

Chapter 4

**BONE ARTEFACTS FROM THE KEAVA HILL FORT  
AND LINNAALUSTE SETTLEMENT SITES**

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**Abstract**

About 50 bone artefacts and pieces of bone working scrap have been found at the Keava hill fort and Linnaaluste settlement sites. More than half of these items were discovered among faunal remains in the course of the investigation of animal bones. From settlement sites I and III of Linnaaluste, finds typical of the Viking Age, particularly in northern and western Estonia, have been recovered. Finds from Keava hill fort have analogies among the finds from many hill forts and settlement sites of the Final Iron Age. Most of the bone artefacts were made of bones of domestic animals, and objects and working scrap of bones of wild animals are few in number. Based on the random choice of bones plus the level of bone working and the number of artefacts and scrap pieces in Linnaaluste, as well as in Keava, bone working was a domestic craft, and users themselves made the necessary artefacts. From the found bone artefacts it is also possible to gain information about some occupations other than bone working.<sup>1</sup>

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## Introduction

About 50 bone artefacts and pieces of bone working scrap have been found at the Keava hill fort and Linnaaluste settlement sites. More than half of these items were discovered by Liina Maldre among faunal remains in the course of the study of animal bones after excavation.<sup>2</sup> The most probable reason for this was that in many cases the artefacts and scrap were only slightly worked, and had also survived quite fragmentarily. The aim of this chapter is to give an overview of the artefact types that were found and the materials that were used to make them, and compare the finds from Keava with those from Linnaaluste, and both of them with finds from other contemporaneous sites. The author also seeks to ascertain what may be learned about the everyday life of those people on the basis of bone artefacts.

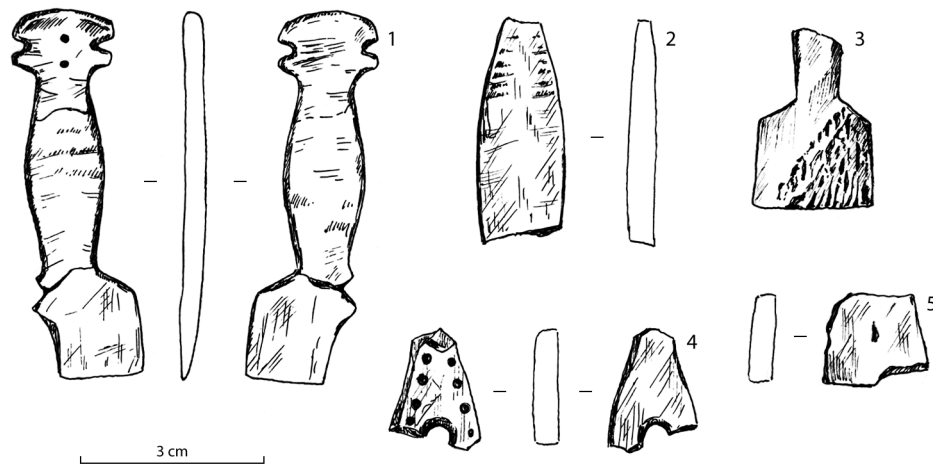
### Bone artefacts from Keava

Nearly twenty bone artefacts and fragments thereof have been found at the hill fort of Keava. The finds include four little bone spades, a small pierced bone, a bone fragment with working traces, a toggle and a thin bone plaque decorated with pits. In studying the faunal remains, Maldre discovered ten more finds: a toggle broken in two, a bone pendant, some bones and a tooth with working traces. Hence 18 bone artefacts and fragments have been recovered from the hill fort.

*Bone spades* (Fig. 4.1: 1–4; Lang et al. 2002, fig. 8). One of the four spades is almost intact, but the others are fragmentary. All spades have been quite roughly worked. Manufacturing traces are visible on some. Dense irregular transverse lines, probably marks of use/wear, can be observed on the blade of one of the spades. Experiments have been carried out to make such spades. It appeared that a person without practical experience of bone working is able to make a plain spade, and it is possible to carve it using only a knife. The making of a spade of a more complicated design, particularly one with an openwork handle, requires greater skill and different tools, for example fine-tipped chisels and augers (Luik 2005, 40 ff.; Luik & Tamla 2006, 119 f., fig. 19). Although one of the spades from Keava has been pierced through the handle and has been decorated with small pits along the sides of the handle, it nevertheless cannot be compared with skilfully made beautiful openwork spades (e.g. Luik & Tamla 2006, figs 8: 1, 9: 1, 11: 1, 13: 1–2). Analogies to the bone spades of Keava can be found in the hill forts and settlements of the Final Iron Age in Estonia and Latvia (e.g. Luik 2004, 163, figs 7–8; Luik & Tamla 2006). Similar carelessly made spades have also for instance been

