Sari Mäntylä-Asplund & Jan Storå

ON THE ARCHAEOLOGY AND OSTEOLOGY OF THE RIKALA CREMATION CEMETERY IN SALO, SW FINLAND

Abstract

The Rikala cremation cemetery under level ground was partly excavated in the 1970s and dated on the basis of a few finds to the Merovingian Period (AD 550/600–800). This paper presents a renewed investigation of the cemetery material. In addition, it was possible to carry out an osteological analysis of the bone material. The analysis shows that most of the burnt bones belonged to animals while the number of human bones was limited. The identified species include sheep (sheep/goat), dog and bear. One bone of cattle was also identified. Three radiocarbon dates indicate a much older and longer use of the cemetery area than previously suggested. This leads to a discussion on the interpretation of the site at Rikala and on general difficulties in our understanding of cremation cemeteries under level ground.

Keywords: cemetery, cremation, Finland, Iron Age, osteology, radiocarbon dating

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INTRODUCTION

Rikalanmäki is situated in the Halikko area, within the present town of Salo in southwestern Finland (Fig. 1).[1] It is a rocky ridge-shaped hillock on the western side of the Halikonjoki River. The Rikalanmäki area is also known with the shorter name Rikala, according to a village already known from medieval documents. In addition to a hillfort,[2] the best-known archaeological site in Rikala is an inhumation cemetery, the main part of which was excavated in the 1950s by the archaeologist Jorma Leppäaho. On the basis of artefacts, the cemetery was in use from the end of the Viking Age until about AD 1200, and it has been regarded as one of the richest Late Iron Age cemeteries in Finland.

In this article, the focus is not on the famous inhumation cemetery but on trial excavations carried out by the University of Turku in the 1970s, conducted by Kimmo Seppänen. During these investigations, several areas were excavated in different parts of Rikalanmäki. Indications of settlement activities from different periods were discovered. The most interesting observations, however, were made in so-called area VII, from which traces of a cremation cemetery were found. This excavation trench covered an area of approximately 56 m^2 (18 m x 2–6 m).

The burial site identified in area VII has been interpreted as a so-called cremation cemetery under level ground (Fi. *polttokenttäkalmisto*)[3] and it has been dated according to artefacts to the Merovingian Period (AD 550/600–800) (Seppänen 1978; see also Hirviluoto 1992: 62–4). The cremation cemetery under level ground was the predominant type of cemetery in Finland during several centuries of the Late Iron Age (Wickholm 2005: 32). Wessman (2010: 33, 67) reports over 250 cremation cemeteries of this type in Finland. This form of burial is commonly known from the regions of Finland Proper, Satakunta, Southern Ostrobothnia, Häme, western Uusimaa, Savo and Karelia (Wickholm 2008: 90). The early stages of this cemetery type already date from the Early Iron Age, but it became more widespread during the Merovingian Period (Wickholm & Raninen 2003: 4–5 with references; Wessman 2010: 30). Cremation cemeteries under level ground are also known from Estonia, the Karelian Isthmus in present-day Russia and the Curonian peninsula in Latvia (Mägi 2002: 24; Wickholm 2005: 32; 2008: 90; Wessman 2010: 19).

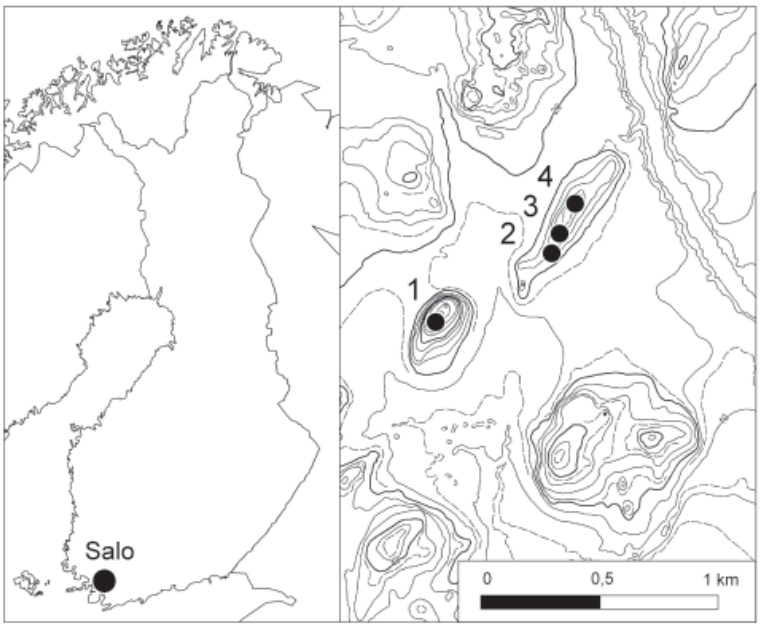
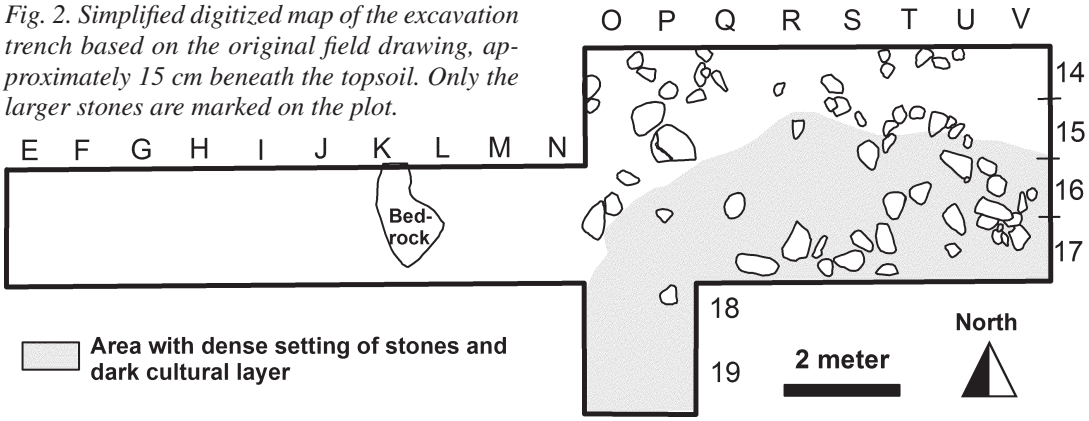


Fig. 1. The location of Salo and some main sites of the Rikala complex: 1) hillfort, 2) cremation cemetery, 3) finds from probable inhumation graves and 4) inhumation cemetery.

In the case of the Rikala, the primary interpretation of the site as a cremation cemetery under level ground was made according to features regarded as typical of this cemetery type (regarding the definition, variants and typical features of the type, see e.g., Kivikoski 1966: 51–2; 1967: 91–2; Wickholm 2005: 32–3; 2008: 90; Wickholm & Raninen 2006: 150–3; Wessman 2010: 19–22; see also Taavitsainen 1992).[4] There were no traces above ground, but there was a stone-setting under the turf layer. There were several layers of stones, and finds associated with the cemetery were recovered mainly in the eastern part of the trench. The cultural layer in this part of the area was up to half a metre thick. The soil between the stones was dark, stained with charcoal and soot, and finds of pottery, bronze and iron as well as burnt bone were recovered. The soil in the western part of the trench was sandier and contained fewer stones (Fig. 2).

Bones and artefacts appeared to be scattered throughout the area. There were, however, some concentrations of bones and artefacts in areas of darker soil – these were interpreted as individual burials. The clearest one was in excavation square Q17 where most of the glass beads and a fragment of a brooch were found. This square also contained the largest amount of bone. Although the stone setting was mainly unstructured, some of the stones seemed to form circular features (Fig. 3). Not all of them, however, were complete. While there were no distinct find concentrations in

Fig. 2. Simplified digitized map of the excavation trench based on the original field drawing, approximately 15 cm beneath the topsoil. Only the larger stones are marked on the plot.



the middle of the possible structures, there were nonetheless burnt bones and artefacts in nearby locations. Although circular features of stone in cremation cemeteries under level ground are not common, they have been found in some cases (see e.g., Söyrinki-Harmo 1996a; Wickholm & Raninen 2003: 5; Pälikkö 2009: 88).

