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MATERIAL, TECHNOLOGY AND MEANING: ANTLER ARTEFACTS AND ANTLER WORKING ON THE EASTERN SHORE OF THE BALTIC SEA IN THE LATE BRONZE AGE

The paper deals with antler working and antler artefacts in the Late Bronze Age fortified settlements on the eastern shore of the Baltic Sea. The reasons behind the ancient craftsmen's choice of material may be functional, economical or depend on cultural traditions. Concerning skeletal materials artefacts were usually made from the bones of the species occurring also among faunal remains. Functional choice depends on the suitability of a bone for an artefact. At the same time, traditions could exist concerning the suitability of certain skeletal element for making a certain tool or artefact. Antler could be preferred as a material for making artefacts because of its dimensions and properties. Antler is tougher and more elastic than bone, therefore it was preferred to bone especially for artefacts or details requiring greater toughness. In the paper an overview of antler working technologies and antler artefacts most typical for the Late Bonze Age fortified settlements in the eastern Baltic region is given. Antler artefacts and traces of antler working in the Late Bronze Age fortified settlements are compared with other contemporaneous sites – open settlements and stone graves, and also with the use of antler in the long run, from the Neolithic until the Viking Age.

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Introduction

The aim of the present article is to give an overview of antler working and antler artefacts in the Late Bronze Age fortified settlements on the eastern shore of the Baltic Sea. Why was antler chosen for making particular artefacts? Were the reasons for choosing antler mostly practical or could there be some other reason as well? Did antler as material have some special meaning(s)? Were there any differences in the use of antler in different regions or sites? I have discussed the use of antler in the Bronze Age together with other osseous materials in several publications already (e.g. Luik 2007; in print; Luik & Maldre 2007), but this time I will concentrate specially on this valuable raw material.

The reasons behind the ancient craftsmen's choice of material may be functional, economical or depend on cultural traditions (e.g. Friedel 1993, 44; Caple 2006, 94). According to Pierre Lemonnier the choice of a certain technique, raw material or tool may sometimes depend on some symbolic value attributed to them by the society, rather than on their real physical properties. This way, the use of a certain material or technique may have been considered imperative in certain cases, regardless of the fact that the artefact could also have been made in a different way or from different material, or, on the contrary, rejected completely notwithstanding the excellent suitability of the material. Members of a society have "ideas" about raw materials, tools, actors, the right time and place, and all these technical representations are part of wider symbolic systems (Lemonnier 1993, 3 f.). Sometimes choices were self-evident because of technical and cultural habits and it could take several generations to overcome a habit (Pétrequin 1993).

Concerning skeletal materials, artefacts were usually made from the bones of the species occurring also among faunal remains. Functional choice depends on the suitability of a bone for an artefact. At the same time, traditions could exist concerning the suitability of a bone of certain species or of certain skeletal element for making a certain tool or artefact; changes in the choice of raw materials may often vary little over a long time although changes took place in the availability of species (Choyke 1997, 66 f.; Choyke et al. 2004, 178; Luik 2009). Beliefs about how certain skeletal parts should be used may be influenced by mythical qualities of particular animals (Choyke & Daróczi-Szabó 2010, 238). For example, Robert McGhee, who has analysed the choices of bone, antler and walrus ivory in bone working of the arctic peoples of North America, has suggested that besides the functional properties of materials, the symbolic meanings attributed to them were also important. He supposes that walrus ivory was symbolically linked with concepts associated with the sea (e.g. sea mammals, birds, and winter life on the sea ice) and antler with the land (land mammals, particularly the caribou, and summer life on the land). From ethnographic data it is known that the Inuit concept of environment was centred around the dichotomy between the land and the sea, e.g. the meat of caribou and sea mammals could not be cooked in the same pot or eaten on the same day, caribou skins could not be sewn on the sea ice, etc. (McGhee 1977). But the choice may be also opposite. For example Christer Westerdahl has analysed the dichotomy of land and sea in northern Europe. In the case of coastal sites by Bothnia the elk antlers from inland had been chosen for making seal harpoons. In Westerdahl's opinion it is possible that the reason for choosing elk antler for making tools used at sea was not the excellent properties of antler, but the fact that antlers were acquired inland. Later ethnographic sources contain beliefs that on board of a boat at sea one should use only things received from land, and not use or eat anything that was produced by or lived in the sea (Westerdahl 2005, 7).

Antler was used for making artefacts from the Palaeolithic until the Middle Ages (e.g. MacGregor 1985, 32 ff.; Van Vilsteren 1987; Kokabi et al. 1994), and was regarded as a complex symbol and a desired trophy for many millennia

(Bartosiewicz & Gál 2010, 122). Finds from Star Carr Mesolithic site in north Yorkshire provide a vivid example that antler working could have been of particular importance. The faunal assemblage of this site is dominated by red deer antler, antler working debris and 192 barbed antler points. Although other sites in the vicinity have been also excavated, only one additional example of such points has been found. Working debris shows that only the initial stages of point manufacture were performed on site and the points seem to have been finished elsewhere. But later they were brought back to Star Carr for depositing. In Chantal Conneller's opinion it seems that red deer was so important for inhabitants of Star Carr that tools made from deer antler needed to be disposed of in a particular way. Barbed points, as well as tools used in manufacturing points and in killing and processing deer, and also debris were deposited together (Conneller 2008, 170 ff.). Red deer antlers have been found as grave goods in some Mesolithic graves in France, Denmark and Sweden (Téviec, Hoëdic, Vedbaek, Skateholm: Schulting 1996, 344, fig. 1; Bogucki 1999, 134, fig. 4.3; Mikhailova 2006, 192 ff., fig. 5), and elk-headed antler staffs from Mesolithic and Neolithic graves and settlements in Northeastern Europe (e.g. Olenii Ostrov, Zvejnieki, Šventoji: Mikhailova 2006, 195 ff., fig. 6; Zagorska 2006, 95 f., fig. 3; Jonuks 2009, 133 ff.; Iršenas 2010, 175 ff., fig. 1).

The choice of material may give clues to the estimation of the specialization of handicrafts. In domestic crafts odd kitchen waste was often used, for professional production the material was usually specially selected and procured in an organized manner (e.g. Provenzano 2001).

Thus both economical and functional reasons – the availability of material and its suitability for certain artefact – should be considered as possible reasons for choosing antler for making artefacts, but aesthetic and symbolic values attributed to antler could also have been significant.

Antler as material

Bone and antler artefacts constitute a remarkable part of the archaeological record of the Late Bronze Age fortified settlements in the eastern Baltic region (Fig. 1). In the discussed fortified settlements the majority of faunal remains belongs to domestic animals (about 52–94%), the relative importance of bones of wild animals is considerably smaller among faunal remains, as well as in bone artefacts (Graudonis 1989; Lõugas 1994; Vasks 1994; Grigalavičienė 1995, 268; Lang 2007a, 110 f.; Luik & Maldre 2007, 6 ff.; Maldre 2008). Nevertheless the percentage of wild animals is bigger among worked osseous materials than among unworked faunal remains, and the reason lies in the use of antler for making artefacts. In the Late Bronze Age context in the eastern Baltic region it means mostly elk (*Alces alces*) antler (Fig. 2), but in a few cases red deer (*Cervus elaphus*) antlers have been also used (e.g. Graudonis 1989, pl. XI: 6).

