

WORKED AND UNWORKED BONE FROM THE VILJANDI CASTLE OF THE LIVONIAN ORDER (13TH–16TH CENTURIES)

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The paper deals with bone material from the medieval Viljandi castle in South Estonia. Most of the animal bones belonged to domestic animals, specimens from game were rare. The material from the castle is not typical for food waste, probably it can be interpreted as butchering waste. In addition there seems to have existed a workshop of bone processing or weapon repairing somewhere in the vicinity of the investigated area. Up to now, approximately a hundred artefacts and about 500 pieces of bone working refuse have been recovered from the excavations. The working debris mostly consists of antler fragments; most of the artefacts are also made from antler.

Keywords: Viljandi castle, Estonia, the Middle Ages, faunal remains, bone and antler working.

Straipsnyje aptariami Viljandi viduramžių pilyje (Pietų Estija) aptikti kauliniai radiniai. Didžioji dalis kaulų yra naminių gyvulių, medžiojamųjų gyvūnų kaulų aptikta nedaug. Pilyje surasta medžiaga nėra tipinės maisto atliekos, labiau tikėtina, jog tai skerdimio liekanos. Be to, manoma, kad tyrinėtose teritorijose aplinkoje galėjo veikti kaulo apdirbimo ar ginklų taisymo dirbtuvės. Kasinėjimų metu surasta apie 100 kaulinių dirbinių ir apie 500 vienetų kaulo apdirbimo liekanų. Daugumą nuolaužų sudaro rago fragmentai; iš rago pagaminta ir didžioji dalis dirbinių.

Reikšminiai žodžiai: Viljandi pilis, Estija, viduramžiai, osteologinė medžiaga, kaulo/rago apdirbimas.

INTRODUCTION

The castle of Teutonic Order in Viljandi (hereafter: Viljandi castle) is one of the most powerful in the territory of present-day Estonia. The main castle, located on a lakeside plateau, is surrounded by three outer baileys, two of which are separated from the main castle by deep moats. Thus, the ruins visible on hilltop have resulted in a relatively early scientific interest in the site.

Viljandi castle has been a subject of archaeological research already since 1878 (see Haak 2006 for historiography). The reasons leading to the investigations, and the problems addressed thereby

have been manifold, but these strongly influence the methods used and the areas chosen for investigation. In this regard, it should not be surprising that the amount and composition of the find material is of remarkable variability, which is also true of the bone artefacts, working debris and faunal remains found so far. One of the aims of the current article is to review the information available, look at the context of the bone finds and compare information about faunal remains with that obtained from determining bone objects and working refuse. While it is impossible with materials from the earliest excavations, as such information was not recorded at that time, special attention is paid to the investiga-

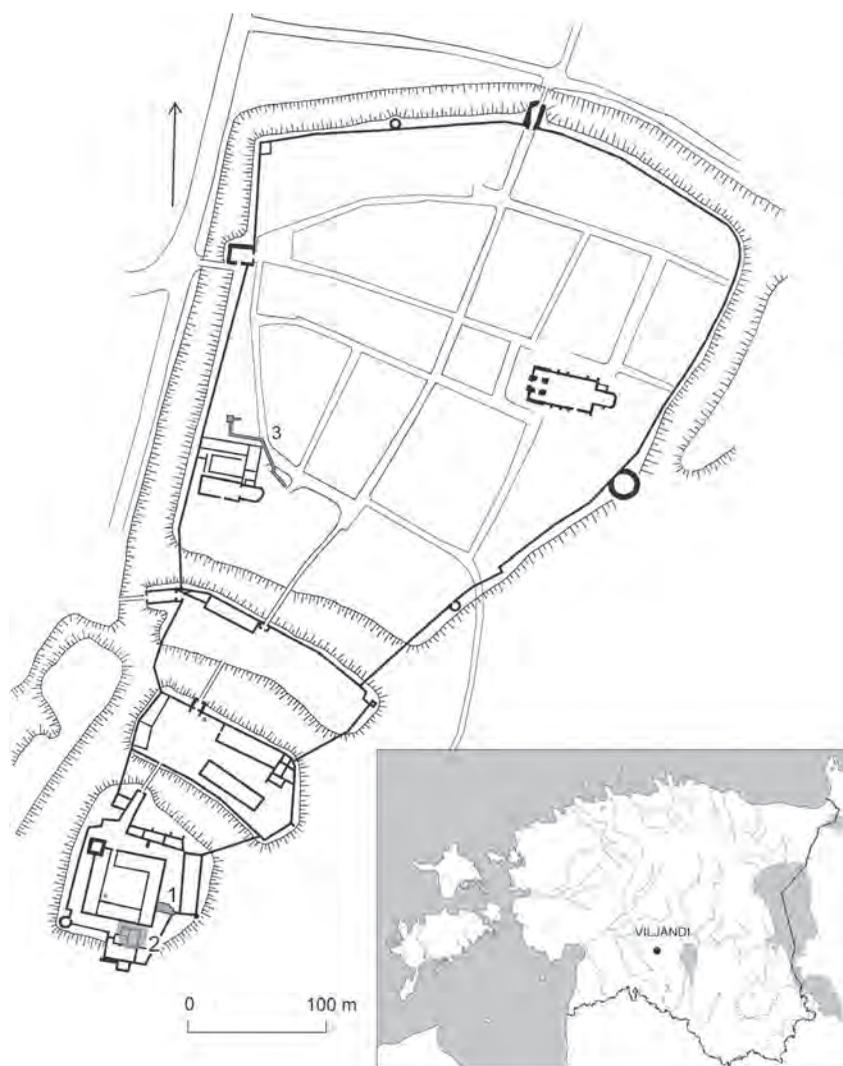


Fig. 1. Location map of the investigated areas in Viljandi: 1 – area investigated in the castle in 2003–2004, 2 – approximate area investigated in 1939 by A. Tuulse, 3 – area investigated in 1991 at Pikk Street by H. Valk. *Figure by A. Haak.*

tions of 2003¹ and 2004², carried out by Arvi Haak, which took place next to the southeastern corner of the Convent House, in the territory of the first outer bailey (Fig. 1; see Haak 2004; 2005 for overview of excavation results of these years). Bone assemblage from the excavations in 2003 was identified by Eha Järv (2005), and reanalysed by Eve Rannamäe using somewhat different methods. Material from

excavations in 2004 was also analysed by Rannamäe. Heidi Luik provided analysis of the bone artefacts and working refuse; the osteological identification of worked bone and antler items was done by Liina Maldre.

ARCHAEOLOGICAL CONTEXTS AT THE CASTLE

In order to use stratigraphic information for dating the finds from Viljandi, there are two main concerns. On the first place, the excavations where stratigraphic information was recorded, took place in the territory of the first outer bailey, and only one part of it (even the building unearthed was not investigated in its full extent), thus the results cannot be extrapolated to the whole castle without necessary criticism. In addition, many of the finds originate from layers of destruction, which seem to have been levelled later, and may thus contain finds from several periods.

In spite of that, there are three main medieval and post-medieval phases that have been established:

1. Strata with finds from the last third of the 13th and possibly, first decades of the 14th century. These were dated according to pottery finds (near stoneware from Siegburg, Paffrath-type ware, near-stoneware of South Lower Saxony – cf. the first and second horizons of usage of imported wares in

¹ VM 10922; the bone material is stored in the collections of UT.

² VM 11041; the bone material is stored in the collections of UT.

West Estonian towns: Russow 2006, pp.147–149, 154–156, 166–167), and corroborated by coin finds, as well as local pottery with wavy ornament. This is also the phase which had yielded several production remains of bone items, and the faunal remains of this phase was chosen for deeper examination.

2. Strata from mid-14th century till the beginning of the 16th century. These were distinguished by finds of stoneware from Siegburg and South Lower Saxony, as well as coins minted during the 14th and 15th centuries. In the area of interest, these strata had deposited into a building with brick floor, and also included a relatively smaller number of fragments of bone processing.

3. Strata connected to the period of the Livonian Wars, i.e. the 2nd half of the 16th century. As there is very little evidence of 17th-century activities in the castle, it seems likely that these strata represent the final phase of its usage before its demolition, which, according to the written sources, took place in the war between Poland and Sweden from 1600 onwards, and was rather complete by 1611 (e.g. Fabricius 2010, pp.355–357). Archaeological information seems to be in accordance with this data: finds from the 17th century have been rather limited. Most of the items connected to that phase have been collected from the earlier excavations inside the Convent House, but some contemporary contexts were unearthed also in 2003, 2004 and 2006. These also include bone items, but up to date, no information of bone processing has been connected to that phase.

In addition to establishing the broad temporal limits for the find contexts, the phasing also allows an attempt to compare the composition of the bone finds from these phases. As many of the items cannot be precisely dated on the basis of their form, which changed rather little over time, the question if the usage of bone changed over the period of usage of the castle would also be of interest.

ZOOARCHAEOLOGICAL MATERIAL

Zooarchaeological material in Viljandi is numerous and quite well preserved. Previous treatments of it (Rannamäe 2010; see also Haak 2007) have been rather general, relied partially on existing unpublished identification reports and mostly concentrated on economic issues. For this article, Eve Rannamäe has studied faunal remains from the strata connected with habitation during the late 13th and early 14th century, which also yielded numerous fragments of bone working debris, to offer an interpretation of their origin and composition. Animal utilisation is one of the main issues of this faunal study. Basic questions addressed to the material under study are about peculiarities of the dietary structure³ and evidence of activities secondary to food and diet, i.e. utilising animals for different by-products.

The detailed analysis of bone material from only a small area and a short period does not allow making any general conclusions about the whole castle area and there is no material of similar dating available from the castle. For comparison, a bone assemblage from the early medieval town area has been analysed. It derives from the excavations in Pikk Street in 1991⁴ (Valk 1993), not far from the castle, and was collected from the strata forming the earliest phase of habitation in the area. The osteological material determined by Eha Järv and Paul Saks (1991) was reanalysed by Rannamäe, using the same methodology as for the assemblage from the castle. On the basis of the investigation results, the area at Pikk Street has been considered as one of the earliest habitation areas in the town (Valk 2005, pp.102–103) or simultaneous to the phase chosen for analysis from the castle (Haak, Russow, forthcoming). Therefore, comparison between the castle and the town would allow a better understanding of the faunal remains and usage of animals during the period in question.

³ In addition to animal and bird consumption, the usage of fish had a major role in medieval Viljandi. Among the osteological material there is a considerable amount of fish bones and scales. However, these have not been analysed so far and therefore are not included in this paper.

⁴ No collection number; stored in the collections of UT.

Methodology

The methods applied for analysing the bone assemblages are common in zooarchaeology. Specimens were identified by morphological features with the help of reference collections⁵ and bone atlases (Schmid 1972; Ernits, Saks 2004). Sheep and goat bones were difficult to distinguish, especially because of their extensive fragmentation, and therefore these two species will be handled together in this study. When possible, they were differentiated only based on cranium fragments (see Boessneck 1969). For cattle and sheep/goat, in Pikk Street also for pig, the age structures, i.e. the age at death was calculated. For ageing, methods of epiphyseal fusion by Silver (1969), teeth eruption by Schmid (1972) and mandibular tooth wear by Grant (1982) were used. In few cases it was possible to speculate on cattle's and sheep/goat's sex, using horn cores (Boessneck 1969; O'Connor 1982, p.22) and metacarpals

(Wiig 1985, p.495; Wigh 2001, p.66). All measurements were taken according to method by Driesch (1976). Withers height was possible to calculate only for pigs (Teichert 1990). In further analysis every bone specimen was examined individually to document the fragmentation, taphonomical features (cut and chop marks, gnawing, weathering, trampling, marrow fracturing, etc.) and traces of pathologies.

The analysis of the animal bones from Viljandi castle and from Pikk Street

The composition of the assemblage from the castle was quite remarkable (Fig. 2, Table 1). From bone material studied (altogether 7253 specimens), 58% were cranium fragments. From the town the respective value was only 21% (Table 2). Large number of skull fragments in the castle is partly reasoned because of the easy fracture of this bone element, but still they comprise the majority, thus raising some interesting questions. Rest of the castle material was also quite fragmented, including relatively many fragments of unidentifiable young animals (most probably lambs, but maybe also piglets). Therefore only nearly half (48%) of all the material from the castle was identified. Most of the specimens belonged to domestic animals. A noticeable fact about the castle assemblage was that cattle (*Bos primigenius f. taurus*) and sheep/goat (*Ovis ammon f. aries/Capra ibex f. hircus*) bones were in great majority, while pig (*Sus scrofa f. domestica*) bones were practically missing. Another notable thing is that among bird bones, in addition to goose

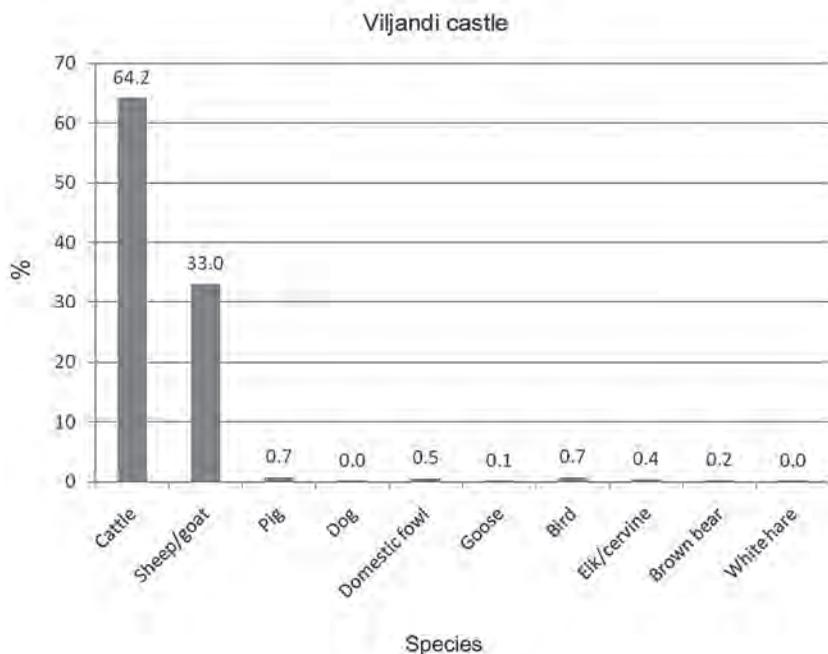


Fig. 2. Distribution of species in the assemblage from Viljandi castle (3495 specimens identified to species). Figure by E. Rannamäe.

⁵ The anatomical collections of the Zoomedicum of the Estonian University of Life Sciences and of the Institute of History and Archaeology of the UT were used.

Table 1. Distribution of identified bone elements by species in the assemblage from Viljandi castle

Bone element	Cattle	Sheep/goat	Pig	Dog	Domestic fowl	Goose	Bird	Elk/cervine	Brown bear	White hare	Rat	Total	Total (%)
Cranium/horn or horncore	1539/6	840/26	2					6/5		1	1	2426	69.9
Vertebra	106	71	1		3							181	5.2
Costa and sternum	168	95	4		4		4					275	7.9
Scapula	13	11	1		1							26	0.7
Humerus	11	5			1			1			2	20	0.6
Radius and ulna	71	16	1		1		4					93	2.7
Metacarpal and carpal	47	3	2			1	2	2				57	1.6
Pelvis	18	10	1		2		1					32	0.9
Femur	14	9	3		1						2	29	0.8
Tibia and fibula	85	33	4		5		1				1	129	3.7
Metatarsal and tarsal	117	25	2		1		2					147	4.2
Phalanx and sesamoid	35	3	2	1		3	6		6			56	1.6
Total	2230	1147	23	1	19	4	20	14	6	1	6	3471	100.0
Total (%)	64.2	33.0	0.7	0.0	0.5	0.1	0.6	0.4	0.2	0.0	0.2	100.0	

Table 2. Distribution of identified bone elements by species in the assemblage from Pikk Street

Bone element	Cattle	Sheep/goat	Pig	Dog	Cat	Domestic fowl	Bird	White hare	Total	Total (%)
Cranium/horncore	35/3	42/4	22						106	21.4
Vertebra	48	24	6						78	15.7
Costa and sternum	12	11	1				1		25	5.0
Scapula	11	3	4		1				19	3.8
Humerus	15	12	5			3		1	36	7.3
Radius and ulna	20	13	9	1					43	8.7
Metacarpal and carpal	6	23	1						30	6.0
Pelvis	13	9	2						24	4.8
Femur	4	7	6	2		1			20	4.0
Tibia and fibula	11	11	7	1		4	1		35	7.1
Metatarsal and tarsal	21	28	2				1		52	10.5
Phalanx and sesamoid	15	10	3						28	5.6
Total	214	197	68	4	1	8	3	1	496	100.0
Total (%)	43.1	39.7	13.7	0.8	0.2	1.6	0.6	0.2	100.0	

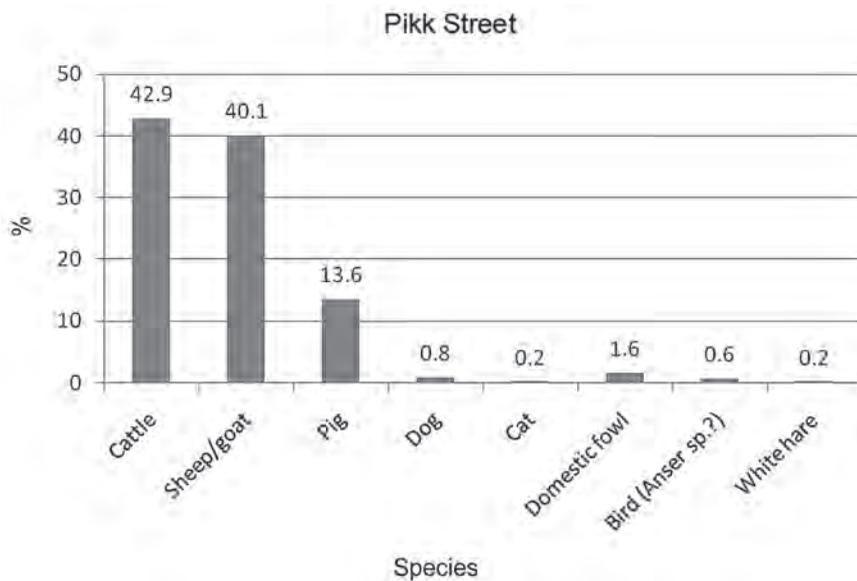


Fig. 3. Distribution of species in the assemblage from Pikk Street (499 specimens). Figure by E. Rannamäe.