It is evident that the cemetery was larger than the excavated area. Furthermore, parts of the cemetery area have most probably been destroyed in later construction work. Some later disturbances were also noticed within the research area. It is, however, very difficult to estimate the original size of the site, since a great deal of information is lacking. In his excavation report, Kimmo Seppänen (1978) assumes that the cemetery was not extensive (even if he does not give any explicit figure for its size). The interpretation is based on data from the main trench as well as test-pits and the topography. Seppänen may well be right; the cemetery seems to be situated on a terrace on the slope of the ridge. According to the excavation data and other observations, a rough approximation could be that the area of the site would not have exceeded 200–300 m^2.[5] Since the excavated area was only 56 m^2, the following results should be treated as a sample of a larger entity. Nonetheless, they can provide some interpretations regarding the cemetery. The main aim of this article is, however, to give an example of the difficulties of interpretation of cemeteries under level ground and to stress the importance of osteological analysis and radiocarbon dating.

ARTEFACTS

Most of the finds came from the area where the stone-setting was densest and the sooty soil layer was thickest. The majority of the metal artefacts – pieces of melted bronze and corroded iron – are in such poor condition that it is impossible to know what they were originally. It is possible, however, to identify and date some artefacts.[6] For example, a piece of an equal-armed brooch, typical of the Merovingian Period (TYA 105:274; cf. Kivikoski 1973: Abb. 399–401; Lehtosalo-Hilander 1982: 86–9) was found together with glass beads in square Q17. As mentioned above, these finds, together with bones found nearby, were interpreted as representing an individual female burial.

There were at least more than 20 glass beads or parts of them, but their exact number remains

Fig. 3. Stone-setting in the Rikala cremation cemetery. Some of the stones seemed to form circular features. Photograph by Kimmo Seppänen / University of Turku, Department of Archaeology.

unknown because of the poorly preserved and fragmentary material. One of the better-preserved finds is half of a large bead with monoframe circular eye decoration (TYA 105:282; Fig. 4). Beads of this type have been found, for example, also in Vöyri and Köyliö where they date from the Merovingian Period (Cleve 1943: 87, Pl. 26; Kivikoski 1973: Abb. 501; Lehtosalo-Hilander 1984: 292). In the material from Vöyri there are also smaller beads with eye decoration or a knot without a frame. There may be a similar item among the Rikala beads (i.e. the poorly preserved bead TYA 101:275). Beads with eye or knot decoration, however, have also been found in younger contexts (see e.g., Callmer 1977: 85; Lehtosalo-Hilander 1982: 139). In addition, one blue rectangular bead with roughly cut corners from Rikala (TYA 105:284; Fig 4) may be of a type within Callmer's (1977: 80) group An, which contains blue beads of several forms regarded as most common during the period AD 790–820.

One of the identifiable finds is a so-called pyramid-shaped pendant (TYA 105:327; Fig. 4), which belongs to the suspension system of a sword. These pendants are usually found in pairs, from both sides of the hilt. This artefact type presumably arrived in Finland via the Frankish weapon trade and it is also known from Central Europe (Luoto 1985; see also Hirviluoto 1992: 64). The pyramid-shaped pendant is the only verified find belonging to weaponry, as actual weapons were not found. The only blades are two fragments of knives (TYA 105:194, 198).[7] The lack or scarcity of weapons is interesting, because in many Merovingian Period cremation cemeteries under level ground there is an increasing number of weapons and some find clusters of weapons have been interpreted as individual burials (e.g., Söyrinki-Harmo 1996a; Wickholm & Raninen 2003; Raninen 2005; Wickholm 2005: 35; Wessman 2010: 62–4). It is, of course, possible that there still could be burials with weapons in some yet unexcavated part of the cemetery.

Almost 30 iron rivets were found in excavation area VII. They may indicate the cremation of the deceased in a boat on a pyre. The iron rivets exhibited a slightly more dispersed pattern than the other find categories (Fig. 5). The number of rivets is not very large, but a boat burial is nonetheless a possibility – it is difficult to estimate the size of the boats or the amount of rivets in a single boat. It is also possible that parts of a boat were used as firewood or that the rivets are from other wooden artefacts (Lehtosalo-Hilander 1984: 282; Raike 1996: 19; Söyrinki-Harmo 1996b: 67; Wessman 2009: 31). Other minor artefact groups were pieces of burnt clay and fragments of loom weights.

The largest category of finds was ceramics. About 7.5 kg of ceramics were found altogether and the largest amounts were recovered in the same areas as the densest agglomeration of stones, bone, glass beads and bronze finds occurred (Fig. 6). Most of the potsherds were undecorated and they represent a type of coarse ceramics that was already in use during the Late Roman Iron Age and remained in use until the Middle Ages (Carpelan 1979: 10–11; Pihlman 2003; Enqvist 2005). The wall thickness and colour of the pots varied.

Fig. 4. Glass beads (TYA 105:282, TYA 105:284) and a pyramid-shaped pendant (TYA 105:327) from the Rikala cremation cemetery. Photograph by Sari Mäntylä-Asplund.

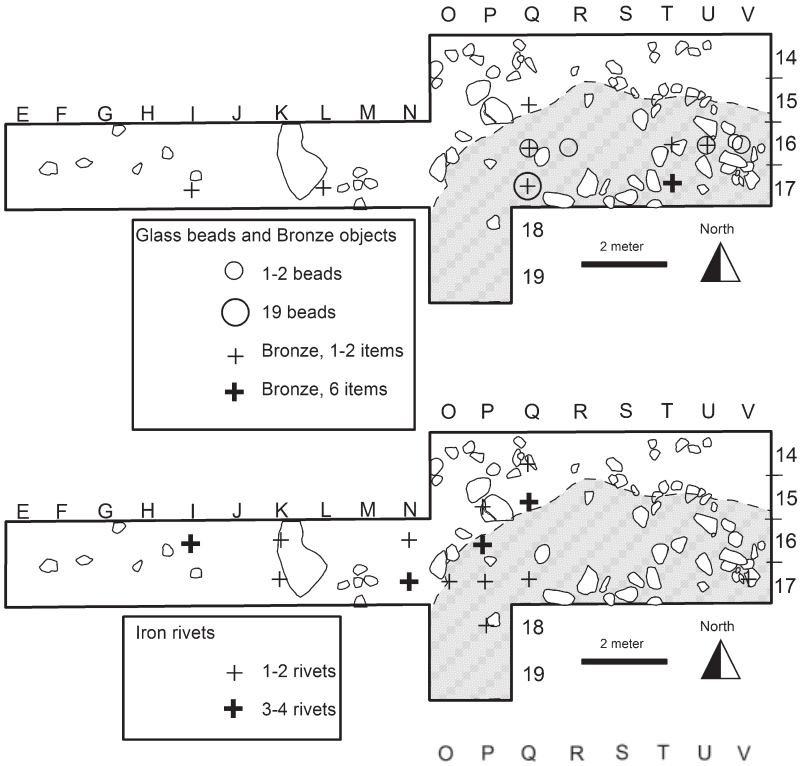


Fig. 5. Distribution of glass beads, bronze objects and iron rivets.