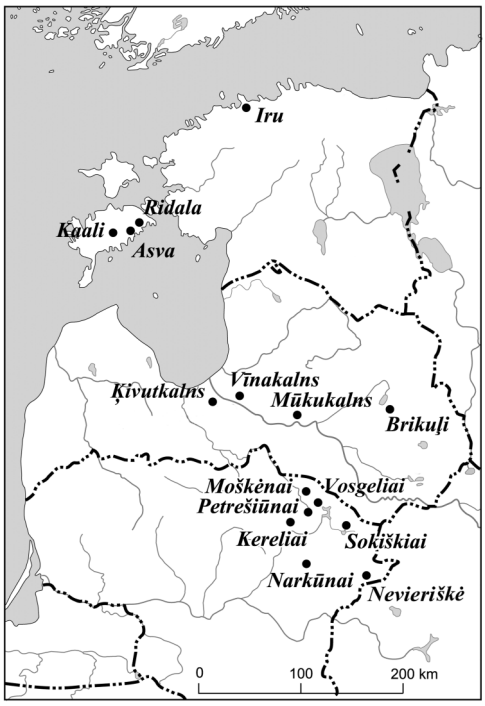

Fig. 1. Bronze Age fortified settlements in eastern Baltic region mentioned in the text. Drawing by Kersti Siitan.

Fig. 2. Elk antler pieces with working traces from Asva (AI 3799: 84; 3658: 459; 3799: 97, 42; 2787: 6). Photos and drawings on figs 2–7 by Heidi Luik.

The share of wild animal bones is quite small also among Bronze Age faunal remains in other parts of Europe, being usually less than 10%; the most frequent animal is red deer, whose antlers were used for making tools (e.g. Ijzereef 1981, 187; Choyke et al. 2004, 183; Rackham 2004, 164; Choyke 2005, 132 ff.; Malinowski 2006, 172; Vretemark 2010, 156 ff.). The choice of species of course depended on locally available species (e.g. MacGrergor 1985, 30 ff.; Borodovskij 2007).

There is no data about using cattle (*Bos taurus*), goat (*Capra hircus*) and sheep (*Ovis aries*) horns for making artefacts in the Late Bronze Age in the eastern Baltic region. Perhaps these materials were not used, but it is also possible that horn artefacts did not survive, because horn as keratin substance survives considerably worse than bone or antler. At least in some places horn has been used for making artefacts in the Bronze Age, horn combs were preserved for example in the oak coffins of the Danish Middle Bronze Age burials (e.g. Egtved, Skrydstrup, Borum Eshøj: Bergerbrant 2007, 12, 63, 70; Hurcombe 2007, 138, fig. 7.4). Horn was used also in southern Siberia in the Late Bronze Age and Early Iron Age (Borodovskij 2007, 79 f., 90 ff.).

Antler could have been preferred as material for making artefacts because of its dimensions and properties. The density and amount of mineral and organic components in antler is roughly comparable with those in bone. Owing to the rapid growth of antlers – they gain full size in about two months – their structure is not as compact as that of bones, which grow considerably slower (Ambrosiani 1981, 102; Smirnova 1995, 120). Antler has proved to be tougher and more elastic than bone, and it requires considerably more strength to break it. Therefore antler was preferred especially for making artefacts or details requiring greater toughness. Different elasticity and hardness of bone materials is connected with their different mineral content and different functions of skeletal parts. Male elks and deer use their antler in fighting, crashing their antlers together with considerable force and speed, so the antlers should be stiff and strong, bear strong impact and not fracture (Currey 1979; MacGregor & Currey 1983, 73 ff.; MacGregor 1985, 27 ff.; Hurcombe 2007, 125, 138). Antler, especially elk antler, is suitable for making larger artefacts. As there is cavity inside large tubular bones it is either possible to use the compact part of the bone or there will be the cavity also in the middle of the artefact. So, one reason for choosing antler could be the dimensions of the artefact. Of course it is possible to use the bones of killed animals, but in the case of antler, the shed antler could be used as well. It is possible to establish whether the antler comes from a slaughtered animal or was shed only if the lower part of antler beam, the burr, survives. Only a few such pieces of antler have been found from Bronze Age fortified settlements, e.g. red deer antler from Ķivutkalns (Graudonis 1989, pl. XI: 6) and some elk antler fragments from Asva and Iru. In both cases the use of material could be influenced by seasonality – the growth and shedding of antlers take place in certain time of year but animals were also killed in certain seasons. For making artefacts, bones should be first cleared of soft tissues, but antler could be just used.

Antler working

Nevertheless, most of the artefacts from the fortified settlements under study are made from bone. In Narkūnai as well as in Nevieriškė, antler artefacts and antler working scrap make up less than 10%. Among the finds from Kereliai, antler artefacts and antler working scrap are slightly more frequent, constituting nearly 20%, but this rate may be influenced by the relatively small number of finds here (Luik & Maldre 2007, 8 ff.). In Asva and Ridala antler artefacts and working scrap make up 16–17% of all worked osseous materials. It should be mentioned here that the bones of terrestrial wild animals constitute only 3% of faunal remains in Asva and Ridala (Maldre 2008, 272; Luik in print). Mostly elk antler was used, but a few pieces of red deer antlers are also found, e.g. from Ķivutkalns and Kereliai (Graudonis 1989, pl. XI; Luik & Maldre 2007, 10, fig. 5). The share of antler among worked osseous materials could be very different in sites of one region. For example in the Middle Bronze Age settlement site of Százhalombatta–Földvar in Hungary, only 2% of worked osseous materials were red deer antler, tools were made foremost of cattle bones, wild animal bones were more often used for making ornaments and amulets (Sofaer 2010, 199, 211 f.), but in the settlement of Jászdózsa–Kápolnahalom worked red deer antler constitute more than 20% (Choyke 2005, 139 ff.). In northern Italian terramares even more than 70% of exploited raw material was red deer antler (Provenzano 2001, 95, fig. 4).

Although both bone and antler as local raw materials were generally available, rules might have existed about who could or could not make or use certain things. For instance, Alice Choyke has suggested, on the basis of the composition of finds (finished production vs. bone working scrap) and the location of scrap (most of it was recovered from the central mound of the settlement) that in the socially differentiated society of the Hungarian Middle Bronze Age settlement of Jászdózsa–Kápolnahalom, people of different strata might have had different access to antler as valuable material, and rules stipulated who had the right to collect, stock and work antler and trade in antler artefacts (Choyke 2005, 144; Choyke & Daróczi-Szabó 2010, 238).

The right for hunting game could be an indicator of power and prestige of a certain social group. For example in the Bronze Age site of Monte Polizzo in Sicily wild animal bones constitute only 4–5% on all faunal remains, but in the acropolis the share of red deer bones was even 85% (Vretemark 2010, 174 f.). Similar phenomenon is characteristic also for later periods. The research of Roman period faunal remains from Switzerland shows that the inhabitants of certain settlement sites in the same district could have had different possibilities to hunt deer and also different access to antler as raw material (Deschler-Erb 2001). It is also known that deer hunting was the privilege of nobility in the Middle Ages (e.g. MacGregor 1985, 32; 1991, 366).

The finds from the eastern Baltic fortified settlements also include antler artefact types the use of which could have been limited to a certain group of

population (Luik 2007). It is also possible that the use of antler was somehow checked or restricted and the inhabitants of some sites had more opportunities to use antler. Antler (as well as bone) artefacts are more numerous only in the eastern Baltic fortified settlements, which were also centres of bronze casting and pottery making. Only a few finds are known from other contemporaneous settlement sites (e.g. some antler pieces with working traces and a bone arrowhead from Peedu hilltop settlement: Lang 2007a, 72). However, one should take into account that mainly fortified settlements have been archaeologically studied and the majority of finds of the period also comes from the fortified settlements. Most of the open settlements sites of the Late Bronze Age are small and have thin cultural layers with few artefacts, which are often destroyed by later intensive agricultural activities (Lang 2007a, 49 ff.; 2007b, 39 ff.).