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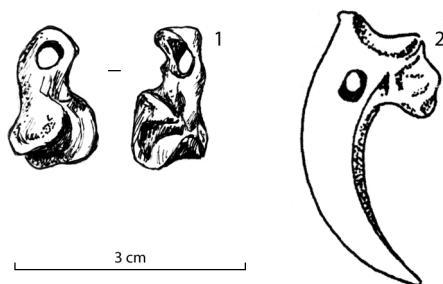
<sup>2</sup> Artefacts recovered from among faunal remains have been marked with L after the collection number. Their find numbers correspond with numbers in the list of bones. The author wishes to thank Liina Maldre, who paid attention to bone fragments with working traces during her investigation of faunal remains, and also identified the material used to make bone artefacts.



**Fig. 4.1.** Bone spades (1–4) and a bone fragment (5) from Keava (TÜ 1026: 412, 508, 432, 503, 504). Drawing by Heidi Luik.

found in the Savastvere hoard, which is dated to the middle or second half of the 12th century (Luik & Tamla 2006, fig. 2). Nevertheless, some of the spades may even date from the Viking Age; for example an unornamented spade made from a rib was found at Rõuge hill fort (Luik & Tamla 2006, fig. 4: 1). Ain Lavi (pers. comm.) has suggested that the spades from Lehmja (Luik & Tamla 2006, fig. 7) may also date from the Viking Age. In Latvia the largest number of bone spades (40 items) has been found at the hill fort of Daugmale, which was used until the late 12th century (Luik & Tamla 2006, 114, table 2, figs 12–13). It is not yet clear what such spades were used for. Although they have sometimes been classified as pendants, they are more likely utility articles that may have been carried hanging from a belt or a chain arrangement. They could have been cosmetic items, possibly for extracting some ointment or salve out of a receptacle and spreading it upon the skin (Luik & Tamla 2006, 120 ff.).

*Pendant of hare astragalus* (Fig. 4.2: 1) was recovered from among the faunal remains. A similar pendant of a hare's astragalus attached to a dog's canine pendant by a couple of bronze chain links was earlier found at the hill fort of Varbola



**Fig. 4.2.** Pendant of hare astragalus from Keava (1) and pendant of eagle talon from Linnaaluste III (2; after Konsa et al. 2003, fig. 4) (TÜ 1026 L: 341; 1115: 188). Drawing by Heidi Luik.

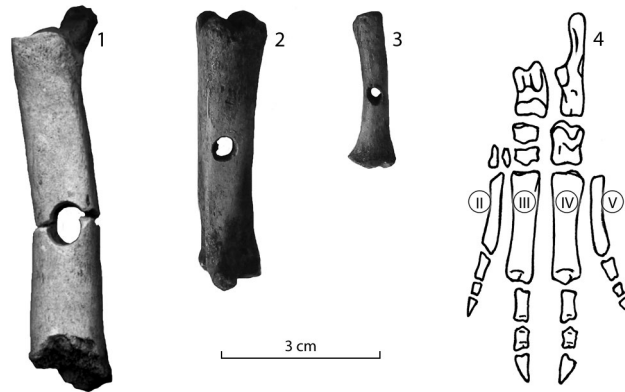
(Tamla & Maldre 2001, 374, fig. 20). Pendants of beavers' astragali occur most often; their total number is 24 and they have been recovered from seven sites, mostly south Estonian Viking Age settlements and hill forts (e.g. Aun 1992, 68, pl. XXXI: 2, 5; Leimus & Kiudsoo 2004; Rammo & Veldi 2005, 104 ff., fig. 4; Luik & Maldre 2005b, fig. 12: 1, 2). In northern Estonia some pendants of pine marten astragali have been found in the cemeteries of Pada and Kaberla (Luik 2003, 162, fig. 7: 1, 2; Luik & Maldre 2005a, 269, fig. 17: 1). Animal bone pendants have frequently been regarded as amulets, for example pendants of beavers' astragali have been associated with a beaver cult (Aun 1992, 68; Tvauri 2001, 161). A pendant of an animal bone could have expressed the principle of *pars pro toto*, i.e. represent the entire animal. It may also have symbolized an abstract notion, if it was to grant the wearer the vitality, strength, dexterity or some other character of the animal. The symbolism of a bone pendant was most likely connected primarily with the animal species from whose bone or tooth it was made. For example, the pendants of beaver astragali found in Rõuge are apparently related to the fact that the trade in beaver furs was a source of wealth for the inhabitants of the hill fort in the Viking Age (Leimus & Kiudsoo 2004). Tõnno Jonuks (2005, 48 f.) has suggested that several pendants, including astragalus pendants, are too often interpreted as representing cults. In his opinion, animal bone pendants may have been indicators of social status, for example marking a successful fur hunter and his wife.<sup>3</sup> Indeed, all animals whose astragali have been used as pendants have been fur animals; however, the same cannot be said about pendants made from teeth and talons (about talon pendants (Fig. 4.2: 2) see below). It must also be mentioned that in addition to bones and teeth, bronze replicas have also been used (e.g. Asplund 2005; Luik & Maldre 2005b, fig. 14), while in the Volga region and Åland, beaver paws made of clay have been deposited in burials (e.g. Fekhner 1963; Kivikoski 1965, 27 ff.). The occurrence of such finds, however, may indicate somewhat more complicated symbolism, although it may also have been connected with social status.

