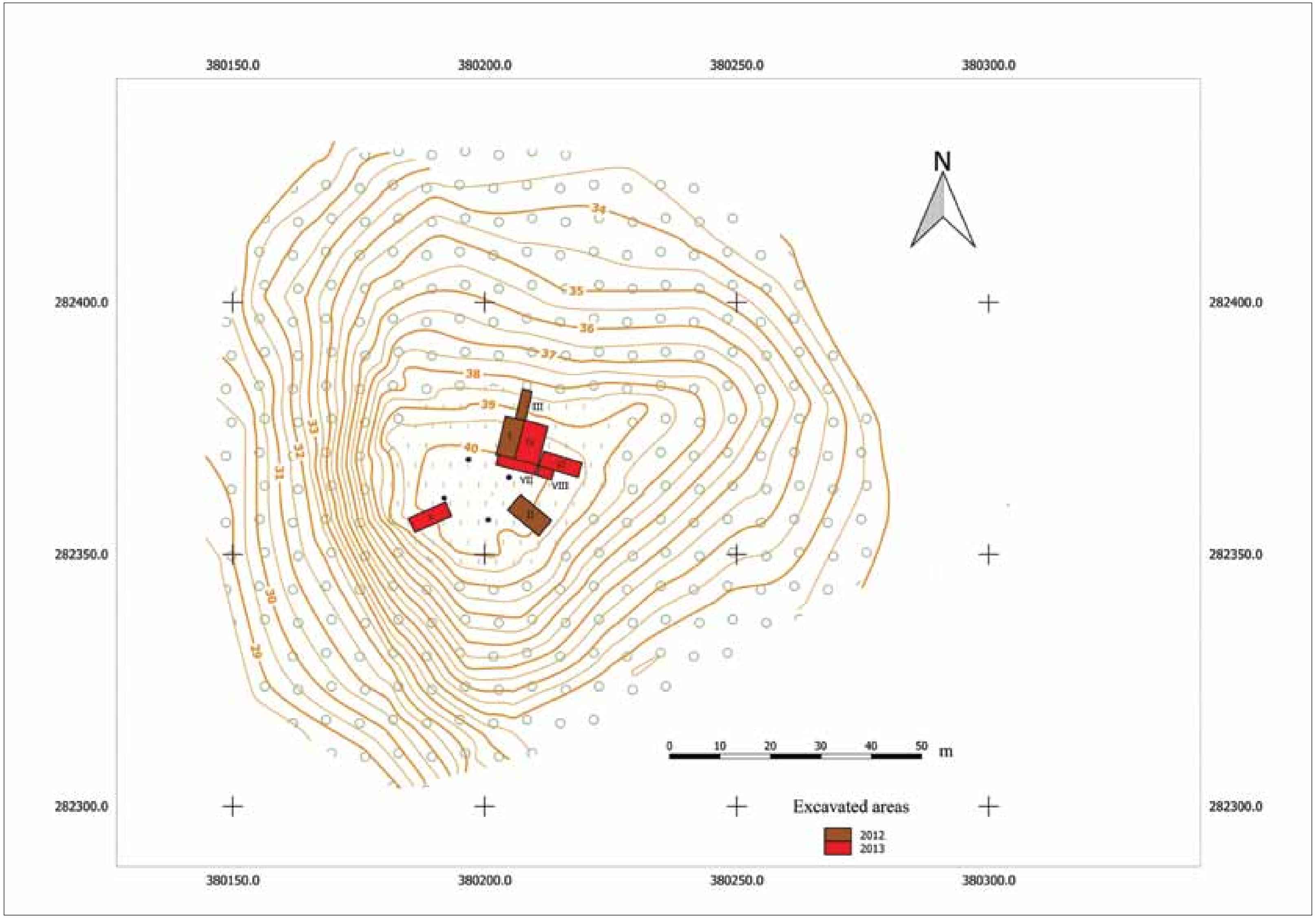


Fig. 2. A plan of the Krievu kalns hill-fort, indicating the areas excavated in 2012 and 2013 (surveyed by A. Rečs, M. Šķēle and E. Guščika).

a coarse-slipped surface (Mugurēvičs 1970). Prior to 2012, no archaeological excavations had been undertaken on Krievu kalns.

In 2012 and 2013, excavations were conducted in the northern part of the plateau (areas I, III, IV, VII and VIII) and the southeast part (area II) and the southwest part (area V), investigating a total area of 178 square metres (Fig. 2). A dark grey, charcoal-rich cultural layer was revealed in areas I, IV and VII, where it reached a thickness of 0.80 to 0.90 metres, with various features and postholes extending as deep as 1.90 metres into the natural subsoil. At the margins of the plateau on the eastern (area VIII), south-eastern (area II) and south-western side (area V) the cultural layer was less intensive, grey in colour, with charcoal-rich patches in places, having a thickness of 0.3–0.8 metres.

The structures and their chronology

Evidence of structures on the site took the form of postholes, hearths made of stones, groups of dispersed burnt stones, and a charcoal-rich cultural layer in the possible positions of buildings.

The defensive system. This was indicated by rounded or elongated postholes from a palisade in areas I, II, III, IV and VI, measuring 0.3 to 0.7 metres across and dug into the subsoil to a depth of 0.8 to one metre. On the northern side of the plateau, the postholes crossed areas I and IV obliquely, approximately northwest to southeast, while on the southeast edge of the plateau they crossed area II in a north-south direction. The distance between these large postholes varied considerably: some were close together, while others were up to 0.5 to one metre apart. They were connected by a ditch dug into the subsoil, 0.5 metres wide and 0.2 to 0.3 metres deep, within which smaller postholes (0.2 to 0.3 metres across) appeared in several places. Evidently, the palisade consisted of thicker posts dug into the subsoil, together with thinner posts dug in at a shallower depth. According to a radiocarbon-dated charcoal sample from a posthole in square 3–4/B, area IV (Figs. 3: A & 4: A; Table 1: 1), the absolute age of this earliest palisade was 1047–821 cal BC.[2] The line of a second, later palisade (Fig. 3: B) was revealed in areas III and IV, at a distance of two to three metres from the earlier one, closer to the slope of the hill. It was marked by a row of rounded or elongated postholes measuring 0.7×0.7 metres, 0.6×0.8 metres and 0.7×1.0 metres, extending 0.7 to 1.1 metres into the subsoil, and separated by distances of 0.2 to 0.6–1.0 metres. A charcoal sample from a posthole in area IV, square 7–8/A–B was dated to 797–471 cal BC (Table 1: 2). Two elongated pits (0.5×0.6 metres and 0.45×1.05 metres), 0.5 to 0.8 metres deep, were revealed in the northern part of area III even further out on the slope, about one to 1.5 metres from the postholes of the second palisade (Fig. 3: C). Because of the small extent of the excavated area (2×6 metres), it is, however, not possible at present to confirm with certainty the existence of a third palisade. The lines of two fences were also identified in area II, by the southeast slope, but here the distance between the two rows of posts did not exceed one metre.

Excavation area V (3×8 metres) was opened up on the southwest side of the plateau, in order to ascertain whether there were defences on this side, facing the steepest slope of the hill, towards the Venta valley. In the southwest part of the plateau, where the slope towards the side of the hill began and where there were hopes of identifying postholes from a palisade, trenches from the Second World War were revealed, which had erased any potential traces of a palisade. Therefore, traces of fortifications on the southwest side of the plateau were not revealed.

Buildings. The presence of buildings was indicated by a charcoal-rich belt of the cultural layer with burnt and split rock, measuring three to four metres in width, along the line of the palisade (Fig. 4: 2). The positions of individual structures could not be distinguished. Postholes uncovered at the level of the subsoil (diameter 0.2 to 0.4 metres, depth in subsoil up to 0.5 metres) evidently indicate above-ground post-built buildings. Two larger pits extending into the subsoil were revealed in the belt of structural remains: one 0.8 metres deep, oval in plan, measuring 1.2×1.4 metres; the other circular, 1.2 metres in diameter and 0.5 metres deep. Wood charcoal from this pit was dated to 769–411 cal BC (Table 1: 3). These were possibly storage pits underneath the buildings. In the area of the buildings, three hearths of piled stones in different states of preservation were revealed, and groups of dispersed burnt rocks indicated a further two such hearths. These measured from 0.3×0.5 up to 0.5×0.7 metres, and had been excavated 0.4 metres into the subsoil. Two of the hearths were uncovered in areas I and IV, on the line of the oldest palisade, showing that they belonged to the phase of habitation when the palisade was already closer to the slope (Fig. 4: 1). The recovered 405 fragments of clay daub indicate that in places, possibly in the vicinity of the hearths, the walls of the wooden buildings were covered in clay for protection from the fire. Judging from impressions in the daub fragments, the daub had covered structures made of roundwood five to ten centimetres thick.

[2] All 14C dates from Krievu kalns have been calibrated by OxCal 4.2 (Bronk Ramsey 2009).

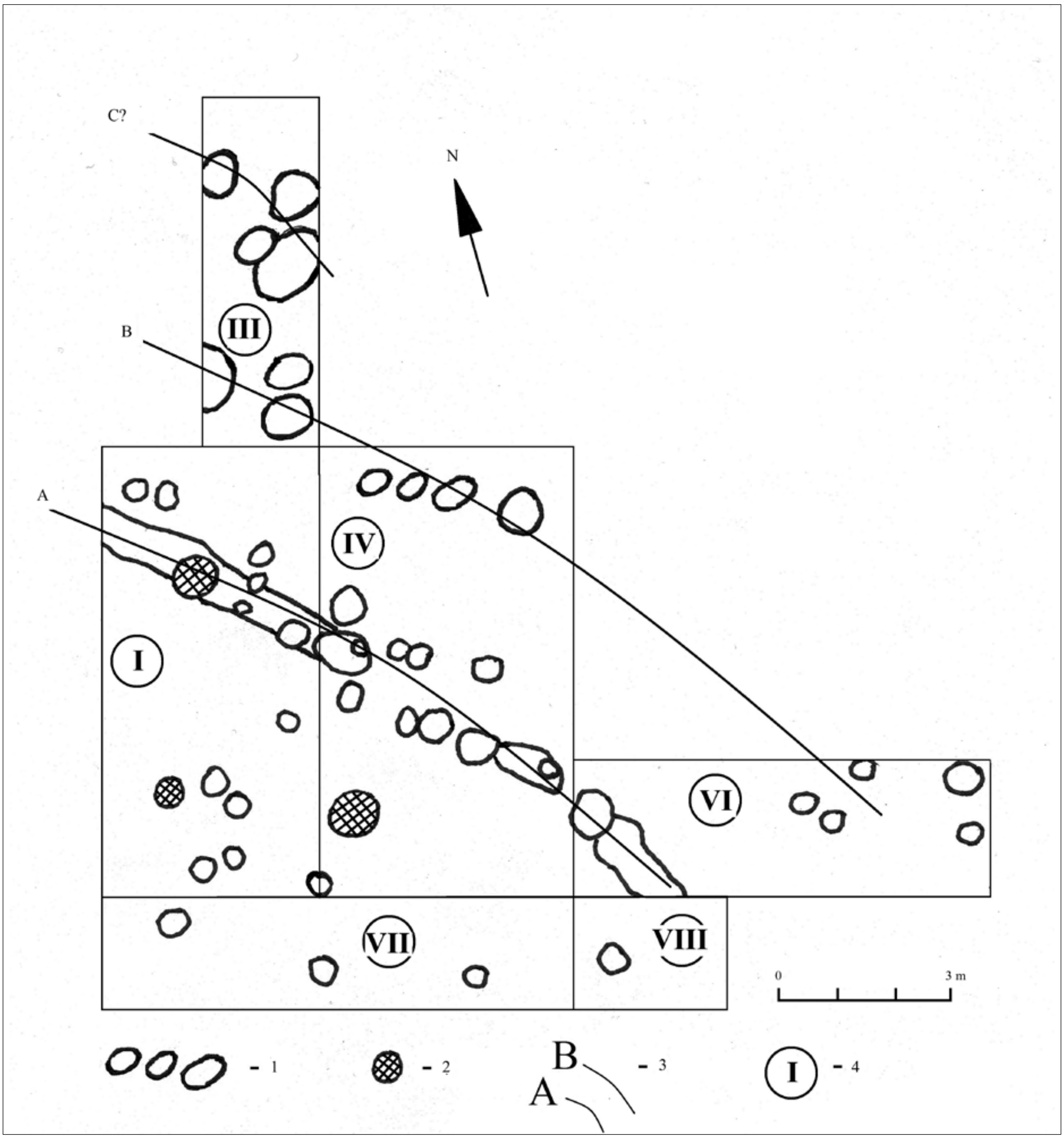


Fig. 3. The lines of the palisade in areas I, III, IV, VI, VII and VIII: 1 postholes; 2 hearths; 3 lines of palisades; 4 excavation area numbers (drawing by A. Vasks).

