ARCHAEOLOGICAL FIELDWORK IN ESTONIA

2008

ARHEOLOOGILISED VÄLITÖÖD EESTIS

EDITORS / TOIMETAJAD:
ESTER ORAS, ERKI RUSSOW

MUINSUSKAITSEAMET
TALLINN 2009

ARCHAEOLOGICAL RESEARCH IN JÄGALA

AIVAR KRIISKA
aivar.kriiska@ut.ee

Ajaloo ja arheoloogia instituut
(Institute of History and Archaeology)
Tartu Ülikool (University of Tartu)
Lossi 3, 51003 Tartu, Estonia

MARILIN RAPPU
marilin.rappu@gmail.com
KRISTI TASUJA
kristitasuja@hotmail.com
JANEK ŠAFRANOVSKI
janek@saf.ee

JÜRI PLADO
juri.plado@ut.ee

Ökoloogia ja maateaduste instituut
(Institute of Ecology and Earth Sciences)
Tartu Ülikool (University of Tartu)
Vanemuise 46, 51014 Tartu, Estonia

INTRODUCTION

In July and August 2008 a research group of the University of Tartu conducted small-scale excavations and research with ground-penetrating radar in Harjumaa (Jõelähtme parish), at the Jägala Jõesuu hill fort and at the settlement site on the foot of the hill fort, and also carried out landscape survey in the surroundings (Fig. 1).

The purpose of the fieldwork at the Jägala Jõesuu hill fort was to ascertain the existence and character of the cultural layer, especially in the area where the future building of the visitors' centre of the hill fort is currently being planned. The settlement site was detected on an extensive area and the gathered find material enables to specify the date of the site.

Fig. 1. View at the north-western part of the Jägala Jõesuu hill fort settlement site, the oval sign marks the most northwestern excavation plot.

Jn 1. Vaade Jägala Jõesuu Linnamäe asulakoha loodeosale, ovaaliga on markeeritud kõige loodepoolsem kaevand.

Photo / Foto: Kristel Külljastinen

The task of the fieldwork in the yard area of the hill fort was to explain the geological structure of the ridge of the hill, ascertain the presence and character of the cultural layer under the sand heaps covering the plateau, the existence of a rampart on the eastern edge of the ridge and the possibility of a moat at the northern foot of the hill fort. It turned out that the yard area of the hill fort is covered by sand of eolian origin with numerous strata from sites of different periods and type preserved under it.

The purpose of the archaeological landscape survey was to find new sites and explain the extent of the Jägala Jõesuu II Stone Age settlement site. The research mostly concentrated on the right bank (the one by the hill fort) of the Jägala River, progressing into north as well as south from the hill fort. Intensive survey was accomplished on the whole area with *ca.* 20–50 cm wide and *ca.* 30 cm deep (deeper if necessary) test-pits dug with the distance of 10–20 m on the territory between the Jägala River and the Ruu–Neeme road. Finds were gathered from the surface of the settlement site as well. A new Stone Age settlement site and two Iron Age settlement sites were discovered and the borders of an already known Stone Age settlement were specified, separating among other things its two habitation stages.

EXCAVATIONS AND RESEARCH WITH GROUND-PENETRATING RADAR

Jägala Jõesuu Linnamäe settlement site

The settlement site is situated approximately 80 m north of the Jägala Jõesuu hill fort, north-east of the gravel way extending from the Ruu–Neeme road to the Jägala River (Figs. 1; 9). The site, where the first finds were discovered already in the beginning of the 20th century, has been mentioned in several publications, it is taken under national heritage protection (reg. no. 17534) and dated to the prehistory and the Middle Ages (Tõnisson *et al.* 2008, 191). However, definite data on the character and extent of the cultural layer there were absent until now, therefore the existence of the settlement site was rather questionable before the beginning of the research, since no traces from the cultural layer could be detected from the surroundings of the hill fort from the test-pits dug in 2007 (Lõhmus & Oras 2008, 37). Since weak cultural layers poor in finds cannot easily be distinguished in test-pits and finds need not always be found from the test-pits, it was decided to establish four 2 × 2 m big trial pits. The cultural layer of the settlement site was discovered north-west from the aforementioned gravel road, but its extent still needs additional research.

The cultural layer that in places was buried under up to twenty centimetres thick (dune?) sands, was in places excellently preserved, still partly destroyed in the course of later human activity. The topmost sand contained sporadic nails and pieces of slag and brick from the historic times. 3 redware sherds, one fragment of a faience vessel, 5 pieces of brick and 12 slag chunks

Sample / Proov	Lab no. / Labori nr	D13C(‰)	Radiocarbon age (BP) / ^{14}C-aastad	Measuring age (1s)* / Kalendriaasta (1s)**	Measuring age (2s) / Kalendriaasta (2s)
1. Jägala Jõesuu hill fort, charcoal, lower cultural layer	SPb-77	–	2400±80	750–390 cal. BC	800–300 cal. BC
2. Jägala Jõesuu hill fort, bone (TÜ 1444: 1046), upper cultural layer	Hela-1888	–22,4	2200±30	360–200 cal. BC	380–180 cal. BC
3. Jägala Jõesuu hill fort, charcoal, upper cultural layer	SPb-78	–	1950±50	20 cal. BC – 130 AD	160 cal. BC – 220 AD
4. Jägala Jõesuu II site, bone (TÜ 1704:1)	Hela-1908	–28,1	7635±50	6560–6430 cal. BC	6600–6420 cal. BC
5. Jägala Jõesuu IV site, bone (TÜ 1706:3)	Hela-1874	–21,8	210±35	1640–1960 cal. AD	1640–1960 cal. AD
6. Jägala Jõesuu Linnamäe site, bone	Hela-1907	–28,2	105±30	1690–1920 cal. AD	1680–1940 cal. AD

Table 1. Radiocarbon dates from the Jägala Jõesuu hill fort and settlement sites investigated in 2008.
Tabel 1. Jägala Jõesuu linnuse ja asulakoha 2008. a uuringute radiosüsinikdateeringud.

* All the calibrations by: Atmospheric data from Reimer *et al.* (2004); OxCal v3.10 Bronk Ramsey (2005); cub r:5 sd:12 prob usp[chron].
** Kõik kalibreeringud: Atmospheric data from Reimer *et al.* (2004); OxCal v3.10 Bronk Ramsey (2005); cub r:5 sd:12 prob usp[chron].

were gathered from the intermingled strata. Probably a few of the 42 fragments (the majority of these burned) of animal and fish bones (including two vertebrae) can also be associated with the historic times. This is indicated by a radiocarbon analysis from an animal bone (Table 1: 6). Especially much garbage from the previous century, were collected from the most south-eastern test excavation.