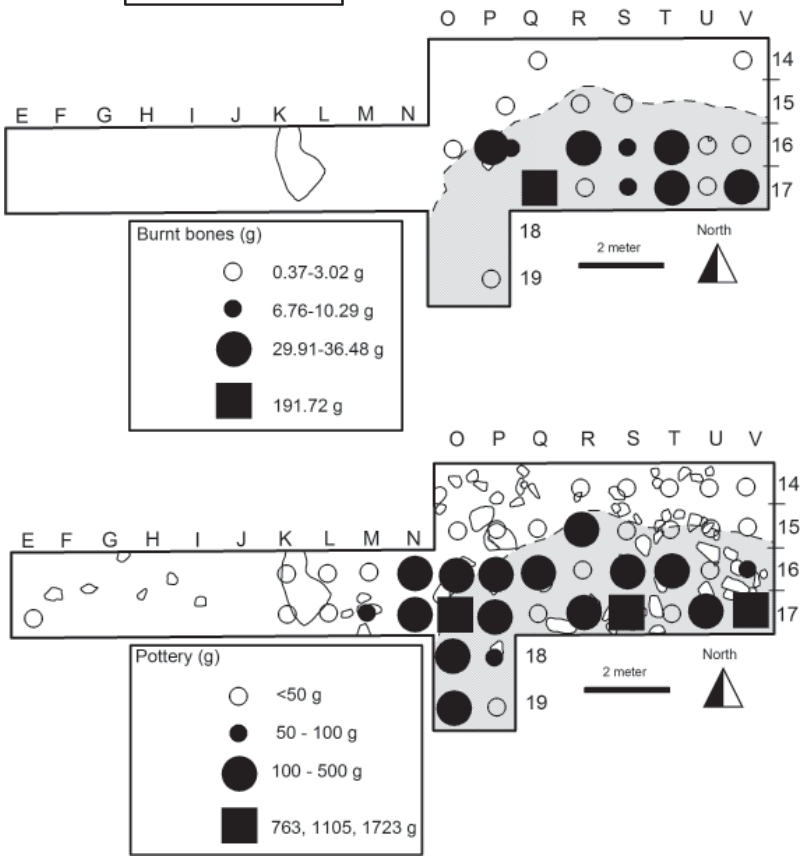


Fig. 6. The distribution of burnt bones (upper) and ceramics (lower). The location of most of the ceramics and bones was documented only with reference to excavation square and level.

Fig. 7. Decorated ceramics (TYA 105:184b, TYA 105:185c, TYA 105:186c, TYA 105:195b, TYA 105:229b, TYA 105:359) from the Rikala cremation cemetery. Photograph by Sari Mäntylä-Asplund.

A number of decorated potsherds were found (Fig. 7), with cord impressions on some of them. This type of decoration appears in Iron Age pottery from as early as the Late Roman Iron Age (Carpelan 1980: 191), although it became common much later. In many cremation cemeteries in western Finland cord-impressed ware has been found; the use of these cemeteries covers the period from the Migration Period or the Merovingian Period into the Viking Age (Hirviluoto 1996: 74; see also Kivikoski 1939: Pl XXXVIII:4, 9). Because of the long period of use, a precise dating is not possible. According to Hirviluoto (1996: 74), this type of decoration did not become widespread in Finland until the Merovingian Period. Cord-impressed ceramics from the Merovingian Period have been found, for example, in the cemeteries of Vanhakartano in Köyliö, Vainionmäki in Laitila and Luistari in Eura. In the area of the Aurajoki River valley in southwestern Finland this type of decoration has been dated from the Merovingian Period to the 11th century (Kivikoski 1939: 199-200, Pl XXXVIII:4, 9). According to Lehtosalo-Hilander (1982: 79; 2000: 208), as a whole, cord impressions are a common element of decoration in Viking Age vessels.

The most typical decoration of the Rikala vessels consists of two or three horizontal scored lines. There is also a sherd in which the scored lines form a pattern of horizontal lines in combination with oblique lines in between (TYA 105:229b). A similar piece has been found in the Merovingian Period cemetery of Vainionmäki in Laitila (KM 24834:116). Horizontal scored lines already occur in the Merovingian Period but the use of such decoration continues into the Viking Age (Kivikoski 1973: Abb. 651). In the Rikala vessels, both cord impressions and scored lines are found immediately below the rim, which is a typical feature of Merovingian Period vessels (Lehtosalo-Hilander 2000: 208; see also Kivikoski 1973: Abb. 653). In a couple of sherds from Rikala, there are also wavy or zigzag lines. Such decoration elements came into use at the turn of the Merovingian Period and the Viking Age but, for example, in the Luistari cemetery they occur only in the Viking Age (Kivikoski 1939: 200; Lehtosalo-Hilander 1982: 79).

An interesting feature in trench VII was the occurrence of striated ceramics, found somewhat deeper than other artefacts. In addition the striated surface, some potsherds also had pits as elements of decoration. This pottery resembles so-called Morby Ware, a type of ceramics dated mainly to the Pre-Roman Iron Age (500–1 BC) and the beginning of the Roman Iron Age (on the dating of Morby Ware, see Asplund 2004; 2008: 210–31). Some of it was brick-red which might indicate that it had been re-fired or that the original firing process had been special in some way (Asplund 2008: 225; Asplund et al. 2008: 42). Most of these sherds were found in a dense concentration, mainly in a single square, which suggests that they are all from one vessel. In addition, there were two pieces – probably from different vessels – with decoration on the top of the rim. This feature of decoration is most common during the Early Iron Age (Asplund 2008: 211).

According to the ceramics, it is thus clear that the site of the cremation cemetery under level ground with mainly Merovingian Period artefacts had an earlier stage of use. However, except for the striated ceramics no other artefacts dating from the Early Iron Age were found. When interpreting the situation, one possibility is that the Early Iron Age pottery could, at least in principle, indicate a settlement site. This could still have been of importance during the later stage of the Iron Age when the location of the cremation cemetery under level ground was chosen (for a similar discussion, see Wickholm & Raninen 2003: 4; Wickholm 2008: 92). On the other hand, one could just as well assume that the location had been ritually significant long before the Merovingian Period. Whether or not the site still remained in use after the Merovingian Period remains unclear. Apart from the ceramics and beads of types that remained in use in the Viking Age there is no distinctive dating to the Viking Age.

OSTEOLOGICAL ANALYSIS

The aim of the osteological analysis was to examine in detail the depositional patterns of the bones and their (spatial) association with the other finds. The analysis also permits a comparison of the material with results from other cremation cemeteries. During the excavations, approximately 400 g of burnt bones were recovered. Almost half of the amount of bones (according to weight) was recovered from square Q17 (Table 1). Six squares contained more than 20 g of burnt bones. There is also variation in the distribution of burnt bones among the excavation layers.

Where possible, each bone fragment was identified by species or group of species, element, part of element and side. Criteria for ageing or sexing were also noted, where possible, following standard osteological methodology (e.g., Holck 1986; Buikstra & Ubelaker 1994 for human remains and Boessneck 1969; Silver 1969; Habermehl 1975 for faunal remains). The preferred method of quantification was the number of identified specimens (NISP). All bone fragments that could be identified were counted and most of them were also weighed individually. The undetermined specimens were not counted individually. The minimum number of individuals (MNI) of each species was estimated (e.g., Lyman 1994).

The burnt bones are highly fragmented and exhibit a white or light grey colour indicating that they had burnt at temperatures as high as above 650/700 degrees Celsius. Three fragments, two human and one from a medium-sized mammal, exhibit a more greyish colour indicating that they were burnt at slightly lower temperatures. However, in general the material can be characterized as rather homogeneous.

A total of 158 bone fragments were identified by species or group of species. This corresponds to ca. 34 % of the weight. Bones of medium-sized mammals predominate in the assemblage. The most common species are sheep (*Ovis aries*) (including fragments from sheep/goat and sheep/goat?) followed by dog (*Canis familiaris*) and brown bear (*Ursus arctos*) (Table 2). One bone of cattle (*Bos taurus*) was identified. This has to be considered as the minimum number of species since some squares that only contained bones from medium-sized mammals in fact may contain several species.

Bones were recovered from twenty different excavation squares, all of them in the eastern part of the excavation trench. Half of the squares contained bones of one species only while seven squares contained bones of at least two different species (Table 1). The anatomical distribution was investigated using six anatomical regions:

Table 1. The amount of bones in each 1 m² excavation square by weight, and the number of different species and anatomical regions identified.

Square	Level	Sp. *N*	AR *N*	Total (g)
Q14	15–20	1	x	0.59
V14	c. 20	1	x	0.37
P/Q15	20–30	1	x	2.06
R15	30–35	1	1	2.40
S15	c. 30	1	1	0.61
O16	30–40	1	2	1.47
P16	30–35	2	5	31.39
P/Q16	20–40	2	4	10.29
R16	25–45	3	5	36.48
S16	25–30	2	1	6.76
T16	15–40	2	5	35.96
U16	25–30	2	1	2.49
V16	15–30	1	x	0.57
Q17	30–50	2	5	191.72
R17	20–40	1	1	0.55
S17	25–45	3	2	8.92
T17	15–35	2	4	29.91
U17	15–25	1	2	3.02
V17	15–30	4	4	33.13
P19	10–15	1	2	1.69
Total				400.38

Key: Sp.= species, AR= anatomical regions, x= only long bones identified

the cranium, vertebral column, rib cage, front and rear extremities and the hand/foot. A high number of species in a square is not always related to a high number of different anatomical regions. Several anatomical regions of sheep and dog are represented while the other species exhibit a more restricted distribution. In Iron Age cremation graves in Sweden most often horse and dog (and humans) are found complete, while only selected body parts of cattle, sheep/goat and pig are found (Iregren 1972; Sigvallius 1994). At Rikala brown bear is represented only by toe or finger bones.

