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Archaeological survey in the northern and north-western parts of Lake Peipsi

Maili Roio

Muinsuskaitseamet (National Heritage Board), Pikk 2, 10123 Tallinn, Estonia; maili.roio@muinas.ee

Andri Baburin

Aivar Kriiska

Tartu Ülikool, ajaloo ja arheoloogia instituut, arheoloogia osakond, laboratoorse arheoloogia õppetool (University of Tartu, Institute of History and Archaeology, Department of Archaeology, Chair of Laboratory Archaeology), Jakobi 2, 51014 Tartu, Estonia

INTRODUCTION

The Stone and Bronze Age in the area of Lake Peipsi have been studied relatively poorly. More extensive excavations have been carried out only at the mouth of the Emajõgi River, at the settlement sites of Akali and Kullamäe, and those works were also conducted already more than half a century ago (Jaanits 1959). After that, only the shores of Lake Pskov have been systematically surveyed, and in the course of those surveys, a few Stone and Bronze Age artefacts were found (Aun & Kiristaja 1998). Knowledge about the northern and north-western shores of Lake Peipsi was limited only to stray finds (Indreko 1964, fig. 1). The first of those finds reached the collections of museums already in the end of the 19th century and the latest finds in 2010 (Kriiska 2012).

In addition to the stray finds from the Stone Age, the geological development of the lake makes the search for earlier settlements by Lake Peipsi more promising, as the size of Lake Peipsi has changed a lot since the end of the last glacial period. Therefore, Lake Peipsi is today one of the main water bodies in Estonia where it is possible to find submerged prehistoric settlements dating back to the Stone Age.

Since 2012, archaeological survey has been conducted in the northern and north-western parts of Lake Peipsi by Maili Roio and Andri Baburin. During the survey, Stone and probable Bronze Age bone artefacts, refuse of bone working industry, as well as unworked animal bones, fish and bird bones, some human bones, and sherds of Narva Ware, Comb Ware, Corded Ware and Early Textile Ware, and also some pottery fragments from the Iron Age and from the Medieval and the Modern Period were found. By today, the remains of sites belonging to the Stone Age (and in at least one case also to the Early Bronze Age) have been identified in 13 locations, 11 of which are located near the mouths of rivers, below the average water level. Some of the new sites, like Rannapungerja, Avijõgi and Omedu, are directly linked with the dredging operations conducted in Lake Peipsi near the mouths of rivers in 2015. The rest of the sites were revealed due to low water level, erosion, or as the result of former dredging operations.