(*Anser* sp.) and domestic fowl (*Gallus gallus* f. *domesticus*), some larger birds, possibly swan (*Cygnus* sp.), stork (*Ciconia* sp.) or crane (*Grus grus*) were represented. Game animals formed very small part of the assemblage. In addition to brown bear (*Ursus arctos*), white hare (*Lepus timidus*), elk (*Alces alces*) and cervine – red deer (*Cervus elaphus*) or roe deer (*Capreolus capreolus*), pieces of elk and red deer antler working debris were found which were handled apart from zooarchaeological assemblage (see below). Dog (*Canis lupus* f. *familiaris*) was represented only with one phalanx and there was also one possible fragment of a cat (*Felis silvestris* f. *catus*) radius, but its identification remained uncertain. It should also be mentioned that in previous identification report of castle assemblage two horse (*Equus ferus* f. *caballus*) bone fragments were documented (Järv 2005). However, during new examination these were identified as cattle.

Bone assemblage from the town area had different characteristics than the one from the castle (Fig. 3, Table 2). The diversity of represented species was smaller, there were not as many game species as in the castle and the distribution of domestic animals

was more homogeneous. Cattle and sheep/goat bones were almost in a same amount and there were relatively more pig bones compared to the castle. Also more dog bone specimens from the town assemblage were found, including two whole femurs, one whole tibia, one fragment of a radius and one possible fragment of a costa. Cat was represented with one scapula. In addition to mentioned species about ten bone artefacts and two elk antler fragments with working traces were recovered (Luik, forthcoming, fig. 3).

Bone specimens both from the castle and from the town had been affected by different biostratinomic factors like trampling, weathering and gnawing. Bones had been chewed mostly by dogs, but some rodent gnaw marks were also detected. Frequent marks of dog gnawing on archaeological bone finds offer evidence of scavenging and show that dogs contributed to keeping areas clean (Bartosiewicz 2003, p.187).

Cattle

In the assemblage from the castle area, the dominant species was cattle, represented mostly with cranium fragments (Fig. 4a). However, horn cores were practically missing – a fact that leads to presumption of collecting them to some other location for processing. Also quite numerous were parts of limbs below elbow and knee, followed by costae and vertebrae. Uppermost parts of limbs, meatier shoulder-blades and buttocks, were strongly underrepresented. It is very risky to assess the value of body parts, because in different societies the preferences and traditions for meat consumption are diverse. However, one version of distributing the bones is by

meat yield (according to Wigh 2001, p.59), whereby in castle the cattle bones represented were mostly poor in meat (78%) and therefore more like butchery waste. The latter is supported with the presence of two cranium fragments indicating splitting of the skull and one cranium fragment with a cut mark on the internal surface.

The main by-products of butchering – horns, hides and bones – could have been detached on the spot in the castle for further processing. In the assemblage from Viljandi castle 114 specimens carry probable skinning marks (Fig. 5a), i.e. fine transversal cuts located typically on forehead, mandibles, metapodials and phalanges. Absence of horn cores was already mentioned and this might indicate probable horn processing at some other location. Was this raw material processed inside the castle area or not, is disputable. Yet, evidence for bone and antler work is more obvious (see below). Consuming animals for food is also apparent: cut and chop marks on bones indicate dismembering the carcass and consumption of beef (Fig. 5a). Additionally 79 specimens of mandible and tubular bones carried marks of marrow exploitation. Besides those there were poorly preserved bone fragments that might indicate cooking or boiling.

In the assemblage from the town area, on the other hand, cattle bones rich in meat were dominant (63%). Mostly there were fragments of vertebra and cranium, but also quite a lot of distal parts of limbs (Fig. 4b). Comparing butchery and skinning marks between the material from the castle and town, it can be seen that fragments from the town have less chop and cut marks (Fig. 5b). Although these two assemblages are in different size, it still shows one distinct difference between them: there is more

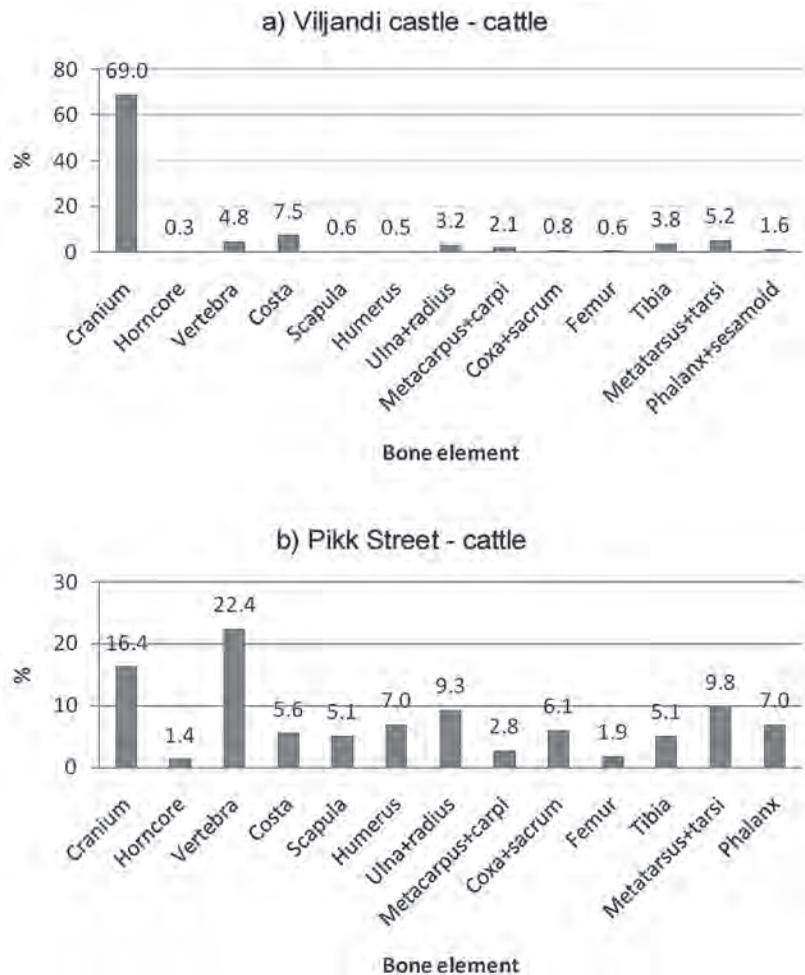


Fig. 4. Distribution of cattle bone specimens from Viljandi castle (2230 specimens) (a) and Pikk Street (214 specimens) (b) by bone element. *Figure by E. Rannamäe.*

evidence of cattle skinning from the castle. In the town material, on the other hand, there seems to be mostly evidence of butchering, i.e. so-called kitchen waste, among which 19 specimens of tubular bones carried possible marks of marrow fracturing. There were also some fragments that probably had been cooked or boiled and therefore poorly preserved.

Majority of age assessment was done on the basis of epiphyseal fusion (Silver 1969). According to 165 specimens from the castle, most of the cattle were slaughtered at the age of 3 to 5 years (Fig. 6a). The method of mandibular teeth eruption (Schmid 1972) confirms this pattern: out of 60 mandible fragments only two had belonged to animals under

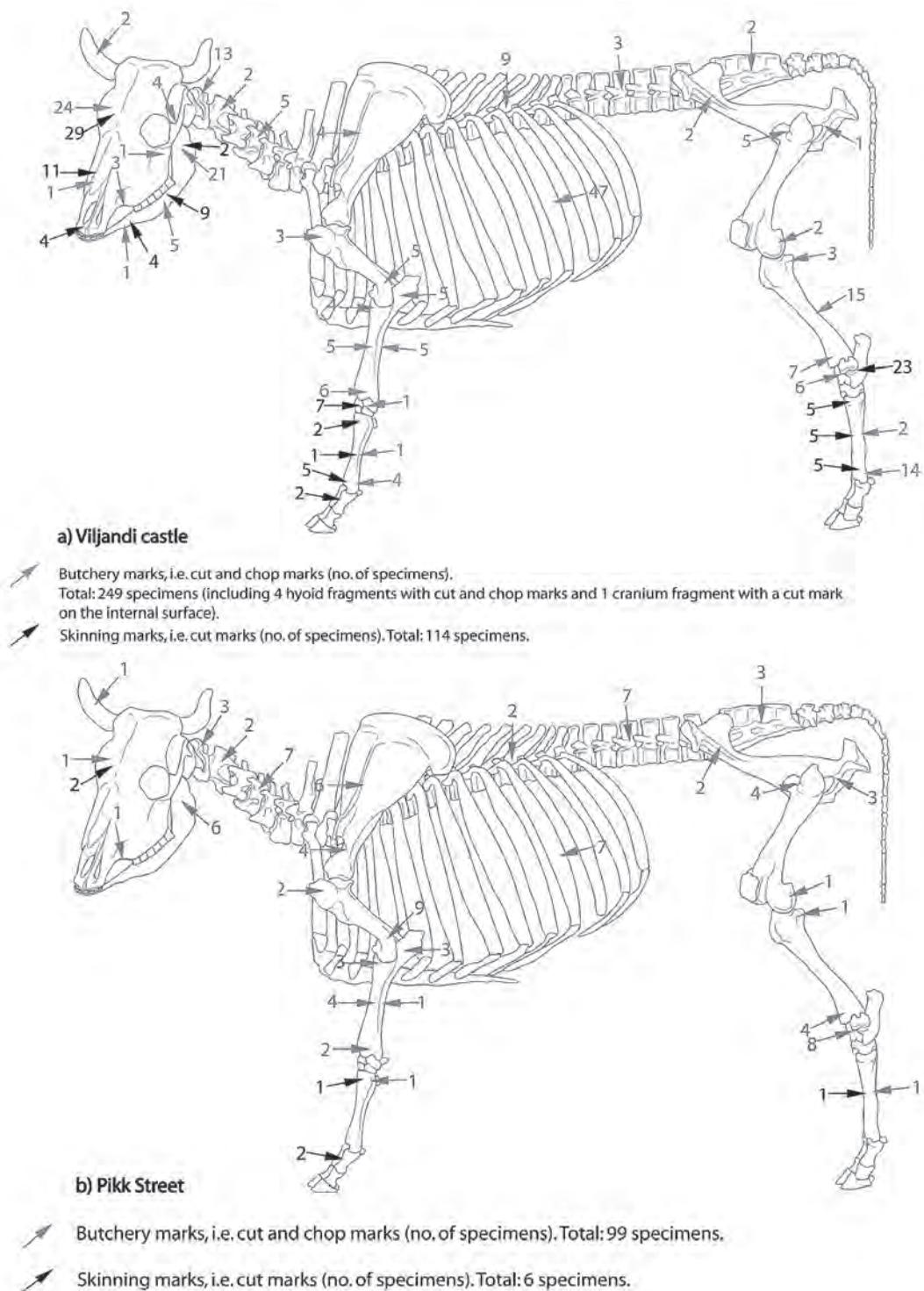


Fig. 5. Number of specimens with cut and chop marks on cattle bones in the assemblages from Viljandi castle (a) and Pikk Street (b). *Figure by E. Rannamäe.*

2.75 years. For method of mandibular wear stage (M.W.S.; Grant 1982) there was not enough material for making a scale for age structure: five calculated M.W.S. values concurred with the data by teeth eruption, deriving from animals older than 2.25 years and one animal slightly younger. Besides there were one small carpal and one metacarpal that had probably belonged to a calf. And six teeth that had been worn practically till the roots derived from rather old individual(s).

In the town area, there occurred a slight tendency for slaughtering animals a bit younger (Fig. 6b), but otherwise the pattern was very similar to that of the castle. Few estimable mandibles from town confirmed this. There were also two quite worn molars in the material, indicating older individual(s).

Due to the scarcity of the material any sex assessment was difficult. Measurements of two horn cores (according to O'Connor 1982) and five metacarpals (according to Wiig 1985, p.495) from the castle and one horn core from the town were compared with the results of the analysis of late-medieval material from the town area (Rannamäe 2010). Comparisons showed that the specimens from present study should be the ones from cow.

Size of the animals was also impossible to calculate. From castle material four noticeable specimens probably belonging to larger individual were distinguished: one robust specimen of tibia (supposedly belonging to a draught animal), one fragment of quite massive mandible and two fragments of massive costae.

Pathological features were not very abundant: in castle there were eleven teeth with abnormal attrition (Fig. 7:3, 4), and one metatarsal with slight periosteal hyperostosis. In the town material two teeth with abnormal attrition were found.

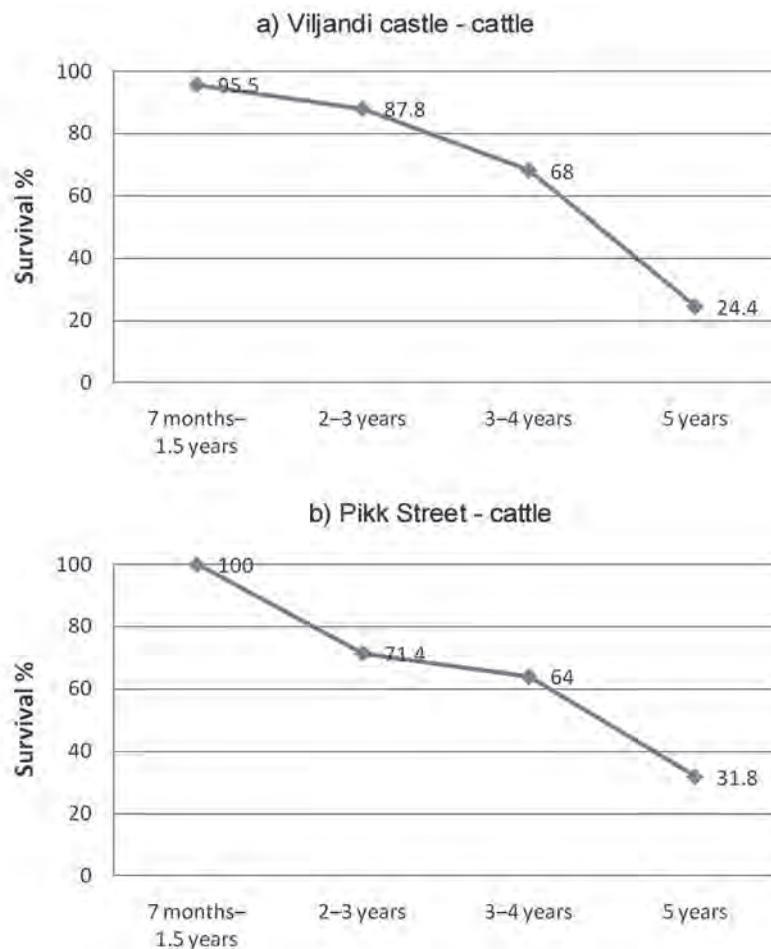


Fig. 6. Age distribution of cattle in the assemblages from Viljandi castle (165 specimens) (a) and Pikk Street (84 specimens) (b) based on epiphyseal closure (according to Silver 1969). Figure by E. Rannamäe.

Sheep and goat

Specimens of small cattle were second numerous both in the assemblages from the castle and from the town. Again, as for cattle, in the castle cranium fragments were most numerous (Fig. 8a), while in the town assemblage bone elements were more equally distributed (Fig. 8b). Bone elements rich in meat formed only 22% in the castle, while in the town the same figure was 46%.

