# *RESCUE EXCAVATIONS OF THE NEOLITHIC SETTLEMENT SITE IN VABADUSE SQUARE, TALLINN*

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## *INTRODUCTION*

In Vabaduse Square – one of the main squares of Tallinn located to the south from the medieval centre of the city – archaeological rescue excavations were carried out in connection with the erection of the Monument to the War of Independence (1918–1920)[1] and because of the reconstruction works of the whole square – an underground parking ground was established beneath the square. It was previously known that early modern town fortifications (a system of bastions), the medieval city wall (with the complex of Harju Gate and moat) and a former road to Pärnu have been situated in that area (Fig. 1).

On 15.07.2008, after the excavation and removal of the cultural layer of the medieval suburb in the first excavation plot that measured 300 m$^2$; and just before the area was handed over to builders, archaeologist Guido Toos found a small piece of ceramics from the Stone Age from the north-western corner of the excavation plot – a fragment originating from the rim of the Late Comb Ware vessel. Five more sherds of the same vessel were found the next day from the same spot, also flakes of quartz[2] processed by using bipolar technology and a small amount of bones.[3] Investigations of the sand layer uncovered beneath the medieval cultural layer and comparison of the altitude of the area with the sea level and the speed of land upheaval made it clear that these were not single stray finds but traces of a wider Neolithic settlement site.

Excavations of the site lasted from the end of July 2008 until the middle of March 2009. These studies were carried out by OÜ Agu EMS, field work was conducted by archaeologists Villu Kadakas, Garel Püüa, Gurly Vedru and Guido Toos; Ulla Kadakas from the National Heritage Board was a consultant. Since these excavations were rescue excavations, archaeologists had to accept the climatic conditions of autumn and winter and the rapid pace of work caused by the set time of building. Most of the time the excavations were carried out in tents and with artificial lights; the uppermost layer

[1] The War of Independence (28.11.1918–03.01.1920) was held by the troops of Estonian Republic against the troops of Soviet Russia and in 1919 in Latvia against the troops of Germany that consisted of Landeswehr and the so-called Iron Division for defending and strengthening the independence.
[2] AI 6917: 1/1–8.
[3] AI 6917: bones 1.

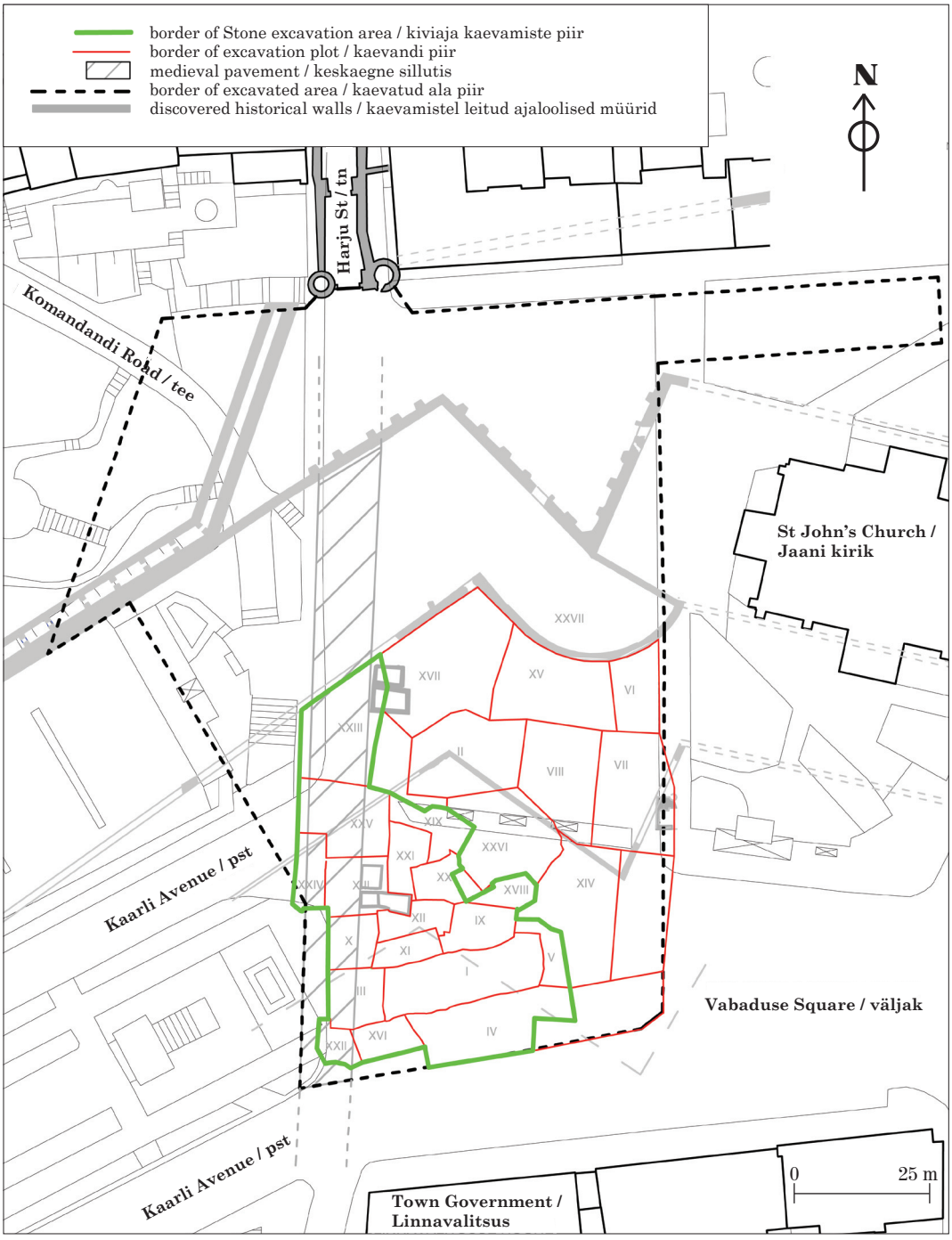



*Fig. 1. Situation plan of the excavation area of Vabaduse Square.*
*Jn 1. Vabaduse väljaku kaevamisala asendiplaan.*
*Drawing by / Joonis: Villu Kadakas*

was in some cases frozen in winter. These factors had their effects on the final results of excavations, but the team gave their best so that the site might be studied at least on a satisfactory level.

### *PALEOGEOGRAPHICAL LOCATION*

The natural relief of Tallinn is very varied because of the variety of sediments. The most imposing form of natural relief is the limestone plateau and the coastal plain with the glint edge/limestone bluff separating them. The most central form of the relief is a denudation elevation oriented in the north-west – south-east direction measuring *ca*. 7 km, where the elevations of Kopli and Kalamaja, the elevation of Toompea and Tõnismägi stand out. The oval relic glint island of Toompea with steep banks is *ca*. 700 m long and up to 200 m wide, to the south-east of it, the oval hillock of Tõnismägi is located. The latter is covered by a cultural layer measuring 2–5 m, moraine and in small scale also by marine sediments (Rosentau 2009; Kadakas *et al*. 2009, 10–11).

Geologists Alar Rosentau, Leili Saarse and Jüri Vassiljev compiled the palaeo-reconstruction of the natural relief and water levels of the Vabaduse Square. The coast of the Litorina Sea was located in the south-western part of the square about 5200–4800 calendar years ago. At that time the coast was protected from the winds blowing mainly from western direction by the small cape of Toompea – Tõnismäe. In the conditions of continuous land upheaval and lowering of the water horizon, a land strip started to form to the north-east from the small cape, offering a shelter also from the north winds. Sometimes between 2500–2300 BC the Litorina Sea receded also from the northern areas of the present Vabaduse Square and retreated towards north-east, making the studied area unfavourable for the Stone Age people using the coast (Kadakas *et al*. 2009, 10–12).

### *DISTRIBUTION AREA OF THE SETTLEMENT SITE*

A cultural layer of varied intensity was discovered in the south-western part of the Vabaduse Square in an area of 2200 m$^2$ (Fig. 1). The layer was preserved in areas situated above the sea level between 15.0–16.5 m; and where the former surface layer was not removed by diggings of later periods (digging for sand in medieval and early modern period, creating pits for foundations of buildings, establishing communications tracks in the 20th century). In the territory of the settlement site the surface has been naturally gently sloping towards north-east: in the south-western corner of the excavation area the cultural layer of the Stone Age began in the height of 16.36 m a.s.l. and in the north-eastern corner in 15.05 m a.s.l.

In the area under reconstruction of the square the cultural layer was excavated completely; but the intensity of the distribution of find material (Fig. 5) enables to suppose that a cultural layer of the Stone Age may have been partially preserved beneath the southern drive of the square in front of the present town government building. Unfortunately the authors of the present article have no information if the sand layers beneath the medieval cultural layer were studied or not during the displacement work of the communication tracks.[4] For the works mentioned, a track was dug that run

[4] Archaeological surveillance was carried out by OÜ Tael.