Antler working scrap and unfinished artefacts provide most valuable information about manufacturing technologies, but sometimes working traces are visible on the finished artefacts as well. Usually bone working scrap is known in smaller quantities than antler scrap. One of the reasons for such distribution may be that antler working scrap is easier to recognize, while bone scrap may fall among faunal remains; moreover, the making of simple bone artefacts exploiting the natural shape of bone left almost no scrap (Luik 2005, 94; Luik & Maldre 2007, 30 f.). Nevertheless the larger number of antler working scrap could be the result of the fact that antler artefacts were manufactured by craftsmen who were specialized, at least to some extent, and whose activities were in some way organized and checked. Perhaps the access to antler as raw material, as well as the use of antler artefacts, was regulated.

Antler working scrap includes pieces of palmate of antler from which tines were removed, as well as tines and tine tips bearing tool marks (Figs 2, 3; Graudonis 1989, fig. 23, pls XI–XIII, XLII; Luik & Maldre 2007, 12, figs 5, 6, 8; Luik in print, fig. 19). The first operation of antler working evidently was to cut it into pieces of required size: the compact part of antler was cut or hacked around and the porous tissue inside the antler was simply broken. This method gives blanks their specific shape, since the porous middle part usually does not break smoothly, it forms a protrusion in the middle of the cut surface or, on the other piece, a cavity in the porous part (Fig. 3; compare e.g. Provenzano 2001, fig. 8; Borodovskij 2007, 73, fig. 45; Luik & Maldre 2007, fig. 4). Antler was sometimes also dissected by grooving (Luik & Maldre 2007, fig. 36). Tines and palmate can be regarded as an intermediate product for further working. Some of the antler fragments bear traces of further working: their rough surface was partly removed and the pieces were cut smoother, producing facets (Fig. 4: 2; Luik & Maldre 2007, fig. 7; Luik in print, fig. 20). Small tine tips may be regarded as antler working scrap not meant for use.

Chopping and cutting traces are also visible on some unfinished artefacts and on some tools which are not very carefully finished (Fig. 4: 1; Luik & Maldre 2007, fig. 10). A specific type of working traces on Bronze Age bone and antler artefacts are chatter-marks (Fig. 5; Luik & Maldre 2007, fig. 12; Luik in print, fig. 22).

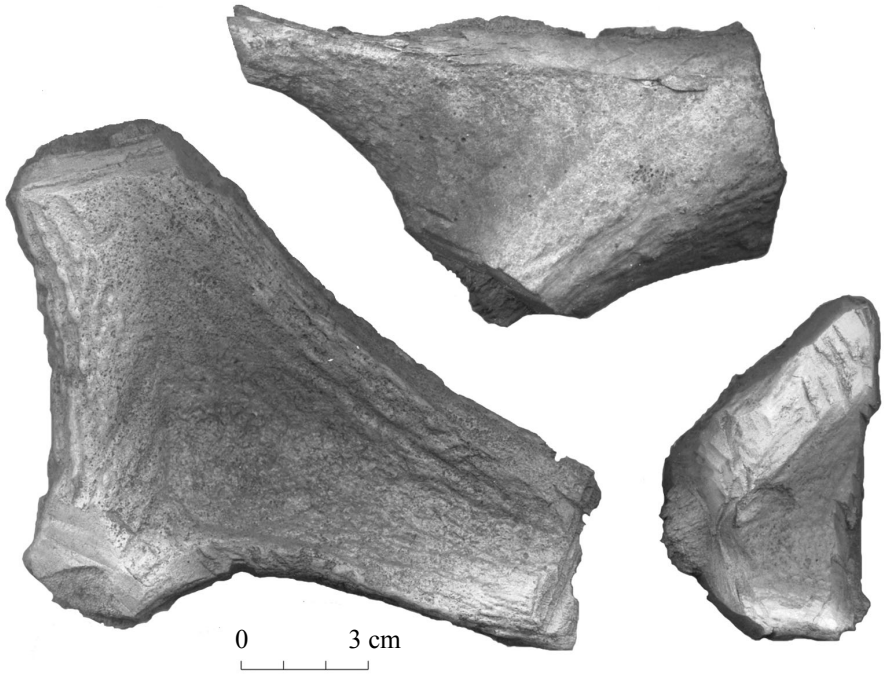

Fig. 3. Antler pieces with chopping traces from Asva. The compact part of antler was hacked around and the porous tissue inside was broken (AI 3307: 224, 114; 4366: 1409).

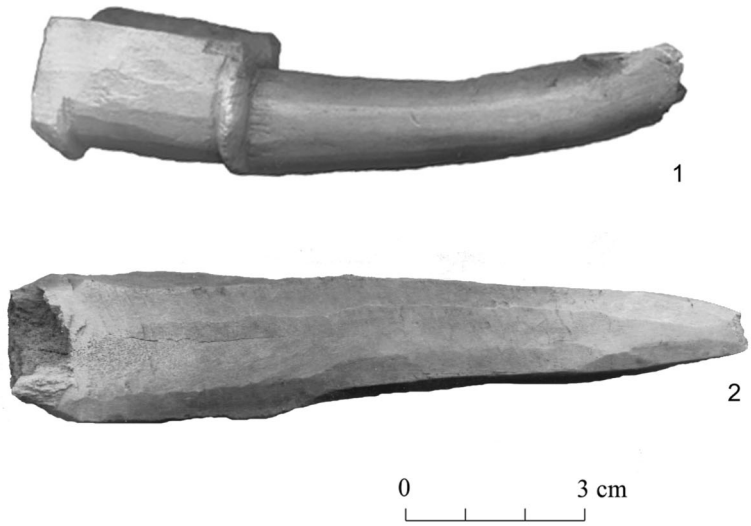

Fig. 4. Antler pieces with working traces from Asva. 1 socket part of harpoon head, 2 worked antler tine (AI 4366: 1863; 4012: 297).

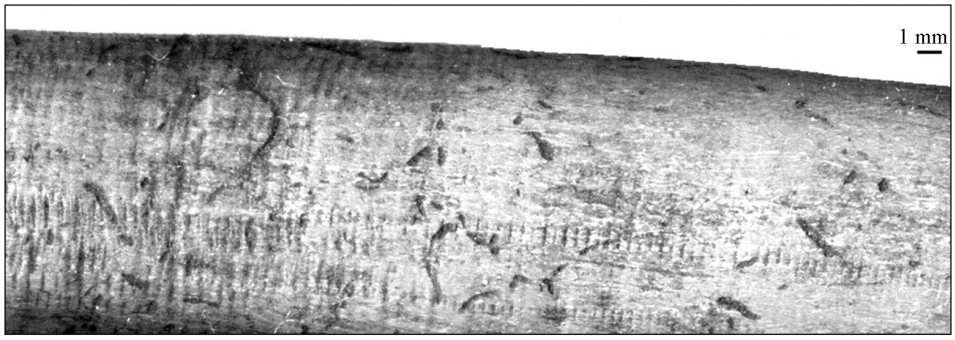

Fig. 5. Chatter-marks on cylinder-shaped antler blank from Ridala (AI 4261: 235).

These marks have emerged during the finishing of the surface of the artefact using either a bronze or flint cutting tool – when cutting a rather hard material powerfully and with steady force, the blade may begin to vibrate, thus leaving small transverse lines with equal intervals – chatter-marks – on the surface of bone or antler. It seems, however, that mostly stone tools have been used for antler working in the eastern Baltic region. For comparison for example in Hungary mostly stone tools have been used for bone working in the Middle Bronze Age, but in the Late Bronze Age metal tools were also used, especially for making the ornamented antler details of horse harness (Choyke 2005, 129; Sofaer 2010, 199); in northern Italian terramares in the Middle Bronze Age bronze tools were used for antler working (Provenzano 2001, 97).