One important phenomenon appears: in the castle sheep/goat skulls have been butchered in much greater extent than in the town: even 21 cranium fragments carried marks of splitting in halves



Fig. 7. Examples of zooarchaeological material from Viljandi castle (VM 11041): 1 – a cranium of a sheep, split in two, 2 – a mandible of a sheep or goat with periosteal hyperostosis, probably caused by inflammation, 3 – a pathological third lower molar of cattle with abnormal attrition, 4 – a maxilla of cattle with an upper molar with abnormal attrition. *Photo by V. Pajuste.*

(Fig. 7:1; 9a, b). And again, horn cores were removed and were not included in the assemblage. Skinning of sheep and goats cannot be proved based on the material from the castle nor from the town, because only few cut marks on skull and metapodials could have derived from butchering as well. So it seems that these two species were consumed mostly for food – an assumption which is supported by presence of bones probably fragmented for marrow (nine specimens in the assemblage from the castle and 29 specimens from the town).

In the castle relatively younger sheep and goats were consumed than in the town. 40% of them were slaughtered even in age younger than ten months, but most of the bone specimens in the assemblage from the castle derived from animals between age 2

and 4 years (Fig. 10a; according to Silver 1969). This age structure is confirmed by the method of tooth eruption (Schmid 1972), according to which at least 33% were slaughtered under 2 years and 67% at the age of over 1.25 years. M.W.S. (Grant 1982) could be calculated for 16 specimens, showing seven relatively younger animals (approximately 1.75 to 2 years compared to the time of eruption) and nine older animals (over 1.75 years compared to the time of eruption). It must be remembered that in addition to the material described above, quite a lot of young animals' bones remained unidentified because of the complexity of distinguishing them among fragmented material. And so, 64 specimens were possible to age as "young" because of their small size and light porous structure. Thus, in the castle high-quality and soft mutton or goat meat from young animals seem to have been preferred. Among the material also six rather worn down teeth were found, indicating older individual(s).

In the town assemblage, however, according to the time of epiphyseal fusion (Silver 1969), sheep and goats were let to live longer – most of the animals were slaughtered there at age from 2 to 4 years (Fig. 10b). According to the time of tooth eruption (Schmid 1972), out of 16 specimens from Pikk Street, eight belonged both to animals younger than 2 years and older than 1.75 years. Probably sheep and goats were let to live longer because of their milk and wool.

For sex assessment too little evidence was available: only four goat horn cores from the castle and three horn cores from the town were possible to analyse, showing all bucks in the castle and all goats in the town. For sheep there were seven skulls from the castle showing six ewes and one ram, and from the town there were two skulls, both of them from ewes.

Size of sheep and goats was impossible to calculate because of lack of suitable material. However, one temporal bone and one cheekbone from the castle are noteworthy because of being rather massive and therefore indicating to a larger and older individual.

Most of the bones with traces of pathological features found in the castle material were related with teeth and jawbones. One maxilla had no alveolus of two premolars. One premolar and four incisors had an abnormal attrition. Five mandibles had had an inflammation causing periosteal hyperostosis (Fig. 7:2) and in one case even some deformation in jaw structure.

Pig

Only 23 pig bone specimens were found in the castle assemblage, so any profound conclusions about pig consumption were impossible to make. However, age according to the time of epiphyseal fusion was assessed for eight specimens, showing two of them belonging to animals younger than 1 and 2 years, one older than 2 years, one 1.5–3.5 years old and one younger than 3.5 years. So even this small material supports a common structure for the time of death for pigs, who usually were slaughtered in rather young age, as soon as they had gained their maximum body weight (Järv 2005, p.2). Evidence for butchering consisted of cut and chop marks on four specimens.

From Pikk Street more pig bones were found (68 specimens), 59% of those deriving from body parts rich in meat (Fig. 11). There were butchering marks on 21 specimens, three of them probably from marrow fracturing. In town assemblage more bones for

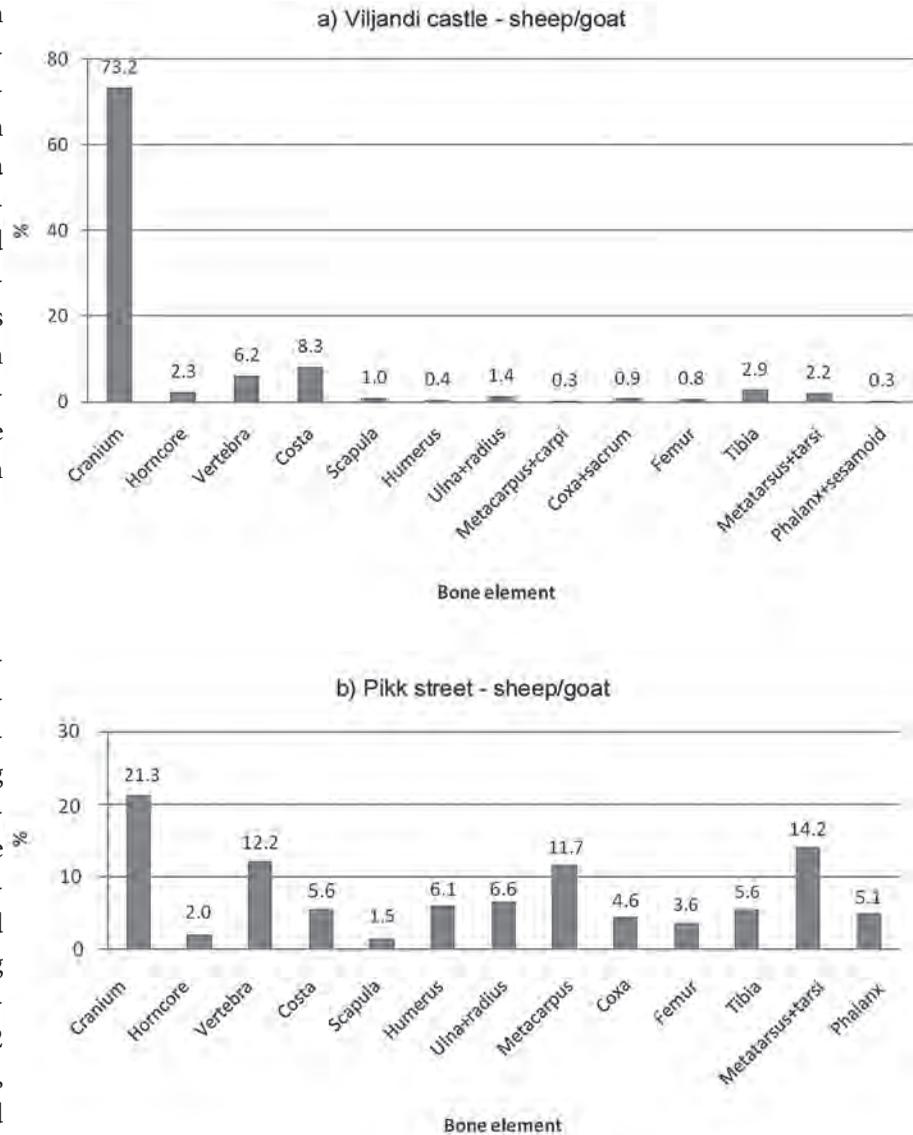


Fig. 8. Distribution of sheep/goat bone specimens in the assemblages from Viljandi castle (1147 specimens) (a) and Pikk Street (197 specimens) (b) by bone element. Figure by E. Rannamäe.

calculating age at death were available (Silver 1969), showing that all pigs were slaughtered before reaching age of 2.5–3.5 years (Fig. 12). Data from tooth eruption partly confirms that – out of seven analysed mandibles three belonged to piglets younger than 1 year and four to animals older than 1 year. Of course the material analysed was too small to make any reliable conclusions, but it seems rather typical that pigs were consumed extensively, using the whole carcass. This could be one explanation,

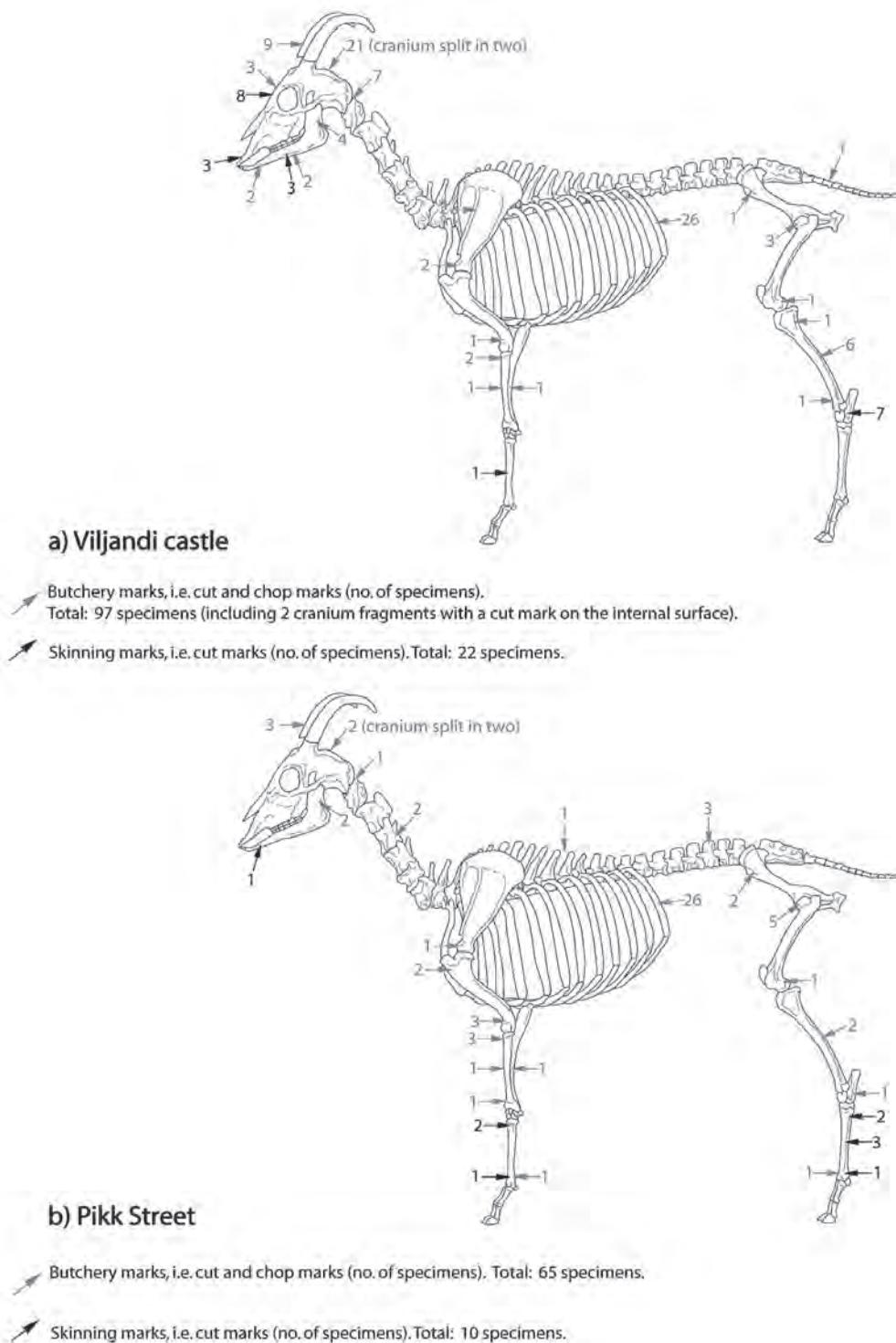


Fig. 9. Number of specimens with cut and chop marks on sheep/goat bones in the assemblages from Viljandi castle (a) and Pikk Street (b). *Figure by E. Rannamäe.*

why there were so few pig bones found – all parts of pigs were consumed for food, leftovers were eaten by dogs or might have decayed in the soil more easily than other because of their softer structure.

Withers height for pigs was possible to calculate for two specimens from the castle and six from the town. These had belonged to pigs between 58 cm and 77 cm high (according to Teichert 1990).

Birds

Number of bird bones was not high neither in castle nor in the town assemblage, and most of them were of limbs (Fig. 13). Due to their fragility, bird bones might just preserve more poorly or, as in the case with the town assemblage, they might have been missed during the excavations because sieving was not done at that time. In the town only domestic fowl and probable wild goose bones were found, mostly of hind limb. In the castle, on the other hand, some other bird species were represented as well. Few of them derived from birds approximately

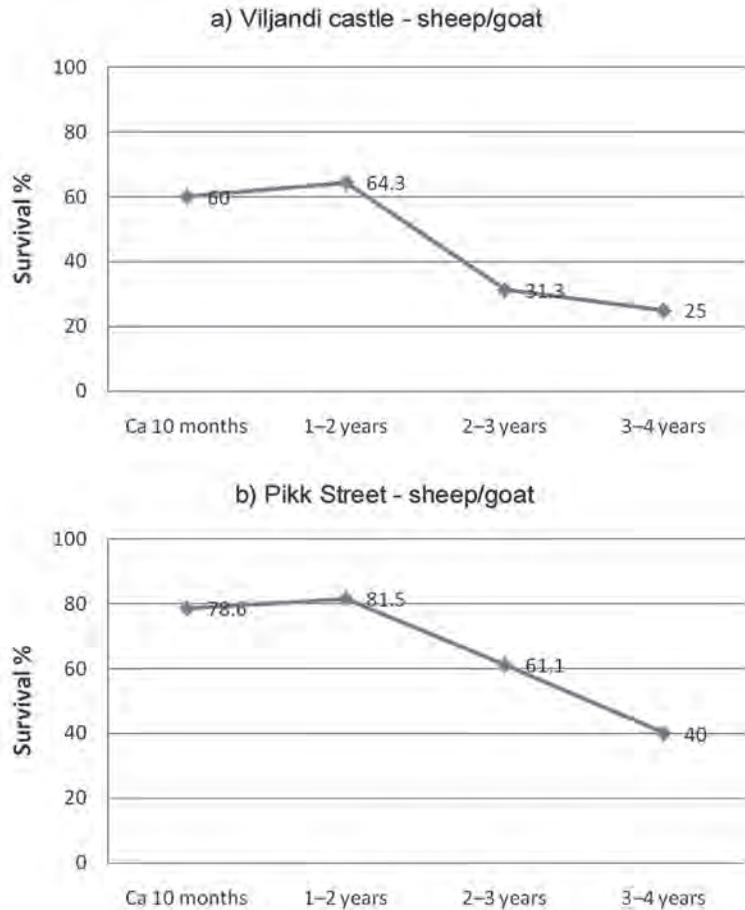


Fig. 10. Age distribution of sheep/goat in the assemblages from Viljandi castle (52 specimens) (a) and Pikk Street (70 specimens) (b) based on epiphyseal closure (according to Silver 1969). Figure by E. Rannamäe.

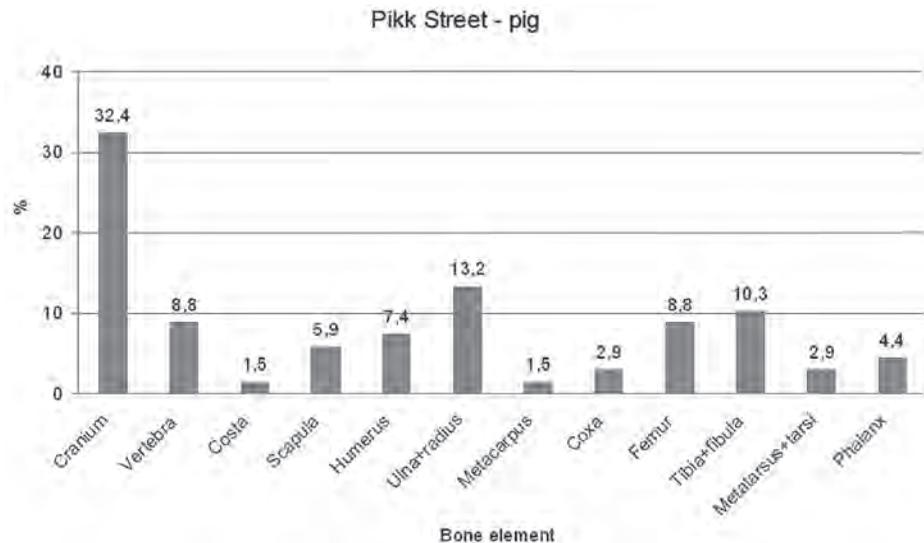


Fig. 11. Distribution of pig bone specimens in the assemblage from Pikk Street by bone element (68 specimens). Figure by E. Rannamäe.