Human bones

Somewhat surprisingly only thirteen human bones were identified in the material. They were found in three different excavations squares (Table 2). Two of the areas do not coincide with larger concentrations of other archaeological finds or the largest concentrations of burnt bones. Cranial fragments (including maxilla and teeth) were recovered in all three areas. Other anatomical parts are represented in excavation squares R16 and V17. There may be some human bones also among the unidentified specimens in square V17.

The cranial fragments and a fragment probably from the upper arm (*Humerus?*) are from an adult individual. The finger bone is also from an adult. The high level of fragmentation hinders observations of criteria that would reveal information on the age or sex of the individuals. The human bones may be from the same individual. The finger bone in R16 and the upper jaw (maxilla) in P/Q16 exhibited a greyish or brownish colour, which indicates that they did not burn at the same temperatures as the other fragments that display a whiter colour. The human bones were recovered together with animal bones in all the squares in question (see Table 2).

The small amount of human bones in each of the excavation squares shows that the bones were apparently scattered throughout the cemetery area. The bones in adjacent squares P/Q16 and R16 were recovered at a slightly deeper level than those from square V17. The distance between these two areas is approximately five metres. Possibly they represent (at least) two different depositional events. The possibility should also be taken into account that bones from one individual could have been buried in several places within the same cemetery (Wickholm 2008: 90). The excavated area, however, does not seem to contain any spatially restricted deposition of larger amounts of burnt human remains. In fact, the larger concentrations seem to contain bones of animals. Most human bones were identified outside areas exhibiting larger concentrations of burnt bones, which had been interpreted as burials during fieldwork.

The amount of human bones is very small even considering the excavation area. The small amount of human bones is not exceptional – the

Table 2. Identified species in the excavation squares, NISP.

Square	Human/?	Cattle	Sheep	Sheep-goat/?	Dog/?	Brown bear	Mammal[1]	Total
Q14	–	–	–	–/–	–/–	–	1	1
V14	–/–	–	–	–/–	–/–	–	1	1
P/Q15	–/–	–	–	–/–	–/–	–	9	9
R15	–/–	–	–	1/–	–/–	–	2	3
S15	–/–	–	–	–/–	–/–	–	3	3
O16	–/–	–	–	2/–	–/–	–	3	5
P16	–/–	–	–	12/–	–/–	3	–	15
P/Q16	1/1	–	–	2/–	–/–	–	42	46
R16	6/–	–	1	4/–	–/–	1	–	12
S16	–/–	–	–	–/–	–/–	4	9	13
T16	–/–	–	–	–/–	6/18	2	–	26
U16	–/–	–	–	–/–	–/–	1	10	11
V16	–/–	–	–	–/–	–/–	–	5	5
Q17	–/–	–	7	54/–	–/–	4	10	75
R17	–/–	–	–	–/–	–/–	1	–	1
S17	–/–	1	–	1/–	–/–	1	31	34
T17	–/–	–	–	12/1	–/–	2	43	58
U17	–/–	–	–	–/–	–/–	–	39	39
V17	3/2	–	–	1/–	2/–	1	–	9
P19	–/–	–	–	1/–	–/–	–	1	2
Total	10/3	1	8	90/1	8/18	20	209	368

[1)] Middle-sized

same phenomenon occurs in other cremation cemeteries as well. It seems evident that all the bones were not taken from the pyre to the cemetery. It has been assumed that bones could have had other ritualistic uses or that bones could have been divided and deposited in several different locations. It might be that small amounts of bones symbolized the deceased or that only some of the corpses were burnt and brought to the cemetery. Maybe some other ritual was more meaningful than bringing the bones to the cemetery (see e.g., Kaliff 1992: 120–1; 1997: 90–7; Heikkurinen-Montell 1996: 96; Pihlman 1999: 65; Wickholm & Raninen 2003: 4; 2006: 159–60; Wessman 2010: 53–4). It should also be taken into account that there are a number of potential taphonomic reasons affecting the amounts of bones in the cemeteries (Wessman 2010: 55).

Sheep and sheep/goat bones

A total of 99 bones from sheep *(Ovis aries)*, sheep/goat *(Ovis aries/Capra hircus)* and sheep/goat? were identified from 10 different squares. Eight bones were identified as sheep and one as sheep/goat? However, most probably squares that contained bones from a medium-sized mammal only in fact also contain bones from sheep/goat. Seven of the squares contained between one and five bones, two contained 12–13 bones and one (Q17) contained 61 bones from sheep/goat. Sheep bones (including sheep/goat) were recovered together with human bones in three excavation squares, that is, in all squares where human bones occurred (Table 2). The minimum number of individuals of sheep/goat is three on the basis of three different proximal parts of right radii recovered in square Q17 (two individuals) and P16. These individuals are all older than 10 months (Silver 1969). For one of the individuals this is the closest age estimate possible. However, other bones indicate that one individual is younger than 3–3.5 years of age while another is older than 4–5 years of age.

Bones from all major anatomical regions of sheep/goat occur in the cemetery area. The three squares that were richest in sheep bones contained bones of at least four different anatomical regions. Five squares contained bones from one anatomical region only. Bones from the hand and/or foot were identified in eight squares while cranial fragments only in one. However, this is most probably misleading because of identification bias. The smallest cranial fragments have probably been identified as medium-sized mammals. There is an interesting difference in frequency between the front and rear extremities. This difference is also visible for bone fragments from the hand and foot: 22 bone fragments could be assigned to the hand or the foot – 18 of these are from the foot. It may be noted that no bones of the hand were identified with certainty in other squares than Q17. In this square, four specimens from the hand were identified while nine are from the foot. The bone fragments from the foot appear to exhibit a slightly more dispersed spatial distribution than the bone fragments from the hand. This pattern is also notable for the front versus the rear extremity.

Although all anatomical regions are present, their relative representation is difficult to estimate. However, considering the anatomy of a complete animal, the cranium, vertebral column and ribs seem to be underrepresented. The difference in anatomical representation between the squares indicates that there is some level of difference in the depositional patterns. Again, however, the effects of possible post-depositional disturbance are difficult to evaluate. Most squares seem to contain only parts of the animals but Q17 possibly contains (at least) one complete animal. Nearly half of all the burnt bones according to weight from the excavated area were recovered from square Q17. In this square, all the anatomical regions of sheep/goat are represented and the minimum number of individuals is two, which have been identified on the basis of two right proximal radii, two right distal femora, and two right proximal tibias. It can be mentioned as an interesting comparison that, according to Formisto (1996: 85; see also Bennett 1987: 116–18), in cremation cemeteries and burials, the bones from sheep/goats are from extremities or as Hårding (2002: 217) describes them, ‘ben från köttrika kroppsdelar’, that is, bones from parts of the body rich in meat. All in all, according to the number of sheep bones and their anatomical representation, it appears that there has been some level of variability in which anatomical parts that were deposited at the cemetery.

Bear bones

Bones from brown bear (*Ursus arctos*) were identified in 10 excavation squares. All the bones are claws and the number in each square varies

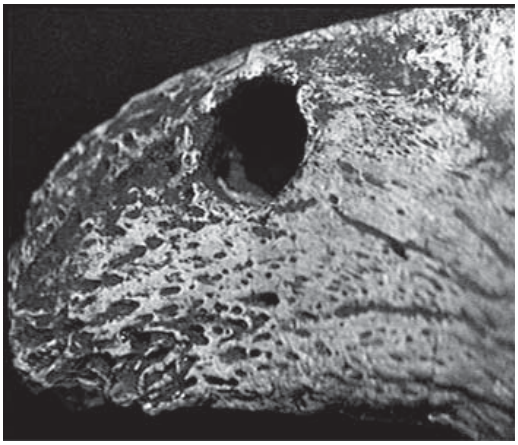


Fig. 8. Bear claw with a hole that was most probably drilled through the bone. The claw was recovered from square Q17. Photograph by Jan Storå.

from one to four. Bear bones occur in many other cremation cemeteries in Finland and also in these cases they are only claws. The same phenomenon is known from Sweden, Norway and Denmark (Iregren 1972; Bennett 1987: 118; Sigvallius 1994; Formisto 1996: 84–5; Hårding 2002: 217, 219).

