



Archaeological investigations at the Naakamäe Stone Age settlement site on Saaremaa

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INTRODUCTION

The Naakamäe Stone Age settlement and burial site (no. 12402 in the National Registry of Cultural Monuments) is located in southeastern Saaremaa, in Kõrkküla (formerly Hirmuste) village (Fig. 1). The site is situated on top of a steep, ancient coastal formation that opens to the east/southeast (about 12.5–15.5 m a.s.l.). The hinterland of the formation is relatively flat.

The Naakamäe settlement site is one of the few classical sites that long formed the basis for interpretations of the Estonian Stone Age, particularly those related to the Comb Ware culture(s)¹ (see, e.g., Jaanits *et al.* 1982). As early as 1869, a shaft-hole stone axe was discovered at Naakamäe (Grewingk 1871, 51). Another shaft-hole axe is also connected with this site, although its precise find spot remains uncertain (Vaas 1922, 1). According to reports from 1922, ‘fire stone’ flakes (Est. *tulikivikild*²) and traces of charcoal were repeatedly found during ploughing (also in the summer of 1922). This provided the basis for identifying Naakamäe as a Stone Age settlement site (Vaas 1922, 1; *kiviaja elamu*, i.e., ‘Stone Age dwelling’). The site is among the earliest discovered Stone Age settlements in Estonia (Kriiska 2006, 59).

¹ In Estonia, there are currently two ways of conceptualizing the Comb Ware culture: one treats all material as a single Comb Ware culture, while the other distinguishes between two variants, the Typical and the Late Comb Ware culture (see Jaanits *et al.* 1982; Kriiska *et al.* 2020; Khrustaleva & Kriiska 2025).

² In the parlance of that time, *tulikivi* could mean both flint and quartz.

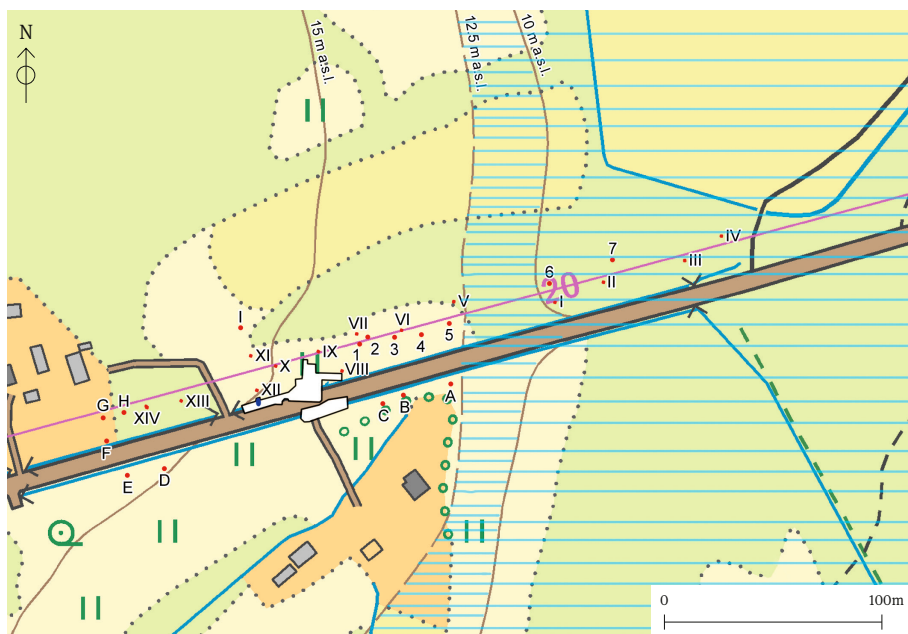


Fig. 1. Research area at Naakamäe in 2024. Large test pits are marked with Roman numerals, small test pits dug in spring with Arabic numerals, and small test pits dug in summer with letters. The white polygon marks the excavation area from the 1950s–1960s, and the blue dot marks the Stone Age burial. Dense blue streaking marks the sea level from 3300 BC, and sparse blue streaking from 2700 BC (Baltic Sea level reconstruction by Jussila & Kriiska 2004a; 2004b).

Jn 1. 2024. aasta uuringuala Naakamäel. Rooma numbriga on tähistatud suured prooviaugud, araabia numbriga kevadel kaevatud väikesed prooviaugud ja tähtedega suvel kaevatud väikesed prooviaugud. Valge polügon markeerib 1950.–1960. aastate kaevandeid, sinine punkt kiviaegset hauda. Tihe sinine viirutus markeerib mere veetaset alates 3300 aastat eKr ja hõre sinine viirutus alates 2700 aastat eKr (Läänemere veetaseme arvutus Jussila & Kriiska 2004a; 2004b).

Base map / Aluskaart: Estonian Land and Spatial Development Board / Maa- ja Ruumiamet

Location of the excavation areas of the 1950s–1960s based on / 1950.–1960. aastate kaevandi paigaldamise alus:

Map / Plaan: AI 4-1-20-1-1

Map / Kaart: Kerkko Nordqvist & Irina Khrustaleva

In 1958, the settlement site was destroyed during road construction. In 1958–1959 and 1961–1962, archaeological excavations were conducted at the site under the direction of Lembit Jaanits, alongside collecting finds from soil that had accumulated during the road-works (Jaanits 1965, 28–30). Jaanits' excavations were conducted on both sides of and beneath the current road, close to the edge of the coastal formation (Fig. 1). The excavations took place over an area of 430 m², uncovering seven stoneless pit-hearths (Jaanits 1965, 28–30; Sikk 2015, Appendix 1). In 1962, an exceptional assemblage of pottery was recovered from Naakamäe – four complete Comb Ware vessels placed in pits dug into the sand (Jaanits *et al.* 1982, 83). A burial was also discovered: an adult woman interred in an extended supine position, with a bone awl as a grave good, and a patch of ochre beneath the skull (Jaanits 1965, 28; Tõrv 2018, 164). According to local inhabitants, another human skeleton had already been unearthed earlier, accompanied by pendants made of animal teeth (Jaanits *et al.* 1982, 83).