*Toggles.* One of the two toggles is wholly preserved; the other was broken at the hole (Fig. 4.3: 1–2). Toggles of pigs' metacarpal and metatarsal bones mostly occur in Estonia among finds from the Final Iron Age and the Middle Ages (e.g. Luik 2001, 14 f.; 2004, 168).

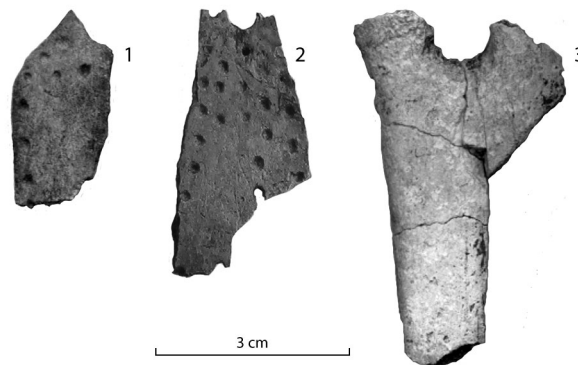
*Bones and bone fragments with working traces.* A small pierced bone is a II or V metapodial of a pig (Fig. 4.3: 3), and may have been used as a pendant. No analogies are known for such bone pendant.<sup>4</sup> A flat bone plaque with small pits and a small matching fragment with similar decoration (Fig. 4.4: 1–2) are made of a thin flat bone. Its edges are broken and it is impossible to establish the original shape of the artefact. This object may also have been a pendant – there is a curve at one of the broken ends of the fragment, probably marking the edge of the hole

<sup>3</sup> Recently Jonuks (2009a, 291 ff.) has analysed this topic more thoroughly.

<sup>4</sup> It could also be a toggle. Toggles were usually made of III and IV metapodials of pigs, i.e. of two larger bones in the middle of autopodium. The small II and V metapodials lie outside these (Fig. 4.3: 4). However, they might be too small and light for toggles.



**Fig. 4.3.** Toggles (1–2) and a small pig bone with a hole (3) from Keava (TÜ 1260 L: 266/272; 1026: 734, 507). Photo by Heidi Luik. Pig autopodium bones (4); Roman numerals mark metapodial bones II–V (drawing after Shmid 1972, pl. XXV).



**Fig. 4.4.** Bone plaque with pits made of a flat bone (1–2) and cattle bone with a hole in it (3) from Keava (TÜ 1026 L: 760; 1026: 806; 1260 L: 191). Photo by Heidi Luik.

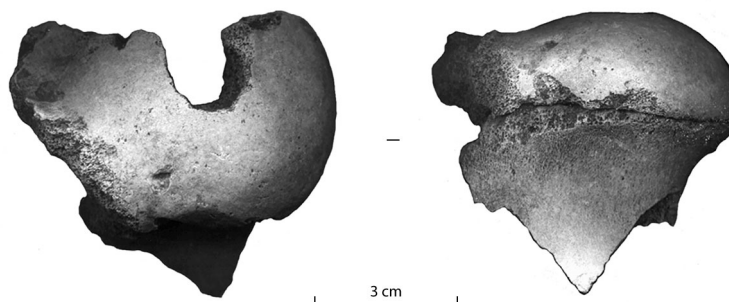
pierced in the artefact. Pit decoration also indicates that the artefact was an ornament. Pit decoration is typical of bone artefacts of the Final Iron Age, for example bone spades, knife- and S-shaped pendants (Luik 2004, fig. 13; 2005, 32; Luik & Tamla 2006, figs 3: 2–4, 5: 1, 6: 1, 7: 1, 8: 1, 9: 1), but it can also be observed on some comb-shaped pendants from the Viking Age (e.g. Luik 1999, figs 3: 4, 4: 2). The pierced cattle bone (Fig. 4.4: 3) is also preserved fragmentarily, and its original shape and function are not known. Working traces can be observed on the smooth surface of a small bone fragment (Fig. 4.1: 5), while other surfaces are eroded. Based on its size, it could belong to the blade of a spade, but owing to the fragmentary nature of the object, it is not possible to state this firmly.