Judging from the size of the claws and level of epiphyseal fusion, they are from adult individuals. The difference in size indicates that they originate from several individuals. However, fragmentation hinders a reliable interpretation. The claws were possibly parts of hides or furs. A claw from square Q17 exhibits a hole that most probably has been drilled through the bone (Fig. 8). It was possibly used as a pendant. On the other hand, it is also possible (judging from the location and size of the hole even more believable) that something was suspended from the claw. The bear claws were identified together with human bones in two squares. In a way, the rather scattered spatial distribution of the bear claws is similar to that of the archaeological artefacts.

Dog bones

Altogether eight fragments of dog bones *(Canis familiaris)* were identified in two squares, T16 and V17. In square T16 they were recovered for a small area of ca. 10 x 10 cm. The anatomical distribution in square T16 is varied and most major anatomical regions are represented. The deposition possibly represents a complete – or at least most parts of an – individual. Fragmentation hinders interpretations of the character of the dog. However, the bones probably come from an adult individual. One of the bones (*tibia*) in square V17 comes from a small-sized dog. It is not possible to determine whether the bones in the two squares come from different individuals. There are no overlapping skeletal elements in the two areas. It can be mentioned that, according to Formisto (1996: 85), all parts of the skeleton are present in dog bone materials from Finland.

RADIOCARBON DATES

After the osteological analysis, three radiocarbon datings were carried out. One bone of sheep/goat, one human bone and one bear claw were chosen for dating. In addition to obtaining results demonstrating the Merovingian Period use of the cemetery, there were some expectations that the dates could have confirmed continuity into the Viking Age. The results, however, proved, to be something different (Fig. 9).

The oldest result came from the sheep/goat sample (TYA 105:267)[8] from square Q17, which is the area previously interpreted as the location of an individual burial due to the concentration of bone and the occurrence of Merovingian Period artefacts (see above). The date is 1855 ± 45 BP (Ua-36962), that is, 50–260 cal. AD (95.4% probability); the most probable period is the Early Roman Iron Age.[9] The sample of human bone (TYA 105:368) was chosen from square V17, which also contained, for example, dog bones and a

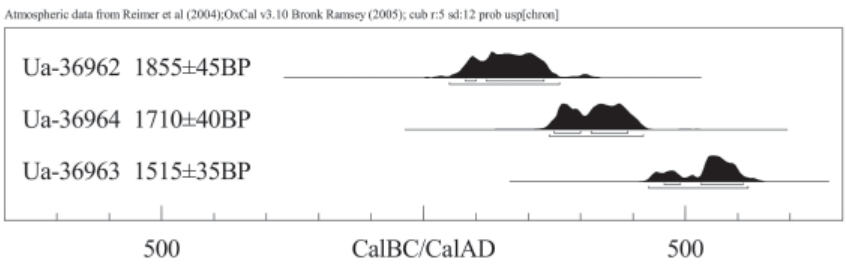


Fig. 9. Radiocarbon dates from the site of the Rikala cremation cemetery.

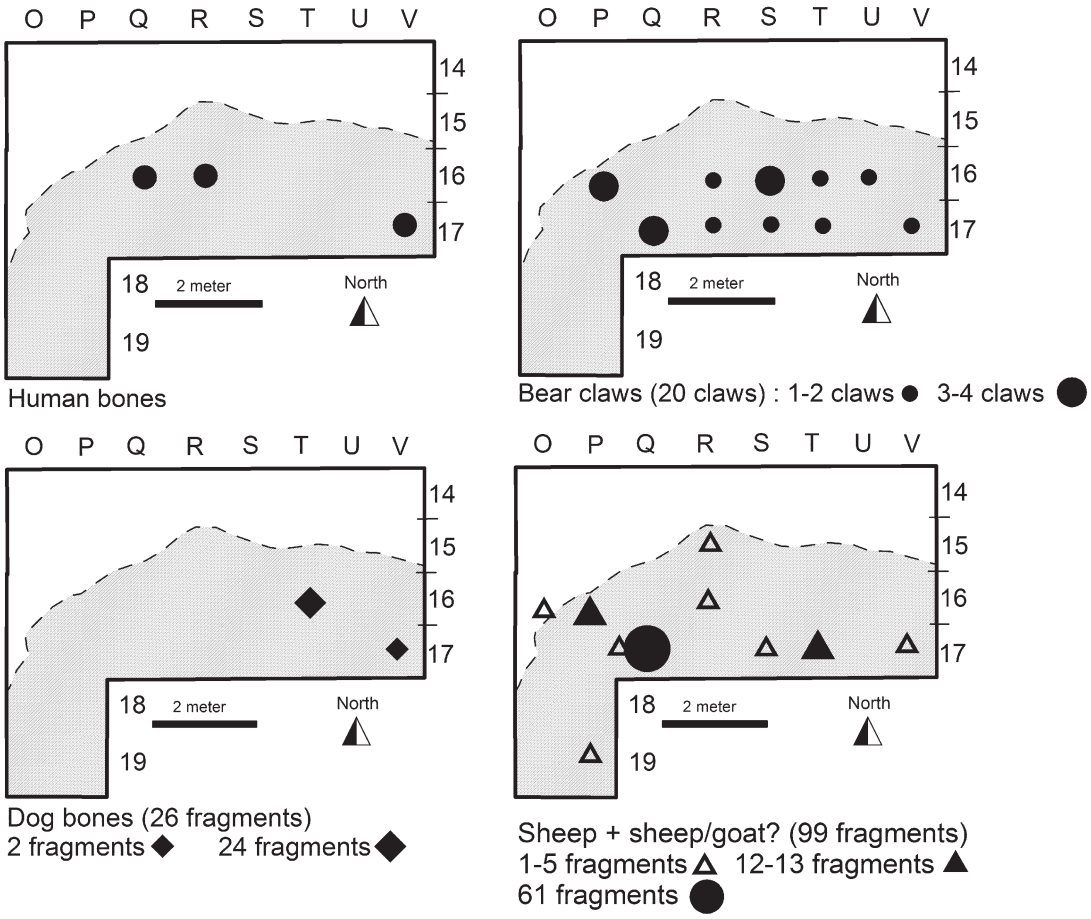


Fig. 10. The spatial distribution of bones from humans, brown bear, dog and sheep (including sheep/goat).

concentration of ceramics. The result is 1710 ± 40 BP (Ua-36964), that is, 240–420 cal. AD (95.4% probability), the most probable period of the date being the Late Roman Iron Age. This appears to be older than the associated finds in the excavation square. The sample of bear, a claw (TYA 105: 322), was chosen from square T16, which also revealed, among other items, dog bones and the Merovingian Period pyramid-shaped pendant. The result is 1515 ± 35 BP (Ua-36963), that is, 430–620 cal. AD (95.4% probability). In the Finnish chronology, the date mainly corresponds to the Migration Period but also extends to the beginning of the Merovingian Period.

SUMMARY AND DISCUSSION

It seems obvious that when interpreting cremation cemeteries, it should always be essential to have the possibility to analyse the bone material and to complement such analyses with radiocarbon datings. There have been insufficient numbers of analyses so far.[10] The osteological analysis of the Rikala material highlights the complicated character of cremation cemeteries and the difficulties involved in interpreting the depositional patterns at such sites. Some squares exhibited rather high amounts of burnt bones while other areas contained few or no bone finds. The locations of the concentrations may reflect a deposition pattern. Furthermore, the interpretations are complicated by the small number of identified bones. This is most obvious in the case of human bones (Fig. 10).