The majority of the material collected during these studies is associated with the Comb Ware culture(s) (e.g., Jaanits *et al.* 1982, 85; Kriiska *et al.* 2020, 109). Based on its elevation

above sea level, Jaanits considered Naakamäe to be the oldest Comb Ware culture settlement site on Saaremaa Island (Jaanits *et al.* 1982, 85). In the pottery assemblage, he identified the late phase of Typical Comb Ware and Late Comb Ware, characterised by sparser ornamentation, a higher frequency of small pits compared to comb impressions, and striated surfaces (Jaanits 1965, 30). The site also yielded finds associated with the Corded Ware culture (Jaanits *et al.* 1982, plate V; Sikk *et al.* 2020, 125). The artefact and osteological material excavated at Naakamäe has been repeatedly used in studies of subsistence (e.g., Paaver 1965; Lõugas 1997a–b; Tõrv 2018, 130), settlement patterns (e.g., Kriiska 2001; 2023), the general prehistory of Saaremaa (Kriiska 2007), Stone Age art (e.g., Jaanits 1961; Jonuks 2009; Khrustaleva & Kriiska 2020), and the distribution of non-local materials (Kriiska *et al.* 2013).

In 2023, the Naakamäe settlement site and its protection zone were damaged during the removal of trees and undergrowth under a power line. The operation involved the use of heavy machinery, leaving deep furrows in the ground; trees and shrubs were felled in an unorganized manner, and the subsequent clean-up was inadequate. In spring and summer 2024, further clean-up works were carried out to restore the settlement site and its protection zone. They were accompanied by small-scale archaeological investigations.

OBSERVATIONS FROM ARCHAEOLOGICAL INVESTIGATIONS AND RADIOCARBON DATING

In 2024, thirteen test pits of approximately 1 m² each, one test pit of 1.5 m², and sixteen smaller test pits with dimensions up to 50 cm were excavated, resulting in a total area of approximately 19 m². All soil was sieved using individual hand sieves (mesh 4 mm), and the artefacts and bones were documented in 3D (x, y, z) with a horizontal accuracy of ± 5 –10 cm.

No cultural layer was identified below (i.e., seaward of) the coastal formation (test pits I–IV and 6–7), although isolated artefacts were recovered. These may either have been deposited incidentally during the Stone Age settlement (e.g., discarded or lost in the shore waters adjacent to the site) or as a result of later anthropogenic activity, primarily agricultural practices. Above the coastal formation, a cultural layer of some kind was present in all test pits. The upper part of the cultural layer (15–30 cm) had often been disturbed by ploughing; in some cases, a cultural layer up to several tens of centimetres thick was preserved beneath it *in situ*. In test pit XIV, part of a pit-hearth was excavated. It was identifiable as a soil lens approximately 60 × 90 cm in area, containing charcoal and fragments of burnt stones (Fig. 2). The test pit is located in the western edge of the settlement area, approximately 150 m from the edge of the fossil coastal formation.

Three unburnt seal bones and a fragment of charred nutshell have so far been radiocarbon dated. Seal bones originate from various depths in test pit VIII, located in the central area of the settlement (Fig. 1) and containing a cultural layer over 70 cm thick with Stone Age finds (Fig. 3). A bone from the lower part of the layer (AI Z 8896: 449) yielded an age of 4940 $\pm$ 40 BP (Poz-190248); however, the age determination of seal bones is affected by the reservoir effect. For the Neolithic in Estonia, a correction of 347 $\pm$ 73 ¹⁴C years has



Fig. 2. A pit-hearth in the south wall of test pit XIV.
Jn 2. Maapinda süvendatud tulease, prooviauk XIV lõunasein.

Photo / Foto: Irina Khrustaleva

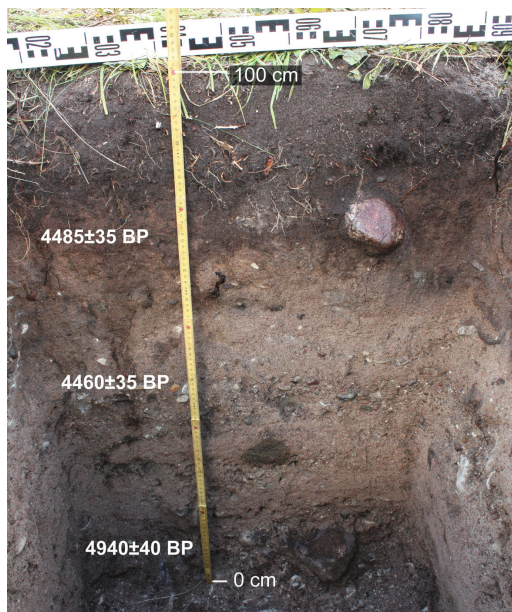


Fig. 3. The west wall of test pit VIII and projected radiocarbon dates of seal bones from different depths.

Jn 3. Proovikaevand VIII läänesein ja sellele projitseeritud eri kõrgustel paiknenud hülgeluude radiosüsiniku dateeringud.

Photo / Foto: Kerkko Nordqvist

customarily been applied to seal bones to account for this effect (for a detailed explanation, see Muru *et al.* 2017). The corrected date corresponds to a calibrated age range of 3630–3010 cal BC.³ A seal bone recovered about 40 cm above the first one (AI Z 8896: 453) gave an age of 4460±35 BP (Poz-190246), corresponding to a corrected value of 2920–2340 cal BC. The third seal bone (AI Z 8896: 452) was located still approximately 20 cm higher in the upper part of the layer and directly beneath the plough-damaged surface. It yielded an age of 4485±35 BP (Poz-190245), corresponding to 3010–2360 cal BC. Despite the broad ranges resulting from the reservoir effect correction, these results indicate two phases of settlement activity.

