Estonian Journal of Archaeology, 2015, **19**, 1, 3–28 doi: 10.3176/arch.2015.1.01

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RECONSIDERED LATE MESOLITHIC AND EARLY NEOLITHIC OF THE LITHUANIAN COAST: THE SMELTĖ AND PALANGA SITES

Middle and Late Neolithic (4200–2000 cal BC) of the Lithuanian coast are well known because of dozens of sites that have been investigated and are still being investigated in the environs of the Šventoji settlement as well as on the Curonian Spit. On the contrary, very few Late Mesolithic (7000–5300 cal BC) and Early Neolithic (5300–4200 cal BC) sites have been discovered so far. The aim of this publication is to present archaeological finds and radiocarbon dates from the little-known Late Mesolithic and Early Neolithic Lithuanian coastal sites – Smeltė (Klaipėda city) and Palanga (Palanga city). Both were discovered during constructional and drainage works during the 3rd quarter of the 20th century. Right then and also some time after the discovery both sites were severely or even totally destroyed by urbanization. Today, field research seems to be especially complicated there. Short excavation reports, museums' inventories, and artefacts themselves – almost exclusively bone and antler tools were the main sources for this study. Direct AMS ^{14}C dates together with the most recent information about the Baltic Sea coastlines enable us to overcome some shortcomings caused by poor field documentation and to put the Palanga and Smeltė sites into the most probable chronological, palaeogeographic and cultural contexts of the southern and eastern Baltic Sea area. Some scientific problems related to sites in question, e.g. the topography of coastal sites, the beginning of pottery and amber production in the southern and eastern Baltic Sea area have also been discussed from several viewpoints.

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Introduction

Middle and Late Neolithic (4200–2000 cal BC) of the Lithuanian coast are well known because of dozens of sites that have been investigated and are still being investigated in the environs of the Šventoji settlement as well as on the

Curonian Spit. On the contrary, very few Late Mesolithic (7000–5300 cal BC) and Early Neolithic (5300–4200 cal BC) sites have been discovered so far and even those few sometimes have been mistakenly been attributed to other periods because of lack of radiocarbon dates. The most famous Lithuanian Stone Age archaeologist Rimutė Rimantienė in her monograph devoted to the Šventoji Neolithic sites wrote that Early Neolithic sites are drowned or buried deeply under marine sand because of post-glacial sinking of the land (Rimantienė 2005). Today we know that at least for Lithuania's northern coastline it was not an absolute truth.

The aim of this publication is to present archaeological finds and radiocarbon dates from little-known Late Mesolithic and Early Neolithic Lithuanian coastal sites – the Smeltė site (Klaipėda city) and the Palanga site (Palanga city) (Fig. 1). Both sites were discovered during constructional and drainage works during the 3rd quarter of the 20th century. Right then and also some time after the discovery both sites were severely or even totally destroyed by urbanization. Today, field research seems to be especially complicated at both sites. Short excavation reports, museums' inventories, and artefacts themselves – almost exclusively bone and antler tools were the main sources for this study. Direct AMS ^{14}C dates

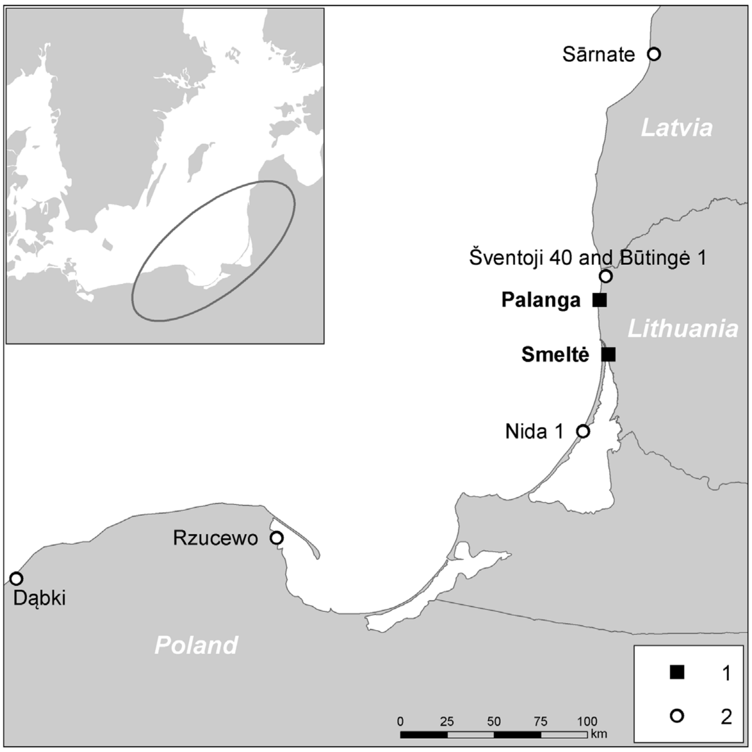


Fig. 1. Late Mesolithic/Neolithic sites on the SE coast of the Baltic Sea. 1 studied, 2 mentioned.

together with the recent information about the Baltic Sea coastlines enable us to overcome some shortcomings caused by poor field documentation and to put the Palanga and Smeltė sites into most probable chronological, palaeogeographic and cultural contexts of the southern and eastern Baltic Sea area.

All dates in this study were calibrated by using OxCal 4.2 software (Bronk Ramsey 2009) and IntCal13 atmospheric curve (Reimer et al. 2013). Dates were discussed with 68.2% probability when calibrated.

The Palanga site

The Palanga site is among the first Stone Age sites in Lithuania where scientific archaeological excavations took place. It was discovered in summer 1958 during canalizing the Rąžė River in Palanga city, coastal Lithuania. Workers found many animal bones as well as large pieces of unworked amber and reported the finds to the Lithuanian Institute of History. Preliminary revision of excavated material by professional archaeologists identified a bone arrowhead and several other worked bones. Then rescue excavations were launched on the presumably Mesolithic site. It took 12 days to excavate an area of 105 square metres. Excavations were complicated due to ground water because trenches were situated just within and beside the river bed. They were led by two young archaeologists – Ona Navickaitė-Kuncienė from the Lithuanian Institute of History and Marija Vaitkunskaitė-Banikonienė from the Kretinga local museum. Stone Age was not the main interest for either of the women. Today only a short report about the excavation exists in the Lithuanian Institute of History (Navickaitė 1958). It consists of a general description of the excavation, stratigraphy and artefacts, and also contains several photos of the artefacts and Kalju Paaver's report on the bones of the various species. Unfortunately, it seems that photography was not used during the fieldwork. Just a year after the excavation another Lithuanian archaeologist Pranas Kulikauskas made an attempt to interpret and evaluate the finds. Already then Kulikauskas drew attention to the scarcity of information available. However, at the same time he recognized the importance of bone and antler tools, attributing them solely on typological background to the Mesolithic and the Early Bronze Age (Kulikauskas 1959). Finds from the Palanga site were later described or referred to in many subsequent publications (e.g. Kulikauskas et al. 1961; Rimantienė 1974; 1984). The second attempt to understand the stratigraphy, chronology and palaeoenvironmental context of the Palanga site was made very recently (Girininkas 2011). However, the absence of radiocarbon dates and mistakes in the reconstruction of the site stratigraphy led the author to misleading conclusions about the site chronology. Finally, in 2013–2014 ten boreholes were made using a Ø 30 mm Eijkelkamp corer in order to get a better understanding of the site stratigraphy of the area in-between the Palanga site and the Baltic Sea. Three AMS ^{14}C dates have been obtained from the museum's bone and antler tools. Antler tools were revised technologically and typologically. The results of these newest investigations are presented in this study.

