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Bronze Age bone artefacts from Narkūnai, Nevieriškė and Kereliai fortified settlements. Raw materials and manufacturing technology

Heidi Luik, Liina Maldre

INTRODUCTION

In the framework of the project "Bone artefacts among archaeological finds from the Bronze Age fortified settlements of the Baltic countries" (Estonian Science Foundation grant No 6898) we had the opportunity in 2006 to investigate bone and antler artefacts from three fortified settlements of the Bronze Age in Eastern Lithuania – Narkūnai, Nevieriškė and Kereliai (Fig. 1). Surveys of the investigations of these settlements, including the typological analysis of bone artefacts, have been published (Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a; 1992; 1995). A more detailed discussion of the bone artefacts and raw materials used to make them has been published by Linas Daugnora and Algirdas Girininkas in their monograph dealing mainly with the history of natural conditions and fauna of Lithuania (Daugnora, Girininkas, 1996). The aim of the following study is to give a survey of the manufacturing of bone and antler artefacts in these mentioned fortified settlements, with an emphasis on materials, tools and technologies used in this craft. We could not investigate and analyse the bone artefacts from the museum's exposition. Material identifications are arranged by the sites; since the tools and technologies used are largely the same at all three sites, they are discussed together. No special studies have been published about the Bronze Age bone working in the neighbouring areas, but bone artefacts have been discussed among other finds (Indreko, 1939; Baccap, 1955; Lõugas, 1970; Граудонис, 1967; Graudonis, 1989; Vasks, 1994; Lang, 1996; Sperling, 2006). Studies on Bronze Age bone artefacts have been published for central and southern Europe (e.g., Bąk, 1985; Elster, 2001; Choyke, Vretemark, Sten, 2004; Becker, 2005; Choyke, 2005). We have also used studies on earlier, mainly Neolithic, bone working for comparison (e.g., Bulten, Clason, 2001; Russell, 2001a; 2001b; Sidéra, 2001; 2005; Christidou, 2001; 2005; Legrand, 2005; Maigrot, 2005).

In the archaeological research of recent decades, more attention has been paid to problems connected with technologies, accentuating the fact that technology is inseparable from man and society (e.g., Lemonnier, 1993; Dobres, 1995; 2000; Choyke, 1997; Ingold, 2000). Material culture is actively involved in social processes and human interaction; material objects are not barely reflections of human behaviour, they are manipulated as part of intentional strategies (Prown, 1993, p. 1; Schiffer, 1999; Gosden, Marshall, 1999, p. 170; Renfrew, 2002, p. 135; Hodder, 2004, p. 29, 36; Caple, 2006, p. 13 ff.). The knowledge and opinions about how something must be done exist in human societies, they form part of everyday life (Earle, 2002, p. 163; Barrett, 2005). This knowledge also includes technology – how an artefact should be made, which materials, tools and working techniques must be chosen. Humans reproduce their being and their social relations through everyday practices which take place in material conditions and through material culture. These everyday practices are influenced by historically established cultural beliefs, attitudes and habits (Robb, 2005; see Bourdieu, 1977).

Pierre Lemonnier emphasises that techniques are first and foremost social products. Any technique, in any society, is concerned with how things work, how they are to be made and to be used and is taught through tradition (Lemonnier, 1993). According to Marcia-Anne Dobres, technology depends on cultural attitudes to what are the right and wrong ways to make and use material culture, it concerns the active involvement of social actors in the gradual creation of their material world; it is a continuous process through which people, society and materials together create and recreate the meaningful conditions of

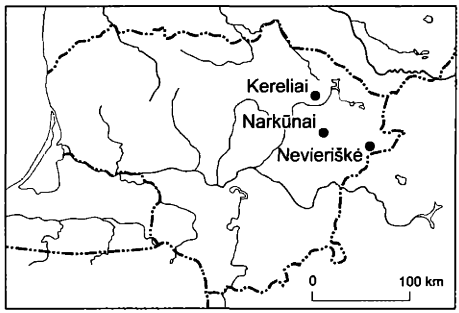

Fig. 1. **Location of fortified settlements discussed in the analysis of bone artefacts** (drawing by K. Siitan).

1 pav. Įtvirtintų gyvenviečių, naudotų analizuojant kaulinius dirbinius, buvimo vietos (piešė K. Siitan)

everyday life. Technological practice is not simply the activities and physical actions of artifact production and use, but also a sensuous, engaged, mediated, meaningful and materially grounded experience causing individuals and collectives act as they do (Dobres, 1995, p. 27 ff.; 2000, p. 4–5).

Besides the identification of materials and study of technologies, the aim of the article is to compare bone artefacts from the three fortified settlements and with the other finds from the Baltic countries and thus to establish which similarities or differences of people's choices can be observed, for example, in selecting material or techniques for making different artefacts. Were these choices always based on practical purposes, or were they influenced also by other reasons? Were traditions and habits or, on the contrary, innovations the determinant factors? The answer is also sought to the question whether and which conclusions can be drawn on the basis of the analysis of bone artefacts concerning the people's activities, social relations, the organization of production and the occurrence or absence of the specialization of production in the society under survey.

OUTLINE OF THE ARCHAEOZOOLOGICAL MATERIAL OF THE BRONZE AGE FORTIFIED SETTLEMENTS OF LITHUANIA

Bones of domestic animals prevail among the faunal remains from the settlement sites discussed in the article – in Narkūnai bones of domestic animals make up 78% of the total and bones of wild animals 22% (Volkaitė-Kulikauskienė, 1986, p. 47); in Nevieriškė 92.9% of faunal remains belong to domestic animals (Grigalavičienė, 1986a, p. 88). The amount of animal bones found from Kereliai was rather small – 74 bone fragments (84.1%) belonging to domestic animals and 14 fragments to wild animals and wildfowl (Daugnora, Girininkas, 1996, p. 125). Without reference to bird bones, the percentage of domestic animals here is 88.1% (see *ibid.*, p. 129, Tab. 49). Apart from these sites, information about archaeozoological material from the Bronze Age is also available for Sokiškiai, Juodonys, Šeimyniškėliai and Petrešiūnai sites in East Lithuania. In the first of them, bones of domestic animals make up 89.8% (Grigalavičienė, 1986b, Tab. p. 128), in the second 81.4% (Daugnora, Girininkas, 1996, Tab. 51), in the third 67.9% (*ibid.*, Tab. 47) and in the fourth 75.1% of all identified bones (Паавер, 1965, Appendix II). Among the bones, domesticated pig bones prevail in most places, usually followed by those of cattle and sheep/goat or horse (Fig. 2).

Daugnora and Girininkas assert in their monograph that most of the bone artefacts are made of bones of wild animals; of domestic animals, only horse bones had been used (Daugnora, Girininkas, 1996, Tabs. 45, 50, 55, 56). Artefacts made from roe deer bones are numerous while none of the objects has been identified as made of sheep or goat bone. The same can be said about pig and wild boar bones – only one possible bone of domestic pig has been mentioned among the finds from Nevieriškė (*ibid.*, Tab. 46).

Sheep/goat bones make up 4.7–16.7% of all identified bones. Their relative importance is still higher in layer 5 of the fortified settlement of Narkūnai, where their amount is 19.8% of all identified bones. The percentage of roe deer bones is quite insignificant in archaeozoological material of most East Lithuanian fortified settlements of the Bronze Age. In Narkūnai their share is different in different layers, constituting 0.1–1.3% of all animal bones (Volkaitė-Kulikauskienė, 1986, Tab. p. 43), in Nevieriškė roe deer bones form 0.3% of the identified animal bones (Grigalavičienė, 1986a, Tab. p. 84). Among the scanty faunal remains of Kereliai, the percentage of roe deer bones is higher – 8.3% of identified animal bones (on the basis of Daugnora, Girininkas, 1996, p. 129, Tab. 49). Among faunal remains from Sokiškiai, the percentage of roe deer bones is 0.5% (Grigalavičienė, 1986b, Tab. p. 128). In Šeimyniškėliai their share is highest – 17.0% of all identified animal bones (Daugnora, Girininkas, 1996, Tab. 47), but the material here is very scanty as only 53

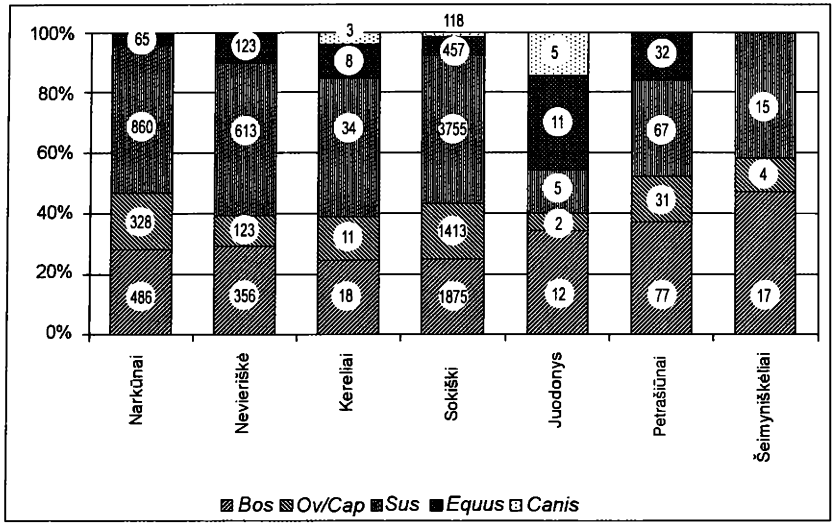

Fig. 2. **The number and ratio of bones of domesticated animals in Lithuanian Bonze Age fortified settlements** (after Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a; 1986b; Daugnora, Girininkas, 1996; Паавер, 1965).

2 pav. Prijaukintų gyvūnų kaulų skaičius ir santykis Lietuvos žalvario amžiaus įtvirtintose gyvenvietėse (pagal Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a, 1986b; Daugnora, Girininkas, 1996; Паавер, 1965)

animal bones were recovered. In faunal remains from Juodonys (Daugnora, Girininkas, 1996, tab. 51) and Petrašiūnai (Паавер, 1965, Appendix II) roe deer bones are missing altogether (Fig. 3).

Thus, the amount of roe deer bones found in the Bronze Age sites of Lithuania is small. Although Kalju Paaver reported that the relative number of roe deer bones among game bones from South Latvia and Lithuania increased in the Late Holocene (Паавер, 1965, p. 221), their share among all faunal remains still constituted only a few percent.

Relying upon such species composition of faunal remains, it is possible that most of the artefacts made from metacarpal and metatarsal bones are made of sheep/goat bones. Distal ends of metacarpal and metatarsal bones are very similar in these species, and since artefacts are worked bone fragments the distinction of species is rather complicated. The same problem arises with spearheads and some scrapers made from tibia: in most cases it is impossible to establish firmly whether the bones belonged to sheep/goat or roe deer.

The results of bone identifications presented by Daugnora and Girininkas reveal that bones of domestic pigs had not been used for making artefacts (except a single bone fragment of a domestic pig or wild boar from Nevieriškė) (Daugnora, Girininkas, 1996). The results of investigations carried out in the framework of the present study by Liina Maldre, however, suggest that most of scrapers from the fortified settlement of Narkūnai are made from tibia of domestic pigs. Since bones of domestic pigs constitute a considerable part (32–56%) of all bones of domestic animals found in the Lithuanian Bronze Age fortified settlements (only in Juodonys their percentage is only 14), it is quite logical that they were also used for making artefacts. Pins made from pig fibulae are also numerous.

MATERIALS USED FOR MAKING ARTEFACTS

Fortified settlement of Narkūnai

The hillfort of Narkūnai was investigated in 1975–1978 when an area of 660 sq. m was excavated. Two settlement layers were discovered on the hillfort. The lower one, belonging to the Early Metal Age, was dated to the period from the late 2nd and early 1st millennia BC to the first centuries AD. Three horizons can be observed in this layer; of them two lower ones, being better preserved, belong to the end of the 2nd – beginning of the 1st millennium BC and to the 1st millennium BC. The layer belonging to the time about the birth of Christ could not

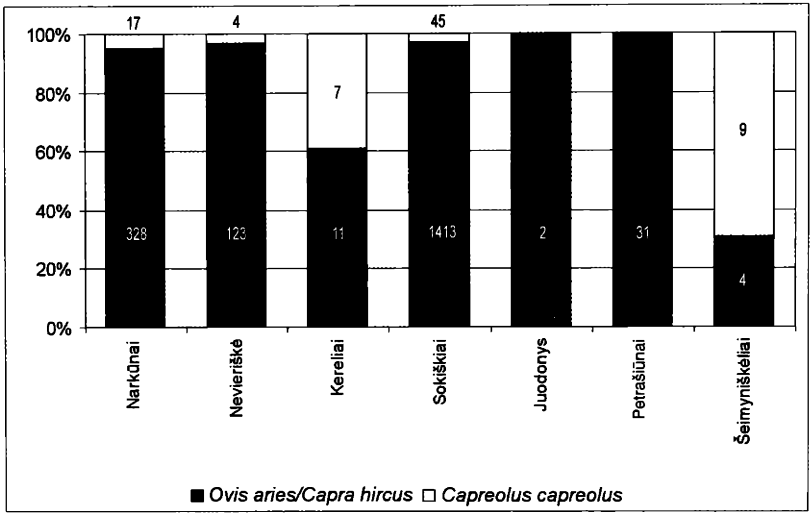

Fig. 3. **The number and ratio of sheep/goat and roe deer bones in Lithuanian Bonze Age fortified settlements** (after Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a; 1986b; Daugnora, Girininkas, 1996; Паавер, 1965).

3 pav. Avių / ožkų ir stirnų kaulų skaičius ir santykis Lietuvos žalvario amžiaus įtvirtintose gyvenvietėse (pagal Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a, 1986b; Daugnora, Girininkas, 1996; Паавер, 1965)

be accurately examined (Volkaitė-Kulikauskienė, 1986, p. 47). Apart from pottery, the largest group of finds recovered from the site consisted of bone and antler objects and their fragments, the total number of them being 465 (*ibid.*). In the course of the present research, 385 artefacts and their fragments from collections of the National Museum of Lithuania were examined, of them 360 can be regarded as artefacts or production waste, and about 25 bone fragments did not bear clear working or wear traces.

Most of the artefacts are made from bone. Only one tooth (beaver tooth with cutting traces) and two horn cores[1] (one belonging to cattle and one to goat) were found, which each constitute only about 0.5% of the material; 31 artefacts, their fragments and pieces of production refuse (more than 8%) are of antler. In most of the cases where animal species could be established, elk antler had been used. In two cases red deer antler was identified, and one belonged to roe deer. 326 artefacts, i.e. about 90% of the total, are made from bone.

Bones could be identified to species and skeletal parts only in the artefacts that had only an edge or some other working part processed so that features indicating a certain bone and/or species were preserved. Therefore bones of smaller animals could be determined more accurately. From large animals, mostly diaphyses of long bone were used after removing epiphyses and other characteristic parts of bone, on the basis of which it would be possible to determine the species. Summarily, in about a half of the artefacts, animal species or at least the size of the animal could be determined. 51 artefacts are definitely made of pig bones and 13 are very likely from pig bones, thus about one fifth of bone artefacts (about 40% of those determinable) are made of pig bone. Besides, deciding by the size of bones, three artefacts are made from wild boar bone. Next by number, sheep/goat bones could be determined. These were used in at least 40 cases, with six presumable cases in addition (which makes 1/7 of bone artefacts). It is possible that in some cases roe deer bones also were used, but in fragmentarily preserved artefacts it is not always possible to distinguish them from sheep/goat bones. All determinable artefacts, however, are made of sheep/goat bones. In 27 cases, material could be

[1] Horn cores with cutting traces can be regarded as production refuse. Horn consists of the bony horn core and the covering sheath which was removed and used for making artefacts. The horn sheath, consisting of keratin substance, usually does not preserve in the soil (Luik, 2005, p. 79 and the references therein).

determined in artefacts which, deciding by their size, were made of bones of large herbivores (elk, red deer, cattle, horse). Of these, five belonged to cattle, two to horse, two to elk and three to elk or red deer. The species of the rest of the large bones could not be identified. Here it must be mentioned that long bones of large herbivores were also used for making decorative pins and arrowheads; most of them were located in the exposition of the museum at the time of our investigation and therefore are not included in this analysis. From decorative pins and arrowheads it is usually impossible to identify the species. A few artefacts made from hare (2) and bird bones (3–4) were also determined.