The fourth radiocarbon date was obtained from a charred nutshell from the pit-hearth in test pit XIV (Fig. 2). The sample gave an age of 3450±35 BP (Poz-186631), corresponding to a calibrated range of 1880–1640 cal BC. This suggests yet another phase of settlement at Naakamäe.

ARTEFACTS AND ECOFACTS

The assemblage comprises 1234 artefacts, 2416 bones, and three fragments of charred nutshell. Most artefacts (905) are ceramic. Of these, 881 fragments (71.4% of the finds), are pottery sherds: 880 fragments of hand-made vessels and a fragment of glazed redware. In the following, only the hand-made pottery sherds are considered. According to rim fragments, they derive from at least 24 vessels.

Most of the vessels were large, but eight fragments of small pots were also found, representing at least five vessels according to the rim sherds. The wall thickness is generally 6.7 to 12 mm, increasing to 12.7–14.6 mm towards the bottom, while the small vessels have a wall thickness of 2.6–5.8 mm, with one exception measuring 7.9 mm. The rim thickness ranges from 3.7 to 13.6 mm. The rim shape could be described for 19 fragments. In seven cases (36.8% of the described rims), the rim was straight, thickening and inclining inwards; in one case, straight, thickening outwards and inclining inwards; in one case, convex, thickening and inclining outwards; in two cases, straight, thickening inwards with a flat top (Fig. 4: 1); in three cases, convex and tapering upwards; in two cases, convex with walls of uniform thickness; and in one case, straight with walls of uniform thickness. Only two rim fragments are profiled: one is turning inwards, and the other is turning outwards.

Only three bottom fragments are present, all flat or nearly flat (AI 8896: 453, 516, 574). However, it can be assumed that most vessels originally had a rounded or pointed base. Such

³ All dates have been calibrated using the OxCal 4.4.4 programme with the IntCal20 atmospheric curve, and are given with a 95.4% probability (Reimer *et al.* 2020; Bronk Ramsey 2021).

forms tend to be more poorly preserved than flat bases and are therefore underrepresented at Neolithic settlement sites in Estonia, or are occasionally missing altogether (cf. Kriiska 1998, 33; Kriiska & Nordqvist 2012, 24).

The fabric of most pottery fragments (822; 93.4%) contains rock debris (Fig. 4), often in significant quantities and including large pieces. Together with suboptimal firing, this renders the sherds small, fragile, and friable. Two fragments contain only sand within the clay matrix. Organic temper is comparatively rare and observed in 54 sherds: solely organic temper occurs in seven sherds (0.8%), organic admixture together with rock debris in 39 sherds (4.4%), and organic component and sand in eight sherds (0.9%). The forming technique could be determined for 13 sherds: 12 exhibit the N-type coil, and one the U-type.

The vessel surfaces were either smoothed or striated. Both surfaces are preserved on 106 sherds (12%): of these, 68 (64.2%) have both surfaces smoothed, ten (9.4%) have both surfaces striated, four (3.8%) have a striated outer and a smoothed inner surface, and 24 (22.6%) have a smoothed outer and a striated inner surface. A total of 121 fragments are decorated. Ornamentation occurs on the rim top in five cases and on the outer surface on 118 fragments (including two sherds with both rim tops and outer surface decorated). Seven types of decorative elements were identified: deep⁴ pits (76; 62.8% of decorated sherds), shallow pits (33; 27.3%), comb impressions (19; 15.7%), grooves (4), notches (2), impressions made with a cord wound around a stick (1), and fingernail impressions (1). The ornamental motifs are certainly underrepresented, as the sherds are mostly so small that they can accommodate only individual elements. Combinations of decorative elements occur on only 12 potsherds. The most frequent combination is rows of deep pits and comb impressions (eight sherds, Fig. 4: 3–4). Single sherds display combinations of deep pits and grooves (Fig. 4: 1–2), deep pits and fingernail impressions, deep pits and cord-wound stick impressions, and shallow pits and comb impressions. In one case, a groove was probably made using a seashell (Fig. 4: 2).



Fig. 4. Comb ware pottery fragments found at the Naakamäe settlement site. 1–2 – pottery sherds ornamented with deep pits and grooves, 3–4 – pottery sherds ornamented with deep pits and comb impressions.

Jn 4. Naakamäe asulakohalt leitud kammkeraamika killud. 1–2 – lohkude ja soontega ornameenteeritud savinõukillud, 3–4 – lohkude ja kammivajutistega ornameenteeritud savinõukillud.

(AI 8896: 312, 446, 286a, 286b.)

Photo / Foto: Irina Khrustaleva

⁴ The distinction between shallow and deep pits depends on the depth of the impression; in the first case, the impression reaches up to 3 mm, in the second case they are deeper.

In most cases, the sherds can be broadly classified as Comb Ware according to prevailing Estonian pottery typologies. However, for approximately 10% of the pottery fragments, the type is unclear. More than half of these originate from test pit XIV, which also provided the youngest radiocarbon dating. Further research is required to confirm whether these vessels belong to a later settlement phase.

The remaining ceramic finds consist of 23 pieces of burnt clay. These were primarily recovered from test pits IX and X. Moreover, a small fragment of a clay figurine (AI 8896: 304) was found, but cannot be identified more precisely.

The Naakamäe assemblage includes 324 stone artefacts (26.3% of all finds), of which 150 are quartz (46.3%), 109 Baltic red quartz porphyry (33.6%), 25 quartzite (7.7%), 17 flint (5.2%), and 23 other rock types (7.1%) (Table). Most quartz artefacts are flakes (131; 87.3%; Fig. 5: 2–4), the majority of which (73) were found in test pit IX. There are 15 blades (10%; Fig. 5: 1), two cores (1.3%), and two proto-cores (1.3%). The knapping technique could be determined in 56 cases (37.3% of the quartz finds); apart from one proto-core, which was processed using the platform technique, bipolar knapping prevails (Fig. 5: 3–4). No formal tools are present, but one flake exhibits macroscopic signs of use.