The Palanga site is situated right in the middle of the Palanga city on the left bank of the present watercourse of the Rąžė River (55° 55' 4.88" N, 21° 3' 45.71" E). This is a small river, 17.9 km in length, highly canalized. There is a lack of accurate data on the elevation of the site's surface. Today the bottom of the canalized Rąžė River is at about 0 m a.s.l. while the surface of the adjacent banks rises up to 3 m a.s.l. Prehistoric landscapes in the Palanga city are hidden by buildings and streets as well as by occasional thick layers of aeolian sand deposited already during historical periods (Fig. 2).

A brief description of stratigraphy (Navickaitė 1958) and a schematic drawing of a profile (Fig. 3) are the main sources for understanding the site formation process and the palaeoenvironment of the Palanga site. We know that most of the finds were found in a 0.2–0.25 m thick 'peat' layer, which was covered by ca 0.5 m thick technogenic soil containing modern rubbish. However, there are some doubts concerning the definition of the layer. The young researchers lacked experience in wetland sites and did not have a geological background (Navickaitė 1958). The author of the report complains about mud, which covered the bottom of the trenches every time water was pumped away. Another interesting detail is

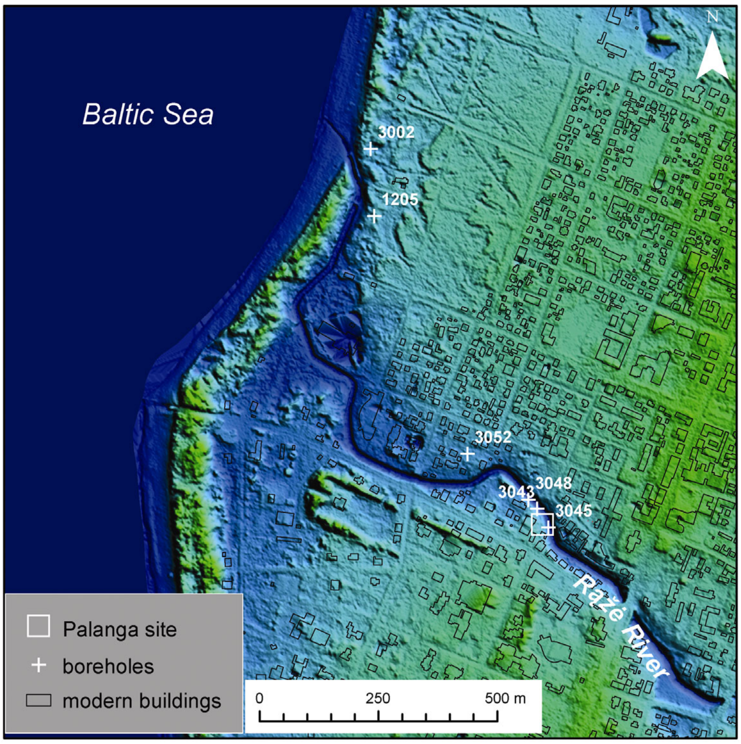


Fig. 2. Location of the Palanga site and the topography of surroundings interpolated from LIDAR data. Drawing by Gytis Piličiauskas.

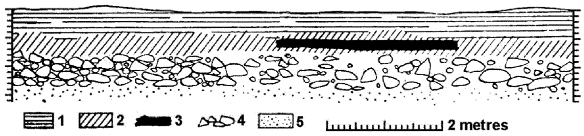


Fig. 3. Stratigraphy of the Palanga site according to P. Kulikauskas (1959). 1 technogenic layer, 2 peat (archaeological layer), 3 wood, 4 stones, 5 sand.

that tree leaves and branches were found within 'peat'. But this is very common for lagoonal or lake sediments, i.e. gyttja with plant detritus. Finally, all bones are in great condition. They do not demonstrate any signs of degradation or abrasion due to post-depositional transportation or damage. All this made us believe that finds were found within gyttja instead of peat at the Palanga site. Drilling in 2014 supported this idea. In-between alluvium gravel and clayish sand a layer of gyttja containing wood and charcoal has been documented for borehole No 3043 (Table 1; Fig. 4).

A layer of stone boulders and pebbles was found just below organic sediments at a depth of 0.6–0.7 m during excavations. This layer was of up to 0.7 m in thickness and stones were arranged into 3 floors one upon another (Fig. 3). A number of animal bones and antler pieces were found within the upper part of the stony layer. At first it was interpreted as a man-made structure – a cobbled pavement constructed at a dwelling area (Kulikauskas 1959). However, similar pavements are not known at any other Stone Age site. Moreover, the so-called 'pavement' was of an extra large size. An area of 30 × 3.5 metres was excavated and stones were discovered lying under peat everywhere. Very probably a layer with stone boulders was formed during natural processes. Glacial till was reached at a depth of 0 or 0.6 m a.s.l. during drilling at the Palanga site in 2014. Actually the top-surface of the glacial landscape was higher, but it has been removed during drainage and canalizing works. A so-called 'cobble pavement' could have been formed during the Littorina Sea transgression when sea water was able to erode glacial till at coastlines. A profound erosion of glacial till could be also caused by the Rąžė River before the transgression.

Table 1. Lithology of a borehole No. 3043 at the Palanga site

m a.s.l.	Thickness, m	Depth, m	Layer
1.87	1.1	0	Technogenic layer
0.77	0.3	1.1	Gravel
0.47	0.25	1.4	Gyttja dark gray sandy with plant detritus
0.22	0.15	1.65	Gyttja dark gray with plant detritus and charcoal (most likely an archaeological layer)
0.07	0.6	1.8	Sand medium clayish
–0.53	0.05	2.4	Gravel or boulders (top of glacial till)

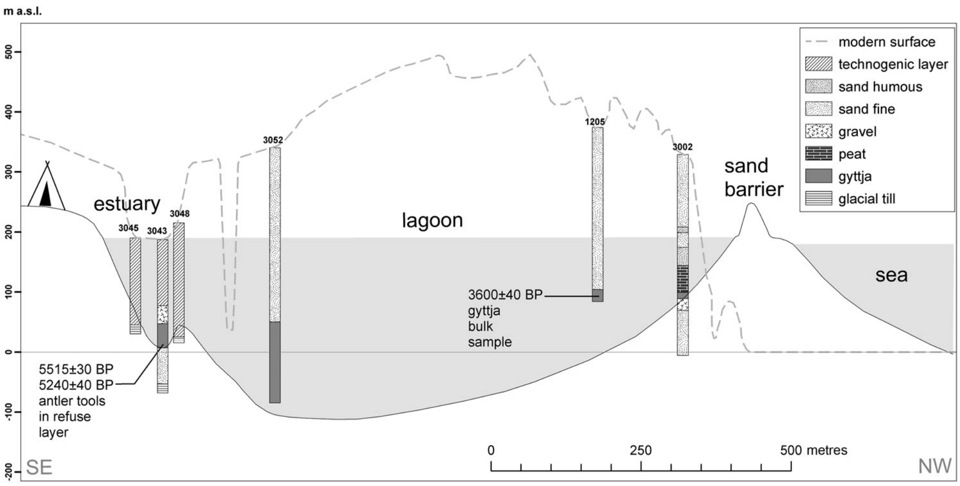


Fig. 4. Borehole stratigraphy and schematic reconstruction of Early Neolithic palaeolandscape west from the Palanga site. Data of borehole No. 1205 used from A. Bitinas (2004). Drawing by Gytis Piličiauskas.