A hole extending to the medullary cavity has been pierced in the distal end of a goat/sheep femur (Fig. 4.5); the other end of the bone is broken. Two interpretations can be offered to explain this. Sometimes handles were made of slightly worked goat and sheep bones; such finds have been dated to the 10th–14th centuries (e.g. Andersen et al. 1971, 208 f., 281; Margeson 1993, 131, fig. 96: 869; MacGregor et al. 1999, 1972, fig. 927: 7059, 7053, 7060). In Estonia one such handle, with slightly smoothed sides, has been found in Tallinn, from the excavation site at 9/11 Roosikrantsi St. (Luik & Maldre 2003, 13). Metacarpal or metatarsal bones were, however, normally used for such handles. As for the broken end of the bone, it remains unclear whether the crack was accidental, or perhaps a part of the broken edge was a result of deliberate shaping. In the latter case the object might be a bone scraper with a chisel-shaped end that may have been used for hide working (cf. Rajando 2002, photo p. 5).

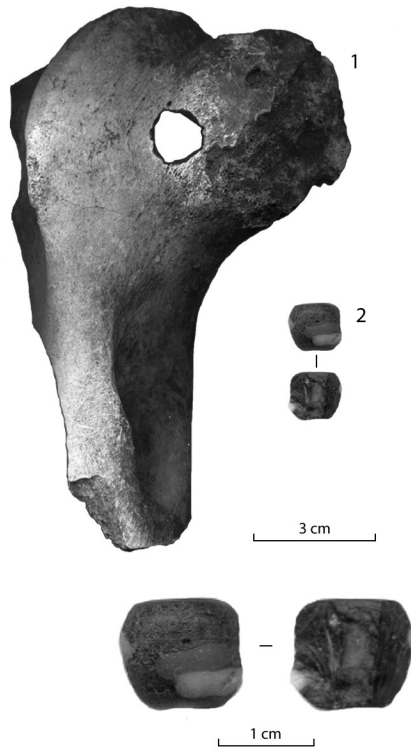
The proximal end of a cattle humerus (Fig. 4.6) is preserved together with the head of a humerus with a round hole (with a diameter of 1.4–1.5 cm) drilled into it. It is possible that it was meant to be a spindle whorl. Hemispherical spindle whorls were mostly made from femur heads, but specimens of humerus heads have also been found (Vedru 1999a, 103 ff.; Luik 2001, 16 f.; 2004, 159, fig. 3). It is possible that the hole in the middle of the spindle whorl was made before the



**Fig. 4.5.** Handle or scraper of a goat/sheep femur from Keava (TÜ 1026 L: 925). Photo by Heidi Luik.



**Fig. 4.6.** The head of a cattle humerus, which was probably intended to be made into a spindle whorl (TÜ 1260 L: 108). Photo by Heidi Luik.



**Fig. 4.7.** Horse femur in which a cavity has been drilled (1). The cavity presumably contained a fragment of a glass bead (2) (TÜ 1026 L: 759). Photo by Heidi Luik.

purpose of the hole is not clear either, but it is interesting to observe that a broken dark brown glass bead with a green and a white spot (Fig. 4.7: 2) was found in the same bone assemblage during the study of faunal remains. Deciding by its size, it can pass through the narrow end of the hole. Liina Maldre thinks it likely that when recovered in the excavation, the bead was in the hole, which was also filled with soil. When the soil later dried up, the bead fell out. It is not known if the bead fragment got into the hole accidentally or if it was placed there deliberately. The diameter of the hole is quite similar to a hole in the presumable blank of a spindle whorl, but it would apparently not be possible to make a spindle whorl from this end of a bone. Perhaps this hole was drilled in order to test a tool on a bone, or to practice drilling. Some bones, presumably used for such purpose, have been found (e.g. Tamla & Maldre 2001, 373, fig. 14; Tvauri 2001, 158, fig. 78: 3; Luik 2005, 33).