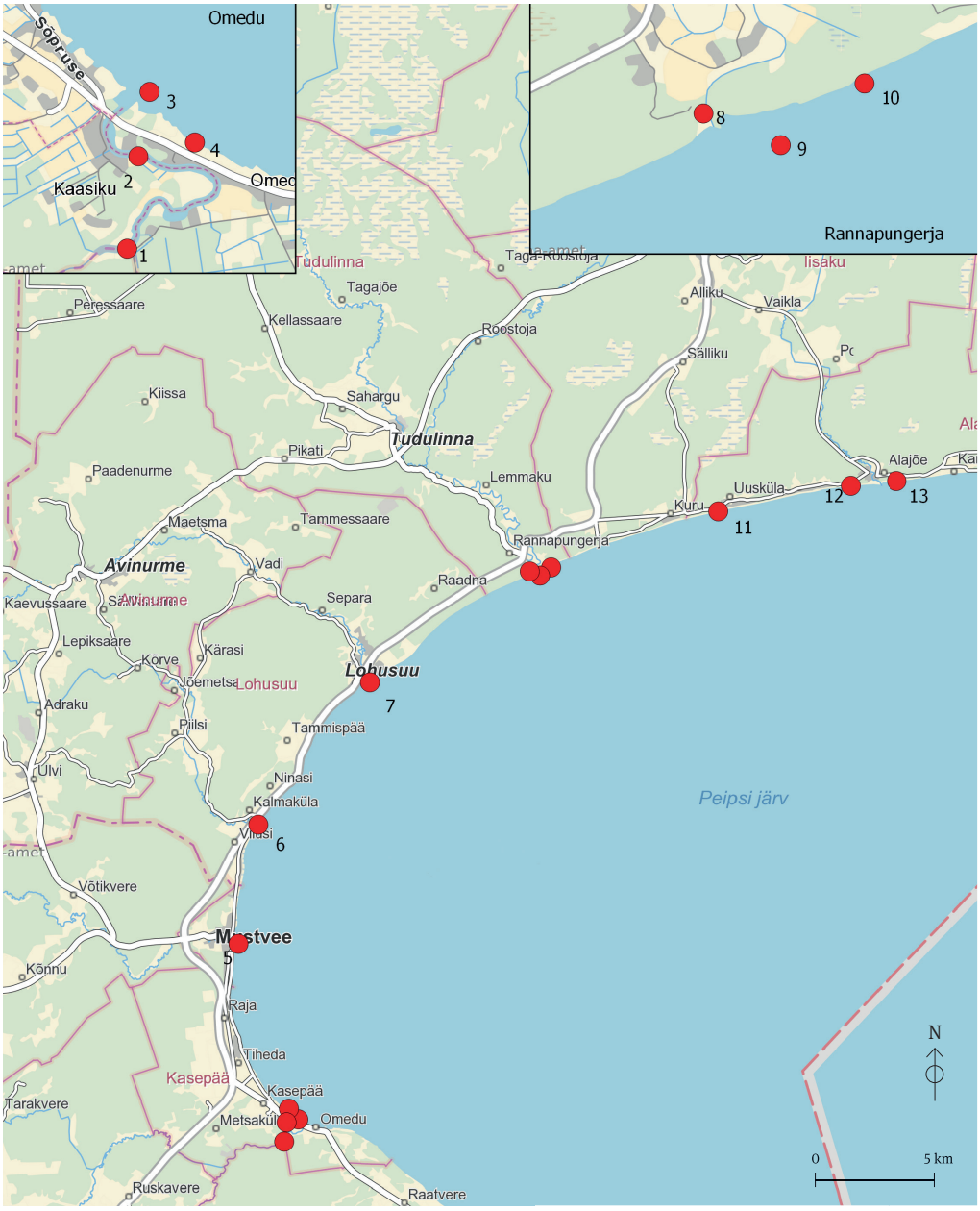

Fig. 1. *The location of sites. 1 – Omedu Metsavahi, 2 – Omedu Jõekääru, 3 – Omedu jõesuu, 4 – Omedu paadisadam, 5 – Mustvee sadam, 6 – Piilsi jõesuu, 7 – Avijõe suue, 8 – Rannapungerja I, 9 – Rannapungerja II, 10 – Rannapungerja III, 11 – Uusküla, 12 – Alajõe I, 13 – Alajõe II.*

Jn 1. *Leiukohtade kaart. 1 – Omedu Metsavahi, 2 – Omedu Jõekääru, 3 – Omedu jõesuu, 4 – Omedu paadisadam, 5 – Mustvee sadam, 6 – Piilsi jõesuu, 7 – Avijõe suue, 8 – Rannapungerja I, 9 – Rannapungerja II, 10 – Rannapungerja III, 11 – Uusküla, 12 – Alajõe I, 13 – Alajõe II.*

Map / Kaart: Estonian Land Board / Maa-amet, Maili Roio

SITES AND FIND MATERIAL

Omedu Metsavahi (Fig. 1: 1)

The first known Stone Age artefact was found from the riverbank of the Omedu River, presently the land unit Metsavahi. In 1897, Villem Paju found a bone arrowhead from the right bank of the river, in a hole used for soaking flax, at the depth of about 1.5 metres. The hole was located in front of a barn between the farm and the river (Indreko 1948, 105).