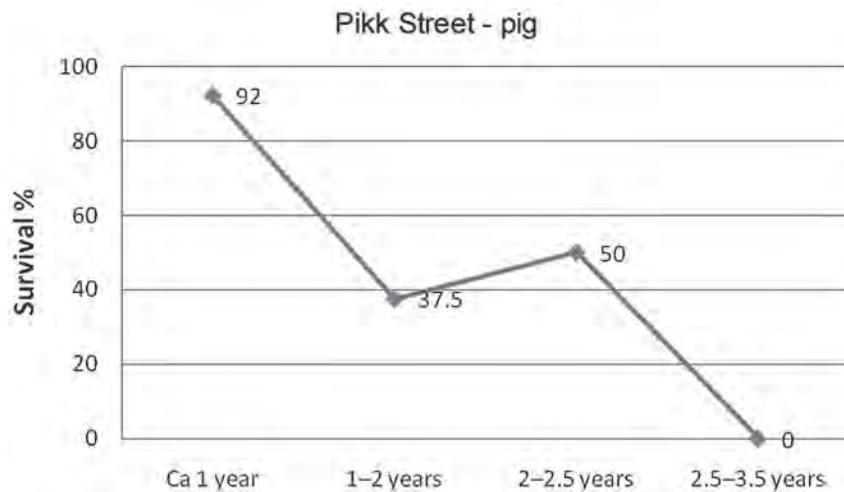


Fig. 12. Age distribution of pig in the assemblage from Pikk Street (30 specimens) based on epiphyseal closure (according to Silver 1969). *Figure by E. Rannamäe.*

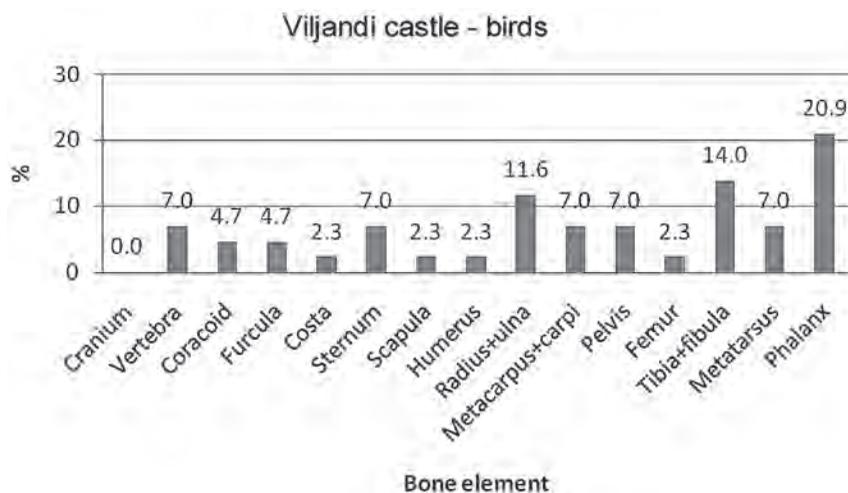


Fig. 13. Distribution of bird bone specimens in the assemblage from Viljandi castle by bone element (43 specimens). *Figure by E. Rannamäe.*

the same size as a domestic fowl, but there were also much smaller and a bit larger birds in the assemblage, the latter belonged probably to geese. Because of lack of reference collection as well as complexity of identification of bird bones it could be only assumed that the largest bones found in the castle (eight specimens) could have belonged to swan or crane.

Consumption of swan and crane can be interpreted as a privilege for higher social class in me-

dieval society. In England, most of the wild bird bones have been found from sites of high status (castles) and not from towns or rural sites of lower status (Albarella, Thomas 2002, p.23). These parallels could be drawn also to present case of Viljandi assemblage, where even eight specimens were identified as large bird.

Wild animals

In the assemblage from Pikk Street there was only one specimen of a game animal – a humerus of white hare. In the castle there was also a white hare, represented with a fragment of a mandible and one possible phalanx, but besides there were also an elk, brown bear and likely a cervine – red deer or maybe even roe deer.

Elk was represented with four fragments of antlers (in addition to processed pieces and working debris; see below), one fragment of maxilla, humerus and metacarpal. Presence of fragments of forelimb is probably from having elk for meat.

Both humerus and metacarpal seem to have been fractured for marrow and metacarpal had also chop marks on it.

Among probable cervine bones there were one fragment of a mandible with two premolars, and four loose premolars and molars. One antler fragment might also have belonged to a cervine or elk. Besides there were few pieces among working debris that might have belonged to a red deer as well. However, it is not certain that red deers were hunted by

the castle crew, merely antlers might have imported to Viljandi from southern areas (see below).

Brown bear was represented with six distal phalanges. These could have belonged to one individual, because they were found near to each other, and most probably they derived from a bearskin (Rackham 1994, p.57).

In addition to game, six specimens of a rat were found and even though they could not be identified to exact species, it is most probable that they were still from black rat (*Rattus rattus*) and not from brown rat (*Rattus norvegicus*), because the latter arrived to these areas not before the 18th century (Lepiksaar 1986).

According to previous identification report by Eha Järv (2005), there were European bison bones (*Bison bonasus*) among the material from Viljandi castle. The author of current analysis, E. Rannamäe, cannot confirm this identification. New analysis of the material (with the help by E. Järv) showed that these bones proved to be cattle instead. Although it is possible that bisons did arrive on these areas in the end of the 1st millennium AD or there could have been hunting trips to southern areas where bisons grazed (Rannamäe 2010), it cannot be stated based on this material.

Hunting and consumption of game was a privilege of higher class, i.e. the castellans. Regulations for hunting were common to whole Europe at the time of Middle Ages, and although there are no evidence from Viljandi for these regulations, it is still probable that this was practised there as well. This might be one of the reasons why traces of game are rather rare in the whole zooarchaeological material from medieval Viljandi (see Rannamäe 2010).

Discussion: what do the assemblages of faunal remains reflect?

Despite their size difference, larger assemblage from the castle (in total 7253 specimens) and smaller one from the town area (in total 504 specimens) should be representative and submit the nature of the material.

Distinctive characteristics of the castle material are a large amount of cranium fragments without horn cores and dominance of cattle, sheep and goat, but very few of pig bones. As one possibility, since there are many fragmented and split skulls in the material, it could have been a location for primary butchery, where animal carcasses were skinned and dismembered (Rackham 1994, p.56). Products could have been transported onwards: parts for food to some kind of kitchen area, skins and horn cores for further processing to workshop. Bones and horns were most probably processed inside the castle area, especially because of need of making armoury (see below). Hides, however, might have been transported to the tanners outside the castle because of the conditions for tanning, e.g. need for water and bad smell (see Rackham 1994; Bartosiewicz 2003). Usually the hides were taken to tanneries with horns and hooves attached (Cherry 1991, p.295), and limbs dismembered at the knuckle or ankle. According to John Cherry (1991, p.308), the leatherworking trades may be divided into the heavy and light, whence the first one consist of the manufacture from cattle-hide for footwear, saddles, harness, costrels, sheaths, belts or leather-covered coffers. The light trades manufactured gloves, purses and bags from sheep- and goat-skins. The dominance of bones from adult and mature cattle further supports the hypotheses of hide processing (Bartosiewicz 2003, p.180). However, on the other hand, the studied assemblage from the castle might have been some kind of a deposit of the butchering waste and not the place for butchering itself. In that case the activities of butchering were held somewhere farther and the leftovers were brought to the location under study.

Although the material from the castle is not very typical for food waste, there are some bones that could carry evidence of boiling to extract the bone grease, oils and marrow fats. Fact that there are very few pig bones, also might indicate that the assemblage is neither of kitchen nor food waste. Absence of pig bones could be explained with several possible reasons. Firstly, pig bones are considered

to be rather fatty, due to which they could be more likely to be scavenged by other animals. Also, pig bones could have been utilised in greater extent, because in case of pigs almost everything from head to toes could be used, leaving very few traces and the leftovers might have been eaten or gnawed by other animals. In some studies it has been stated that 70% of the pigs would be suitable for the table, the remainder going into by-products such as fertilizer, leather, soaps and glue (White 1953, p.397). Another reason for lack of pig bones is their young slaughtering age – bones of young animals tend to decay more easily in the soil because of their lighter structure. However, bones of one food animal have as good chance of being preserved as bones of another food animal (White 1953, p.396) and therefore an important issue arises: why there are practically no pig bones in the assemblage from the castle? One possible solution for this is that food products were treated somewhere else and not in or near the location of this primary butchery. However, only further studies could give possible solutions for this matter.

While castle material cannot be treated as kitchen waste, assemblage from Pikk Street has more characteristics for that. So-called meatier body parts, almost no traces of skinning and relatively larger amount of pig bones indicate that consuming animals for food was more considerable there.

BONE ARTEFACTS AND BONE WORKING REFUSE FROM VILJANDI CASTLE

Bone working refuse and bone and antler artefacts have been found from Viljandi castle throughout the times, but usually only more outstanding finds have been published (e.g. Tvauri 1999, fig. 2:1; Haak 2004, fig. 5; 2005, fig. 4:1–3). Bone working in Viljandi is shortly discussed by Anton Pärn and Erki Russow in the article about handicrafts in small medieval towns of Estonia (Pärn, Russow 2006, p.486, fig. 4). One of the authors of the present article, Arvi Haak has analysed bone working of Viljandi in some

earlier papers (Haak, Pärnamäe 2004, pp.78–80; Haak 2007). In the article about bone working and faunal remains (Haak 2007, p.49) the finds from both the Viljandi castle and town area have been discussed. As a surprising fact he has pointed out a relatively large amount of bone working refuse particularly in the castle. In view of the strictly regulated nature of medieval handicrafts it would seem more logical if bone working were practiced in the town area, rather than in the castle. The answer to the question why most of the worked bone material collected so far comes from the castle area has been sought for also by the other author, Heidi Luik (forthcoming).

Until now most of bone artefacts and bone working refuse have been found from the territory of the Order's castle in Viljandi. During earlier excavations about 124 objects have been found, 47 of these are artefacts and their fragments and 77 pieces are unfinished items and working debris. Finds recovered from the excavations of 2003 include about a hundred find numbers of bone artefacts and bone working debris, and from the excavation of 2004, about fifty find numbers. Since some find numbers mark more than one object, the total number of finds is larger: from the excavations of 2003 there exist 279 finds, including 29 artefacts and 250 pieces of working refuse; from the excavation of 2004 there are 69 finds, including 25 artefacts and 44 pieces of refuse. In course of identifying the animal bones, additionally 98 fragments with traces of processing could be determined from material collected in 2003, and 60 fragments from material originating from the excavation plot of 2004. Mostly these were small chips and other working debris of elk antler, only a few bones with traces of processing could be identified. Of item fragments, a broken toggle, a fragment of a plate with holes for rivets, another fragment of a plate made of costa, and a single comb tooth could be traced among the osteological material.

Up to now, approximately a hundred artefacts and about 500 pieces of bone working debris have been recovered from the excavations. A great share

of bone objects and refuse comes from an intensive cultural layer from the late 13th and early 14th century, but finds belonging to the 15th and 16th centuries are also represented (Haak, Pärnamäe 2004, pp.79, 81). The debris mostly consists of elk antler fragments, in some cases the fragments come from red deer antler. Most of artefacts are also made from antler. Only about 40 objects and debris pieces are animal bones, that is less than 10% of all artefacts and refuse from osseous materials. Among bones identified to the level of a species, the bones of cattle and goat/sheep prevail. Only a few unworked elk and red deer bones are found (Järv 2005, table 1; Rannamäe 2010, p.61ff.), probably shed antlers were used more frequently than antlers of hunted animals. The antler burrs with working traces all come from shed antlers. A fragmentarily preserved comb and a presumable chessman are made from elephant ivory, but probably these were not locally made. From town area, however, from the neighbourhood of the Riga Gate (Kauba St. 12), a half-worked fragment of elephant's tusk has been found (Luik 2009, fig. 9), which is probably a late find. Find material from the excavations dates from a long period – the earliest finds belong to the Middle Ages, the latest to the 19th century (Andres Tvauri – personal communication).

Artefacts

Quite a large number of bone objects from Viljandi castle is related to weapons, for example decorative and cover plates of varying shapes (Fig. 14, 15). Bone and antler plates have been used as supports for arrows on crossbow (Rackevičius 1999; 2001, fig. 1, 2; Lūsēns 2000, fig. 3), and to decorate stock parts of crossbows and guns (e.g. Röber 1994, fig. 7; Schlenker, Wahl 1994, fig. 1). Some of the bone and antler plates found from Viljandi could have been used namely for these purposes (Fig. 14, 15; Tvauri, 2000a fig. 2:1, 2, 5; Kree 2011, pp.33–34, pls. XXV–XXVI). An antler support for an arrow has also been found from excavations in the suburb

of Viljandi in front of the Tartu gate (VM 10872:376). Usually such plates have grooves on the underside, which were necessary for glueing the plate onto the weapon (Fig. 14:1, 2). Some plates are decorated with incised motifs – lines, plaited bands, meanders and figural motifs (Fig. 14:4, 5; 15). Of the plates found from Viljandi, only the example on figure 14:3 can be dated more precisely on the basis of the context – it originates from a deposit of the last third of the 13th or the 1st third of the 14th century. The rest of the Viljandi plates originate from the investigations of 1939, when the stratification of the finds was not determined. However, most of the finds from these excavations can be dated to the 16th century. Another bone plate of similar shape, found from the town area (Haak 2001, fig. 5), originates from a deposit dated to the 2nd half of the 16th or early 17th century.

Similar bone and antler plates are known also from Lihula in Western Estonia (Luik 2002, p.315, fig. 8), in Latvia, e.g. in Ventspils and Cēsis (Lūsēns 2000, fig. 3; Apala 2002, fig. 2:2–5; 2006, fig. 1:6, 10) and in Lithuania, e.g. in Vilnius, Punia hillfort and Dubingiai castle (Volkaitė-Kulikauskienė 1974, fig. 24:2; Rackevičius 1999, fig. 2:9–12, 3:3; 2001, fig. 2; Kuncėvičius *et al.* 2010, fig. 9). Presumably not all such plates were used for decorating weapons, for example wooden boxes also have been decorated with bone and antler plates (Van Vilsteren 1987, pp.60–61, fig. 107, 108; Theune-Großkopf, Röber 1994, p.107, fig. 10). From Kernavė, Lithuania, decorative antler plates, which were mounted on scabbards and saddles are known (Luchtanas, Vėlius 2002, pp.134–139, fig. 220, 233ff.).

Three broken crossbow nuts and some working debris of producing these items has been found from the castle (Fig. 16; Tvauri 2000a, fig. 2:3; Luik, forthcoming). Probably a craftsman (or craftsmen) has been working in the castle who manufactured antler details for weapons, foremost for crossbows. In Estonian sites crossbow nuts are known also from Tartu (Trummal 1992, pl. IX:7) and Otepää. The nut

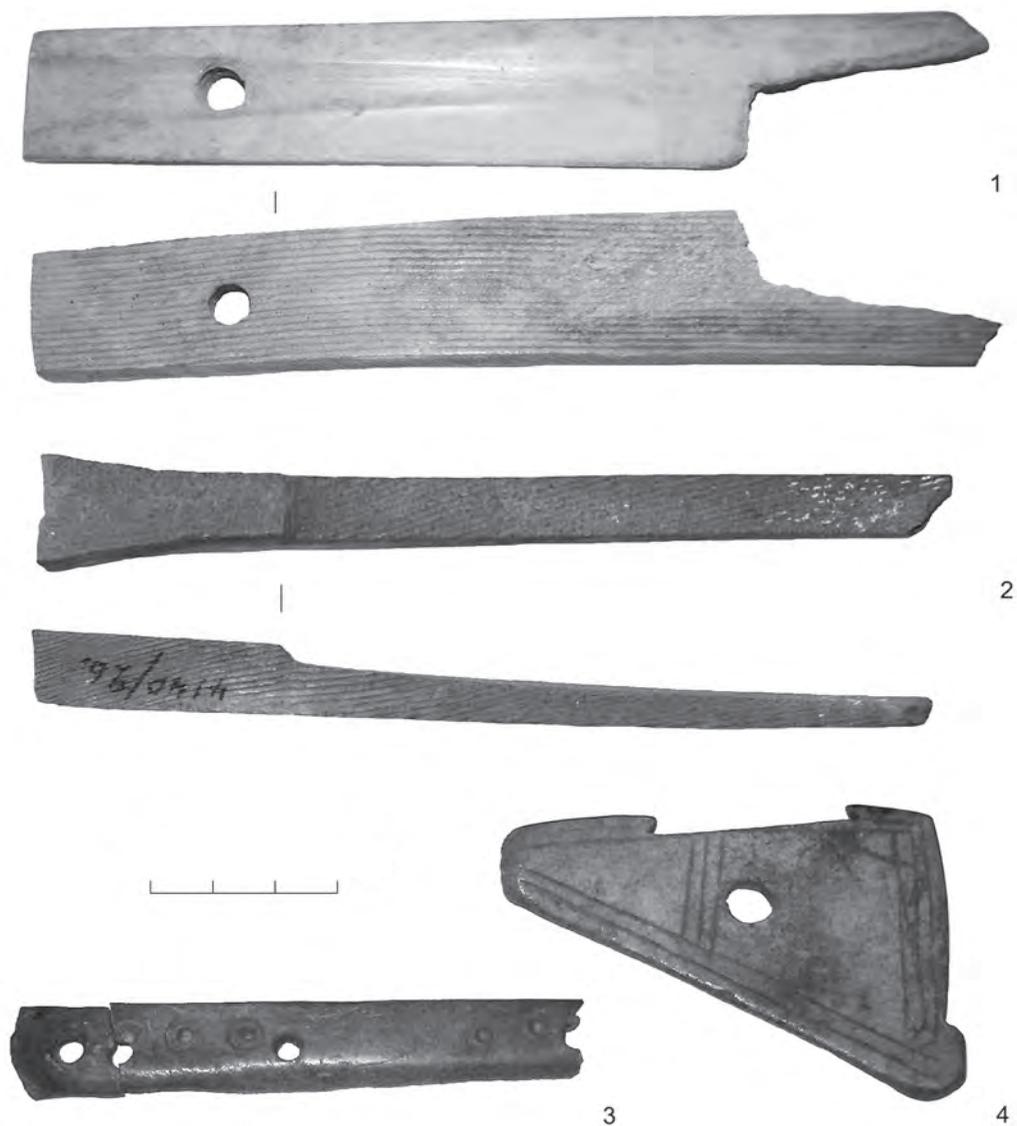


Fig. 14. Cover plates: 1–2 – probable support plates for arrows, 3–4 – decorative plates (VM 4139: 1; 4140: 26; 11041: 1403; 4415).
Photo by H. Luik.