Finally, the lowermost layer documented in 1958 at the Palanga site was labeled as 'sand' (Fig. 3). However, it was impossible to identify this layer in our boreholes made in 2014. Eroded stones might be deposited too sparse for a thin corer to hit them. Alternatively, the validity of documented stratigraphy in 1958 should be questioned. The excavation report does not mention glacial till (Navickaitė 1958). It seems very likely that boulders have been removed and the underlying layer was observed in very few or single spots during excavations, provided it has been really observed somewhere at all due to ground water rapidly flooding the trenches (Kulikauskas 1959).

When combining all available data it seems that the site might be situated just at the mouth the Rąžė River to the lagoon. Uncovered finds originate from a refuse layer deposited in the bottom of the lagoon while the dwelling zone might be very close to the refuse layer on glacial till at any bank of the Rąžė River estuary (Fig. 4). A dwelling zone must be completely or very severely damaged by the Palanga city during the 20th century.

Three AMS ^{14}C dates were obtained for the Palanga site in 2014, one for an elk bone fragment 85 ± 30 BP, the second for an antler axe 5515 ± 30 BP, and the third one for a T-axe 5240 ± 40 BP (Table 2). The first date was made on a bone fragment, which might have been taken from the technogenic layer underlying the cultural layer. The second and the third dates should be recognized as reliable. Dated axes were made of red deer antler and there is no room for any offsets due to aquatic reservoir effects. The dates indicate a span of 126–281 years with a 68.2 % probability within 4440–3980 cal BC. They point to Early Neolithic according the East European Stone Age periodization or ceramic

Table 2. AMS ^{14}C dates from Palanga, Smeltė and Šventoji 40 sites, coastal Lithuania

No.	Site	Lab. code	Date BP	Calibrated age (1σ)	Sample description
1	Palanga	Poz-61568	85 ± 30	1700–1920 AD	Fragment of elk tibia, Kretinga museum
2	Palanga	Poz-64684	5515 ± 30	4440–4330 BC	Red deer antler axe, No. A1 : 4, Kretinga museum (Fig. 7: 10)
3	Palanga	Poz-66588	5240 ± 40	4220–3980 BC	Red deer antler T-axe, No. A1 : 6, Kretinga museum (Fig. 7: 8)
4	Smeltė	Poz-61593	225 ± 30	1650–1940 AD	Cattle skull No. KKM 9144, History Museum of Lithuania Minor
5	Smeltė	Poz-61594	6920 ± 40	5840–5750 BC	Red deer antler axe No. KKM 9141, History Museum of Lithuania Minor (Fig. 11: 10)
6	Smeltė	Poz-66589	6130 ± 40	5210–5000 BC	Elk antler axe No. KKM 9150, History Museum of Lithuania Minor (Fig. 11: 9)
7	Šventoji 40	Poz-65434	7260 ± 50	6210–6070 BC	Charcoal from a pit No. 11, test pit No. 135, 2013 year's research by G. Piličiauskas

Mesolithic in Western understanding. The real occupation could be longer, but definitely the refuse layer does not refer to habitation of thousands of years. 4500–4000 cal BC is a period of retreating sea coast resulting in the formation of new bays, lagoons and lagoonal lakes. Moving sea coastlines prevented sites being occupied for longer periods. Multiperiod sites are very common for inland sites rather than the coastal ones.

A date 3600 ± 40 BP (2020–1910 cal BC, Vs–1290) was once presented as a chronological benchmark for the Palanga site (Girininkas 2011, fig. 3). It was made on a gyttja bulk sample taken from a borehole which was situated 740 m NW from the Palanga site (Fig. 2, borehole No. 1205; Bitinas 2004). Actually, the date points to the final stage of the lagoonal lake, i.e. many centuries after the Palanga site occupation. Due to profound sea regression many lagoonal lakes in-between Palanga and Šventoji became overgrown by 2000 cal BC (Piličiauskas et al. 2012). However, in general the dating of bulk samples is very problematic, since the proportion of fossil carbon cannot be assessed.

A single stone tool has been found during the excavations of the Palanga site. It is a polished stone axe, made of dark gray rock, 117.2 × 53.3 × 27.2 mm in size (Fig. 5). Polished stone axes were definitely in use at least since the Early Neolithic in the Eastern Baltic area. They are known from the Zvejnieki cemetery, Latvia, graves Nos 51, 57 and 233. The middle one was dated even to the Late Mesolithic or 5748–5646 cal BC (Zagorska 1997). However, the date might be several hundred years too old due to the fresh water reservoir effect, which for the nearby Lake

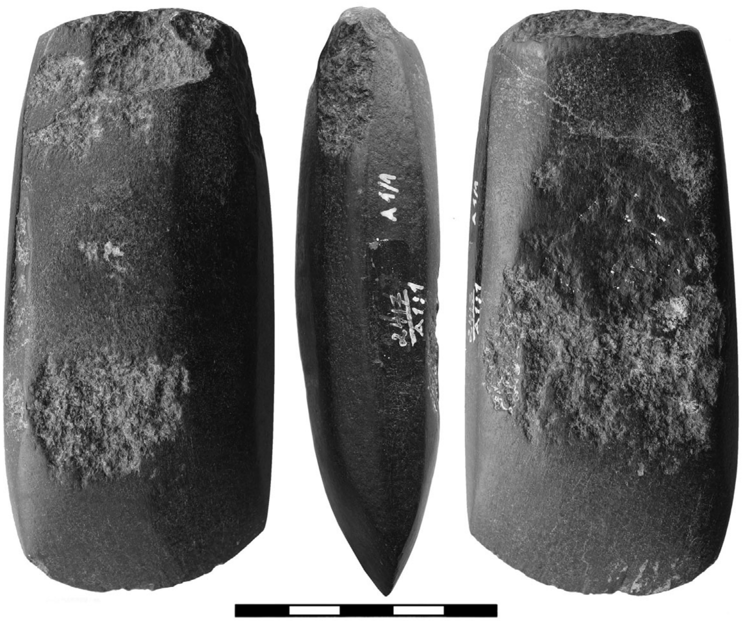


Fig. 5. Polished stone axe found at the Palanga site (A 1 : 1). Photo by Giedrė Piličiauskienė.

Burtnieki has recently been estimated by 800–900 yrs (Meadows et al. 2014). Another stone axe of similar form and size was found in the River Rąžė in 1959, just a year after the excavations of the Palanga site and very near to it (Rimantienė 1974, 161). It might originate from the same site. However, we were unable to find this tool at the Kretinga museum in 2014.

There was an attempt to attribute two other stone chopping tools to the Palanga site's collection (Girininkas 2011, 54, fig. 6: 1, 3), yet no proof was found for it. Algirdas Girininkas claims that a flint gouge and an axe with a quadrangle cross-section were also found at the Palanga site (Fig. 6). However, the museum inventories attribute those tools to a collection which has been compiled by landowner Feliksas Tiškevičius (Feliks Tyszkiewicz) at the turn of the 19th–20th centuries. The collection was donated to Kretinga museum in 1936 (Rimantienė 2005). A donation certificate with the inventory numbers of tools is preserved in Kretinga museum. These numbers are still visible on some tools (Fig. 6). Moreover, a photo of those tools has been already published 22 years prior to the excavation of the Palanga site (Tarvydas 1937)! A fluted adze resembles a Karelian type metatuff chopping tools produced during 3500–1500 cal BC (Fig. 6: 1; Tarasov & Stafeev 2014) rather than Mesolithic tools. There is a similar story about six flint blades that have never figured as finds from the Palanga site prior to Girininkas' publication (Girininkas 2011, 50, 54, fig. 4). They were not mentioned in a report (Navickaitė 1958) or in a publication (Kulikauskas 1959). The museum stored them in a box labelled as 'Palanga'. However, they might