A pig canine (TÜ 1260 L: 294) as well as three small bone fragments (TÜ 1260 L: 295; 1026 L: 345, 506) bear traces of cutting that is presumably not related with eating. Two fragments seem to be bone working scrap, and the third may be a fragment of an artefact, but owing to its incompleteness we cannot be sure.

epiphysis was detached from the bone – probably because it was more convenient to hold it that way – and only after the hole was drilled was the epiphysis detached and its edge cut to give it the required regular shape. The bone is broken at the hole; this probably happened in the course of manufacturing, and the artefact remained unfinished. Nevertheless, a spindle whorl could have been made in a reverse order, removing the epiphysis first and then drilling a hole into it. This method of work is suggested for example by a femur head found at Soontagana hill fort: it has been cut off the femur, but the hole has not been drilled (Luik 2004, 159); a similar unfinished artefact was also found at Asva (AI 4366: 1162).

The distal end of a horse femur is preserved with a partly damaged articular surface (Fig. 4.7: 1). A roughly round hole has been made in the bone, with a diameter of 1.3 cm at one side. The other side of the bone is broken, and at the surviving place the diameter of the hole is 2.4–2.6 cm. It is not clear whether or not the hole pierced the bone. The

In comparison with some hill forts of the Final Iron Age (e.g. Otepää, Varbola, Lõhavere, Soontagana; see Maldre 2001; Tamla & Maldre 2001; Luik 2004), the assortment of bone artefacts from Keava is scarce, but there are also hill forts where bone artefacts are few in number or have not been found at all (Luik 2005, table 1; Luik & Maldre 2005a, 273). Some bone fragments with working traces prove that bone artefacts were made in Keava. The few artefacts seem to have been locally made; more complicated objects requiring professional skills have not yet been found in Keava.

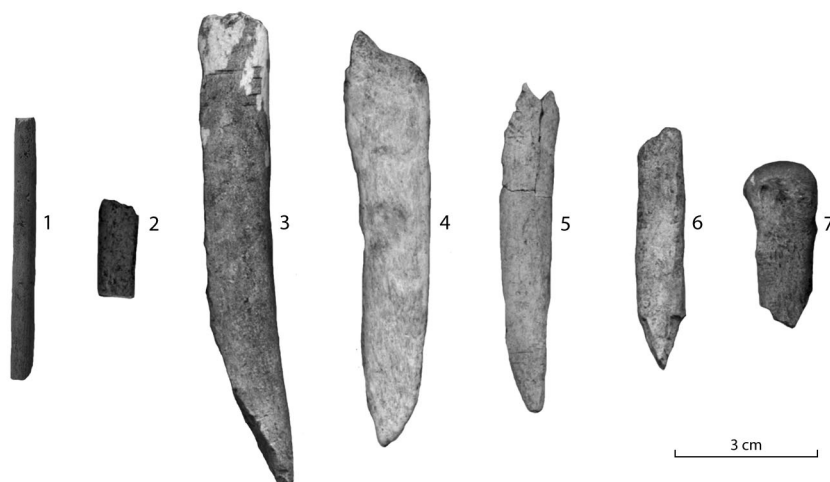
All Keava artefacts are made of bone, and no antler artefacts have been found. In addition, a tooth with working traces has been recovered. Bones can be identified at species level in less than half of the specimens. Only one artefact is made of the bone of a wild animal (hare). Similarly, only 0.7% of all faunal remains from Keava belong to wild animals (chapter 5). All common domestic animals are represented: pigs (four artefacts), horses, cattle and goats/sheep (one artefact each). The unidentified artefacts are most likely made of cattle bones, but they may also be of equine origin. Although the number of finds from Keava is small, thus not allowing any conclusions about preferences in the choice of bones, one may nevertheless assert that the species composition coincides with bone artefacts from the Final Iron Age hill forts, where mostly artefacts made of pig bones can be identified, and bones of wild animals are relatively few in number (cf. Luik 2004, 172 ff., table 3).

### **Bone artefacts from Linnaaluste**

A little over 30 bone artefacts, their fragments and pieces of scrap have been found at the three settlement sites in Linnaaluste. Only a few objects – a pendant of an eagle's talon (Fig. 4.2: 2) and a fragment of a bone pin (Fig. 4.8: 1) from settlement site III and a small round bone bead from settlement site II – were recovered during the excavations. The remaining artefacts and pieces of scrap were discovered by Maldre during the investigation of faunal remains from settlement sites I and III. Since the soil was carefully sieved during the excavations, very small pieces of scrap were also found among the bones. Six points, four knives made from ribs, a couple of unidentified artefact fragments and fifteen pieces of scrap were recovered. These had fallen among faunal remains evidently because the artefacts were either of the type where the natural shape of the bone had been only slightly worked, or they are preserved very incompletely. Considering the small area of the excavations, the number of finds is not so very small. The study of bones from settlement site II brought to light no additional artefacts.