Fig. 4. Structural remains in area I: A zone along the palisade; 1 hearth on the line of the palisade; 2 area of buildings with remains of hearths (photograph by A. Vasks).

Table 1. Radiocarbon dates from the Krievu kalns hill-fort.

No.	14 C date, years BP	Lab. code	Cal (95,4 % probability)	Sample description	Context report
1.	2779 ± 50	Tln 3519	1047 – 821 BC	Charcoal	Area IV, sq 3-4/B, posthole, depth 0,5 – 0,6 m
2.	2507 ± 60	Tln 3518	797 – 430 BC	Charcoal	Area IV, sq 7-8/A-B, posthole, depth 0,7 m
3.	2454 ± 45	Tln 3520	760 – 411 BC	Charcoal	Area VII, sq 2-3/A, storage pit, depth 0,55 m
4.	2515 ± 30	Poz-112330	793 – 541 BC	Charcoal	Area II, sq 1/C, posthole, depth 1.34 m
5.	2375 ± 30	Poz-112331	541 – 390 BC	Charcoal	Area II, sq 3/B-C, posthole, depth 1.14 m
6	6390 ± 40	Poz-112408	5471 – 5311 BC	Charcoal	Area III, sq 5/B, pit, depth 0.75 m

The finds

During the two seasons of excavations, 37 artefacts in stone (including flint), amber, clay, bone and bronze were found. A bronze dress-pin with a spiral head, which had broken in two, had a total length of 17.1 centimetres (Fig. 5: 1). A similar spiral pin, only shorter, has been found at Mūkukalns, a site dated to the end of the Bronze Age, 750–500 cal BC (Graudonis 1967, 98, plate XX: 26). Such dress-pins were in use in a wide section of Central, northern and eastern Europe from the Early Bronze Age in Únětice culture, Trzciniec and Lusatian cultures, and in the culture of the Scythians. Because of their simple form, these spiral pins are not suitable for dating particular stages of the Bronze Age (Filip 1969, 1156). In the earliest Iron Age, such pins also began to be made from iron. Examples have been found on the settlement site at Kerkūzi, Mūkukalns hill-fort, stone cist graves in Estonia, and barrow graves in Sambia, as well as in the Upper Dnieper basin (Vasks 1994a, 53). Thus, iron spiral pins were widespread not only in the Bronze Age, but also in the Iron Age.

A bronze spearhead, 9.2 centimetres long, is without a socket. There is a pronounced midrib on the four-centimetre-wide leaf of the spearhead, forming a continuation of its socket (Fig. 5: 11). Similar spearheads with a pronounced or a less distinct midrib have been found in Latvia and Lithuania, and are dated to periods V–VI of the Bronze Age, which resembles the ninth to the sixth century BC (Čivilytė 2009, Tables 5: 5; 6: 3; 8: 3). Noteworthy among the stone artefacts is a nine-centimetre-long celt with a flat butt and flat sides forming a pronounced angle in relation to the faces of the axe (Fig. 5: 12). Such axes represent a slightly altered continuation in the Bronze Age of the thick-butted axes of the Neolithic; they were widespread in the Bronze Age in Latvia and in neighbouring areas. A stone drilling core (Fig. 5: 4) indicates that a shaft-hole tool was produced on the site. Since the core is conical, it is probably from a mace-head or hoe, rather than from an axe. The latter have almost cylindrical drilling cores. Six flint flakes, the largest of which measured 3×1.3 centimetres, and the smallest 0.7×1.5 centimetres, do not show any retouch (Fig. 5: 8–10). In comparison with the Neolithic, during the Bronze Age, the use of flint and the skill of knapping became markedly reduced. Finds at other settlement sites from this time, such as Ķivutkalns hill-fort, nevertheless indicate that the range of flint implements (arrowheads, scrapers, burins, etc), and the methods of working the material (Graudonis 1989, 29–39), in some cases still reflect the tradition of the Neolithic flint industry. The same cannot be said of the finds from Krievu kalns. As with flint, amber artefacts occur rarely in the Bronze Age. On Krievu kalns, two pieces of amber jewellery were found, along with one unworked piece of amber. The only preserved part of an amber double button is the conical projection (Fig. 5: 3). Three such buttons have been found at Ķivutkalns hill-fort (Graudonis 1989, plate X: 2–4). These were made after the example of the characteristic bronze double buttons of Period IV of the northern European Bronze Age (Orrling 1991, 62). Such bronze buttons have not so far been found in the eastern Baltic, but there are imitations in antler (Vasks 2015a, 38). The other decoration is an elongated amber pendant with a drilled perforation (Fig. 5: 2), similar to finds from several other Bronze Age sites (Vasks 2015, Fig. 2: 19–24). Artefacts of bone and antler, characteristic of Bronze Age and earliest Iron Age living sites, were absent at Krievu kalns on account of the soil's acidity. An exception in this regard is the point of a bone needle and two fragments of the head of a flat-headed dress-pin with the remains of a drilled hole. Both fragments had been exposed to fire, which ensured their preservation. Similar pins are widely known from hill-forts along the banks of the Daugava (Graudonis 1974, Figs. 2, 4).

Testifying to bronze-working on Krievu kalns are nine fragments of clay moulds (Fig. 5: 5–7). The moulds were made of a fabric consisting of clay and fine sand. All the fragments derive from moulds used for casting bronze rings. A rare find is the sprue or funnel from such a mould (Fig. 5: 14). These moulds have been found for the first time in western Latvia, whereas in the eastern part of the country, as well as in Estonia and eastern Lithuania, many have come to light on Late Bronze Age and earliest Iron Age living sites (Vasks 2007, Fig. 1).

Krievu kalns hill-fort has also yielded a large collection of sherds from pottery vessels: a total of 31,568 fragments of pottery, the surface treatment being determinable for 7,133 of them (Doniņa et al. 2014, 38). Three methods were applied in the pottery analysis: 1) macroscopic (vessel profile, surface treatment, wall thickness, coil-joining technique); 2) petrographic analysis based on thin sections; 3) Wavelength dispersive X-ray fluorescence (WD XRF) oxide analysis in a helium atmosphere.Three measurements were done on each sample, afterwards calculating the average amount and sigma (standard error).

Detailed macroscopic analysis was undertaken on 603 vessel fragments; petrographic analysis was conducted on 16 samples, and six samples were analysed by WD XRF.

Most of the vessels were made from iron-rich clay paste, with a variety of additions: silt, sand, mica,

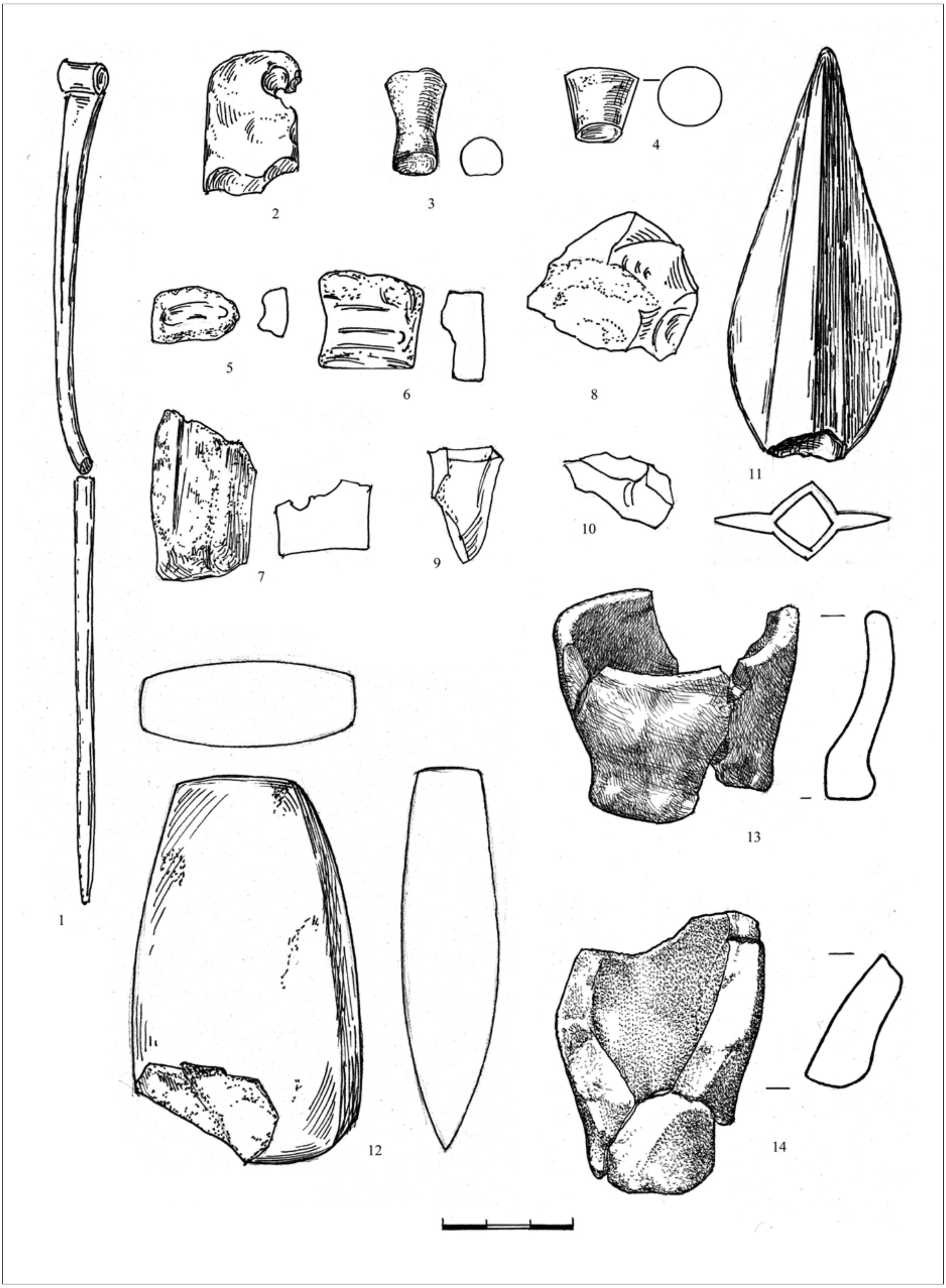


Fig. 5. Finds from Krievu kalns: 1 dress-pin; 2 pendant; 3 fragmentary double button; 4 core from drilling stone tool; 5–7 casting mould fragments; 8–10 flint tools; 11 spearhead; 12 celt; 13 miniature vessel; 14 sprue from mould; 1, 11 bronze; 2, 3 amber; 4, 12 stone; 5–7, 13, 14 clay (drawing by B. Vaska).