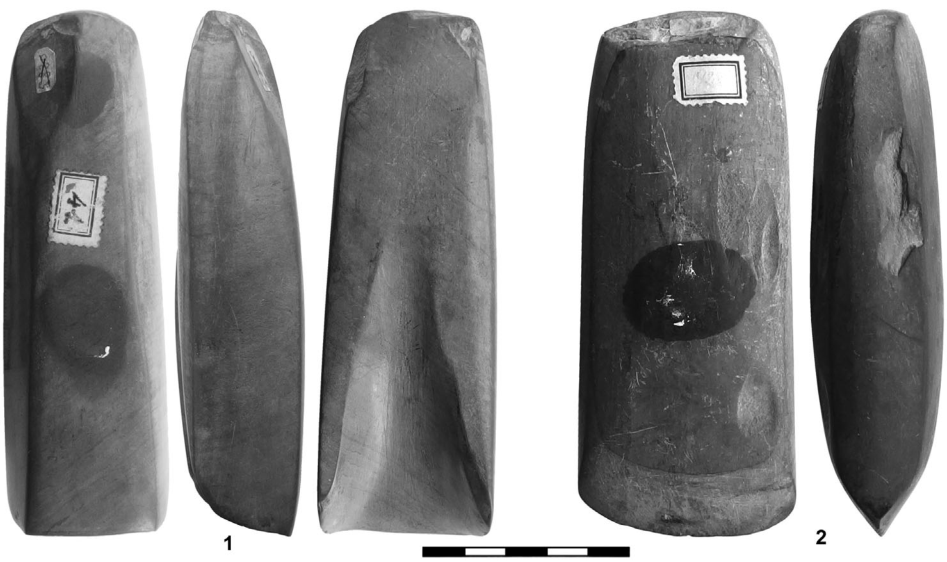


Fig. 6. Chopping tools from F. Tiškevičius' collection that was donated to the Kretinga Museum in 1936 (KM 5820, 5831). Photo by Giedrė Piličiauskienė.

originate from any part of the Palanga city and its environs. Flints lack bogy patina and most probably might be found at a sandy site instead of wetland as the Palanga site was.

67 pieces of animal antler and bone (Table 3) were found in the Palanga site. Analysis of zooarchaeological material was made by Professor Kalju Paaver from Tartu University and was included in the archaeological report (Navickaitė 1958). A table of zooarchaeological material which was 'compiled by L. Daugnora' was published by Algirdas Girininkas (2011, fig. 1). However, it is absolutely unclear where and how data in this table was obtained; because during excavations zooarchaeological material was not identified according to layers and bones were not placed in storages until now. Species of both wild and domestic animals were identified by Paaver; however bones of domestic animals (cattle and pig) could be taken from the technogenic layer. Bone and antler fragments of red deer dominate among other animal species. Bones of seals (probably of harp seal) were also found. Compared with the Šventoji Neolithic sites (Stančikaitė et al. 2009), where bones of red deer are rare and bones of seals prevail, the number of seal bones (6 pieces) in the Palanga site is very low. Also one fragment of human bone and two pieces of bird bones were found.

Altogether sixteen bone, antler and teeth pieces found at the Palanga site are stored in Kretinga museum. Twelve of them are bone and antler tools. Four artefacts were made from antler. One of them was a T-axe (Fig. 7: 8) and another three were insert axes or adzes, made from red deer (*Cervus elaphus*) antler (Fig. 7: 8–10). Bone could be identified in eight cases. Several adzes were made of bone (Fig. 7: 3, 5–6, 7), the same for points (Fig. 7: 1–2, 4). Few adzes were made from red deer metapodials. Another adze-type bone tool stored in the museum was poorly preserved. One arrowhead with biconical shape (Fig. 7: 2)

Table 3. Zooarchaeological material from the Palanga site (NISP – number of identified specimens, MNI – minimum number of individuals). Analysed by Kalju Paaver (according to Navickaitė 1958)

Specimens/Individuals	*Cervus elaphus*	*Alces alces*	*Bos primigenius/Bison bonasus*	*Equus ferus*	*Ursus arctos*	*Phoca (Phoca groenlandica?)*	*Large herbivore (Cervus elaphus?)*	*Bos taurus*	*Sus scrofa domesticus*	In total
NISP	31	5	4	2	5	4	5	6	5	67
%, NISP	46.3	7.5	6.0	3.0	7.5	6.0	7.5	9.0	7.5	100.0
MNI	8	3	1	1	2	2	–	3	2	22
%, MNI	36.4	13.6	4.5	4.5	9.1	9.1	–	13.6	9.1	100.0

Fig. 7. Bone and antler tools from the Palanga site: bone arrowheads (1–2), bone adzes (3, 5–7), bone point (4), antler T-axe (8), antler insert axes/adzes (9–11) (A 1 : 11, 1 : 10, 1 : 14, 1 : 9, 1 : 7, 1 : 8, 1 : 5, 1 : 6, 1 : 3, 1 : 2, 1 : 4). Photo by Giedrė Piličiauskienė.

was decorated with oblique crosses and net ornament, another arrowhead (Fig. 7: 1) had a small pit for fixation to the shaft. Most of the few bone and antler artefacts from Palanga belong to the types which were used over a long time and it is not possible to date them precisely according to the typology. However, the composition of tool types and materials used for making tools from skeletal materials are quite different compared with the Neolithic sites of Šventoji where antler tools are very rare (Piličiauskienė & Luik 2014).

The most interesting items are the T-axe and the biconical arrowhead. The natural shape of a red deer antler was exploited in manufacturing the T-axe (Fig. 7: 8): the shaft hole was made into the antler beam at the base of the removed trez tine (Jensen 1991, fig. 2: B; van Gijn 2005, 54, fig. 8; Elliott 2012, fig. 92). Antler axes were used both in the Mesolithic and Neolithic period and also in the Bronze Age (e.g. Butrimas 1996, fig. 2: 4; Jensen 2001, 166, fig. 5; Gál 2011, fig. 11; Pratsch 2011, 88, figs 12: 2, 15: 10; Elliott 2012, 107 f., fig. 93; 2014; Tóth 2013, 162, fig. 15.5: 1, 2; Kabaciński et al. 2014). The position and the direction of the shaft hole has been regarded as a chronological feature of these axes: in the opinion of Stefan Pratsch T-axes with the perforation passing through the base of the removed trez tine came into use in the Late Atlantic period (Pratsch 2011, 87), i.e. in the Late Mesolithic/Early Neolithic.

Biconical arrowheads (Fig. 7: 2) have been found also from other Neolithic sites in Lithuania, e.g. Šarnelė, Kretuonas and Žemaitiškė (Girininkas 1990, figs 31, 117; Butrimas 1996, fig. 6: 6–9). Such arrowheads are known also from south-eastern Estonia, from the Neolithic sites of Kääpa and Tamula (Kriiska et al. 1999; Kriiska & Tvauri 2002, 51) and from Lake Lubāna in Latvia (Vankina 1999, figs LXXX–LXXXVII; Bitner-Wróblewska 2007, figs 58, 90–91, 243). The biconical arrowheads from Lake Lubāna are dated to the period 5000–2000 BC (Bitner-Wróblewska 2007, 328, 334, 363); Estonian biconical arrowheads are regarded to be especially typical for the Early Neolithic (Kriiska et al. 1999).