from Otepää is not finished – the indent for trigger is absent in this nut. From Otepää an antler piece is found also which probably was a blank intended for making a crossbow nut (Maldre 2001, fig. 10; Luik 2009, fig. 27:1, 2). A pierced antler piece from Viljandi castle could be another blank but the nut that could be carved out of it would be a little smaller than the other nuts found from Viljandi castle (Fig. 16:4). The production remains mentioned above (Fig. 16:5,

6) have deposited in the castle already by late 13th or the early 14th century, according to the find context; the third item was collected from disturbed strata. Antler crossbow nuts are known in neighbouring regions, for example from Cēsis, Vilnius and Turku (Apala 1992, fig. 1:14; Rackevičius 1999, fig. 3:1, 2; 4; Majantie 2007, p.44; Lietuvos pilys), but also from the other parts of Europe, e.g. from England, Netherlands, Poland, Hungary, Austria, etc. (MacGregor



Fig. 15. Decorative plates of firearms with incised motifs: 1–3, 6 – with meander ornament, 4 – with plaited band ornament, 5, 8 – with figural motifs, 7 – with line ornament (VM 4416; 3799; 3800; 4416; 4427; 4418; 3802; 3798). *Photo by H. Luik.*

1976; 1985, p.160, fig. 84:d, e; 1991, fig. 183:p; van Vilsteren 1987, fig. 28; Cnotliwy 1999, fig. 3:16, 17; Kovács 2005, fig. 4:5, 6; Lang 2010, p.88, fig. 2). The workshop of crossbow maker in Vilnius where also antler plates and crossbow nuts have been found is dated to the 2nd half of the 14th century and the 1st half of the 15th century (Rackevičius 1999). Crossbow nut from Utrecht, Netherlands, belongs to the 15th century or to the 1st half of the 16th century

(van Vilsteren 1987, fig. 28), and nut from Tartu is dated to the 15th–16th centuries (Trummal 1992, p.20).

A beautiful powder horn made from elk antler is decorated with figures of a man and a woman wearing folded garments (Fig. 17). Similar finds are known from Tartu and Riga, but also from Medemblik, the Netherlands; such powder horns are dated mostly to the 16th century (van Vilsteren 1987, p.35,

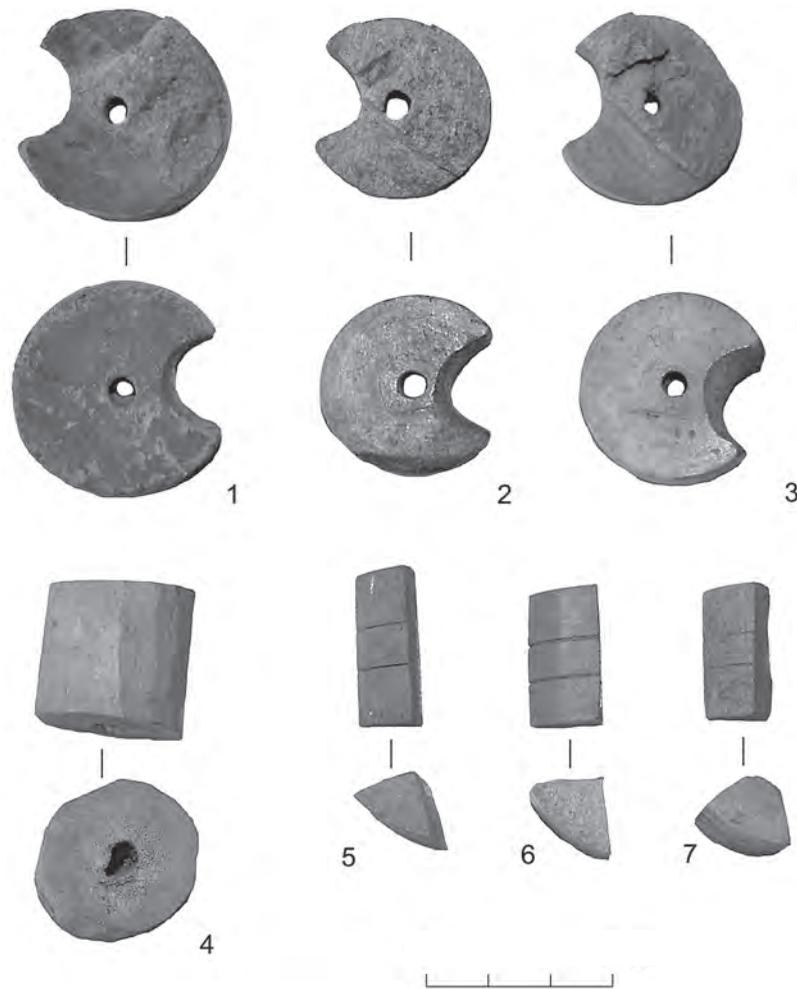


Fig. 16. Crossbow nuts: 1–3 – broken crossbow nuts, 4–7 – production waste (VM 3876; 3877; 3878; 4139: 7; 10922: 1449, 1362; 11041: 54). *Photo by H. Luik.*

fig. 30; Caune, Celmiņš 1988, fig. 58; Trummal 1992, pp.19–20, pl. VIII:1, 2).

The means of pastime constitute the second large group of artefacts from the Viljandi castle. The most frequent finds of this group are chessmen, gaming pieces and dice (Fig. 18). Eight turned chessmen have been found from the castle, belonging to different sets according to their size and shapes (Fig. 18:5–12; Tvauri 1999, fig. 2:1; Haak 2004, fig. 5:1; 2005, fig. 4:3; Sander 2011, p.19ff.). Two of them could still belong to the same set (Fig. 18:10, 11). The three items from the excavation plots of 2003

and 2004 (Fig. 18:5–7) all were collected from the deposits with finds from the 2nd half of the 14th until early 16th century. Most chessmen have been made of antler, but one is of ivory (Fig. 18:12); however, in the opinion of Kristjan Sander the latter item is not a chessman (Sander 2011, p.33). A charred wooden chessman has been also found (Tvauri 1999, fig. 2:3). Five turned antler chessmen have been obtained from the territory of the Franciscan monastery in the town area of Viljandi, four of these probably belong to the same set (Selirand 1982, p.400, pl. XXII:4–8; Sander 2011, pp.16, 20). So alto-

gether 13 or 14 chessmen have been found from Viljandi, which is the largest number known from any Estonian site so far (Sander 2011, p.37). A conical antler piece with traces of turning could be a blank for making a chessman (Fig. 18:13). In the opinion of Sander (2011, p.27) one of the chessmen from the castle is probably unfinished (Fig. 18:11). Six turned disc-shaped gaming pieces have been found, four of them are of a similar size, the fifth is only a little large, and the sixth one is remarkably larger (Fig. 18:14–19; Haak 2004, fig. 5:2; 2007, fig. 3). The four similar items were noticed in the 1939 excavations together with arbalest arrowheads (Tuulse 1939, p.5), on the basis of the latter, the context might have been Late Medieval. The remarkably larger object was collected from the stratum of late 13th or early 14th century. Such gaming pieces were probably used in some board game like backgammon, morris, or draughts (e.g. Wilkins 2002, p.103ff, fig. 4.5; Heinloo *et al.* 2011, pp.30–38, fig. 42–47). Similar chessmen and gaming pieces are known both in Estonia (e.g. Lange, Tamm 1985, pl. XXXII:10; Sepp 1995, pl. XXVIII, 2:2, 4; Sander 2011), in neighbouring regions (e.g. Apala 1992, fig. 1:5; 1994, fig. 1:3, 4; 2000, fig. 1:3; Caune 1998; Spirģis 2006, fig. 1:3; Blaževičius 2009, table 3; Kuncevičius *et al.* 2010, fig. 10; Lietuvos pilys) and elsewhere (Megaw 1984, fig. 195:42; van Vilsteren 1987, fig. 51). In Lithuania the chessmen are most numerous in Vilnius and Trakai; the turned pieces similar to the chessmen of Viljandi are dated to the 14th–16th centuries (Blaževičius 2009, table 3).

Besides these four dice have been also found, two of them are common cube-shaped items, but two others have pyramidal ends (Fig. 18:1–4; Haak 2004, fig. 5:3–6). A specimen similar to the latter has been found from the Cēsis Order's castle (Apala 1992, fig. 1:6; Haak 2004, p.116). The smaller dice with pyramidal ends (Fig. 18:3) was found from a stratum, dated to the last third of the 13th or early 14th century. It seems possible that one of the dice (Fig. 18:1) has been left unfinished, as its corners are so sharp that it did not roll when thrown. Dice with



Fig. 17. Powder horn (VM 4389). Photo by H. Luik.

cubical shape are much more common in Estonian medieval sites (Мяэсалу 1984, табл. XVII:11; Lange, Tamm 1985, pl. XXXII:5; Aus, Dubovik 1989, pl. XVII:6; Aus 1990, pl. XXXIX:5–7; Аун 1996, табл. XXII:3; Luik 2002, pp.319–320, fig. 14). Similar bone and antler dice are known also from the neighbouring countries and elsewhere (e.g. Megaw 1984, fig. 195:40, 41; MacGregor 1985, fig. 71:b–d; Heege 2002, fig. 696; Luchtanas, Vēlius 2002, fig. 265; Kovács 2005, fig. 4.1; Kovács 2005, pp.299–300, fig. 11; Röber 2006, fig. 17; Majantie 2007, p.45).

A flute (Fig. 19:1) is made from the tibia of goat or sheep. For making flutes, the long bones of goat and sheep have been used most often, but items made from bird bones were also common. In Estonian medieval sites bone flutes are known e.g. from Tallinn, Tartu, Uderna and Lihula (Aus, Dubovik



Fig. 18. Gaming pieces: 1–4 – dice, 5–12 – chessmen, 13 – presumable blank of chessman, 14–19 – disc-shaped gaming pieces (VM 10922: 502, 557, 1106, 558; 11041: 731; 10922: 503; 11041: 385; 10694: 7; 3864; 3863; 3865; 3884; 4139: 6; 3862 (4 pieces); 3681; 10922: 1107). *Photo by H. Luik.*

1989, pl. XVII:8; Ланг, Лиги 1990, табл. XXII:3; Аун 1994, табл. XXIII:1, 2; Luik 2002, pp.317–318, fig. 11). Such flutes have been found also from Latvia, e.g. Riga, Valmiera and Cēsis (Caune, Celmiņš 1988, fig. 49; Berga 1992, fig. 7:9; Apala 1994, fig. 1:1), and from Denmark, Germany and the British Isles (Andersen *et al.* 1971, p.120; Brade 1978; Megaw 1984, fig. 195:1–3, 5–7; Ulbricht 1984, pl. 43, 91; MacGregor 1985, fig. 78:b, c; Leaf 2007).

As means of pastimes five toggles made from pig's metacarpal and metatarsal bones could also be mentioned (Fig. 19:2), such toggles have been common finds both at the sites of the end of the

Prehistoric period and the Middle Ages in Estonia (Luik 2002, p.319, fig. 13; 2004, p.164, fig. 14; 2012, p.95, fig. 4.3), but also in neighbouring regions and farther (e.g. MacGregor 1985, pp.102–103, fig. 59; Berga 1992, fig. 7:7; Majantie 2007, p.45; Blaževičius 2008, fig. 24, 25). Four toggles from the Viljandi castle were collected from the strata dated from the 2nd half of the 14th until early 16th century, but the fragmented fifth item was found among osteological material from the last third of the 13th or the beginning of the 14th century.

Besides the toggles some other simple artefacts have been found in which the used bone has re-



Fig. 19. Bone artefacts: 1 – flute made from goat/sheep tibia, 2 – toggle from pig metapodial, 3 – point from elk rudimentary metapodial, 4, 5 – tools from costae (VM 10937: 33; 10922: 636; 559; 4140: 66, 63). *Photo by H. Luik.*

tained its original shape, for example a point made from elk rudimentary metapodial probably used for weaving bark and bast (Fig. 19:3; Haak, Pärnamäe 2004, fig. 2:1). Such points are more common in earlier sites dated to the Viking Age and the end of the Prehistoric period (Luik 2004 fig. 5; 2009, fig. 25), the item from Viljandi originates from the inside of the building, which was in use from the 2nd half of the 14th until early 16th century. Some tools made from costae are also known (Fig. 19:4, 5), these were collected as processed animal bones in the 1939 excavations. One of these is pig's costa with rounded tip, and the other is a costa of some large herbivore, having a round tip and a sharp edge. It resembles the

bone knives known from some Estonian Viking Age sites, which probably were used for dehairing hides (Luik, Maldre 2005, p.265, fig. 3, 4; Luik 2012, p.101, fig. 4.9).

As already mentioned, some artefacts – cross-bow nuts, chessmen and gaming pieces – were turned. Besides these some other turned objects have been found, most of them with tubular shape (Fig. 20:1–3). Most turned items are made from antler but few are turned from bone. These objects are mostly decorated with grooves, but one bone tube is also decorated with dots and circles (Fig. 20:3). Similar turned artefacts are known e.g. from Rakvere (Museum of Rakvere: RM 999/A 7: 560) and



Fig. 20. Bone and antler artefacts: 1–4 – turned artefacts, 5 – beads and buttons (VM 4425; 4423; 4424; 4429; 10922: 404, 38, 490, 1067, 1795, 1438, 1794). *Photo by H. Luik.*



Fig. 21. Bone and antler artefacts: 1–3 – comb fragments, 4–6 – handles, 7 – a cover for a pepper shaker (VM 10922: 1186, 1291; 4139: 11; 10922: 236, 227; 11041: 19, 1277a). *Photo by H. Luik.*

Vilnius (Lietuvos pilys). Turned objects of tubular shape from Pärnu, into which holes have been drilled, have sometimes been considered chanters of a bagpipe (Heinloo *et al.* 2011, p.20, fig. 59). A round turned object (Fig. 20:4) has its closest parallel in Antwerp, the Netherlands (Ervynck 1998, fig. 48). Both this, and presumably also some other turned artefacts could be details of some sort of handles. Some bone beads and buttons which are drilled out from the compact part of bone are also found (Fig. 20:5; e.g. Röber 1994, p.118, fig. 13; Spitzers

1999; 2006; Luik 2002, pp.323–325, fig. 17, 18; Luik, Maldre 2003, pp.21–26, fig. 18–21).

Only some fragmentarily preserved combs have been found from the castle (Fig. 21:1–3). More completely preserved combs are not known from the castle yet, but some specimens are from the town area of Viljandi (Luik 1998, pp.87, 91, fig. 69, 74; 2008, p.154, fig. 1, 2). One fragment from the castle is a small piece of tooth plate of a double composite comb (Fig. 21:2), found from the stratum from the last third of the 13th or early 14th century; the



Fig. 22. Antler details of bags: 1 – bag detail from Viljandi (VM 4432a, b; *photo by Heidi Luik*), 2 – a bag with antler detail from Laihia, Finland (from Sirelius 1919, fig. 298).

other is a narrow fragment from a double one-piece comb, made from elephant ivory (Fig. 21:3). From the same context as the former item, one more piece was found which is probably a fragment from the connecting plate of a double composite comb (Fig. 21:1). Working refuse from comb making is not known from the Viljandi castle yet. It is interesting to note that both combs and comb making waste are absent also in the archaeological finds from the medieval Bailiff's Castle of Edsholm in Sweden (Svensson 1995, pp.162–163). In addition, fragments of handles, and details of such have been found (Fig. 21:4, 6) together with the finds of the 15th and 16th century. Of a few other finds, a probable stylus from

late 16th century context, and a cover for a pepper shaker from the stratum of the last third of the 13th and early 14th century (Fig. 21:7; Haak, Pärnamäe 2004, p.79, fig. 2:3; Haak 2005, fig. 4:1, 2) should be mentioned. The faceted hollow object, preserved in two fragments, could also be some sort of handle, all surface of it is decorated with dots and double circles (Fig. 21:5); similar item is known for example from Antwerp (Ervynck 1998, fig. 49).