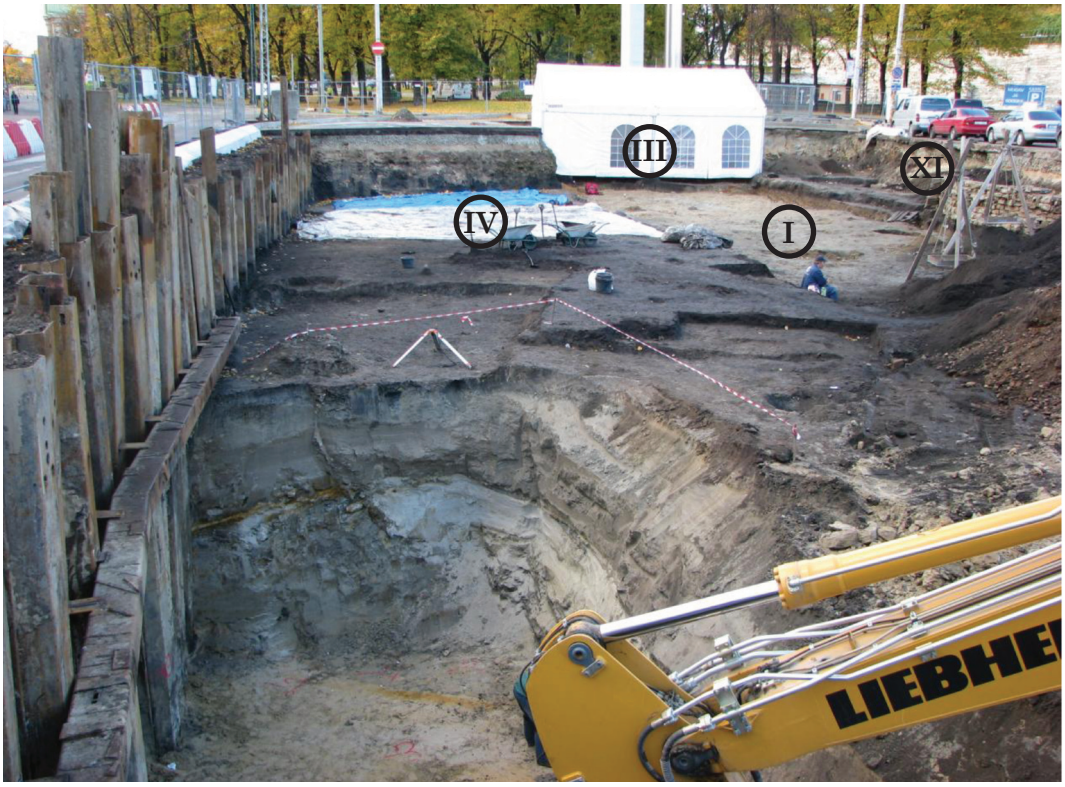



*Fig. 2. Excavation plots IV, I, III and XI at Vabaduse Square. View from the south-west.*
*Jn 2. Vabaduse väljaku IV, I, III ja XI kaevandid. Vaade kagust.*
*Photo / Foto: Villu Kadakas*

beneath a pavement in the southern part of the square and where the same deposits of sand that contained the Stone Age finds in the area to the north of the track had to be unearthed.

### *EXCAVATION METHODS*

Due to the different stages of building process, the study area of the Stone Age was divided into 14 excavation plots (Figs 1, 2, 5). Four other excavation plots were excavated using the same methods, but the soil layers beneath the medieval layers contained no finds from the Stone Age.

The methods used did not differ from the methods of excavation of the Stone Age settlement site used overall in Estonia, but it was in some cases more imprecise than usually; mainly considering the thickness of the excavation layer and the preciseness of sieving the soil. Generally excavation squares measuring 2 × 2 m were marked down in the plots. The first plot (300 $m^2$) was excavated using arbitrary layers *ca.* 5 cm thick, taking into account the natural slope of the soil and using shovels and hand sieves. Finds were gathered from areas measuring 10–15 cm in diameter. Spades and big sieves were used in more difficult conditions in autumn and winter (Fig. 2), due to that


*Fig. 3. Cross section of strata in south-western corner of excavation plot I at Vabaduse Square.*
*1 – black coloured medieval cultural layer;*
*2 – layer of sand of medium grain, coloured from reddish brown to greyish yellow and containing a large number of roots;*
*3 – layer of medium- or coarse-grained sand that contained unrounded limestone pebbles mostly 1–3 cm in diameter or bigger;*
*4 – homogeneous dark brown middle-grained sand;*
*5 – grey untouched fine-grained sand with intermediate layer of gravel and pebble.*
*Jn 3. Vabaduse väljaku pinnasekihtide läbilõige I kaevandi edelanurgas.*
*1 – must keskaegne kultuurkiht;*
*2 – juurtest läbikasvanud keskmiseteraline liiv;*
*3 – ümardumata veeristega keskmise ja jämedateraline liiv;*
*4 – homogeenne tumepruun keskmiseteraline liiv;*
*5 – hall peeneteraline liiv kruusa ja veeriste vahekihtidega.*
*Photo / Foto: Villu Kadakas*

finds were collected from areas measuring *ca.* 25 × 25 cm in diameter. Also the thickness of the layer was bigger when excavating with spades – about 10 cm. Spots of different colour than the rest of soil, presumably filled pits of human origin, were excavated separately from other parts of layers using shovels, the areas more rich in finds were dug with shovels as well. The finds were documented using a total station, bone finds were collected from squares measuring 4 m$^2$ of discerning the excavation layer.

### *STRATIFICATION*

The stratification of the cultural layer of the Stone Age (Fig. 3) was similar in its main features all over the whole excavation area. Beneath the black-coloured medieval cultural layer, rich in organics, there was a layer of sand of medium grain, coloured from reddish brown to greyish yellow and containing a large

number of roots. The upper part of the layer was darkened to dark brown due to the organics of the medieval layer. Beneath that sand layer there was a layer of medium- or coarse-grained sand that contained unrounded limestone pebbles mostly 1–3 cm in diameter or even bigger in some places. The layer that had also been penetrated by roots consisted in some areas mostly of pebbles and of sand in others. The colour of the layer varied from intensive rusty brown to grey. In Rosentau's estimation these layers might have formed in the above sea level part of the coastal zone, in beach zone that was occasionally flooded due to waves and in the course of higher water level. Beneath the sand layer with pebbles there was grey untouched fine-grained sand with an intermediate layer of gravel and pebble – a sea sediment (more precise c.f. Rosentau 2009, fig. 2; Kadakas *et al*. 2009, 12).

Two upper layers of sand and pebble contained Stone Age arte- and ecofacts. The cultural layer was mostly 20–30 cm thick, but reached 50 cm in some places. The uppermost layer of sand was thinner than the layer of pebble and sand, mostly 5–10 cm. The transition of the upper sand to pebble sand was difficult to distinguish when digging with horizontal technical layers – the beginning of a lower layer became apparent mostly in larger areas of pebble in the surrounding sand. Nevertheless, archaeologists tried to dig following the principle that the first technical excavation layer should comprise the upper sand layer and the following technical layers the layer of pebble sand.

### *SUPPOSEDLY MAN-MADE PITS IN THE EXCAVATION AREA*

Not a single Stone Age building structure was found from the whole excavation area, neither any certain remains of a fire place. There were some pits dug into the surface of the upper sand layer, filled with homogeneous dark brown middle-grained sand. The majority of these were 5–10 cm thick lenses of brown sand with uneven shape; their size varied considerably: some smaller spots measuring *ca*. 1 m$^2$ as well as a number of larger ones with a diameter of several meters were recorded. The areas with brown sand were not richer in finds and they did not contain a remarkably higher amount of bones as compared with the surrounding soil. Nevertheless, it was characteristic that the majority of such depressions were located in the south and south-western part of the whole excavation area, which was generally richer in finds and looked more intensive than the area to the north that turned up to be peripheral.

However, some of the brown spots were quite delineated, with a compactly round or oval shape. In the course of excavations these areas were dug separately from the surrounding soil, so it was possible to record their shape, soil consistence and possible finds in more detail. Altogether five such pits filled with brown soil and at least 25 cm deep were found in the excavation area.

Two of the pits were located in the western part of the excavation plot I (measuring 1.05 × 1.15 m and 0.7 × 1.2 m). Both of them were only partially in the excavation plot I. When the excavation area was widened, it was found out that the areas left outside at first were the marginal areas of the pits that dispersed in the surrounding soil. The largest pit was located in the southern edge of the excavation area in the squares L/6–7 in excavation plot IV (Fig. 4). While removing brown sand a boat-shaped pit, measuring 1.2 m in width and at least 1.9 m in length and with a depth of 25–30 cm appeared.