The most common working traces visible on the bone and antler tools from Palanga are caused by scraping with a flint tool (e.g. Fig. 7: 6, 9, 11; cf. David 2014, 60 ff.). The blade of one antler axe/adze is grounded on stone (Fig. 7: 9). Nicking and breaking have been used for dissecting the antler for another axe/adze (Fig. 7: 10; David 2014, 100 ff.). The oval shaft hole of the T-axe (Fig. 7: 8) is not drilled, but probably made by using hammer and chisel for removing the compact layer of antler on both sides and after that perforating the spongy tissue (Pratsch 2011, 87). The blade of this axe is broken and it is not possible to identify which techniques were used to shape it. Only one bone item is decorated: oblique crosses and a net ornament have been engraved on the biconical arrowhead (Fig. 7: 2). Similar decorations can be seen also on some other biconical arrowheads found from Lithuania and Latvia (e.g. Girininkas 1990, fig. 117; Vankina 1999, fig. LXXXIII). All these working methods were used both in the Mesolithic and Neolithic and so it is not possible to specify the dating of bone and antler tools according to manufacturing techniques.

Smeltė site

In 1974 the manager of a state construction company brought to the History Museum of Lithuania Minor a set of bone, antler and amber finds. The artefacts had been collected in 1970–1973 from heaps of soil excavated at a bog, which was close to the Klaipėda shipyard, alongside the northern part of the artificial bay excavated to meet the port's needs. Today there are no bogs left in this area because of urbanization. Nevertheless, a small boggy area (2 ha) could be seen in a map of 1939 (Fig. 8). It corresponds quite well to the short description recorded in the museum's inventories. That helped us to localize the Smeltė site in the southernmost part of the Klaipėda city, on the bank of the Curonian lagoon, not far away from the present mouth of the Smeltalė River (55° 39' 27.42" N, 21° 9' 22.44" E). This is a small river, 20.9 km in length, totally canalized today.

Three AMS ^{14}C dates were obtained for the Smeltė site, first for a cattle skull fragment – 225 ± 30 BP, the second for an antler axe 6920 ± 40 BP and the third for another axe 6130 ± 40 BP (Table 2). Modern stuff among the debris might originate from nearby prewar villages because rubbish might have been mixed with archaeological finds during construction work. The second and the third dates point to the Late Mesolithic and the Early Neolithic. The dates indicate a span of 604–788 years with a 68.2 % probability within 5830–5000 cal BC.

Ancient landscapes at this part of Klaipėda have been extremely altered due to the port construction. During the Soviet time a large bay was excavated and an artificial island made of excavated soil raised in the middle of the Curonian Lagoon (Fig. 8). All holocene deposits up to glacial till were removed during the

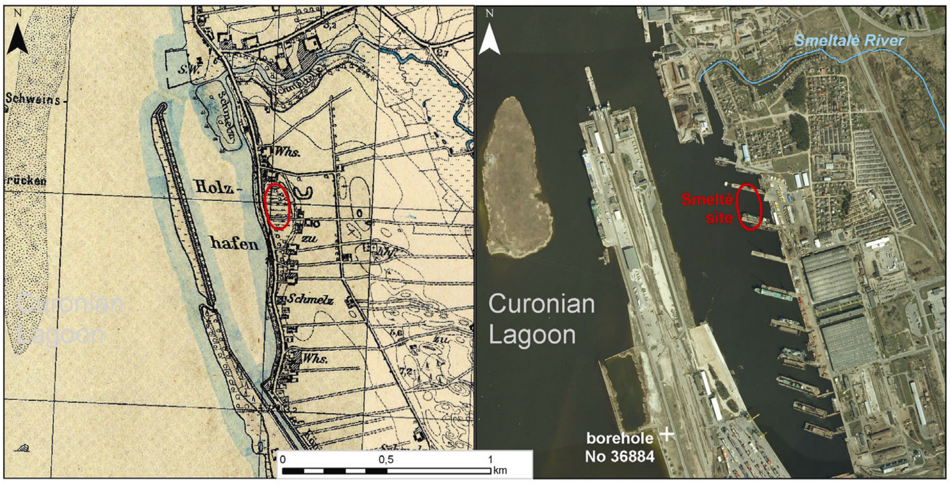
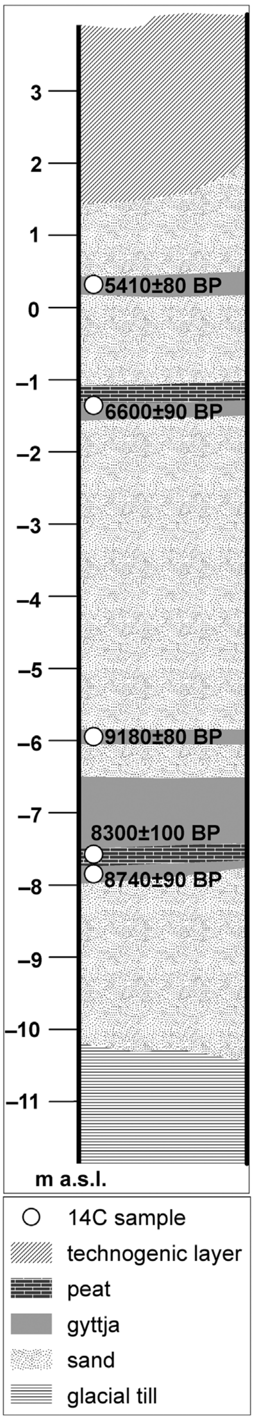


Fig. 8. Location of the Smeltė site in 1939 and in 2010. An advance of the lagoon water onto a small bog due to port construction is notable.



dock construction. Therefore, the Smeltė site was totally destroyed. However, some boreholes have been made in this part of the city prior to the destruction of holocene deposits[1]. According to them organic sediments, i.e. peat and gyttja, were registered up to 7 meters in depth there. Glacial till was reached at the depth of ca 10 metres. It seems very likely that before being excavated the Smeltė artefacts may have lain in a waterlogged bog or lacustrine deposits that ensured the preservation of antler tools. The unoxidized surface of amber finds is another evidence for that. In order to establish a narrow range of the possible horizon of the archaeological layer within holocene stratigraphy data from borehole No. 36884 drilled about 1 km south from the probable Smeltė site location is worth considering. This borehole has 5 radiocarbon dates made on gyttja and peat bulk samples (Fig. 9). Of course, they could be incorrect due to highly likely although unknown amount of fossil carbon within each sample. If this was not a case, then the lower horizon of organic sediments seems to be much older than the age of Smeltė artefacts (Fig. 9). This gives us a hint that antler tools might have been extracted from gyttja or peat at ca. 1.5 m b.s.l. A dwelling zone of the site might have been situated on a bank of the lagoon or the oxbow lake, just beside the mouth of the Smeltalė River.

It is essential to know whether the Smeltė site was situated by a lagoon or an inland lake. We know that this part of the Lithuanian coast experienced a slightly different rhythm of marine oscillations comparing to the northern coast. Unfortunately, the sea shore displacement curve for the central part of the Lithuanian coast has been built completely on geological data because of lack of archaeological sites (Damušytė 2011, fig. 10). This segment of the

Fig. 9. Stratigraphy of borehole No. 36884 drilled at about 1 km south from the Smeltė site. Drawing by Gytis Piličiauskas according to A. Damušytė (2011, table 5, fig. 27).

[1] Data from borehole database by Lithuanian Geological Survey: http://www.lgt.lt/zemelap/main.php?sesName=lgt1414573217

Lithuanian coast was also affected by maximal Littorina transgression at about 5000 cal BC. The sea water level advanced very quickly from 14.5 m b.s.l. in Melnragė drowned forest at about 6680–6440 cal BC (Vs–1388: 7720 ± 120) to 2–5 m a.s.l. in the Smeltalė River valley at about 5000/4750 cal BC according to relicts of ancient shores in the modern landscape (Damušytė 2011). The dates of antler axes found at the Smeltė site (5840–5750 and 5210–5000 cal BC) point to a period when the sea has come very close to the site.