A larger flat antler plate is probably a detail of a bag (Fig. 22:1; cf. e.g. Sirelius 1919, fig. 298–301). It is broken and has 13 holes in it. Probably it was used for a long time since the plaited ornament on it is worn and only hardly visible in some parts of it. A

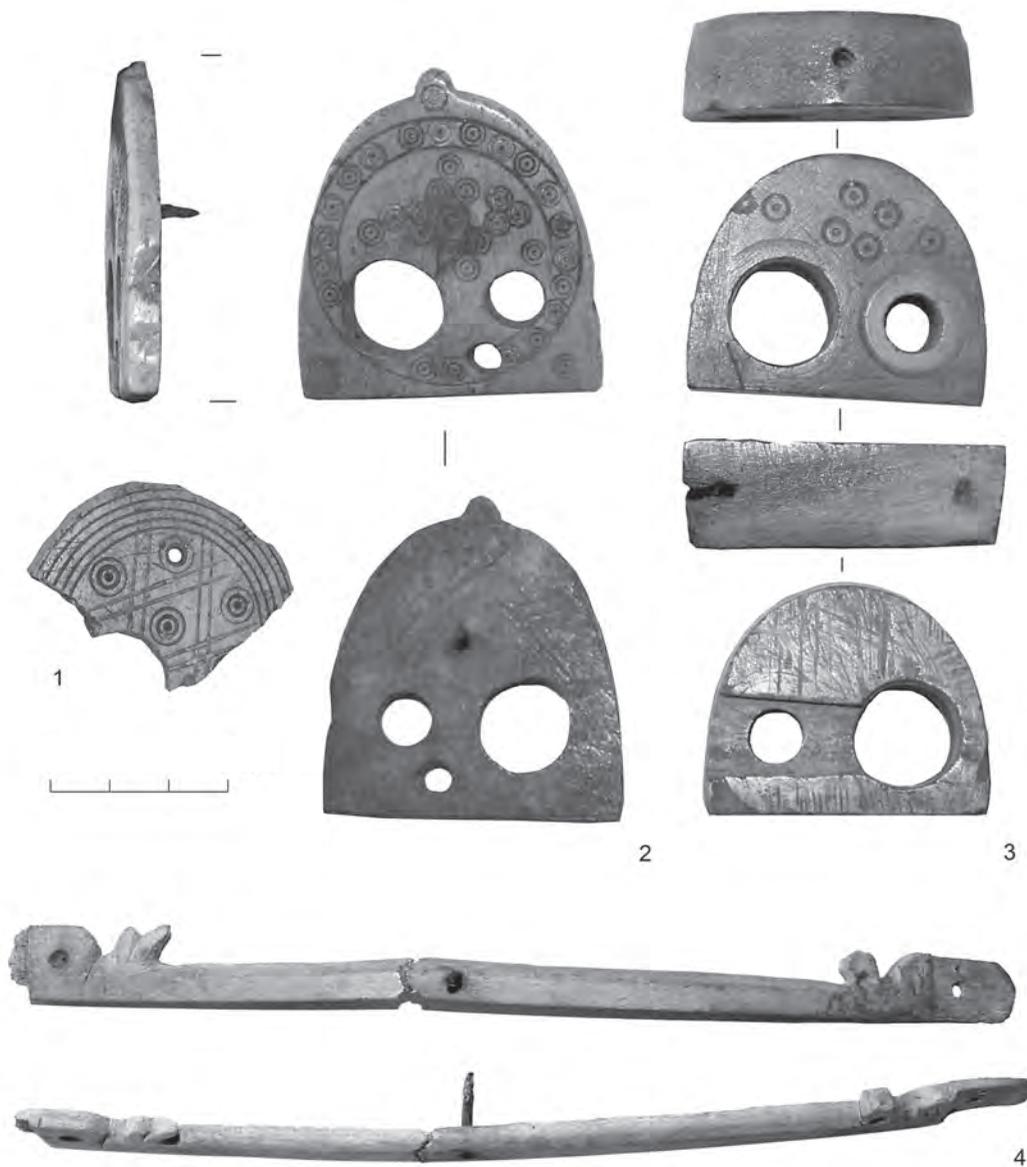


Fig. 23. Artefacts with unknown function: 1–3 – antler plates with holes, 4 – antler strap with bronze rivet (VM 11041: 330; 4420; 4421; 4431a, b). *Photo by H. Luik.*

similar antler plate is found from Pärnu, the latter is decorated with net ornament (Museum of Pärnu: PÄMu 2918: A 2703). Similar bag details are known from Finland, e.g. Suomusjärvi, Kurikka and Laihia, a datum '1734' is engraved on one of them (Fig. 22:2; Sirelius 1919, fig. 298–301). In principle similar, but much smaller bone or antler details of purses are known from Hungary, but these are dat-

ed to the 6th–9th centuries there (Czeglédi 2005; Szóllósy 2005).

Some antler objects with unknown function are also known from the Viljandi castle. Most interesting of them is an item which consists of two antler plates with round upper part (Fig. 23:2, 3). There are two round holes in both plate fitting together and both are also decorated with dots and circles.

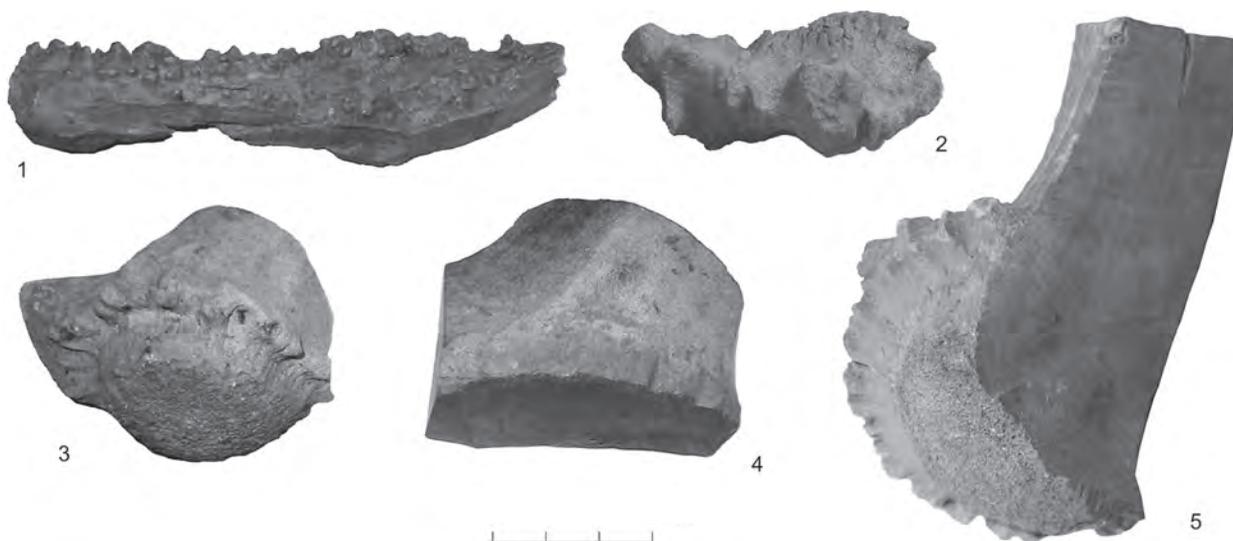


Fig. 24. Fragments of antler: 1–4 – red deer antler, 5 – elk antler (VM 4140: 24; 10922: 1480; 4140: 9, 10, 7). *Photo by H. Luik.*

In the thinner plate an iron nail, about 1.4 cm long, is preserved, and there are several nail holes on the sides of the thicker plate. On the back side of this plate there is a trapezoid cavity around the smaller hole. One fragmentarily preserved plate decorated with net ornament and dots and circles could be a piece from the thinner plate of a similar item (Fig. 23:1). Two similar thin plates are also known from Tartu, one of them is decorated with net ornament and dots, the other one with dots and circles (Tartu City Museum: TM A-126: 1101; 2084/A-49: 36). The function of an antler strap with a bronze rivet in the middle of it and holes in its ends is also not known (Fig. 23:4).

Working debris

Most of bone working refuse has been recovered from the southeastern part of the Order's castle, where excavations have been carried out in 1939 and 2003–2004 (Haak 2007, p.48). Bone working debris from the excavations of 1939 consists mostly of larger antler pieces, but from the excavations of 2003 and 2004 lots of small antler fragments and chips

are recovered also. The reason for that could be that during earlier excavations usually only larger bones and antler pieces were picked up, the existence of large fragments of worked bone and antler was also recorded during the excavations (Tuulse 1939, p.7; cf. Luik 2012, p.103). It still seems that as such larger fragments were missing in the area investigated in 2003–2004, such items might have been deposited in the area south of the main castle. Perhaps it was in this area that the bone and antler worker(s) practised their trade?

As already mentioned, the largest part of the bone finds consists of working debris of elk antler (Fig. 24–27). Only some pieces certainly come from red deer antler (Fig. 24:1–4), but a part of small waste pieces may also be fragments of deer antler. There are larger pieces, including some burr fragments which only come from shed antlers, and are missing in case these are cut or sawn off a butchered animal's skull (Fig. 24:3, 5). Working refuse also contains tine tips and pieces of hollow parts of antler, which were not very suitable for making artefacts (Fig. 25:1–3, 6, 8–12; 26:4, 6, 10). There are also sawn antler slices, small plates and straps prepared



Fig. 25. Antler working debris: 1–3, 6, 8–11 – small antler tips, 4, 5, 7, 11–27 – miscellaneous antler pieces with working traces (VM 10922: 648, 633 (4 pieces); 4140: 17, 12, 16, 15, 14, 13, 27, 25, 5, 44, 9, 23, 34, 56, 64, 38, 42, 31, 47, 30, 39, 50). *Photo by H. Luik.*

for further working (Fig. 25:4, 5, 15, 26; 27:1–10). The finds from later excavations, where all the soil was carefully screened, include lots of small antler chips (Fig. 28).

About ten bone pieces with sawing or cutting traces could be identified among the working debris (Fig. 29). Only a few bones with working traces are identifiable: a cattle costa with triangular indentation cut into it, cattle metacarpal bone with cutting

traces and tibia of goat or sheep with cut ends (Fig. 29:5, 4, 2). Besides these three horn cores with working traces have been found. Only the largest one is identifiable, it is cut off from the skull of a large bovid (Fig. 30). Eleven circles with dots are visible on its surface. Presumably these are traces of button making (e.g. MacGregor 1985, pp.59–60, fig. 35; Spitzers 1999; 2006; Gróf Gróh 2001, pp.281–282, fig. 2, 4–6; Luik, Maldre 2003, pp.21–26, fig. 18–21).

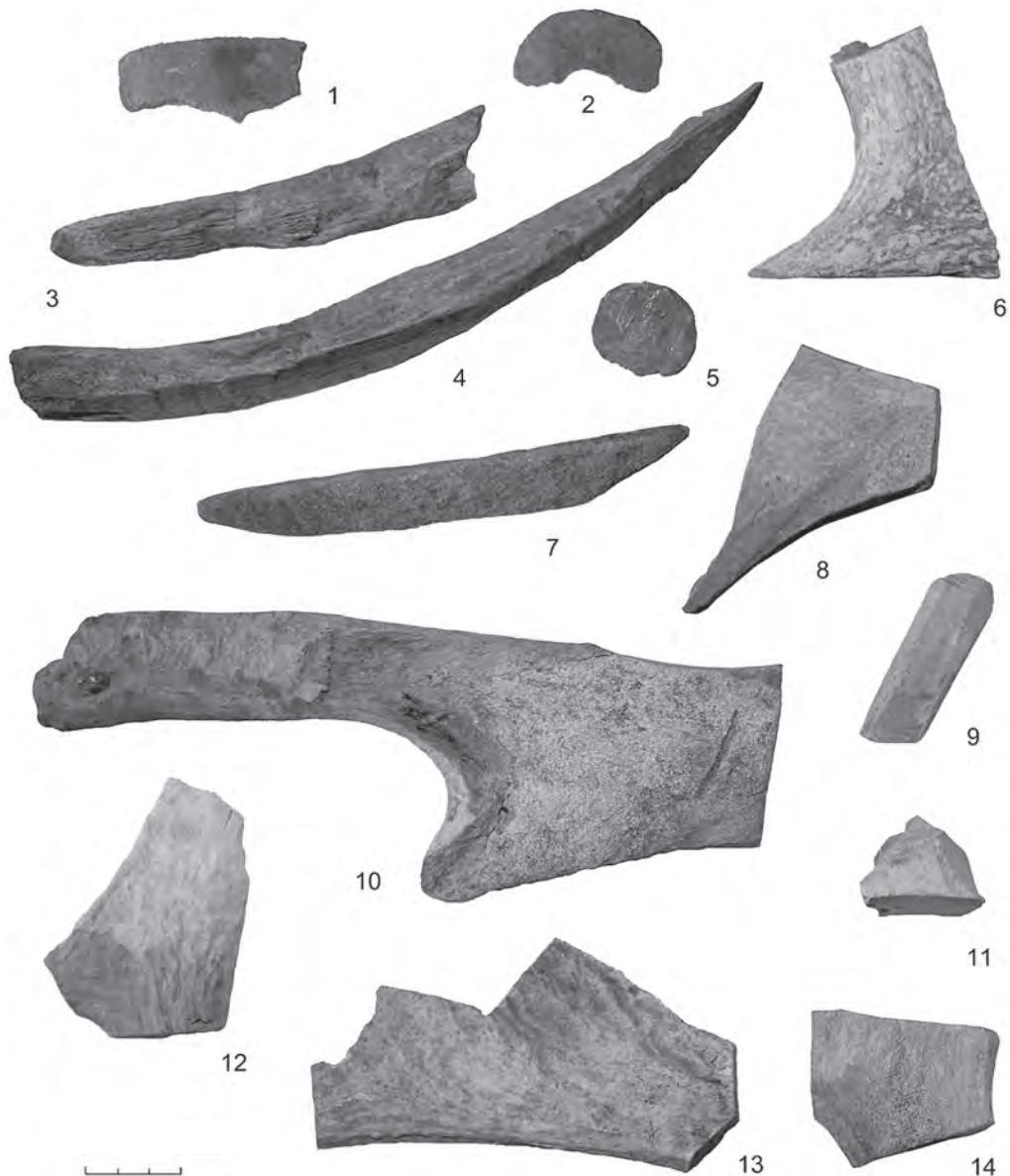


Fig. 26. Antler working debris: 1–5, 7–9, 11–14 – worked antler pieces with different shape and size, 6, 10 – pieces of hollow parts of antler (VM 4140: 48, 46, 4, 6, 45, 8, 21, 22, 36, 18, 11, 20, 19, 10). Photo by H. Luik.

All these circles are only lightly carved into horn core. As horn core is not very suitable for making buttons it seems more probable that buttons were drilled out from the horny part covering the core. Usually the horn cuticle was first removed from the horn core and worked into a flat plate which was

thereafter used for making artefacts (Ulbricht 1984, pp.24–26, fig. 3; MacGregor 1985, p.66, fig. 41; 1991, pp.364–366, 371; Luik 2005, p.83 f.; Mulsow 2006, pp.286–287, fig. 3), but sometimes it was worked while still attached to the horn core (Rackham 1994, p.56).