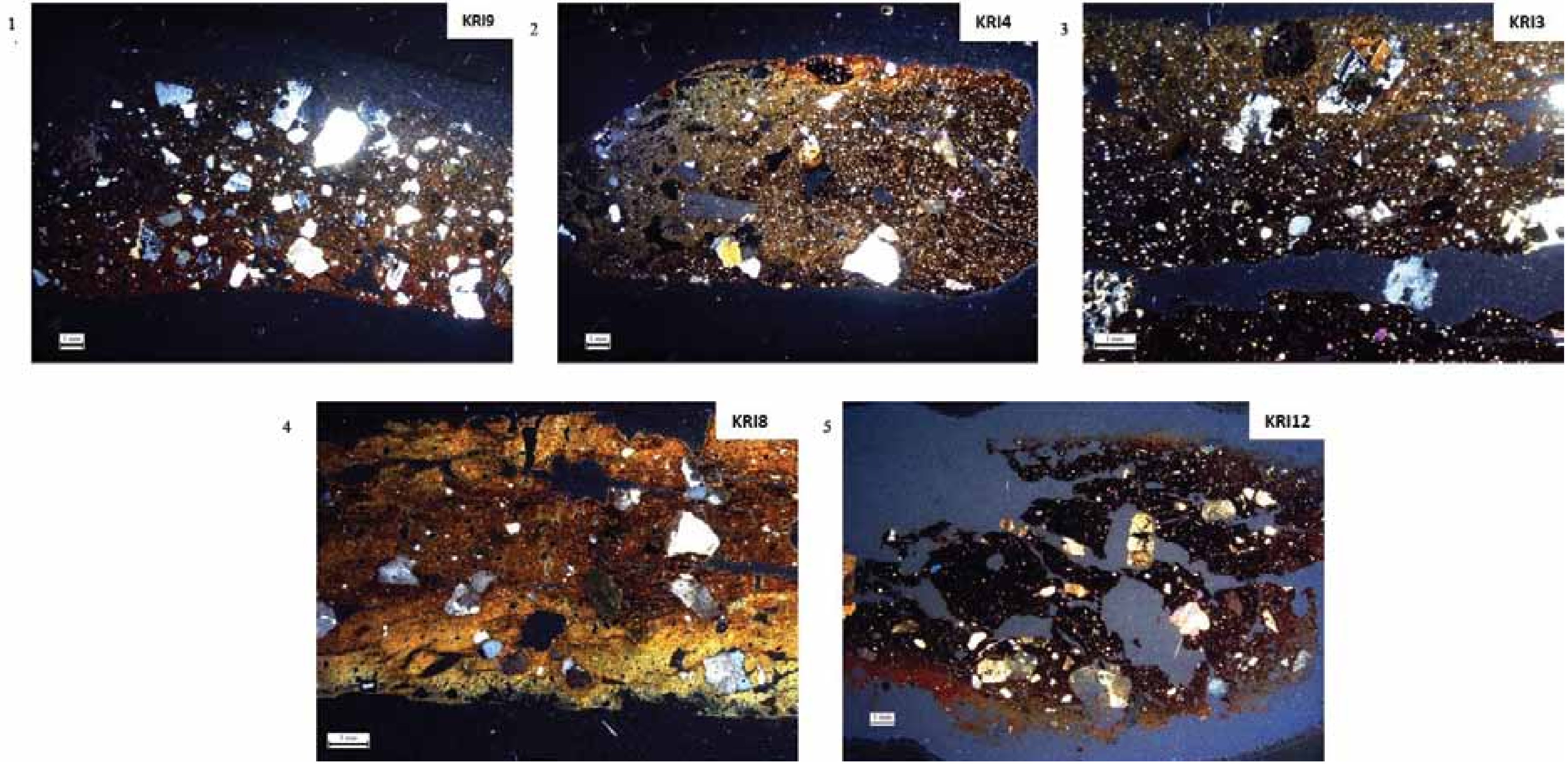


Fig. 6. Microphotographs of pottery fabrics (XPL, photographed by V. Visocka);

feldspar, quartz, lumps of iron compounds, etc. It was observed that most of the petrographically analysed samples had a strong admixture of medium-grain sand. It may be noted that the fabric of two samples (KRI8 and KRI13) contained a much smaller amount of sand. Possibly, the potters made these vessels using clay from a different source. One sample (KRI9) was found to have clay pellets in the fabric, indicating that the potter had not kneaded the clay thoroughly (Kadron, Rauba-Bukowska 2017, 423). In all cases, crushed granite was used as a tempering material, as is shown by the occurrence of angular quartz and feldspar grains in the fabric. It might be noted that in the fabric of some pottery, impressions of plant stems, burnt away in the course of firing, were observed macroscopically. However, the thin sections did not show organic remains, and so there are no grounds for considering that organic matter was used as temper.

In terms of the patterns of tempering and fabric characteristics (amount and grain size of temper, fabric texture), five fabric groups may be distinguished (Table 2; Fig. 6):

Group 1. Medium texture fabric with a strong admixture of sand and silt; crushed granite has been added as temper in amounts varying from 12% to 17%, with a grain size of 2.5 to 4.5 millimetres. This fabric group is the most common, represented by six samples.

Group 2. Coarse fabric with a strong admixture of sand and fine sand; crushed granite has been added as temper. It has been added in relatively small amounts, only 5%, with a grain size of two to four millimetres. This fabric group is the second most common, represented by five samples.

Group 3. Coarse fabric with a strong admixture of sand; crushed granite has been added as temper in amounts varying between 10% and 15%, and with a grain size of four to six millimetres;

Group 4. Fine-textured fabric with a small amount of sand; crushed granite has been added as temper in amounts varying between 10% and 15%, with a grain size of three to four millimetres;

Group 5. Medium-textured fabric with a strong admixture of fine sand; crushed granite has been added as temper, constituting 20%, with a grain size of up to six millimetres. This group includes only one sample (KRI12).

An unusual feature is the occurrence of lumps of iron compounds in the pottery fabric (Fig. 7: A). In the pottery collection as a whole (7,133 sherds), iron compounds were observed in the fabric in 12% of cases (Visocka 2016a, 30). The iron compounds usually take the form of oval, uneven lumps. Their hardness varies along with the colour: the light red-brown fragments are fragile and friable, whereas the reddish and dark brown iron compounds are hard. Some of the pottery sherds have red-brown patches, usually found on the surfaces of early coarse-slipped pottery, and these, too, can be regarded as iron compounds. Their concentration in the fabric varies: some sherds have a couple of separate, dispersed large fragments; while others have a concentration of several fine pieces. It may be noted that iron compounds of this kind have also been identified in the fragments of clay daub recovered from the hill-fort. Daub fragments with iron compounds constitute 23% of the total (179 fragments).

All the potsherds with an admixture of iron compounds visible in the fabric also have granite temper. Considering the grain sizes of the temper in relation to the iron compounds, we concluded that the dominant relationship between the two kinds of inclusions is two to four millimetres (granite grains) and two to four millimetres (iron compounds), this combination occurring in 35% of cases; also frequently found are the following grain size grain relationships: two to four millimetres versus one to two millimetres (15.3%) and four to six millimetres versus two to four millimetres (15.08%) (Table 3: A). Interestingly, the fabric of 15 sherds showed particularly large iron compound lumps, varying in size from six to eight millimetres.

The occurrence of iron compounds in pottery fabric has also been observed in other pottery assemblages from present-day Latvia, namely Ķente and Asote hill-forts and Tērvete (Dumpe 2013; 2014a; 2014b). Accordingly, this unusual feature of the clay fabric cannot be regarded as specific to the western Kurzeme area. The temper grains and iron compound lumps do not correlate in terms of size. Thus, the latter were already present in the clay prior to the addition of the tempering material, and it is concluded that they represent a natural addition in the clay. No comprehensive interpretation can currently be given as to why the potters did not remove the iron compounds from the fabric before making their vessels.

Before discussing the chemical composition of the clay, it should be noted that it consists mainly of silicon, with various amounts of iron, aluminium, potassium sodium and calcium in oxide form. Therefore, the authors have focussed mainly on the mainly on the relative amounts of these elements in their oxide forms in the analyzed samples. It is observed that all the analyzed pottery samples next to silicon oxide are rich in aluminum oxide, little less with iron oxides. Only in one occasion calcium oxide concentration is higher than 2% in the sample (KRI14), however the dominant

Table 2. The results of petrographic analysis.

Sample code	SAMPLE INFO		CLAY PASTE								TEMPER PROPRIETIES					Group
	Inventory No.	Type	Coarseness	Sorting	Silt	Fine sand	Sand	Mica	Iron compounds	Clay pellets	Temper	Amount %	Max. grain size, mm	Max. avg. grain size, mm	Homogeneity	
KRI1	A13957:119	Striated coarse-slipped	Coarse	Sorted	Rich	Common	Rich	Sparse	Rich	-	Granitic rock	5	2.3	2	Poor	2
KRI2	A139578:52	Striated	Medium	Unsorted	Common	Common	Sparse	Sparse	None	-	Granitic rock	12	4	1.8	Well	1
KRI3	A139578:98	Striated	Coarse	Sorted	Common	Rich	Common	Sparse	Common	-	Granitic rock	10	3.8	3.2	Well	3
KRI4	A13957:59	Coarse-slipped	Coarse	Unsorted	Common	Common	Rich	Sparse	Common	-	Granitic rock	5	3.5	1.8	Poor	2
KRI5	A13957:119	Coarse-slipped	Coarse	Sorted	Rich	Rich	Common	Sparse	Rich	-	Granitic rock	5	4.5	2.6	Poor	2
KRI6	A139578:26	Coarse-slipped	Coarse	Unsorted	Common	Rich	Common	Sparse	Sparse	-	Granitic rock	5	3	1.8	Well	2
KRI7	A139578:116	Smooth	Medium	Unsorted	Sparse	Common	Sparse	Sparse	Common	-	Granitic rock	13	4.1	2.6	Well	1
KRI8	A139578:21	Smooth	Fine	Sorted	Sparse	Sparse	Sparse	Sparse	Common	-	Granitic rock	5	3	1.5	Poor	4
KRI9	A139578:95	Smooth	Medium	Unsorted	Sparse	Common	Common	Rich	Common	+	Granitic rock	13	2.6	1.9	Well	1
KRI10	A13957:116	Striated	Medium	Unsorted	Rich	Common	Sparse	Sparse	Sparse	-	Granitic rock	13	4.5	2.64	Medium	1
KRI11	A139578:94	Striated	Medium	Sorted	Sparse	Common	Common	Rich	Common	-	Granitic rock	17	2.25	1.74	Well	1
KRI12	A13957:37	Smooth	Medium	Unsorted	Sparse	Common	Sparse	Sparse	Sparse	-	Granitic rock	20	5.1	1.29	Medium	5
KRI13	A13957:117	Striated	Fine	Sorted	Sparse	Sparse	Sparse	Sparse	Common	-	Granitic rock	10	3.9	2.88	Poor	4
KRI14	A13957:23	Striated	Coarse	Unsorted	Common	Rich	Common	Common	Sparse	-	Granitic rock	5	1.8	1.47	Poor	2
KRI15	A13957:24	Smooth	Coarse	Unsorted	Sparse	Rich	Common	Common	Common	-	Granitic rock	15	5.7	3.27	Well	3
SKRU1	Not registered	Striated	Medium	Sorted	Common	Common	Sparse	Rich	Rich	-	Granitic rock	17	2.3	2.1	Well	1

Table 3. Statistical data on size correlation between temper and lumps of iron compounds (A), and the results of WD XRF analysis (B).

A

SIZE OF IRON COMPOUNDS	SIZE OF GRANITE GRAINS					
	< 1 mm	1-2 mm	2-4 mm	4-6 mm	6-8 mm	8-10 mm
< 1 mm	0	0	1 (0,12%)	0	0	0
1-2 mm	2 (0,25%)	35 (4,43%)	121 (15,3%)	66 (8,36%)	9 (1,14%)	0
2-4 mm	2 (0,25%)	45 (5,7%)	275 (35%)	119 (15,08%)	18 (2,28%)	1 (0,12%)
4-6 mm	1 (0,12%)	16 (2%)	35 (4,43%)	25 (3,16%)	2 (0,25%)	1 (0,12%)
6-8 mm	0	3 (0,38%)	5 (0,63%)	7 (0,88%)	0	0

B

CODE	AMOUNT OF THE ELEMENTS (NORMALIZED)				
	SiO2	Al2O3	Fe2O3	K2O	CaO
KRI10	58.93% +/- 1.68	18.82% +/- 0.76	8.95% +/- 0.21	5.24% +/- 0.45	0.84% +/- 0.4
KRI11	52.29% +/- 5.88	19.25% +/- 0.3	11% +/- 2.52	5.48% +/- 0.1	2.13% +/- 0.86
KRI12	56.87% +/- 3.81	19.11% +/- 2.21	9.16% +/- 3.47	5.03% +/- 0.36	1.85% +/- 0.71
KRI13	53.43% +/- 3.6	19.68% +/- 1.15	11.34% +/- 0.98	5.1% +/- 0.79	1.49% +/- 0.2
KRI14	46.7% +/- 4.34	17.47% +/- 2.86	11.53% +/- 0.24	3.72% +/- 0.8	5.65% +/- 0.86
KRI15	55.51% +/- 4.14	17.44% +/- 1.81	12.47% +/- 0.52	4.66% +/- 0.64	1.7% +/- 0.25

besides silicon is still aluminum and iron oxides (Table 3:B). An examination of the correlation of the major elements in the pottery vessels leads us to the conclusion that in almost all cases, sample KRI14 stands out in relation to the others (Fig. 8). This vessel may have been made of clay from a different source. However, the sample does correspond to the general tradition of pottery production at the site. Detailed interpretation would require further investigation of the material.