Eight amber finds were collected at the Smeltė site. There are one circular bead, one irregular and three trapezoidal pendants, two preforms for cylindrical beads, and one amorphous worked piece (Fig. 10). Two or all three pendants had their boreholes drilled while the forth pendant has a natural hole with a few signs of scraping visible on the surface. Two prolonged preforms for beads have quadratic cross-sections and have not been polished.

Thirteen bone and antler artefacts (Fig. 11) were found in the Smeltė site. Four of them were axes made from red deer (*Cervus elaphus*) antler (Fig. 11: 4, 7–8, 10), two axes were made from elk (*Alces alces*) antler (Fig. 11: 5, 9) and one mount produced from red deer antler (Fig. 11: 3). One artefact made from red deer antler tine was identified as pressure tool (Fig. 11: 2). Also two fragments of antler

Fig. 10. Amber finds from the Smeltė site: circular bead (2), irregular (3) and trapezoidal (1, 4, 5) pendants, preforms for cylindrical beads (6–7), worked piece (8) (KKM 9140, 9139, 3133, 9134, 9138, 9136, 9137, 9135). Photo by Giedrė Piličiauskienė.

Fig. 11. Bone and antler tools from the Smeltė site: bone awl (1), red deer antler pressure tool (2), red deer antler mount (3), reed deer antler axes (4, 7–8, 10), elk antler axes (5, 9), auroch/bison bone adze (6) (KKM 9148, 9142, 9152, 9151, 9147, 9146, 9153, 9149, 9150, 9141). Photo by Giedrė Piličiauskienė.

tines without traces of processing were found. Presumably these tines were removed from antler beams in preparing them for making axes. Bone objects were represented by an adze made from auroch/bison (*Bos primigenius/Bison bonasus*) metatarsus (Fig. 11: 6) and an awl made from unidentified long bone (Fig. 11: 1). Both bone items were common tools in the Mesolithic (e.g. Louwe Kooijmans 1970, figs 5–6, 14; van Gijn 2005, figs 17–18; Diakowski 2011, fig. 15: 1, 2; Gramsch 2012, figs 26: 2, 28: 12), but similar tools were used also in later periods. Dotted perforation was used for making a shaft hole into the bone adze (Fig. 11: 6; cf. David 2007, figs 3, 5; 2014, 45, 96 ff.). Most of the tools from Smeltė are made from antler and the percentage of axes with shaft holes is remarkable. The shapes of axes vary according to the natural shape of red deer and elk antler. Shaft holes are regularly rounded and have been made by drilling or coring (David 2007, fig. 3; 2014, 86, 91). The places from where the antler tines have been removed were either smoothed and polished (Fig. 11: 7), but sometimes also not carefully finished, so that the manufacturing traces were still visible (Fig. 11: 3). Antler tines have been chopped or cut around and then the porous middle part of antler was broken. A similar method was also used for detaching the tine used as a pressure tool (Fig. 11: 2). In most cases the rough original surface of antler has not been removed from the axe, but one axe has its surfaces partly polished (Fig. 11: 10). This is also the only artefact having a simple decoration: a group of small oblique notches. The blades and heels of axes have been damaged in most cases (Fig. 11: 4, 5, 8–10). The oblique blade of the intact axe (Fig. 11: 7) is produced by groove and truncated breaking technique (David 2007, fig. 6; 2014, 125) and then grounded on stone. Better preserved tools with observable characteristic features (Fig. 11: 3, 7) belong to the types which were used in the Mesolithic period (Louwe Kooijmans 1970, fig. 17; Diakowski 2011, fig. 12: 2; Pratsch 2011, fig. 15: 4d, 4a). Pressure tools made from antler tine are dated to the Mesolithic and Early Neolithic (Pratsch 2011, fig. 15: 15).

The beginning of amber processing in the south-east coast of the Baltic Sea

The question about when amber became available on the beaches of the south-east coast of the Baltic Sea is very important because amber itself could be used as a chronological marker. The largest amber deposits are known from the Sambian peninsular in East Prussia. Generally it was assumed that Sambian deposits have started eroding since the Littorina Sea transgression. Sea currents dispersed amber along the east coastline of the Baltic Sea (Katinas 1983, 11). Onshore amber is found exclusively within Littorina Sea marine and lagoonal sediments in Lithuania. Theoretically mass availability of raw amber on the south-east beaches of the Baltic Sea should be contemporaneous to the Littorina Sea maximal transgression dated to around 5000 cal BC (Damušytė 2011) or

4750 cal BC (Fig. 12). However, amber in archaeological contexts actually appears 300–600 years later. In the Zvejnieki cemetery the oldest grave containing amber items (No. 277) was dated to 5545 ± 65 BP or 4450–4340 cal BC (Eriksson et al. 2003). In fact ca. 20 graves at Zvejnieki dated by ^{14}C to a period of 5500–4500 cal BC lack amber at all. Together with graves which lack ^{14}C dates but were dated to the same period by other criteria the real number of amber-less graves from the Early Neolithic must exceed the number of radiocarbon dated graves by several times. From many sources of information today we know that sea transgression at about 5000/4750 cal BC was rapid and profound (Fig. 12). The rapidly advancing sea coastline might have passed through amber bearing deposits, quickly leaving them behind and outside of shallow littoral with profound erosion. Amber-rich beds were exposed at underwater slopes eroded by waves (Grigelis 2001, 39). The most profound erosion of amber deposits might have begun only several hundred years after the peak of maximal transgression, during subsequent regression, when the erosion zone moved westwards.

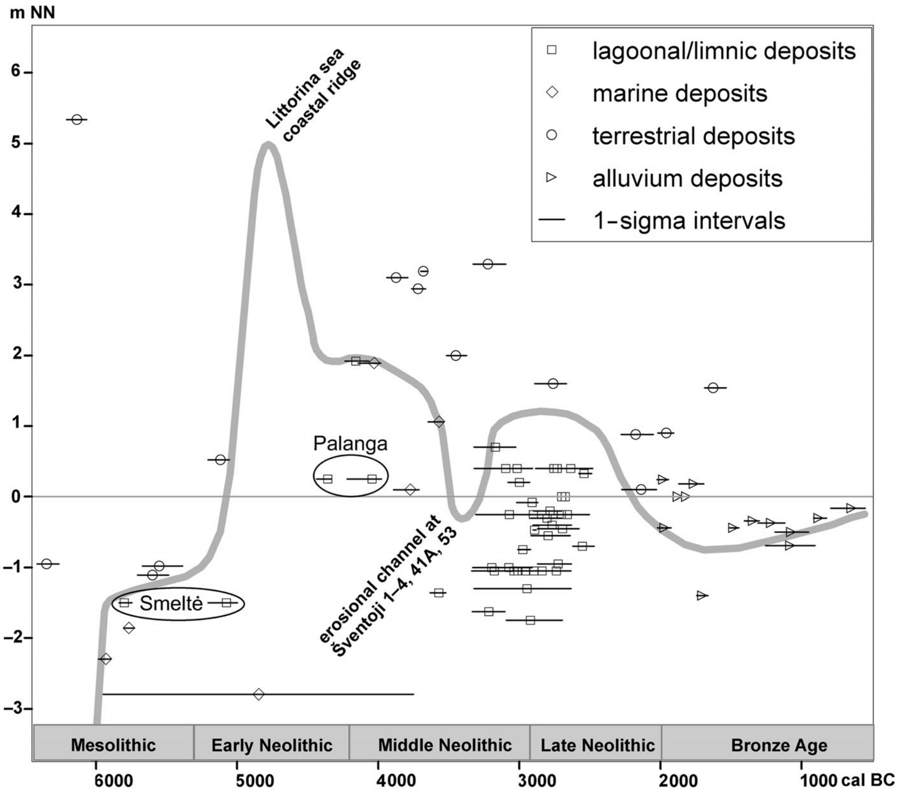


Fig. 12. Relative sea level curve compiled for the northern coast of Lithuania on the basis of 84 ^{14}C dates made on terrestrial animal bones, basal peat, wood, and charcoal. Drawing by Gytis Piličiauskas.