*Fig. 4. Supposedly man-made pit in the excavation plot IV at Vabaduse Square.*
*Jn 4. Võimalik inimese poolt tehtud lohk Vabaduse väljaku IV kaevandis.*
*Photo / Foto: Ulla Kadakas*

A pit in the eastern edge of the excavation plot XI was 1 m wide and 35 cm deep. A pit in the south part of the excavation plot XVI measured in its upper part 2.8 × 2.0 m and part of it continued to the area south of the excavation area. In deeper part that pit measured 1 m in diameter and had a rounded bottom. The depth of that pit was altogether 25 cm.

Generally the measures of pits were between 1.05–1.2 m × 1.15–1.5 m. They had a slightly rounding or conical bottom reaching into the pebble sand, the depth of the pits extended to 25–35 cm. It is not possible to say for certain what exactly they were. As the soil removed from pits did not contain larger pieces of charcoal they could rather be interpreted as household pits than remains of fireplaces.

### *FINDS*

1068 sets of finds were gathered from the whole excavation area; these were located in soil between the heights of 15–16.5 m a.s.l. Altogether 2109 artefacts were found, 2010 of them come from Stone Age (Fig. 5). The rest of the finds are artefacts of later date that have accidentally got into the Stone Age cultural layer. Most of such finds are pieces of medieval ceramics. A small number of quartz flakes was found from the layers associated with the Middle Ages and Early Modern period (for details see Kadakas 2010).

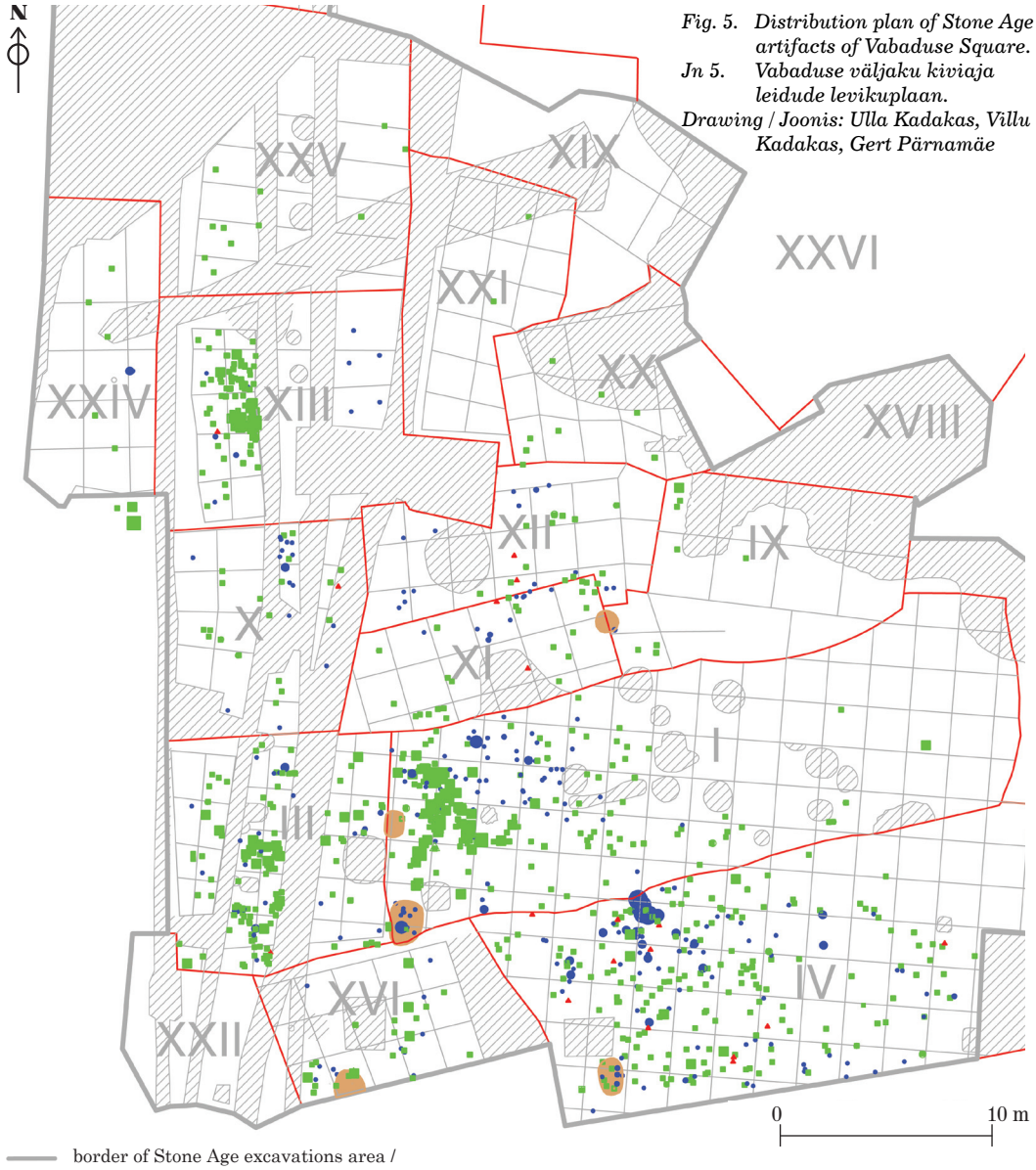



*Fig. 5. Distribution plan of Stone Age artifacts of Vabaduse Square.*
*Jn 5. Vabaduse väljaku kiviaja leidude levikuplaan.*
*Drawing / Joonis: Ulla Kadakas, Villu Kadakas, Gert Pärnamäe*

***Ceramics***

875 sherds of Stone Age pottery was found, 95% (831 pieces) of them originate from Late Comb Ware pots and 1.8% (16 pieces) from the Corded Ware pots. Five pieces of one ceramic vessel are classified as typical Comb Ware pottery. 23 pot sherds, i.e. 2.6% of the material remain indeterminable.

Mineral temper (sand, gravel, crumbled rock debris) has been mixed with organic admixtures in the moulding mass of Late Comb Ware pottery. The vessels have been burned in oxydating environment. The thickness of the wall of clay vessels is possible to measure by 292 pot sherds. 22 pieces of pottery have a thinner wall (5–7 mm), the rest of the fragments have wall thickness between 8–13 mm. The thickness of walls of the rim is on average 9–9.5 mm, in the sides of the vessel 9.5–1 mm and in foot 12 mm. The shape of the rim was possible to determine in case of 54 sherds originating from *ca.* 40 vessels. Vessels are unprofiled; rims are mostly flat or slightly convex, horizontal or slightly slanting inwards and lightly thickening. One vessel has a rim that is of a similar width with the wall and flat on top, three vessels have a rim that is thinning and has a focused edge, with a flat surface aslant inwards.

Processing of both surfaces could be evaluated in 290 sherds. Smoothing and striating was used in processing the surfaces. In most cases, both the inner and outer surface has been processed to be similar (either smoothed or striated – 67% of the sherds), but sometimes one surface is smoothed and the other is striated. A few trends can be emphasized among the variations of surface processing. Smoothing of the outer surface is used in the case of 61% of ornamented sherds and in the case of 94% when there is no ornament. In the same time in the case of inner surface, 64% of ornamented sherds are striated but 86% of not ornamented sherds are smoothed in their inner surface.

Vessels have been ornamented on their outer surface. Most commonly the rim of the vessel has been unornamented, but in three cases the ornament has been pressed also into the rim. Pits of different size and comb marks have been used as main elements of ornamentation (Fig. 6). More than 90% of the pits have been pressed into the surface of the vessel, not turned. The pits measure mostly 5–6 mm, but there are also smaller and bigger ones. Comb marks are quite similar to each other – in most cases a long temple has been used; its teeth have left narrow (1 mm) sharp oval pits. To a lesser extent (13%) also shallow pits, notches and several lines and stripes have been used as elements of ornament in clay vessels.


*Fig. 6. Fragments of Late Comb Ware.*
*Jn 6. Hilise kammkeraamika nõude fragmendid.*
*(AI 6917: 215, 440, 477, 739, 1019.)*
*Photo / Foto: Ulla Kadakas*

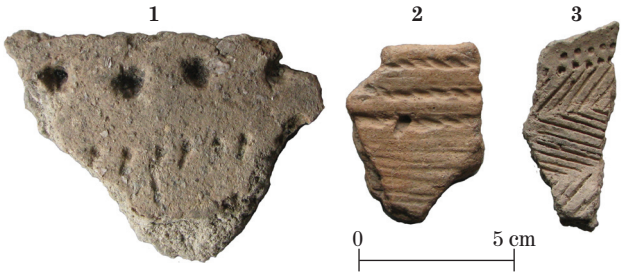



*Fig. 7. Fragments of typical comb ware (1) and Corded Ware (2–3).*
*Jn 7. Tüüpilise kammkeraamika (1) ja nöörkeraamika fragmendid (2–3).*
*(AI 6917: 527, 376, 637.)*
*Photo / Foto: Ulla Kadakas*

As an addition to the late comb marked ceramics, also fragments of a pot which moulding mass contains no organic admixtures but only stone debris of quite homogenous size (2–3 mm) together with finer sand has been found. All these sherds originate from the wall part of the vessel and have quite small convexity; thus it can be stated that it was a large vessel. That vessel has been moulded in coiling technique with N-type contact surfaces; the thickness of the wall is 12–13 mm. The outer surface has been smoothed and the inner striated. That vessel, determined as Typical Comb Ware, has been probably entirely ornamented with horizontal zones of pits and short comb impressions on its outer surface (Fig. 7: 1).