Among the Baltic red quartz porphyry finds, there are 93 flakes (85.3%; Fig. 6: 1, 3, 4), eight blades (7.3%), and five cores (4.6%), including a large one weighing 290 g. Four flakes have signs of burning (lightened colour). Three formal tools (2.8%) were identified: a scraper, a knife (Fig. 6: 2), and a retouched pebble. In addition, a flake with macroscopic wear traces was identified (Fig. 6: 3). The knapping technique was identified in 36 artefacts (33% of the Baltic red quartz porphyry finds): the platform technique was used in 23 cases (17 flakes, one blade, and all cores; Fig. 6: 1, 4) and the bipolar technique in 13 cases (Fig. 6: 3).

The quartzite finds (all Jotnian quartzite; Fig. 7: 4) include 21 flakes (84%), two blades, and one whetstone. The platform knapping technique was recognized in two cases and bipolar in one. One flake shows macroscopic wear traces.



Fig. 5. Quartz and flint finds from the Naakamäe settlement site. 1 – a quartz blade, 2 – a quartz flake, 3–4 – quartz flakes knapped in the bipolar technique, 5 – a flint flake knapped in the bipolar technique with use-wear traces on the edge, 6 – a lump of flint, 7 – a flint flake knapped in the bipolar technique, 8 – a flint flake knapped in the platform technique.

Jn 5. Kvartsi- ja tulekivileiud Naakamäe asulakohalt. 1 – kvartslaast, 2 – kvartsikild, 3–4 – bipolaarselt lõhestatud kvartsikillud, 5 – kasutusjälgedega bipolaarselt lõhestatud tulekivikild, 6 – tulekivimakas, 7 – bipolaarselt lõhestatud tulekivikild, 8 – platvormtehnikas lõhestatud tulekivikild.

(AI 8896: 380, 109, 86, 87, 154, 403, 634, 73.)

Photo / Foto: Irina Khrustaleva

The flint assemblage contains 15 flakes (88.2%) and one blade (Fig. 5: 5, 7–8). The knapping technique was recorded in eight cases (47.1% of the flint finds), six of which were produced using the bipolar technique and two using the platform technique. There is only one formal tool – a retouched flake. In addition, two flakes bear macroscopic use-wear (Fig. 5: 5). All flint originates from the Silurian formation, a rock naturally found in the Quaternary deposits of Saaremaa, including Naakamäe. Excavations also recovered eight Silurian flint nodules, the largest measuring $4.2 \times 4 \times 2.5$ cm, some of which may have been brought to the site by humans (Fig. 5: 6).

A small but diverse group of other rock types (Table) includes ignimbrite rhyolite porphyry (5; Fig. 7: 3), melanocratic quartz porphyry (4; Fig. 7: 1), quartz porphyry (2), plagioclase porphyrite (1; Fig. 7: 5), feldspar-gneiss (1), amphibolite (1), porphyry (1), biotite gneiss (1), granites (2; Fig. 7: 2), and sandstone (1). The sandstone artefact is a whetstone (Fig. 7: 6), while the others are mostly knapping products. The knapping technique was determined in nine cases (39.1% of the other rocks): the platform technique was observed in four flakes of ignimbrite rhyolite porphyry and one core, one flake of biotite gneiss, and one flake of dark rhyolite porphyry; the bipolar technique was observed in one flake of melanocratic quartz porphyry and one flake of rhyolite porphyry.



Fig. 6. Baltic red quartz porphyry finds from the Naakamäe settlement site. 1 – a flake knapped in the platform technique, 2 – a knife, 3 – a flake knapped in the bipolar technique with use-wear traces on the edge, 4 – a flake knapped in the platform technique.

Jn 6. Läänemere punase kvartsporfüüri leiud Naakamäe asulakohast. 1 – platvormtehnikas lõhestatud kild, 2 – nuga, 3 – kasutusjälgedega bipolaarses tehnikas lõhestatud kild, 4 – platvormtehnikas lõhestatud kild. (AI 8896: 235, 70, 13, 447.)

Photo / Foto: Irina Khrustaleva



Fig. 7. Finds of different rock types from the Naakamäe settlement site. 1 – a melanocratic quartz porphyry flake knapped in the bipolar technique, 2 – a piece of granite-aplite, 3 – an ignimbrite rhyolite porphyry flake knapped in the platform technique, 4 – a flake of quartzite, 5 – a plagioclase porphyrite flake, 6 – a whetstone from Jotnian sandstone.

Jn 7. Naakamäe asulakoha eri kivimitest leiud. 1 – bipolaarselt lõhestatud melanokraatse kvartsporfüüri kild, 2 – graaniit-apliidi tükk, 3 – platvormtehnikas lõhestatud ignimbriitse rüoolitporfüüri kild, 4 – kvartsiidikild, 5 – plagioklassporfüüridi kild, 6 – Jotnia liivakivist lihvimiskivi.

(AI 8896: 47, 114, 449, 234, 153, 437.)