In about 300 artefacts, material could be identified to a skeletal part. The overwhelming majority of the artefacts were made from long bones. In 140 cases it was only possible to establish that the artefact was made of an undeterminable long bone. The use of the following long bones was possible to establish more accurately: tibiae (52–57), metapodial bones (32, including 4 determinable metacarpal and 5 metatarsal bones), fibulae (24–28), femuri (6–8), radii (4), humeri (2–4). Ribs (19–22), astragalus (1), scapula (1) and some flat bones which could not be determined more accurately (2) had also been used. The large number of metapodials is evidently connected with the fact that they are long and straight and have a thick compact part, which makes them suitable for producing a large variety of artefacts (see Luik, 2005, p. 37, 92–93 and the references therein). Most of the artefacts that could be identified only as made of a long bone are probably also made from metapodial bones. Other bones that could be identified more frequently were connected with a certain type of artefacts for which they were most suitable. For instance, pig fibulae were used to make pins and points, sheep/goat tibiae were preferred for making spearheads; pig, but also sheep/goat tibiae were used to make scrapers. Of flat bones, ribs were most frequently used (usually split longitudinally into two flat halves) for making artefacts with oval ends, but also for points.

Fortified settlement of Nevieriškė

An area of 1486 sq. m was excavated on the hillfort of Nevieriškė in 1976–1978. The presence of at least four settlement layers was established, but a few finds suggested also the presence of an earlier settlement. The oldest finds date from the 1st half of the 2nd millennium BC, and the latest habitation was dated to the 3rd–4th centuries AD (Grigalavičienė, 1986a, p. 86–87). Nearly a half (about 300 objects and fragments) of the recovered finds (altogether 622) consist of bone and antler artefacts (*ibid.*, p. 87). In the course of the present research, 290 artefacts and their fragments were examined. On about 50 of them, no working traces were discovered and in about 20 cases only vague cutting traces could be observed, which may also be of culinary origin. However, it is still possible that at least part of these bones had been crushed deliberately trying to produce a blank for further working. This is probably the case with the bones that had been broken in a way to form a rather regular oval end.

Here, like in Narkūnai, most of the artefacts and fragments are of bone. Only four worked canines (3 belonging to wild boar and 1 to bear) were found, antler could be determined only in five cases (two fragments belonged to red deer, one to elk, two could not be identified). The rest of the artefacts and fragments are of bone. In the following review, only the identifications of bone artefacts and fragments that are definitely or very likely worked have been taken into consideration. About a half of bones could be determined to species, and in nearly 100 cases the species could not be identified. The largest number of artefacts are made of bones of large herbivores but, like in Narkūnai, their species cannot be determined in most cases. The total number of artefacts and scrap from bones of large herbivores is 55; of these, only one horse and two cattle bones could be identified. In 3–4 more cases a bone presumably belonged to cattle, one presumably to horse and 2–3 probably to elk. Sheep/goat bones could be positively determined in 27 artefacts, including one definite sheep bone, and presumable sheep or goat bones in 9–10 more cases. At least 21 artefacts are from pig bone, 4–5 more specimens are probably from pig bone and two most likely from wild boar bone. A few artefacts are made from hare and bird bones (7–12 and 1–4, respectively). As for skeletal parts, in most cases it is only possible to identify the bone as a long bone (in about 130 cases). Long bones that could be determined more accurately were metapodial bones (25 pieces, among them 4 metacarpal and 4 metatarsal bones could be identified), fibulae (19–21), tibiae (14–18), radii (9), humeri (3), ulnae (2) and femuri (1–3). In ten cases ribs were used, and one mandible could also be identified.

Fortified settlement of Kereliai

Excavations of the Kereliai hillfort took place in 1985–1986, an area of 568 sq. m was investigated. Three deposits can be distinguished in the cultural layer, the earliest of them belonging to the Bronze Age. Most of the found bone artefacts apparently came from this deposit (Grigalavičienė, 1992, p. 102). A total of 170 artefacts were recovered, and nearly a half of them (80 specimens) were bone and antler artefacts (*ibid.*). In the course of the present study 66 of them were investigated, ten of which lacked clear working traces.

Most of the artefacts and scrap here are also from bone. Two worked teeth were found (one canine of a domestic pig, the other of a wild boar). Of eleven antler fragments, only one belonged to a red deer, the rest were from elk antler. The majority (20) of determinable bones belonged to large herbivores, among these one horse bone and 3–5 elk bones could be determined to species level. Besides, seven sheep/goat bones (one of them positively sheep) and four pig bones could be determined. Of skeletal parts, long bones are again most frequently determined: 24 bones could be identified just as long bones, and more accurately 8 metapodials (including 3 metacarpals and 1 metatarsal bone), 4 fibulae, 4 tibiae and 1 ulna could be determined.

Choice of material

The reasons for the selection of material by ancient craftsmen may be biological as well as cultural (see, e.g., Friedel, 1993, p. 44; Caple, 2006, p. 94). Usually artefacts were made from bones of the species occurring also among faunal remains. Biological selection depends on the suitability of a bone for an artefact; for example, the use of a rudimentary metapodial bone or ulna for a point, the inclination of metapodials of ruminants to split along the longitudinal groove in their middle, etc. At the same, time traditions could also exist concerning the suitability of a bone of certain species or from certain skeletal parts for making a certain tool or artefact (Choyke, 1997, p. 66–67; Choyke, Vretemark, Sten, 2004, p. 178). According to Pierre Lemonnier, the choice of a certain technique, raw material or tool could sometimes depend on some symbolic value attributed to them by society rather than on their real physical properties. This way the use of a certain material or technique might have been considered imperative in certain cases, regardless of the fact that an artefact could have been made in a different way or from different material, or, on the contrary, rejected completely notwithstanding the excellent suitability of the material (Lemonnier, 1993, p. 3). Robert McGhee, who has analysed the choices of bone, antler and walrus ivory in bone working of the arctic peoples of North America, has also suggested that besides the functional properties of materials the symbolic meanings attributed to them were also important (McGhee, 1977).

The study of the archaeological record from the Lithuanian fortified settlements under discussion reveals that mostly bones of domestic animals were used. The relative importance of bones of wild animals is considerably smaller among faunal remains as well as in bone artefacts. The situation is similar in Estonian Bronze Age fortified settlements where bones of domestic animals prevail among faunal remains (Lõugas, 1994; Maldre, 1999, p. 322; in print; Sperling, 2006, p. 125–127) and most of bone artefacts are also made from bones of domestic animals. The same can be observed, for example, in Hungarian bone artefacts of the Bronze Age: the choice of bones depended primarily on their availability, and most of the bone artefacts are made from bones of domestic animals, which also prevail among faunal remains (Choyke, Vretemark, Sten, 2004, p. 184). But apparently this was not always the case. Isabelle Sidéra's analysis of the Neolithic bone artefacts from the Michelsberg and Chasséen find complexes (in the Rhine and Paris basins) may be presented as an example. There the situation was quite reverse: during the periods in which domesticated animals provided most meat, the bone industry emphasised the significance of wild animals using their bones more frequently (Sidéra, 2001, p. 222; see also Bradley, 2005, p. 102). And yet such principles of selection seem to be an exception rather than a rule.[2] The proportion of wild animals' bones may nevertheless be higher among worked bone than in faunal remains. This

[2] The proportion could have been influenced also by the large number of beads and pendants of red deer canines, which are decidedly not practical objects. More likely they had some other meaning, for example, expressing social identity, which was attributed precisely to the objects of this certain shape, made from this certain material (replicas of red deer canines made from bone or stone have also been found). It must also be mentioned that artefacts of wild animal bones frequently occur in burial assemblages, which has led to the assumption that they might have been meant to emphasize the status of the buried person (Sidera, 2001, p. 222; see also Choyke, 2001b).

may be caused also by the use of antler in bone working – antler could have been preferred for its large size and better qualities (toughness and durability). It has been supposed that, if bones of both domestic and wild animals were available, the latter might have been preferred for their larger size and toughness, but it is also possible that the selection of a certain species or skeletal part might have been related to the symbolic value attributed to it (Russell, 2001a, p. 272; see, e.g., McGhee, 1977).

The choice of a specific skeletal part may also have had various reasons. Choosing antler for making an artefact, the reason might often be the size of the designed artefact. Among the discussed finds, ploughshares or hoes, handles and also double buttons can be mentioned as objects made only of antler. On the other hand, the properties of bone and antler as substances are also different; antler is tougher and more durable and, to some extent, easier to work, which also might have influenced the choice (see Luik, 2005, p. 89 ff.). The relatively frequent use of metapodials may be caused by two reasons: these bones are particularly suitable for making artefacts owing to their straight shape and a thick compact part, and they have little flesh and thus are not much worth as food. Still it must be mentioned that metapodial bones crushed for cooking frequently occur among faunal remains, which suggests that notwithstanding their low nutritive value they were nevertheless used for culinary purposes. The selection of bones may also cast light on the question whether bone working in the society under study was domestic craft or also specialization could be observed. The use of occasional kitchen scrap usually indicates domestic crafts while more standardized choice of bones may suggest the a certain specialization (Provenzano, 2001; Russell, 2001a; Choyke, 1997).

Most of the artefacts from the fortified settlements under study are made from bone. In Narkūnai as well as in Nevieriškė, bone artefacts and bone working scrap make up more than 90%. 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. However, it is also possible that the use of antler was somehow checked or restricted and the inhabitants of Kereliai, for some reason, had more opportunities to use antler. As already mentioned, the number of animal bones recovered from Kereliai is small and thus does not allow any conclusions concerning this problem. In all the discussed sites, that bones of domestic animals were mostly used. Thus, we may say that for making bone artefacts mainly easily available material was used, and its acquirement did not require centralised or organised activities. Still it might be emphasised that the ratio of sheep/goat bones is slightly higher among worked bone than in faunal remains (in Narkūnai and Nevieriškė; in Kereliai the number of finds is too small to draw any conclusions). We shall seek the answers to these questions in the discussion following the section dealing with artefacts and techniques.

ARTEFACTS, TOOLS, METHODS OF WORK

In the present article we describe only macroscopic working traces, i.e. those that can be seen with the naked eye. The discussion of the methods of working and manufacturing the artefacts is divided into materials (antler, teeth and bone) and artefact types. Concerning bone artefacts, attention is paid also to the species of animals and skeletal parts chosen for making a certain type of artefacts. A survey of basic bone working methods and tools is also given.

Many plain bone and antler artefacts of the Bronze Age resemble those used in the Neolithic; the manufacturing technology and the main methods of work were also quite similar. For example, Alice Choyke has asserted on the basis of Hungarian finds that although extensive social changes occurred during the Bronze Age, changes in bone and antler working were only minor, most of the techniques were continually used, and the tools for bone working were still made of stone (Choyke, 2005, p. 129). A new phenomenon concerning the finds from the fortified settlements of the Bronze Age in the Eastern Baltic, including Lithuania, is making bone or antler replicas of foreign bronze artefacts (e.g., decorative pins and double buttons). Certainly both consistency and innovations can be observed in the development of technologies since any technical system is continually developing, mingling conservatism with changes (Lemonnier, 1993, p. 22).

Antler artefacts and antler working

The greater part of antler objects consist of blanks and antler working scrap, which allow us to study the manufacturing of antler artefacts. Among the antler finds from Narkūnai a couple of points, two handles (one of them was evidently broken in the course of manufacturing and was thus left unfinished), a presumable blank of a

Fig. 4. **For cutting antler into pieces, the compact part of it was cut or hacked around and the porous tissue inside was simply broken** (Kereliai, AR 726: 106, 108).

4 pav. Pjaustant ragą į gabalus, kompaktiška jo dalis buvo aplinkui nupjauta ar nukirsta ir akyti audiniai viduje paprasčiausiai nulaužti (Kereliai, AR 726:106, 108)

handle, spearhead, ploughshare and two fragments of adzes or axes could be mentioned. As for Nevieriškė and Kereliai, only one antler point and one handle were found from each. Part of the antler artefacts are in the museum exhibition and therefore are not discussed here. Among them, for example, a figurine and a double button from Narkūnai (Volkaitė-Kulikauskienė, 1986, Fig. 39; Grigalavičienė, 1995, Fig. 100: 1), a double button from Kereliai (*ibid.*, Fig. 100: 2), and a handle from Nevieriškė (Grigalavičienė, 1992, Fig. 16: 1) should be mentioned.

Antler working scrap (Volkaitė-Kulikauskienė, 1986, Figs. 43–45; Grigalavičienė, 1986a, Fig. 16: 8–11; 1992, Fig. 8) includes pieces of palmate of antler from which tines were removed, as well as tines and tine tips bearing tool marks. 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 (Fig. 4). 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. But one tine from Kereliai was removed in a different way – it was cut on two sides thus forming a triangular tip (Fig. 5). Tines and palmates (Fig. 6) can be regarded as an intermediate product for further working.[3] 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. 7). One deer tine was longitudinally bisected and the porous part gouged out (AR 594: 54). One hollowed tine tip was also found (AR 594: 216). The finds from Kereliai include a palmate fragment with two round hollowed cavities extending into the porous part of the antler (Fig. 8). The purpose of the cavities is not clear. Tine tips may be regarded as antler working scrap not meant for use.

Some artefacts, however, were made exactly from tine tips. An example can be found among the finds from Kereliai, where one tine tip with working traces was evidently meant to be made into a **double button** (Fig. 9: 1). As already mentioned, such double buttons, made of antler and imitating Scandinavian bronze buttons, occur among the finds both from Kereliai and Narkūnai (Fig. 9: 2; Grigalavičienė, 1995, Fig. 100: 1, 2), but we could not investigate them during our stay in Vilnius. Double buttons recovered from the fortified settlements of Asva and Kaali, Estonia, are also made from antler (Indreko, 1939, Fig. 19: 1; Luik, in print, Fig. 4), and similar buttons

[3] Although one large piece of antler from Narkūnai has been interpreted as a bird figure (Volkaitė-Kulikauskienė, 1986, Fig. 45; Grigalavičienė, 1995, p. 274, Fig. 113: 2), we nevertheless insist that it belongs to antler working scrap, one tine of which just resembles a bird's bill. The artefact was exhibited in the museum and thus we could not study it closer, but it seemed to bear similar hacking and cutting traces as other pieces of antler scrap.

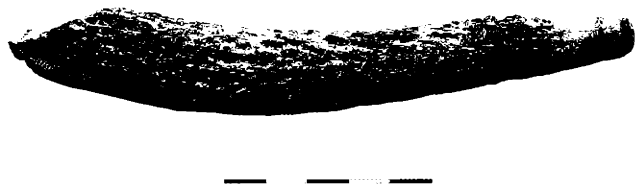

Fig. 5. **One tine of red deer antler cut on two sides thus forming a triangular tip** (Kereliai, AR 726: 109).
5 pav. Viena stirnos rago šaka buvo iš dviejų pusių nupjauta, taip suformuojant trikampį galiuką (Kereliai, AR 726:109)

Fig. 6. **Elk antler palmates with cutting traces** (Narkūnai, AR 594: 392, 393, 409, 416, 417).
6 pav. Briedžio rago mentė su pjaustymo žymėmis (Narkūnai, AR 594:392, 393, 409, 416, 417)

have been found also from Latvia (Graudonis, 1989, pl. XXV: 20, 21; Vasks, 1994, p. 115, pl. IX: 18, 19). Double buttons as artefacts copying foreign bronze objects might have expressed the social position of the wearer or had some other symbolic meaning (Merkevičius, 2005, p. 48–49; Luik, in print, Fig. 4; Luik, Ots, in print; compare, e.g., Earle, 2002, p. 51).

With **ploughshares, adzes** and **axes,** smooth surface was apparently not the aim, and on them rough surface of antler is sometimes preserved (Fig. 10). To shape a ploughshare antler, it was evidently hewn with an axe; plain visual observation does not reveal whether a stone or a bronze axe was used. Adzes, axes, hoes and ploughshares of antler have been found also from Latvia and Estonia (e.g., Graudonis, 1989, pl. XIIa; Baccap, 1955, pl. XXIII: 1–2, Figs. 2–3; Lang, 1996, pl. VIII: 3).