During the survey conducted in 2014, two small sherds of Comb Ware were found from the eroded right bank of the river, from the land unit Halliku Metskond 97 (AI 7582). Therefore, it may be assumed that somewhere in that area there has been a Neolithic settlement site, and it is possible that the arrowhead found in the end of the 19th century is related to that site.

Omedu Jõekäärd (Fig. 1: 2)

The site is located on the left bank of the Omedu River, on the land unit Jõekäärd. The finds were revealed in spring 2015 in the course of earthwork carried out on the land unit Jõekäärd, when the riverbank area was dredged and the soil that was removed was used as filling material for a waterlogged area next to the dredging site. The remains of the settlement site may also reach to the neighbouring properties and are most likely located at a depth of a few metres from the current ground level. Sherds of Narva Ware, Comb Ware with organic and mineral admixture, Corded Ware and Early Textile Ware (Fig. 2: 5) were found in the removed soil, as well as a blank of a stone adze, a bone harpoon point (Fig. 3: 2), and flakes from Silurian flint (AI 7516).

Omedu jõesuu (Fig. 1: 3)

The site is located at the mouth of the Omedu River in Lake Peipsi, approximately 30 metres from the shore. In the course of dredging operations, the soil has been removed from a strip of land approximately

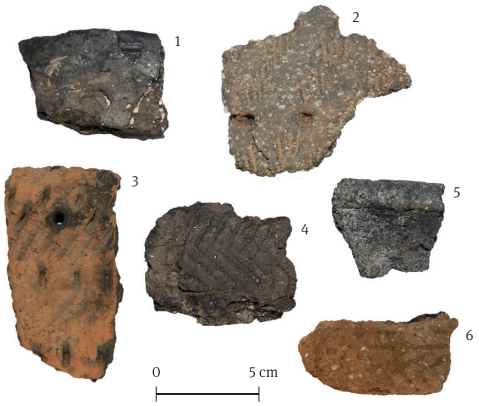

Fig. 2. *Pottery fragments from the area of Lake Peipsi. 1 – Narva Ware from Rannapungerja II, 2 – Comb Ware with mineral admixture from Omedu jõesuu, 3, 4, 6 – Comb Ware with organic admixture from Rannapungerja II, 5 – Early Textile Ware from Omedu Jõekäärd.*

Jn 2. *Keraamikat Peipsi piirkonnast. 1 – Narva tüüpi keraamika kild Rannapungerja II asulakohast, 2 – mineraalse lisandiga kammkeraamika kild Omedu jõesuu asulakohast, 3, 4, 6 – orgaanilise lisandiga kammkeraamika Rannapungerja II asulakohast, 5 – varane tekstiilkeraamika Omedu Jõekääru asulakohast.*

Photos / Fotod: Maili Roio, Kristel Roog

Fig. 3. *Bone finds from the area of Lake Peipsi. 1 – beveledged bone point from Omedu paadisadam, 2 – bone harpoon from Omedu Jõekäärd, 3, 4 – bone arrowheads from Rannapungerja II, 5 – bone fishing hook from Omedu paadisadam, 6 – bone fishing hook from Rannapungerja II.*

Jn 3. *Luuleide Peipsi piirkonnast. 1 – viltuse nurkteraga luuteravik Omedu paadisadama asulakohast, 2 – luust harpuuniots Omedu Jõekääru asulakohast, 3, 4 – luust nooleotsad Rannapungerja II asulakohast, 5 – luust õngekonks Omedu paadisadama asulakohast, 6 – luust õngekonks Rannapungerja II asulakohast.*