The vessels from Krievu kalns were made without a potter's wheel, by using a coiling technique. Of the distinguishable techniques of coil joining, namely the N-, H- and U-techniques (on coil-joining techniques, see Hulthén 1977, 25–26). The N-technique predominates at this site, although the U-technique has also been employed. It may be noted that these are the most widespread techniques of coil joining, represented at all Late Bronze Age sites. Turning to vessel sizes and forms, it may be noted that, taking together all the fragments which permit the determination of the vessel's diameter, large vessels constitute 18%, medium-sized vessels 70%, and small vessels 9%, while miniature vessels make up 3% of the total. The dominant vessel profile shape is slightly everted or everted: CS- or S-shaped (65% of the total). Bucket or barrel-shaped, i.e. I C shape, vessels are less common (23.8% of the total). Even less common are K-shape vessels, with a shoulder angle (11.2%) (Fig. 9). It should be noted that in the Late Bronze Age and Pre-Roman Iron Age, vessel shapes CS and S were more characteristic of sites in western Latvia (Beltes, Paplaka and Matkule hillforts); whereas in eastern Latvia, I C shape vessels prevailed at that time.

The miniature vessels from Krievu kalns are in various sizes, from 2.6 to 6 centimetres in diameter, examples with a diameter of six centimetres being the most common (27%). The rim thickness varies from 0.5 centimetres to 0.9 centimetres (Fig. 5: 13). Two vessel profile shapes are represented in this group: I C (86%) and CS (14%). As at other Bronze Age sites, the miniature vessels at Krievu kalns are undecorated; they are generally smooth-walled, striation being observed in only one case.

The small vessels measure seven to ten centimetres in diameter, but mostly vessels with a diameter of eight

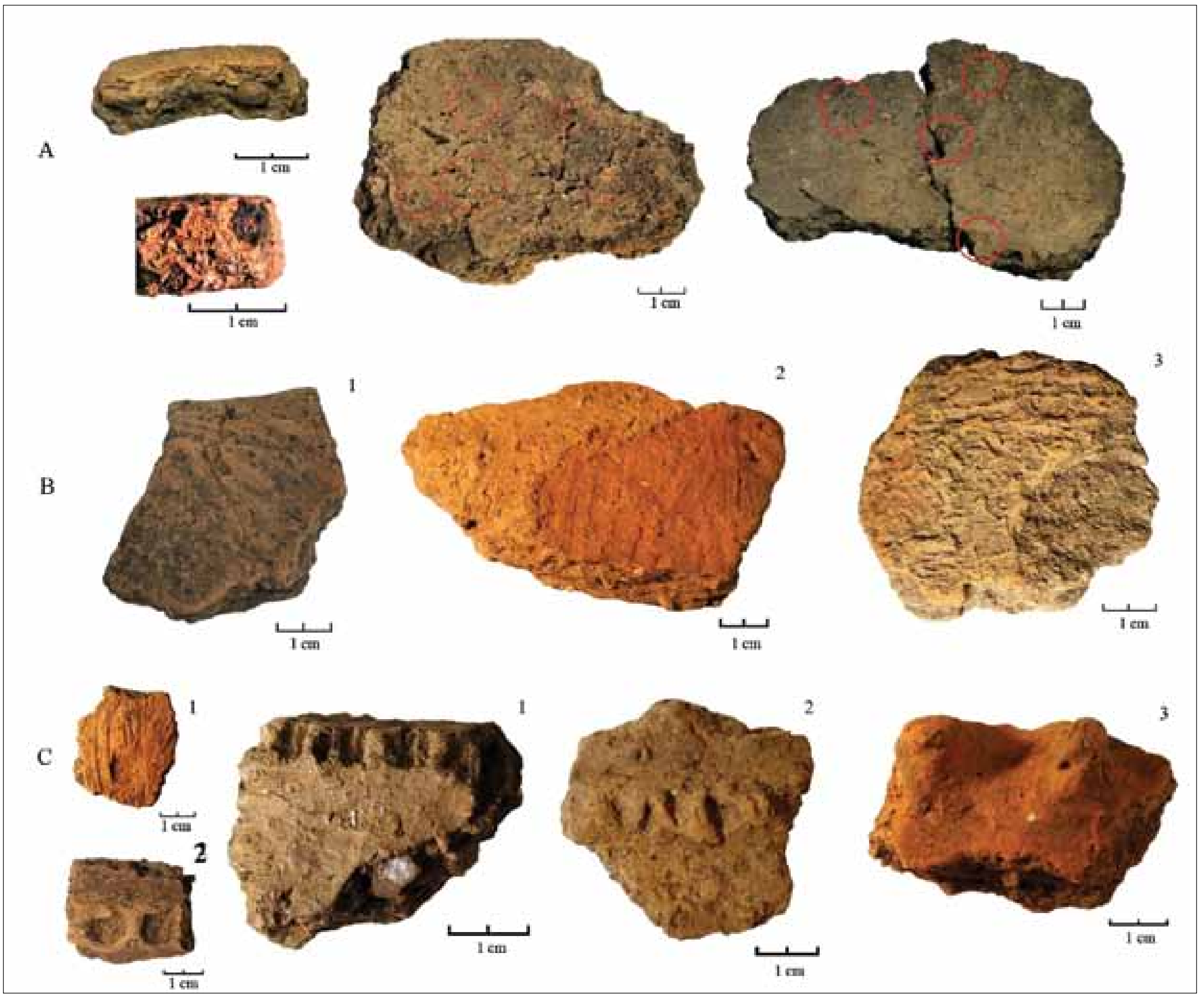


Fig. 7. Photographs of pottery from Krievu kalns (A – iron compound lumps in the pottery; B – common surface treatments): 1 striated; 2 striated coarse-slipped; 3 early coarse-slipped; C types of ornamentation: 1 pits; 2 nail/finger impressions; 3 oval lumps (inventory numbers of pottery collection: LNVM A13957, A13958; photograph by V. Visocka).

centimetres occur (29%), with a wall thickness of 0.4 to one centimetre. The small vessels are characterised by I C (47.4%) as well as C S (47.4%) vessel shapes, but S-shaped vessels are also present (5.2%).

The medium-sized vessels are 11 to 20 centimetres in diameter, those with a diameter of 16 centimetres (22%) and 18 centimetres (21%) being dominant. Also common are vessels with a diameter of 14 centimetres (15%), 12 centimetres (12%), and 20 centimetres (12%). The vessels vary in wall thickness, from 0.4 centimetres right up to two centimetres; they are generally thicker than the miniature and small vessels. Two vessel profile shapes predominate: C S (44%) and I C (41%); S-shaped vessels are also relatively common (13%), whereas K-shaped vessels are very rare (2%).

The large vessels constitute 18% of all the vessels whose size could be determined. The vessel diameter varies from 21 centimetres to 38 centimetres. This size group is dominated by vessels with a diameter of 24 centimetres (28%) or 22 centimetres (26%). Vessels of 26 centimetres (16%) and 21 centimetres (9%) are also common, whereas vessels with a diameter of 23 centimetres (5%), 28 centimetres (5%), 30 centimetres (3%) and other sizes are less common. The wall thickness is variable, ranging from 0.4 centimetres to 1.7 centimetres. Thus, the walls are thinner than those of medium-sized vessels. Two vessel profile shapes predominate: C S (44%) and I C (42%); less commonly represented are K-shaped vessels (3%) and S-shaped vessels (3%).

Striated pottery predominates at Krievu kalns, constituting 82% of the assemblage (Visocka 2016a, 22). This is a characteristic surface treatment of all Late Bronze Age sites. Therefore, Krievu kalns belongs to the circle of striated pottery sites (Fig. 7: B).

It should be noted that striated coarse-slipped pottery also occurs in very small amounts at Krievu kalns, constituting 3% of the whole assemblage. The term 'striated coarse-slipped' refers to pottery that has first been striated, and has subsequently been covered with a thin,

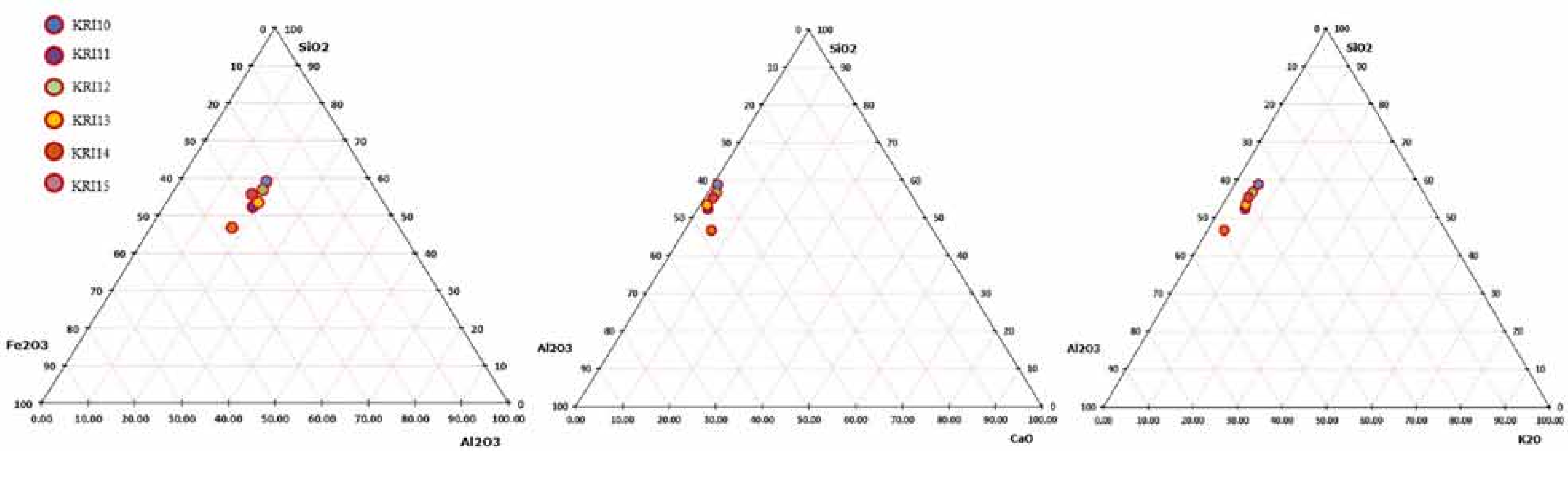


Fig. 8. Triangular plots of concentrations between the min chemical elements of the samples.