Photo / Foto: Irina Khrustaleva

Table. *Lithic artefacts from the Naakamäe site (excavations in 2024)*

Tabel. *Kivileiud Naakamäe asulakohast (2024. aasta väljakaevamised)*

Compiled by / Koostanud: Aivar Kriiska, Irina Khrustaleva, Aija Macāne, Juho Kirs and Kerkko Nordqvist

Material / Materjal	Flake / Kild	Blade / Laast	Proto-core / Protonukleus	Core / Nukleus	Tool / Tööriist	Whetstone / Lihvimiskivi	Anvil / Alasi	Total / Kokku
Quartz	131	15	2	2	-	-	-	150
Baltic red quartz porphyry	93	8	-	5	3	-	-	109
Flint	15	1	-	-	1	-	-	17
Amphibolite	1	-	-	-	-	-	-	1
Biotite gneiss	1	-	-	-	-	-	-	1
Granite	1	-	-	-	-	-	-	1
Ignimbrite rhyolite porphyry	4	-	-	1	-	-	-	5
Granite-aplite	1	-	-	-	-	-	-	1
Quartzite	21	2	-	1	-	1	-	25
Sandstone	-	-	-	-	-	1	-	1
Melanocratic quartz porphyry	4	-	-	-	-	-	-	4
Feldspar-gneiss	-	-	-	-	-	-	1	1
Plagioclase porphyrite	1	-	-	-	-	-	-	1
Porphyry	1	-	-	-	-	-	-	1
Quartz porphyry	2	-	-	-	-	-	-	2
Rock (without definition)	3	1	-	-	-	-	-	4
Total	278	27	2	9	4	2	1	324

An anvil stone made of feldspar-gneiss, measuring 16.5 × 13.6 × 9.7 cm and weighing 1.23 kg, is a unique find (Fig. 8). It features three impact points on one flat surface, two on another, and one on an irregular side surface. It was presumably used for bipolar stone knapping.

Only three bone artefacts are included in the assemblage (0.2% of the artefacts). Two of these can be identified more precisely: a harpoon fragment (AI 8896: 210) and a fragment of a knife from a wild boar tusk (Fig. 9).

A total of 2416 bones were recovered, of which 438 are burnt and 1978 are unburnt. Most finds are small fragments of unidentified mammal bones. Only 184 (9%) fragments could be identified more accurately (Fig. 10). Of the identified specimens, 169 are seal bones (92%), and 18 belong to other mammals, including wild boar (8), marten (2), beaver (3), dog (1), other

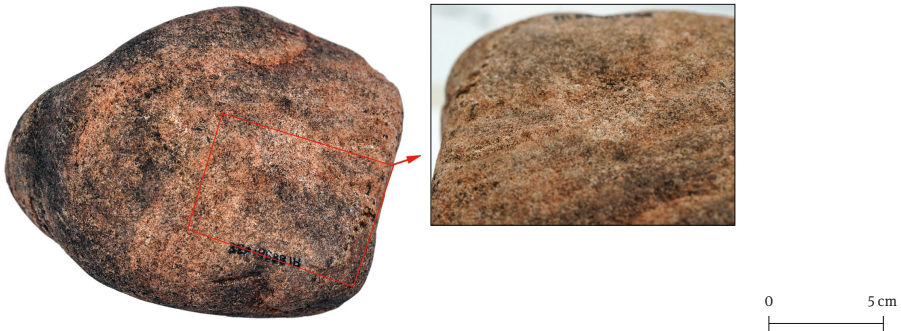


Fig. 8. *An anvil stone of feldspar-gneiss.*

Jn 8. *Päevakivi gneisist alaskivi.
(AI 8896: 638.)*

Photo / Foto: Irina Khrustaleva

carnivores (3) and rodents (1).⁵ In two cases, the possibility of human remains cannot be ruled out. In addition, 329 fish bones were identified, including flounder (12), perch (3), cod (10), pike (3) and eel (4), as well as four bird bones.

DISCUSSION AND CONCLUSIONS

The Stone Age research on Saaremaa has been sporadic, with the last substantial fieldwork conducted in the late 1990s (Kriiska 1998). Consequently, the results of the Naakamäe excavations make an important contribution to regional knowledge and, in many respects, provide significant new insights within the broader Baltic Sea context.

The Naakamäe studies demonstrate the importance of sieving and the careful collection and documentation of finds. A comparison between the material recovered in the 1950s–1960s and that obtained in 2024 reveals a large quantitative disparity. For example, the mammal⁶ bones (7676; Paaver 1965, 439) collected by Jaanits from an excavation area of 430 m² are only 3.7 times more numerous than the bones collected (2081) during the preliminary investigations of 2024, which covered an area almost 23 times smaller. Furthermore, the number of fish bones is considerably higher in our investigations than in the earlier excavations (54 versus 329; see Paaver 1965, 440). These differences are not due to the varying characteristics or the uneven preservation of the cultural layer, but rather to the fieldwork methods employed. The new Naakamäe material is notable also because burnt animal bones constitute only 18% of all bone finds that could be identified as either burnt (438) or unburnt (1978). This provides valuable additional evidence for our limited perspectives, as most Stone Age settlements in Estonia contain only or predominantly burnt bones.

The differences in documentation and recovery accuracy are evident when comparing the find distribution maps (Tõrv 2018, fig. 10). Because only a few finds were collected in the hinterland in the 1950s–1960s, it was suggested that the cultural layer did not extend far beyond the edge of the shoreline formation. The burial was likewise considered to be situated on the periphery of the settlement (Jaanits *et al.* 1982, 83; see also the general excavation plan and find density map in Tõrv 2018, fig. 10) (Fig. 1). This interpretation has proven to be incorrect: based on our observations, the settlement's cultural layer continues both to the north and west of the areas excavated by Jaanits (Fig. 1).

The finds collected from Naakamäe in 2024 are in many ways similar to those previously excavated at the site, as well as to those from other settlement sites on Saaremaa associated



Fig. 9. A knife fragment of wild boar tusk.

Jn 9. Metsseakihvast noa katke.

(AI 8896: 223.)

Photo / Foto: Irina Khrustaleva



Fig. 10. Seal limb bones in situ in test pit VIII.

Jn 10. In situ paiknevad hülge loivaluud prooviaugus VIII.

Photo / Foto: Irina Khrustaleva

⁵ This information is based on a preliminary analysis.