Fragments of **handles** (Figs. 11; 12) may be mentioned as an example of more elaborated antler objects. These had a flat cavity in the middle, where a small flint blade was inserted (Volkaitė-Kulikauskienė, 1986, Fig. 42; Grigalavičienė, 1986a, Fig. 16: 1; 1992, Fig. 6: 6; 1995, Figs. 10–12).[4] Such handles are usually carefully smoothed and polished. On the surface of one handle (Fig. 12) tiny transverse working traces can be observed, which will be discussed closer in the section dealing with bone working. Antler handles of this type occur also among finds from Estonian and Latvian Bronze Age fortified settlements (e.g., Jaanits, Laul, Lõugas, Tõnisson, 1982, Fig. 102: 2, 5; Graudonis, 1989, pl. XV: 1–5).

One of the most interesting antler artefacts is the antler **spearhead** found from Narkūnai (Fig. 13) because its shape imitates spearheads made from sheep/goat tibiae,

[4] The figures in the book Grigalavičienė, 1995, referred to here and hereafter, depict also artefacts from other Lithuanian sites.

Fig. 7. **Some antler tines are cut smoother, producing facets (Kereliai, AR 726: 107, 114).**
7 pav. Kai kurios rago šakos yra lygiai nupjautos taip suformuojant briauneles (Kereliai, AR 726:107, 114)

Fig. 8. **Palmate fragment with two round hollowed cavities extending into porous part of antler** (Kereliai, AR 726: 99).
8 pav. Mentės dalis su dviem apvaliomis duobutėmis, įgilintomis į akytą rago dalį (Kereliai, AR726:99)

which have been found in all three fortified settlements under discussion (see below). The surface of the artefact is cut in facets and is evidently unfinished.

Teeth and canines

Only a few teeth and canines are known to bear working traces. A pig canine pendant was found in Nevieriškė, and a pendant of a canine of a small carnivore (Grigalavičienė, 1992, Fig. 7:3) comes from Kereliai. All the rest are teeth and canines split in two or bearing cutting traces. In Narkūnai, a beaver's incisor with cutting traces and a bear's canine were found (Volkaitė-Kulikauskienė, 1986, Fig. 41), from Nevieriškė came two wild boar canines with cutting traces (Grigalavičienė, 1986a, Fig. 17:16, 18). In Kereliai two canines were found (Grigalavičienė, 1992, Fig. 7:1, 2); the pig canine was longitudinally split (AR 726:16), the wild boar canine has one side smoothed (Fig. 14:2). A longitudinally split bear canine (Fig. 14:1) with slightly smoothed edges was also found in Nevieriškė. Pierced or split teeth and canines have been found also in other Bronze Age fortified settlements of Lithuania (Grigalavičienė, 1986b, Fig. 23:6–9, 11; 1995, Fig. 111). In many regions of Europe (e.g., in the Netherlands, Hungary, France) whole or split pig and wild boar mandibular canines were used as knives, hollow chisels and scrapers for working wood and tree-bark in the Neolithic and the Bronze Age (Bulten, Clason, 2001, p. 301, Figs. 30 ff.; Choyke, 2005,

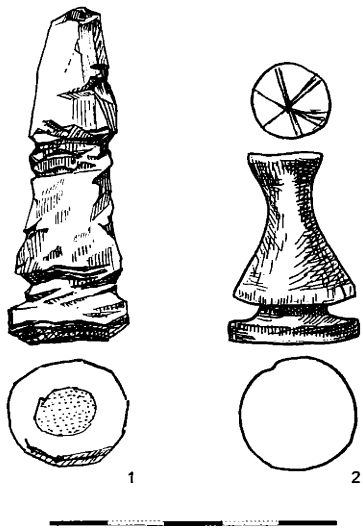

Fig. 9. **Tine tip with working traces, evidently meant to be made into a double button** (Kereliai, AR 726: 100; drawing by K. Siitan), **and double button decorated with engraved lines** (Narkūnai, AR 594: 344; drawing by A. Ruzienė).

9 pav. Šakos galas su apdirbimo žymėmis, matyt, ketinant pagaminti dvigubą sagą (Kereliai, AR 726:100; piešė K. Siitan), ir dviguba saga, papuošta įrėžtomis linijomis (Narkūnai, AR 594:344; piešė A. Ruzienė)

p. 139; Maigrot, 2005, p. 115, Figs. 2:4–6; 3:2, 3). A piece of boar's tusk from Sobiejuchy, Poland was presumably used as a burnisher or smoother (Harding, Ostoja-Zagórski, Palmer, Rackham, 2004, p. 63, Pl. 36:1).

Bone artefacts

In general, bone artefacts can be divided into two groups: 1) artefacts for which a bone of the most suitable shape was chosen and was but slightly worked; 2) carefully elaborated artefacts, which were usually made from the diaphysis of large long bones (see Choyke, 1997; 2001a; 2005, p. 131; Choyke, Vretemark, Sten, 2004, p. 185). According to Choyke, carefully manufactured artefacts usually reflect the greater economic importance of the task they were used in the prehistoric community as a whole, while plain artefacts made from suitable bones were more likely made to suit the individual needs (Choyke, 1997, p. 71; compare also Maigrot, 2005, p. 125).

Various **points** constitute more than one third of the bone artefacts found in the study sites. One of the simplest types, exploiting the shape of a bone, consists of points and pins made from pig fibulae (Fig. 15; Volkaitė-Kulikauskienė, 1986; Grigalavičienė, 1986a, Fig. 20:12–14; 1992, Fig. 10:4, 10). Quite frequently the end of the bone used as a head was not worked at all (if the tip of such bone is broken, it cannot be established whether it is an artefact or unworked bone). Usually the distal end of the bone was chosen for the head, while the proximal end was used less frequently. Sometimes, however, pin's head was smoothed or cut thinner, and sometimes a hole was made in it to make a needle. The other end of the bone was removed and the tip sharpened; the length may vary; shorter items had been probably re-sharpened when the tip broke. Such points and pins are quite universal and were used also during the Iron Age, therefore the items discussed here need not belong all to the Bronze Age, since later finds have been also recovered from these sites. The largest number (25–29) of such pins has been found in Narkūnai, 16–18 in Nevieriškė and four in Kereliai. Similar points/pins from pig fibulae were also found in Estonian and Latvian fortified settlements (e.g., Baccap, 1955, Fig. 41:4; Graudonis, 1989, pls. XXVII:1–7; XXXI:4, 5; Vasks, 1994, pl. VI:9–16).

Points were made also from various other bones (Volkaitė-Kulikauskienė, 1986, Fig. 23–25; Grigalavičienė, 1986a, Fig. 14 ff.; 1992, Fig. 5:1, 3–7, 9–21; 1995, Figs. 76–80). One of the widespread variations consists of points made from long bones (most frequently metapodials) of sheep/goat (Figs. 16–18). Among the finds from the Lithuanian sites under discussion, the majority of such points were made from a sheep/goat metapodial bone, splitting it along its natural longitudinal groove, and the articular surface of the distal end was used as a handle. The shape of the handle end varies, depending on the stage of ossification of epiphyses (Fig. 17). A few of such points made from longitudinally split bones have been also found in Latvia (e.g., Граудонис, 1967, pl. XVI:13; Vasks, 1994, pl. V:21) and Estonia (e.g., Ridala, AI 4261:287 and Asva, AI 4366:823). Points from metapodial sheep/goat bones, made without longitudinal splitting of bone, are considerably rarer among the finds from Lithuanian fortified settlements (Grigalavičienė, 1986b, Fig. 15:5, 6). In that case, the whole epiphysis forms the handle, and the point is shaped by cutting the bone diagonally. Among the finds we have investigated, there was only one such point, recovered from Kereliai (Fig. 16:3; Grigalavičienė, 1992, Fig. 5:20). Differently from Lithuania, such points were more widely spread in Latvia (Graudonis, 1989,

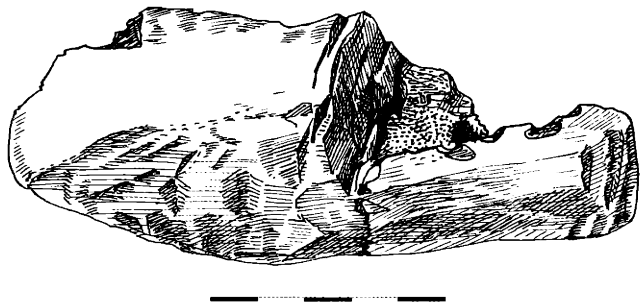

Fig. 10. **Probable ploughshare made from elk antler** (Narkūnai, AR 594: 6; drawing by K. Siitan).
10 pav. Tikriausiai noragas, pagamintas iš briedžio rago (Narkūnai, AR 594:6; piešė K. Siitan)

Fig.11. **Unfinished antler handle** (Narkūnai, AR 594:353).
11 pav. Neužbaigta raginė rankena (Narkūnai, AR 594:353)

pls. XXII:7–17; XLIII:9, 10) as well as in Estonia, where most of points made of sheep/goat bones are made precisely by this method (Vassar, 1939, Fig. 46:6; Lang, 1996, pl. VIII:11).

Such bone points (which, beside sheep/goat metapodials, were also made from roe deer and red deer bones) are a type of artefacts known almost everywhere and throughout different periods, probably because of their functionality. Examples can be given from all over Europe, from the Neolithic as well as from the Bronze Age (Bąk, 1985, Fig. 3:3–5; Christidou, 2005, Fig. 12; Maigrot, 2005, Fig. 4:17–19, 21–23; Sidéra, 2005, p. 85, Figs. 7, 8; Choyke, 2005, Fig. 10:5, 6; van Vilsteren, 1987, Fig. 13; Malinowski, 2006, Fig. 13:1–4), but also from sites temporally and spatially as distant as Arizona of the archaic and classic periods (Griffits, 2001, Fig. 4; James, 2001, Ffigs. 2, 6) or settlements of the Slavonic period (7th–12th cc. AD) in Germany (Becker, 2001, Figs. 4, 9).

Long bones of large herbivores (cattle, elk, horse) were also used for making points. In this case, the bone may be split in four longitudinally and the articular surface at the end of the bone left for the handle (Fig. 19). Some small and very fine points were made from hare bone (Fig. 20:1, 2). One of the points from Kereliai was made from a long ridge of a long bone faceted in the upper part but with a very regular circular cross-section at the tip and with a polished surface (AR 726:98). This object may be an unfinished decorative pin. Quite frequently points were made just from suitable pieces of diaphysis, which may be chosen from crushed bone fragments from kitchen refuse, by smoothing the existing sharp tip and cutting the other end to a more convenient shape (Fig. 21). Such objects have been called *ad hoc* tools (Choyke, 1997, p. 66; 2005, p. 142).

Another possibility for making points was to choose bones with tapering ends which had to be slightly sharpened to form a tip; the other, wider and smooth, end was left for a handle. Such bones have a shape so closely resembling an awl that quite often unworked bones or those with a broken tip have been picked up as tools (about this see, e.g., Смирнова, 1999, p. 149–150). Some sharp-tipped bones could have been used also without further working; this can be concluded from the polished surface of a bone (Bulten, Clason, 2001, p. 298). Such bones are

Fig. 12. **Broken antler handle with working traces** (Narkūnai, AR 594: 219).
12 pav. Nulūžusi rankena su apdirbimo žymėmis (Narkūnai, AR, 594:219)

Fig. 13. **Antler spearhead imitates spearheads made from sheep/goat tibiae** (Narkūnai, AR 594: 230).
13 pav. Raginis ietigalis, imituojantis ietigalius, pagamintus iš avių / ožkų blauzdikaulio (Narkūnai, AR 594:230)

rudimentary metapodials of elk and horse, as well as ulnae of several species (Fig. 20:3), which could be made, depending on species, into a small and fine or a particularly large and substantial point (e.g., Bąk, 1985, Fig. 3:20; Choyke, 2005, Fig. 10:1, 2; Bulten, Clason, 2001, Figs. 21, 22; Harding, Ostoja-Zagórski, Palmer, Rackham, 2004, pls. 28:28; 29:7; 31:50, 59, 60; Malinowski, 2006, Fig. 47:2). Bone points of this type have been found also from Latvian and Estonian Bronze Age fortified settlements (Indreko, 1939, Fig. 7:2; Graudonis, 1989, pls. XXI, XXII:1–6, 18, 19; XLIII:11–14; Vasks, 1994, pl. V:4, 12).

The point length varies greatly (Figs. 16:1, 2; 18). Short items were evidently repeatedly sharpened (compare Christidou, 2005, p. 96, 98, figs. 3, 12; Pétrequin, 1999, Fig. 1.19). Since making a point is usually not a laborious task, sharpening was apparently not connected with the difficulty of making a new point, but the fact was that the required raw material might have been unavailable at the moment. It has been supposed to be connected with the fact that animals were killed infrequently and most likely in certain seasons (Russell, 2001b, p. 244). Another reason might have been that the existing point was clean and smooth already, but for a new one a bone had to be first cleaned of soft tissues, which was inconvenient and took more time. The problem of recycling and re-sharpening naturally arises with more carefully worked points, so-called *ad hoc* sharp-tipped bone fragments which apparently were just used when necessary and then simply cast aside (Choyke, 1997, p. 66, 68).

Points of various size were primarily used as awls, for instance, for piercing leather, bark, birch bark, etc. (e.g., Maigrot, 2005; Christidou, Legrand, 2005), but such items could have been also used for weaving bast and bark.

Scrapers constitute another numerous group of artefacts (Volkaitė-Kulikauskienė, 1986, figs. 27–29; Grigalavičienė, 1986a, figs. 15, 16:3–7; 1992, Fig. 6:2–4, 7, 8; 1995, Figs. 72, 73). These artefacts have a characteristic chisel-shaped edge which may be rather wide or quite narrow. The edge may be straight or curved.

Fig. 14. **Longitudinally split bear canine and wild boar canine with one side smoothed** (*1* – Nevieriškė, AR 597: 577; *2* – Kereliai, AR 726: 119).

14 pav. Išilgai nuskelta meškos iltis ir šerno iltis, kurios viena pusė nulyginta (1 – Nevieriškė, AR 597:577, 2 – Kereliai, AR 726:119)

Fig. 15. **Points made from pig fibulae** (Narkūnai, AR 594: 150, 139, 141).

15 pav. Antgalis, pagamintas iš kiaulės šeivikaulio (Narkūnai, AR 594:150, 139, 141)

They are made from long bones – from a diaphysis, a split or a whole bone (Figs. 22–25).

Diaphyses of long bones of large herbivores were used for making artefacts with a rectangular or curved blade (Fig. 22). Such bone tools were most likely attached to some handle. Items have been found also with both ends suitable for working. In these cases, one end was sharper and the other was blunt (Fig. 23:3; e.g., Grigalavičienė, 1986a, Fig. 16:4, 5; compare Graudonis, 1989, pl. XIX:11). Maybe it was possible to attach such blade to a handle in different ways as appropriate.

Some of the scrapers are made from a longitudinally split long bone. Quite close match for a hollow scraper made from a big animal's long bone found in Nevieriškė (Fig. 24:2; Grigalavičienė, 1986a, Fig. 15:9; 1995, Fig. 73:1) is known from Swifterbrant, Holland, but it belongs to the Neolithic. It is made from a metatarsal bone of cattle (Bulten, Clason, 2001, Fig. 14). One half-split horse radius was also found from Nevieriškė, which was evidently intended to be made into a similar artefact (Fig. 24:1).

Scrapers have been also found with the handle end of bone whole, while the other end is diagonally cut forming a curved or rectangular edge. The articular surface of the bone may form a handle, but it may be also cut to form a socket for a handle. For such scrapers, pig femuri, tibiae, humeri or radii were usually chosen (Fig. 25), but sheep/goat tibiae, radii and metapodials were also used (Fig. 23:1, 2).