A unique find complex was formed by 2 quartz flakes (including a single big example shaped in platform technique, Fig. 2: 7), 1 flint flake and 319 hand-moulded pottery sherds. The majority of the pottery was obtained from the most south-eastern test excavation. The pottery sherds originated from vessels made of clay mixed with rock debris. Also sherds of both bowls (Fig. 2: 3) and pots were found. The pots have been moulded from clay coils with N-type contact surfaces (observable on one sherd). The wall thickness varies from 6 mm to 10 mm, but the majority of sherds are 7–8 mm thick. Pots with both smoothed surfaces as well as vessels striated on the outer surface have been produced (Fig. 2: 1–2, 4–6). Among sherds with both preserved surfaces, fragments with a striated outer surface and smoothed

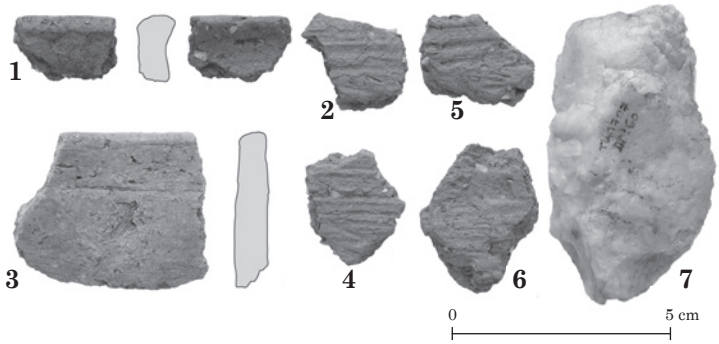


Fig. 2. Pottery sherds (1–6) and a quartz blade (7) from the Jägala Jõesuu Linnamäe settlement site.
Jn 2. Savinõukillud (1–6) ja kvartslaast (7) Jägala Jõesuu Linnamäe asulakohalt.
Photo / Foto: Kristel Külljastinen

inner surface are over three times more numerous than fragments with both smoothed surfaces. Since many sherds have crumbled surfaces, this comparison might not be conclusive, but it surely refers to a certain trend. Also the bowls have been produced from coils with N-type contact surfaces (can be followed on two sherds). The wall thickness varies from 3 mm to 8 mm. Mostly both surfaces of bowls have been smoothed.

There are very few certain aspects to date the complex more exactly. According to the striated pottery the settlement site might, for the time being, be dated to a long period – the Early Iron Age (500 BC – 450 AD), at the same time an edge fragment of the rim of a bowl with smoothed surface could originate already from the Middle Iron Age (450–850 AD).

Jägala Jõesuu hill fort

The research group of the University of Tartu continued archaeological excavations at the Jägala Jõesuu hill fort (reg. no. 17535) already for the third season. If earlier, in years 2005 and 2007, the fieldwork concentrated on different sections of the rampart and the yard area directly by the rampart and further only with test-pits (Johanson & Veldi 2006; Lõhmus & Oras 2008), then in 2008 the research of the yard of the hill fort concentrated on the archaeological and geological aspect. An extensive part of the hill fort is covered by sand masses, commonly considered as dunes, but the possibility of human impact cannot be excluded either. The purpose of the studies in 2008 was to explain the formation of the sand mounds and ascertain the existence of a cultural layer under the mounds.

The ground-penetrating radar was used to gather information (1) on the rampart on the northern side of the hill fort as well as inspect its existence on the eastern side of the ridge, (2) on the supposed moat at the northern foot of the hill fort and (3) on the existing cultural layers in the yard area of the hill fort. The research was conducted with the ground-penetrating radar of Radar Systems Inc. on the frequency of 500 MHz. The reflected signal was measured during 150 ns for geological purposes and during 50 ns for archaeological purposes. In order to avoid noise 2, up to 4 signals were attached. During the research value

5 was used as the value of the dielectric permittivity of the subsurface. The mentioned value corresponds to the speed of electromagnetic waves 0.15 m/ns (dry sand; Davis & Annan 1989) and was used to convert the time scale into depth scale. The measuring took place in 44 profiles with a different length. In the course of the work the location of the apparatus was measured with the help of the GPS-system attached to the radar, the distances were duplicated with the help of a measuring wheel. The processing of the cross-sections was conducted with the software-packet 'Prism-2', filtrating and amplifying signals in order to achieve a better visual effect.

In the general geological structure the results of the radar enable to distinguish three different environments in the cross-sections on the basis of the pattern (Fig. 3). In the case of the topmost subsurface environment we are dealing with dune sands which contain numerous hyperbolic reflections caused by objects near the surface (e.g. stones, metallic garbage etc. brought there by people). Partly stronger and partly weaker reflections intertwined with each other under the dune sands that are characteristic of sands with marine origin. Considering the absolute altitude, these may be the beach formations of the Litorina Sea (Suuroja *et al.* 2002). The lowermost stronger reflection can be associated with the groundwater level. Electromagnetic waves perish very quickly within groundwater.

The rampart located in the northern side of the hill fort, which has been archaeologically repeatedly studied (Spreckelsen 1924/1925; Johanson & Veldi 2006; Lõhmus & Oras 2008), was accurately documented with the ground-penetrating radar as an up to 2 m thick environment poor in reflections

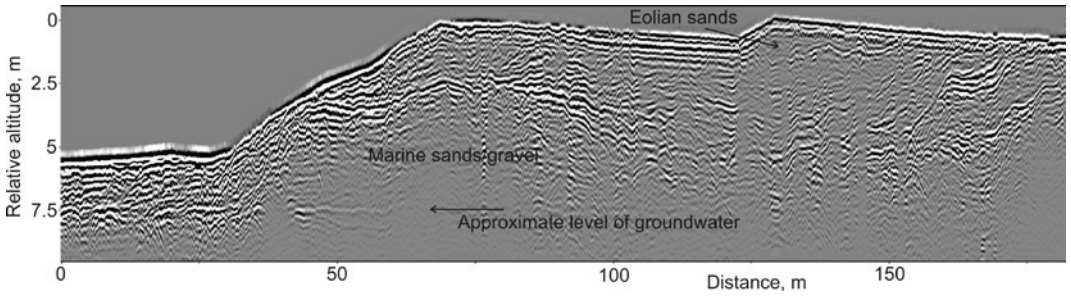


Fig. 3. Radargram across the Jägala Jõesuu hill fort. The geological feature is composed of marine sands and gravel mostly; and is covered by eolian sands. The topographic correction is approximate, based on the levelling of the reflection from groundwater. Vertical scale is exaggerated.

Jn 3. Radargramm üle Jägala Jõesuu linnamäe. Linnamägi koosneb peamiselt merelise päritoluga liivadest ja kruusadest, mis on kaetud eoolsete liivadega. Radargrammil kujutatud reljeef on ligikaudne, kuna parandi aluseks on võetud peegeldus pinnaseveetasemelt. Vertikaalne skaala on ülekõrgendusega.