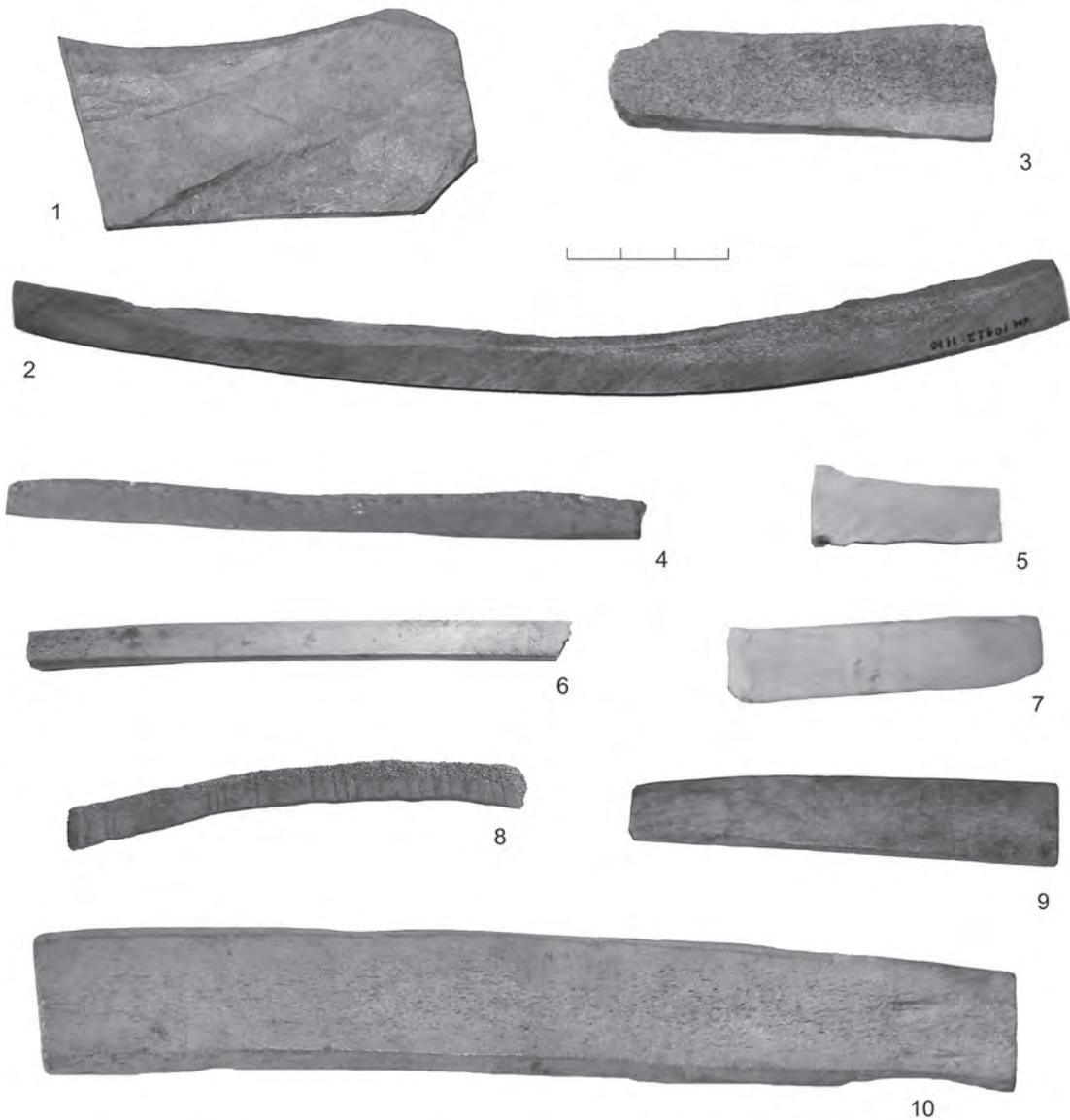


Fig. 27. Antler working debris: 1, 2 plates, 3–10 straps (VM 10922: 1110 (2 pieces); 4140: 36, 28; 4139: 9, 10, 8; 10922: 1431; 1068; 4433). *Photo by H. Luik.*

Working refuse also contains a few pieces, which allow to guess the artefact that was intended to be made. There are straps with square cross-section, which were meant for making dice (Fig. 27:3–8; cf. Gróf, Gróh 2001, p.282, fig. 3; Arndt 2006, p.185, fig. 3; Mulsow 2006, p.286, fig. 2; Röber 2006, p.344, fig. 17). Small plates and flat straps are probably raw material prepared for making decorative and cover

plates (Fig. 26:1, 2, 10). A faceted conical piece with a small hollow in the wider end may be a blank of a chessman, which was attempted to be fixed by the hollow for turning (Fig. 18:13). Some more refuse pieces also belong to turning refuse, like the three antler pieces, which could be a refuse from making crossbow nuts (Fig. 16:5–7; Luik, forthcoming). For making a crossbow nut probably first a cylinder of



Fig. 28. Antler chips and shavings (VM 10922: 571, 634, 1323, 1389, 1480, 1567). Photo by H. Luik.



Fig. 29. Bone working debris: 1–4 – fragments of long bones, 5 – fragment of costa (VM 4140: 61, 67, 65; 10922: 445; 4140: 62). Photo by H. Luik.

required thickness was turned. Quite often the side of a nut also bears two parallel lines, which also marked the width of the indent made for the trigger (Rackevičius 1999, fig. 3:2; 4; Luik 2009, fig. 27:2). The completed nut has a concave cavity on one side for the bowstring. This cavity was apparently made by first sawing a right-angled notch and then fin-

ishing it into a concave one (Fig. 31). The measurements of the pieces found from the Viljandi castle agree with the version that they could be sawed off from the crossbow nuts. The already mentioned antler cylinder with pierced hole in the middle of it could be a blank for making a crossbow nut (Fig. 16:4).



Fig. 30. Bovine horn core with circles (VM 4140: 1). *Photo by H. Luik.*

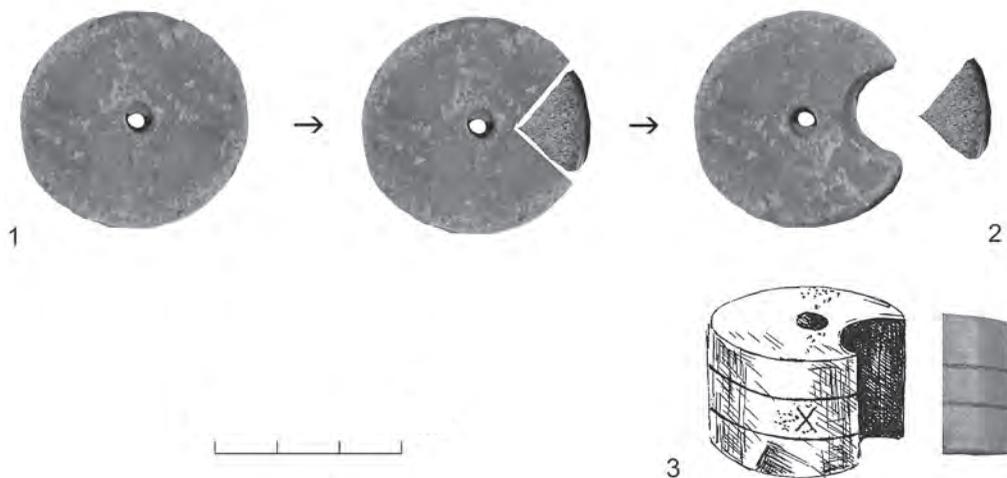


Fig. 31. Crossbow nuts: 1 – making a crossbow nut, 2 – a refuse piece, 3 – complete crossbow nut from the Otepää castle (VM 3876; 10922: 1362; Institute of History, Tallinn University: AI 4036: NW233). *Photo and drawing by H. Luik.*

Tools and methods of bone and antler working, used in Viljandi, are similar to those in use in other medieval sites in Estonia (cf. Luik 2005; 2009). Most often, sawing traces can be distinguished (Fig. 24:4, 5; 25:7, 11, 14–18). Sawing traces show that larger tines were turned during the sawing process and the porous part inside the antler was broken (Fig. 25:6),

smaller tines and tine tips were sawn in one direction only and the last remaining bit was broken (Fig. 25:1–3, 7). A saw was also used for longitudinal dissecting, but on some pieces the traces of a drawknife are visible (Fig. 25:14, 17; cf. Luik 2009, fig. 15, 16, 20). Axes and knives were also used in antler working, leaving small antler chips and shavings (Fig. 28;

cf. Ulbricht 1978, pl. 23; Luik 2012, p.103, fig. 4.11). Circle shaped traces on the horn core mentioned already prove the use of drills and turning refuse refers to the use of a lathe. Besides the Viljandi castle some turning refuse is also known from the Bishop's Castle of Otepää in southeastern Estonia (Luik 2009, p.33, fig. 27).

Discussing the context of the bone working debris can be started from the fact that the greatest share of it originates from the strata of the last third of the 13th and early 14th century. The exact dating of the large pieces, collected in 1939, remain unknown; however, the fact that the stratum was located below the floor of the cellar in the southern part of the castle allows to suggest that these might also be of 13th or 14th century origin. In this case, we are speaking of some kind of larger activity during that phase.

Another context, where bone working debris is represented, but in somewhat smaller numbers, is the inside of the building in the first outer bailey, which was in use from the 2nd half of the 14th until early 16th century. This might be connected with a smaller-scale activity, and perhaps even mercenaries, who have been considered as possible inhabitants of the building, might have used their spare time to produce some necessary objects.

Comparative material from other sites in Estonia and neighbouring regions

Bone and antler artefacts as well as production debris are found also from the town area and suburbs of Viljandi (Haak 2005; 2007; Luik, forthcoming). At the present state of investigations it is not possible to say whether the same masters who manufactured artefacts in the castle sometimes also sold and made their products in the town's market place, or did some other craftsman work there. Methods of antler working (chopping, sawing, cutting) characterise the production refuse both from the castle and from the town area, but while in the castle some, although quite scarce, traces of turning artefacts can

be also found, they are missing in the town material known today. The possibility, however, remains that archaeological excavations in the town area just have not come across the majority of production refuse there.

Generally similar bone and antler objects are known from other Estonian medieval castles and towns. Most outstanding of these sites for the abundance of antler and bone tools and debris is the Bishop's Castle of Otepää in southeastern part of Estonia (Мяэсалу 1984, табл. XVII:11–13; Maldre 2001; Luik 2009, fig. 15:1–9; 20:1, 3; 27). From the Bishop's castle in Lihula, Western Estonia, only a few bone items are known, much more bone tools and waste is known from the small market town aside the castle there (Luik 2002, table 1). Bone artefacts have been found also from the Rakvere Order's castle. Although some of these have been published (Altoa *et al.* 1987, pl. XXIII:7, 10, 11), the bone finds from Rakvere have not been studied more thoroughly yet. In the neighbouring regions the Cēsis Order's castle in Latvia could be mentioned, where quite a lot of bone and antler artefacts have been found (Apala 1992; 1994; 2000; 2002). Comparative finds are known also from medieval towns in Estonia, but only finds from some excavations in Tallinn have been analysed more precisely (Luik 2001; Luik, Maldre 2003). It could be pointed out here that there are some differences in the composition of bone and antler artefacts from the Viljandi castle if compared to finds from the town areas of Lihula, Tallinn and Viljandi. The find assemblage of Viljandi castle consists lot of covering plates of armour and also chessman and other gaming pieces, which could be connected with the activities of soldiers in the castle. In mentioned town areas tools and other artefacts connected with usual daily activities of common people prevail: bone needles, spindle whorls, handles, combs, etc. (Luik 2001; 2002; forthcoming; Luik, Maldre 2003).

If compared to Viljandi, where quite a large share of objects were made from antler, usually bone artefacts and refuse are more numerous in medieval sites, and in some sites sawn horn cores are abun-

dant referring to the use of horn (e.g. Mührenberg 2006, fig. 7; Rech 2006, fig. 9; Reinsnert 2006, p.562, fig. 12; Thiemann 2006, p.385, fig. 5). But in some sites, for example Lund, antler is also used in large quantities (Carelli 2006, fig. 5). Both in Viljandi and Otepää castles elk antler has been used more often than bone. In Lihula, on the other hand, mostly bones were used, which is characteristic also to most medieval sites in Estonia. On ground of the present data it seems that antler has been used more often in the southern part of Estonia (Luik 2002, pp.327–328, table 2; 2005, pp.91–92). Antler was often used also in some earlier, Viking Age sites in South Estonia (e.g. Rõuge), but in these sites elk bones are numerous also among faunal remains (Паавер 1965, табл. 67; Luik 2005, pp.90–91).

Discussion: antler workers in the Viljandi castle

Why the majority of bone working refuse from Viljandi comes from the Order's castle and not from the town area? Of course, the answers to that question can be manifold, and the period of their deposition is over three centuries. Still, there are several versions that might lead us nearer to the answer.

One explanation could be that at least a part of bone working in the castle was connected with production of weapons. The workshop for making or repairing weapons suites definitely well to the context of the castle. Maybe they were even not foremost bone workers, but crossbow-makers, who just used bone and antler for making some details (cf. e.g. MacGregor 1985, pp.160–161; Rackevičius 1999; 2001). Both crossbow nuts and antler plates used as supports for arrows on crossbows have been found from the castle and also bone and antler plates which have been used to decorate stock parts of crossbows and guns. The fact that such objects were made in the castle is supported by finds of manufacturing waste left from making the crossbow nuts (Fig. 16:4–7; 31) and also unfinished flat antler plates which could be meant for making decorative plates for crossbows (Luik, forthcoming).

Another field of products, suggested by the bone working refuse of the Order's castle in Viljandi is the making of gaming pieces and dice. Among production waste there are several antler straps with square cross section, suitable for making dice (Fig. 27:3–8). A conical antler piece with turning traces could be a blank for making a chessman (Fig. 18:13), and presumably one chessman is an unfinished item (Sander 2011, p.27). It is however questionable if complete sets of chessmen were produced in the castle. It seems more probable that bone worker having a lathe has tried to make a chessman – maybe for replacing a broken or lost piece (which deciding by this conical blank was not successful). Making of dice and gaming pieces also fits into the context of castle, as gambling and board games suited well for the pastime of warriors and hence this field can be also closely connected with the castle (cf. e.g. Svensson 1995). Working debris also includes blanks for making handles, but, as already mentioned, waste which could be connected with comb making has not been found from the castle yet.

Since Viljandi was a very small town, the demand for weapon details and means of pastime from the castle probably offered more stable subsistence than the small-numbered town population's need for bone artefacts. It is also possible that in the castle the purveyance of antler for craftsmen was organized. Since hunting was a privilege of upper classes, one may assume that antlers of killed animals primarily reached the castle. The use of shed antlers could also have been regulated; a respective example can be found in English written sources: in the *Close Rolls* of Henry III from 1225, an order to Hasculf Adhelhakeston is recorded, that he must hand over all antler beams he finds in the forest to the crossbow-maker Philip Convers for the manufacture of crossbow nuts (MacGregor 1985, pp.160–161; 1991, p.367). Olaus Magnus (1996/1998, p.872) also mentioned that crossbow-makers procured antler for crossbow details by bartering. The occurrence of red deer antlers may also suggest the regulated purveyance of material. As red deer did not live wild

in Estonia at that time (Паавер 1965, с.235ff., рис. 37:IV), probably antlers have been brought to the castle specifically as raw material for bone working, either by bone worker or somebody else.

DISCUSSION AND CONCLUSIONS: WHICH ACTIVITIES DOES THE BONE MATERIAL FROM VILJANDI REFLECT?

The composition of the find complex of the late 13th century does not allow an unproblematic interpretation. In the first review of excavation results from 2003–2004, this layer with numerous and manifold finds was interpreted as an occupation layer (Haak 2004, p.109; 2005, p.92). This was supported by the large number of finds of different origin, including animal bones, pottery fragments, fragments of glazed tile and brick, iron nails, but also a few less ordinary items, e.g. fragments of armour, pieces of amber, a few coins, unusual in Estonia (Kiudsoo 2004, pp.202–203, appendix 1, fig. 2), etc. However, the composition of the faunal assemblage collected (see above) shed considerable doubt over the interpretation as an “ordinary” occupation layer.

On the one hand, we should include the location of the site in the considerations. The area investigated was located less than six metres from the outer wall of the Convent House (with windows to the lakeside). It seems rather unlikely that of all possible options, this was the site chosen for regular slaughtering of animals, as the bone material would suggest. Rather the location would lead to the assumption that the deposition of such material in this area might be the result of some exceptional rather than regular activity.

Before the analysis of the bone material, one of the possibilities was to connect the deposits with the construction period of the Convent House. The abundance of used iron nails, and broken brick and tile might support this idea. However, as kitchen waste is by no means the main source of such a faunal assemblage, this option cannot be considered as a likely one. Perhaps some of the find material can indeed be

connected with the builders, but there are items that do not correspond to such an interpretation.

Large amount of faunal remains also led to a hypothesis that this area might be connected with the antler working activities. The present analysis made it clear that the antlers were specially collected for processing, as other skeletal bones of elk and red deer are almost nonexistent among the faunal remains. As details of weapons were one of the dominant categories of bone items, it can be suggested that repairing weapons and armour might be one of the activities that took place in the area. In addition to the bone items, the finds included several small iron rings (1.2–1.8 cm in diameter; see also Haak 2005, p.98) that could be used for repairing chain mail coats. A few crossbow arrowheads were also collected. In addition to the archaeological finds, the information from written sources about workshops or specialists for making or repairing crossbows in the larger castles of the Livonian Order exists (Ekdahl 1998). Cattle and sheep/goat horns could also have been used for making composite crossbows (Ekdahl 1998), and missing horn cores among skull fragments suggest the use of this material. Horn as keratin substance usually does not preserve in the soil (O'Connor 1999, pp.1898–1899; Luik 2005, p.79), so missing of horn details and artefacts is not surprising, but horn cores with working traces are also very rare among bone working waste in the castle. If horn was used by the bone workers or armoury makers in the castle the horn cores have been deposited somewhere else by some reasons.

Finally, there is a possibility that the context chosen for deeper analysis actually reflects some kind of rubbish disposal. The reason why such waste remained in the area may be in the need to elevate the ground level of the area between the newly built eastern wing of the (prospective) Convent House, and the outer wall of the castle on the lakeside. However, the fact that in the area investigated, several skeletal parts that could be anatomically connected, were found near each other (reinforced by several fragments of ceramic vessels that could be joined), does not allow us to speak of some area of

refuge disposal, which could be in use for a longer time. The possibility that events that took place during some shorter period are reflected, perhaps with the inclusion of some rubbish that could be used for levelling the ground, seems one of the most likely interpretations at the current stage of research.

The current study was aimed at understanding animal consumption, usage and production of bone and antler items in the case of Viljandi castle. The analysis of the skeletal remains revealed that most likely these activities are not interconnected – while most of the processing remains from the castle area are of antler, elk and red deer are not represented in the animal bone collection with other skeletal parts. It thus seems that unlike the South Estonian hill-forts of the Viking Age, the amount of wild animals among food in the castle is actually rather small.