Photos / Fotod: Maili Roio, Kristel Roog

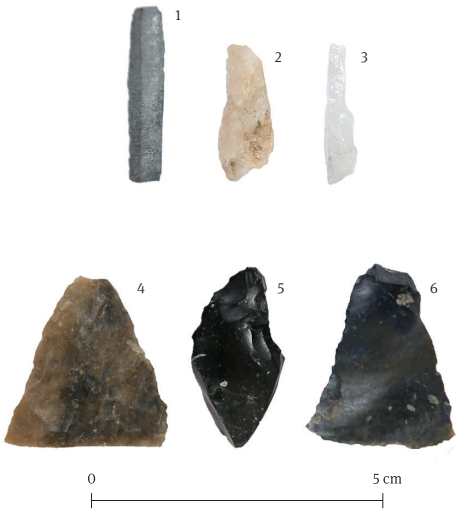

Fig. 4. *Flint and quartz finds from the area of Lake Peipsi. 1 – flint insert from Rannapungerja II, 2 – quartz blade from Omedu jõesuu, 3 – quartz blade from Omedu paadisadam, 4 – fragment of flint arrowhead from Omedu paadisadam, 5, 6 – flint scrapers from Omedu paadisadam.*

Jn 4. *Tulekivi- ja kvartsileide Peipsi piirkonnast. 1 – tulekivist pistiktera Rannapungerja II asulakohast, 2 – kvartslaast Omedu jõesuu asulakohast, 3 – kvartslaast Omedu paadisadama asulakohast, 4 – tulekivist nooleotsa katke Omedu paadisadama asulakohast, 5, 6 – tulekivist kõõvitsad Omedu paadisadama asulakohast.*

Photos / Fotod: Maili Roio, Kristel Roog

100 metres in length, down to the depth of 2 metres. Between 2014–2015, sherds of Narva Ware, Comb Ware with mineral (Fig. 2: 2) and organic admixture, potsherds from the Medieval Period and Early Modern Period, Carboniferous flint flakes, a quartz blade (Fig. 4: 2), a quartz flake, a wild boar's tusk point (Fig. 5: 1), clay net sinkers, and animal bones among which there is most likely refuse of bone working industry, were found from the removed soil (AI 7517).

Omedu paadisadam (Fig. 1: 4)

As a result of construction and dredging operations at Omedu boat harbour, sherds of Narva Ware and Comb Ware with mineral and organic admixture, bone bevel-edged points (Fig. 3: 1), a bone awl, a bone point, a bone fishing hook (Fig. 3: 5), tooth pendants (Fig. 5: 2–4), Carboniferous and Silurian flint flakes, a fragment of a flint arrowhead (Fig. 4: 4) and scrapers (Fig. 4: 5, 6), quartz flakes and blades (Fig. 4: 3), as well as a fragment of a human skull were found from the removed soil in 2015 (AI 7518).

Earthworks were carried out also on the neighbouring properties – Omedu puhkerand and Mihkli parkla.[1] Finds were collected from all the mentioned properties, as well as from the edges of the boat canal.

Mustvee sadam (Fig. 1: 5)

The construction work of Mustvee harbour took place in 2013 and 2014. The first sherd of Comb Ware was found in the swimming area behind the pier on the left bank of the Mustvee River by hobby detectorist Ivan Mersalov in 2014. In 2015, additional sherds of pottery from the Medieval Period and Early Modern Period, net sinkers, and animal bones among which there are most likely refuse of Stone Age bone working industry, were found at both banks of the river mouth (AI 7591).

Due to the extensive construction works at the harbour, it is no longer possible to determine a more precise location of the settlement site. Most of the artefacts have been found in the area between the bridge and the lake, both from the riverbanks and from the shore area of the lake, in the immediate proximity of the river.

[1] The soil that was used for filling was removed from the boat canal, from Kase property by the Omedu River and allegedly from the former Kirov collective fishery. The origin of the additional soil still needs to be verified, however, there were no archaeological finds observed in the course of preliminary survey at Jõe property, where some of the soil removed from Kase property had been transported.