Drawing / Joonis: Jüri Plado

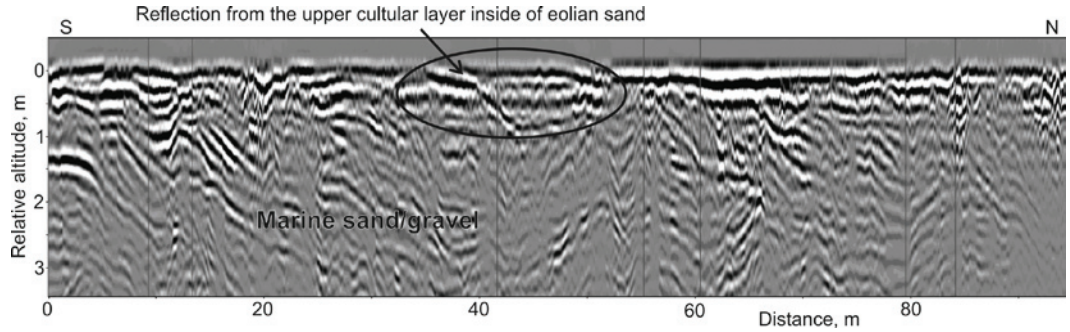


Fig. 4. Radargram on top of the Jägala Jõesuu hill fort. The referred reflection corresponds to the upper cultural layer inside the eolian sand. No topographic correction is applied; vertical scale is exaggerated.

Jn 4. Radargramm Jägala Jõesuu linnamäelt. Viidatud peegeldus tähistab eoolsete liivade sees paiknevat ülemist kultuurkihti. Reljeefiparandit pole kasutatud; vertikaalne skaala on ülekõrgendusega.

Drawing / Joonis: Jüri Plado

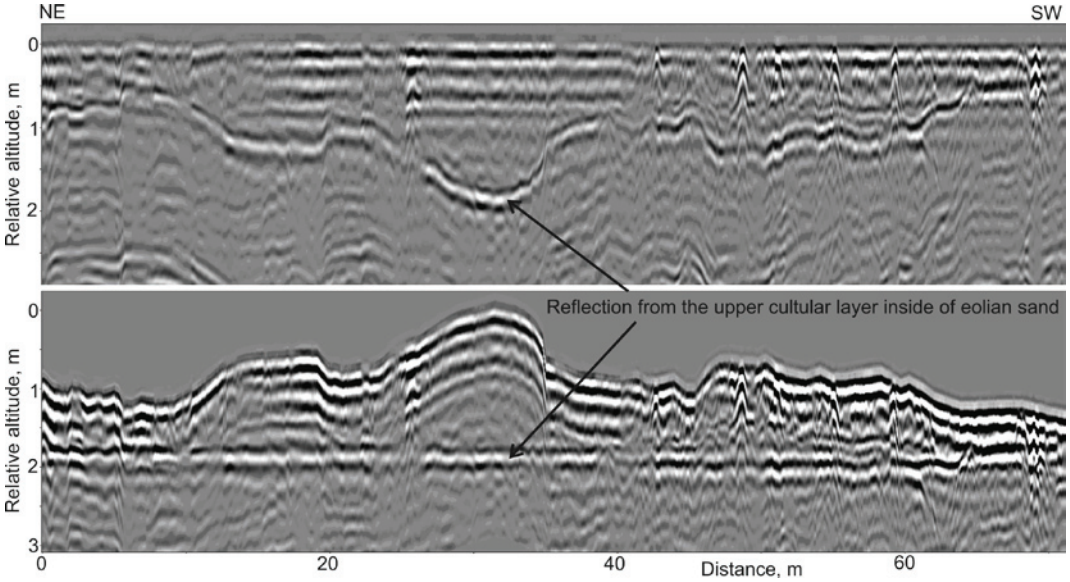


Fig. 5. The upper radargram across the Jägala Jõesuu hill fort along the area covered by sand dunes shows a strong reflection associating with the upper cultural layer. The lower figure illustrates the thickness of the cover sand, assuming that the cultural layer is horizontal.

Jn 5. Ülemine Jägala Jõesuu linnamäe luidetega kaetu alal koostatud radargramm koos tugeva ülemise kultuurkihiga seostuva peegeldusega. Alumine joonis illustreerib kultuurkihti katva liiva paksust eeldades, et kultuurkiht paikneb piki profiili horisontaalselt.

Drawing / Joonis: Jüri Plado

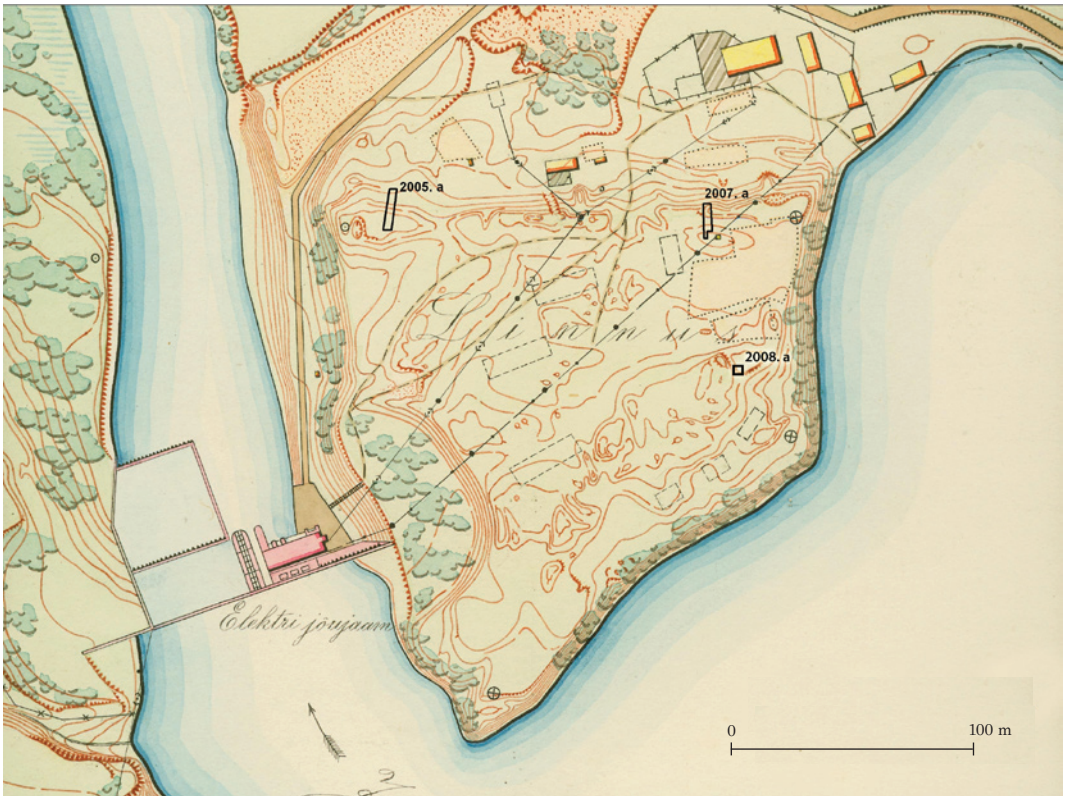


Fig. 6. Excavation plots founded by the research groups of the University of Tartu in 2005, 2007 and 2008 on the plan of the Jägala Jõesuu hill fort composed in the 1930s.

Jn 6. Tartu Ülikooli töörühmade poolt 2005, 2007 ja 2008 rajatud kaevandid 1930. aastatel koostatud Jägala Jõesuu linnuse plaanil.

on top of the marine material. In the centre of this material, in its upper part, hyperbolic reflections originating from stone pieces were discerned that formed the defence structure. The rampart is missing in the eastern and southern slope of the ridge.