Antler artefacts in the Late Bronze Age

Antler artefacts typical of the Late Bonze Age fortified settlements in the eastern Baltic region include both tools and hunting weapons, and also personal objects. Most of these objects are related to spheres, which were important for the society and people of that time. Probably antler was regarded as valuable material and all parts of it – beam, palmate, tines and tine tips – were used for making artefacts (Fig. 6).

Antler hoes or ard points are made from antler beam and palmate (Fig. 6: 1–2). In Estonia such tools are found mostly from Asva, one artefact comes from Iru and some fragments from Ridala (Lang 1996, pl. VIII: 3; 2007a, fig. 48: 1, 4; Luik in print, fig. 7). In Latvia most examples come from Ķivutkalns and some from Vīnakalns (Graudonis 1989, pls XIIa, XLII: 12; Luik in print, fig. 8). In Lithuania a couple of finds are known from Narkūnai and Sokiškiai (Grigalavičienė 1986, fig. 19: 5; Volkaitė-Kulikauskienė 1986, figs 21, 22). Latvian archaeologists have called these tools ‘axes’ (Graudonis 1989, 99), but according to the use wear and shape of artefacts it seems more probable that they were used as agricultural tools (Lõugas 1970, 109; Lang 2007a, 107; Luik in print).

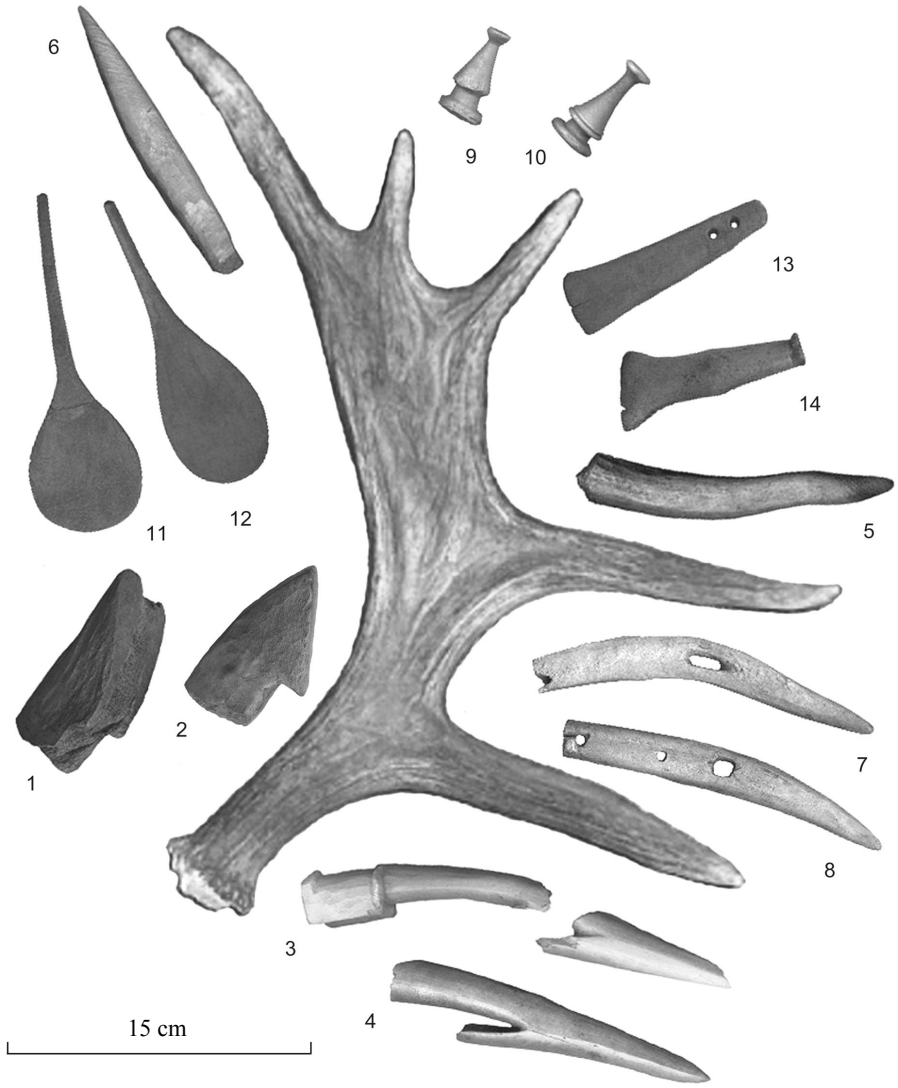

Fig. 6. All parts of antler were used for making artefacts. Antler artefacts from Asva. 1–2 hoes or ard points, 3–4 harpoon heads, 5–6 points with spiral use wear, 7–8 cheek-pieces of horse harness, 9–10 double buttons, 11–12 spoons, 13–14 handles (AI 4366: 1832, 1534; 4012: 113; 4366: 1863, 1942, 1823, 1883, 1644, 122, 614; 3658: 500; 3799: 83; 4366: 700, 1860, 1792).

Large curved harpoon heads with hemicylindrical sockets are made from antler tines (Fig. 6: 3–4). Such harpoon heads are found from Estonia (Asva, Iru, Ridala) (Vassar 1955, fig. 35: 1–3; Lang 1996, pl. VIII: 1; Luik in print, fig. 11). Large antler harpoon heads from the coastal settlements of Estonia are most likely connected with seal hunting. Besides these smaller straight harpoon heads also occur, which are made from bone (Luik in print, fig. 12).

Points with spiral use wear are made from antler tines (Fig. 6: 5–6). They have been mostly found from Asva, a total of ten specimens and fragments, one fragment comes from Ridala. Such objects have not been found from Latvia and Lithuania yet. Probably these tools were used for working some threads or fibres into a thicker cord, which could be used for fishing or seal hunting (Maldre & Luik 2009, 43, fig. 7; Luik 2010).

Cheek-pieces of horse harness are made from antler tines (Fig. 6: 7–8). From Estonia seven such specimens are known: three complete and two fragmentary pieces from Asva, one from Iru and one fragment from the stone cist of the grave of Proosa (Deemant 1980, pl. IV: 1; Lang 1996, pl. VIII: 2; 2007a, fig. 48: 2, 3; Luik in print, fig. 15). Some fragments of cheek-pieces have been found also in Latvia (e.g. Brikuļi, Mūkukalns) and Lithuania (e.g. Petrešiūnai) (Graudonis 1967, pl. XVIII: 10, 11; Vasks 1994, 115, pl. VII: 19, 20; Grigalavičienė 1995, fig. 100: 11). Various disc- and bar-shaped antler and bronze cheek-pieces are known since the early Bronze Age from many districts in Europe, e.g. Poland, Hungary, Ukraine, Scandinavia, and in southern Siberia (Bąk 1992; Harding 2000, fig. 5: 3; Choyke et al. 2004, 184, fig. 10; Usachuk 2004; Borodovskij 2007). In central Europe antler details belonging to horse harness were probably manufactured by specialized craftsmen (Choyke et al. 2004, 184; Choyke 2005, 140; Sofaer 2010, 211 f.).

Double buttons are mostly made from tine tips (Fig. 6: 9–10). Such buttons have been recovered both from Latvia (Ķivutkalns, Brikuļi), Lithuania (Narkūnai, Kereliai, Moškėnai) and Estonia (Asva and Kaali) (Graudonis 1967, pls VII: 12, VIII: 9; 1989, pl. XXV: 20, 21; Volkaitė-Kulikauskienė 1986, fig. 39: 1; Vasks 1994, 115, pl. IX: 18, 19; Grigalavičienė 1995, fig. 100: 1–4; Luik & Ots 2007). Antler double buttons are imitating similar bronze buttons from central Europe and Scandinavia, their occurrence may also refer to the distribution of the ideologies and symbolic meanings connected with them on the eastern shore of the Baltic Sea (Lang 2007a, 144, 253; Luik & Ots 2007).