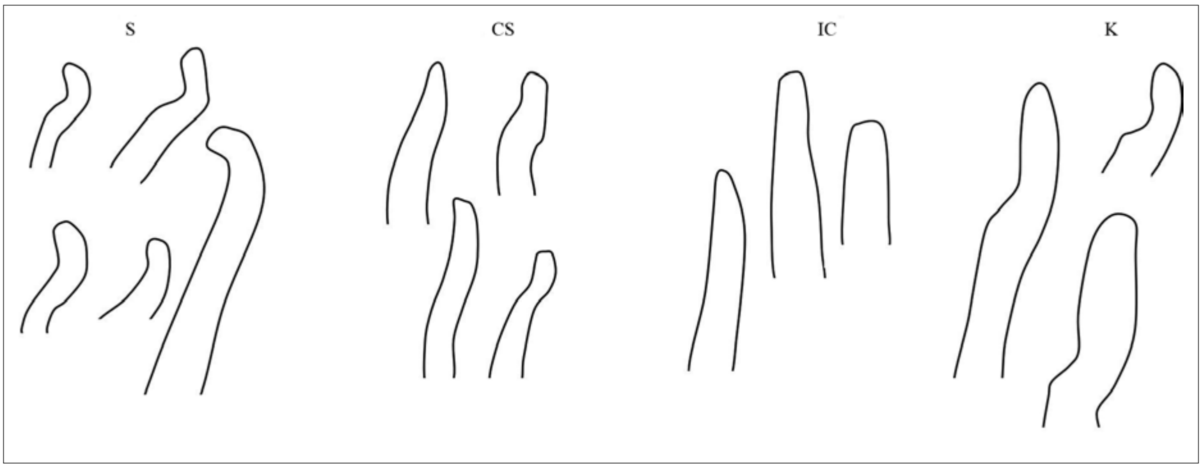


Fig. 9. Types of vessel profile shapes of the pottery from Krievu kalns (by V. Visocka).

liquid layer of clay slip rich in rock fragments (Vasks 1991, 41). This pottery also occurs in western Latvia, on Paplaka and Beltes (Padure) hill-forts, and individual sherds are present at Vīnakalns and Ķivutkalns, in the lower Daugava area, as well as in eastern Latvia, at Brikuļi hill-fort (Visocka 2017, 15).

The occurrence together of these two kinds of pottery surface treatment indicates a change in tradition resulting from people's contacts with other communities. Local pottery correlates with novel pottery, thus giving rise to a new form (Eriksson 2012, 186; Vasks 1991, 41). It is possible that a potter from a different region came to this hill-fort, introducing a new tradition of coarse-slipped pottery, which took the form of pottery covered with a sandy clay slip. This pottery is found in relatively small amounts on the hill-fort, constituting only 4% of the total. Of the various kinds of surface treatments, smooth-walled pottery is represented in the smallest amount, constituting only 2% of the total.

Sherds of ornamented pottery are represented in the Krievu kalns assemblage, constituting only 0.6% of the total. Most common is decoration with a fingernail or finger impressions (52% of all sherds with ornamentation) and pits (30%). Less common are oval bulges (11%) and ridges (7%) (Fig. 7: C). Fingernail and finger impressions occur mainly on vessel shoulders, and in individual cases on the lower part or 'foot' of the vessel and on ridges. This ornamentation has been created by making an impression in the vessel's surface with one or two fingers, or else creating a lightly impressed semi-circular mark or notch using the fingernail (Cimmermane 1976, 35). This ornamentation is also represented at the hill-forts of Paplaka, Dievukalns and Mūkukalns (Visocka 2016b, 82).

Pit ornamentation occurs at Krievu kalns on the vessel shoulders. In most cases, the pits are circular or oval, but in one case square pits occur. Unfortunately, due to the highly fragmented state of the pottery, it is impossible to say whether some kind of motif has been created, and the number of rows of pits cannot be determined. Pits represent one of the most widespread forms of decoration. With the exception of Paplaka, they occur at all Late Bronze Age hill-forts (Visocka 2016b, 82).

Oval bulges on the vessel surface are very rare. This kind of ornamentation is represented only at Ķivutkalns, which could indicate that the two hill-forts were subject to influence from a similar region, or that the inhabitants had mutual contacts.

A ridge constituting a decorative detail was attached to the upper part of the unfired vessel, or else was formed together with the body of the vessel, creating a shoulder angle (Graudonis 1989, 49). It seems unlikely that these ridges served any functional role, so they may be regarded as a decorative element, the possible intention being to imitate vessels with a sharp angle at the shoulder. This kind of decoration occurs at practically all Late Bronze Age hill-forts in the lower Daugava area, except for Klaņģukalns (Visocka 2016b, 82).

Overall, it can be concluded that the Krievu kalns pottery assemblage follows the general trends of pottery making in the Late Bronze Age. At the same time, distinctive characteristics may be noted: the occurrence of iron compound lumps in the fabric, the dominance of CS and S-vessel profile shapes, the presence of early coarse-slipped pottery, and decoration with oval bulges.

Palaeozoological and palaeobotanical data

The palaeozoological assemblage from Krievu kalns includes the bones of domestic and wild animals, along with a couple of bird and fish bones. Bone was poorly preserved in the cultural layer, or not preserved at all. Better preserved are animal teeth, which are protected by the tooth enamel; hence, teeth occur in the greatest number. The degradation of bone has evidently been promoted by the acidity of the cultural layer (soil). For this reason, the data in the table should be treated with great caution. In total, 510 bones of domestic and game animals were found, and the species of animals were identified, in the Krievų kalns hill-fort. The bones of domestic animals accounted for 44.13%, and game animals for 29.04% of all the bones uncovered in the hill-fort (Table 4; Graph 1). Bones of domestic animals also prevailed in other hill-forts of the same age in Latvia (Graudonis 1989, 71–84). Judging by MNI, the hill-fort population in the eighth to fifth centuries BC left small amounts of domestic and game animals in the territory of the hill-fort. Presumably, some game or domestic animals were slaughtered outside the hill-fort territory. Some osteological material belongs to the category of bad preservation. The burning of bones is evident by 56 fragments of bones uncovered in the Krievu kalns hill-fort.

But even the poorly preserved osteological material is sufficient to assume that the Krievu kalns population raised mainly cattle and horses, followed by sheep/goats and pigs. In comparison with other sites and hill-forts from the same period in western Latvia (Padure/Beltes) and western Lithuania (Šarnelė), the Krievu kalns zooarchaeological material showed similar livestock breeding patterns (Daugnora et al. 2013, 117–133; Girininkas, Daugnora 2015, 226–227). It is interesting to note that horses and cattle prevailed in the livestock not only in west Latvian and Lithuanian hill-forts and sites, but also in West Baltic Barrow Culture sites (northeast Poland) (Piątkowska-Malecka 2004, 174). Horses were seemingly raised not only for food, but also for warfare. This could be related to the changed geopolitical situation in Europe, i.e. with the Celtic-Scythian activities.

Judging by the skeletal remains uncovered at the Krievu kalns hill-fort, the age of the horses ranged from three to ten years (Table 4). Detailed pathological examination allowed their breeding conditions to be determined. Based on the roughness of the enamel of the molar tooth from the lower jaw M_3, the age of one of the horses was ten years (Fig. 10). There is evidence that the horse went hungry from time to time, probably in the winter period. This implies that the Krievu kalns population was not always able to store enough fodder necessary for the survival of animals.

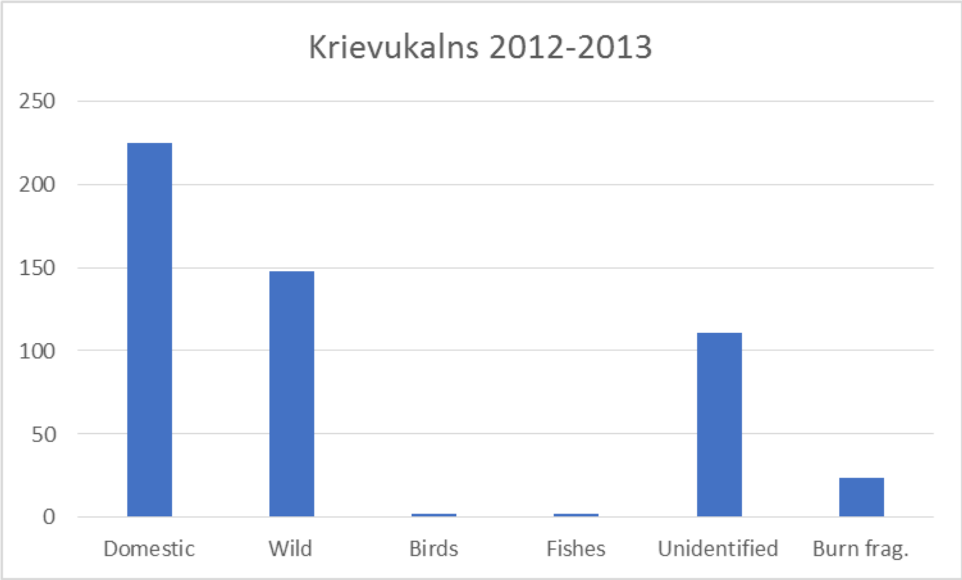
The age of some skeletal remains of animals uncovered in the Krievu kalns hill-fort was determined by the level of ossification of bones and the occurrence of permanent teeth. For example, the cultural level of the hill-fort contained a cattle foot with a loose distal epiphysis indicating that the animal was 24 to 30 months. The loose tuber calcanei of the right leg showed that one of the horses was young. The age of sheep/goats could be determined by temporary premolar (dP_{3+4}), whereas solitary molars of aurochs were indicative of the maturity of the animal (Fig. 11).

In the Krievu kalns hill-fort, similar techniques were applied for slaughtering domestic and game animals. The hill-fort did not contain any full animal skulls, only fragments (Fig. 12). All of them were purposely broken. The skulls were chopped separating the ramus of the mandible (*ramus mandibulae*) from the body, and severing the process of mandible (*processus mandibulare*) from the jaw (Fig. 13). One lower jaw of a sheep/goat was chopped in this way. The processus coronoideus was severed from the jaw of one wild pig, and the ramus mandibulae from the jaw near the dens premolare of another wild pig. The body of one elk jaw was cut off at M_3, separating the body from the process. Similar slaughtering techniques were characteristic of east Lithuania during the Early Bronze Age (Daugnora, Girininkas 2009, 50, Fig. 3). The cultural layer of the hill-fort contained isolated tongue-bones belonging to the Cervidae and Bovidae families, cut off from the stylohyoid muscle. A similar slaughtering technique was identified in the osteological material of Padure (Beltes) hill-fort (Daugnora et al. 2013, 130). The cuts are observed at the spot of articulation of the tongue root, implying tongue separation during slaughtering.

The slaughtering technique is supplemented with the dens of axis and articularis cranialis of red deer cut off from the first cervical vertebra (*atlas*) of the spine. In this way, the skull of the animal with the first cervical vertebra was separated from the body. The same slaughtering technique was applied to horses. It was observed that the first cervical vertebra of one of the horses was separated from the second cervical vertebra at the atlantoaxial joint. The uncovered chopped parts of the second cervical vertebra of sheep/goats indicate that sheep and goats were also slaughtered in this way.

Table 4. A zooarchaeological analysis of the excavation of Krievu kalns in 2012 and 2013.

Gyvūnų rūšis / Skeleto kaulai	Horn/ Antler /*processus cornus*	*Cranium*	Mandible / *Mandibula*	Tooth / *Dentes*	*Columna* vertebralis Vertebrae	*Scapula*	*Humerus*	*Ossa* antebrachii	*Carpus*	*Ossa* metacarpalia	*Ossa coxae*	*Femur*	*Ossa cruris*	*Tarsus*	*Ossa* metatarsalia	*Phalanx*	Unidentfied	Total:	Percentage	MNI	comments
Cattle / *Bos bovis*	1	4	4	38		4	3			2		1	1	2	3	2		65	12,76	4	
Sheep/goat / Carpinae *Ovis aries/ Capra hircus*		1	1	11*	3	2	2			2				2	1			25	4.9	1	*2 Dentes decidui
Horse / *Equus caballus*		6	4	76	2		1				1	2	7	4		8	2	113	22,16	3	<3;6-8 year; <10
Domestic pig / *Sus suis*		3	1*	12				1					3			2		22	4,31	2	*1piglet
Total	**1**	**14**	**10**	**137**	**5**	**6**	**6**	**1**		**4**	**1**	**3**	**11**	**8**	**4**	**12**	**2**	**225**	**44,13**	**10**	
Wisent / *Bison bonasus*				9	1					1		2		1		1		15	2.94	2	
Boar / Sus scrofa		1	4	4				2					4	2	1	3		21	4,12	2	
Elk / *Alces alces*		1	2	12	2		2		2	2		1	3	3		1	3	34	6,66	2	
Red deer / *Cervus elaphus*	1	2	5	11	2		1	1	2	6	1	5	5	6*	8	3	2	61	11,97	3	1 burnt
Roe deer / *Capreolus capreolus*		2		2	1		1			1	1							8	1,58	1	
Beaver / *Castor fiber*												6	3					9	1,77	2	
Total	**1**	**6**	**11**	**38**	**6**		**4**	**3**	**4**	**9**	**2**	**14**	**15**	**12**	**9**	**8**	**5**	**148**	**29.04**	**12**	
Birds /*Aves*:																	1	1	0.19	1	
Fishes /*Esox lucius*					1													1	0.19	1	
Unidentified small fragments																		111	21,76		
Burn fragments																	24	24	4,69		
Total:	**1**	**31**	**30**	**241**	**19**	**7**	**14**	**5**	**4**	**14**	**6**	**18**	**25**	**19**	**14**	**25**	**205**	**510**	**100.00**	**24**	
Cervidae and *Bovidae* family bone fragments:		13	6	66	7	1	4	1	1		3	1	2	1	1	5	172	284		3	*32 burnt



Graphic 1. An analysis of the osteological material from the Skrundas Krievu kalns hill-fort (graph drawn by L. Daugnora).