On the northern foot of the hill fort a small declivity of ground can be observed compared to the surrounding area, which might be a low moat. However, research with the ground-penetrating radar did not reveal any reflection that would enable such interpretation.

In the yard of the hill fort the ground-penetrating radar demonstrated the existence of reflections inside the dune sands (Fig. 4). In order to indentify the cause of the reflections a 4 × 4 m test pit was created to the boundary of the sand mounds located in the eastern part of the hill fort (Fig. 6). Visual inspection of the sand in the excavation pit confirmed that the sand in the yard was really natural dunes. In the place of the excavation the thickness of the fine light and in places horizontally layered dune sand with grey organic-rich lines originating from temporary overgrowing extended up to 1.5 m. A single quartz flake was obtained from the dune sand.

The 10–15 cm thick cultural layer (upper cultural layer) composed of greyish black sand containing organics was located directly under the dune sand, inclining northwards. In addition to scarce finds, human activity in the layer was referred to by a single piece of limestone, some charcoal particles and burnt stone rubble.

Directly under the upper cultural layer the remains of a field were detected. The field remains were distinguished by 20 darker plough-marks consisting of charcoal particles (Fig. 7), 11 of which were north–south or north-east–south-west directed and 9 east–west or north-west–south-east directed. The plough-marks with U- or V-shaped cross-sections were 0.3–3.5 m long, up to 14 cm wide and up to 8 cm deep. The reflection of electromagnetic waves originating from the upper cultural layer and/or the field remains can be followed inside the eolian sands on an extensive area of 2500 m² (Fig. 5).

Another cultural layer that could not be identified in the radargrams (undistinguishable from the upper cultural layer), was exposed under the plough-marks. Namely in the north-western part of the excavation first a darker charcoal-rich stratum containing finds was exposed. Then, an approximately 3 m long and up to 85 cm wide coaly line was discerned in the stratum. Considering its shape and the interpretation of analogous coaly lines it might have derived from the burning of horizontally placed logs. The lower cultural layer was located in a soil depression that can be followed in the upper cultural layer (Fig. 8). It is possible that the layer may include remains of a dwelling house with sunken floor. The hypothesis needs to be tested in the course of further investigations.

The find material[1] of the part of the hill fort comparatively small in number. Altogether only 95 finds were gathered from the upper cultural layer, including 51 pottery sherds, 28 pieces of burnt clay (at least a part of these are clay daub stuck between the logs of a building), 10 burnt bone fragments, 5 quartz finds and 1 fossil. The majority of the pottery sherds derive from vessels moulded from clay mixed with rock debris, a part of the sherds have plant remains or plant remains with rock debris or sand added to the moulding mass. The plant remains used in the clay mixture have burnt out and their presence can only be followed by hollows in the places of fracture and traces on the surfaces of the sherds. The N-type contact surfaces used to connect the clay coils can be seen on three sherds. A more completely preserved edge fragment of the rim is as thick as the wall and slightly slanting outside. The wall thickness of the vessels is 4–9 mm. The sherds with both preserved surfaces suggest that the majority of the vessels have been smoothed on both inner and outer surface, but there have been vessels with smoothed outer and striated inner surfaces as well as containers with smoothed inner and striated outer surfaces. Ornamentation – shallow pits – was present only on a single sherd. Among the quartz finds 4 flakes of an unclear flaking technique and a single blade fragment should be mentioned.

[1] TÜ 1444.

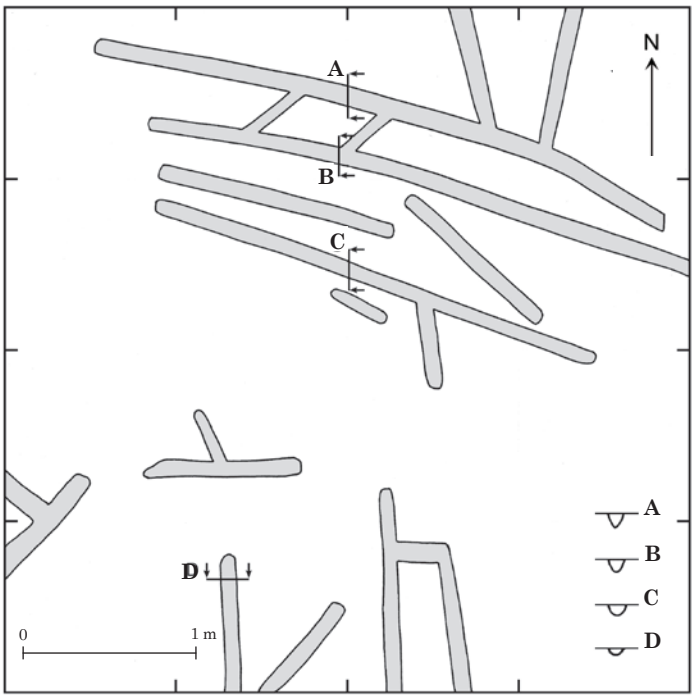


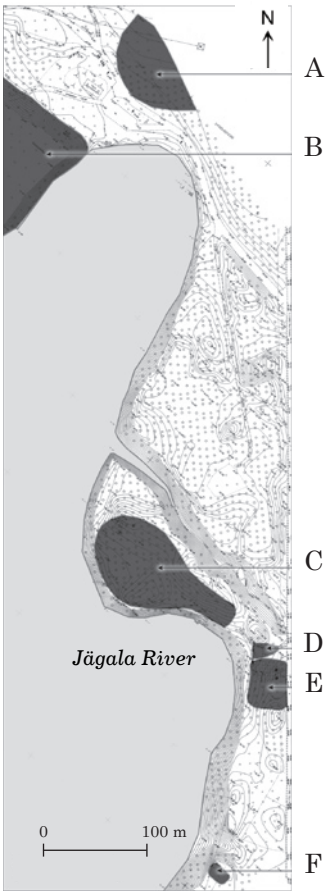
Fig. 7. Plough-marks exposed at the Jägala Jõesuu hill fort.
Jn 7. Jägala Jõesuu linnusel avatud künnijäljed.
Drawing / Joonis: Kristel Külljastinen

Fig. 8. A part of the lower cultural layer in the western and northern wall of the excavation plot.
Jn 8. Alumine kultuurkiht kaevandi lääne- ja põhjaseinas.
Photo / Foto: Kristel Külljastinen

Altogether 440 finds were obtained from the lower cultural layer, including 431 pottery sherds (at least 421 of these being the sherds from a one and the same vessel), 6 burnt bone fragments, 2 pieces of burnt clay and 1 quartz flake. The vessels have been preserved from clay mixed with plant

Fig. 9. Sites discovered or studied in 2008 in the surroundngs of the Jägala Jõesuu hill fort.
A – Jägala Jõesuu Linnamäe settlement site
B – Jägala Jõesuu hillfort and Jägala Jõesuu I settlement site
C – Jägala Jõesuu II settlement site
D – Jägala Jõesuu III settlement site
E – Jägala Jõesuu IV settlement site
F – Jägala Joa III settlement site.