The composition of the faunal remains of the late 13th century assemblage from the castle area can be interpreted as butchering waste, thus the animals were most probably slaughtered in the castle area. In addition to a butchering site, there seems to have existed a workshop of bone and antler processing or weapon repairing somewhere in the vicinity of the investigated area.

In case of a small town like Viljandi, it seems likely that the need for some specified products mostly originated from the castle area. This may be the explanation why some of the handicrafts were practised, according to the current state of research, in the castle area rather than in the medieval town.

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ABBREVIATIONS

APL – Arheologu pētījumi Latvijā

AVE – Arheoloogilised välitööd Eestis (Archaeological Fieldwork in Estonia)

BAR – British Archaeological Reports

EJA – Estonian Journal of Archaeology

LA – Lietuvos archeologija

MT – Muinasaja teadus

TATÜ – Eesti Teaduste Akadeemia Toimetised, Ühiskonnateadused (Proceedings of the Estonian Academy of Sciences, Social Sciences)

TATHS – Eesti Teaduste Akadeemia Toimetised, Humanitaar- ja sotsiaalteadused (Proceedings of the Estonian Academy of Sciences, Humanities and Social Sciences)

UT – University of Tartu

VM – Viljandi Muuseum (Museum of Viljandi)

ZASMA – Zinātniskās atskaites sesijas materiāli par arheologu

KAULO DIRBINIAI IR NEAPDIRBTO KAULO RADINIAI IŠ LIVONIJOS ORDINO VILJANDI PILIES (XIII–XVI A.)

Arvi Haak, Eve Rannamäe, Heidi Luik, Liina Maldre

Santrauka

Teutonų ordino Viljandi pilis yra viena iš didžiausių pilių dabartinės Estijos teritorijoje, archeologų tyrinėjama jau nuo 1878 m. Vienas iš šio straipsnio tikslų yra apžvelgti tyrimų metu sukauptą kaulo radinių ir dirbinių rinkinį bei jo kontekstą, taip pat palyginti informaciją apie kaulinę medžiagą su informacija apie kaulo dirbinius ir kaulo apdirbimo atliekas. Kadangi tokios informacijos stinga iš ankstyvųjų kasinėjimų, ypatingas dėmesys sutelktas į 2003–2004 m. kasinėjimus, kurie vyko šalia vienuolyno pastato PR kampo, tvirtovės pirmosios išorinės sienos teritorijoje (1 pav.). Išskiriamos trys pagrindinės viduramžių ir vėlesnio laikotarpio Viljandi pilies statybos fazės: 1) sluoksnis su XIII a. paskutiniojo ketvirčio – XIV a. 1-ojo dešimtmečio (?) radiniais; 2) XIV a. vidurio – XVI a. pradžios

sluoksnis; 3) sluoksnis, susijęs su Livonijos karais (XVI a. 2-oji pusė), kai pilis buvo sugriauta.

Viljandi zooarcheologinė medžiaga yra gausi ir gana gerai išlikusi. Šiame straipsnyje aprašoma XIII a. pabaigos – XIV a. pradžios sluoksnio osteologinė medžiaga, į kurią įeina ir gausūs kaulo apdirbimo liekanų fragmentai. Tyrimu siekta pateikti galimą jų kilmės ir susidarymo aiškinimą. Palyginimui buvo analizuojamas ankstyvųjų viduramžių miesto kasinėjimų, vykusių 1991 m. Pikk gatvėje, metu sukauptas kaulo radinių rinkinys.

Dauguma gyvūnų kaulų yra naminių gyvulių, o laukinių gyvūnų kaulų yra nedaug. Osteologinės medžiagos analizės rezultatai pateikti lentelėse ir diagramose (1, 2 lent.; 2–13 pav.). Išskirtinė pilies osteologinės medžiagos ypatybė – didelis skaičius

kaukolių be ragų fragmentų, taip pat galvijų, avių ir ožkų kaulų vyravimas bei labai mažas kiaulių kaulų skaičius. Viena galimų versijų: tai buvusi pirminės skerdyklos vieta, kurioje buvo dirama oda ir darinėjama skerdiena. Vėliau maistinės dalys keliaudavo į virtuvę, oda ir ragai buvo toliau apdirbami. Kita vertus, tyrinėtąją medžiagą galima laikyti tam tikromis skerdienos liekanomis, o ne pačios skerdimo vietos indikatoriumi: tokiu atveju su skerdimu susijusi veikla vyko kažkur kitur, o kasinėtame plote susidurta tik su į jį patekusiomis liekanomis. Pilies osteologinė medžiaga negali būti laikoma liekanomis iš virtuvės, tuo tarpu Pikk gatvės medžiagai tokia interpretacija tinka: gyvūnų vartojimą maistui atspindi tarp radinių vyraujantys vadinamosios mėsinės kūno dalies fragmentai, santykinai didelis kiaulių kaulų skaičius, taip pat beveik nepastebėta odos lupimo pėdsakų.

Kaulo apdirbimo liekanų, taip pat kaulo ir rago dirbinių Viljandi pilyje aptinkama nuolat. Iki šiol rasta apie 100 kaulo dirbinių ir apie 500 vienetų kaulo apdirbimo liekanų. Didžioji dalis kaulinio inventoriaus rasta XIII a. pabaigos – XIV a. pradžios intensyviame kultūriniame sluoksnyje, taip pat aptikta ir XV–XVI a. datuojamų kaulo radinių. Gana daug Viljandi pilies kaulo radinių yra susiję su ginklais. Kita didelė radinių grupė priskirtina turėjusiems pramogų paskirtį. Taip pat aptikta keletas paprastų kaulinių įrankių, tekintų dirbinių, šukos, rankenos fragmentai ir kt. (14–23 pav.). Apdirbimo atliekas (24–31 pav.) daugiausiai sudaro rago fragmentai, iš rago pagaminta ir didžioji dalis dirbinių.

XIII a. pabaigos radinių komplekso sudėtis kelia tam tikrų problemų interpretacijoms. Pirmojoje 2003–2004 m. kasinėjimų ataskaitoje šis sluoksnius su gausiais ir įvairiais dirbiniais buvo interpretuojamas kaip supiltinis, bet osteologinio rinkinio sudėtis leido pagrįstai suabejoti tokia interpretacija. Kol nebuvo atlikta kaulo radinių analizė, viena galimybių buvo susieti įvairias liekanas, tarp kurių buvo ir statybinių nuolaužų, su vienuolyno statybos laikotarpiu. Nors atliekos iš virtuvės dažniausiai neabejo-

tinai tampa pagrindiniu panašių gyvūninės kilmės radinių šaltiniu, negalima atmesti ir kitų galimybių. Taip pat mažai tikėtina, kad tai buvo reguliaraus gyvūnų skerdimo vieta (kaip rodytų kaulinė medžiaga), kadangi tyrinėtą plotą buvo nutolęs mažiau kaip 6 m nuo vienuolyno pastato išorinės sienos. Didelis osteologinės medžiagos kiekis taip pat sudarė prielaidas kelti hipotezę apie šios vietos sąsajas su kaulo apdirbimo veiklomis. Galiausiai, tikėtina, kad išsamesnei analizei pasirinktas kontekstas iš tiesų atspindi tam tikrą šiukšlių sąvartą, tuo siekiant pakelti žemės lygį teritorijoje tarp vienuolyno naujai pastatyto R sparno ir išorinės pilies sienos iš ežero pusės.

Tyrimu buvo siekiama suprasti, kaip Viljandi pilyje buvo naudojami gyvūnai bei gaminami kaulo ir rago dirbiniai. Osteologinė analizė parodė, kad šios veiklos greičiausiai neturėjo tarpusavio ryšio, kadangi dauguma apdirbtų radinių iš pilies teritorijos yra pagaminti iš elnio (briedžio) rago, o šių gyvūnų kaulų bendroje medžiagoje nėra. Tai rodytų, kad pilyje laukiniai gyvūnai maistui naudoti retai. XIII a. pabaigos pilies osteologinė medžiaga gali būti traktuojama kaip skerdimo liekanos, kadangi gyvūnai, beveik neabejojama, buvo skerdžiami pilies teritorijoje. Be to, manoma, kad tyrinėtos teritorijos aplinkoje galėjo veikti kaulo apdirbimo ar ginklų taisymo dirbtuvės. Tokio mažo miesto kaip Viljandi atveju, panašu, kad kai kurių specifinių gaminių, pvz., ginklų ar žaidimų sudėtinųjų dalių, poreikis atsirasdavo pirmiausia pilies teritorijoje. Tai galėtų paaiškinti, kodėl, esamais tyrinėjimų duomenimis, kai kurie amatai buvo intensyviau plėtojami pilies teritorijoje, o ne viduramžių mieste.

LENTELIŲ SĄRAŠAS

1 lent. Viljandi pilies identifikuotų kaulų fragmentų rinkinio rūšinė sudėtis.

2 lent. Pikk gatvės identifikuotų kaulų fragmentų rinkinio rūšinė sudėtis.

ILIUSTRACIJŲ SĄRAŠAS

1 pav. Viljandi tyrinėtų plotų planas: 1 – 2003–2004 m. pilies teritorijoje tyrinėtas plotas, 2 – A. Tuulse 1939 m. tyrinėtas plotas (apytikslis), 3 – H. Valk 1991 m. Pikk gatvėje tyrinėtas plotas. *A. Haak. brėž.*

2 pav. Viljandi pilies kaulo radinių rinkinio rūšinė sudėtis (3495 egzemplioriai). *E. Rannamäe brėž.*

3 pav. Pikk gatvės kaulo radinių rinkinio rūšinė sudėtis (499 egzemplioriai). *E. Rannamäe brėž.*

4 pav. Galvijų kaulų pasiskirstymas pagal kaulo rūšį: a) Viljandi pilis (2230 egzempliorių), b) Pikk gatvė (214 egzempliorių). *E. Rannamäe brėž.*

5 pav. Galvijų kaulų su pjautinėmis ir kirstinėmis žymėmis skaičius: a) Viljandi pilis, b) Pikk gatvė. *E. Rannamäe brėž.*

6 pav. Galvijų pasiskirstymas pagal amžių (remiantis epifizijų kaulėjimu pagal Silver 1969): a) Viljandi pilis (165 egzemplioriai), b) Pikk gatvė (84 egzemplioriai). *E. Rannamäe brėž.*

7 pav. Viljandi pilies zooarcheologinės medžiagos pavyzdžiai (VM 11041): 1 – avies kaukolė, perskelta į dvi dalis, 2 – avies ar ožkos apatinis žandikaulis; uždegiminės kilmės (?) antkaulio hiperostozė, 3 – patologinis (netipinis nudilimas) trečiasis krūminis galvijo dantis, 4 – viršutinis galvijo žandikaulis; netipiškai nudilęs krūminis dantis. *V. Pajuste nuotr.*

8 pav. Avių/ožkų kaulų pasiskirstymas pagal kaulo rūšį: a) Viljandi pilis (1147 egzemplioriai), b) Pikk gatvė (197 egzemplioriai). *E. Rannamäe brėž.*

9 pav. Avių/ožkų kaulų su pjautinėmis ir kirstinėmis žymėmis skaičius: a) Viljandi pilis, b) Pikk gatvė. *E. Rannamäe brėž.*

10 pav. Avių/ožkų pasiskirstymas pagal amžių (remiantis epifizijų kaulėjimu pagal Silver 1969): a) Viljandi pilis (52 egzemplioriai), b) Pikk gatvė (70 egzempliorių). *E. Rannamäe brėž.*

11 pav. Pikk gatvės kiaulių kaulų pasiskirstymas pagal kaulo rūšį (68 egzemplioriai). *E. Rannamäe brėž.*

12 pav. Pikk gatvės kiaulių kaulų pasiskirstymas pagal amžių (remiantis epifizijų kaulėjimu pagal Silver 1969; 30 egzempliorių). *E. Rannamäe brėž.*

13 pav. Viljandi pilies paukščių kaulų pasiskirstymas pagal kaulo rūšį (43 egzemplioriai). *E. Rannamäe brėž.*

14 pav. Plokštelės: 1–2 – atraminės plokštelės (?) strėlėms, 3–4 – dekoratyvinės plokštelės (VM 4139; 1; 4140; 26; 11041; 1403; 4415). *H. Luik nuotr.*

15 pav. Šaunamųjų ginklų dekoratyvinės plokštelės su įrėžomis: 1–3, 6 – meandros motyvas, 4 – pynės motyvas, 5, 8 – figūrinis motyvas, 7 – linijinis ornamento motyvas (VM 4416; 3799; 3800; 4416; 4427; 4418; 3802; 3798). *H. Luik nuotr.*

16 pav. Arbaletų riešutai: 1–3 – sulūžę arbaletų riešutai, 4–7 – gamybos atliekos (VM 3876; 3877; 3878; 4139; 7; 10922: 1449, 1362; 11041: 54). *H. Luik nuotr.*

17 pav. Parakinė (VM 4389). *H. Luik nuotr.*

18 pav. Žaidimų dalys: 1–4 – kauliukai, 5–12 – šachmatų figūrėlės, 13 – šachmatų figūrėlės ruošinys (?), 14–19 – disko formos žaidimų figūrėlės (VM 10922: 502, 557, 1106, 558; 11041: 731; 10922: 503; 11041: 385; 10694: 7; 3864; 3863; 3865; 3884; 4139: 6; 3862 (4 vnt.); 3681; 10922: 1107). *H. Luik nuotr.*

19 pav. Kaulo dirbiniai: 1 – fleita, pagaminta iš avies/ožkos blauzdikaulio, 2 – užsynė, pagaminta iš kiaulės pėdos kaulo, 3 – smaigas, pagamintas iš briedžio rudimentinio pėdos kaulo, 4, 5 – dirbiniai, pagaminti iš šonkaulių (VM 10937: 33; 10922: 636; 559; 4140: 66, 63). *H. Luik nuotr.*

20 pav. Kaulo ir rago dirbiniai: 1–4 – tekinti dirbiniai, 5 – karoliai ir sagos (VM 4425; 4423; 4424; 4429; 10922: 404, 38, 490, 1067, 1795, 1438, 1794). *H. Luik nuotr.*

21 pav. Kaulo ir rago dirbiniai: 1–3 – šukų fragmentai, 4–6 – rankenėlės, 7 – pipirinės dangtelės (VM 10922: 1186, 1291; 4139: 11; 10922: 236, 227; 11041: 19, 1277a). *H. Luik nuotr.*

22 pav. Raginės rankinių detalės: 1 – rankinės detalė iš Viljandi (VM 4432a, b; *H. Luik nuotr.*), 2 – rankinė su ragine detale iš Laihia, Suomija (iš Sirelius 1919, fig. 298).

23 pav. Neaiškios paskirties dirbiniai: 1–3 – raginės plokštelės su skylėmis, 4 – raginės juostelės su bronzinėmis kniedėmis (VM 11041: 330; 4420; 4421; 4431a, b). *H. Luik nuotr.*

24 pav. Rago fragmentai: 1–4 – tauriojo elnio ragas, 5 – briedžio ragas (VM 4140: 24; 10922: 1480; 4140: 9, 10, 7). *H. Luik nuotr.*

25 pav. Rago nuolaužos: 1–3, 6, 8–11 – smulkūs ragų smaigaliai, 4, 5, 7, 11–27 – įvairūs rago fragmentai su apdirbimo žymėmis (VM 10922: 648, 633 (4 vnt.); 4140: 17, 12, 16, 15, 14, 13, 27, 25, 5, 44, 9, 23, 34, 56, 64, 38, 42, 31, 47, 30, 39, 50). *H. Luik nuotr.*

26 pav. Rago nuolaužos: 1–5, 7–9, 11–14 – įvairaus dydžio ir formos apdirbtos rago fragmentai, 6, 10 – vamzdinės rago dalies fragmentai (VM 4140: 48, 46, 4, 6, 45, 8, 21, 22, 36, 18, 11, 20, 19, 10). *H. Luik nuotr.*

27 pav. Rago nuolaužos: 1, 2 – plokštelės, 3–10 –

juostelės (VM 10922: 1110 (2 vnt.); 4140: 36, 28; 4139: 9, 10, 8; 10922: 1431; 1068; 4433). *H. Luik nuotr.*

28 pav. Rago atplaišos ir drožlės (VM 10922: 571, 634, 1323, 1389, 1480, 1567). *H. Luik nuotr.*

29 pav. Kaulų nuolaužos: 1–4 – ilgųjų kaulų fragmentai, 5 – šonkaulio fragmentas (VM 4140: 61, 67, 65; 10922: 445; 4140: 62). *H. Luik nuotr.*

30 pav. Jaučio ragas su apskritimo formos įrežomis (VM 4140: 1). *H. Luik nuotr.*

31 pav. Arbaletų riešutas: 1 – arbaletų riešuto gamyba, 2 – gamybos atlieka, 3 – užbaigtas arbaletų riešutas iš Otepää pilies (VM 3876; 10922: 1362; Talino universiteto Istorijos institutas: AI 4036; NW233). *H. Luik nuotr. ir pieš.*

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