*Points.* A total of seven points and their fragments were found (Fig. 4.8). Various points are one of the most widespread types of bone artefacts – they constitute more than 10% of Estonian bone artefacts from the Late Iron Age (Luik 2005, table 1). The shape and material of the points may vary, and evidently they may also have had different functions. Both ends of the thin bone rod from settlement III are broken (Fig. 4.8: 1). This object was most likely a





**Fig. 4.8.** Bone points from Linnaaluste (TÜ 1114: 444; 1025 L: 152, 220, 164, 193; 1024 L: 55; 1025 L: 164). Photo by Heidi Luik.

decorative pin. Some decorative pins of the same kind have been found at the Viking Age settlement site of Pada (Luik & Maldre 2005a, 266, fig. 9: 1–2). The rest of the points are rather blunt, probably unfinished artefacts or fragments whose original shape is unknown. Three blunt points are made from diaphyses of large long bones (Fig. 4.8: 3–5). Another bone fragment comes from the diaphysis of a long bone; its tip has been sharpened quite carelessly, but apparently this object was not used (Fig. 4.8: 6). Similar blunt points have been found at the Viking Age settlement site of Pada, for example (Luik & Maldre 2005a, figs 5–6), as well as from the hill fort of Tartu. Andres Tvauri (2001, 159 f., fig. 79) has regarded the latter as implements for making bast shoes. A fragment with an oval cross-section (Fig. 4.8: 2) evidently also belongs to a broken point. An epiphysis end of an elk's rudimentary metapodial was found (Fig. 4.8: 7). Such bones were often used in the Viking Age and in the Final Iron Age to make points (e.g. Luik 2004, fig. 5; Luik & Maldre 2005b, figs 15, 23), but in this case the point end of the bone has not survived. Visible working traces prove that the bone was manufactured.

A *pendant made of eagle talon* (Fig. 4.2: 2; Konsa et al. 2003, fig. 4) was among the finds from settlement site III. Two such pendants are known from the cemetery of Pada, both from male burials (Luik 2003, 163 ff., fig. 10: 5; Luik & Maldre 2005a, 269, fig. 19: 4). One more pendant made of eagle's talon was found at the settlement site of Rebala (AI 5916: 93). Jonuks (2005, 48 f.) has suggested that claw pendants, like some other bone pendants, may have expressed social status – that of a fur hunter or trader (see above). It must be recognized, however, that such pendants known in the Estonian archaeological record are made of the talons of large birds of prey, and not from the claws of furry animals.

*Bone knives* (Fig. 4.9) are made of ribs. Working traces are clearly visible on one of the two better-preserved knives; this probably already broke in the course of manufacturing, and was never used (Fig. 4.9: 4). Similar bone knives have been found at the settlement site of Pada (Luik & Maldre 2005a, 265, figs 3–4). Artefacts made of ribs have also been found at the hill fort of Iru. Although some of these may come from a Bronze Age fortified settlement, knife-shaped artefacts most likely date from the Viking Age. No animal species can be identified on the partially preserved knives, but all knives that could be identified to species level were made from cattle ribs (Luik & Maldre in print).

Bone knives were presumably used for leatherworking (Vassar 1939, 92; Tamla 1983, 306). John Cherry (1991, 296), who has studied medieval leatherworking in England, has asserted that to tan a hide

... the hair or grain side was scraped with a blunt single-edged knife and the flesh side with a sharper two-edged fleshing knife.

Although bone scrapers, including those made from ribs, can be used to flesh a hide (e.g. Christidou & Legrand 2005), one may presume that iron tools were preferred for this work in the Viking Age. It seems likely that bone knives, which were certainly blunter than iron ones, were used to scrape hair off a hide during the tanning process. This has also been confirmed by a written source (although it dates from the 16th century), *The Plichto of Gioanventura Rosetti*, which teaches the dyeing of textile and leather (Edelstein & Borghetty 1969). In the section that describes the tanning of hides, the author writes:

To tan skins of kid or any other kind [...] put them over the trestle with the hair side upwards and [dehair them] with a rib of ox, that is with a bone, because with a knife you might tear them (Edelstein & Borghetty 1969, 173; MacGregor et al. 1999, 1913).