Jn 9. 2008. aastal avastatud või uuritud muistised Jägala Jõesuu linnuse läheduses.
A – Jägala Jõesuu Linnamäe asulakoht
B – Jägala Jõesuu linnamägi ja Jägala Jõesuu I asulakoht
C – Jägala Jõesuu II asulakoht
D – Jägala Jõesuu III asulakoht
E – Jägala Jõesuu IV asulakoht
F – Jägala Joa III asulakoht.
Drawing / Joonis: Nuki Geo OÜ, Aivar Kriiska and Kristel Külljastinen



remains or rock debris and moulded from clay coils with N-type contact surfaces. The majority of sherds derive from vessels with smoothed surfaces, only a single sherd has striations on its inner surface. The wall thickness of the sherds ranges from 5 to 7 mm, the only edge fragment of the rim is 8 mm thick. The edge fragment originates from a vessel moulded from clay mixed with rock debris and has a rim turned outwards in a slightly convex manner.

The radiocarbon analyses obtained from charcoal and burnt animal bones from the upper cultural layer of the hill fort yard yielded 280±100 cal. BC and 160±60 AD with the probability of 95.4 % (Table 1: 2–3). The radiocarbon date from the charcoal from the lower cultural layer resulted in 550±250 cal. BC with the probability of 95.4 % (Table 1: 1). According to the dates the upper cultural layer correlates with the first fortification of the hill fort rampart, detected on the northern side of the plateau and erected of logs and at least partly of limestones directly onto the natural soil. The first fortification remains have been dated to the time between 285±115 cal. BC up to 180±180 cal. BC with the probability of 95.4 % in the part of the hill fort excavated in 2007 (Lõhmus & Oras 2008, 36) and 125±85 cal. BC up to 70±60 AD in the section excavated in 2005 (Johanson & Veldi 2006, 34; Tõnisson *et al.* 2008, 191). During the Pre-Roman Iron Age Jägala Jõesuu hill fort had the largest area (altogether 2.8 ha) in the whole northern Europe.

The find material and radiocarbon dates obtained until now allow us to distinguish three settlement stages on the plateau of the Jägala Jõesuu hill fort: (1) Neolithic (according to the finds the Typical and Late Comb Ware Culture, the combined date 4200–1900 cal. BC), (2) Pre-Roman and Roman Iron Age and (3) Middle Iron Age (the date of the period 450–800 AD)

(Lõhmus & Oras 2008, 29). New excavations gave evidence of human activities on the hill fort at the end of the Bronze Age and the beginning of the Iron Age, the field remains were radiocarbon dated between the 6th and the 3rd century cal. BC. Both probably pre-date the period when a rampart was erected to the northern side of the ridge. Similarly to the two earlier fieldwork seasons of the research group of the University of Tartu, the cultural layer from the Middle Iron Age could not be detected from the hill fort. The discerning of this stage is continuously based on only a single stray find and a radiocarbon date from the test-pit dug into the hill fort yard (Johanson & Veldi 2006, 30 and the literature cited there). Together with the plough-marks discovered under the cultural layer of Ilumäe II and IV settlement sites, that are younger than the Late Neolithic and older than the 4th – 6th century AD (Lang 2000, 178–179), the plough-marks from Jägala are the oldest of their kind in Estonia.

RESULTS OF THE LANDSCAPE SURVEY

Jägala Jõesuu II settlement site

The site was discovered by Gurly Vedru in 2004. Finds were gathered from loose sand from a forest path located on the track of the Jägala River bank (Vedru 2004) (Fig. 9: C). During the survey of 2008 test-pits were dug on a wider area and finds were gathered from loose sand surface. The cultural layer containing finds[2] covered an area of approximately 160 × 75 m. Narva-type pottery was gathered from two test-pits about 6 m from each other from the higher north-western part of the settlement site. Altogether 9 pottery sherds were collected. These derive from big 6–7 mm thick vessels moulded from clay mixed with plant remains (7 sherds) or plant remains and rock debris (2 sherds). One fragment of the rim has a thinning edge as is common for the Narva-type pottery. The vessels have been moulded from narrow (0.9–1.6 cm) coils with U-type contact surfaces. The surfaces have been striated and smoothed. A charred layer was detected on the inner surfaces of two sherds. Two other quartz flakes, a bipolar quartz blade, a stone flake and burnt pieces of clay and bone were found from the same test-pits. A dark charcoal-rich sand layer was discerned from the most find-rich test-pit that was located 50 m from the steep edge of the river bank approximately 15 cm from the modern ground level. A maximum 15 cm thick cultural layer rested on coarse-grained light brown (marine?) sand.

Only some stone finds and bone pieces were gathered elsewhere, from loose sand and test-pits. The majority of the find material constituted of quartz, including two flakes of pink variety. Two blades and 18 flakes have polished cortex that refers to the use of pebbles. Altogether 122 quartz finds were collected outside the area with pottery, 109 (i.e. 89 %) of these were flakes. The flaking technique could be identified in 55 cases, from these 53

[2] TÜ 1704.

were bipolar and only 2 processed with platform technique. 9 quartz blades and one blade fragment were found. These were 1.3 up to 3.4 cm long, all struck in the bipolar flaking technique. Altogether 3 quartz cores were collected, all bipolar, measuring 2.2 × 1.2 × 1.1 cm up to 2.7 × 0.9 × 1.0 cm.

The share of flint in the find material is extremely small (only 6.9 % of flint and quartz finds). The flint is local Palaeozoic grey or beige low-quality rock. Among nine flint finds 6 were flakes and 2 bipolar 1.1 cm and 1.4 cm long blades. From the artefacts of secondary processing only a single fragment of flint scraper on a flake with steep convex blade was obtained. 3 stone flakes were gathered as well, 2 of these were aphanitic limestone and 1 porphyry. Altogether 70 bone fragments were collected, all burnt.

The described find material, dominated by quartz, with the supremacy of flakes and bipolar flaking technique, the small share of artefacts with secondary processing etc., is relatively typical of the collections of Estonian Late Mesolithic coastal and island collections during the periods both predating pottery (7000–5500 cal. BC) as well as with pottery (5500–4200 cal. BC) (see Kriiska 2003). A radiocarbon date obtained from a burnt animal bone found from loose sand resulted in 6510±90 cal. BC (Table 1: 4) with the probability of 95.4 %. This indicates at the multilayeredness of the habitation. Considering the earliest dates of the Narva-type ceramics and the pottery types spread in the neighbouring countries that commonly are not older than 5500 cal. BC (e.g. Loze 1988, 101; Piezonka 2008, 69), two habitation periods with the time span of at least 1000 years can be distinguished at the Jägala Jõesuu II settlement site. This does naturally not presume a permanent and long-term occupation of the site during the periods.