Fig. 10. Pathological changes are visible on the surface of the lower jaw of a horse's M_3 (photograph by L. Daugnora).

Fig. 11. A horse's incisor teeth (photograph by L. Daugnora).

Fig. 12. The horse pyramis otica and a fragment of the temporal bone (photograph by L. Daugnora).

Fig. 13. The lower jaw of a moose with M_3 (photograph by L. Daugnora).

Analysing the limb bones of animals, it was observed that distal parts of the humerus were cut off in one cow and one horse. In this way, the shoulder muscles were separated from the rest of the limb. Similarly, the proximal part of the pig's left limb radius was separated from the body.

An examination of the bones of the hind limbs of animals showed that the acetabulum of one of the horses was separated from other parts of the hip bone. In this way, the hip part of the horse was separated from its rear part. The hill-fort yielded one caput femoris of a mature beaver separated from the remaining part of the bone. This proves that the *caput femoris* remained with the hip bone, because the ligament attaching the caput femoris to the acetabulum is barely separable.

It is easier to cut off the caput femoris than the attaching ligament (*lig. capitis ossis femoris*). It was noted that the lower part of the femur was cut off on another beaver.

An analysis of tibia showed that the distal part of the left tibia of one pig was cut off from the body. The distal part of the right tibia of one horse was also cut off from the body in the same way (Fig. 14). The purpose of the application of this technique was to get access to the bone marrow of the tubular bones. The same slaughtering technique was identified in osteological material from the Kretuonas 1C site in the east Lithuania (Daugnora, Girininkas 2009, 52, Figs. 10, 11).

An examination of the foot bones (ossa pedis) showed that the proximal part of the left extremity of one deer was cut off from the body (Fig. 15). It was also observed that the foot bones of deer and elk were cut lengthwise, to be used for the production of bone artefacts. Since the Mesolithic, foot bones had often been used for production of harpoons and spearheads (Meadows et al. 2014, 583–585; David 2006, 235–252).

It is interesting to note that horse phalanges found in abundance in the osteological material from the Krievu kalns hill-fort bear the signs of solitary dents left after cutting off the tendons or the skin.

In order to obtain information about the vegetation and landscape during the time of the existence of the Krievu kalns hill-fort, five sediment samples from the excavated cultural layer were analysed, along with the mineral soil underlying it, and the contents of an intact pottery vessel found in situ. Samples were prepared for pollen and plan macrofossil analysis. Pollen is generally change to overall, and provides comprehensive information about the local and surrounding vegetation, whereas macroscopic plant remains reflect only the local flora and human economic activity at the research site.

Pollen analysis was conducted in accordance with the methods of K. Bennet and K. Willis (Bennet, Willis 2001). The results were visualised in the form of a percentage pollen diagram, where the pollen sum (100%) is taken to be the sum of all the pollen except for aquatic plant pollen, spores and charcoal dust (up to 25 μ) (Berglund, Ralska-Jasiewiczowa 1986). The processing of plant macro-remains was undertaken in accordance with generally accepted methods for plant macrofossil analysis (Birks 2007). The samples were placed in water, and flotation (separating the lighter, floating plant matter from the heavier mineral matter in the sediment, i.e. sand grains) was used in order to

Fig. 14. The distal part of a horse tibia cut off from the bone body (photograph by L. Daugnora).

Fig. 15. The inner surface of the proximal part of the metatarsal bone of a deer (*Cervus elaphus*) formed by the cut palmar and the distal parts of the bone (photograph by L. Daugnora).

Fig. 16. The horse heel bone pathology (*tendinitis musculi flexor digitalis superficialis*) (photograph by L. Daugnora).

Fig. 17. An adult horse lower jaw molar teeth M_1, M_2, M_3 (photograph by L. Daugnora).

Fig. 18. Inflammation (*osteitis*) of the inner surface of the lower jaw of a horse (photograph by L. Daugnora).

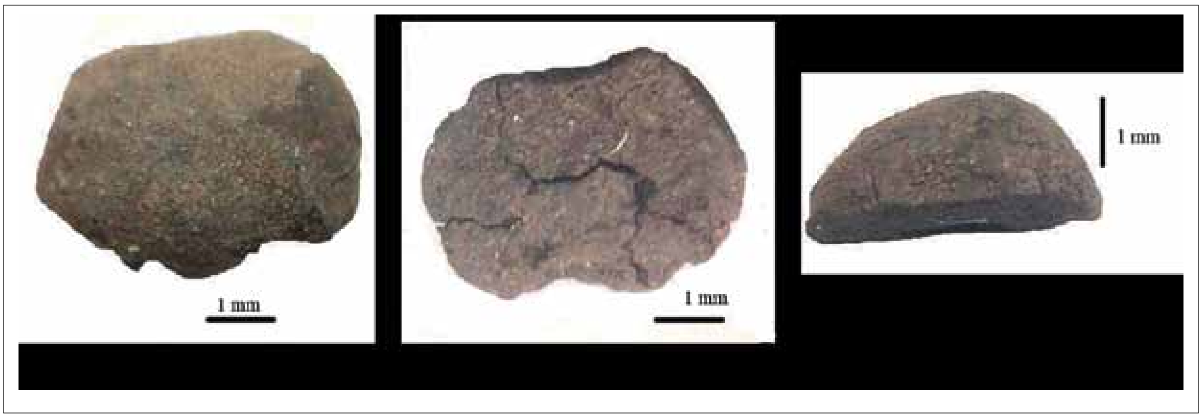


Fig. 19. Fragmentary cotyledon of a charred seed: half the seed of a plant from the legume (Fabaceae) family: a an exterior (lateral) view; b an interior (lateral) view of the cotyledon; c a proximal view (seed attachement place or Hilum).

divide the sample into a light and a heavy fraction. The light (floating) fraction was poured off through a sieve with a mesh size of 0.25 millimetres. After flotation, the samples were dried at room temperature, placed in paper bags and labelled. Each sample was sorted using a Zeiss Stemi 2000-C stereoscopic binocular microscope at 10–50× magnification. The plant remains were sorted from the recovered plant detritus, and identified according to plant taxon. Macrofossil identification was undertaken with the use of plant macrofossil and seed atlases (Cappers et al. 2006; Katz et al. 1965; Rasiņš 1954). Unfortunately, the samples showed poor microscopic and macroscopic plant remains; accordingly, the results provide an incomplete picture of the surrounding vegetation and human use of plants.

Microscopic analysis indicates that the cultural layer consists largely of sandy silt with various-sized charcoal dust and highly degraded plant remains, which were almost impossible to identify. All the samples contain a very low amount of pollen, with a particularly small quantity in sample 4 (vessel contents) and sample 5 (hearth). The pollen grains are generally corroded, and so in some cases they were hard to identify. In sample 1 from the cultural layer (excavation area II), the pollen of pine and alder predominated in the identified tree pollen, while grass (Poaceae), nettle (*Urtica*), goosefoot (Chenopodiaceae) and sedge (Cyperaceae) dominated in the herb pollen. The charcoal dust in the samples from the cultural layer was for the most part angular and varied in size from five to ten microns right up to 100 to 200 microns. Overall, the pollen composition and the high quantity of charcoal dust indicate a relatively open landscape influenced by human activity. Similar results were obtained from sample 2, also from the cultural layer. However, in this case the pollen of ruderals, pasture plants and other herbs predominates, mainly nettle (*Urtica*), as well as plants of the goosefoot (Chenopodiaceae), sedge (Cyperaceae) and knotweed (Polygonaceae) families, along with the pollen of sorrel (*Rumex*) and spores of damp-loving horsetail (*Equisetum*). Plants of cultivated land are represented by individual pollen grains of oats (Avena). The pollen composition indicates an environment affected by human presence and economic activity.

In the sediment under the cultural layer, the identified pollen consisted mainly of corroded pine and alder pollen, along with fern (*Polypodium*) spores. The corrosion indicated that the pollen had been exposed to direct sunlight, and that most of it has been destroyed; so it does not provide information about the flora of that time. Very little pollen was found in the sediment from the pottery vessel. This consists of fine, silty sand. The charcoal dust is fine, generally 10–20 μ. The very small amount of pollen comes mainly from grasses and legumes, and possibly also lentils or vetch. Likewise, very little pollen was present in the sediment under the hearth. Individual grains of pine pollen were recovered there. More common is pollen of ruderal plants: goosefoot (*Chenopodium*), nettle (*Urtica*) and knotweed (*Polygonum*).

The sediment was found to contain individual fragments of seeds (charred endosperm lacking the seed case). Therefore, in general the seed cannot be identified as belonging to a particular plant taxon. The sediment from feature 5 in excavation area II (sample 1) contained a fragmentary seed of a plant belonging to the legume (Fabaceae) family (Fig. 19).

Because of the poor state of preservation, visual examination did not indicate definitely the genus or species that the seed fragment belonged to. It can only be suggested that on the basis of morphological characteristics, it is more reminiscent of lentil (*Lens culinaris*) or pea (*Pisum sativum*), than a species of vetch (Vicia). In addition to cereals and other cultivated plants, sediment from this period in Latvia has been found to contain the seeds of pea (*Pisum sativum*), present at Ķivutkalns, as well as the seeds of broad bean (Faba bona) at Ķivutkalns and Mūkukalns (Rasiņš, Tauriņa 1983). In Lithuania, peas have been found in studies at the Luokesa 1 lake settlement (Grikpėdis, Motuzaitė Matuzevičiūtė 2018). Other plant macrofossils recovered at Krievu kalns hill-fort include charred pine cone scale fragments, indicating either that there were pines growing on the hill-fort, or that pine cones were collected elsewhere to be used as fuel. At the same time, the spherical sclerotia of *Cenococcum geophilum*, a mycorrhizal fungus of tree roots, were present in almost all samples, which is associated with forest soil, and indicates the presence of trees at the time of soil formation (which may not relate to the time of habitation of the hill-fort). The presence of limonite in the sediment may be thought to relate to the formation of an iron pan in the soil.

In all the samples, the light fraction, which may contain seeds and vegetative parts of plants, constituted only a tiny fraction of the total sediment volume, and the number of finds is accordingly very low. At sites where the sediment is above groundwater level and where plant remains decompose intensively, only charred seeds will survive. In spite of the poor preservation of micro- and macro-remains, the analysis of sediment permits the conclusion that during the time of the hill-fort's existence, the surrounding area was relatively open, the floodplain of the River Venta being dominated by wet meadows with sedge, grass and reeds. The pollen of ruderal plants (goosefoot, nettle and knotweed), as well as cultivated plants (cereals and oats), indicates human activity and agriculture in the immediate vicinity of the hill-fort.