Scrapers are typical of the settlements of Narkūnai and Nevieriškė, but they have been found also from other

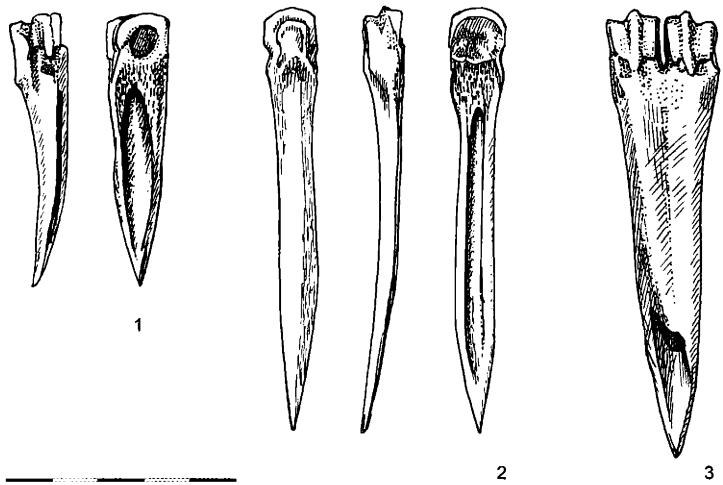

Fig. 16. **Points made from sheep/goat metapodial bones: from longitudinally split bone** (*1, 2* – Nevieriškė, AR 597: 321, 299) and from diagonally cut bone (*3* – Kereliai, AR 726: 62; drawing by K. Siitan).

16 pav. Antgaliai, pagaminti iš avies / ožkos metapodiumo kaulų: iš išilgai nuskeltų kaulų (1, 2 – Nevieriškė, AR 597:321, 299) ir iš įstrižai nupjauto kaulo (3 – Kereliai, AR 726:62; piešė K. Siitan)

Fig. 17. **Points made from sheep/goat metapodial bones with epiphyses in different stages of ossification** (Narkūnai, AR 594: 94, 105, 119).

17 pav. Antgaliai, pagaminti iš skirtingų osifikacijos stadijų avies / ožkos metapodiumo kaulų su epifize (Narkūnai, AR 594:94, 105, 119)

Bronze Age sites of Lithuania (Grigalavičienė, 1986b, Fig. 19:6, 7, 9; 1995, figs. 72, 73). They did not occur among the finds from Kereliai that we were able to investigate. Scrapers have been found in very many regions, they were used already since the Neolithic (e.g., Elster, 2001, Figs. 5, 13; Bulten, Clason, 2001, figs. 18, 19; Sidéra, 2001, Fig. 1:3–4; Choyke, 2005, pls I:3, 4; IV:5–7, 12,13; VI:3–10). Tools of similar type, of varying size and shape, occur also in Latvian and Estonian Bronze Age fortified settlements (Graudonis, 1989, pl. 131; Vasks, 1994, pl. VII; Sperling, 2006, pls. LI:5; LVI:7–9). Depending on size and shape, as well as time and place, the functions of such scrapers might have varied greatly; for instance, bone and antler working, flint knapping, leather working, timber working, debarking of trees (Maigrot, 2005; Christidou, 2005; Christidou, Legrand, 2005). In some cases, quite specific uses have been also established, for example, in Kasakhstan Eneolithic context where they were used for abstracting molars from jaw bones used for making scrapers (Olsen, 2001), or in Mesolithic Scotland for collecting and processing shellfish (Griffits, Bonsall, 2001).

Spearheads (Volkaitė-Kulikauskienė, 1986, Fig. 32; Grigalavičienė, 1986a, Fig. 18:1–4; 1992, Fig. 9:7, 11;

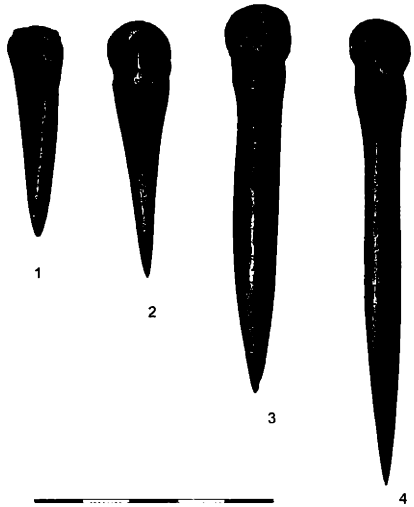

Fig. 18. **Points length varies greatly, the short items were evidently repeatedly sharpened** (Narkūnai, AR 594: 124, 125, 116, 119).

18 pav. Antgalių ilgiai smarkiai skiriasi, trumpi dirbiniai, matyt, buvo pakartotinai aštrinami (Narkūnai, AR 594:124, 125, 116, 119)

1995, Figs. 58–59) are a type of artefacts highly standardized by the choice of material. Nearly all spearheads the material of which could be established were made of sheep/goat tibiae (Figs. 26, 27). The proximal end of bone was as a rule used for the socket of a spearhead, the epiphysis and part of bone were cut off so that medullary cavity formed a socket which was usually cut to a more regular shape. Depending on the shape of a bone, the socket and the cavity usually have a triangular cross-section. The blade of a spearhead was shaped by diagonally cutting the other end of bone and sharpening the tip. Many spearheads bear longitudinal and transverse working traces (Figs. 26, 28). Spearheads were most numerous in Narkūnai; in Nevieriškė and Kereliai they occurred in smaller numbers. They have been also found from other Lithuanian sites, for example, Sokiškiai, Velikuškiai, Moškėnai (Grigalavičienė, 1986a, Fig. 20:13–18; 1995, Fig. 58:1, 2, 10). Similar spearheads have been also found in Latvia, but in considerably smaller numbers than in Lithuania (Vasks, 1994, pl. VIII:3–7). In Estonia, only a couple of such spearheads are known – one from the fortified settlement of Ridala (Jaanits, Laul, Lõugas, Tõnisson, 1982, Fig. 102:1), and the other is a

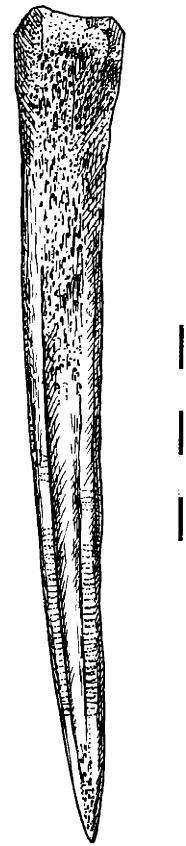

Fig. 19. **For making the point, horse metapodial bone was longitudinally split in four** (Kereliai, AR 726: 74; drawing by K. Siitan).

19 pav. Gaminant antgalį, arklio metapodiumo kaulas buvo išilgai suskaldytas į keturias dalis (Kereliai, AR 726:74; piešė K. Siitan)

stray find from Aheru, South Estonia (Lõugas, Selirand, 1989, p. 341, 343). Similar artefacts are known also from Poland (Durczewski, 1985, pl. 49:2, 8).

Artefacts made from ribs occur in rather large numbers (Volkaitė-Kulikauskienė, 1986, Figs. 30–31; Grigalavičienė, 1992; 1995, Fig. 75:1–2). Usually they are made from a longitudinally split rib, but their working tip may be of various shape (Fig. 29). In most cases it is cut oval, but artefacts with a rectangular or sharp tip also occur. Porous bone tissue on the inner side of a split rib is usually worn smooth on the working end of an artefact.

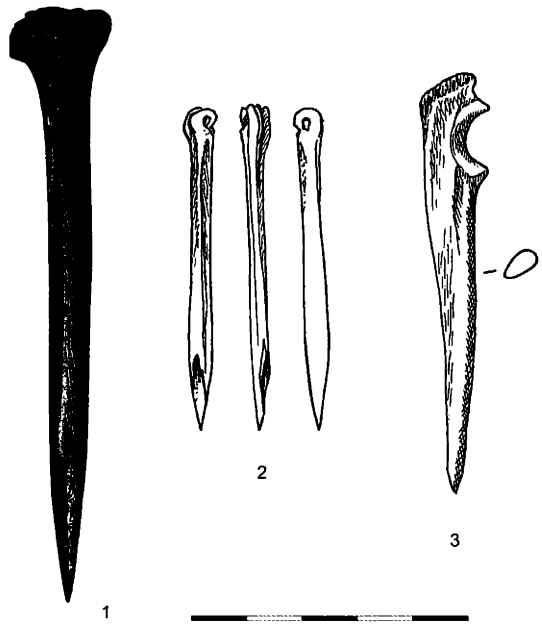

Fig. 20. **Points made from hare tibia and metatarsus** (*1, 2* – Nevieriškė, AR 597: 293, 450; drawing by K. Siitan) and from fox(?) ulna (*3* – Narkūnai, AR 594: 148; drawing by A. Ruzienė; identification of species is not certain because the artefact was in the museum exhibition).

20 pav. Antgaliai, pagaminti iš kiškio blauzdikaulių ir padikaulių (1, 2 – Nevieriškė, AR 597:293, 450; piešė K. Siitan) ir iš lapės (?) alkūnkaulio (3 – Narkūnai, AR 594:148; piešė A. Ruzienė; rūšių identifikacija yra abejotina, nes dirbinys yra muziejaus ekspozicijoje)

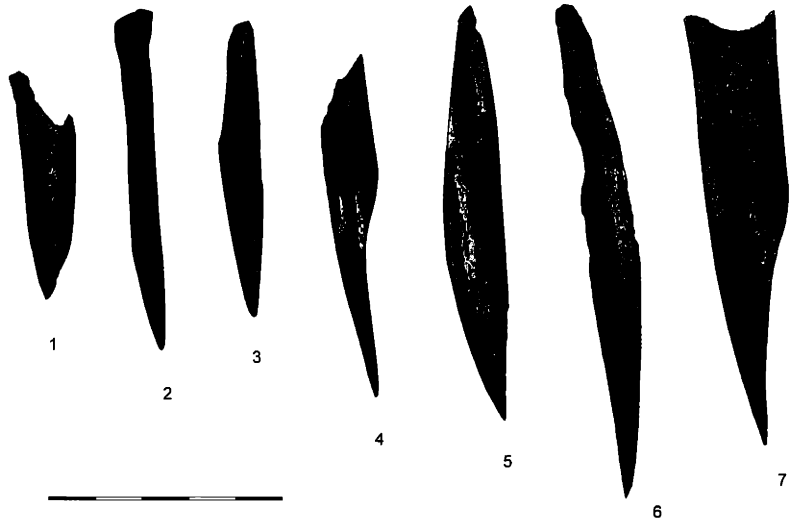

Fig. 21. ***Ad hoc* points made from suitable pieces of diaphysis of long bones** (Nevieriškė, AR 597: 394, 386, 377, 362, 317, 289, 411).

21 pav. Ad hoc *antgaliai, pagaminti iš tinkamų ilgųjų kaulų diafizės dalių (Nevieriškė, AR 597:394, 386, 377, 362, 317, 289, 411)*

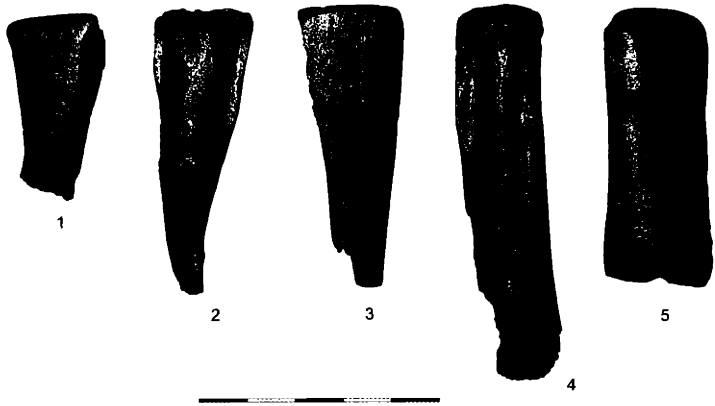

Fig. 22. **Scrapers made from diaphysis of long bones** (Narkūnai, AR 594: 61, 26, 47, 28, 24).
22 pav. Gremžtukai, pagaminti iš ilgųjų kaulų diafizės (Narkūnai, AR 594: 61, 26, 47, 28, 24)

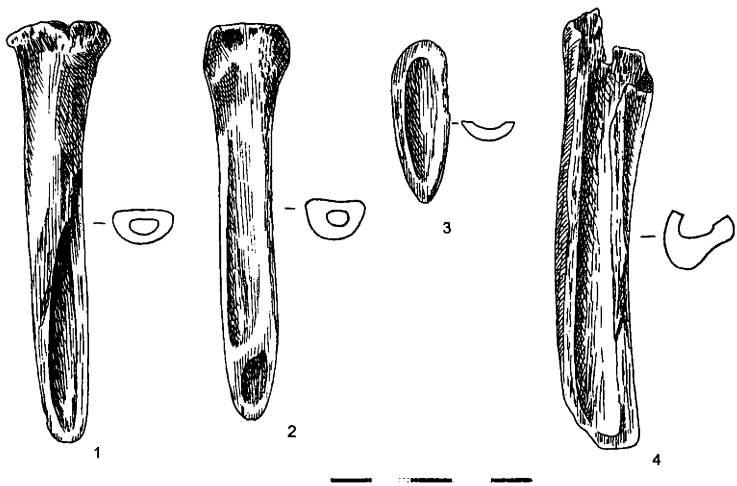

Fig. 23. **Scrapers made from sheep/goat radius (1, 2) and from diaphysis of long bones (3, 4)** (Nevieriškė, AR 597: 332, 447, 373; Narkūnai, AR 594: 192; drawing by A. Ruzienė).
23 pav. Gremžtukai, pagaminti iš avių / ožkų stipinkaulio (1, 2) ir iš ilgųjų kaulų diafizės (3, 4) (Nevieriškė, AR 597:332, 447, 373; Narkūnai, AR 594:192; piešė A. Ruzienė)

Ribs belong mostly to large herbivores (most often cattle, but also elk and red deer); pig or sheep/goat ribs were used considerably less frequently. Artefacts made from split ribs occur also in Latvia and Estonia (Baccap, 1955, Fig. 36:6; Граудонис, 1967, pl. 17:9, 12; Luik, Maldre, in print, Fig. 2). In many places of Europe, rib tools were used already in the Mesolithic (e.g., David, 2005, p. 68, 71, Fig. 1), but also in the Neolithic (Sidéra, 2001, Fig. 1:3; Cristidou, 2001, p. 42–43, figs. 2–3) and the Bronze Age (Bernabò-Brea, 1964, p. 598, pl. 93; Elster, 2001, p. 358, Fig. 9; Provenzano, 2001, p. 96, Figs. 6, 7; Choyke; Vretemark, Sten, 2004, p. 185, Fig. 14). Such artefacts might have been used for processing various materials: one of the possibilities is leather working (Christidou, Legrand, 2005, p. 387 ff., Figs. 1, 10; Luik, Maldre, in print).

Fig. 24. **Half-split radius of horse and scraper made from longitudinally split long bone with working traces** (Nevieriškė, AR 597: 356, 333).
24 pav. Pusiau nuskeltas arklio stipinkaulis ir gremžtukas, pagamintas iš išilgai nuskelto ilgojo kaulo su apdirbimo žymėmis (Nevieriškė, AR 597:356, 333)

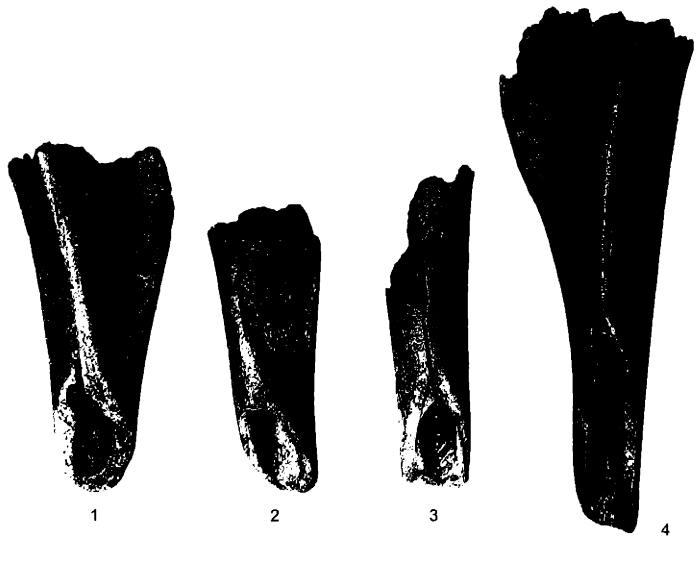

Fig. 25. **Scrapers made from pig tibiae (1, 4), femur (2) and humerus (3)** (Narkūnai, AR 594: 221, 55, 57, 58).
25 pav. Gremžtukai, pagaminti iš kiaulės blauzdikaulių (1, 4), šlaunikaulio (2) ir žastikaulio (3) (Narkūnai, AR 594:221, 55, 57, 58)

An interesting type of finds consists of **small double points** – artefacts with two sharp ends. These are made from a piece of diaphysis and both ends are sharpened (Fig. 30; Volkaitė-Kulikauskienė, 1986, Fig. 26:1; Grigalavičienė, 1986a, Fig. 19:10; 1992; 1995). Some of these small artefacts have been interpreted as arrowheads (Grigalavičienė, 1986a, Fig. 19:10). Such double points occur among Bronze Age finds, for example, from the

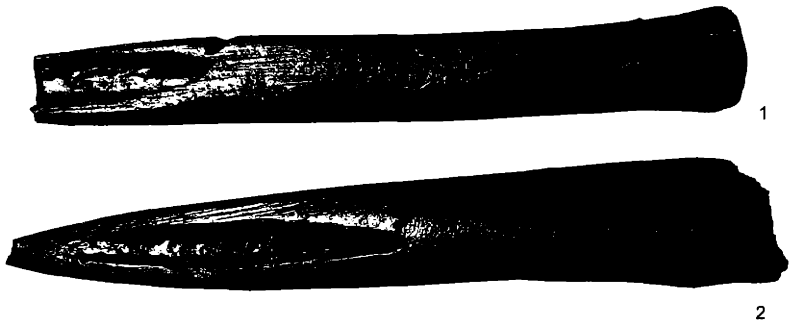

Fig. 26. **Spearheads made from sheep/goat tibiae. Longitudinal working traces can be seen on spearheads** (Nevieriškė, AR 597: 46, 419).