⁶ Without possible human bones.

with the Comb Ware culture(s), notably Loona and Undva settlement sites. With regard to the lithic finds, a common feature is the scarcity of flint⁷ and the predominant use of quartz and Baltic red quartz porphyry (Jaanits *et al.* 1982, 86). Nevertheless, the proportion of porphyries/porphyrites in the Naakamäe assemblage recovered through sieving is striking: taken together, the different variants constitute 37.7% of the lithic material. The overwhelming majority of these are Baltic red quartz porphyry. This red volcanic rock, originating from the floor of the Baltic Sea slightly southeast of the Åland Islands (Hesemann 1975, 136), occurs as glacial erratics on the Estonian islands and along the southwest coast of the mainland (Viiding 1984, 204). On the islands of Saaremaa, Hiiumaa and Ruhnu, Baltic red quartz porphyry was used for tool production already at the earliest known settlement sites in the 6th millennium BC, yet its share remained modest (max. 1.5% of the lithic material) until the Comb Ware culture(s) (Kriiska 2002, 38). On mainland Estonia, a few flakes of Baltic red quartz porphyry have so far been recorded only at the Kaseküla Comb Ware settlement in western Estonia (Kriiska *et al.* 1998, 35). Other porphyries/porphyrites are represented in our finds just by a few specimens, though of different varieties (Table). This is probably another characteristic feature of Saaremaa, where several porphyry types occur in Quaternary deposits (Viiding 1984, fig. 27; Tuuling & Kirs 2013). On a broader scale, however, an increase in the proportion of porphyries/porphyrites in lithic material during the late 4th millennium BC can be observed both in Estonia and Finland (Kriiska & Nordqvist 2012; Mökkönen 2008, 129 and references therein).

Most typologically diagnostic pottery sherds excavated at Naakamäe in 2024 generally correspond to the characteristics of the Comb Ware vessels, previously divided into Typical and Late Comb Ware (e.g. Yanits 1959, 298–299; Kriiska 1995). The most common rim shape – inwards thickened and inclining – is in Estonia associated only with Comb Ware. The other rim shapes likewise fall within the variation documented for Comb Ware (see, e.g., pottery from eastern Estonia in Yanits 1959, figs VI–XV; and from the Narva region in northeastern Estonia in Kriiska 1995, 19 and 88). The same applies to the main decorative elements, pits and comb impressions. Additionally, fingernail impressions, grooves, and impressions made with cord wound around a stick have been described in connection with Comb Ware (e.g., Kriiska 1995, 83 and 91; Kriiska & Rappu 2008, table 3).

Lembit Jaanits, whose typology remains the primary framework for classifying Neolithic pottery in Estonia, regarded the pottery sherds from Naakamäe, Loona, and Undva, as local versions of Late Comb Ware (Jaanits *et al.* 1982). This view has been reiterated up to the present day (e.g., Kriiska *et al.* 2020, 131). Jaanits identified shared features between Saaremaa Comb Ware and both Estonian mainland pottery and Finnish Uskela pottery (i.e., Late Comb Ware in the Finnish classification), as well as ornamental elements on some Loona and Undva sherds that are comparable to the Pitted Ware of Gotland (Jaanits 1965, 30; Jaanits *et al.* 1982, 86; Jaanits 1985, 24–25). In addition, we recovered some pottery sherds at Naakamäe that cannot be unequivocally associated with Comb Ware. At present, however, such sherds are few and can only be recognized as differing from the others.

The similarities between the assemblages we recovered and those previously found at the Naakamäe settlement site are also evident in the presence of less common items, including clay figurines (e.g., Jonuks 2009, 109; Khrustaleva & Kriiska 2020, 40) and certain bone tools such as harpoon heads and wild boar tusk knives (Jaanits *et al.* 1982, 86, fig. 63).

The animal bones collected in 2024 confirm the trend already observed in the earlier Naakamäe material: a predominance of marine mammals (harp seal, ringed seal, and grey

⁷ In fact, no flint was found at either Undva or Loona settlement site (Jaanits *et al.* 1982, 86).

seal; Lõugas 1997b, table 1), with occasional inclusion of terrestrial species. In addition to wild boar, marten, beaver, and dog identified in our osteological material, earlier excavations yielded bones of elk, red deer, aurochs, hare, fox, and bear (Paaver 1965, 439–440). Marine species are also represented in fish bones, including altogether seven species: perch, pike, pikeperch, flounder, cod, sturgeon, and eel (Lõugas 1997a, table 2). A strongly marine-oriented diet is similarly indicated by stable nitrogen and carbon isotope values from human bones recovered at the Naakamäe site (Lõugas *et al.* 1996, 416; Tõrv 2018, 130). Taken together, this evidence leaves little doubt that, at least during the earliest phases of habitation, the site was used by a group or groups largely subsisting on a maritime economy.

The four new radiocarbon dates significantly clarify the settlement history of the Naakamäe site, indicating at least three episodes of habitation with possible intervening gaps (Fig. 11). Based on these data, the earliest phase (Phase 1) dates to the second half of the 4th millennium BC. This age is supported not only by one of the new radiocarbon dates, but also by four AMS dates obtained earlier from collagen extracted from terrestrial animal bones recovered during the excavations of the 1950s–1960s. Together, these dates fall within 3490–3030 BC.⁸

The site was inhabited again during the first half of the 3rd millennium BC (Phase 2). This is evidenced by two new radiocarbon dates from seal bones, and this phase is also associated with the burial of a woman excavated at Naakamäe (Lõugas *et al.* 1996, table II; Tõrv 2018, table 20).⁹ Furthermore, a few artefacts found in the 1950s–1960s have been attributed to the Corded Ware culture of the 3rd millennium BC. This may represent a separate settlement phase (Phase 3), although this cannot be confirmed due to the lack of corroborating evidence and the absence of Corded Ware finds in 2024 studies. In principle, the Corded Ware finds would also overlap chronologically with Phase 2.