Spoons are made so that bowl is carved from palmate and stem from tine (Fig. 6: 11–12). In Estonia three spoons have been found from Asva and one from Iru (Vassar 1955, pl. XXIII: 4; Lang 1996, pl. VIII: 3). In Latvia spoons are known from Ķivutkalns and Brikuļi (Graudonis 1989, pl. XXVI: 6, 7; Vasks 1994, pl. IX: 20). Probably spoons were usually made from wood; it is possible that spoons made from different material – antler – have had some special meaning. The role of food and manners of its serving were changing in the Late Bronze Age Europe (Sørensen 2000, 112 ff.). To the opinion of Valter Lang the appearance of fine-grained small ceramic bowls and bone spoons in the Late Bronze Age indicate that probably more attention was paid to table manners in Estonia as well (Lang 2007a, 230 f.).

Handles are made from antler tines (Fig. 6: 13–14). Some of them have round and some have oval cross section. In Estonia such handles have been found mostly from Asva (Fig. 7: 1, 2, 4; Jaanits et al. 1982, fig. 102: 2, 5) and in Latvia

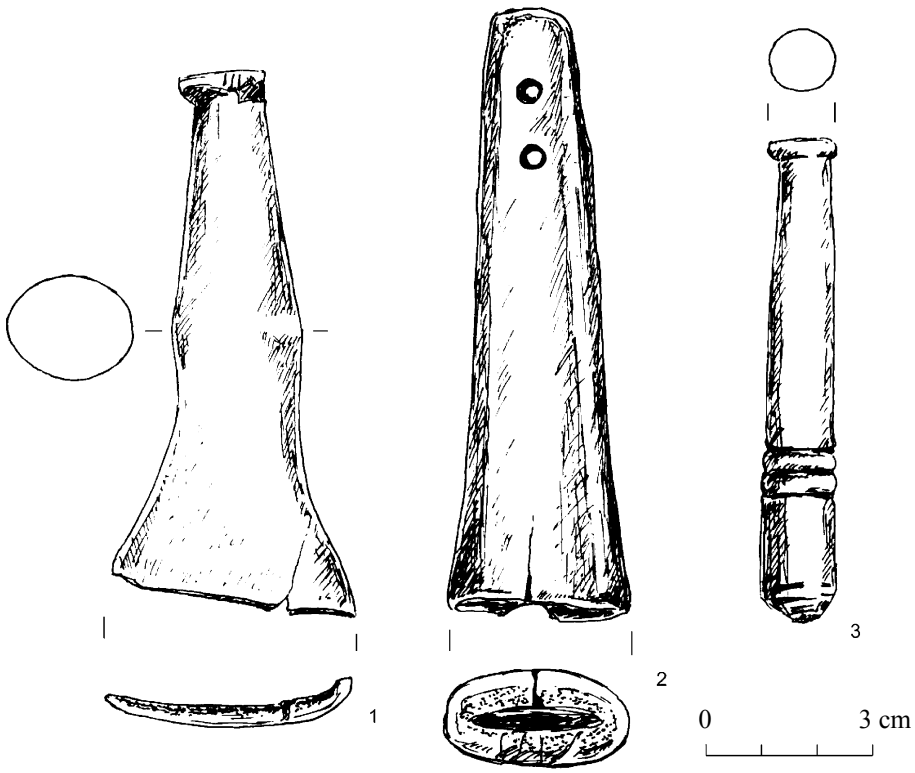

Fig. 7. Antler handles. 1 carefully polished handle with oval cross section and knob from Asva, 2 handle with oval cross section and two holes from Asva, 3 unfinished handle with round cross section from Kaali, decorated with profiled ridges and grooves (AI 4366: 1792, 1860; 4915: 324).

mostly from Ķivutkalns, including some unfinished specimens, but some examples are also from Mūkukalns (Graudonis 1967, pl. XVIII: 4, 5; 1989, fig. 40: 1–4, pls XIV–XV). Antler handles are known also from Lithuania (Narkūnai, Sokiškiai, Moškėnai, Vosgėliai) (Grigalavičienė 1995, fig. 61; Luik & Maldre 2007, 13, figs 11, 12). Such handles are usually carefully smoothed and polished. Sometimes they are decorated with profiled ridges and grooves (Fig. 7: 3; Graudonis 1989, pls XIV: 6, XV: 7; Grigalavičienė 1995, fig. 61: 1, 4, 5). According to the shape of cavity made into the handle for the blade it seems more probable that blade was from stone (flint, quartz), but perhaps in some cases it could be a small and short bronze blade (cf. Graudonis 1989, 33, pl. XV: 5). Most of them have a knob or hole(s) – tools with such handles could have been worn within sight by their owners. Thereof their appearance was important and displaying them could have had some meaning understandable to coeval observers.

Antler artefacts in space and time

Antler artefacts are found mainly from the fortified settlements in the eastern Baltic region in the Late Bronze Age. As already mentioned, only a few antler artefacts are known from open settlements, but these sites are also less investigated. Antler artefacts are not found from the Bronze Age graves either, except a few examples. A fragment of a cheek-piece from the stone grave of Proosa near Tallinn has been mentioned already (Deemant 1980, pl. IV: 1). A round antler plate with pierced holes is known from the Kurevere stone grave in Saaremaa. A small fragment of a similar plate comes from the Loona stone-cist grave, but it is too fragmentary for identifying the material (Luik et al. in print, fig. 13: 7, 8). A trapezoid pendant made from elk antler was found from the area of the Loona grave, but it could belong to the finds of the Neolithic settlement located beneath the Bronze Age grave (Luik et al. in print, fig. 13: 4). It should be mentioned that Estonian stone-cist graves do not contain many grave goods; bone pins are the most common finds in these graves (Lang 2007a, 155). Antler double buttons have not been found from Estonian stone graves yet but some buttons made from bronze and amber are known (Luik & Ots 2007). Amber double buttons are found both from fortified settlements and graves in Latvia, but specimens made from antler are known only from fortified settlements (Graudonis 1967, pls CII: 12, VIII: 9, XIX: 6–10; 1989, pl. X: 1–7; Vasks 1994, pl. IX: 18, 19).

According to Valter Lang, three main models of cultural behaviour can be distinguished in the Bronze Age on the eastern shore of the Baltic Sea: the inland model, the northern/western model and the south-eastern model. Fortified settlements were characteristic of the south-eastern model, the settlement pattern of the inland and the northern/western model consisted of small settlement sites or single farms (Lang in print). The trade in bronze, bronze casting and pottery making were important in more densely inhabited fortified settlements. Crafting bone and antler were also practiced, which is proved by the abundant finds from these sites. However, the presence of antler artefacts in the sites of south-eastern model and the absence of them in the sites of the inland and northern/western model does not mean that antler was regarded as valuable raw material in the area of south-eastern model and not in the others. The reason why antler artefacts are not known from open settlements may lie in their thin cultural layers containing only few finds, as well as in the fact that those settlements are less investigated. The absence of antler artefacts in graves may be influenced by the traditions of which objects were put into graves and which were not. But sometimes, like in the case of double buttons, the material used for making an artefact could have been of significance as well.