Ten potsherds found from the Vabaduse Square bear the ornament characteristic to the Corded Ware. There are fragments of two types of vessels among them: six sherds originate from beakers[5] and four from pots[6] (Jaanits *et al*. 1982, 108–109). As an addition to the ornamented sherds, six unornamented fragments[7] come from the Corded Ware vessels. The content of the moulding mass and surface processing of these sherds have the features characteristic to the Corded Ware. Also finer mineral admixtures have been added together with organic material into the moulding mass of Corded Ware vessels. Organic material originates mostly from some fibrous material that has left long thin imprints on the surface of the vessel in the course of baking. These clay vessels have been baked in oxydating environment. Beakers have been more thinner-walled (0.6–0.7 cm) and pots have had thicker walls (0.7–1.1 cm). Beaker fragments originate from the neck part of the vessels profiled to be thinner than the rest of the pot. Pots have had a simple straight profile. Both the inner- and outer surface of the vessels have mostly been processed smooth, but two fragments bear light but quite characteristic striating marks in their inner and one in its outer surface. The outer surface of one fragment[8] was processed in the so called pseudo textile-impressed technique.

Vessels have been decorated with different cord impressions, small pits, stripes and grooves. The neck parts of beakers have been decorated with spruce twig motifs (Fig. 7: 3). Wider cord has been used in decorating pots and their impressions have wider gaps. Cord impression is also pressed into the rim of the vessel (Fig. 7: 2).[9]

[5] AI 6917: 273, 620, 637, 909, 965, 973.
[6] AI 6917: 376, 481, 604, 605.
[7] AI 6917: 124, 237, 274, 783, 784, 818.
[8] AI 6917: 783.
[9] AI 6917: 375.

### *Stone materials*

Altogether 1099 finds of quartz, other minerals and rocks can be connected with the Stone Age settlement site (Table 1). Pieces of minerals and rocks originate from round pebbles or cobbles. The majority of finds are light grey, white or completely transparent quartz with large crystals; in smaller amounts smoke and milk quartz was also found.

The majority of finds are primary flakes and processing waste (675; 69%) and blades/fragments of blades (185; 19%), also 112 cores (11%); 13 artefacts with traces of secondary processing (1%) were found.

*Table 1. Finds of quartz and other rocks from the settlement site of Vabaduse Square.*
*Tabel 1. Vabaduse väljaku asulakoha kvartsi ja kivimite leiud.*
*Compiled by / Koostaja: Ulla Kadakas*

| | | |
|---|---|---|
| *Fracture technique / Lõhestustehnika* | *Quartz and quartzite / Kvarts ja kvartsiit* | 971 |
| | *Flint / Tulekivi* | 4 |
| | *Rock / Kivi* | 10 |
| *Untreated quartz / Töötlemata kvarts* | | 71 |
| *Untreated other rocks / Töötlemata muud kivimid* | | 16 |
| *Stone artefacts / Kiviesemed* | | 27 |
| *TOTAL / KOKKU* | | 1099 |

Quartz and other rocks have been split mainly by using the bipolar technique; the platform technique has been used only in a marginal amount. The cores have mainly a rectangular shape: sharp oval or rhomboid in profile. Mostly only one striking direction is visible, but objects that are processed from several directions also exist. Around one third of the cores have been exhausted, five larger pieces of quartz can be considered as protocores.

Flakes with sharp edges and without traces of secondary processing (341 pieces) are 0.9–6.5 cm long (average 2.4 cm), 0.5–4.6 cm wide (average 1.7 cm) and 0.1–4.3 cm thick (average 0.7 cm) (Diagram 1).

Complete blades (84 pieces) are 1.1–4.1 cm long (average 2.2 cm), 0.4–1.9 cm wide (average 0.9 cm) and 0.2–1.1 cm thick (average 0.5 cm) (Diagram 1). 83% of blades have been made using the bipolar and 11% probably in the platform technique. In the case of 8–10% (30–40 pieces) of flakes and blade-like flakes there is a reason to believe that sometimes their sharper edge or corner was used as a tool because traces of wear are visible in the probable working area. About half of the quartz production waste (small thin wedge-shaped or angular flakes, cobbles split into halves – altogether 334 pieces) are smaller than 1 cm and most of the rest are flakes less than 2 cm in length/width.

Tools are made of flakes split in the bipolar technique. Mostly white or light grey quartz with transparent crystal, milk quartz and in one case also smoke quartz has been used. Generally tools with traces of secondary processing are tools with a long edge: scrapers (6), knives (2) and flakes with a retouched edge (3); but also two burins were found (Fig. 8). Tools have been prepared from slightly bigger flakes: mainly 2.9 cm in length, 2.1 cm in width and 1 cm thick (Diagram 2, compare Diagram 1).

Scrapers are made of quite thick flakes and their main shape is trapezoid (3), segmented (1) or oval (2). Four are side scrapers. Two of them have a convex and sharp edge, one has a convex and blunt and one a straight and sharp edge. The lengths of edges are 1.1–2.7 cm. One smaller scraper with straight edge was made from a frag-

ment of a bipolar flake that has a broken proximal and distal end. Another small scraper has a convex sharp edge both on the end and side of the flake.[10] The edges of both knives[11] are located in the middle as related to blades of the flake; one has a slightly convex edge, the other is straight. The length of the edge of the first one is 1.5 cm and the other 2.2 cm. Regarding the flakes with retouched edges[12] , the secondary processing of the edge is not as regular as it is by scrapers and knives but more random. Unlike knives the edges of these flakes are not so sharp and with an uneven shape, being even slightly jagged. The length of the edges is 1.9 cm, 4.1 cm and 3.2 cm.There are two burins. One has an edge in the middle of the flake and the other on the corner.[13]

The majority of rock finds not processed in the fraction technique (22 pieces) are fossils of barrel-shape and a hole, which have been often broken in halves either crosswise or lengthwise. It is remarkable that the complete outer surface of fossils or the surroundings of the hole look polished, often in black colour. Slight traces of abrading are visible on three pieces of sandstone measuring 4–6 cm in length and almost the same in width.[14] One bigger limestone with a round-shaped hole in the middle (29 × 27 cm, diameter of the hole 8 cm)[15] may have been used as a net weight.

*Diagram 1. Size of quartz flakes and blades.*
*Diagramm 1. Kvartsikildude ja -laastude suurus.*
*Compiled by / Koostaja: Ulla Kadakas*

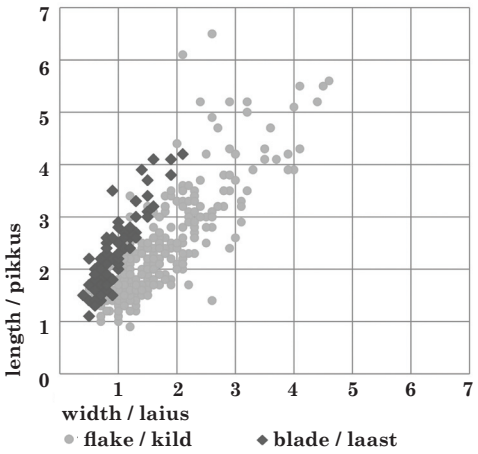
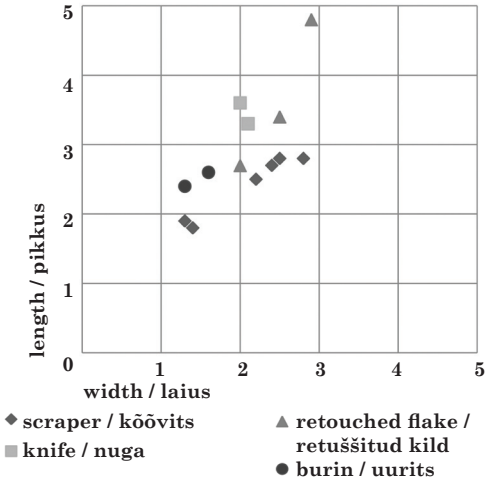



*Diagram 2. Tools.*
*Diagramm 2. Tööriistad.*
*Compiled by / Koostaja: Ulla Kadakas*




***Bone artefacts***

Altogether 24 Stone Age bone artefacts and fragments of bones that bear traces of processing were found from Vabaduse Square. The selection of artefacts is quite varied, yet these are mostly connected to hunting and fishing: fragments of two harpoon

[10] Accordingly AI 6917: 2, 40, 93; 264 and 607; 643
[11] AI 6917: 144, 251.
[12] AI 6917: 484, 532, 837.
[13] AI 6917: 43, 862.
[14] AI 6917: 439, 523, 1005.
[15] AI 6917: 480.