Ribs probably used for this purpose are known from York, for example (MacGregor et al. 1999, 1913), but most of them are only fragments. The specimens from York depicted in the drawings (op. cit., fig. 879) are not shaped like knives as were the Estonian Viking Age bone knives. Rib fragments resembling



**Fig. 4.9.** Fragments of rib knives from Linnaaluste (TÜ 1114 L: 91; 1025 L: 213/227; 1115 L: 84, 55). Photo by Heidi Luik.

the finds from York, some of them with indented edges (op. cit., fig. 879: 6717, 8125), have also been found in Novgorod (e.g. НИАМ 17214/A62-161; НГМ 28080/A57-204, 205). In the Estonian ethnographic record it is known that wooden scrapers were also used to dehair hides (Rajando 2002, 7). Thus we can presume that bone knives were used to process animal hides, evidently to dehair them during tanning. Tanned hides may have been one of the main trading items in Viking Age centres, and they were certainly required for the manufacture of footwear, sheaths and scabbards, straps and belts, etc. In prehistoric archaeological sites, including Viking Age ones, leather artefacts are usually not preserved. Since leather artefacts have not been found at these sites, it is not known what the level of leather-working was and if leather artefacts were also trading items.

It must be mentioned that three of the four bone knives found at Linnaaluste (Fig. 4.9: 1, 3, 4) were recovered from settlement site III, which was a small site where slag was also found. Therefore it has been suggested that the site was meant for activities where there was a high danger of fire (a smithy and a place for bronze casting), located at a distance from the main settlement (chapter 3). If the bone knives were related to leather-working, one may presume that, since tanning is connected with a distinctive and unpleasant smell, it was probably kept away from the main settlement. It seems likely, however, that the tanning stench only presented a problem in the case of extensive activities (e.g. Cherry 1991, 296 ff.; Bartosiewicz 2003, 180 ff.).

*The round bone bead* (TÜ 1228: 23) from settlement site II can be dated to the Middle Ages, and analogies to it can be found in medieval Lihula (Luik 2002, 324, fig. 18), the manor complex of Keila (HMK 1155: 41, 147, 149, 150) and other medieval sites. The above-mentioned bead is the only bone artefact to be found at this site.

*Bone and antler fragments with working traces.* One of the fragments (Fig. 4.10: 1) is from the tarsal bone of a horse, which bears working traces, but it is not clear



**Fig. 4.10.** Bone fragments with working traces from Linnaaluste (TÜ 1025 L: 181, 5, 161 (3 fragments), 240, 144, 128, 164 (2 fragments); 1115 L: 67). Photo by Heidi Luik.

what it was meant to be. In addition, ten larger and smaller bone fragments with cutting traces were found (Fig. 4.10: 2–8), which could not be identified to species level. The find of some antler chips (Fig. 4.11) is worth mentioning (cf. Ulbricht 1978, pl. 23; Luik 2005, 30 f.). Such small pieces of scrap were discovered thanks to careful sieving of the soil. Similar antler chips have also been found in relatively large numbers from the Castle of the Teutonic Order in Viljandi (VM 10922 and 11041, excavations of 2003 and 2004; Haak 2007, 48, fig. 3), where soil was also sieved. The absence of such finds in earlier archaeological records is most likely connected with the excavation methods that were used (the soil was not sieved) or choices in picking up the material (larger and better preserved bones that could be identified were gathered).



**Fig. 4.11.** Antler chips from Linnaaluste (TÜ 1025 L: 188, 83; 1115 L: 98, 126, 103). Photo by Heidi Luik.

The bone working scrap we found indicates that bone and antler artefacts were manufactured in the settlement sites, although presumably not in large quantities. The number of artefact types is also small – most of the finds only represent points and bone knives. All finds are quite simple artefacts. The only tools used in manufacturing bone artefacts were a knife and axe.

Only a few bones could be identified to species level. One presumable point is made of elk bone, and five small antler chips were also found, but no antler artefacts have come to light. One pendant is made of an eagle's talon. The rest of the artefacts are made of bones, mainly unidentified long bones and ribs. The latter most likely belong to cattle. One fragment with working traces is an equine tarsal bone; others are too fragmentary and cannot be identified. Hence the use of bones of wild animals could be established in seven cases (about a quarter of artefacts), but one cannot rule out the possibility that some unidentified fragments may also belong to elk. The situation in the settlement of Pada was approximately the same: in about 1/3 of the cases, bones of wild animals (mainly elk antler) were used (Luik & Maldre 2005a, 272 f., table 1). In the contemporaneous site of Rõuge, however, artefacts and scraps of bones of wild animals (particularly elk antler) prevail overwhelmingly (Luik & Maldre 2005b, table 1). This is undoubtedly caused by the greater importance of hunting, which is reflected by the high percentage of wild animal bones among the faunal remains from Rõuge (Aun 1992, table 6; Luik & Maldre 2005b, fig. 3).

In Linnaaluste the majority of bone artefacts and scrap was found among faunal remains, and in Keava the amount was a little more than half. This fact suggests that in the case of sites where faunal remains have not been investigated by archaeozoologists, many bone artefacts and scrap have not been discovered.