Quite similar types of antler artefacts were spread in the fortified settlements in different parts of eastern Baltic region, nevertheless some differences can be observed. These differences could be caused by the means of subsistence afforded by the local environment. As that kind of example harpoons and points with spiral use wear found from the Estonian coastal sites could be mentioned, which were presumably related with seal hunting (Luik in print). Antler hoes or ard points

have been found mostly from sites located in the region where natural conditions favoured primitive agriculture (Lang 2007b, 77, 82; Luik & Maldre, 2007, 33).

Could it be possible to follow some chronological differences in the use of antler? Two Bronze Age layers are distinguished in the Asva site, the first layer (Asva I) is dated to the 9th–8th centuries and the second (Asva II) to the 7th–6th centuries BC (Lõugas 1970; Sperling 2006, 15 ff., 129 ff., table 1). Although most types of antler artefacts mentioned in the present paper were spread in both layers some differences can be observed. For example harpoons and handles, and also most of points with spiral use wear have been found from the earlier layer, and antler hoes or ard points mainly come from the later layer (Sperling 2006, 101 ff., figs 33, 34). But as the number of such finds is rather small these differences could be occasional.

Different layers are distinguished also in the Lithuanian fortified settlements. For example in Sokiškiai antler (and bone) artefacts are quite similar in two Bronze Age layers (the earlier layer is dated to the last quarter of the II millennium and first quarter of the I millennium BC and the later to the second and third quarters of the I millennium BC). Antler artefacts as well as items made from other osseous materials are scarce in the latest layer, dated to the Early Iron Age (the last quarter of the I millennium BC and the beginning of the I millennium AD) (Grigalavičienė 1986, 136 f., figs 15–23). Antler (and bone) artefacts have been found mostly in the earlier, Bronze Age layer also in Kereliai settlement site and are very rare in the later, Iron Age layers (Grigalavičienė 1992, 104).

How was antler used for making artefacts in the eastern Baltic region in the long run? As I have studied only finds from the Late Bronze Age fortified settlements and some graves in the Lithuanian and Latvian museums the following comparison is based mainly on Estonian finds. The main problem in putting the antler artefacts from the Late Bronze Age into the broader chronological context is that the comparative material is almost absent from the directly preceding and following periods – the Early Bronze Age and Early Iron Age.

The overwhelming majority of Late Bronze Age bone artefacts in Estonia come from the fortified settlements on the Island Saaremaa (mainly Asva and Ridala), therefore some Neolithic sites in Saaremaa where finds include bone artefacts (Naakamäe and Loona) were selected for comparison (Luik et al. in print). The finds from these sites belong to the Middle and Late Neolithic (e.g. Naakamäe 2680 ± 210 ^{14}C cal BC and Loona 2725 ± 375 ^{14}C cal BC: Jussila & Kriiska 2004, 18, table 2: 50, 57), thus the gap between the compared finds is about two thousand years. As for Loona, it has been assumed that people lived there not only in the Late Neolithic but also in the Early Bronze Age, and a Late Bronze Age stone grave is also located upon the settlement site (Jaanits et al. 1982, 84, 149 f., pl. VII; Lang 2007a, 21, 153, figs 3, 87). Only one elk antler piece with working traces is known from Loona, and a small trapezoid pendant already mentioned. Neither antler artefacts nor antler working scrap was found from Naakamäe. Nevertheless, some tools made from elk bones and pendants from elk teeth are represented in both sites (Luik et al. in print).

Antler has been used for making tools in the Neolithic settlements of south-east Estonia, for example in Akali, Kääpa, and Tamula (Yanits 1959, fig. 31 ff.; Jaanits et al. 1982, figs 41: 6, 11, 12, 55: 12). Tools from osseous materials found from the Lake Lubāna also include antler artefacts. Most of these objects could not be dated precisely; both Mesolithic and Neolithic finds are represented (Vankina 1999, figs XCIX, C, CII: 9–12). Antler artefacts have been found also from the Neolithic sites in Lithuania, for example from Kretuonas, Šventoji and Šarnelė (Girininkas 1990, figs 47, 70, 71, 72; Butrimas 1996, figs 2, 7; Rimantienė 1996a, figs 29, 43; 1996b, figs 30, 37). If compared to bone artefacts, antler tools are less numerous in these Neolithic sites. Mostly mattocks, axes and chisels have been made from antler. In the case of all these tools both the measurements of antler and its toughness and elasticity were important. Some antler objects are found also from the Neolithic graves, for example some decorated plaquettes, spoons, awls, and figurines (Loze 2006, fig. 9; Kriiska et al. 2007, fig. 8; Lõugas et al. 2007, figs 3, 4; Ots 2010, figs 3, 4), but much more abundant finds in graves are pendants made from elk and red deer teeth (e.g. Duankalnis, Zvejnieki, Kõnnu, Tamula: Butrimas 1985; Lõugas 1997, appendix IIB; 2006; Larsson 2006; Kriiska et al. 2007, figs 8, 9).

Thus differences in the frequency of antler tools can be observed in the Neolithic sites. The share of elk bones among the faunal remains from these sites is also different. In Akali, Kääpa and Tamula the percentage of elk bones among faunal remains is more than 40%, but in Naakamäe it is only 0.1% (Paaver 1965, table 67). Naakamäe and Loona were located on the coast where seal hunting and fishing were basic means of subsistence (e.g. Lõugas 1997), the bones of terrestrial wild animals are few, most of them belonging to the wild boar (Paaver 1965, table 56).

Antler (and bone) artefacts are practically not known from the periods following the Late Bronze Age. One reason for the scarcity of antler objects could be thin cultural layers in the settlement sites of that time. As mentioned already, antler artefacts are few in the Iron Age layers of Lithuanian sites also (Sokiškiai, Kereliai), probably the use of some previously common raw materials, including antler, was decreasing because of introducing a new material, iron.

Only a limited number of antler objects are known from graves dated from the Early Iron Age to the Middle Iron Age. Most of antler finds from the burials of these periods are imported items, for example combs and dice (Tõnija, Toila, Jäbara, Rõsna-Saare, Salme: Luik 2003, 155 ff.; Aun 2009, 93, fig. 14; Konsa et al. 2009, 58 f., figs 7, 8). One reason for the absence of artefacts made from antler as an organic material could be the tradition of cremation burials. Nevertheless, it is possible to distinguish burnt antler and bone artefacts among cremated bones. For example some comb pieces and a fragmentary box lid have been found from the Rõsna-Saare I barrow cemetery (Aun 2009, fig. 14). Burnt comb fragments and some other broken bone artefacts are also found from the Viking Age and later cremation burials in Estonia (Käku, Viltina, Maidla, Madi, Lümanda: Luik 1998, 28 f., 55 ff., figs 33–37; 2003, 159 f., figs 4–5). Burnt combs are known from the Iron Age cremation cemeteries in Finland as well (e.g. Carpelan 1961; Heikkurinen-Montell 1996, 101, fig. 58), as burnt osseous materials are preserved even better in acid soils.

More numerous are antler (and bone) artefacts again in the sites belonging to the fort-and-settlement system (hill forts with settlement sites next to them), which developed in Estonia in the Pre-Viking and Viking Age. These settlement units were larger and more densely populated and have much thicker cultural layers with more numerous finds. Most abundant are antler and bone artefacts from the hill forts and settlements of Rõuge, Iru and Otepää in Estonia, and especially from Daugmale in Latvia (Luik 2005). Artefacts manufactured from antler were, of course, different in the Viking Age. Antler was no longer used for making larger tools, in case of which the measurements and strength of antler were of greatest importance. Iron and other metals were preferred for such kind of tools in this period. Nevertheless, smaller tools and other objects, such as awls, spindle whorls and handles were manufactured from antler and several types of pendants were carved (Luik 2005). Typical antler artefacts in the different periods of Iron Age were combs. For making combs the toughness and elasticity of antler were also significant, especially for comb teeth, which should not get broken (MacGregor & Currey 1983). Although combs are known in small numbers in Estonia already since the Roman Iron Age, they were not locally manufactured artefacts but imported goods in all these times, including the Viking Age (Luik 1998; 2005).