*Fig. 8. Quartz tools. 1–6 – scrapers; 7–8 – burins; 9–10 – knives; 11–13 – flakes with retouched edges.*
*Jn 8. Kvartstööriistad. 1–6 – kõõvitsad; 7–8 – uuritsad; 9–10 – noad; 11–13 – retuššitud servaga killud.*
*(AI 6917: 2, 40, 93, 264, 607, 643, 43, 862, 144, 251, 484, 532, 837.)*
*Photo / Foto: Ulla Kadakas*

heads, seven arrow heads and bigger piercing weapons, four fish-hooks and other parts of fishing equipment, three pointed tools; two fragments may come from tools for making fishnets. In addition to these, two pieces of bone with processing marks and four tooth pendants were found. These artefacts have been prepared – with a few exceptions – mainly of long bones of large mammals.

One of the arrowheads has a willow leaf shape and a sharp oval cross-section (Fig. 9: 5). In the case of four artefacts we are dealing with fragments of long slender arrow heads – three of them are remains of the rear end from arrow heads of round cross-section, by which the rear end has been cut flat and then polished.[16] One of those might be a piece of the tip.[17] One long bone tool with a segment-shaped cross-section might be the rear part of a thin dagger (c.f. e.g. Jaanits *et al*. 1982, 65) and another a fragment of a blade of a throwing spear.[18]

Only rear parts have been preserved of two harpoon heads (Fig. 9: 1–2). In a 3.5 cm distance from the rear end of one of those heads there are two large incisions cut or polished into its one side; another one has two low incisions cut 3 cm from its end to both sides, obviously for fixing the shaft. One completely preserved fish-hook – 6.4 cm long, max. 1.5 cm wide and 0.5 cm thick – has a well processed short hook on its one end and a hook-like thickening on the other end. Another fish-hook is represented by a polished all over fragment of the hook part (Fig. 9: 3). The root end of one of the pendants that was probably made of a harp seal's fang, which has been polished flat and a hole drilled through it (Fig. 9: 6). A hole was carved into a root end of wild horse's incisor (Fig. 9: 7).

[16] AI 6917: 841, 850, 1008.
[17] AI 6917: 1064.
[18] AI 6917: 1014; 603.


*Fig. 9. Bone artefacts. 1–2 – fragments of harpoons; 3–4 – fish-hooks; 5 – arrowhead; 6–7 – tooth-pendants.*
*Jn 9. Luuesemed. 1–2 – harpuunikatked; 3–4 – õngekonksud; 5 – nooleots; 6–7 – hammasripatsid.*
*(AI 6917: 401, 997, 512, 821, 800, 382, 782.)*
*Photo / Foto: Ulla Kadakas*

### *OSTEOLOGICAL MATERIAL*

Approximately 4300 bone finds were excavated from the layers with Neolithic finds. Nevertheless *ca.* 1350 of them have probably deposited in the Middle Ages, having infiltrated from upper strata. In the case of mammals and birds distinction of two temporally different find sets was quite easy because the colour and preservation were different. Also it was easy to separate medieval domestic animals from Neolithic fauna. It was more difficult with fish bones since their colour and other distinctions of preservation were not so distinguishable. However, it can be said that the bone finds with Neolithic background were divided as follows: about 2950 bones of mammals, 178 bird bones and 34 fish bones (see also Lõugas & Tomek, in print).

Altogether in the case of 779 bone finds (i.e. 26.4%) it was possible to determine the species. In addition, 180 bone finds were determined as 'large ungulates', most probably they belonged to the elk (*Alces alces*). It must still be kept in mind that also aurochs and/or wild horses might have been represented in the Late Neolithic fauna. Nevertheless, bone finds that could be more precisely determined as belonging to those species have not been found from Vabaduse Square, thus their existence cannot be affirmed. Still, one tooth pendant (Fig. 9: 7)[19] found from here is made of incisor of a wild horse, but such pendants could have been brought from afar and thus not originate from local fauna (e.g. Lõugas 1997, 68; Lõugas & Tomek, in print).

Approximately 45% of the determined bones of mammals originated from seals. 2/3 of them came from harp seals and 1/3 from ringed seals. The second largest part of bones comes from beaver (29%) and porpoise (slightly over 16%). The percentage of elk bones remains under 9%, but as mentioned previously, several of the bones of large ungulates might originate from elk. Some wild boar can indicate the so-called half-domesticated animals that are known from other coastal settlements of that period

[19] AI 6917: 782.

(e.g. Paaver 1965, 201; Lõugas *et al*. 2007, 27; Lõugas & Tomek, in print) – at least one of the ulnar bones found from the Neolithic layers of Vabaduse Square originates from quite a small boar. Also fox, otter, marten, wolf, dog and hare are represented with a few bone finds.

Most of the bird bones come from different water birds (duck and goose), but also dry land species (like grouse) and raptors (eagles) are represented. Several determined species of water birds are migratory birds in Estonian waters and thus can be connected to a certain season (see Lõugas & Tomek, in print). Pike, cod and perch were most represented among fish. Also whitefish, pikeperch and flounder were represented with few bones. Cyprinidae were represented with only one bone, it was not possible to determine the exact species.

The majority of the bone artefacts of Vabaduse Square were made from the limb bones of large ungulate (elk), tooth pendants from the already mentioned incisor of wild horse and seal tusk (one is probably from harp seals). In the case of several bones it was not clear if it was food or processing waste.

### *INVESTIGATION OF PLANT MACROFOSSILS*

Two types of samples for plant macrofossil analyses were collected from the excavation area of Vabaduse Square in 2008 and 2009. Three samples were taken from the profile of the excavation plot XVI (square C3, height 15.96–15.91 m a.s.l.; 15.86 and 15.84–15.77 m a.s.l.). These samples did not provide any plant remains except small charcoal pieces.

Large soil samples were collected during the excavation from plots I and III. Sample 1: plot I, G/9–10, brown spot, height 15.6–15.9 m a. s. l., and sample 2: plot III, E–F/9–10, brown spot, height 15.86–15.98 m a.s.l. At the laboratory these big samples were divided into smaller subsamples and soaked into saturated NaCl solution to separate organic material from sand. Floating material was poured through the sieve with a 0.315 mm mesh and washed under tap water. 54 and 18 litres of soil were floated from sample 1 and 2 accordingly. Soil samples were sandy, where the preservation of uncharred plant remains was not good. Only some seeds of *Chenopodium album* and a lot of small fragments of fish bones were discovered from sample 2. The results of the sample 1 are listed in the Table 2.

33 plant taxa were recorded. Most of the seed finds belong to the anthropogenic species like *Chenopodium album*, *C. glaucum*, *Lamium album*, *Stellaria media*, *Urtica dioica*, which are typical settlement weeds. Remarkable is the high occurrence of henbane (*Hyoscyamus niger*) seeds. Henbane is cultivated since the Middle Ages as a medicinal plant. These finds prove that analysed soil samples contain beside Neolithic material younger material as well. Perhaps all the plant remains originate from the Middle Ages. Very doubtful is the find of a fragment of the seedcoat of sunflower (*Helianthus annuus*), probably originating from modern times. Beside weeds and ruderals different grasses occur, some of Poa seeds were charred, which might be of the Neolithic origin. The results of the plant macrofossil analyses indicate the presence of human occupation in the area, but from which time period, it is impossible to say.