Piilsi jõesuu (Fig. 1: 6)
The site is located at the mouth of the Piilsi River in Kalmaküla. A harbour has been built on the left bank of the river. The first sherds of pottery were found in autumn 2014. Although there were dredging operations carried out at the mouth of the Piilsi River in autumn 2015, there was no significant amount of finds revealed.

The riverbed at the mouth area was changed during the Soviet time, and the former riverbed is located approximately 50–200 metres from the current right bank of the river. The find spot of pottery sherds with low mineral admixture from the Medieval Period and Early Modern Period, and bones of domestic animals[2] (AI 7592), is located in the area between the former and the current riverbed.

Fig. 5. *Finds from the area of Lake Peipsi. 1 – Wild boar's point from Omedu jõesuu, 2–4 – tooth pendants from Omedu paadisadam.*
Jn 5. *Leide Peipsi piirkonnast. 1 – metssea kihvast teravik Omedu jõesuu asulakohast, 2–4 – hammasripatsid Omedu paadisadama asulakohast.*
Photos / Fotod: Maili Roio, Kristel Roog

Avijõe suue (Fig. 1: 7)
The site is located on both banks of the mouth of the Avijõe River. Soil removed from the lake was placed under the harbour on the left bank of the river in 2015. Sherds of Comb Ware with mineral admixture, Iron Age pottery, sherds of pottery from the Medieval and Early Modern periods, and clay net sinkers (AI 7593), were located approximately 40–100 metres from the shore of Lake Peipsi, in water depth of down to 0.5 metres.

A long pier that reaches the lake has been built on the right bank of the river. Individual sherds of Comb Ware with mineral and organic admixture, Iron Age pottery, sherds of pottery from the Medieval Period and Early Modern Period, and animal bones among which there are most likely refuse of bone working industry, and a bone of a wild horse were found.[3]

Rannapungerja I (Fig. 1: 8)
Since 2012, sherds of Narva Ware, Comb Ware with mineral and organic admixture, sherds of Iron Age pottery, and worked animal bones, have been collected from the right bank of the Rannapungerja River, under the lighthouse, from a strip of land approximately 120 metres in length. Additionally, there is also one bone bevel-edged point among the finds (AI 7520).

Rannapungerja II (Fig. 1: 9)
In autumn 2015, dredging operations were conducted near the mouth of the Rannapungerja River of Lake Peipsi, over a strip of land approximately 200 metres in length, and to the depth of 2 metres. The site is located approximately 20 metres from the shore; the water depth

[2] Identified by Lembi Lõugas (TLÜ AT).
[3] Identified by Lembi Lõugas (TLÜ AT).

varies between 0.5–2 metres. A very rich find material was collected from the removed soil: sherds of Narva Ware (Fig. 2: 1), Comb Ware (Fig. 2: 3, 4, 6), Corded Ware, sherds of pottery from the Iron Age and the Medieval Period, bone arrowheads (Fig. 3: 3, 4) and a fishing hook (Fig. 3: 6), a fragment of adze and ice pick of bone, a blank of a stone adze, flint scrapers and insert (Fig. 4: 1), and animal and human bones (AI 7519).

Rannapungerja III (Fig. 1: 10)
In 2015, sherds of Narva Ware, Comb Ware with mineral and organic admixture, a bone awl, and animal bones among which there are most likely refuse of bone working industry that were revealed as a result of erosion (AI 7594), were collected approximately 500 metres north-east from Rannapungerja II, on the shore of Lake Peipsi. The artefacts were found 20–40 metres from the lake shore, where the average water depth is *ca*. 20–50 cm.

Uusküla (Fig. 1: 11)
There are several find spots stretching over an area of nearly one kilometre that are located approximately 100–200 metres from each other. The find spots were discovered from eroded soil in 2015 due to low water level. In the otherwise sandy soil of the lake shore there are clearly visible stretches of shingle, where pottery from the Iron Age, the Medieval Period and Early Modern Period, and worked animal bones are found (AI 7595). The oldest artefacts are a bone bevel-edged point, and two small sherds of Corded Ware.