The youngest settlement phase of the Naakamäe settlement (Phase 4) is of particular interest. It dates to the first half of the 2nd millennium BC, a period characterised by a notably

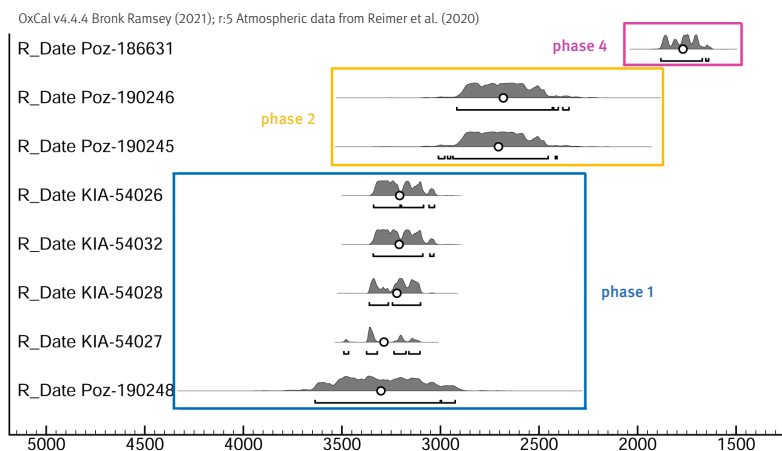


Fig. 11. Radiocarbon dates from the Naakamäe settlement site and the settlement phases supported by them. Phase 3 is visible only in the finds.

Jn 11. Naakamäe asulakohalt saadud radiosüsiniku dateeringud ja neis nähtuvad asustusfaasid. Faas 3 on nähtav vaid leiuaaineses.

Graph / Graafik: Irina Khrustaleva

⁸ Unburnt elk bone – 4477±27 BP (KIA-54026), unburnt fox bone – 4568±28 BP (KIA-54027), unburnt wild boar bone – 4526±28 BP (KIA-54028), unburnt marten bone – 4483±28 BP (KIA-54032) (Khrustaleva & Kriiska 2020, 50).

⁹ Human bone – 4152±85 BP (Ua-4822) (Lõugas *et al.* 1996). Note that the date is affected by the reservoir effect.

weak archaeological signal and very few known sites in Estonia (Kriiska *et al.* 2020, 163). The dating derives from a pit-hearth located in an unusual position: given the rate of Baltic Sea regression and land uplift between the late 4th and the early 2nd millennium BC, the settlement lay several hundred metres inland from the then-coastline. This contrasts with earlier phases: during Phases 1 and 2, settlement areas were located relatively close to the seashore. Overall, further investigation of the youngest settlement phase at Naakamäe has considerable potential to elucidate this poorly understood period, which may represent a decline of settlement in Estonia.

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ARHEOLOOGILISED UURINGUD NAAKAMÄE KIVIAJA ASULAKOHAL SAAREMAAL

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Naakamäe kiviaegne asula- ja matmiskoht paikneb Saaremaa kaguosas Kõrkkülas (varem Hirmuste küla) fossiilsel rannamoodustisel u 12,5–15,5 m ü.m.p. (jn 1). Aastatel 1958–1959 ja 1961–1962 uuriti paika Lembit Jaanitsa juhtimisel. Toona avatud 430 m² suurusel alal leiti mitu maapinda süvendatud kivideta tuleaset ja üks naisematus, panuseks luust naaskel ja kolju all ookrilaik. 2024. aastal toimusid Naakamäel päästetstarbelised arheoloogilised välitööd, põhjusel, et elektriliini aluse puudest ja võsast puhastamisel kahjustati mälestist ja selle kaitsevööndit.

Lisaks olukorra dokumenteerimisele ja mälestise korrastamisele tehti seal ka väikesed arheoloogilised

uurimused. Rajati kolmteist u 1 m² suurust prooviauku, üks 1,5 m² suurune prooviauak ja kuusteist kuni 50 cm läbimõõduga väiksemat prooviauku, kokku kaevati läbi u 19 m² (jn 1). Kogu pinnas sõeluti individuaalsete käsisoõelttega ja leiud dokumenteeriti 3D-s horisontaaltäpsusega ±5–10 cm. Asulakoha idapoolses kaitsevööndis fossiilsel rannamoodustise esisel alal (jn 1; prooviaugud I–IV ja 6–7) kultuurikiht puudus, kuid sealtsaadi üksikuid juhuleide. Rannamoodustise peal oli kultuurikiht kõigis prooviauukudes. Kultuurikiht on seal 15–30 cm paksuselt segi küntud, kuid mitmes prooviaugus oli künnikihi all säilinud kuni paarikümne sentimeetri paksune puutumatu kultuurikiht.

Prooviaugust XIV kaevati välja osa maapinda süvendatud tuleasemest (jn 2).

Välitöödel koguti 1234 eseme- ja 2416 luuleidu. Siinkohal tuleb rõhutada pinnase sõelumise ja hoolika kogumise kasutegurit. Naakamäe 1950.–1960. aastate kaevamiste ja 2024. aasta uuringute leiuaaines on näha kvantitatiivne lõhe, mis ei tulene arvatavasti mitte kultuurikihi eripäradest või säilivusest, vaid välitööde metoodikast. Nii on näiteks imetajate luid (ilma inimluudeta) 23 korda suuremast 1950.–1960. aastate kaevandist kõigest 3,2 korda rohkem 2024. aasta eeluuringutel leitud. Kalaluid leidsime isegi 6 korda rohkem kui neid võeti üles 20. sajandi keskpaigas.