*Table 2. Plant macrofossils from the soil sample of plot I.*
*Tabel 2. Makrofossiilsed taimejäänused I kaevandi pinnaseproovis.*
*Compiled by / Koostaja: Sirje Hiie*

| *Latin name and plant group / ladinakeelne nimi ja taimerühm* | *English name / inglisekeelne taimenimi* | Estonian name / eestikeelne taimenimi | Number of finds / leidude arv |
|---|---|---|---|
| TREES / PUUD | | | |
| *Picea abies* | *Spruce* | harilik kuusk, okas | 2 |
| *Tilia sp.* | *Lime* | pärn | 4 |
| WEEDS and RUDERALS / UMBROHUD ja PRAHITAIMED | | | |
| *Artemisia vulgaris* | *Mugwort* | harilik puju | 2 |
| *Atriplex prostrate* | *Spear-leaved Orache* | odalehine malts | 3 |
| *Capsella bursa-pastoris* | *Shepherd`s Purse* | harilik hiirekõrv | 2 |
| *Chelidonium majus* | *Greater Celandine* | harilik vereurmarohi | 8 |
| *Chenopodium album* | *Fat Hen* | valge hanemalts | 117 |
| *Chenopodium glaucum* | *Oak-leaved Goosefoot* | vesihaljas hanemalts | 7 |
| *Chenopodium hybridum* | *Maple-leaved Goosefoot* | värd-hanemalts | 2 |
| *Erigeron acer* | *Blue Fleabane* | jaani-õnnehein | 2 |
| *Filago arvensis* | *Cudweed* | põld-paganapea | 1 |
| *Helianthus annuus* | *Sunflower* | harilik päevalill | 1 frgm |
| *Hyoscyamus niger* | *Henbane* | koera-pöörirohi | 18 |
| *Lamium album* | *White Dead-nettle* | valge iminõges | 21 |
| *Lamium purpureum* | *Red Dead-nettle* | verev iminõges | 5 |
| *Plantago major* | *Greater Plantain* | suur teeleht | 3 |
| *Ranunculus sceleratus* | *Celery-leaved Buttercap* | mürktulikas | 2 |
| *Rumex acetosa* | *Common Sorrel* | hapuoblikas | 8 |
| *Rumex acetosella* | *Sheep`s Sorrel* | väike oblikas | 4 |
| *Sagina procumbens* | *Procumbent Pearlwort* | lamav kesakann | 2 |
| *Stellaria media* | *Common Chickweed* | vesihein | 4 |
| *Taraxacum officinale col.* | *Dandelion* | võilill | 1 |
| *Urtica dioica* | *Nettle* | kõrvenõges | 24 |
| *Urtica urens* | *Annual Nettle* | raudnõges | 2 |
| MEADOW PLANTS / NIIDUTAIMED | | | |
| *Alchemilla vulgaris agg.* | *Lady`s Mantle* | kortsleht | 2 |
| *Helictotrichon pubescens* | *Downy Oat-grass* | aaskaerand | 2 |
| *Phleum pratense* | *Common Thimothy* | põldtimut | 1 |
| *Poa trivialis* | *Rough Meadow-grass* | harilik nurmikas | 3 |
| *Poa sp.* | *Meadow-grass* | nurmikas | 4 |
| *Poaceae* | *Grasses* | kõrrelised | 3 |
| *Potentilla erecta* | *Sulfur Cinquefoil* | tedremaran | 5 |
| INDEFINITE / MÄÄRATLEMATA | | | |
| *Myosotis sp.* | *Forgetmenot* | lõosilm | 3 |
| *Veronika sp.* | *Speedwell* | mailane | 9 |

### *INVESTIGATION OF POLLEN*

The soil composition lets us to assume poor preservation of pollen, so a pilot study was done to estimate the status of the material. A total of 6 samples were prepared for pollen analysis – 2 from excavation plot I (square G/10) and 4 from plot XVI (square C/3). The samples were processed following a standard laboratory technique (Berglund and Ralska-Jasiewiczowa 1986) with the additional use of a heavy liquid treatment ($CdJ_2$ and KJ solution with the gravity of 2.2 g/cm$^3$) to remove minerogenic material (Pokrovskaja 1950).

On the bases of test samples the standard pollen analyses of the material was considered to be unnecessary as only single pollen grains were present. The high concentration of microscopic charcoal particles in all analysed samples must be mentioned.

### *RADIOCARBON DATING AND SHORE DISPLACEMENT CHRONOLOGY*

Although the approximate date of the Stone Age find set became clear already in the course of excavations, two bone finds were selected for radiocarbon dating for specifying

the date (AMS; Table 3). Those were a femur and temporal of a harp seal (see also Lõugas & Tomek, in print). There are two reasons for using seal bones for AMS dating: first, the occurrence of seal bones in settlement sites is certainly connected with human activities (seals do not die naturally in such places) and the collagen contained in bones is one of the few organic compounds that preserves in such context. For example, when charcoal is found outside of a certain fireplace, its much later origin must be suspected as well as its lack of connection to human activities.

*Table 3. Results of the radiocarbon dating.*
*Tabel 3. Radiosüsinikdateeringu tulemused.*

| Lab. No. | Sample | ∂13C(‰) | Radiocarbon age (BP) | Calibrated age (BC) |
|---|---|---|---|---|
| Hela-1922 | Vabaduse Square, Tallinn (G/10), harp seal, *Femur* dext. | -17,0 | 4630 ± 40 | 3030–2820 |
| Hela-1923 | Vabaduse Square, Tallinn (K/11), harp seal, *Os temporale* dext. | -17,0 | 4750 ± 40 | 3200–2900 |

Calendar years corresponding to the radiocarbon results depend on the selection of the calibration dataset. In the case of radiocarbon results Hela-1922 and Hela-1923 the best possible selection is the Marine04 dataset (Hughen *et al*. 2004) taking into account the reservoir effect of a marine environment.

An alternative method has been worked out for dating settlement sites located on former coasts – a chronology that takes into account shore displacement (Jussila & Kriiska 2004). Using the help of the computer program of Estonian shore displacement chronology[20] it is possible to date the settlement site of Vabaduse Square most probably to *ca*. 3300 BC; its probable youngest age could be 3150 BC as suggested by the program (Table 4).

*Table 4. Results of the shore displacement chronology, based on the program Ranta-ajoitus Eesti 0-7700 BP ver. 1.2B (6.4.04).*
*Tabel 4. Rannasiirdekronoloogia tulemused programmi Ranta-ajoitus Eesti 0-7700 BP ver. 1.2B (6.4.04) alusel.*

| **Paikka: Vabaduse väljak, Tallinn** | **z: 15, z2: 14,0, et: -107** | |
|---|---|---|
| maksimi-ikä / earliest dating (z-0): | 5457 BP | 3457 BC |
| minimi-ikä / latest dating (z-1,5): | 5150 BP | 3150 BC |
| tod.näk.ikä / probable dating (z2) | 5293 BP | 3293 BC |

## *DISCUSSION*

Tallinn has not been systematically investigated from the point of the Stone Age, although several artefacts from Toompea, Veerenni, Juhkentali and Kalamaja area, as well as from the sand plain north of the Rahumäe cemetery are preserved in the collections of archaeology in the Estonian History Museum, in the Institute of History, Tallinn University and the City Museum of Tallinn. The majority of these are stray finds (adzes, axes without a shaft-hole, late shaft-hole stone axes, flint objects), but pieces of quartz and flint have been found from archaeological rescue excavations of several places in the areas mentioned. At the same time, no cultural layer characteristic to settlement sites has been discovered in the course of those studies. Nevertheless, the lack of a larger Stone Age settlement in such favourable coastal area like present Tallinn, where there

[20] http://www.dlc.fi/~microlit/vironranta/vironranta.htm.

is no high limestone klint characteristic to the rest of the coast of Northern Estonia, is quite improbable. Also several rivers and streams, attractive for fishing, flow into the sea in this area.

The majority of pottery fragments found from the settlement site of Vabaduse Square originate from clay vessels characteristic to the Late Comb Ware. Both the shore displacement chronology as well as radiocarbon dates indicate that the settlement site has existed in the period 3300–2900 BC, most probably *ca*. 3100 BC. Settlement sites of the Middle and Late Neolithic Late Comb Ware are known both from mainland Estonia (e.g. Kudruküla, Riigiküla II, Narva Joaoru, Kaseküla, Lemmetsa I and II, Sindi-Lodja III, Jõekalda) as well as from Hiiumaa (Kõpu XI) and Saaremaa (Loona, Naakamäe, Undva) (Jussila & Kriiska 2004, 10). The closest settlement site with similar Neolithic find material is located *ca*. 25 km to the east-northeast from Vabaduse Square: in the former estuary of the Jägala River, on the hill fort of Jägala Jõesuu (Johanson & Veldi 2006; Lõhmus & Oras 2008; Kriiska *et al*. 2009).

Generally the settlement site of Vabaduse Square resembles other Late Comb Ware settlement sites of the same period, yet it is still quite unique. Raw material of local origin predominated as material for making artefacts in settlement sites. In its processing, both in the case of ceramics and stone, local differences occur. Mineral substance with plant mass was used in the moulding mass of pottery in several coastal settlement sites, for example in Vabaduse Square, Jägala Jõesuu and Kaseküla. At the same time, organic mass dominates in other places. In stone processing dissimilarity is, for example, visible in different percentage of flakes and blades – the percent of blades is remarkably higher in the find material of Vabaduse Square and Sindi-Lodja III than in other settlement sites. One special characteristic of the osteological material of Vabaduse Square as compared to other coastal settlement sites is unburned osteological material – generally burned bones are found from settlement sites (Lõugas 2008, 253).

The settlement site of Vabaduse Square stands for its large number of dry land animals and birds found together with sea animals (seals, porpoise) and water-bounded animals (beaver). That indicates more varied activities of people additionally to the seal- and porpoise hunting, maybe also to the longer period of use of the settlement site. Nevertheless, the comparatively small amount of finds gives not enough ground to consider the site as one that was inhabited all-year around.

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**http:**//www.dlc.fi/~microlit/vironranta/vironranta.htm (20.07.2010.)