Alajõe I (Fig. 1: 12)
In 2015, due to low water level, sherds of Comb Ware with mineral admixture, sherds of pottery from the Medieval Period and Early Modern Period, and animal bones were collected from eroded soil on a strip of land 200 metres in length (AI 7596), located west from the mouth of the Alajõe River, approximately 10–15 metres from the shore of Lake Peipsi. The find area is located at the average depth of 10–40 cm.

Alajõe II (Fig. 1: 13)
In 2015, due to low water level, sherds of pottery from the Stone Age, Iron Age, Medieval Period and Early Modern Period, and animal bones (AI 7597), were collected from eroded soil on a 500-metre strip of land where shingle is clearly visible, located east from the mouth of the Alajõe River, approximately 25–30 metres from the shore of Lake Peipsi. Stone Age pottery fragments, however, are too small for more exact determination.

DISCUSSION

The find material collected during the survey is heterogeneous, and small in number, but nonetheless enables to make some preliminary conclusions regarding the age of the sites and their original location. The first finds from many of the current sites, like the mouths of the Omedu River, the Piilsi River and the Avijõe River turned out to be unworked animal bones. As a result of systematic survey, also the bone debitage and other artefacts supplemented the initial finds. In addition to the Stone Age settlements, there are traces of human activity on the shores of Lake Peipsi also from later periods.

Most probably in the majority of cases, the finds are situated on their original location or have been slightly spread around by water. This is confirmed by the fact that the artefacts are very well preserved, do not bear significant marks of being water-worn, and a layer

of carbonized organic remains has preserved on the surfaces of many pottery sherds. The sites where artefacts have been collected immediately after large-scale dredging operations, like Omedu Jõekääru, Omedu jõesuu, Omedu paadisadam and Rannapungerja II, are more clearly distinguishable. The find material from several settlement sites and from Omedu paadisadam, and the human bones found at Rannapungerja II, indicate the possibility that there might by some Stone Age burials preserved.

The age of the settlement sites is currently possible to date only by taking into consideration the dating limits of the pottery types. On the basis of the pottery types (Narva Ware, Comb Ware, Corded Ware and Early Textile Ware), Omedu Jõekääru has been used as a settlement for the longest period. Considering the time spans when Narva Ware[4] and Early Textile Ware[5] were used as the dating limits, the site could be initially dated to approximately 5200–1100 cal. BC. The sherds of three types of Stone Age pottery (Narva Ware, Comb Ware and Corded Ware) have been found at Rannapungerja II, which indicate the pottery was made sometime between 5200–1800 cal. BC. The settlement sites of Omedu paadisadam, Omedu jõesuu, Rannapungerja I and Rannapungerja III share the same typo-chronologic age, even though the sherds of only two types of pottery (Narva Ware and Comb Ware) have been found there. As for the settlement site of Alajõe II, for the time being it is not possible to provide a more precise typology of the pottery. Sherds of Comb Ware have been found at Omedu Metsavahi, Mustvee sadam, at Piilsi jõesuu, the Avijõe suue, and Alajõe I settlement site. On the basis of the finds, the sites can be initially dated to a span of approximately 3900–1800 cal. BC.[6] Only Corded Ware has been found at the settlement site Uusküla, which give the dating limit of approx. 2800–2000 cal. BC,[7] but the bevel-edged point[8] shows that the area has probably been inhabited already during the Narva Ware period.

In 2014, the National Heritage Board commissioned three radiocarbon datings of the found bone material, in order to specify the age of settlement traces with, at the time, still poor find material. One sample was taken from a long bone of a large mammal found at the mouth of the Omedu River, and the result was the time span of 2862–2493 cal. BC (with 95.4% probability).[9] From the two samples taken from the long bones of large mammals from site Rannapungerja I, one gave the result of 4360–4248 cal. BC[10] (with 95.4% probability), and the other 2571–2208 cal. BC.[11]

In terms of long-term settlement during different times, the settlement sites located at the mouths of the northern and north-western parts of Lake Peipsi, are similar to the settlement sites of Akali and Kullamäe at the lower reaches of the Emajõgi River on the west coast of Lake Peipsi (Jaanits *et al.* 1982, 60).