26 pav. Ietigaliai, pagaminti iš avies / ožkos blauzdikaulių. Išilginės apdirbimo žymės matomos ant ietigalių (Nevieriškė, AR 597:46, 419)

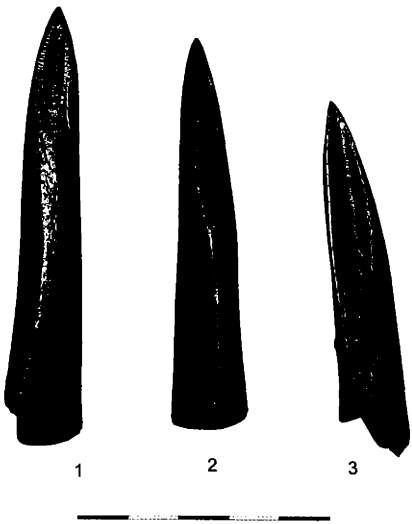

Fig. 27. **Spearheads made from sheep/goat tibiae** (Narkūnai, AR 594: 208, 220; Nevieriškė, AR 597: 420).

27 pav. Ietigaliai, pagaminti iš avies / ožkos blauzdikaulių (Narkūnai, AR 594:208, 220; Nevieriškė, AR 597:420)

Mediterranean countries (Bernabò-Brea, 1964, pl. XC:12–35; Elster, 2001, Fig. 10), Poland (Bąk, 1985, Fig. 1:14, 15; Harding, Ostoja-Zagórski, Palmer, Rackham, 2004, pls. 29:14–17; 30:21, 22; 31:12–17) and Hungary (Choyke, Vretemark, Sten, 2004, Fig. 16), where they were made from ribs and long bones and many of them have a highly polished surface. Larger artefacts of this type have been found from in Hungarian settlement sites, but small (with a length of 2.5–5 cm) double points are characteristic only of the Százhalombatta-Földvár settlement. They were presumed to have been used as ornaments expressing the social identity of a group (Choyke, Vretemark, Sten, 2004, p. 186), but in some places artefacts of this type were regarded as fishing implements (e.g., van Vilsteren, 1987, p. 30–31, Fig. 19).

Decorative pins and arrowheads can be considered as more carefully worked artefacts. These were made from the diaphysis of long bones, but the material cannot be determined more accurately, since the specific parts of bone had been removed in the course of working.

Most of the **decorative pins** found in the sites under discussion are included in the permanent exhibition of the Lithuanian National Museum, which made their closer analysis impossible. From the pins in archaeological collections, it was only possible to establish that they were made from long bones of large herbivores. For making a pin, a strip of required length and width was split from the diaphysis of a long bone and shaped into a pin by grinding and polishing. The pins are decorated with profiled ridges and grooves as well as incised patterns of diagonal lines; some pins have disc-shaped, oval or spade-shaped heads which may also have a round hole (Fig. 31). Besides the fortified settlements under discussion, such pins have been found also in other Bronze Age sites of Lithuania (Volkaitė-Kulikauskienė, 1986, figs. 37:3–6; 38; Grigalavičienė, 1986a, Fig. 20:1, 3, 4; 1992, Fig. 10:9; 1995, figs. 92, 94–

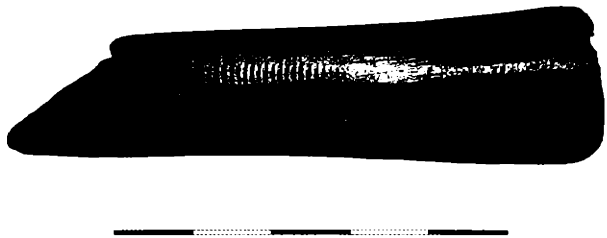

Fig. 28. **Chatter-marks on the socket of probable spearhead made from sheep/goat tibia** (Kereliai, AR 726: 85).
28 pav. Įkartų žymės ant tikriausiai ietigalio įmovos, pagamintos iš avies / ožkos blauzdikaulio (Kereliai, AR 726:85)

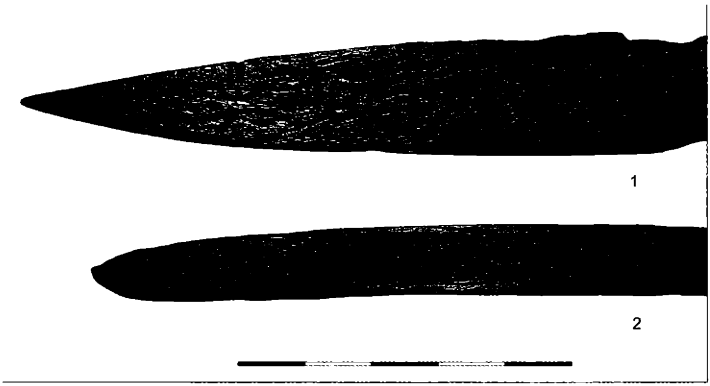

Fig. 29. **Artefacts made from rib of cattle (1) and pig or sheep/goat (2)** (Narkūnai, AR 594: 115, 4).
29 pav. Dirbiniai, pagaminti iš galvijų (1) ir kiaulės ar avies / ožkos šonkaulių (2) (Narkūnai, AR 594:115, 4)

98). Similar pins have been found also in Latvia (Граудонис, 1967, pls. VII, VIII, X; Graudonis, 1989, pls. XXVIII–XXXI, XLIV; Vasks, 1994, pl. IX:1–14), Estonia (Indreko, 1939, figs. 19:2; 20; Baccap, 1955, Fig. 41:1–3, 5; Luik, in print, figs. 2–3) and Poland (Bąk, 1985, Fig. 1:1–12). Some of the bone pins of the Bronze Age imitate by their shape bronze pins of the same period (Lõugas, 1970, p. 129 ff; compare, e.g., Malinowski, 2006, Fig. 72:1–6), and thus they might have express a certain social dignity (Merkevičius, 2005, p. 48–49; Luik, in print).

Carefully worked bone **arrowheads** were discovered only among the finds from the fortified settlement of Narkūnai (Volkaitė-Kulikauskienė, 1986, figs. 33–34; Grigalavičienė, 1995, Fig. 62). Arrowheads have a tang and a lozenge or oval cross-section, some are barbed and some are not (Fig. 32). Studying the making of arrowheads, a certain standardization and similar production techniques could be observed, which will be discussed closer in the chapter dealing with working methods. Bone arrowheads are numerous also in Latvia and Estonia, as well as in other countries around the Baltic – Poland, Sweden, Finland, Russia (Durczewski, 1985, pl. 55:1–29; Graudonis, 1989, pls. XVI–XVIII, XLIV; Harding, Ostoja-Zagórski, Palmer, Rackham, 2004, pl. 31:1–11, 18; Luik, 2006). Although bone arrowheads could have been used also for hunting, it seems more plausible, considering their shape, properties and careful finishing, that these arrowheads were made for warfare (Luik, 2006, p. 141–143).

A couple of **harpoon heads** found in Narkūnai, allegedly made from bone, have been also published (Volkaitė-Kulikauskienė, 1986, Fig. 36; Grigalavičienė, 1995, p. 269, Fig. 64:3), but they were part of the exhibition at the time of our investigation and therefore it was not possible to verify the identification of their material. Harpoon heads are more numerous in Latvia

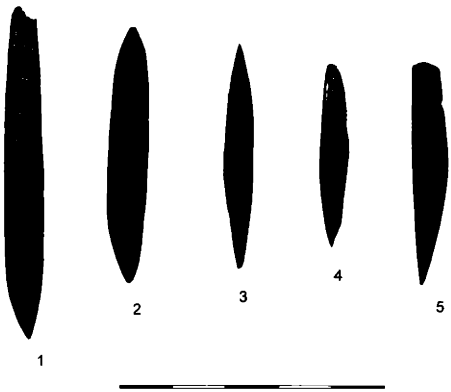

Fig. 30. **Small double points** (*1, 4* – Kereliai, AR 726: 78, 84; *2, 3, 5* – Nevieriškė, AR 597: 462, 461, 465).

30 pav. Nedideli dvigubi antgaliai (1, 4 – Kereliai, AR 726:78, 84; 2, 3, 5 – Nevieriškė, AR 597:462, 461, 465)

and Estonia (Baccap, 1955, Fig. 35:1–3, 6; Граудонис, 1967, pl. XIII; Lang, 1996, pl. VIII:1). Estonian harpoon heads are mostly made from antler, but bone specimens are also known.

Bone working

In completed and finished artefacts, it is often impossible to establish the working methods used to produce them. In this respect, unfinished products and blanks are of great interest. On the basis of bone artefacts from the three Lithuanian fortified settlements we were able to establish several specific bone working methods, most of them having been used already earlier: breaking, splitting, grooving, carving, grinding, polishing. Although most of bone working was still performed with stone tools, it is possible that on some bone artefacts bronze tools were also used. Bone working researchers have striven to discriminate between working traces left by stone and bronze tools, comparing working traces on experimentally made artefacts under powerful microscopes – metallographic microscope and scanning electron microscope (SEM) (e.g., LeMoine, 1997; Cristiani, Alhaique, 2005). It is impossible to discriminate with the naked eye between the traces left by stone and metal blades.

For some artefacts, mainly some points and scrapers, bones broken already for cooking were probably used, but some artefacts indicate that bone had been deliberately broken or split according to the intended shape. For instance, in Hungary the spiral fractures produced when the diaphyses had been broken to extract the marrow were exploited – making a scraper from a bone broken this way was an easy task (Choyke, 1997, p. 70; Choyke, Vretemark, Sten, 2004, p. 185, Fig. 11). Breaking a bone at a suitable point was used in bone working already in the Mesolithic (see David, 2003, figs. 9, 12). The Inuits of North America in their bone working often broke the end of a bone off at a suitable point (LeMoine, 1997); in finds from the Neolithic Çatalhöyük settlement, a blank necessary for bone working was produced just by breaking a bone (Russell, 2001b, p. 243). The finds from the Lithuanian sites we investigated included bones whose broken end was curved and quite regular (Fig. 33), but they did not bear any definite working traces. Still these regularly broken bones seem to be not just incidental kitchen scrap; perhaps they were deliberately broken or split in this way with an intention to make a blade of a scraper from their curved end.

One of the methods for dissecting bones was grooving – a groove was cut in a bone, either using a flint blade or sawing with a small edged sandstone plate, and then the bone was broken or split at the groove (Choyke, 1997, p. 67). Such methods were also used in the Mesolithic (e.g., David, 2003, Fig. 9; 2005, p. 71, Tab. 2) and Neolithic (e.g., Pétrequin, 1993, p. 47, Fig. 1.19; Elster, 2001, p. 361, Fig. 21; Christidou, 2001, p. 43, Fig. 4; 2005, p. 93 ff., Figs. 4, 5, 10, Tab. 2; Legrand, 2005, 109–111, Figs. 5–7, Tabs. 2, 3); the Inuits also used grooving for dissecting bones (LeMoine, 1997; LeMoine, Darwent, 1998, p. 78 ff., Fig. 4). Grooving helped to avoid breaking bone at a wrong place. Among the Bronze Age finds from Lithuania, the use of such method for splitting bones longitudinally (Fig. 34) and their transverse dissecting (Fig. 35) can be established. Antler was sometimes also dissected by grooving (Fig. 36). Longitudinal grooving can be observed quite clearly on some points made from a sheep/goat metapodium. These bones have a natural longitudinal furrow which facilitated their longitudinal splitting. Deepening the furrow by grooving helped to split the bone in a required way (about the methods used to make points from metapodials, see Sidéra, 2005, p. 87, Fig. 8; Legrand, 2005, p. 110, Figs. 5–7). Some bone fragments show that the groove cut into the bone to break off the end runs in spiral and therefore the end was not broken straight (Fig. 35:2). The broken surface produced by grooving could be worked by scraping with flint or grinding on a stone (Choyke, 1997, p. 67).

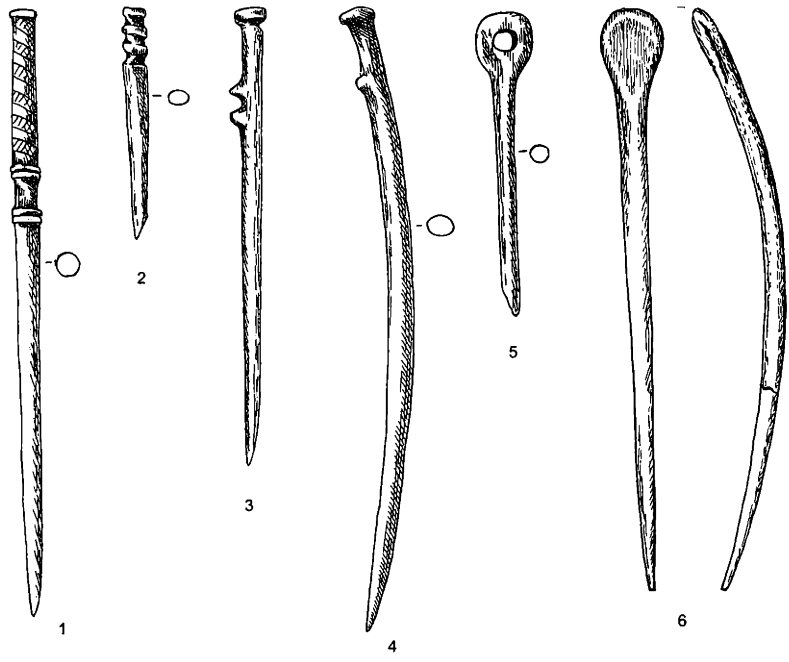

Fig. 31. **Decorative pins made from long bones** (*1–3, 5* – Narkūnai, AR 594: 293, 270, 266, 294; *4, 6* – Nevieriškė, AR 597: 276, 285; 1–5 drawing by A. Ruzienė; 6 drawing by K. Siitan).

31 pav. Puošti smeigtukai, pagaminti iš ilgųjų kaulų (1–3, 5 – Narkūnai, AR 594:293, 270, 266, 294; 4, 6 – Nevieriškė, AR 597:276, 285; 1–5 piešė A. Ruzienė; 6 piešė K. Siitan)

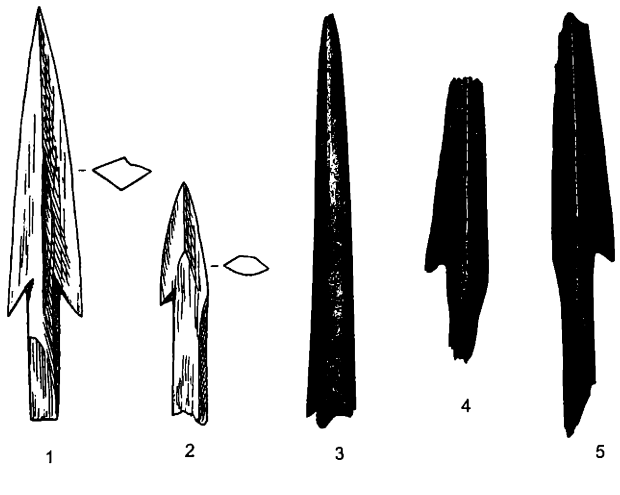

Fig. 32. **Bone arrowheads** (Narkūnai, AR 594: 238, 255, 256, 244, 240; 1–2 drawing by A. Ruzienė).