At first sight the Smeltė site, with antler tools dated to Late Mesolithic/Early Neolithic and also with amber ornaments, seems witnessing the earliest evidence of archaeological amber on the east coast of the Baltic Sea. However, the same site may have various layers of habitation. Amber ornaments and preforms found at the Smeltė site are very close to the Middle Neolithic forms at the Šventoji sites in Lithuania (Rimantienė 2005), the Zvejnieki cemetery (Zagorskis 2004) as well as Lake Lubāna sites (Loze 2008) in Latvia. Only circular beads are not common for this period (Fig. 10: 2). Amber rings and buttons being very characteristic to the Middle Neolithic ornaments are absent at the Smeltė site. This could be easily explained by the small number of artefacts and low representation of the Smeltė site collection. Amber finds from the Smeltė site belong to a younger occupation phase as compared to antler tools. Assuming that the proposed sea level curve (Fig. 12) is correct, the Smeltė site could have been occupied before the maximal transgression and after it. But in this case an unanswered question arises: why no other Middle Neolithic tools (e.g. ceramic, stone and flint) were discovered at Smeltė? Unfortunately, many questions always remain unanswered when studying archaeological materials collected by amateurs many years ago.

Searching for Early Neolithic sites in coastal Lithuania

A huge litostratigraphical dataset (15000 records for 3000 boreholes, test-pits, trenches, etc.) together with 84 secure radiocarbon dates (excluding those made on gyttja bulk samples, molluscs, seal, fish, dog, and human bones) today are available for the Lithuanian northern coast because of an extensive geological and archaeological research has been continuing for many decades up to today (e.g. Bitinas 2004; Rimantienė 2005; Damušytė 2011; Piličiauskas et al. 2012). This enables us to refine the relative sea water curve for Lithuanian NW coast (Fig. 12). According to this, Mesolithic sites rather than Early Neolithic ones might be expected to be destroyed by the rising sea water or covered by thick volumes of marine sand. Furthermore, it seems that dwelling zones of Early Neolithic sites which may have survived should be located at higher elevations compared to Middle Neolithic sites. Post-transgressional Early Neolithic sites might be expected to be found on the banks of sea bays, lagoons and river estuaries at 3 m a.s.l. or higher. At Šventoji area the Middle and Late Neolithic dwelling sites (3800–2500 cal BC) have been found located at 1.5–2.5 m a.s.l. on the banks of shallow and muddy freshwater lagoonal lakes. For the Early Neolithic we may expect less productivity of coastal waters compared to the Middle Neolithic, thus consequently a smaller number of people and sites. Moreover, archaeological visibility of Early Neolithic sites might be much lower as compared to later periods because finds had almost no chance to get into refuse layers made up of gyttja as was very common during the Middle Neolithic. Shallow littorals with sandy substratum were not favourable environments for preserving organic artefacts and ecofacts. The Palanga site was an exception because of moraine uplift situated just beside a deep lagoon where gyttja had started accumulating since very early times. Usually there are no hills on a sandy terrace formed during the maximal transgression of the Littorina Sea.

Another issue, which might complicate the identification of Early Neolithic sites on the Lithuanian coast could be the absence of pottery. Flint industries of the Late Mesolithic and the Early Neolithic are very similar in inland Lithuania. They may be even too similar to distinguish them visually. The Palanga site evidences that some coastal (and inland?) sites could produce no pottery during the 5th millennium cal BC. Their chronological evaluation is complicated without radiocarbon dating. Good examples here are Būtingė 1 and Šventoji 40 sites situated on sandy banks of the Šventoji River at elevations of 4.4–5 m a.s.l. (Rimantienė 2005). These sandy sites contain mixed materials from the Mesolithic to the Late Bronze Age. That is not surprising because the river did not change its route for many years while its shores were nice camping places for both hunters-gatherers and stock-breeders. Flint inventories include some blades and microlithic tools evidencing blade industry (Rimantienė 2005). These could be interpreted as Mesolithic tools discarded at riverine camps being either few or many kilometres away from the sea coast. The only AMS ^{14}C date available is for the Šventoji 40 site – 7260 ± 50 BP or 6210–6070 cal BC (Table 2). It was made on charcoal sample taken from a large pit filled with black sand and tiny charcoals. Eleven undiagnosable flakes removed from small flint beach pebbles have been uncovered there. The date points to the Late Mesolithic, i.e. the time when the sea coast was at a fair distance from the site. However, we believe that other negative structures at the Šventoji 40 site might be relict coastal settlements and might appear of later chronology.

And a final note is about the topography of the Late Mesolithic – Early Neolithic sites on the Lithuanian coast. Palanga and Smeltė sites, probably Šventoji 40 and Būtingė 1 sites as well, seem all to be situated on mouths or estuaries of rivers flowing into lagoons or the sea. Probably that was not always a rule, but this type of settlement location was certainly preferred by prehistoric people before the Middle Neolithic when long segments of lake coastlines lacking any inflows were used for dwelling sites and amber workshops.

Neolithic without farming and pottery?

The absence of ceramics in the Early Neolithic Palanga site is quite an intriguing question. The oldest radiocarbon dates for ceramic in a cultural layer come from eastern Latvia (Loze 1988). According to this information Neolithic may have started in Lithuania since 5500/5300 cal BC (e.g. Antanaitis-Jacobs & Girininkas 2002). However, actually we have no ^{14}C dates from the

6th millennium cal BC made on materials undoubtedly related to the oldest ceramics in Lithuania.[2] Moreover, in the coastal area the oldest ^{14}C dates obtained at ceramic sites fall only to 3800/3700 cal BC (e.g. Šventoji 43[3]). Taking into consideration the oldest dates of ceramic sites on neighbouring coastlines should contribute to a better understanding of the spread of pottery technology across the Baltic Sea coast.

The appearance of pottery at Ertebølle sites in north Germany was dated to 4750 cal BC (Hartz & Lübke 2006). The same date was suggested for the beginning of pointed-bottomed vessels at the Dąbki site on the Polish coast (Terberger et al. 2009, 15). In the south-eastern Baltic Sea coast there are no such old dates yet. For instance, 'foodcrusts' scraped from three Neman Culture potsherds at the Rzucewo site (NE Poland) were dated to a period of 4400–4150 cal BC (Kabaciński et al. 2011). However, these dates could be significantly distorted due to the fresh water reservoir effect. For example, Rzucewo pottery 'foodcrusts' at the Nida site on the Curonian spit gave the age 530–650 yr older than context dates (Piličiauskas et al. 2011; Piličiauskas & Heron 2015). The same problem might occur with 'foodcrusts' at the Sārnate site. Two dates made on 'foodcrusts' belong to a period of 4400–3800 cal BC though context dates are younger by 400–900 yr BP (Bērziņš 2008). The oldest coastal sites with ceramics were dated to c. 5000 cal BC in Estonia (Jussila & Kriiska 2005). According to the data listed it is clear that aceramic Palanga site existed at 300–800 years after the adoption of pottery technology at neighbouring coastal regions. Post-depositional environment must have been very friendly for ceramics at the Palanga site. Bones, antler tools and wood were in a very nice condition during excavation. We cannot see reason why large potsherds should not have been collected during excavations. There is no sign of a very special function and maybe an extremely short occupational time of the Palanga site. On the contrary, bone, antler and stone tools demonstrate a particular functional diversity. In addition, they were found widely dispersed. We are willing to acknowledge the fact that people who left the refuse layer at the Palanga site simply did not produce any ceramics. Further, we can only speculate whether ceramic and aceramic communities could have existed side by side during the 5th millennium cal BC or whether the Stone Age periodization based on inland sites is not relevant for the south-east coast of the Baltic Sea? Unfortunately, the answers are not yet available.