A somewhat different date is referred to by the shore-displacement chronology of Timo Jussila and Aivar Kriiska (2004). According to their chronology the transgressive shoreline of the Litorina Sea in the neighbourhood of Jägala Jõesuu is approximately 20 m a.s.l. by now. In case of the water level being 1 m lower, the part of the settlement site with the finds of Narva Culture located 19–20 m a.s.l., can be dated to about 4200 cal. BC as a settlement site is directly situated on the beach. The offered date definitely remains within the limits of the dates obtained from the sites of the Narva Culture for the time being (Lang & Kriiska 2001). However, the part of the settlement site without pottery, but dated to the Mesolithic, is problematic, since the lower boundary of its cultural layer is about 18 m a.s.l. Prognosing the water level being 1 m below the lower boundary of the cultural layer, the most possible age for beach life is approximately 3800 cal. BC. This contradiction of dates needs further explanation both by additional radiocarbon dates as well as geological studies, since, although find material seems to exclude such a late date of the site, there are other Neolithic settlement sites in Estonia where pottery sherds were not found during test excavations or survey trips (Jussila & Kriiska 2004, 4). At the same time it is also possible that the settlement site

predating the transgression maximum of the Litorina Sea was buried under marine sands during the transgression but was later re-opened for some reason. The removing of sand might for example be connected with active sand drifting in the area.

Jägala Jõesuu III settlement site

Jägala Jõesuu III settlement site is located 45 m south-east from the II settlement site (Fig. 9: D). It is a small area with a relatively weak cultural layer, comprising of an approximately 15 × 15 m big area in the vicinity of the Ruu–Neeme road. Loose sand and test-pits yielded 13 quartz flakes,[3] a single local grey/beige flint flake, one quartzite flake and 10 burnt pieces of animal bones. The flaking technique could be identified only in case of two quartz flakes, one of these was produced in the bipolar, the other in the platform technique. According to the find material the site may allegedly be dated to the Late Mesolithic, however, a contradiction occurs with the shore-displacement chronology of Jussila and Kriiska (2004), which suggests that if the site was situated on the beach, it should derive from approximately 3800 cal. BC or be buried under the sands of the Litorina Sea. An exceptional find is an Iron Age pottery sherd mixed with rock debris which can apparently be associated with human activity of the time of existence of the Jägala Jõesuu III settlement site in the neighbourhood.

Jägala Jõesuu IV settlement site

Jägala Jõesuu IV settlement site is situated directly south of the III settlement site (Fig. 9: E). It comprises an area of about 50 m long and 40 m wide. The cultural layer, which in places was distinguished as an up to 25 cm thick grey or black sand stratum containing charcoal, rock debris and limestone pieces, rests on dune sands and has been buried under more than 0.5 m thick dunes (Fig. 10). Altogether 11 pottery sherds,[4] at least from three vessels, were gathered from test-pits. The majority of sherds originate from pots that have been moulded from clay mixed with rock debris. The preserved surfaces imply that vessels have been smoothed on both outer and inner surfaces. One sherd evidently derives from the edge of the rim of a carinated bowl with a smoothed surface. This vessel has also been produced of clay mixed with rock debris. One animal bone was radiocarbon dated. Its age – 1800±160 cal. AD (Table 1: 5) with the probability of 95.4% – suggests that the cultural layer of the site has at least partly been disturbed in the historic period. For the time being ceramics enables to date the site very generally to the Iron Age, on the basis of the lack of striations in surface finish supposedly still into younger period than the Early Iron Age.

[3] TÜ 1705.
[4] TÜ 1706.

Fig. 10. Cultural layer buried under the dune sand at the Jägala Jõesuu IV settlement site by the Ruu–Neeme road.
Jn 10. Luiteliiva alla mattunud kultuurkiht Jägala Jõesuu IV asulakohal Ruu-Neeme maantee peenras.
Photo / Foto: Aivar Kriiska

Jägala Joa III settlement site

The settlement site is situated approximately 150 m SSW from the Jägala Jõesuu IV settlement site (Fig. 9: F). The cultural layer, which covers only an area of 20 × 13 m, was exposed very feebly by colour, but the stratum containing finds was in places more than half a meter thick. Test-pits yielded 8 pottery sherds and one quartz flake.[5] Seven pottery sherds originated from up to 1.3 cm thick vessels which have been moulded from clay mixed with rock debris. The surfaces of the vessels have been smoothed, polished in one case. Ceramics enables us to date the site very generally to the Iron Age; the lack of striations in surface finish suggests that the site might still be younger than the Early Iron Age. A single fragment of glazed redware refers to human activity in the place during the historic period as well.

[5] TÜ 1713.

Acknowledgements: the research was financed by the European Union via the European Regional Development Fund (Centre of Excellence in Cultural Theory), Estonian Science Foundation research grant 7375 "Coast and Inland. Dual settlement picture in the Eastern Baltic during the Stone and the Bronze Age", MTÜ Jägala Linnamäe, the National Heritage Board and OÜ Arheograator. The authors are grateful to Kristel Külljastinen, Priit Pihelpuu, Markku Oinonen, Gurly Vedru, Kristiina Johanson and all the members of the Jägala expedition.

References

Bronk Ramsey, C. 2005. OxCal (computer programm). Version 3.10. The Manual (available at http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm).

Davis, J. L. & Annan, A.P. 1989. Ground-penetrating radar for high-resolution mapping of soil and rock stratigraphy. – Geophysical Prospecting, 37, 531–551.

Johanson, K. & Veldi, M. 2006. Archaeological excavations at Jägala hillfort. – AVE, 2005, 29–40.

Jussila, T. & Kriiska, A. 2004. Shore displacement chronology of the Estonian Stone Age. – EAA, 8: 1, 3–32.

Kriiska, A. 2003. Colonisation of the west Estonian archipelago. – Mesolithic on the Move. Papers presented at the Sixth International Conference on the Mesolithic in Europe, Stockholm 2000. Ed. by L. Larsson. Oxford, 20–28.

Lang, V. 2000. Keskusest ääremaaks. Viljelusmajandusliku asustuse kujunemine ja areng Vihasoo-Palmse piirkonnas Virumaal. – *Muinasaja teadus, 7.* Tallinn.

Lang, V. & Kriiska, A. 2001. Eesti esiajaloo periodiseering ja kronoloogia. – EAA, 5: 2, 83–109.

Lõhmus, M. & Oras, E. 2008. Archaeological research at Jägala Jõesuu hillfort and its closest surroundings. – AVE, 2007, 27–39.

Piezonka, H. 2008. Neue AMS Daten zur frühneolithischen Keramikentwicklung. – EAA, 12: 2, 67–113.

Reimer, P. J., Baillie, M. G. L., Bard, E., Bayliss, A., Beck, J. W. *et al.* 2004. IntCal04 terrestrial radiocarbon age calibration, 0-26 cal kyr BP. – Radiocarbon, 46: 3, 1029–1058.

Spreckelsen, A. 1924/1925. Der Burgberg in Jaggowal, Ksp. Jeglecht, Estland. – Beiträge zur Kunde Estlands, X. Reval, 16–32.

Suuroja, K., All, T., Kõiv, M., Mardim, T., Morgen, E., Ploom, K. & Vahtra, T. 2002. Eesti geoloogiline baaskaart (mõõtkavas 1: 50 000). 6343 Maardu. Seletuskiri. – Eesti Geoloogiakeskus, Tallinn.