# *NEOLIITILISE ASULAKOHA AVARIIKAEVAMISED VABADUSE VÄLJAKUL TALLINNAS*

***Ulla Kadakas, Gurly Vedru, Lembi Lõugas, Sirje Hiie, Kersti Kihno, Villu Kadakas, Garel Püüa ja Guido Toos***

Tallinnas Vabaduse väljakul toimusid 2008. a kevadest kuni 2009. a märtsini päästekaevamised seoses Vabadussõjale pühendatud ausamba rajamisega ning platsi rekonstrueerimisega. Juulis 2008 leiti väljaku lõunaküljelt hilise kammkeraamika poti fragmente, kvartsikilde ning luid. Liivapinna uurimine ning piirkonna kõrguste võrdlemine merepinna ja maakerke suhtes veenis, et tegemist on neoliitilise asustuse jälgedega.

Tallinna loodusliku pinnamoe kõige silmapaistvam vorm on paelava ja rannikumadalik ning neid eraldav klindiastang. Rannikumadaliku kesksem pinnavorm on ligikaudu 7 km pikkune loode–kagu-suunaline kulutuskõrgendik, millel eristuvad Kopli ja Kalamaja kõrgendik, Toompea saarlava ja Tõnismägi. Geoloogide poolt koostatud Vabaduse väljaku loodusliku pinnamoe ja veetasemete rekonstruktsiooni näitab, et Litoriinamere rand paiknes väljaku edelaosas umbes 5200–4800 kalendriaastat tagasi. Sel ajal kaitses rannikut valdavalt läänest puhuvate tuulte eest Toompea–Tõnismäe neemik. Maakerke ja veetaseme languse jätkudes hakkas neemikust kirdes kujunema maasäär. Umbes 2500–2300 a eKr taandus Litoriinameri nüüdse Vabaduse väljaku põhjapoolsematelt aladelt ning kaugenes kirde suunas.

Neoliitilise asulakoha kultuurkiht tuvastati väljaku edelaosas 2200 m² suurusel alal (jn 1). Kiht oli säilinud piirkondades, mille kõrgus merepinnast jäi vahemikku 15,0–16,5 m ja kus polnud hilisemate kaevetöödega omaaegset maapinnatasandit eemaldatud. Asulakoha alal on looduslik laugjas pinnalangus kirde suunas. Väljaku rekonstrueeritud alal kaevati asulakoht täies ulatuses läbi, kuid osaliselt võib kiviaegset asulakihti veel olla säilinud linnavalitsuse hoone esisel alal.

Ehitusetappide tõttu jaotus kiviaja uuringuala 14 kaevandiks (jn 1, 2, 5). Sama metoodikaga kaevati läbi veel neli kaevandit, kuid sealsed kihid kiviaegseid leide ei sisaldanud. Kaevandites märgiti maha 2 × 2 meetrine ruudustik. I kaevandis kaevati umbes 5 cm tehniliste kihtidena arvestades loomuliku pinnaselangusega, kasutades kühvleid ja käsisõelu. Leiud võeti kokku umbes 10–15 cm läbimõõduga alalt. Edaspidi, sügisel ja talvel kasutati kaevamiseks labidaid ning suurt sõela, leiud võeti seetõttu kokku umbes 25 × 25 cm suuruselt alalt (jn 2). Labidaga kaevamisel oli korrise paksus u 10 cm. Oletatavalt inimtekkelised pinnaselaigud kaevati muust kihist eraldi ja kühvlitega, sama kehtis ka leiurikkamate piirkondade osas. Leidude dokumenteerimisel kasutati tahhümeetrit, luuleiud korjati kokku vastavast korrisest 4 m² suurustest ruutudest.

Kogu kaevamisalal oli stratigraafia põhijoontes ühesugune (jn 3).Kiviaegseid arte- ja ökofakte sisaldus kahes ülemises liiva-veerise kihis. Kogu kultuurkiht oli üldiselt 20–30 cm paksune, kuid kohati ulatus 50 cm-ni.

Kaevamisalalt ei leitud ühtegi kiviaegset ehituskonstruktsiooni jäänust, samuti ei leitud ühtegi kindlat tuleaseme jäänust. Ülemise liivakihiga seondusid mõningad maapinnalohud, mis olid täitunud homogeense koostisega tumepruuni keskmiseteralise liivaga. Enamasti oli tegemist 5–10 cm paksuste ebakorrapärase kujuga pruuni liiva läätsedega, mille suurus varieerus. Mõned pruunidest laikudest olid siiski üsna selgepiirilised, kompaktselt ümara või ovaalse kujuga (jn 4). Selliseid lohke leiti kaevamisalalt kokku viis. Üldiselt jäid lohkude mõõdud vahemikku 1,05–1,2 m × 1,15–1,5 m. Neil oli kergelt ümarduv või kooniline veeriselise liiva kihti ulatuv põhi, lohkude sügavus ulatus 25–35 cm. Lohkude pinnas ei sisaldanud suuremaid söetükke, mistõttu võiks neid interpreteerida pigem majapidamisaukudena kui tuleasemetena.

Leiukomplekte tuli kaevamisalalt 1068, (jn 5); kokku leiti 2109 artefakti, millest kiviaegsesse leiukompleksi kuulub 2010. Vähesel määral leiti kiviaja leide ka kesk- ja uusajaga seonduvatest kihtidest.

Keraamikast leiti 875 kiviaegsest savinõukildu, millest 95% pärinevad hilise kammkeraamika nõudest ja 1,8% nöörkeraamilistest nõudest. Ühest savinõust pärinevad 5 kildu liigituvad tüüpiliseks kammkeraamikaks. Määratlematuid kilde on 2,6% materjalist.

Hilise kammkeraamika (jn 6) vormimismassi hulka on segatud mineraalset ainest (liiva, kruusa,

porsunud kivipurdu) koos orgaanilise lisandiga, nõud on põletatud oksüdeerivas keskkonnas. Õhema seinaga (5–7 mm) nõude fragmente on 22, ülejäänud fragmentidel jääb seinapaksus vahemikku 8–13 mm. Savinõude servakuju oli võimalik määrata 54 killul, mis pärinevad umbes 40 nõust. Pindade töötlemisel esineb silumist ja riipimist, kaunistatud on nõud olnud välispinnalt. Üldiselt on nõu serv olnud kaunistamata, kuid kolmel juhul on ornament vajutatud ka servale. Põhiliste ornamendielementidena on kasutatud mitmesuguse suurusega lohke ja kammivajutisi. Savinõude kaunistuselementidena on vähesel määral kasutatud lohundeid, täkkeid ning mitmesuguseid jooni ja kriipse.

Tüüpiliseks kammkeraamikaks (jn 7) liigitatava nõu vormimismassis pole orgaanilist lisandit, vaid üksnes suhteliselt ühtlase suurusega kivipurd koos peenema liivaga. Tegemist on olnud suuremat sorti nõuga, mis oli vormitud linttehnikas N-tüüpi ühendusega, seina paksusega 12–13 mm. Pinnad on väljastpoolt silutud ja seest riibitud. Nõu on väljastpoolt olnud arvatavasti tervikuna ornamenteeritud lohkude ja lühikeste kammivajutiste horisontaalsete vöönditega.

Nöörkeraamikale (jn 7) iseloomulikku ornamenti kannab kümme savinõukildu, osa neist pärinevad peekritest, teised pottidest. Lisaks ornamenteeritud kildudele kuuluvad nöörkeraamilistele pottidele veel kuus ornamenteerimata fragmenti, millel on vormimismassi koostise ja pinnatöötluse poolest olemas nöörkeraamikale viitavad tunnused. Peekrid on olnud õhemaseinalised (0,6–0,7 cm) ning potid paksema seinaga (0,7–1,1 cm). Peekrifragmendid pärinevad nõude kitsamaks profileeritud kaelaosast. Potid on olnud lihtsa sirge profiiliga. Nõude sise- ja välispinnad on enamasti töödeldud siledaks, kuid kahel fragmendil on sisepinnal ning ühel välispinnal näha kergeid riipeid. Ühel fragmendil on välispinna viimistlemiseks kasutatud nn pseudotekstiiltehnikat. Nõusid on kaunistatud erinevate nöörivajutistega, väikeste lohukestega, kriipsude ja soontega. Peekrite kaelaosad on olnud kaunistatud kuuseoksmotiiviga. Pottide kaunistamisel on kasutatud jämedamat nööri ning jäljendid on laiema vahega.