Discussion and conclusions

In the Late Bronze and the Earliest Iron Age, isolated hills or promontories, and less commonly ridges of glacial till, were chosen as sites for hill-forts. The Krievu kalns hill-fort was established on an isolated hill on the edge of the River Venta valley. The establishment of the habitation and the construction of the fortifications did not alter significantly the natural relief of the hill. Therefore, it lacked characteristic features of hill-forts, such as steepened slopes, a levelled plateau, banks and ditches. The situation is similar at Tērvetes Klosterkalns, only in this case too, when the habitation was established, the natural relief of the hill was not altered, but two lines of fortifications were built from posts to protect the inhabited area (Atgāzis 1977, 8–10). It appears that the hill-fort at Smārdes Milzukalns has likewise retained its original form. Although the remains of defences were not discovered due to the limited scale of the excavations, the choice of the hill, the highest point in the area, indicates the significance of defence as a factor (Urtāns 2013, 146–159). In most cases where an isolated hill has been chosen for a hill-fort, the relief has been transformed, digging away the slopes to make them steeper, levelling the plateau, throwing up embankments, and creating terraces. Examples include Ikšķiles Vīnakalns, Ķekavas Klaņģukalns and Daugmales Sakaiņi hill-forts, and many others. Hill-forts of this kind are especially characteristic of the Late Bronze and Earliest Iron Age in the Augšzeme region (Urtāns 2006, 187–195).

The remains of defences on Krievu kalns indicate that the earliest wooden fortifications from the 11th to the ninth century BC enclosed a smaller area of habitation; whereas in the eighth to fifth century BC, the palisade was shifted outwards several metres, thus extending the living space on the hill-fort. It is possible that a third extension also took place, moving the palisade a few metres further down the slope. In western Latvia, this kind of extension of the habitation area has also been identified at Beltes (Padure) hill-fort (Vasks et al. 2011, 84), and possibly also at Klosterkalns. A similar practice of extending the area surrounded by the defences has been observed at almost all extensively excavated hill-forts, and can evidently be explained in terms of the growing number of residents (Vasks 2015b, 108–114). Similar to the earliest date obtained at the Krievu kalns hill-fort, and even a little earlier, is a date from Beltes (Padure) hill-fort: 2890±100 BP (LE-6682) or 1381–837 BC (95.4% probability) (Bērziņš et al. 2009). The time of the establishment of the two hill-forts is earlier than that of hill-forts in eastern Latvia, where the earliest dates are from the tenth to the ninth century BC. A comparison of the dating suggests that hill-forts appeared in western Latvia slightly earlier than in the east, although this question should be further examined in future research.

The economy of the hill-fort's residents was based on stock-keeping and agriculture, as well as hunting and processing various materials. Cattle predominate among domestic stock, both in terms of the number of bones and the number of individuals (33% of all bones of domestic animals, and 33% of all individuals of domestic stock). Pigs make up 9.1% of the bones, and sheep/goats constitute 9.5%; but in terms of the number of individuals, pigs represent 28%, and sheep only 11%. There is a significant proportion of horses: 48.4% of the number of bones, i.e. almost half of all the bones of domestic stock, and 28% in terms of the number of individuals. A similar proportion of horse has been found in the case of the oldest period of habitation at Beltes (Padure) hill-fort (Daugnora et al. 2013, graph 7). In the Bronze Age and the Earliest Iron Age hill-forts of eastern Latvia, horse bones generally constituted 16% to 18% of all domestic animal bones (Graudonis 1989, Table 9; Vasks 1994b, Table 8). The high proportion of horses among the stock might be regarded as a specific feature of animal husbandry in this period in western Latvia. Of the total number of animal bones (510), 44.13% were from domestic animals, and 29.04% from wild animals. In terms of the minimum number of individuals (24), domestic animals constituted 42%, and wild animals 58%.

It is obvious that at west Latvian and Lithuanian Late Bronze Age hill-forts and sites, the proportion of horses increased markedly. Yet horse bones found at these sites often bear the marks of pathologies (e.g. inflammation of the heel bone) related to using horses as a tractive force. Very often, horse bones with pathologies found at investigated Bronze Age sites belong to different periods. For instance, the actual age of the horse foot bone with pathology (osteoarthrosis, osteoarthrosis/osteoarthritis chronica deformans tarsi) (Daugnora, Girininkas 2004, 118, 138, Fig. 19) from the Šventoji 23 site is 1650–1950 cal AD. Horse bones with pathologies at the Bronze Age site of Papiškės (Vilnius district) have been dated to later period as well. For this reason, without radiocarbon analysis, horse bone with pathology (tendinitis m. digitalis flexor superficialis) found at Krievu kalns hill-fort (Fig. 16) should be treated with caution. It is interesting to note that the horse bone pathologies mentioned were characteristic of horses from the Late Iron Age and the Middle Ages when they were used for pulling carts, ploughing or riding. It should be pointed out that horses started to be used for ploughing rather late. Bulls were usually used for this kind of work. This assumption is supported by P.V. Glob's study, where he mentions rock drawings of ploughing bulls at Tegneby (Scandinavia) (Glob 1951).

Pathologies used to occur not only at horse extremities, but also in skulls. Fragments of the lower jaw of a horse with distinct marks of osteitis (Figs. 17, 18), resulting from malnutrition or starving, were found at Krievu kalns hill-fort.

Although the palaeobotanical data obtained from Krievu kalns is quite limited, some conclusions may be drawn. The recovered samples from the cultural layer contained the pollen of ruderals, pasture plants and other herbs, mainly nettle, as well as plants of the goosefoot, sedge and knotweed families, along with sorrel pollen and horsetail spores. The pollen composition and the high quantity of charcoal in the samples indicate an open landscape influenced by human activity, agriculture being practised in the immediate vicinity of the hill-fort.

The finds of clay casting moulds are important. Although the number of recovered Bronze Age artefacts in bronze is greater in west Latvia, especially in the southwest part of the country, than in east Latvia, until now evidence of bronze working has come mainly from hill-forts along the River Daugava (Ķivutkalns, Vīnakalns and Dievukalns), and in the Daugava basin (Brikuļi, Madalāni and Rušenīca hill-forts). The picture is similar for present-day Lithuania, with evidence of bronze working in six hill-forts in east Lithuania, and only two in the coastal area of the country (Vasks 2007, Fig. 1). The moulds found at Krievu kalns were used to cast bronze rings resembling armbands. Similar moulds have been found in large numbers at other Bronze Age hill-forts in east Latvia. The significance of the rings is not altogether clear. In certain cases, they may be regarded as bracelets, i.e. ornaments. Thus, a bronze bracelet of this kind, carefully ground and polished after casting, has been found in the second hoard at Ķivutkalns, together with a spiral-head dress-pin and a socketed axe (Graudonis 1989, 41). In the majority of cases, the rings were not further processed after removal from the mould. Examples include the pieces from the Staldzene hoard (Vasks, Vijups 2004, 9–10, 26). Thus, they would more likely have served as a means of storing, transporting and possibly also exchanging metal.

In terms of the characteristics of the pottery vessels, the Krievu kalns hill-fort belongs to the circle of sites with striated pottery, while also exhibiting local characteristics. This pottery assemblage, as in the case of the Paplaka and Beltes hill-forts, includes a small but characteristic amount of early coarse-slipped. Moreover, in many cases, striation is seen under the slip, representing a substrate of the indigenous pottery tradition. These characteristics, like the considerable number of CS-S shaped vessels, characterises Krievu kalns as a hill-fort corresponding to the Bronze Age cultural tradition of west Latvia.

Abbreviations

AB – Archaeologia Baltica (since 1995)

AE – Arheoloģija un etnogrāfija (since 1957)

LNVM – Latvijas Nacionālais vēstures muzejs (National History Museum of Latvia)

LVIŽ – Latvijas vēstures institūta žurnāls (since 1991)

ZASM – Zinātniskās atskaites sesijas metres -ateriāli par arheologu, antropologu un etnogrāfu … gada pētījumu rezultātiem (1972–1998).

References

Manuscripts

ŠTURMS, E., 1936. E. Šturma 1936. g. 2. decembra ziņojums Pieminekļu Valdei. LNVM Arheoloģijas departamenta arhīvs, Skrundas Krievu kalna lieta, CVVM 236752:1.

ROZĪTIS, K., 1948. K. Rozīša 1948. g. 21. jūnija ziņojums. LNVM Arheoloģijas departamenta arhīvs, Skrundas Krievu kalna lieta, CVVM 236752:2-5.

Literature

ATGĀZIS, M. 1977. Izrakumi Tērvetes Klosterkalnā un arheoloģisko pieminekļu apzināšana Zemgalē 1976. gadā. ZASM 1976, 8–13.

BENNET, K.D. & WILLIS, K.J., 2001. Pollen. In: J.A., SMOL, H.J.B., BIRKS & W.M., LAST, eds. Tracking environmental change using lake sediments, vol. 3. Terestrial, algal and siliceous indicators. London: Kluwer Academic Publishers, 5–33.

BERGLUND, B.E. & RALSKA-JASIEWICZOWA, M., 1986. Pollen analysis and pollen diagrams. In: B.E., BERGLUND, ed. Handbook of Holocene palaeoecology and palaeohydrology. Brisbane: John Wiley & Sons, 455–484.

BĒRZIŅŠ, V., GRASIS, N., VASKS, A. & ZIEDIŅA, E., 2009. Jauni 14C datējumi arheoloģiskajiem pieminekļiem Rietumlatvijā. LVIŽ, 1, 5–20.

BIRKS, H.H., 2007. Plant macrofossils in palaeoecology - an overview. In: S.A., ELIAS, ed. Encyclopedia of Quaternary science. Amsterdam: Elsevier, 2266–2288.

BRASTIŅŠ, E., 1923. Latvijas pilskalni I. Kuršu zeme. Rīga : Latvijas senatnes pētītāju biedrība.

BRONK RAMSEY, C., 2009. Bayesian analysis of radiocarbon dates. Radiocarbon, 51 (1), 337–360.

CAPPERS, R.T.J., BEKKER, R.M. & JANS, J.E.A., 2006. Digital seed atlas of the Netherlands. Groningen: Barkhus Publishing.

CIMMERMANE, I., 1976. Mālu trauku ornamenta veidi Latvijā m.ē. I gadu tūkstotī. ZASM 1975, 33–39.

ČIVILITĖ, A., 2009. Wahl der waffen. Studien zur deutung der bronzezeitlichen waffendeponierungen im nördlichen Mitteleuropa. Universitätsforscungen zur prähistorischen Archäologie, band 167. Bonn: Verlag Dr. Rudolf Habelt GmbH.

DAUGNORA, L. & GIRININKAS, A., 2004. Rytų Pabaltijo bendruomenių gyvensena XI–II tūkst. pr. Kr. Kaunas: Lietuvos veterinarijos akademija.

DAUGNORA, L. & GIRININKAS, A., 2009. Butchery in the Early Bronze Age (by Kretuonas 1C
settlement data). AB, 12, 46–56.

DAUGNORA, L., VASKS, A., SOVAITÉ, S. & GIRININKAS, A., 2013. Zooarhaeological material from the Padure (Beltes) hill-fort in Latvia: butchering techniques and the composition of species. AB, 20, 117–133.

DAVID, E., 2006. Technical behaviours in the Mesolithic (9th-8th millennium cal BC). The contribution of the bone industry from domestic and funerary contexts. In: L., LARSSON & I., ZAGORSKA, eds. Back to the origin. New research in the Mesolithic-Neolithic Zvejnieki cemetery and environment, northern Latvia. Acta archaeologica Lundensia, Series in 8, No. 52. Stockholm: Almqvist & Wiksell International, 235–252.

DONIŅA, I., VASKS, A. & VILKA, A., 2014. Izrakumi Skrundas Krievukalnā. Arheologu pētījumi Latvijā 2012 un 2013 gadā, 35–41.

DUMPE, B., 2013. Spodrinātā un gludinātā keramika Asotes pilskalna keramikas kolekcijā. LNVM zinātniskie lasījumi 2007–2010, 95–107.

DUMPE, B., 2014a. Podniecība Ķentes pilskalnā – pa Ādolfa Stubava pētījumu pēdām. AE, 28, 32–48.

DUMPE, B., 2014b. Bezripas keramika Tērvetes senvietās. LNVM zinātniskie lasījumi 2011–2013, 23–32.