Tõnisson, E., Lõhmus, M. & Oras, E. 2008. Jägala Jõesuu linnamägi. – E. Tõnisson. Eesti muinaslinnused. Ed. by A. Mäesalu & H. Valk. *Muinasaja teadus, 20.* Tartu-Tallinn, 189–191.

Vedru, G. 2004. 2004. aastal Jägala ja Valgejõe vahel teostatud maastikuinspektsioonil avastatud uued muistised. *(Manuscript in AI.)*

Loze, I. 1988 = Лозе И. А. 1988. Поселения каменного века Лубанской низины. Мезолит, ранний и средний неолит. Рига.

AIVAR KRIISKA, MARILIN RAPPU, KRISTI TASUJA,
JÜRI PLADO ja JANEK ŠAFRANOVSKI

ARHEOLOOGILISED UURIMISTÖÖD JÄGALAS

2008. aasta juulis ja augustis tegi Tartu Ülikooli uurimisrühm Harjumaal Jägala Jõesuu linnusel ja selle jalamil paikneval asulakohal väljakaevamisi ja uuringuid georadariga ning ühtlasi inspekteeriti ümbruskonda.

Jägala Jõesuu linnusest u 80 m põhjas (jn 1; 9) paiknevat Jägala Jõesuu Linnamäe asulakohta uuriti nelja proovikaevandiga. Kohati mattunud kultuurkiht on säilinud paiguti väga hästi, kuid hilisema inimtegevuse tagajärjel ka osaliselt lõhutud. Esiajaloolise asustusega seondub 2 kvartsi- (jn 2: 7), tulekivi- ja 319 keraamikakildu. Savinõukillud pärinevad kivipurruga segatud savist linttehnikas valmistatud kaussidest (jn 2: 3) ja pottidest. Anumate hulgas on nii siledapinnalisi kui ka väljapoolt riibitud potte (jn 2: 1–2, 4–6), sh viimaseid üle kolme korra rohkem kui mõlemalt pinnalt silutud kilde. Kausid on reeglina mõlemalt pinnalt silutud. Riibitud keraamika järgi saab asulakoha dateerida vanemasse rauaaega (500 eKr – 450 pKr), kuid üks silutud pinnaga kausi servatükk võib pärineda ka keskmisest rauaajast (450–850 pKr).

Jägala Jõesuu linnusel oli uurimiskeskmes hooviala. Georadariga koguti teavet (1) linnuse põhjapoolse valli kohta ning kontrolliti valli olemasolu idaküljel, (2) põhjajalamil oletatava vallikraavi ning (3) õueala kultuurkihi kohta.

Geoloogilise ja arheoloogilise eesmärgiga uuringutel kasutati Radar Systems Inc. georadarit sagedusel 500 MHz. Mõõtmine toimus 44 erineva pikkusega profiilil. Linnamäe geoloogilises ülesehituses võimaldavad radariuuringu tulemused eristada kolme erinevat keskkonda: (1) pindmised luiteliivad, (2) nende all merelise päritoluga liivad, (3) nende all tugevam peegeldus, millest allpool elektromagnetlained hääbuvad kiiresti ja mis on seostatav põhjaveetasemega (vt jn 3).

Linnuse põhjakülje vall fikseerus selgelt merelise materjali peal paikneva kuni 2 m paksuse peegeldusvaese keskkonnana, mille keskosa pealmistes kihtides ilmnesid kaitserajatisele osutavad kivide hüperboolsed peegeldused. Seljaku ida- ja lõunanõlval niisugused peegeldused puuduvad. Linnuse põhjajalamil on silmaga jälgitav väike pinnaselangus, mida võib tõlgendada madala vallikraavina. Radaruuringud ei toonud siiski esile ühtegi peegeldust, mis kinnitaks niisugust tõlgendust.

Linnuse hoovil fikseeriti georadariga luiteliivadesiseste peegelduste olemasolu (jn 4). Peegelduste põhjustaja selgitamiseks rajati 4 × 4 m kaevand linnuse idaosas paiknevate liivakuhjatiste piirile (jn 6). Kaevandis avatud liiva visuaalne analüüs kinnitas, et hoovil paiknevad liivakuhjatised on kuni 1,5 m paksused luited. Vahetult luiteliiva all oli põhjasuunas kaldjas orgaanikat sisaldav 10–15 cm paksune hallikasmust liivane kultuurkiht (ülemine kultuurkiht), kus lisaks leidudele osutasid inimtegevusele ka üks lubjakivitükk, söetükid ja kivipurd.

Ülemise kultuurkihi all paljandus kakskümmend 0,3–3,5 m pikkust ja kuni 14 cm laiust söetükikesi sisaldavat U- või V-kujulise ristlõikega ja kuni 8 cm sügavust künnijälge (jn 7). Ülemisest kultuurkihist ja/või põllujäänusest pärinev elektromagnetlainete peegeldus on eoolsete liivade siseselt jälgitav u 2500 m² suurusel alal (jn 5).

Künnitriipude all oli säilinud veel üks kultuurkiht, mis radaripildis pole identifitseeritav. Nimelt paljandus kaevandi loodeosas leide sisaldav süsine kiht, milles eristus u 3 m pikkune ja kuni 85 cm laiune söeviirg, mis võib pärineda rõhtpalkide põlengust. Alumine kultuurkiht on paiknenud süvendis, mis oli jälgitav ka ülemises kultuurkihis (jn 8). Võimalik, et tegemist on süvendatud põhjaga elamu jäänusega.

Ülemisest kultuurkihist saadi kokku 95 leidu (51 savinõukildu, 28 põlenud savi tükki, 10 põlenud luufragmenti, 5 kvartsleidu ja kivistis), alumisest 440 leidu (431 savinõukildu, millest 421 on ühest anumast, 6 põlenud luufragmenti, 2 põlenud savitükki ja kvartsikild). Enamik savinõukilde pärinevad kivipurruga, osa ka taimse massi ning taimse massi ja kivipurru või liivaga segatud savist valmistatud nõudest, mis on vormitud N-tüüpi ühenduspinnaga lintidest. Nõude seinapaksus on 4–9 mm. Mõlema säilinud pinnaga kildude alusel võib arvata, et enamik nõusid oli nii sise- kui ka välispinnalt silutud, kuid on olnud ka välispinnalt silutud ja sisepinnalt riibitud ning sisepinnalt silutud ja välispinnalt riibitud anumaid. Ühel killul esines lohkornament. Kvartsileidudest on 4 ebaselge lõhestustehnikaga killud ja 1 laastu katke.

Linnusehoovi ülemisest kultuurkihist leitud söest ja põlenud loomaluust tehtud radiosüsiniku dateeringud andsid vanuse 280±100 kal. eKr ja 160±60 pKr (Tabel 1: 2–3) ning alumisest kultuurkihist kogutud söest tehtud analüüs 550±250 kal. eKr (Tabel 1: 1). Ülemine kultuurkiht korreleerub dateeringute alusel linnuse valli esimese, platoo põhjaserval loodusliku pinnal paikneva palkidest ja vähemalt osaliselt lubjakividest koosnevate kindlustustega.