32 pav. Kauliniai strėlių antgaliai (Narkūnai, AR 594:238, 255, 256, 244, 240; 1–2 piešė A. Ruzienė)

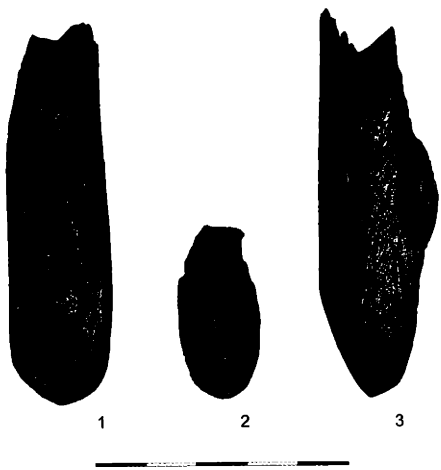

Fig. 33. **Bones with regularly broken curved ends** (Narkūnai, AR 594, without number).
33 pav. Kaulai su taisyklingai nulaužtais lenktais galais (Narkūnai, AR 594, be numerio)

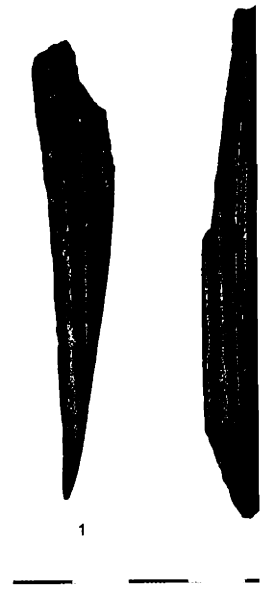

Fig. 34. **Bones with traces of longitudinal** vieriškė, AR 597: 308; Narkūnai, AR 594: 34
34 pav. Kaulai su išilgų griovelių įpjovomis (Nevieri Narkūnai, AR 594:340)

Some of the artefacts are made from longitudinally split ribs. Making such artefact is easy and requires neither special skill nor tools. One of the authors, Heidi Luik, has experimentally made such implement (Luik, Maldre, in print, Fig. 5). The rib boiled immediately before working was very soft and split into two surprisingly easily, and the shaping of the tip was also easy. The bone appeared so soft that a doubt arose whether the artefact made from it could be used at all, but in the course of drying the artefact became sufficiently strong and sharp-edged.

Grinding on a stone was used for shaping as well as finishing artefacts. The tips of scrapers and spearheads were shaped apparently by grinding their sides on a stone. The regular and smooth facets of arrowheads were worked by grinding them on a stone (Luik, 2006, figs. 7, 9). The finds from Nevieriškė include a relatively blunt point with very regular sharp facets (Fig. 37) on each side, which also could be achieved by grinding the artefact on a stone. Decorative bone pins also have a smooth and polished surface, but their final polishing could have been performed, for example, with sand and a piece of leather, ashes, chalk, fish skin, etc. (see, e.g., MacGregor, 1985, p. 58; Luik, 2005, p. 31, 86). It is also possible that their surface was polished so smooth only in use.

Characteristic working traces on the Bronze Age bone artefacts of the Baltic states are small regular transverse lines with equal intervals (compare, e.g., Christiani, Alhaique, 2005, p. 400, Figs. 2:4, 6; 3:4, 6 can be observed on several arrowheads fi (Fig. 38), a point made from a horse me (Figs. 19; 39), some spearheads or scraper and also on the above-mentioned antler ha Similar traces can be observed also on Est Age bone arrowheads (Luik, 2006, p. 13 study of the latter inspired the questi implement or method of work which left these artefacts: could the traces belong to a fi some other tool? For instance, Anthony Ha that bronze files were used for wood workin the Bronze Age (Harding, 2000, p. 226, foo find out about making of these artefacts, Ja Jaak Mäll made a replica of an arrowhead appeared in the course of work that when cu rather hard substance, powerfully and with blade may vibrate, thus producing small trar equal intervals – the chatter marks – on the Such chatter-marks may be observed also on the produced replica (Luik, 2006, Figs. 7, Mäll who made the replica suggested that

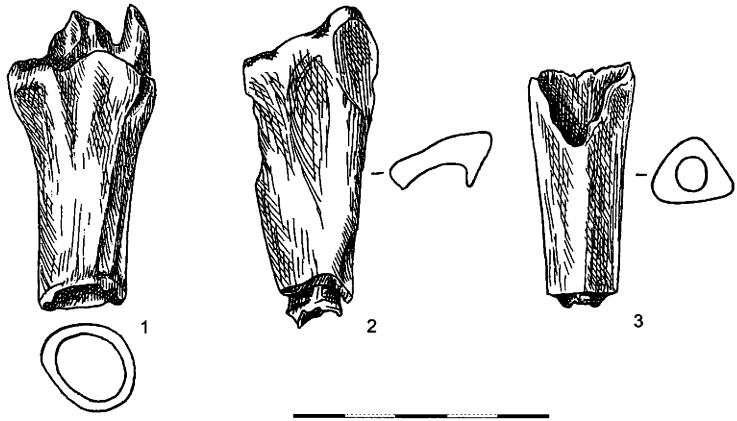

Fig. 35. **Bones with traces of transverse grooving** (Narkūnai, AR 594: 302, 385, 327; drawing by A. Ruzienė).
35 pav. Kaulai su skersinių griovelių įraižomis (Narkūnai, AR 594:302, 385, 327; piešė A. Ruzienė)

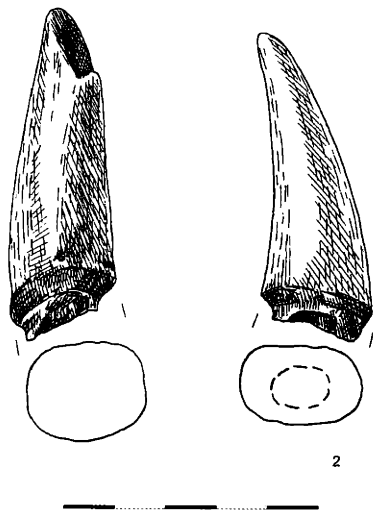

Fig. 36. **Antler tips with traces of transverse grooving** (Narkūnai, AR 594: 391, 390; drawing by A. Ruzienė).
36 pav. Raginės viršūnės su skersinių griovelių įraižomis (Narkūnai, AR 594:391, 390; piešė A. Ruzienė)

marks were apparently produced by working the artefact with a flint blade which was probably fitted into some sort of a handle, probably of the type described earlier in antler artefacts (Figs. 11; 12). Besides the mentioned chattermarks, the work also cast light on making the barbs of arrowheads: one barb of the replica broke at about the same place as the original. Most likely the method chosen for making the barb was not suitable: they attempted to cut it, but in the course of cutting the bone split and the barb broke. The other barb was sawn in with a sharp-edged piece of sandstone (about the making of the replica of the arrowhead, see more Luik, 2006, p. 138–140).

Bone artefacts bear various other longitudinal and transverse lines left there by cutting, carving and smoothing the artefact with a flint blade, which was probably neither very sharp nor even (e.g., Fig. 26; Luik, 2006, p. 140).

DISCUSSION

Finds from the East Lithuanian fortified settlements prove their participation in the network of bronze casting and trade. Bronze casting was an organized and specialised craft. The existence of fortified settlements connected with bronze working indicates the stratification of society (Merkevičius, 2005, p. 46–47; Lang, 2007, p. 73 ff.). In the following, we try to find an answer to the question whether it is possible to draw conclusions about the organization or specialisation of production, as well as the stratification of society, also on the basis of making and using bone artefacts.

The large number of bone and antler artefacts among the finds from the Bronze Age sites demonstrates the importance of bone and antler as raw materials in the society of the period. It must be certainly reckoned that many kinds of organic matter are not preserved in the ground while bronze artefacts could be recycled by

Fig. 37. **Point with very regular sharp facets, probably achieved by grinding the artefact on a stone** (Nevieriškė, AR 597: 430).
37 pav. Antgalis su labai taisyklingomis ryškiomis briaunelėmis, atrodo, išgautomis dirbinį trinant į akmenį (Nevieriškė, AR 597:430)

Fig. 38. **Chatter-marks on arrowhead** (Narkūnai, AR 594: 244).
38 pav. Įkartų žymės ant strėlės antgalio (Narkūnai, AR 594:244)

recasting them. Nevertheless a considerable part of tools and implements, with a rather wide field of use, were made of bone and antler. The choice of raw material was mainly based on its availability but also on the suitability of a certain skeletal part for making a certain type of artefact. Working methods were basically the same as in the Neolithic; mainly stone tools were probably still used for bone working. The question whether, after all, metal tools were used in some cases remains unanswered at the present stage of investigations. From the technological point of view, bone and antler artefacts can be broadly divided into two groups: simple tools made from most suitable bones, and more complicated and laborious artefacts. In some artefact types, the choice of species and skeletal parts was quite standardised, and the finished products were quite alike. The existence of such standardisation evidently indicates the existence of certain organisation and specialisation of bone working.

Although bone and antler as local raw material were generally available, rules might have existed about who could or could not make or use some things (Dobres, 1995, p. 27, 40; 2000, p. 104; Caple, 2006, p. 10). For instance, 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 Bronze Age settlement of Jászdózsa–Kápolnahalom, people of different strata might have had different access to antler as a valuable material, and rules stipulated who had the right to collect, stock and work antler and trade in antler artefacts (Choyke, 2005, p. 144). The finds from the Eastern Baltic fortified settlements also include bone or antler artefact types the use of which could have been limited to a certain group of population (Luik, in print).

In this respect, attention should be paid to the fact that in the archaeological record of the Lithuanian fortified settlements under discusson antler occurs mainly as production refuse; antler artefacts are rare. As regards bone, the situation is opposite: the majority of finds are artefacts and their fragments; blanks and production refuse are found in smaller numbers. One of the reasons for such distribution may be that antler working scrap is easier to recognise, 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 (the same can be observed in finds from later periods: Luik, 2005, p. 94). But reckoning the fact that the few found antler artefacts are mainly carefully finished products, handles and double buttons, of which also a few unfinished items and blanks have been found, it is also possible that such artefacts were made by craftsmen who were specialised, at least to some extent, and whose activities were in some way organised and checked. Perhaps the access to antler as raw material, as well as the use of antler artefacts were regulated, and finished artefacts were used mainly somewhere else.[5] The small

[5] The situation was the same in bronze casting: numerous moulds and other traces of bronze working but almost no finished products have been found in East Lithuanian fortified settlements. Lang has assumed the occurrence of a certain functional difference of division of work and production in the Bronze Age, which entailed an unequal mutual dependence (Lang, 2007, p. 79–81). It seems that the East Lithuanian fortified settlements were primarily production but not consumption centres.

Fig. 39. **Chatter-marks on point made from horse metapodial bone** (Kereliai, AR 726: 74).
39 pav. Įkartų žymės ant antgalio, pagaminto iš arklio metapodiumo kaulo (Kereliai, AR 726:74)

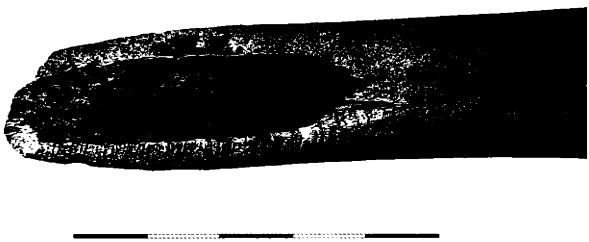

Fig. 40. **Chatter-marks on spearhead or scraper made from horse metapodial bone** (Narkūnai, AR 594, without number).
40 pav. Įkartų žymės ant ietigalio ar gremžtuko, pagaminto iš arklio metapodiumo kaulo (Narkūnai, AR 594, be numerio)

number of finds in Kereliai does not allow to answer the question whether the higher ratio of antler artefacts and refuse there indicates a higher level of organisation and specialisation or, on the contrary, easier access to antler and wider possibilities to use it. The shape of the refuse recovered there and rather similar working traces on them seem to favour the first suggestion.

Seeking the reason for the relatively high ratio of sheep/goat bones among finds compared with the occurrence of these species among faunal remains, which has been mentioned before in the discussion of the choice of material, we may find it in two artefact types: points made from metapodials (Figs. 16–18) and spearheads made from tibiae (Figs. 26–27).[6] Both artefacts are relatively standardised, compared to the rest of finds, and also more carefully worked. Evidently a certain opinion or preference existed as to how these artefacts should look and what they had tobe made from. In this connection, an antler spearhead (Fig. 13) is worth mentioning; it reveals attempts to shape it like a spearhead made from tibia, although an artefact of different shape could be made from antler. It is possible that the standardisation and careful finishing of these artefacts marks their greater role in the society of that period (compare Choyke, 1997, p. 71; Maigrot, 2005, p. 125).

Spearheads are weapons that were associated with hunting (Grigalavičinė, 1995, p. 269). Most of such bone spearheads are small and light, and the diameter of their socket does not allow using a thick shaft, thus most of them apparently belong to javelins. Jaak Mäll, the researcher of weaponry, has expressed an opinion that in a forested landscape the javelin is considerably more effective for hunting than the bow and arrows (Jaak Mäll, pers. comm.). Considering the fact that bronze weapons are few among archaeological finds from the Baltic countries, it is also possible that bone spearheads were

[6] The fact that some of these artefacts (which, owing to their fragmentariness, do not allow precise determination and may be made from roe deer bone), does not alter the situation from the aspect of standardisation. Evidently the choice of a certain species was not so important than the choice of a bone of a specific shape, which allowed to make an artefact of required properties and appearance. Since the bones of the mentioned species are similar, they were suitable for making similar artefacts.

used for warfare, thus their standardisation may be caused by their importance for society.[7]

Points, as already mentioned, were mainly used as awls for making holes in various materials, for example, hides and furs the edges of which had to be pierced for stretching them on a wooden frame or on the ground for working (Christidou, Legrand, 2005, p. 387 ff., Figs. 3 ff.). The recovered faunal remains prove that cattle breeding played an important role in the occupations of the Bronze Age settlements, and hides as well as furs were probably the products that could be bartered for bronze necessary for the society of the period. For example, Timothy Earle has mentioned hides and furs as possible barter ware for bronze in the context of the Danish Bronze Age (Earle, 2002, p. 312). Furs could have had a certain role in barter trade alongside with hides also in Lithuania. The 22% ratio of wild animal bones in Narkūnai is quite a considerable figure, particularly because from fur animals not used for food, usually only furs were brought to the settlement and thus their bones are not reflected among faunal remains. The archaeozoological record from East Lithuania shows quite a constant ratio of bones of fur animals (16.4–18.8%) from the Middle Neolithic until the Early Bronze Age, but in the Late Bronze Age it falls to only 9.3%; it was related to the decreased importance of furs and production of clothing from plant fibres (Daugnora, Girininkas, 1998, p. 231). Probably working of hides and fur was important for society, thus causing the organisation and standardisation of tools connected with it.[8] Very short, repeatedly re-sharpened points also occur mainly among the items made from metapodials (Fig. 18). Undoubtedly, awls and points were also used for various housework: the so-called *ad hoc* points produced by using a sharp-tipped bone fragment or a bone of suitable shape could be probably related to this field of use.

Concerning these two artefact types – awls from metapodials and spearheads from tibiae – it should be also emphasised that they are typical specifically of the Bronze Age fortified settlements of this region. With awls from metapodials, the diameter or shape of holes produced by them is functionally important, but from a bone, longitudinally split or not, thicker and finer points as well as artefacts with tips with oval or round cross-section can be made. Whether the whole or halved end of a bone was left for the handle was functionally unimportant; probably in that case the choice was cultural – an artefact was made in an accustomed shape and way. Of course, by halving bones one could produce a double number of points. Considering the identifications of faunal remains, sheep/goat were dominant in Estonian sites: in East Lithuania their ratio was considerably lower (Lang, 2007, p. 73). But judging from the fact that faunal remains always include unused potential raw material, such "economizing of material"" was hardly of great importance. The production technologies were also different: one of them split the bone longitudinally, sometimes with the aid of grooving, while for another a bone had to be broken diagonally. Since we have not investigated the Latvian finds yet and the analysis of Estonian finds is not finished, at the present stage of investigations we cannot say whether or not grooving as a bone working technique was less spread in these regions.