Valdav osa esemeleidudest on savinõukillud, neist 880 käsitsikeraamika katked (servatükkide järgi vähemalt 24 nõust), millest enamiku võib liigitada kammkeraamikaks (jn 4). 2,6–14,6 mm seinapaksusega nõud on valmistatud peaaesjalikult kivipurru segatud savist. Nõude pinnad on olnud silutud või riibitud ja osa neist (121) kaunistatud valdavalt lohku (76), lohundite (33) ja kammvajatistega (19), harvem esineb ka sooni (4), täkkeid (2), ümberpulga mähitud nõõri vajutisi (1) ja küünevajutisi (1). Muudest keraamilistest leidudest on märkimisväärne üks savifiguuri tükk.

Kiviesemeid saadi 324, neist 150 kvartsist, 109 Läänemere punasest kvartsporfüürist, 25 kvartsiidist, 17 tulekivist ja 23 muudest kivimitest (tabel). Kvartsartefaktidest (jn 5: 1–4) enamik on killud (131), kuid esineb ka laaste (15), nukleusi (2) ja protonukleusi (2). Peale ühe platvormtehnikas protonukleuse on kõikidel määratavatel juhtudel kvartsi lõhestatud bipolaarselt. Läänemere punasest kvartsporfüürist artefaktidest (jn 6) on samuti enamik killud (93), lisaks mõned laastud (8) ja nukleused (5), morfoloogiliselt tööriistu on 3: killust valmistatud kõõvits, nuga ja retušeeritud veeris. Seda materjali on sagedamini lõhestatud platvormtehnikas (23), kuid kasutatud on ka bipolaarset tehnikat (13). Kvartsiidist (jn 7: 4, 6) on enamik killud (21), lisaks kaks laastu ja üks lihvimiskivi, lõhestatud on need platvorm- (2) või bipolaarses tehnikas (1). Tulekivi (jn 5: 5–8) on kohalik, pärit Siluri ladestust. Enamiku neist moodustavad killud (15), on ka üks laast. Tulekivileiud on lõhestatud kas bipolaarses (6) või platvormtehnikas (2). Üks kild on retušeeritud servaga. Väikesearvulise, aga samas kireva rühma moodustavad muud kivimid (tabel): ignimbriitne rüüliitporfüür (5; jn 7: 3), melanokraatne kvartsporfüür (4; jn 7: 1), plagioklassporfüürit (1; jn 7: 5), graniit (2; jn 7: 2), amfiboliit (1), Jotnia liivakivi (1) jt. Liivakivist on lihvimiskivi (jn 7: 6), muudel juhtudel on enamasti tegemist lõhestatud artefaktidega. Haruldane on päevakivi gneisist alaskivi (jn 8),

mille pinnal on mitmeid struktuuririkkkega lõõgikohti. Suure tõenäolisusega kasutati alaski bipolaarseks lõhestamiseks. Üldmuljelt sarnanevad kivileiud nii varem Naakamäelt kui ka teistest Saaremaa kammkeraamika kultuuri(de) asulakohtadest kogutuga, mida iseloomustab tulekivi vähesus ning kvartsi ja Läänemere punase kvartsporfüüri rohke kasutamine. Siiski üllatab Naakamäe sõelumisega kogutud leiuaaines porfüüri, eriti Läänemere punase kvartsporfüüri, suur osakaal. Need kivimid moodustavad kokku 37,7% kiviainesest. Saaremaa, Hiiu- ja Ruhnu saartel on Läänemere punast kvartsporfüüri kasutatud tööriistade valmistamiseks juba vanimates teadaolevates asulakohtades 6. aastatuhandel eKr, kuid kuni kammkeraamika kultuurini oli selle osakaal siiski tagasihoidlik, ulatudes kuni 1,5%-ni kiviainesest.

Luuesemeid leiti kõigest kolm, sh harpuuni katke ja metsseakihvast nuga (jn 9). Luid on 2416, neist 438 on põletatud ja 1978 põletamata. Fragmentaarsetest ja raskesti määratavatest luukildudest 2081 kuuluvad imetajatele, sh esialgse määrangu kohaselt 169 hülgele (jn 10), 8 metsseale, 3 koprale, 2 nugisele ja üks koe-rale. Kalaluid on 329, sh 12 lesta, 10 tursa, 4 angerja, 3 haugi ja 3 ahvena luud. Neli luud on lindudelt ja kahel juhul on arvatavasti tegemist inimluudega.

Kolm 2024. aastal väljakaevatud hülgeleud proovikaevandist VIII (jn 3) ja üks karboniseerunud pähklikoor proovikaevandist XIV dateeriti radiosüsiniku meetodil. Koos nelja varasema dateeringu ja leiuainesega osutavad proovid, et Naakamäe asulakohal elati vaheaegadega neljas episoodis (jn 11). Vanim asustusperiood on 4. aastatuhande teine pool eKr (asustusfaas 1). Sellist vanust annavad lisaks 2024. aasta vanimale dateeringule ka kõik 1950.–1960. aastate kaevanditest kogutud maismaaloomade luude kollageenist tehtud AMS vanusemäärangud. Järgnevalt elati samas kohas 3. aastatuhandel eKr. Kaks meie väljakaevatud hülgeleust tehtud radiosüsiniku dateeringut on 3. aastatuhande esimesest poolest eKr (asustusfaas 2). Selle asustusetapiga seondub ka Naakamäelt väljakaevatud naise luustik. Mõlemal juhul paiknes asulakoht suhteliselt lähedal mererannale. 3. aastatuhandesse eKr kuuluvad ka üksikud esemeleiud 1950.–1960. aastate kaevamistelt, mida seostati nöörikeramika kultuuriga (asustusfaas 3), kuid meie väljakaevatud leidude hulgas puudus see etapp täiesti. Naakamäe asulakoha noorimad esiajaloolised asustusjäljed pärinevad 2. aastatuhande esimesest poolest eKr (asustusfaas 4). Dateering saadi tuleasemest, mis arvestades Läänemere regressiooni ja maakerke kiirust 4. aastatuhande lõpust eKr kuni 2. aastatuhande alguseni eKr paiknes juba mitmesaja meetri kaugusel vahetust mererannast.