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2 At sandy sites close spatial associations of ceramics and fireplaces do not necessarily mean that they existed at the same time. For example, it is a common thing to discover Final Paleolithic tanged point just besides Late Neolithic ceramics in southern Lithuania. Also there is plenty of evidence when charcoal from fireplaces was dated to a different time compared to the surrounding finds. This was caused by palimpsest effect. Thus we cannot accept a date 6550 ± 70 BP (Ki-7642) from the Katra 1 site as benchmark for the beginning of pottery production in Lithuania as it has been previously suggested (Antanaitis-Jacobs & Girininkas 2002, 10, 19).

3 Šventoji 43 site was discovered in 2013. It was excavated by G. Piličiauskas and radiocarbon dated in 2014. The results are not yet published.

Conclusions

Smeltė and Palanga, two Late Mesolithic/Early Neolithic sites from coastal Lithuania present new data on the Baltic Sea coast displacement, the beginning of pottery technology, amber and bone and antler tools usage. Bone and antler tools from Smeltė and Palanga differ quite considerably from bone items known from the Late Neolithic sites on Lithuanian coast, both in terms of used raw materials and tool functions. However, the number of analysed bone and antler objects is too small to make any significant conclusions. Both Smeltė (5830–5000 cal BC) and Palanga (4440–3980 cal BC) were coastal sites once situated at estuaries of small rivers. Chronologically they were separated by a profound environmental change that was maximal Littorina Sea transgression at about 5000 cal BC. The most intriguing is the fact that the Palanga site yielded no pottery which had already been produced for several hundred to one thousand years before in adjacent regions, and that seems to be unconnected with site function.

Acknowledgements

This study was funded by the Research Council of Lithuania (Grant No. VP1–3.1–ŠMM–07–K–03–021) and the Research Foundation of Tallinn University. The authors are grateful to the staff of Kretinga museum and the History Museum of Lithuania Minor for their generous help and permission to study archaeological materials. We also thank Aivar Kriiska and an anonymous reviewer for valuable comments on an earlier version of this draft as well as Helle Solnask for her help with the English.

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UUS PILK LEEDU RANNIKU KIVIAEGA: SMELTĖ JA PALANGA ASULAD

Resümee

Artikli eesmärgiks on tutvustada Leedu rannikul paiknenud kahest seni vähetuntud hilismesoliitilisest ja varaneoliitilisest asulast – Smeltėst ning Palangast – saadud arheoloogilisi leide ja radiosüsinikudateeringuid (joon 1). AMS ^{14}C dateeringud koos uusima infoga Läänemere rannajoone muutuste kohta võimaldavad, vaatamata puudustele Palanga ja Smeltė asulakohtade välitööde dokumentatsioonis, paigutada need asulad tõenäoliselt õigemasse Läänemere lõuna- ning idaranniku kronoloogilisse, paleogeograafilisse ja kultuurilisse konteksti.

Palanga asulakoht paikneb tänapäeva Palanga linna keskosas (joon 2). 1958. aastal leiti Rąžė jõe kraavitamise käigus turbakihist loomaluid ja sarvi (joon 3). Päästekaevamiste läbiviimise järel oletati, et tegu on mesoliitilise asulakohaga. Leiukoha stratigraafia paremaks mõistmiseks tehti sinna 2013.–2014. aastal kümme puurauku. Tõenäoliselt paiknes asula kohas, kus Rąžė jõgi suubus laguuni (joon 4). Kahe sarvkirve dateerimisel saadud tulemused jäävad ajavahemikku 4440–3980 cal eKr (tabel 2), mis siinses periodiseeringus tähendab varaneoliitikumi. Palanga asula kaevamiste käigus leiti üksainus lihvitud kivitööriist (joon 5). Leitud 16 luu- ja sarveset on Kretinga muuseumis. 12 neist on tööriistad: nooleotsad, talvad ja kirved, sh üks T-kujuline kirves (joon 7). Enamik Palanga vähestest sarv- ja luuesemetest kuulub tüüpidesse, mis olid kasutusel pika aja jooksul, ning neid ei ole võimalik tüpoloogiliselt dateerida. T-kujulise kirve ja veel mõne eseme valmistamistehnoloogia viitab nende kuulumisele hilismesoliitikumi või varaneoliitikumi.

1974. aastal tõi riikliku ehitusettevõtte juhataja Klaipėda muuseumi kogumi luu-, sarv- ja merevaikesemeid Klaipėda linna territooriumil asunud Smeltėst.

Esemed koguti rabast väljakaevatud pinnase hunnikutest (joon 8). Smeltė asulakoht hävitati doki ehitustööde käigus täielikult. Kahe leitud sarvkirve dateeringud jäävad ajavahemikku 5840–5000 cal eKr (tabel 2). Leiukohale tehtud puuraugu andmete põhjal asusid Smeltė esemed enne väljakaevamist märjas raba või järvega seotud ladestuses (joon 9), mis tagas sarvesemete hea säilimise. Asula võis paikneda laguuni või poolkuukujulise järve kaldal, vahetult Smeltalė jõe suudme (joon 8) ja samuti mere lähedal. Smeltėst leiti 8 merevaikeset (joon 10), mille puhul on tegu tüüpiliste keskneoliitikumi esemetega ja mis pärinevad ilmselt hilisemast asutuskihist kui ^{14}C abil dateeritud sarvkirves. Luu- ja sarvesemeid leiti 13, enamik neist on hirve- ning põdrasarvest kirved (joon 11). Terviklikumalt säilinud esemed kuuluvad iseloomulike tunnuste põhjal mesoliitikumis kasutusel olnud tüüpidesse.

Uued litostratigraafilised ja radionisüsinikudateeringutel põhinevad andmed võimaldavad täpsustada Leedu looderanniku suhtelise veetaseme kõverat (joon 12). Eeldatavalt võib oletada pigem mesoliitikumi kui varaneoliitikumi asulate hävimist tõusva veetaseme tõttu või nende mattumist paksude mereliiva ladestuste alla. Transgressioonile järgneva perioodi varaneoliitilisi asulakohti võib arvatavasti leiduda merelahtede, laguunide ja jõgede suudmelahtede kallastel kõrgusel 3 m üle merepinna või kõrgemal. Kõik teadaolevad hilismesoliitilised ja varaneoliitilised asulad paiknevad laguuni või merre suubuvate jõgede suudmetes või suudmelahtedes. See erineb keskmise neoliitikumi asustusmustrist, mil asulad ja merevaigu töötlemise kohad asusid pikkadel jõesuudmeteta järveranniku lõikudel.

Palanga asula kasutusaeg on vähemalt 300–800 aastat hilisem ajast, mil naabruses asuvates rannikupiirkondades võeti kasutusele keraamika. See leiukoht osutab võimalusele, et 5. aastatuhandel cal eKr ei valmistatud kõigis ranniku (ja sisemaa?) asulates keraamikat.