Conclusions

Antler artefacts and traces of antler working are well represented in the Late Bronze Age fortified settlements, compared to other sites of that time, and to the preceding and following periods. The abundance of antler artefacts and working scrap is definitely caused by the importance of antler working in these settlements but also by the fact that these sites had intensive cultural layers with abundant finds and good conditions for preserving osseous materials, and have also been more thoroughly investigated.

All parts of antler, which was regarded as valuable material, were used for making artefacts. As hunting had only minor importance for the inhabitants of the Late Bronze Age fortified settlements, shed antlers were presumably also used in addition to antlers of hunted animals. As some antler artefacts are very carefully finished products (e.g. handles and double buttons), it is possible that such artefacts were made by craftsmen who were specialized, at least to some extent, and whose activities were in some way organized and controlled. Undoubtedly practical reasons were important in choosing antler for making artefacts. In the case of ard points and harpoon heads, both dimensions of artefacts and also the toughness, hardness and elasticity of material were reasons for choosing the antler. The shape of antler tines was suitable for making e.g. points, cheek-pieces and handles. The beautiful appearance of polished objects with bright white colour was probably also important, for example in the case of double buttons and handles which were displayed and could have had some symbolic meaning.

When following the use of antler in the long run, qualities which were always considered most important when choosing antler for making artefacts included the strength, toughness and elasticity of this material. These characteristics were significant both in the case of Neolithic axes and chisels, Bronze Age ard points and seal harpoons, as well as Iron Age combs.

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Heidi Luik

MATERJAL, TEHNOLOOGIA JA TÄHENDUS: SARVESEMED NING SARVETÖÖTLEMINE LÄÄNEMERE IDAKALDAL NOOREMAL PRONKSIAJAL

Resümee

Eseme valmistamiseks materjali valimisel võisid muistsetel inimestel olla funktsionaalsed ja majanduslikud põhjused, aga need võisid sõltuda ka kultuuritraditsioonidest. Luumaterjalide puhul tehti esemeid tavaliselt nende loomade luudest, kelle luid esineb ka faunajäänuste hulgas. Funktsionaalne valik võis sõltuda konkreetse skeletiosa sobivusest mingiks esemeks. Siiski võisid kehtida ka traditsioonid: kelle luud või millised skeletiosad mingi eseme või tööriista valmistamiseks sobisid.

Baltimaade pronksiaegsete kindlustatud asulate (joon 1) faunajäänuste hulgas on ülekaalus koduloomade luud, mis moodustavad 52–94% faunajäänustest, metsloomaluude osakaal on väiksem, ka esemeid tehti nendest vähem. Siiski on töödeldud luumaterjali hulgas metsloomaluude osakaal suurem kui faunajäänuste hulgas üldiselt. Selle põhjuseks on sarve kasutamine esemete valmistamiseks. Baltimaade materjalis on sarve puhul tegu eelkõige põdrasarvede kasutamisega (joon 2), tunduvalt vähem leidub hirve sarvede tükke.

Sarve võidi eelistada nii selle mõõtmete kui ka omaduste tõttu. Kuigi nii luu kui ka sarv pärinevad loomade skeletist, on neil siiski erinevusi. Mineraalse ja orgaanilise aine tihedus ning hulk sarves ja luus on sarnased, kuid tulenevalt sarvede kiirest kasvust ei ole sarv nii tiheda struktuuriga kui luu, mis kasvab tunduvalt aeglasemalt. Sarv on luuga võrreldes elastsem ja selle katkimurdmiseks läheb vaja tunduvalt suuremat jõudu kui luu murdmiseks. See on üks põhjus, miks eelistati sarve, eriti vastupidavust nõudvate esemete või detailide puhul. Põdrasarvest on võimalik ka suuremate esemete valmistamiseks sobivat materjali saada. Loomulikult saab kasutada ainult tapetud loomade luid, kuid sarve puhul on võimalik ka mahaheidetud sarvede kasutamine. Mõlemal juhul võib kasutamist mõjutada sesoonsus: sarvede kasv on seotud aastaaegadega, aga ka loomi tapeti tavaliselt kindlal aastaajal.

Leedu pronksiaegsete kindlustatud asulate Narkūnai ja Nevieriškė töödeldud luumaterjali hulgas on sarvesemeid ning töötlemisjääke alla 10%, veidi rohkem, ligi 20%, on sarvesemeid ja -jääke Kereliai leidude hulgas. Eesti asulates Asvas ja Ridalas moodustavad põdrasarvest esemed ning töötlemisjäägid 16–17% luumaterjalist esemetest. Kuigi luu ja sarv kui kohalikud toormaterjalid olid üldiselt kättesaadavad, võisid siiski kehtida reeglid selle kohta, kes mingit materjali tohtis kasutada. Baltimaade kindlustatud asulate leiuaineses esineb luust ja sarvest esemetüüpe, mille kasutamine võis kindla elanikkonna rühmaga piiratud olla. Sellistena võib mainida sarvest kaksiknööpe, mis imiteerisid võõramaiseid eeskujusid, ja hobusevarustuse juurde kuulunud suitsekange.

Töötlemisjäätmete hulgas leidub sageli rohkem sarve- kui luutöötlemisjääke. Selle üheks põhjuseks on, et sarvetöötlemisjäägid on hõlpsamini äratuntavad, samas kui luujäägid võivad faunajäänuste hulka sattuda. Sarvetöötlemisjääkide hulgas leidub tükke sarve labaosast, mille küljest on eemaldatud sarveharud, samuti sarveharusid ja -tippe, millel on tööriistade jälgi. Kõigepealt tükeldati sarv vajaliku suurusega tükkideks. See toimus sarve kompaktosa ümberringi lõikamise või raiumise teel, seejärel murti sarve keskel olev poorne kude lihtsalt katki (joon 3). Sarveharusid ja labaosi võib pidada edasiseks töötlemiseks ettevalmistatud toormaterjaliks, väikesi sarvetippe aga tootmisjäätmeteks. Osal sarvetükkidest on näha edasise töötlemise jälgi – sarve konarlikku pealispinda on hakatud eemaldama ja sarve on tahuliselt siledamaks lõigatud, töötlemisjälgi leidub mõnikord ka valmisesemetel (joon 4). Iseloomulikeks töötlemisjälgedeks Baltimaade pronksiaegsetel luu- ja sarvesemetel on väikesed korrapärased ühtlaste vahedega põikjoonekesed, mis on tekkinud lõiketera libisemisel ning vibreerimisel (joon 5). Need võisid luuesemetele tekkida eseme töötlemisel tulekivist lõiketeraga, kuid võimalik on ka pronksist tööriista kasutamine.

Erinevate esemetüüpide valmistamisel leiti kasutusvõimalus sarve kõikidele osadele (joon 6). See näitab, et sarve kui väärtuslikku materjali püüti võimalikult täielikult ära kasutada. Sarvesemete hulgas leidub nii töö- ja jahiriistu kui ka personaalseid esemeid. Enamik neist on seotud valdkondadega, millel oli tolleaegse ühiskonna ja inimeste jaoks oluline tähtsus ning tähendus. Sarve tüve- ja labaosast valmistati kõpla- või adraterasid (joon 6: 1, 2), sarveharudest hülgeharpuune, spiraalsete kasutusjälgedega sarvteravikke ning suitsekange (joon 6: 3–8). Kaksiknööbid (joon 6: 9, 10) tehti sarveharude tipuosast ja lusikad nõnda, et kaha on sarve labaosast ning vars sarveharust (joon 6: 11, 12). Sarveharudest tehti ka hoolikalt poleeritud käepidemeid, millesse võis olla kinnitatud kivist või pronksist teravik (joon 6: 13, 14; 7).