The deposition of bones in the cemetery seems to have been at least partly spatially planned. In two cases, burnt bones of complete animals were deposited in the cemetery area. More often, however, the depositions seem to represent bones from

selected parts of animals. In fact, this pattern also appears to be true for humans. Larger amounts of burnt human bones were not deposited in the excavated area of the cemetery.

Formisto (1996: 86) estimates that around 10% of cremation burials in Finland contain burnt animal bones. The amount of human bones compared with animal bones varies. The presence of animal bones can indicate several things. There could have been animals on the pyre together with the deceased, they can be evidence of burial rituals with meals in the cemetery, or animal sacrifices in connection with burials or afterwards when remembering the deceased, that is, remains of commemorative meals or rituals. Animal bones can also indicate status (Bennett 1987: 116; Formisto 1996: 85–6; Hymylä 2004b: 43; Wessman 2010: 51–2). According to Bennett (1987: 116), on the basis of Swedish material there is no clear pattern regarding which animals were included in the burials or whether they were deposited in the burials as whole animals or as only as certain parts of the body. Sigvallius (1994), however, noted an increase in the numbers of animal species and numbers of individual animals in cremation burials in Eastern Middle Sweden from the Early to the Late Iron Age. Sacrificed animals such as horse and dog which were with the deceased on the pyre seem to be found as a whole, while other animals such as cattle and sheep/goat are represented by only certain parts that were placed with the deceased. Sacrificed animals and those that were eaten could have been handled differently; as mentioned above, some parts of the animals were rich with meat. However, as Hymylä (2004b: 43) states, a distinction between meals and sacrifices cannot be necessarily be made.

During the fieldwork, some of the concentrations of bones were interpreted as possible burials. A good example of the necessity of bone analyses is excavation square Q17, mentioned several times here. The bone concentration in square Q17 coincides with the largest occurrence of glass beads. Other finds in square Q17 were a bronze bead and a piece of an equal-armed brooch. However, no human bones at all were identified in this square. Instead, bones from sheep and brown bear were identified. Furthermore, one sheep bone from the concentration in Q17 was radiocarbon-dated to AD 50–260, that is, older than the archaeological artefacts recovered in association with the bones. It seems that the deposition mainly represents bones from two sheep. All the anatomical parts are represented in the deposition and may represent at least one complete animal. However, this is based on the fact that all major anatomical regions are present. The amount of bones is not representative of a complete animal. Four bear claws were identified in the same square. One of them may have been used as a pendant, or something was attached to the claw.

Without osteological analysis, it is commonly assumed that the majority of bone material consists of human bones. The conclusion made by Seppänen (1978) during the excavation that the bones and artefacts in square Q17 form a single burial is thus very natural. Anna Wessman (2009: 31) has pointed to the pitfalls of interpreting artefact concentrations in cremation cemeteries under level ground without osteological and radiocarbon analyses. It may be purely accidental for artefacts to be found near each other. In addition, she mentions several examples where bones within find clusters can belong to several individuals (see also Wickholm & Raninen 2006: 152). It is also possible that the bones from one individual were buried in several different places within the same cemetery (Wessman 2010: 56).

Despite the small excavated area at Rikala, it is possible to discuss the character of the site with regard to the new data. This is especially important in the light of the radiocarbon dates, as they clearly point to the multi-period use of the site. Since some cremated human bones are present, the interpretation as a cemetery site cannot be rejected. One alternative is that in the northeastern part of Rikalanmäki there was cemetery for over a period of several hundred years, already from the beginning of the Iron Age until, at least, the Merovingian Period. It is not uncommon for remains of older burials to be found within cremation cemeteries under level ground (Wickholm 2008: 92–; Wessman 2009: 33). In general, the same place could have been used as a cemetery area over a long period. Artefacts from different time periods were possibly deposited in the area but they have vanished due to plundering or other kinds of disturbance. This is, of course, quite difficult to prove and it might actually be a completely wrong interpretation. For the time being, we can only say that apart from striated ceramics there are no artefacts clearly dating from the Early Iron Age or the Migration Period within the excavated area.

A complicating factor is that there is no clear stratigraphy within the excavated area. Despite the indication that the bone finds seem to reflect some non-random spatial pattern or planning, the stratigraphy of the site is far from distinct. The bone concentration from the square dated to the Early Roman Iron Age as well as the Merovingian Period artefacts are marked on the same excavation map, so they should be approximately from the same layer. In square T16, at least some of the bones, including the bear claw from the Migration Period, came from the same level as the Merovingian Period pyramid-shaped pendant. The datable objects are, however, few and the poor accuracy of recovering and documenting the bone fragments offers no possibility to compare in detail the location of the radiocarbon-dated bones with the find locations of the objects. At any rate, the proximity of finds from different periods indicates that some kind of mixing occurred during the period of use of the site, or later. There seemed to be some kind of stratigraphy regarding the Early Iron Age striated Morby Ware as most of the sherds were found deeper than most of the other ceramics. One of the two decorated pot rim fragments from the Early Iron Age also came from a deeper location, while the other one was close to the surface in the western part of the excavation area, where the cultural layer was thinnest.

Instead of regarding the site as an actual cemetery used continuously for centuries, an alternative interpretation could be that it had the character of an important ritualistic location where several kinds of rituals – funerals, sacrifices, feasts etc. were carried out, separately or jointly, in different periods. Sacrifice, for example, can be part of a funeral ritual or can be carried out independently. As Wessman (2009: 33) has pointed out, continuity is an important aspect. Spatial proximity to the burials may also have been important. Due to memories and stories about the place, people may have been aware over the centuries of earlier rituals or burials there, and the same location would thus have been chosen repeatedly for ritual activities. Sites have symbolic meanings and the re-use of old cemeteries is not accidental. It can be interpreted as a manifestation of the relationship between the living society and its ancestors. Re-use can be seen as an expression of collective remembrance and cremation cemeteries under level ground can thus be understood as sites of memory (Wickholm 2006; 2007; 2008; Wessman 2010). As Wickholm (2007: 114) has pointed out, site re-use is probably more common than archaeologists usually want to believe. The radiocarbon dates and archaeological finds seem to support such an interpretation at Rikala.

One question is whether a complex site such as Rikala should be called a cremation cemetery under level ground. At Rikala this is specifically relevant regarding the idea of a Merovingian Period cemetery, which has been the repeated interpretation ever since the excavations during the 1970s. Although the new results presented here present a much more complicated picture of the chronology and the identification of actual burials, the idea of a cemetery is still a plausible interpretation. There are artefacts that had clearly been on a pyre as well as other features that support this interpretation. With regard to the older dates that have been obtained, it cannot be ruled out that also they reflect burial activity at the site. There were possibly other cemetery structures before the site gained the form of a true cremation cemetery under level ground. Older structures may have been destroyed over the centuries, but the importance and use of the place continued. Furthermore, because only one human bone and two animal bones were dated, it is quite probable that there is also bone material of the same age as the artefacts that provided the original dating, that is, the Merovingian Period.

When the radiocarbon dates and the dates of the artefacts are combined, it can be seen that they indicate that the area has been of importance and in use – continuously or occasionally – from the Pre-Roman Iron Age to the Merovingian Period, that is, during more than half a millennium.[11] It is even possible that the site was also used during the Viking Age. In addition, we can note that there are traces of inhumation graves only some 80 metres away (Mäntylä 2006: 7–8), possibly representing the first inhumation burials on Rikalanmäki hill near the cremation cemetery. After that, in the Crusade Period, a separate inhumation cemetery was established further away but still on the same hill. We may ask whether the old cremation cemetery was in fact one reason for choosing the location for the inhumation cemetery.

The re-evaluation of the material from Rikala is an example of how little is sometimes known of sites categorized as a certain type of cemetery. Sites given a stereotyped label may in fact be quite heterogeneous and contain different kinds

of features, not all of which can be recognized and interpreted without a thorough site-specific investigation. The results of the present study especially stress the importance of osteological analysis and radiocarbon dates. Most probably new results may be obtained in a similar manner also within other cremation cemeteries under level ground.

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NOTES

[1] The municipality of Halikko became part of the town of Salo at the beginning of 2009.

[2] For the most recent discussion on the Rikala Linnamäki hillfort, see Asplund 2008: 119–22.