In addition, as has already been emphasized, the careful collection of finds by sieving the soil is important. It has been suggested that unless soil is sieved and faunal remains studied, about 30% of bone artefacts may be lost (cf. Luik 2003, 159; Choyke 2005, 133; Kunst 2007, 15).<sup>5</sup> Linnaaluste can be compared with two sites, Pada and Tornimäe, where bone artefacts generally resemble those of Linnaaluste. Finds from Pada included 28 bone artefacts, and another 44 were discovered among faunal remains (Luik & Maldre 2005a, 264). In Tornimäe only a few bone artefacts and bone fragments with cutting traces were recovered in the course of excavations (Mägi 2005, 71 f., 75) but in investigating the faunal remains, Maldre discovered 29 fragments of bone artefacts and scrap. Thus it seems that at the sites where most of the bone artefacts are plain, slightly worked objects, the percentage of artefacts and scrap that went unnoticed during the excavations may be even higher than the above-mentioned 30%.

### Conclusions

The Keava and Linnaaluste sites are near to each other, but they belong to different periods and different types. In Linnaaluste there are open settlements, whereas in Keava there is a hill fort. Comparing the finds from the hill fort and the settlements, one can observe that antler working scrap is only found in settlements I and III. In Estonia, antler artefacts and scrap are generally found in larger numbers at earlier, Viking Age sites; among the material from the Final Iron Age, antler is rarer. Although finds are mostly quite fragmentary and not numerous, one can observe that the finds recovered from settlement sites I and III at Linnaaluste are characteristic of the Viking Age, particularly in northern and western Estonia, while artefact types recovered from the Keava hill fort have analogies among the finds from many hill forts of the Final Iron Age, as well as from contemporaneous settlement sites. Neither bone artefacts nor scrap were found at settlement site II, which was dated to the Final Iron Age and Middle Ages, except for a bone bead, which was apparently not locally made. Concerning Estonia in general, it can also be said that only a few bone artefacts have been found in medieval rural settlements, and these have been evidently manufactured in towns.

What can one say about the occupations and everyday life of people on the basis of bone artefacts? Nearly half of the finds are bone working scrap or fragments with working traces, indicating local bone and antler working. Most of the artefacts were also presumably made on the spot. Based on the relatively random choice of bones, the level of bone working and the number of artefacts and scrap pieces,

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<sup>5</sup> According to Terry O'Connor (2001), sieving increases not only the number of recovered bones but also the information gained from them. At the same time it causes some problems too: a large amount of tiny unidentifiable fragments is collected, as well as material not connected with human occupations (frogs, mice, etc.). O'Connor suggests that sieving has "got ahead" of the development of methods of analysis, hence problems may arise with the quantification of material, and the labour input increases considerably.

both in the Viking Age settlements of Linnaaluste and the later hill fort of Keava, bone working was on the level of a domestic craft, and necessary artefacts were made by those who used them (cf. Luik 2005, 44 ff.).

Most of the raw material comes from the bones of domestic animals, which were also prevalent in the diet of the local population (chapter 5). Of the worked bone material, only two pendants – the astragalus of a hare and an eagle's talon (Fig. 4.2) and a fragment of an awl made from elk metapodial (Fig. 4.8: 7) indicate that hunting was still practiced. Bone working scrap from Linnaaluste also includes a small amount of fragments of elk antler, but it is not possible to establish whether the antler had been shed or belonged to a slaughtered animal on the basis of these tiny fragments. Apart from antler fragments and elk bone with working traces, faunal remains from Linnaaluste include a few elk bones without working traces; beaver bones are slightly more numerous. In Keava, bones of wild animals are represented by only a few hare, fox and beaver bones (chapter 5).

The bone artefacts that were found also suggest some other occupations than bone working, animal husbandry and hunting. Among these, leather-working must be mentioned – rib knives (Fig. 4.9) recovered from the Viking Age settlement sites of Linnaaluste and perhaps also the artefact made from a goat/sheep femur (Fig. 4.5) recovered from the hill fort could be related to it. Bone points (Fig. 4.8) may have been used in leather working, but they may also have been implements for bast weaving. The blank of a spindle whorl from the hill fort, made from the head of a cattle humerus (Fig. 4.6), points to spinning. No doubt, artefacts made of leather, birch bark and textiles, which are usually not preserved, were in daily use. In addition to these practical tools, a few objects were found that probably possessed some other meaning. The bone pendants (only two of which have been found here; Fig. 4.2) evidently had some symbolic significance. Toggles (Fig. 4.3: 1–2) have also sometimes been regarded as magic objects, but perhaps, as in historical times, they were just children's toys.