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[4] The oldest and youngest reliable datings from Narva Ware originate from the area between the Narva River and the Luga River (see Kriiska *et al.* 2016, 107, 109) – beginning *ca.* 5200 cal. BC and end *ca.* 3900 cal. BC.

[5] The Early Textile Ware was most probably made in the end of the Stone Age and in the beginning of the Bronze Age (Jaanits *et al.* 1982, 117–118). So far, the attempts to date this type of pottery have not been successful. The AMS datings made of carbonized organic remains on potsherds found at the mouth of the Emajõgi River, give the average time span of 2700–2000 cal. BC (Kriiska *et al.* 2005, table 1). However, $\delta^{13}C$ from the charred organic remains indicates the possibility of a reservoir effect. Therefore, until now the limit with a very high possibility of error is the end of the Early Bronze Age, i.e. *ca.* 1100 cal. BC.

[6] The oldest reliable dating of Comb Ware in Estonia originates from the settlement site Sindi-Lodja III, and it was dated to 3900 BC (data is unpublished). The youngest originates most probably from the settlement site Kunda Lammasmäe, and is dated to 1800 BC (Sander & Kriiska 2015, table 1).

[7] Reliable radiocarbon datings that mark the limits of Corded Ware originate from the area between the Narva River and the Luga River and give the time span between 2800–2000 cal. BC (Kriiska *et al.* 2016, 107, 109).

[8] The long bone points with *ca.* 45° angle have been rightly considered as one of the common items of Narva period (Jaanits 1970, 82).

[9] Poz-70253, 4085±35BP. This and the following datings are calibrated with OxCal v4.2.4 (Bronk Ramsey 2009; 2013); using IntCal13 atmospheric curve (Reimer *et al.* 2013).

[10] Poz-70252, 5460±35 BP.

[11] Poz-70470, 3920±60 BP.

Each site requires a thorough analysis and radiocarbon dating in order to identify the time spans of the use of the settlements, a localised paleogeographic reconstruction, and to be connected to the geological development history of Lake Peipsi.

Today it is clear that water level in Lake Peipsi was considerably lower in the end of the Pleistocene and beginning of the Holocene than it is nowadays. The water level began transgression from the second half of the 9th millennium cal. BC (Moora *et al.* 2005, 28; Punning *et al.* 2008, 103), and the rise of the water level in most parts of Lake Peipsi has continued ever since. Unlike the southern parts of Lake Peipsi, where the rise of the water level has been documented relatively well (Moora *et al.* 2005, 17–18), it has been assumed that there has also been a regression of the water level since the end of the Atlantic biozone (approximately from the beginning of the 4th millennium BC), and that the regression could be even 5–6 metres (Hang & Miidel 1999, 53). The finds collected between 2012 and 2015 from the banks of rivers of the northern and north-western shores of Lake Peipsi, would rather exclude that assumption and indicate more to the rise of the water level also in that area.

ACKNOWLEDGMENTS

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ARHEOLOOGILINE LEIRE PEIPSI JÄRVE PÕHJA- JA LOODEOSAS

Maili Roio, Andri Baburin ja Aivar Kriiska

Alates 2012. aastast on Peipsi loode- ja põhjakaldal tehtud arheoloogilist leiret. Mitmel pool Peipsi järves ja jõgede kallastel leiti kivi- ja pronksiaegseid luuesemeid, luutööjääke, töötlemata looma-, kala- ja linnuluid, inimluid ning narva, kamm-, nöör- ja varase tekstiilkeraamika kilde ja mõnevõrra ka hilisemaid, raua-, kesk- ja uusaegseid, savinõukilde. Suurem osa esemelisest materjalist tuli päevavalgele 2015. aasta sügisel, mil mitmete jõgede suudmete lähedal toimusid järves süvendustööd. Praeguse seisuga on kogutud kivi- ja vähemalt ühel juhul ka varase pronksiaja leide 13 kohast, millest 11 paiknevad jõgede suudmete lähedal Peipsi järves allpool keskmist veetaset.