[3] The concept 'cremation cemetery under level ground' has been chosen in accordance with Wessman (2010). As Wessman (2010: 19) states, this type of burial form has been translated into English in many different ways.

[4] In this article, it is not possible to go deeper into all the various research aspects of cremation cemeteries under level ground. In recent years, several interesting articles and graduate theses have been written on this topic (see e.g., Haimila 2002; 2005; Hietala 2003a; 2003b; Hymylä 2004a; 2004b; Raninen 2005; Wickholm & Raninen 2003; 2006; Wickholm 2005; 2008; Pietikäinen 2006; Wessman 2009). Recently, a doctoral dissertation on this cemetery type has been published by Anna Wessman (2010).

[5] No signs of the cemetery are visible in the cuttings of a road running west of the site. To the east, the slope below the terrace is rather steep. The north boundary of the cemetery is the most problematic and uncertain one; in this direction construction work has probably damaged the site. The documentation of test-pits dug in the vicinity was not of very good quality but, nevertheless, all the pits were either empty or contained only a few pieces of burnt clay.

[6] The find material is catalogued in the collections of the Department of Archaeology at the University of Turku under the number TYA 105.

[7] Some finds have been previously interpreted as weapons, such as a small spearhead (TYA 105:203) and part of a shield mount (TYA 105:328). These artefacts are in such poor condition that the interpretation cannot be verified; it is just as likely that these pieces of iron could have belonged to other objects.

[8] According to the morphology of the bone, the sample is of sheep (*Ovis aries*).

[9] Though beyond the topic of this study, it could be pointed out that cases of well-dated Early Iron Age sheep are not very numerous in Finland. Although the history of sheep farming goes far back, the dating from Rikala also bears some relevance to the study of the history of domesticates.

[10] In addition to Rikala, only 12 cremation cemeteries under level ground have been osteologically analysed in Finland so far, and none of them has been fully excavated (Wickholm & Raninen 2006: 159).

[11] The dating of the Rikala complex (see Fig. 1) as a whole is an interesting question. In addition to the dates discussed above it is noteworthy that some finds and radiocarbon dates from the Rikala hillfort also indicate a long duration or several periods of use (Asplund 2008: 121–2). In a trial excavation in 2001, two fragments of ceramics with textile-impressed surface were found. According to Asplund (2008: 121–2), these fragments can be quite reliably dated to the Early Metal Period. There are also two radiocarbon dates from the hill-fort: one from the Merovingian Period and the other from the Viking Age. During the excavations, undecorated ceramics were also found which can be dated in general terms to the Iron Age / Medieval Period.

REFERENCES

Unpublished sources

Haimila, M. 2002. *Polttokenttäkalmisto – erään tilan analyysi: esimerkkeinä Hämeenlinnan Riihimäki ja Hämeenlinnan Imatran Voima 9*. MA thesis. Department of Archaeology, University of Turku.

Hietala, E. 2003a. *Lieto, Sauvala, Ylipää: polttokenttäkalmiston tutkimushistoriasta uusiin tulkintoihin?* MA thesis. Department of Archaeology, University of Turku.

Hymylä, J. 2004a. *Rituaalit ja polttokenttäkalmisto: Piikkiön Rungon Koskenhaan polttokenttäkalmiston löytömateriaalin ja rakenteiden rituaaliarkeologinen tulkinta*. MA thesis. Department of Archaeology, University of Turku.

Pietikäinen, T. 2006. *Muutos ja pysyvyys: hautausrituaali nuoremmalla rautakaudella Raision Mahittulan Tuomalan kalmistossa*. MA thesis. Department of Archaeology, University of Turku.

Seppänen, K. 1978. *Halikon Rikalanmäen kaivauskertomus 3.7.–29.8.1978*. Excavation report. Department of Archaeology, University of Turku.

Literature

Asplund, H. 2004. Problems of Pre-Roman Iron Age radiocarbon dating: an example from SW Finland.

In P. Uino (ed.), *Fenno-ugri et slavi 2002: Dating and Chronology*: 9–14. Museoviraston arkeologian osaston julkaisuja 10. National Board of Antiquities, Helsinki.

Asplund, H. 2008. *Kymittæ: Sites, Centrality and Long-Term Settlement Change in the Kemiönsaari Region in SW Finland*. Annales universitatis Turkuensis, Ser. B Humaniora 312. University of Turku, Turku.

Asplund, H. & Eskola, K. & Oinonen, M. 2008. Luminesenssiajoitus, taustasäteily ja vuosikymmenten takaiset kaivauslöydöt. *Muinaistutkija* 1/2008: 33–42.

Bennett, A. 1987. *Graven – religiös och social symbol: strukturer i folkvandringstidens gravskick i Mälarområdet*. Theses and Papers in North-European Archaeology 18. University of Stockholm, Stockholm.

Boessneck, J. 1969. Osteological differences between sheep (*Ovis aries*) and goat (*Capra hircus*). In D.R. Brothwell & E. Higgs (eds.), *Science in Archaeology*: 331–58. Thames and Hudson, London.

Buikstra, J.E. & Ubelaker, D.H. 1994. *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archaeological Survey Research Studies 44. Fayetteville, Arkansas.

Callmer, J. 1977. *Trade Beads and Bead Trade in Scandinavia ca. 800–1000 AD*. Acta Archaeologica Lundensia, Series in 4°, Nr 11. Lund universitet, Lund.

Carpelan, C. 1980. Contacts in the Northern Baltic Region as shown by ceramics. *Fenno-ugri et slavi 1978: Papers presented by the participants in the Soviet-Finnish Symposium "The Cultural Relations between the Peoples and Countries of the Baltic Area during the Iron Age and the Early Middle Ages" in Helsinki May 20–23, 1978*: 188–99. Helsingin yliopiston arkeologian laitos, moniste 22. University of Helsinki, Helsinki.

Cleve, N. 1943. *Skelettgravfälten på Kjuloholm i Kjulo I: den yngre folkvandringstiden*. Suomen Muinaismuistoyhdistyksen Aikakauskirja XLIV:1. Suomen Muinaismuistoyhdistys, Helsinki.

Enqvist, J. 2005. Rautakauden tyypin keramiikka – rautakautinen keramiikkatyyppikö? In P. Pesonen & T. Mökkönen (eds.), *Arkeologipäivät 2004: Muinaisjäännösten suojelun ja tutkimuksen yhteensovittaminen, uutta rautakauden tutkimuksessa*: 95–102. Suomen arkeologinen seura, Helsinki.

Formisto, T. 1996. Osteological analyses. In P. Purhonen (ed.), *Vainionmäki – A Merovingian Period Cemetery in Laitila, Finland*: 81–7. National Board of Antiquities, Helsinki.

Habermehl, K.-H. 1975. *Die Altersbestimmung bei Haus- und Labortieren*. Paul Parey, Berlin.

Haimila, M. 2005. Kollektiivisuus, hautaaminen ja polttokenttäkalmisto. In P. Pesonen & T. Mökkönen (eds.), *Arkeologipäivät 2004: Muinaisjäännösten suojelun ja tutkimuksen yhteensovittaminen, uutta rautakauden tutkimuksessa*: 87–90. Suomen arkeologinen seura, Helsinki.

Heikkurinen-Montell, T. 1996. Distribution of the osteological material. In P. Purhonen (ed.), *Vainionmäki – A Merovingian Period Cemetery in Laitila, Finland*: 88–101. National Board of Antiquities, Helsinki.

Hietala, E. 2003b. Liedon Sauvalan Ylipää – perusteellisesti tutkittu polttokalmisto? *Muinaistutkija* 3/2003: 2–12.

Hirviluoto, A.-L. 1992. Esihistoriallisen ajan Halikko. *Halikon historia* I: 11–150. Halikon kunta, Halikko.

Hirviluoto, A-L. 1996. Pottery, burnt clay and slag. In P. Purhonen (ed.), *Vainionmäki – A Merovingian Period Cemetery in Laitila, Finland*: 73–80, 163–5. National Board of Antiquities, Helsinki.