FILIP, J., 1969. Rollennadel. Enciklopädisches Handbuch zur Ur- und Frügeschichte Europas, b. II, 1156.

GIRININKAS, A. & DAUGNORA, L., 2015. Ūkis ir visuomenė Lietuvos priešistorėje, t. 1. Klaipėda: Klaipėdos universiteto leidykla.

GLOB, P.V., 1951. Ard og Plov i Norden Oldtid. Jysk arkaeologisk Selskabs Skrifter. Aarhus: Universitetsforlaget i Aarhus.

GRAUDONIS, I., 1967. Latvia v epokhu pozdnei bronzy i rannego zheleza. Riga: Zinatne.

GRAUDONIS, J.,1974. Par dažiem Latvijas agro metālu perioda kaula rotadatu tipiem. AE, 11, 63–73.

GRAUDONIS, J., 1989. Nocietinātās apmetnes Daugavas lejtecē. Rīga: Zinātne.

GRIKPĖDIS, M. & MOTUZAITĖ MATUZEVIČIŪTĖ, G., 2018. A review of the earliest evidence of agriculture in Lithuania and the earliest direct AMS date on cereal. European journal of archaeology, 21 (2), 264–279.

ERIKSSON, T., 2012. Pottery, transmission and innovation in Mälardalen. In: N., ANFINSET & M., WRIGGLESWORTH, eds. Local societies in Bronze Age northern Europe. London, New York: Routledge, 185–200.

HAUPT, W., 1987. Das war Kurland. Die sechs Kurlandschlachten aus der Sicht der Divisionen. Friedberg: Podzun-Pallas-Verlag.

HENIŅŠ, A., 2002. Ventas sakta: atradumi, atzinas, atminas. Rīga: Preses Nams.

HultHén, B., 1977. On ceramic technology during the Scanian Neolithic and Bronze Age. Thesis and papers in North-European Archaeology, No. 6. Stockholm: Akademilitteratur.

JUŠKĒVIČS, V., KONDRATJEVA, S., MŪRNIEKS, A. & MŪRNIECE, S., 1997. Latvijas ģeoloģiskā karte M 1:200 000. 31. lapa – Liepāja. Paskaidrojuma teksts un kartes. Rīga: Valsts ģeoloģijas dienests.

KADRON, S. & RAUBA-BUKOWSKA, A., 2017. The technology of Neolithic pottery North and South of the western Carpathians. In: T., PEREIRA, X., TERRADAS & N., BICHO, eds. The Exploitation of Raw Materials in Prehistory: Sourcing, Processing and Distribution. Cambridge: Cambridge Scholars publishing, 414–432.

KATZ, V., KATZ, S. & KIPIANI, M., 1965. Atlas and keys of fruits and seeds occurring in the Quaternary deposits of the U.S.S.R. Moscow: Nauka.

LÖWIS of MENAR, K.v., 1922. Burgenlexicon für Alt –Livland. Riga: Walter & Rapa.

MEADOWS, J., ERIKSEN, B.V., ZAGORSKA, I., DREVES, A. & SIMPSON, J., 2014. Dating Late Paleo-

lithic harpoons from Lake Lubāns, Latvia. Radiocarbon, 56 (2), 581–589.
MUGUREVICH, E., 1966. Ukreplennoje poselenie nachala nashei eri v zapadnoi Latvii (Kurzeme). In: Ot epokhi bronzi do rannego feodalizma. Issledovania po arheologii Pribaltiki i smezhnih territorii. Tallin, 139–149.
MUGURĒVIČS, Ē., 1970. Arheoloģisko pieminekļu apzināšana Kurzemē 1969 g. In: Zinātniskās atskaites sesijas referātu tēzes par arheologu, antropologu un etnogrāfu 1969. gada pētījumu rezultātiem. Rīga: Zinātne, 57–58.
ORRLING, C., (ed.) 1991. Dubbelkapp. In: Sten- och bronsålderns ABC. Stockholm: Statens historiska museum.
PIĄTKOWSKA-MAŁECKA, J., 2004. Gospodarowanie zwierzętami na ziemiach Polski północno - wschodniej we wczesnej epoce żelaza w porównaniu z obszarami ościennymi. In: M., HOFFMANN & J., SOBIERAJ, eds. Pruthenia Antiqua. Studia do pradziejów i wczesnej historii ziem pruskich, t. 1. Olsztyn: Wydawnictwo Littera, 157–178.
RASIŅŠ, A., 1954. Latvijas PSR nezāļu augļi un sēklas. Rīga: Latvijas Valsts izdevniecība.
RASIŅŠ, A. & TAURIŅA, M., 1983. Pārskats par Latvijas PSR arheoloģiskajos izrakumos konstatētajām kultūraugu un nezāļu sēklām. AE, 14, 152–176.
URTĀNS, J., 2006. Augšzemes pilskalni. Rīga: Nordik.
URTĀNS, J. 2013. Apceres par Latvijas pilskalniem. Rīga: Nordik.
VASKS, A., 1978. Jauns agro metālu laikmeta piemineklis Rietumlatvijā. LPSR ZA Vēstis, 3, 65–74.
VASKS, A., 1991. Keramika epokhi pozdnei bronzy i rannego zheleza Latvii. Riga: Zinatne.
VASKS, A., 1994a. Agrā dzelzs laikmeta apmetne Kerkūzos. AE, 16, 46–64.
VASKS, A., 1994b. Brikuļu nocietinātā apmetne. Lubāna zemiene vēlajā bronzas un dzelzs laikmetā (1000. g. pr. Kr. – 1000. g. pēc Kr.). Rīga: Preses Nams.
VASKS, A., 2007. Bronze-working centres in the system of social relations in the territory of Latvia during the Early Metal Period. In: A., MERKEVIČIUS, ed. Colours of archaeology, material culture and the society. Interarchaeologia, vol. 2. Vilnius–Tartu: Aušra, 65–77.
VASKS, A., 2015a. Dzintars bronzas un senākajā dzelzs laikmetā Latvijas teritorijā. LVIŽ, 1, 28–47.
VASKS, A., 2015b. No medniekiem un zvejniekiem līdz lopkopjiem un zemkopjiem. Latvijas aizvēstures senākais posms (10500. – 1. g. pr. Kr.). Rīga: Zinātne.
VASKS, A. & VIJUPS, A., 2004. Staldzenes bronzas laikmeta depozīts. Staldzene Bronze Age Hoard. Riga: Ventspils muzejs.
VASKS, A., KALNIŅA, L. & DAUGNORA, L., 2011. Beltu pilskalns. AE, 25, 73–99.
VISOCKA, V., 2016a. Vēlā bronzas laikmeta keramika Skrundas Krievukalna un Paplakas pilskalnos: Reģionālās līdzības un atšķirības. Jauno vēsturnieku zinātniskie lasījumi I 2015, 26–34.
VISOCKA, V., 2016b. Dekoratīvie elementi vēlā bronzas laikmeta keramikā Latvijas teritorijā. In: V. SEGLIŅŠ, red. Lietišķi ģeoloģiskie pētījumi, jaunas tehnoloģijas, materiāli un produkti. Rīga, 78–89.
VISOCKA, V., 2017. Švīkāts-apmests trauks Vīnakalna keramikas kolekcijā. LVIŽ, 4, 5–24.

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KRIEVUKALNO (KRIEVU KALNS) PILIAKALNIS: NAUJI DUOMENYS APIE VĖLYVĄJĮ BRONZOS AMŽIAUS IR IKIROMĖNIŠKĄJĮ GELEŽIES AMŽIAUS LAIKOTARPIUS VAKARŲ LATVIJOJE

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Santrauka

Iš 85 archeologų tyrinėtų Latvijos piliakalnių14 yra Vakarų Latvijoje. Šie skaičiai rodo, kad Vakarų Latvijos piliakalniai yra mažiau tyrinėti nei likusioje šalies dalyje. Dauguma šių piliakalnių buvo apgyventi vėlyvuoju geležies amžiaus laikotarpiu ir viduramžių pradžioje: Talsai (Talsi), Padurė (Padure), Puzė (Puze), Sabilė (Sabile), Tukumas (Tukums) ir Paberzkalnas (Pabērzkalns). Latvijos vakarinėje dalyje Matkulės (Matkule) ir Beltės (Padurės) piliakalniai buvo apgyventi dar vėlyvuoju bronzos amžiaus ir

ikiromėniškuoju geležies amžiaus laikotarpiais. Juose buvo gyvenama viduriniu bei vėlyvuoju geležies amžiaus laikotarpiais, todėl buvo sudėtinga atskirti ankstyvesnio ir vėlyvesnio laikotarpių medžiagą. Vienintelis piliakalnis, kuris, kaip žinoma, buvo apgyventas tik vėlyvuoju bronzos amžiaus ir ikiromėniškuoju geležies amžiaus laikotarpiais, o vėlesniais laikotarpiais buvo apleistas, yra Smardės Milzukalnas (Smārdes Milzukalns), kuriame buvo atlikti nedideli archeologiniai tyrimai (36 m2). Archeologinių duomenų apie bronzos amžiaus ir ikiromėniškojo geležies amžiaus laikotarpio Vakarų Latvijos piliakalnius, kurie įgalintų geriau suprasti minėtų laikotarpių kultūrinę raidą, vis dar yra labai maža.

Skrundos Krievukalno piliakalnis, kuriame aiškiai išsiskyrė vėlyvojo bronzos amžiaus ir ikiromėniškojo geležies amžiaus laikotarpių kultūriniai sluoksniai, buvo tirtas 2012 ir 2013 metais. Jis yra dešiniajame Ventos upės krante. Piliakalnyje ištirtas 178 m2 plotas. Į šią vietovę buvo atkreiptas dėmesys dar 1920 m., tačiau ji nebuvo priskirta piliakalnių kategorijai, nes nebuvo būdingų reljefo bruožų. Archeologiniai tyrinėjimai atskleidė, kad ši gyvenamoji vieta iš tikrųjų buvo piliakalnis, įtvirtintas stulpine konstrukcija dar XI–IX a. pr. Kr. VIII–V a. pr. Kr. gynybiniai įrenginiai buvo perkelti į išorę, siekiant padidinti gyvenamosios vietos plotą. Vėliau galėjo atsirasti ir trečioji gynybinė tvora. Pastatų buvimą įgalino nustatyti 3–4 m pločio medžio anglies gausaus kultūrinio sluoksnio juosta su perdegusiais akmenimis, esančiais greta gynybinės tvoros linijos. Aptiktos stulpavietės rodo, kad buvo statomi stulpinės paskirties pastatai su iš akmenų sukrautais židiniais. Tarp gausių archeologinių radinių buvo aptiktas bronzinis ietigalis, bronzinis smeigtukas, akmeninis kaltas, akmeninių dirbinių išgrąžų, gintaro kabutis ir dvigubos sagos fragmentas, taip pat pirmosios Vakarų Latvijoje aptiktos metalo liejimo formelės. Keramikoje vyrauja indai su brūkšniuotu paviršiumi. Nedideliais kiekiais aptikta ankstyvosios grublėtosios keramikos, taip pat keramikos gludintu paviršiumi. Pagal keramikos pobūdį Krievukalno piliakalnis priklauso brūkšniuotosios keramikos kultūros aplinkai, tačiau turi ir vietinių specifinių ypatumų. Piliakalnio gyventojų ūkis buvo susijęs su gyvulininkyste ir kultūrinių augalų auginimu, medžiokle bei metalų liejimu.

Krievukalno piliakalnyje iš viso buvo aptikta ir rūšiniu požiūriu identifikuota 510 naminių ir laukinių gyvūnų kaulų. Naminių gyvulių kaulai sudarė 44,13 proc. visų piliakalnyje nustatytų kaulų kiekio, tuo tarpu medžiojamų – 29,04 proc. Krievukalno piliakalnio osteologinėje medžiagoje aptikta arklių apatinio žandikaulio ir kulnakaulio patologijų.

Krievukalno piliakalnis ir čia gyvenusios bendruomenės gali būti apibūdinamos kaip bronzos amžiaus kultūrų tradicijų puoselėtojos Vakarų Latvijoje.