Kiviaegse asula kivileidudega võib seostada 1099 kvartsist, muudest mineraalidest ja kivimitest kildu (Tabel 1). Mineraalide ja kivimite killud pärinevad ümaratest veeristest või munakatest. Põhiosa leidudest on helehall, valge või täiesti läbipaistev ja suure kristalliga kvarts, väiksemal hulgal leiti ka suitsu- ja piimkvartsi. Enamik leidudest on esmased killud ja töötlusjäägid (69%) ning laastud/laastukatked (19%), kuid leiti ka nukleusi (11%) ja 13 teisese töötlusega esemet (1%). Kvartsi on lõhestatud valdavalt bipolaarses tehnikas, platvormtehnikaid on kasutatud marginaalsel määral. Nukleused on üldiselt ristkülikukujulised, külgvaates teravovaalsed või rombjad. Enamasti on näha ühte löögisuunda, kuid on ka mitmes suunas töödeldud eksemplare. Umbes kolmandik nukleustest on n.ö ärakurnatud. Teisese töötluseta teravate servadega killud on keskmiselt 2,4 cm pikad, 1,7 cm laiad ning 0,7 cm paksud. Laastud on keskmiselt 2,2 cm pikkused, 0,9 cm laiused ning 0,5 cm paksused (Diagramm 1). Laastudest 83% on löödud bipolaarses ja 11% tõenäoliselt platvormtehnikas. Umbes 30–40 killu puhul on alust eeldada nende mõne teravama serva või nuki kasutamist tööriistana, kuna oletatavas tööpiirkonnas võib näha kulumisjälgi.

Tööriistad on valmistatud bipolaarses tehnikas löödud kildudest. Leiti kuus kõõvitsat, kaks nuga, neli retuššitud teraga kildu ja kaks uuritsat (jn 8). Tööriistu on valmistatud pisut suurematest, keskmiselt 2,9 cm pikkustest, 2,1 cm laiustest ning 1 cm paksustest kildudest (Diagramm 2, võrdle Diagramm 1). Kõõvitsad on trapetsjad, segmentjad või ovaalsed. Neljal kõõvitsal on teraks killu külg, terad on 1,1–2,7 cm pikkused. Nugadest ühel on tera kergelt kumer, teisel sirge, terade pikkus on 1,5 cm ja 2,2 cm. Retuššitud servaga kildude puhul pole serva töötlus olnud nii regulaarne kui kõõvitsatel ja nugadel. Erinevalt nugadest on nende kildude terad pisut järsemad ja ebaühtlasema kujuga, isegi kergelt sakilised. Ühel uuritsal paikneb tera keskel ning teisel killu nurgal.

Ka kiviaegsete luuesemete valik on üsna mitmekesine: leiti kaks harpuuniotsikut, seitse nooleotsa ja torkerelva, neli õngekonksu ja muid õnge osi, kolm teravikku ning kaks arvatavat luda katket (jn 9). Lisaks neile on veel kaks töötlusjälgedega luutükki. Esemed on valmistatud – üksikute eranditega – peamiselt suurimetaja toruluudest. Leiti ka neli hammasripatsit, millest üks oli tehtud ulukhobuse lõikehambast ja teised hüljeste kihvadest (jn 9).

Osteoloogilisest ainesest kaevati neoliitiliste leidudega kihistustest välja ligikaudu 4300 luuleidu, millest u 1350 olid keskaegse leiukompleksiga seotud. Neoliitilistest luuleidudest olid ligikaudu 2950 imetajaluud, 178 linnuluud ja 34 kalaluud.

Esimeste hulgas oli liigini võimalik määrata 26,4% luuleidu. Lisaks määrati 180 luuleidu kui "suurimetaja", mille puhul on kõige tõenäolisem, et tegu on põdraga. Samas peab arvestama, et ka näiteks tarvas ja/või ulukhobune võivad hilisneoliitilises faunas esineda, kuid nende liikide täpsemini määratavaid luid ei leitud. Ulukhobuse lõikehambast tehtud ripats võib olla ka kaugemalt kaasa toodud, mitte pärineda kohalikust faunast. Määratud imetajaluudest u 45% pärineb hüljestelt, nendest omakorda 2/3 grööni hülgelt ja 1/3 viigrilt. Luuleidude hulga järgi järgnevad kobras (29%) ja pringel (pisut üle 16%). Põdraluude protsent jääb alla 9%, kuid nagu mainitud, võivad mitmed suurimetaja luufragmendid pärineda just põdralt. Mõned metssea luud võivad viidata nn poolkodustatud sigadele, mida tolleaegsetest rannikuasulatest on mujaltki teada. Mõne üksiku luuleiuga oli esindatud veel rebane, saarmas, nugis, hunt, koer ja jänes. Linnuluudest pärineb enamik erinevatelt veelindudelt (pardid, haned), kuid esineb ka maismaa liike (teder) ja röövlinde (kotkad). Kaladest olid esindatud haug, tursk ja ahven, üksikute luudega ka siig, koha ja lest ning karplased, kelle täpsemat liiki polnud võimalik määrata.

XVI kaevandi seinaprofiilist võetud kolm proovi taimejäänuseid ei sisaldanud, ainult väikseid söeosakesi. Kaks suurt pinnaseproovi võeti I (proov 1) ja III (proov 2) kaevandist. Pinnaseproovid olid liivased, kus söestumata taimejäänuste säilivus oli halb. Proovist 2 saadi vaid üksikuid valge hanemaltsa seemneid ja palju väikseid kalaluude fragmente. Proovist 1 leitud taimejäänused on esitatud Tabelis 2. Enamik seemnetest kuulusid inimkaaslejatele, tüüpilistele asula umbrohtudele. Märkimisväärne on koerapöörirohu seemnete suur protsent. Alates keskajast kasvatati seda kui ravimtaime. Need leiud tõestavad, et analüüsitud pinnaseproovid sisaldasid neoliitilise kõrval ka uuemat materjali, võib isegi olla, et kõik taimejäänused kuuluvad keskaega. Väga kahtlane on päevalilleseemne katke leid, mis ilmselt pärineb veelgi uuemast ajast. Umbrohtude ja prahitaimede kõrval oli ka rohttaimi, millest mõned söestunud nurmika seemed võivad olla neoliitilist päritolu.

Pinnase koostisest võis eeldada, et õietolm on Vabaduse väljaku kiviaja kultuurkihis halvasti säilinud, mistõttu tehti materjali kontrolliks pilootuuring. Ette valmistati kuus proovi pollenanalüüsiks. Tuginedes testproovide tulemusele otsustati edasisest polleni analüüsist loobuda, kuna säilinud olid vaid üksikud õietolmuterad. Samas peab märkima, et analüüsitud proovides oli kõrge mikroskoopiliste söeosakeste kontsentratsioon.

Leiukompleksi ajalise päritolu täpsustamiseks tehti kahest luuleiust radiosüsinikudateering (AMS) (Tabel 3). Teiseks kasutati asulakoha dateerimiseks Eesti rannasiirdekronoloogia programmi, mille abil sai hinnata asulakoha kõige tõenäolisemaks asustusajaks u 3300 eKr, noorimaks võimalikuks vanuseks pakub programm aega u 3150 eKr (Tabel 4).

Kokkuvõteks võib tõdeda, et nii rannasiirdekronoloogia kui ka radiosüsinikudateeringute andmeil jääb asulakoha vanus vahemikku 3300–2900 eKr, kõige tõenäolisemalt u 3100 eKr.Keskja hilisneoliitilisi hilise kammkeraamika kultuuri asulakohti on teada nii mandrilt kui ka Hiiu- ja Saaremaalt. Lähim sarnase neoliitilise leiumaterjaliga asulakoht paikneb linnulennul 25 km kaugusel idakirdes: Jägala jõe kunagises suudmes, Jägala Jõesuu linnamäel. Üldjoontes sarnaneb uuritud asulakoht Eesti teiste samaaegsete hilise kammkeraamika asulakohtadega. Valdavalt on asulakohtades artefaktide tegemisel kasutusel kohalik tooraine, kuid selle menetlemisel, nii keraamika kui ka kivitöötluse osas, tulevad välja piirkondlikud eripärad. Mandri-Eesti rannikuasulate seas näiteks Vabaduse väljakul, Jägala Jõesuus ja Kasekülas on keraamika vormimismassis mineraalne aines koos taimse massiga, kui mujal domineerib orgaaniline mass. Kivitöötluses ilmnevad eripärad näiteks kildude ja laastude erinevas osakaalus – Vabaduse väljakul ja Sindi-Lodja III on leiumaterjali hulgas laastude osakaal oluliselt suurem kui teistes asulates. Uuritud asulakoha osteoloogilise materjali üheks eripäraks, võrreldes teiste rannikuasulatega, on põlemata osteoloogiline materjal – üldjuhul leitakse asulakohtadest just põletatud luid. Asulakoht tõuseb esile ka selle poolest, et mereloomade ja veesidusate loomade kõrval on leiumaterjalis üsna märgatav hulk maismaaloomade ja lindude luid. See viitab inimeste mitmekesisematele tegevustele hülge- ja pringliküttimise kõrval, vahest ka pikemale asulakoha kasutusperioodile. Siiski ei võimalda leiumaterjali suhteline vähesus antud muistist aastaringseks asulakohaks pidada.