Holck, P. 1986. *Cremated Bones: A Medico-Anthropological Study of an Archaeological Material on Cremated Burials*. Antropologiske Skrifter 1. Anatomisk Institutt, University of Oslo, Oslo.

Hymylä, J. 2004b. Rituaalit ja polttokenttäkalmistot: teoreettista ja metodologista pohdintaa. *Muinaistutkija* 2/2004: 38–50.

Hårding, B. 2002. Människan och djuren: om dagligt liv och begravningsritualer under järnålder. In K. Viklund & K. Gullberg (eds.), *Från romartid till vikingatid. Pörnullbacken – en järnålderstida bosättning i Österbotten*. Acta Antiqua Ostrobotniensia, Studier i Österbottens förhistoria 5 / Studia Archaeologica Universitatis Umensis 15: 213–22. Scriptum,Vasa.

Iregren, E. 1972. *Vårby och Vårberg 2: studie av kremerat människo- och djurbensmaterial från järnåldern*. Theses and papers in North-European archaeology 1. Stockholms universitet, Stockholm.

Kaliff, A. 1992. *Brandgravskick och föreställningsvärld: en religions-arkeologisk diskussion*. Occasional Papers in Archaeology 4. Uppsala Universitet, Uppsala.

Kaliff, A. 1997. *Grav och kultplats: eskatologiska föreställningar under yngre bronsålder och äldre järnålder i Östergötland*. Aun 24. Department of Archaeology, Uppsala University, Uppsala.

Kivikoski, E. 1939. *Die Eisenzeit im Auraflussgebiet*. Suomen Muinaismuistoyhdistyksen Aikakauskirja XLIII. Suomen Muinaismuistoyhdistys, Helsinki.

Kivikoski, E. 1966. *Suomen kiinteät muinaisjäännökset*. Tietolipas 43. Suomalaisen Kirjallisuuden Seura, Helsinki.

Kivikoski, E. 1967. *Finland.* Ancient Peoples and Places 53. Thames and Hudson, London.

Kivikoski, E. 1973. *Die Eisenzeit Finnlands: Bildwerk und Text*. Finnische Altertumsgesellschaft, Helsinki.

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

Lehtosalo-Hilander, P.-L. 1984. Keski- ja myöhäisrautakausi. *Suomen historia 1*: 250–405. Weilin +Göös, Espoo.

Lehtosalo-Hilander, P-L. 2000. *Kalastajista kauppanaisiin: Euran esihistoria*. Euran kunta, Eura.

Luoto, J. 1985. Rikala frankkien kauppapiirissä. *Hakastarolainen* 19: 20–1.

Lyman, R.L. 1994. Quantitative units and terminology in zooarchaeology. *American Antiquity* 59(1): 36–71.

Mägi, M. 2002. *At the Crossroads of Space and Time: Graves, Changing Society and Ideology on Saaremaa (Ösel), 9th–13th centuries AD*. CCC papers 6. Gotland University College & Institute of History, Tallinn.

Mäntylä, S. 2006. Rikala – myöhäisrautakautinen keskusalue Halikonjokilaaksossa. In S. Mäntylä (ed.), *Miekka – Menneisyys – Maisema*: 6–35. Halikon

kunta, Halikko.
Pihlman, S. 1999. Kuolema arkeologisena ilmiönä – yleistyksiä esihistoriasta. *ABOA: Turun maakuntamuseon vuosikirja* 59–60: 62–70.
Pihlman, A. 2003. Kaupunki, maaseutu ja keskiaikaiset saviastiat. In L. Seppänen (ed.), *Kaupunkia pintaa syvemmältä: arkeologisia näkökulmia Turun historiaan*: 195–206. Archaeologica Medii Aevi Finlandiae IX. Suomen keskiajan arkeologinen seura, Turku.
Pälikkö, M. 2009. Aittamäki – hautauksia hartsitiivisteuurnasta polttokenttäkalmistoon. In K. Korkeakoski-Väisänen, J. Pukkila & H. Lehtonen (eds.), *Muinaisjäännös ja maisemakohde: kaksitoista näkökulmaa arkeologisiin ja kasvitieteellisiin tutkimuksiin Liedon Vanhalinnassa ja sen ympäristössä* : 86–96. Turun Yliopistosäätiö, Turku.
Raike, E. 1996. Venepolttohautaus Suomessa rautakaudella. *Muinaistutkija* 2/1996: 19–24.
Raninen, S. 2005. Big men on the river banks: some thoughts on the Middle Merovingian Period weapon burials in Finland. In S. Mäntylä (ed.), *Rituals and Relations: Studies on the Society and Material Culture of the Baltic Finns*: 224–45. Suomalaisen Tiedeakatemian toimituksia, humaniora 336. Suomalainen Tiedeakatemia, Helsinki.
Sigvallius, B. 1994. *Funeral Pyres: Iron Age Cremations in North Spånga*. Theses and Papers in Osteology 1. Stockholm University, Stockholm.
Silver, I.A. 1969. The ageing of domestic animals. In D. Brothwell & E. Higgs (eds), *Science in Archaeology*, 2nd edition: 283–302. Thames and Hudson, London.
Söyrinki-Harmo, L. 1996a. The formation of the Vainionmäki cemetery. In P. Purhonen (ed.), *Vainionmäki – A Merovingian Period Cemetery in Laitila, Finland*: 102–18. National Board of Antiquities, Helsinki.
Söyrinki-Harmo, L. 1996b. Tools and implements. In P. Purhonen (ed.), *Vainionmäki – A Merovingian Period Cemetery in Laitila, Finland*: 63–72, 159–62. National Board of Antiquities, Helsinki.
Taavitsainen, J.-P. 1992. Cemeteries or refuse heaps? Archaeological formation processes and the interpretation of sites and antiquities. *Suomen Museo* 1991: 5–14.
Wessman, A. 2009. Polttokenttäkalmistot muistojen maisemassa. In T. Mökkönen & S.-L. Seppälä (eds.), *Arkeologipäivät 2008*: *Sosiaaliarkeologiaa – yhteisöt arkeologisen aineiston taustalla & tutkimushistorian painolasti:* 30–7. Suomen arkeologinen seura, Helsinki.
Wessman, A. 2010. *Death, Destruction and Commemoration. Tracing ritual activities in Finnish Late Iron Age cemeteries (AD 550–1150)*. Iskos 18. The Finnish Antiquarian Society, Helsinki.
Wickholm, A. 2005. The cremation cemeteries under flat ground – a representative of what? In R. Karl & J. Leskovar (eds.), *Interpretierte Eisenzeiten. Fallstudien, Methoden, Theorie. Tagungsbeiträge der 1. Linzer Gespräche zur Interpretativen Eisenzeitarchäologie*: 31–40. Studien zur Kulturgeschichte von Oberösterreich, Folge 18. Oberösterreichisches Landesmuseum, Linz.
Wickholm, A. 2006. "Stay where you have been put!" The use of spears as coffin nails in Late Iron Age Finland. In H. Valk (ed.), Etnos ja kultuur. Uurimusi Silvia Laulu auks. *Muinasaja Teadus* 18: 193–207.
Wickholm, A. 2007. Commemorating the past: a case of collective remembering from Alsätra cemetery in Karjaa, Finland. In A. Merkevi ius (ed.), *Colours of Archaeology: Material Culture and Society. Papers from the Second Theoretical Seminar of the Baltic Archaeologists (BASE) held at the University of Vilnius, Lithuania, October 21–22, 2005*: 107–16. Interarchaeologia 2. University of Vilnius, University of Helsinki, University of Latvia, University of Tartu, Vilnius, Helsinki, Riga, Tartu.
Wickholm, A. 2008. Reuse in the Finnish cremation cemeteries under level ground: examples of collective memory. In F. Fahlander & T. Oestigaard (eds.), *Materiality of Death: Bodies, Burials, Beliefs*: 89–97. British Archaeological Report International Series 1768. Archaeopress, Oxford.
Wickholm, A. & Raninen, S. 2003. Rautakautinen riesa: polttokenttäkalmistojen problematiikkaa. *Muinaistutkija* 2/2003: 2–14.
Wickholm, A. & Raninen, S. 2006. The broken people: deconstruction of personhood in Iron Age Finland. *Estonian Journal of Archaeology* 10(2): 150–66.