The standardised choice of raw material of the mentioned points and spearheads can be established because on these artefacts the natural shape and characteristic features of a bone are partly preserved, enabling the determination of bone to species level and skeletal parts. On some of the carefully worked artefacts like arrowheads and decorative pins, the original shape of a bone was modified in the course of work so that the material and hence also the choice preferences cannot be established. Double buttons should be also mentioned among carefully finished objects. Their size, and the porous tissue observable in some places owing to the size of the buttons, prove that they are made from antler, the use of which may have been regulated to some extent.

As already mentioned, the carefully finished arrowheads were probably made for warfare (see Luik, 2006). In the Bronze Age, warfare and the image of warrior became an important part of social ideology in Scandinavia and elsewhere in Europe (e.g., Kristiansen, 1999; Harding, 1999; 2000, p. 271 ff.; Renfrew, 2002, p. 136–137). In the Eastern Baltic, bronze weapons and

[7] According to Earle, in the Hawaiian chiefdom one of the specialised groups consisted of craftsmen who manufactured artefacts their chieftains needed for warfare, for example, wooden spears and war clubs (Earle, 2002, p. 146).

[8] Bone scrapers could have been also used for leather working. They include also occasional *ad hoc* tools as well as more standardised, uniform artefacts. Without complementary microscopic and experimental research it is not possible to establish which artefacts were used for which materials and processes, and whether tools of some specific shape were used for some specific work. Artefacts made from ribs could have been also used for leather working.

other bronze artefacts are few compared to Scandinavia (e.g., Sidrys, Luchtanas, 1999, p. 174). Although fortified settlements appear in the settlement pattern, they may have been, according to Valter Lang, established primarily in defense of the bronze casters whose traces have been discovered there, not as footholds connected with the spread of military ideology. The fact that almost no weapons occur in graves of the Late Bronze Age in the Eastern Baltic[9] also suggests that on the eastern shore of the Baltic military ideology did not play such an important role. In Eastern Lithuania no graves of that period, except a few flat cemeteries with scanty finds, are known at present (Lang, 2007, p. 64, 115–116). However, even for defence purposes one needs, besides a fortified site, also weapons. In case of the absence or a insufficient amount of bronze weapons, bone weapons could be also used for the purpose. Here we should remind that spear/javelin heads from sheep/goat tibiae were primarily spread in Lithuanian fortified settlements, while the situation is opposite with more carefully worked arrowheads – these are more numerous in Latvia and in Estonia where only a few spearheads are found. It is possible that the preference of bow or javelin for long distance combat was also a cultural choice.

According to Algimantas Merkevičius, a rank of semi-professional warriors also existed in the Bronze Age stratified society on the Eastern shore of the Baltic (Merkevičius, 2005, p. 50). One of the indications of the existence of such rank is the finds of antler cheek-pieces in the Eastern Baltic, which suggest that horse was used here for riding in that period (see Luik, in print).[10] Although a few cheek-pieces have been found also in Lithuania (e.g., Petrešiūnai: Grigalavičienė, 1995, Fig. 100:11), they have not been found in the fortified settlements under discussion. Among faunal remains, horse bones are present (Grigalavičienė, 1986a, p. 88; Volkaitė-Kulikauskienė, 1986, p. 47; Lang, 2007, p. 73). Whether the difference lies in the fact that in one region the horse was used for riding and in another it was not is not possible to say on the basis of the present-day knowledge. The difference could lie in the construction of the bridle which did not include cheek-pieces, or cheek-pieces could have been made from wood and consequently are not preserved.[11]

Another artefact type in which regional differences can be observed in the Eastern Baltic consists of antler hoes or ploughshares. Only a few of them have been found in the East Lithuanian fortified settlements (Fig. 10). They are considerably more numerous in Estonia and Latvia, for example, in Asva and Ķivutkalns. According to Lang, agriculture played only a secondary role in the region of East Lithuanian fortified settlements; cattle breeding, bronze-casting and trade were more important (Lang, 2007, p. 82). The earliest finds of cereal pollen from this region date from the Early Iron Age (Daugnora, Girininkas, 1998, p. 232). Apparently the scarceness of bone artefacts connected with agriculture also reflects the moderate role of agriculture in East Lithuania. Although the fortified settlement of Asva itself is not located on a site favourable for cultivation, both Asva and Ķivutkalns are located in a region where natural conditions favoured primitive agriculture (Lang, 2007, p. 77). Perhaps the population of these fortified settlements, which were primarily working centres, manufactured tools for the neighbouring agricultural areas and bartered them for agricultural products. Ploughshares or hoes were made from antler about which we have assumed already that its use could have been regulated to some extent.

A separate group consists of decorative pins and double buttons (Figs. 9; 31). Their practical function was the fastening of clothing, but at the same time they were also decorations and, being visible on the garments, could have possessed also a symbolic meaning as exponents of social identity (see, e.g., Earle, 2002, p. 354–356). Perhaps only members of a certain social rank had the right to wear such artefacts (Merkevičius, 2005, p. 48–49; Luik, in print). As already mentioned in the survey of artefacts, both double buttons and decorative pins imitated bronze artefacts of foreign origin;[12] it is possible that together

[9] A bronze arrowhead from the ship-grave in Lülle, Saaremaa, could be mentioned, some information concerns also a knife or a sword found from Couronian ship-graves, which was lost (Lang, 2007, p. 62–63).

[10] It has been suggested that the use of horse for riding, particularly for fast motion in battle, began in Europe in the first millennium BC. However, in the Bronze Age horse flesh was also used for food (Harding, 2000, p. 136, 170; see also Lõugas, 1994, p. 75).

[11] Wooden details of bridles have been suggested in Finland, but a find of this type dates from a considerably later time (Lehtosalo-Hilander, 1982, p. 63).

[12] Foreign bronze artefacts were imitated not only in some bone artefact types. Bronze copies were also made; for example, in the Narkūnai mould, fragments of Mälar type axes were found, and mould fragments for Härnev type decorative pins were among the finds from Asva, Estonia (Lang, 2007, p. 81; Merkevičius, 2006, p. 34, fig. 3). Earle has expressed an opinion that local production copying foreign artefacts were regarded as valuable prestige items. But, although copies made from locally available materials could

with the adoption of the shape of an artefact the ideologies, tenets and/or meanings connected with them were adapted too. One of the possibilities is that double buttons expressed the symbolism connected with the cult of Sun, which occupied a significant place in the Scandinavian Bronze Age religion. Kristian Kristiansen and Thomas Larsson are of the opinion that bronze discs at the waists of the deceased in Scandinavian Bronze Age burials may have symbolised the Sun (Kristiansen, Larsson, 2005, p. 294 ff., figs. 135 ff.). Sometimes the discs worn on the belts were tutulus-shaped. Scandinavian flat bronze double buttons are often decorated with patterns of circles, spiral motives, star ornaments, which probably can be also related to the Sun (e.g., Harding, 2000, p. 324; Kristiansen, Larsson, 2005, p. 302). Perhaps the tutulus-shaped double buttons, made from antler in the Baltic countries, could be also regarded as exponents of the same symbolism. Spokes, or rays of Sun, engraved on one of the Narkūnai buttons (Fig. 9:2) as well as the occurrence of double buttons made from amber seem to support this opinion (Luik, Ots, in print).

Decorative bone pins are found in all Baltic countries; they occur more frequently in fortified settlements, but are also found in graves. Their regional differences and the possible function or meaning a certain type of pins could have in a certain context[13] require further investigation. It is possible that these pins, being imitations of foreign artefacts, expressed also some meaning adopted together with their shape, that they lack connections with local traditions and therefore are similar throughout the Eastern Baltic region.

be suitable for demonstrating wealth and status, Earle stresses that the manufacture and spread of such objects would be more difficult to monopolize than in the case of rare and/or imported materials, and the use of such symbolic objects demonstrates that the ideological power remained diffuse (Earle, 2002, p. 221, 322, 355, 363).

[13] In this connection, for example, spade-headed bone pins among Estonian finds could be mentioned: unlike other pin types, they mainly occur among grave goods (Lang, 1992; Luik, in print).

SUMMARY

Bone and antler artefacts constitute a remarkable part of the archaeological record of the East Lithuanian fortified settlements discussed in this paper, thus indicating the importance of bone and antler as raw materials in the Bronze Age society. Artefacts used in a variety of fields were made from bone and antler. In antler working, as well as in the production of certain bone artefacts, we may assume the existence of a certain degree of organisation and specialisation.

Although, in general, bone artefacts from East Lithuanian fortified settlements are quite similar to those from other sites in the Baltic countries, certain regional differences can be observed. The reason in some cases may be the differences of occupations (e.g., the quantity of ploughshares or hoes), in other cases it may lie in cultural choices and habits of a certain society, in the way and material an artefact used for a certain purpose had to be made (e.g., awls from metapodials of sheep/goat and spearheads from tibiae). The occurrence of artefacts imitating foreign bronze objects may refer to the distribution of the ideologies and symbolic meanings connected with them on the eastern shore of the Baltic Sea, as well as the existence of a social group or rank whose requirements these artefacts met.

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Abbreviations

AR – Lithuanian National Museum, Department of Archaeology, Vilnius.

AI – Tallinn University, Institute of History, Tallinn.

References

Barrett J., 2005. Habitus. In: *Archaeology. The Key Concepts (eds. C. Renfrew, P. Bahn)*. London; New York, p. 133–137.

Bąk U., 1985. Przemysł kościany i rogowy w grupe Nowocerekwiańskiej na Górnym Śląsku. In: *Archeologia Polski, XXX: 2*, p. 311–328.

Becker C., 2001. Bone points – no longer a mystery? Evidence from the Slavic urban fortification of Berlin-Spandau. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 129–148.

Becker C., 2005. Spindle whorls or buttons? Ambiguous bone artefacts from Bronze Age *castelliere* on Istria. In: *From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group in Tallinn, 26–31 August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). Muinasaja teadus, 15.* Tallinn, p. 157–174.

Bernabò-Brea L., 1964. Poliochni. Città preistorica nell' isola di Lemnos, 1: 1–2. Monografie della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente. Roma.

Bourdieu P., 1977. Outline of a Theory of Practice. Cambridge.

Bradley R., 2005. Ritual and Domestic Life in Prehistoric Europe. London; New York.

Bulten E. E., Clason A., 2001. The antler, bone and tooth tools of Swifterbant, the Netherlands (c. 5500–4000 cal. BC) compared with those from other Neolithic sites in the Netherlands. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 297–320.

Caple C., 2006. Objects. Reluctant Witnesses to the Past. London, New York.

Choyke A. M., 1997. The bone tool manufacturing continuum. In: *Anthropozoologica, 25–26*, p. 65–72.

Choyke A. M., 2001a. A quantitative approach to the concept of quality in prehistoric bone manufacturing. In: Animals and Man in the Past. Essays in honour of Dr. A. T. Clason, emeritus professor of archaeozoology Rijksuniversiteteit Groningen, the Netherlands (eds. H. Buitenhuis, W. Prummel). *ARC-Publicatie, 41.* Groningen, p. 59–66.

Choyke A. M., 2001b. Late Neolithic red deer canine beads and their imitations. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 251–266.

Choyke A. M., 2005. Bronze Age bone and antler working at the Jászdózsa-Kjpolnahalom tell. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 129–156.

Choyke A. M., Vretemark M., Sten S., 2004. Levels of social identity expressed in the refuse and worked bone from the Middle Bronze Age Százhalombatta-Földvár, Vatya culture, Hungary. In: *Behavior Behind Bones. The Zooarchaeology of Ritual, Religion, Status and Identity. Proceedings of the ICAZ 9th Conference, Durham, August 2002* (eds. S. Jones O'Day, W. van Neer, A. Ervynck). Oxford, p. 177–189.

Christidou R., 2001. Study of bone tools at three Late/ Final Neolithic sites from Northern Greece. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 41–47.

Christidou R., 2005. Investigating technical and functional variability in the Neolithic bone tool assemblages of Eastern Macedonia (Northern Greece): Methods and preliminary results. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 91–104.

Christidou R., Legrand A., 2005. Hide working and bone tools: Experimentation design and applications. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 385–396.

Cristiani E., Alhaique F., 2005. Flint *vs.* metal: the manufacture of bone tools in the Eneolithic site of Conelle di Arcevia (Central Italy). In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 397–403.

Daugnora L., Girininkas A., 1996. Osteoarcheologija Lietuvoje. Vidurinysis ir vėlyvasis holocenas. Vilnius.

Daugnora L., Girininkas A., 1998. Stock breeding in the Baltic Culture Area. In: *Archaeologia Baltica, 3.* Vilnius, p. 223–234.

David E., 2003. The Mesolithic Zvejnieki site (Latvia) in its European context: Preliminary results delivered by a technological study of the bone and antler industry. In: *Journal of Estonian Archaeology/Eesti Arheoloogia Ajakiri, 7: 2*, p. 99–122.

David E., 2005. The bone and antler industry of the oldest Mesolithic site of Estonia, Pulli. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 67–74.

Dobres M.-A., 1995. Gender and prehistoric technology: on the social agency of technical strategies. In: Symbolic Aspects of Early Technologies (ed. S. Shennan). *World Archaeology, 27: 1.* London; New York, p. 25–49.

Dobres M.-A., 2000. Technology and Social Agency. Outlining a Practice Framework for Archaeology. Oxford.

Durczewski D., 1985. Gród ludności kultury łużyckiej z okresu halsztackiego w Smuszewie woj. Pilskie, 1. *Biblioteka Fontes Archaeologici Posnanienses,* 6. Poznan.

Earle T., 2002. Bronze Age Economics. The Beginning of Political Economies. Oxford.

Elster E., 2001. Middle Neolithic to Early Bronze Age tools from Sitagroi, Greece. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 355–369.

Friedel R., 1993. Some matters of substance. In: *History from Things. Essays on Material Culture* (eds. S. Lubar, W. D. Kingery). Washington; London, p. 41–50.

Gosden C., Marshall Y., 1999. The cultural biography of objects. In: The Cultural Biography of Objects (eds. C. Gosden, Y. Marshall). *World Archaeology, 31: 2.* London; New York, p. 169–178.

Graudonis J., 1989. Nocietinātās apmetnes Daugavas lejtecē. Rīga.

Griffits J., 2001. Bone tools from Los Pozos. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 185–195.

Griffits J., Bonsall C., 2001. Experimental determination of the function of antler and bone 'bevel-ended tools' from prehistoric shell middens in western Scotland. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 207–220.

Grigalavičienė E., 1986a. Nevieriškės piliakalnis. In: *Lietuvos archeologija, 5. Ankstyvieji šiaurės rytų Lietuvos piliakalniai.* Vilnius, p. 52–88.

Grigalavičienė E., 1986b. Sokiškių piliakalnis. In: *Lietuvos archeologija, 5. Ankstyvieji šiaurės rytų Lietuvos piliakalniai.* Vilnius, p. 89–138.

Grigalavičienė E., 1992 Kerelių piliakalnis. In: *Lietuvos archeologija, 8. Straipsnių rinkinys*. Vilnius, p. 85–105.

Grigalavičienė E., 1995. Žalvario ir ankstyvasis geležies amžius Lietuvoje. Vilnius.

Harding A., 1999. Warfare: a defining characteristic of Bronze Age Europe. In: *Ancient Warfare. Archaeological Perspectives* (eds. J. Carman, A. Harding). Gloucestershire, p. 157–173.

Harding A. F., 2000. European Societies in the Bronze Age. Cambridge.

Harding A., Ostoja-Zagórski J., Palmer C., Rackham J., 2004. Sobiejuchy: A Fortified Site of the Early Iron Age in Poland. *Polskie Badania Archeologiczne, 35.* Warsaw.

Hodder I., 2004. The "social" in archaeological theory: an historical and contemporary perspective. In: *A Companion to Social Archaeology* (eds. L. Meskell, R. W. Preucel). Oxford, p. 23–42

Indreko R., 1939. Asva linnus-asula. In: *Muistse Eesti linnused. 1936.–1938. a. uurimiste tulemused* (ed. H. Moora). Tartu, p. 17–52.