Sarvesemeid leidub Baltimaades nooremal pronksiajal peamiselt kindlustatud asulate materjalis. Peaaegu üldse ei ole neid leitud avaasulatest, ka pronksiaegsetest kalmetest ei ole sarvesemeid teada, peale mõne üksiku erandi (näiteks suitsekang Proosalt ja ümar plaadike Kureverest). Eesti kivikalmetest on leitud paar pronksist ja merevaigust kaksiknööpi, kuid sarvest kaksiknööpe pole praeguseks kalmetest teada. Lätis on merevaigust kaksiknööpe saadud nii kindlustatud asulatest kui ka kalmetest, sarvest eksemplarid on leitud asulatest. Tihedama asustusega kindlustatud asulates olid olulised kaubavahetus ja käsitöö, muuhulgas tegeldi seal ka luu- ning sarvetöötlemisega. Siiski ei saa järeldada, et avaasulates sarve ei kasutatud. Põhjuseks, miks sealt sarvesemeid ei teata, võib olla nii nende õhuke ja leiuvaene kultuurkiht kui ka vähesem uuritus. Sarvesemete puudumine kalmetes võib olla seotud sellega, missuguseid esemeid oli kombeks hauda kaasa panna ja missuguseid mitte. Kuid esemeid võidi panuseks valida siiski ka vastavalt sellele, millisest materjalist need olid.

Üldiselt olid Baltimaade eri piirkondade kindlustatud asulates levinud ühesugused sarvesemete tüübid, kuigi leidub ka erinevusi, mis on seotud looduslike olude poolt võimaldatud elatusaladega. Sellisteks näideteks on Eesti rannikul paiknenud asulates esinevad harpuunid ja spiraalsete kasutusjälgedega teravikud, mille kasutamine võis hülgepüügiga seotud olla. Sarvest kõpla- või adraterasid leidub rohkem leiukohtades, mille läheduses olid algeliseks maaharimiseks ka sobivamad tingimused. Kuigi pronksiaegsetes kindlustatud asulates eristatakse eriaegseid asustuskihte, on luu- ja sarvesemed seal üsna ühesugused.

Milline aga oli sarve kui materjali kasutamine Läänemere idakaldal nooremal pronksiajal – võrreldes varasema ja hilisema ajaga – pikemas perspektiivis? Noorema pronksiaja sarvesemete paigutamisel pikemasse kronoloogilisse konteksti on peamine probleem selles, et vahetult eelnevast ja järgnevast perioodist – vanemast pronksiajast ning varasest rauaajast – ei ole võrdlusmaterjali praeguseks peaaegu üldse teada. Enamik noorema pronksiaja sarvesemetest Eestis pärineb Saaremaalt Asvast ja Ridalast, seetõttu valisin võrdluseks kõigepealt Saaremaa asulad Naakamäe ning Loona, kus samuti leidub luust esemeid. Nende puhul on tegu keskmise ja hilisneoliitikumi leiukohtadega, seega jääb võrreldavate leidude vahele umbes paar tuhat aastat. Loonast on teada üksainus töötlemisjälgedega sarvetükk ja trapetsikujuline sarvripats, Naakamäelt sarvesemeid pole. Kagu-Eesti neoliiti-

listes asulates (Akali, Kääpa, Tamula) on sarve tööriistade valmistamiseks kasutatud. Sarvesemeid on ka Lubāna järvest saadud kiviaja leidude hulgas ja Leedu neoliitilistes leiukohtades (Kretuonas, Šventoji, Šarnelė). Sarvest tehti peamiselt kõplaid, kirveid ja talbu, mille puhul olid olulised sarve mõõtmed ning tugevus ja vastupidavus. Ka neoliitikumi matustes leidub sarvesemeid (loomakujukesi, lusikaid, naaskleid, sarvplaadikesi). Sarvesemete hulk neoliitikumi asulates on erinev, kuid väga erinev on ka põdraluude osatähtsus nende asulate faunajäänuste hulgas: Akalis, Kääpal ja Tamulas on põdraluid loomaluude hulgas enam kui 40%, Naakamäel aga ainult 0,1%. Rannikuasulates Naakamäel ja Loonas oli põhitegevuseks hülgeküttimine ning kalapüük, maismaaulukite luid on seal vähe.

Ka pronksiajale järgnevate perioodide asulapaikadest Eestis ei ole sarv- (ega ka luu-) esemeid peaaegu üldse teada. See võib olla seotud selleaegsete asulate õhukese kultuurkihiga, aga ka sellega, et seoses raua kasutuselevõtuga vähenes osa varem kasutatud toormaterjalide, sh sarve, kasutamine. Varase, vanema ja keskmise rauaaja kalmetest Eestis on teada üksikuid sarvesemeid, millest enamik on ilmselt importesemed. Arvukamalt on sarv- (ja luu-) esemeid teada alles viikingiaegsetest linnus-asula-süsteemi kuulunud muististest, millest jäi maapinda paksem kultuurkiht ning rohkem leiumaterjali (näiteks Rõuge, Iru ja Otepää ning Daugmale Lätis). Enamasti pole viikingiajal sarvest enam tehtud suuremaid tööriistu, mille puhul olid eriti olulised sarve mõõtmed, tugevus ja vastupidavus. Selliste esemete valmistamiseks eelistati kahtlemata metalli. Sarvest tehti väiksemaid esemeid, näiteks naaskleid, värtnaketrasid ja käepidemeid, ning nikerdati mitmesuguseid ripatseid. Üheks sarve kasutusalaks rauaajal olid kammid, mille puhul on samuti oluline sarve kui materjali sitkus ja vastupidavus, et vältida piide murdumist. Üksikuid kamme leidub Eestis alates rooma rauaajast, viikingiajast on neid juba veidi rohkem, kuid ka siis on nende puhul tegu ilmselt mujalt toodud, mitte kohapeal valmistatud esemetega.

Võrreldes nii sama perioodi muude muististega kui ka eelneva ja järgneva perioodiga, on noorema pronksiaja kindlustatud asulad muistised, mille materjalis on sarvesemed ning sarvetöötlemine hästi esindatud. Kahtlemata on sarvesemete ja töötlemisjääkide rohkus seotud nii sellega, et sarvetöötlemine oli neis asulates olulise tähtsusega, kui ka sellega, et nende muististe intensiivne kultuurkiht on leiurohke ning luumaterjalide säilimiseks soodne ja et neid on praeguseks ka rohkem uuritud. Sarve valimisel esemete valmistamiseks olid kindlasti olulisel kohal praktilised põhjused. Adraterade ja hülgeharpuunide puhul olid valiku põhjusteks nii eseme mõõtmed kui ka materjali tugevus, elastsus ning vastupidavus. Spiraalsete kasutusjälgedega sarvteravike ja suitsekangide puhul paistab silma sarveharude kuju sobivus nende esemete valmistamiseks. Käepidemete ja kaksiknööpide puhul võisid põhjusteks olla ka materjali hea töödeldavus ning valge värvus. Kui jälgida sarve kasutamist pikema aja jooksul, võib täheldada, et sarve valimise puhul arvestati alati selle omadusi – sitkust, tugevust ja vastupidavust, mis olid tähtsad nii neoliitilise kirve ning talva, pronksiaegse adratera ja hülgeharpuuni kui ka rauaaegse sarvest kammi puhul.