Kui varasema leiuainese ja radiosüsiniku dateeringute järgi on Jägala Jõesuu linnuseplatool eraldatud neoliitilist, eelrooma- ja roomarauaaegset ning keskmise rauaaja asustusetappi, siis uued uuringud lisasid sellele veel valli rajamisele eelnenud

pronksiaja lõpu ja rauaaja alguse asustusjärgu ning põllumaa.

Inspektsiooni eesmärk oli leida uusi muistiseid ning selgitada välja Jägala Jõesuu II kiviaja asulakoha mõõtmed. Peamiselt uuriti Jägala jõe paremkallast, liikudes linnamäest nii põhja kui lõuna suunas. Tehti pinnakorjet ja intensiivset seiret kaevates 10–20 m vahega prooviauke Jägala jõe ja Ruu–Neeme maantee vahelisele alale.

2004. aastal avastas Gurly Vedru u 160 × 75 m suurusel alal paikneva Jägala Jõesuu II asulakoha (Jn 9: C). Asulakoha loodepoolsesse kõrgemasse ossa kaevati kaks prooviauku, millest leiti 9 Narva tüüpi keraamika kildu, mis pärinevad taimse massi või taimse massi ja kivipurruga segatud savist valmistatud suurtest 6–7 mm paksustest nõudest. Anumate pinnatöötluses esineb nii riibet kui ka silumist. Samast leiti veel kaks kvartsikildu, kvartslaast, kivikild ning põlenud savi- ja luutükke. Jõe järsust kaldaservast 50 m kaugusele kaevatud leiurikkamas prooviaugus eristus u 15 cm sügavusel tänapäevasest maapinnast süsine liivakiht.

Lahtiselt liivapinnalt ja teistest prooviaukudest koguti kivileide ja luutükke. Enamuse leiuainesest moodustab kvarts. Kokku saadi keraamikaga alast väljapoolt 122 kvartsleidu, sh 109 bipolaarselt lõhestatud kildu. Kvartsleidude seas oli veel 10 bipolaarset laastu või nende katket ja 3 nukleust. Tulekivi osakaal leiuaineses on vaid 6,9% ja tegemist on eranditult kohaliku Paleosoikumi-aegse halli või beeži värvi madala kvaliteediga kivimiga, neist 6 killud ning 2 bipolaarsed laastud. Teisese töötlusega esemetest saadi killust valmistatud kumera järsu teraga väike tulekivikõõvitsa katke. Kivikilde leiti 3, neist 2 peitkristallilisest lubjakivist ja 1 porfüürist. Luutükke on 70 ja need kõik on põlenud. Ühest lahtiselt liivapinnalt leitud luust tehtud radiosüsiniku dateering andis vanuseks 6510±90 kal. eKr (Tabel 1: 4).

Narva tüüpi keraamika ja radiosüsiniku dateeringute järgi võib Jägala Jõesuu II asulakohal eristada vähemalt 1000 aastase vahega kahte asustusperioodi. Mõnevõrra teistsugusele dateeringule osutab rannasiirdekronoloogia, mille alusel jääb Litoriinamere transgressiivne rannajoon praeguse Jägala Jõesuu kandis u 20 m ü.m.p. Narva kultuuri leidudega asulaosa, mis paiknes kõrgusel 19–20 m ü.m.p., oleks 1 m madalama veetaseme juures pidanud paiknema vahetult mererannas ja sellisena oleks selle dateering u 4200 kal. eKr, mis jääb Narva kultuuri muististest praeguseks saadud dateeringute piiridesse. Probleemne on aga mesoliitilise dateeringuga ja ilma keraamikata asulaosa, mille kultuurkihi alumine piir on u 18 m ü.m.p. Juhul, kui veetase oleks olnud kultuurkihi alumisest piirist 1 m madalamal, oleks rannaelupaigaks kõige sobivam vanus u 3800 kal. eKr. See dateeringute vastuolu vajab edasist selgitamist nii uute radiosüsiniku analüüside kui ka geoloogiliste uuringute kaudu. Kuigi leiuaines näib välistavat muistise nii noore vanuse, on Eestist teada teisigi neoliitilisi asulakohti, kust proovikaevamiste ja inspektsioonide käigus pole savinõukilde leitud. Samas on võimalik ka olukord, kus Litoriinamere transgressiooni maksimumi eelne asulakoht mattus küll transgressiooni ajal mereliivade alla, kuid avanes mingil põhjusel hiljem uuesti. Liiva ärakanne võis olla seotud nt aktiivse luitetekkega.

Jägala Jõesuu III asulakoht paikneb II asulakohast 45 meetrit kagus (jn 9: D). Tegemist on väikese ja väheintensiivse kultuurkihiga u 15 × 15 m suurusel alal. Lahtiselt liivapinnalt ja prooviaukudest koguti 13 kvartsikildu, üks hallikasbeeži värvi kohalik tulekivikild, üks kvartsiidikild ja 10 põlenud loomaluutükki. Leiuainese järgi võib muistise dateerida oletamisi hilismesoliitikumi, kuid siingi on vastuolu rannasiirdekronoloogiaga.

Jägala Jõesuu IV asulakoht paikneb III asulakohast vahetult lõuna pool (jn 9: E) ja hõlmab u 50 × 40 m suuruse ala. Kultuurkiht eristub kuni 25 cm paksuse sütt, kivipurdu ja lubjakivitükke sisaldava halli või musta värvi liivaladestusena, mis paikneb luiteliivade peal ning on paiguti mattunud u 0,5 m paksuste luidete alla (jn 8). Prooviaukudest saadi 11 savinõukildu, mis on vähemalt kolme nõu tükid. Enamik kilde pärineb pottidest, mis on valmistatud kivipurruga segatud savist. Säilinud pindade järgi on need olnud silutud nii välis- kui siseküljelt. Üks kild pärineb tõenäoliselt silutud pinnaga nivendilise kausi servast. Ühest loomaluust tehtud radiosüsiniku dateering osutab, et asulakoha kultuurkihti on ajaloolisel ajal vähemalt kohati segatud (Tabel 1: 5). Keraamika võimaldab muistise dateerida väga üldiselt rauaaega, nõude pinnatöötluses riibete puudumise järgi oletamisi vanemast rauaajast nooremaks.

Jägala Joa III asulakoht jääb Jägala Jõesuu IV asulakohast u 150 m lõunaedelasse (jn 9: F). Kultuurkiht katab 20 × 13 m suuruse ala ja eristub nõrgalt tumedama värvuse poolest, kuid leidudega kihi paksus küündib kohati üle 0,5 m. Prooviaukudest koguti 8 savinõukildu ja üks kvartsikild, sh 7 savinõukildu pärinevad kuni 1,3 cm paksustest silutud (ühel juhul ka lihvitud) pinnaga nõudest, mis on valmistatud kivipurruga segatud savist. Keraamika võimaldab muistise esialgu dateerida väga üldiselt rauaaega; nõude pinnatöötluses riibete puudumise järgi oletamisi vanemast rauaajast nooremaks. Üks punase glasuurkeraamika kild osutab ka ajaloolisel ajal toimunud inimtegevusele.