Ingold T., 2000. The Perception of the Environment. Essays in Livelihood, Dwelling and Skill. London; New York.

Jaanits L., Laul S., Lõugas V., Tõnisson E., 1982. Eesti esiajalugu. Tallinn.

James S. R., 2001. Prehistoric Hohocam bone artifacts from southern Arizona: craft specialization, status and gender. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 331–341.

Kristiansen K., 1999. The emergence of warrior aristocracies in later European prehistory and their long-term history. In: *Ancient Warfare. Archaeological Perspectives* (eds. J. Carman, A. Harding). Gloucestershire, p. 175–189.

Kristiansen K., Larsson T. B., 2005. The Rise of Bronze Age Society: Travels, Transmissions and Transformations. Cambridge.

Lang V., 1992. Eesti labidaspeaga luunõelte dateerimisest. In: *Stilus, 1. (eds. L. Jaanits, V. Lang).* Eesti Arheoloogiaseltsi Teated. Tallinn, p. 8–32.

Lang V., 1996. Muistne Rävala. Muistised, kronoloogia ja maaviljelusliku asustuse kujunemine Loode-Eestis, eriti Pirita jõe alamjooksu piirkonnas. *Muinasja teadus, 4.* Tallinn.

Lang V., 2007. Baltimaade pronksi- ja rauaaeg. Tartu.

Legrand A., 2005. New evidence on the bone reduction techniques from Khirokitia – Cyprus (7th millennium calBC). In: *From Hooves to Horns, from Mollusc to Mammoth.* Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 105–112.

Lehtosalo-Hilander P.-L., 1982. Luistari II. The Artefacts. *Suomen Muinasmuistoyhdistyksen Aikakauskirja, 82: 2.* Helsinki.

LeMoine G., 1997. Use Wear Analysis on Bone and Antler Tools of the Mackenzie Inuit. *British Archaeological Reports, International Series, 679.* Oxford.

LeMoine G. M., Darwent C. M., 1998. The walrus and the carpenter: Late Dorset ivory working in the High Arctic. In: *Journal of Archaeological Science, 25*, p. 73–83.

Lemonnier P., 1993. Introduction. In: *Technological Choices. Transformation in Material Cultures since the Neolithic. Material Cultures. Interdisciplinary Studies in the Material Construction of Social Worlds (ed. J. Lemonnier)*. London, New York, p. 1–35.

Luik H., 2005. Luu- ja sarvesemed Eesti arheoloogilises leiumaterjalis viikingiajast keskajani/Bone and antler artefacts among Estonian archaeological finds from the Viking Age until the Middle Ages. Dissertationes archaeologiae Universitatis Tartuensis, 1. Tartu. http://www.utlib.ee/ekollekt/diss/dok/2005/b17285896/luik.pdf

Luik H., 2006. For hunting or for warfare? Bone arrowheads from Late Bronze Age fortified settlements in Eastern Baltic. In: *Estonian Journal of Archaeology/Eesti Arheoloogiaajakiri, 10: 2*, p. 132–149.

Luik H., in print. Dazzling white. Bone artefacts in Bronze Age society – some preliminary thoughts from Estonia. In: Colours of Archaeology. Material Culture and Society. Papers from the second theoretical seminar of the Baltic archaeologists (BASE) held in Padvaria, October 20–22, 2005 (ed. A. Merkevičius). *Interarchaeologia, 2.* Vilnius, Riga, Tartu.

Luik H., Maldre L., in print. Same material, different age and function? Tools made from ribs in the archaeological material of Estonia. In: *Of People and Bones: The Archaeology of Osseous Artefacts. Proceedings of the 5th Meeting of the ICAZ Worked Bone Research Group, August 29 – September 3, 2005, Veliko Turnovo, Bulgaria.*

Luik H., Ots M., in print. Bronze Age double buttons in Estonia. In: *Estonian Journal of Archaeology/Eesti Arheoloogiaajakiri.*

Lõugas L., 1994. Subfossil vertebrate fauna of Asva site, Saaremaa. Mammals. In: *Stilus, 5 (ed. V. Lang)*. Eesti Arheoloogiaseltsi Teated. Tallinn, p. 71–93.

Lõugas V., 1970. Eesti varane metalliaeg (II a.-tuh. keskpaigast e.m.a. – 1. sajandini m.a.j.). Diss. kand. Tallinn. (Manuscript at the Institute of History, Tallinn University.)

Lõugas V., Selirand J., 1989. Arheoloogiga Eestimaa teedel. Tallinn.

MacGregor A., 1985. Bone, Antler, Ivory and Horn. The Technology of Skeletal Materials Since the Roman Period. London.

Maigrot Y., 2005. Ivory, bone and antler tools production systems at Chalain 4 (Jura, France): late Neolithic site, 3rd millennium. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26th–31st of August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 113–126.

Maldre L., 1999. Osteological evidence for the introduction of farming in Estonia. In: Environmental and Cultural History of the Eastern Baltic Region: Journal of the European Network of Scientific and Technical Cooperation for the Cultural Heritage (eds. U. Miller, T. Hackens, V. Lang, A. Raukas, S. Hicks). *PACT, 57. Rixensart*, p. 319–323.

Maldre L., in print. Karjakasvatusest Ridala pronksiaja asulas. In: *Muinasaja teadus*. Tallinn.

Malinowski T., 2006. Komorowo, stanowisko 1: Grodzisko kultury Łużyckiej – faktoria na szlaku bursztynowym. *Collectio Archaeologica Resoviensis*, 1. Rzeszów.

McGhee R., 1977. Ivory for the Sea Woman: The symbolic attributes of a prehistoric technology. In: *Canadian Journal of Archaeology, 1*, p. 141–149.

Merkevičius A., 2005. Material culture and the East Baltic Bronze Age society. In: Culture and Material Culture. Papers from the first theoretical seminar of the Baltic archaeologists (BASE) held at the University of Tartu, Estonia, October 17–19, 2003 (ed. V. Lang). *Interarchaeologia, 1.* Tartu; Riga; Vilnius, p. 39–52.

Merkevičius A., 2006. The Vaškai hoard. In: *Archaeologia Baltica, 6.* Klaipėda, p. 32–38.

Olsen S., 2001. The importance of thong-smoothers at Botai, Kazakhstan. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 197–206.

Pétrequin P., 1993. North wind, south wind. Neolithic technical choices in the Jura Mountains, 3700–2400 BC. In: *Technological Choices. Transformation in Material Cultures since the Neolithic. Material Cultures. Interdisciplinary Studies in the Material Construction of Social Worlds* (ed. J. Lemonnier). London; New York, p. 36–76.

Provenzano N., 2001. Worked bone assemblages from Northern Italian Terramares: A technological approach. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 85–91.

Prown J. D., 1993. The truth of material culture: History or fiction? In: *History from Things. Essays on Material Culture* (eds. S. Lubar, W. D. Kingery). Washington; London, p. 1–19.

Renfrew C., 2002. Symbol before concept. Material engagement and the early development of society. In: *Archaeological Theory Today* (ed. I. Hodder). Cambridge, p. 122–140.

Robb J., 2005. Agency. In: *Archaeology. The Key Concepts* (eds. C. Renfrew, P. Bahn). London; New York, p. 3–7.

Russell N., 2001a. Neolithic relations of production: insights from the bone tool industry. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 271–280.

Russell N., 2001b. The social life of bone: a preliminary assessment of bone tool manufacture and discard at Ēatalhöyük. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 241–249.

Schiffer M. B., 1999. The Material Life of Human Beings. Artifacts, Behavior, and Communication. London; New York.

Sidéra I., 2001. Domestic and funerary bone, antler and tooth objects in the Neolithic of western Europe: a comparison. In: Crafting Bone: Skeletal Technologies through Time and Space. Proceedings of the 2nd Meeting of the (ICAZ) Worked Bone Research Group, Budapest, 31 August – 5 September 1999 (eds. A. M. Choyke, L. Bartosiewicz). *British Archaeological Reports, International Series, 937.* Oxford, p. 221–229.

Sidéra I., 2005. Technical data, typological data: a comparison. In: From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present. Proceedings of the 4th Meeting of the ICAZ Worked Bone Research Group at Tallinn, 26–31 August 2003 (eds. H. Luik, A. M. Choyke, C. E. Batey, L. Lõugas). *Muinasaja teadus, 15.* Tallinn, p. 81–90.

Sidrys R. V., Luchtanas A., 1999. Shining axes, spiral pins. Early metal consumption in the East Baltic. In: *Acta Archaeologica, 70.* København, p. 165–184.

Sperling U., 2006. Die spätbronze- und früheisenzeitliche Siedlung von Asva in Estland. MA thesis, Berlin. (Manuscript in the Freie Universität Berlin.)

Vilsteren V. T. van, 1987. Het Benen Tijdperk. Gebruiksvoorwerpen van been, gewei, hoorn en ivoor 10.000 jaar geleden tot heden. Assen.

Vasks A., 1994. Brikuļu nocietinātā apmetne. Lubāna zemiene vēlajā bronzas un dzelzs laikmetā (1000. g. pr. Kr. – 1000. g. pēc Kr.). Rīga.

Vassar A., 1939. Iru Linnapära. In: *Muistse Eesti linnused. 1936.–1938. a. uurimiste tulemused (ed. H. Moora).* Tartu, p. 53–100.

Volkaitė-Kulikauskienė R., 1986. Narkūnų didžiojo piliakalnio tyrinėjimų rezultatai (Apatinis kultūrinis šluoksnis). In: *Lietuvos archeologija, 5. Ankstyvieji šiaurės rytų Lietuvos piliakalniai.* Vilnius, p. 5–49.

Вассар А., 1955. Укрепленное поселение Асва на острове Сааремаа. In: *Muistsed asulad ja linnused. Arheoloogiline kogumik, 1 (eds. H. Moora, L. Jaanits).* Tallinn, p. 113–137.

Граудонис Я., 1967. Латвия в эпоху поздней бронзы и раннего железа. Начало разложения первобытно-общинного строя. Рига.

Паавер К. Л., 1965. Формирование териофауны и изменчивость млекопитающих Прибалтики в голоцене. Тарту.

Смирнова Л. И., 1999. Проколки. Хронология и функциональное назначение. In: *Новгород и Новгородская земля: История и археология, 13. Материалы научной конференции. Новгород, 26–28 января 1999 г.* Новгород, p. 142–162.

ŽALVARIO AMŽIAUS KAULINIAI DIRBINIAI IŠ NARKŪNŲ, NEVIERIŠKĖS IR KERELIŲ ĮTVIRTINTŲ GYVENVIEČIŲ. ŽALIAVA IR GAMYBOS TECHNOLOGIJA

Heidi Luik, Liina Maldre

Santrauka

Vykdant projektą „Kauliniai dirbiniai tarp kitų žalvario amžiaus įtvirtintų gyvenviečių archeologinių dirbinių Baltijos šalyse" buvo tyrinėti kauliniai ir raginiai dirbiniai iš trijų žalvario amžiaus Rytų Lietuvos įtvirtintų gyvenviečių: Narkūnų, Nevieriškės ir Kerelių (1 pav.). Tyrimų tikslas – apžvelgti kaulinių ir raginių dirbinių gamybą šiose gyvenvietėse, daugiausia dėmesio skiriant medžiagai, įrankiams ir technologijoms, naudotiems gamybos metu. Darbo tikslas taip pat yra palyginti šių gyvenviečių kaulo dirbinius su kitais Baltijos šalių dirbiniais, taip nustatant panašumus ar didesnius skirtumus, pavyzdžiui, renkantis medžiagas ar metodus, gaminant įvairius dirbinius. Išanalizavus kaulo dirbinius taip pat ieškota atsakymo į klausimą, kokias galime padaryti išvadas apie žmonių veiklą, socialinius santykius ir tiriamos visuomenės gamybos specializacijos atsiradimą ar nebuvimą.

Senųjų amatininkų medžiagos pasirinkimo priežastis galėjo būti biologinė, taip pat kultūrinė. Paprastai dirbiniai buvo gaminami iš tokių rūšių kaulų, kurių taip pat randama tarp faunos liekanų. Biologinis atrinkimas priklausė nuo kaulo tinkamumo dirbiniui pagaminti. Tuo pačiu metu tikriausiai buvo susiformavusios ir tradicijos dėl tam tikrų gyvūnų rūšių ar atitinkamų skeleto dalių tinkamumo, norint gaminti tam tikrą įrankį ar dirbinį. Technikos, žaliavos ar įrankio pasirinkimas kartais galėjo labiau priklausyti nuo visuomenės jiems skiriamos simbolinės vertės, negu nuo jų tikrų fizinių savybių. Tyrinėtų Lietuvos įtvirtintų gyvenviečių archeologinių duomenų tyrimai atskleidė, kad daugiausia naudoti prijaukintų gyvūnų kaulai; laukinių gyvūnų kaulų buvo surasta gerokai mažiau, taip pat mažiau jų naudota ir dirbiniams gaminti (2–3 pav.). Dauguma aptariamose gyvenvietėse tyrinėtų dirbinių buvo gaminti iš kaulo. Narkūnuose ir Nevieriškėse kauliniai dirbiniai ir kaulinės atliekos sudarė daugiau kaip 90%, o tarp Kerelių radinių rago dirbinių ir rago atliekų buvo šiek tiek daugiau, jie sudaro apie 20%. Dauguma paprastų žalvario amžiaus kaulo ir rago dirbinių panašūs į naudotus neolito laikotarpyje; gamybos technologija ir pagrindiniai gamybos metodai taip pat buvo gana panašūs. Naujas reiškinys kalbant apie Rytų Baltijos regiono žalvario amžiaus įtvirtintų gyvenviečių radinius, įskaitant Lietuvą, yra importinių žalvarinių dirbinių kopijų iš kaulo ir rago gamyba (pvz., puoštų smeigtukų ir dvigubų sagų).

Didesnę raginių radinių dalį sudaro ruošiniai ir darbinės atliekos, tačiau taip pat surasta ir dirbinių (4–13 pav.). Tik keletas dantų ir ilčių rasta su darbinėmis žymėmis (14 pav.). Kauliniai dirbiniai (15–32 pav.) dalijami į dvi grupes: 1) dirbiniai, kuriems naudoti pagal formą labiausiai tinkami kaulai, kurie buvo nedaug apdirbti; 2) kruopščiai pagaminti dirbiniai, kurie paprastai yra iš didelių ilgųjų kaulų diafizės. Remiantis kauliniais dirbiniais iš minėtų gyvenviečių, galima atkurti keletą specifinių kaulo apdirbimo meto-

dų, dauguma kurių naudoti ir anksčiau: nulaužimas, skaldymas, drožimas, pjaustymas, raižymas, šlifavimas, poliravimas (33–40 pav.).

Didelis kaulo ir rago dirbinių kiekis tarp kitų žalvario amžiaus paminklaviečių dirbinių rodo kaulo ir rago žaliavos svarbą aptariamojo laikotarpio visuomenėje. Žaliavos pasirinkimą daugiausia nulėmė jos prieinamumas, bet taip pat ir atskirų skeleto dalių tinkamumas tam tikro tipo dirbiniams gaminti. Kai kurių dirbinių tipų gyvūnų rūšių ir skeleto dalių pasirinkimas buvo gana standartizuotas ir pagaminti dirbiniai buvo gana panašūs. Toks standartizavimas akivaizdžiai rodo buvus tam tikrą kaulo apdirbimo organizaciją ir specializaciją. Apibendrinant, nors kaulo dirbiniai Rytų Lietuvos įtvirtintose gyvenvietėse yra gana panašūs į kitų Baltijos šalių gyvenviečių kaulo dirbinius, yra tam tikrų regioninių skirtumų. Kai kuriais atvejais galima to priežastis yra verslų skirtumai, kitais atvejais – atskirų visuomenių kultūriniai skirtumai ir įpročiai, kaip ir iš ko tie dirbiniai pagaminti ir kam jie buvo naudoti. Dirbinių, imituojančių atvežtinius žalvarinius dirbinius, atsiradimas atspindi su jais susijusios ideologijos ir simbolinių reikšmių plitimą Baltijos jūros rytinėje pakrantėje, taip pat skirtingų socialinių grupių ar skirtingų rangų žmonių, kuriems buvo reikalingi šie dirbiniai, buvimą.

Vertė Algimantas Merkevičius

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