Kuigi leiuaines on suhteliselt väikesearvuline ja ebaühtlane, on selle alusel võimalik teha esialgseid järeldusi nii leiupaikade vanuse kui ka omaaegse paiknemise kohta. Küllalt suure tõenäosusega on vähemalt enamikel juhtudel tegemist asulakohtadega, mis paiknevad oma algses kohas või on vaid veidi vete poolt laiali kantud. Sellele osutab tõsiasi, et esemed on säilinud väga hästi ja on ilma oluliste vees lihvumise jälgedeta ning paljudel savinõukildudel on pindadel säilinud kõrbekihti. Mitme asulakoha leiuaines ja Omedu paadisadamast ja Rannapungerja II leitud inimluud viitavad võimalusele, et paiguti võib olla säilinud ka kiviaegseid matuseid.

Asulakohtade vanust on võimalik enamikel juhtudel määrata esialgu vaid keraamika tüüpide piirdateeringuid arvestades. Keraamika tüüpide järgi (narva-, kamm-, nöör- ja varane tekstiilkeraamika) on kõige pikema kasutusajaga Omedu Jõekääru. Arvestades võimalikeks piirdaatumiteks narva keraamika ja varase tekstiilkeraamika

kasutusaega, võib muistise esialgu dateerida vahemikku u 5200–1100 aastat eKr. Rannapungerja II on leitud kolme kiviaegse keraamikatüübi (narva- ja kamm- ja nöörkeraamika) kilde, mis annavad piirdaatumitega vahemikuks 5200–1800 eKr. Sama tüpokronoloogilise vanusega on ka Omedu paadisadama, Omedu jõesuu, Rannapungerja I ja Rannapungerja III asulakohad, olgugi, et sealt on leitud vaid kahte tüüpi (narva- ja kammkeraamika) savinõude kilde ning Alajõe II asulakoht, mille keraamikat ei ole esialgu võimalik täpsemalt tüpologiseerida. Kammkeraamika kilde on leitud Omedu Metsavahi, Mustvee sadama, Piilsi jõesuu, Avijõe suudme, Alajõe I asulakohalt ja nende alusel võib need muistised esialgu dateerida vahemikku u 3900–1800 aastat eKr. Uusküla asulakohalt on leitud seni vaid nöörkeraamikat, mis annab piirdaatumiks u 2800–2000 aastat eKr, kuid nurkteraga luust teravik osutab, et seal on elatud ilmselt juba narva keraamika etapil.

Omedu jõesuust on dateeritud üks ja Rannapungerja I asulakohalt kaks suurimetaja toruluud, mis andsid 95,4% tõenäosusega vanuseks vastavalt 2862–2493 aastat eKr, 4360–4248 aastat eKr ja 2571–2208 aastat eKr.

Peipsi järve veetase on holotseenis muutunud, senisest palju väiksem järv on laienenud ja veetaseme tõus on jätkunud tänini. Erinevalt Peipsi lõunapoolsetest osadest, kus veetaseme tõus on suhteliselt hästi dokumenteeritud, on põhjapoolses osas oletatud aga ka veetaseme langust alates u neljanda aastatuhande algusest eKr isegi 5–6 m võrra. Peipsi loode- ja põhjarannikult järvest ja jõgede kallastelt aastatel 2012 kuni 2015 kogutud leiud näivad seda seisukohta siiski välistavat ja osutavad pigem veetaseme tõusule ka selles piirkonnas.