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## ILLITERATE IMITATIONS AND QUALIFIED COMMODITIES: LETTER-LIKE MARKS IN FINNISH EARLY MEDIEVAL SWORD BLADES

### Abstract:

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This article presents the study of Finnish Late Iron Age swords with ferrous inlays, particularly those with inlaid obscure letter-like marks. Altogether 33 blades with letter-like marks were discovered in Finland, all of them being more or less unique in terms of dimensions, materials and the contents of the inlaid motifs. The diversity of these blades suggests the existence of multiple makers, possibly even in Scandinavia, where these kinds of finds are concentrated. Experimental archaeology was also used to show the relative ease of inlaying sword blades. Moreover, these swords were not merely status artefacts or objects of various powers, but were also used in combat.

Key words: swords, Late Iron age, Viking age, metallurgy, experimental archaeology

### **Background: swords with ferrous inlays in Finland**

Sword blades with ferrous inlays are a phenomenon of the Late Iron Age. These inlays made of iron, steel or pattern-welded material appear already in the 700s AD, and they start to disappear roughly in the 1100s AD, in some cases their use extending as far as around 1200 AD. Their peak is the Viking Period, ca. 800-1025 AD according to Finnish chronology. Ferrous inlays, or iron inlays as they are also referred to, were forge-welded on the surface of a double-edged sword blade, in its concave central groove known as a fuller (Fig. 1). These marks were usually present on both flats of the blade near the hilt, but sometimes these inlays appear only on one side of the blade.

These inlays are commonly understood as names of blacksmiths or smithies, of which the most common ones are VLFBERHT and INGELRII. After the Viking Period Christian inscriptions and invocations appear, the most widespread one being ‘in nomine domini’, ‘in the name of God’, in various abbreviated and wrongly-spelled forms as well. In addition to these there exist a number of various motifs, which are discussed below in more detail.

In a technological viewpoint, materials of the inlays have varied from one blade to another,

and from time to time. As a simplified generalization, pre-Viking and Viking Age inlays were large and usually pattern-welded, perhaps to continue the tradition and connotations of pattern-welding itself used to construct the mid-sections or the fullered parts of blades before the Viking Age. The term pattern-welding means that at least two different kinds of iron or steel are forge-welded together and then manipulated to create a desired pattern on the final object. After polishing and etching, the different steels become differently coloured. The steel with higher carbon content will be etched darker and deeper than the one with lower carbon content.

After the Viking Period the inlays decrease in size along with the narrowing fuller of the blade, and are executed with plain iron or steel rods instead of patterned material. As a last stage of development, the inlays become non-ferrous, after which they disappear completely during the medieval period. The use of inlays on sword blades decreases towards the end of the medieval period, when also etched decorations appear on blades. It must be noted that these material- and size-based transitions of inlays are not sudden but clearly overlapping. This can best be observed in pattern-welded blades with inlays on top of the patterned fuller of the blade, which are also evident



Fig. 1. Reconstructions of early medieval swords made by the author.

Ryc. 1. Rekonstrukcje wczesnośredniowiecznych mieczy wykonanych przez autora.

in the Finnish material. In similar fashion, materials of the blades have varied as well as the expertise of the smiths has done.

This article is based on my doctoral thesis (Moilanen 2015), which explores swords with ferrous inlays found in Finland, dating from the Late Iron Age, ca. 700-1200 AD. These swords reflect profound changes not only in styles and fashion but also in the technology of hilts and blades. The fundamental questions of my thesis were how many of these kinds of swords are known from Finland, how they were made and where, what their status was in Late Iron Age Finland, and how the Finnish finds fit within patterns known from other areas of Europe (Fig. 2).

At this stage it is worth mentioning that studies in sword blade inlays have been done earlier in Finland, although in smaller scale. The fundamental work on Finnish Late Iron Age sword blades is the posthumously published work of Jorma Leppäaho (1964). This catalogue-like work includes a number of photographs and drawings of pattern-welded inlays as they appear on the surface of the blades. This work has sometimes been considered as a complete presentation of inlaid blades in Finland, but the

reality is something else. Also Leena Tomanerä (1978; see also Kirpičnikov et al. 2014) has used radiography to reveal Crusade period inlays on swords.

The methodology of my work was multidisciplinary. Basic methods included measuring of the finds and statistical analyses. Due to corrosion, inlaid marks were visible only in few cases, and so they had to be revealed to study them. The main method of revealing inlaid marks was radiography due to its non-destructive nature (Fig. 3). In cases where inlays were visible without radiography, their details were inspected via microscopy. To study the materials and manufacture of inlaid swords, samples were metallographically analysed to determine the forging technologies and nature of used materials. Furthermore, the manufacture was also studied with the help of experimental archaeology.

As a result, a catalogue of 151 swords with ferrous inlays was created. This number is relatively high compared with other European countries, although systematic studies have been conducted in only some countries. The inlaid motifs were classified into five distinct categories. To summarize, almost every documented inlaid



Fig. 2. The geographical area from where the swords were studied in my thesis. This area includes the mainland Finland, the Åland islands in the southwestern coast of Finland, and the region of ceded Karelia east to the modern borders of Finland. *Elaborated by M. Moilanen.*

Ryc. 2. Geograficzny zasięg występowania mieczy prezentowanych w niniejszym studium. Obejmuje on głównie Finlandię, Wyspy Alandzkie przy południowo-zachodnim wybrzeżu Finlandii oraz obszar Karelii, położony na wschód od współczesnych granic Finlandii. *Oprac. M. Moilanen.*

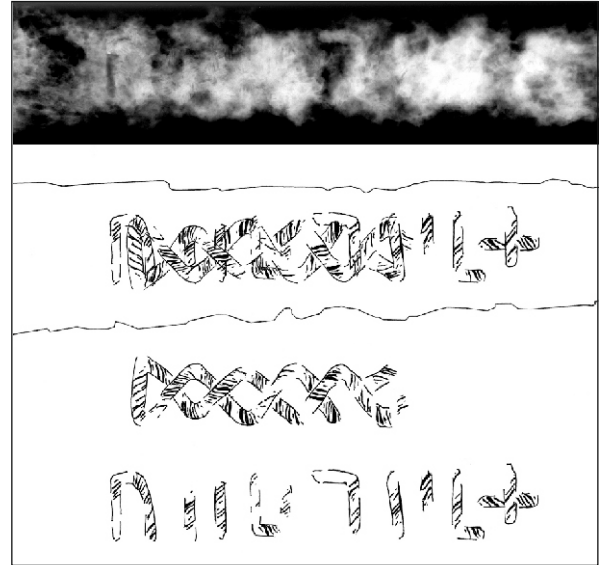


Fig. 3. An example of a radiographic study of an inlaid sword blade. The topmost image shows a radiograph of sword KM 1120:1 from Eura with pattern-welded inlays of both sides of the blade. The drawings below clarify the inlays and their arrangement on both sides of the blade. *Elaborated by M. Moilanen.*

Ryc. 3. Przykład badań nad rentgenowskim obrazem jednej z głowni z intarsją. U góry przedstawiono rentgen miecza KM 1120:1 z Eury z obustronną intarsją. Poniżej ukazano przerys zachowanych znaków i ich rozmieszczenie na obu stronach głowni. *Oprac. M. Moilanen.*

sword was unique in some respect including measurements, inlaid motifs and materials of blades and inlays. Technological variation was also present, some blades being poorer and some of higher quality in spite of the presence of inlaid motifs.

The above observations, along with experimental results indicating the existence of multiple alternative techniques of inlaying, suggest that these swords were manufactured locally in Scandinavia, most likely in imitation of Continental European models. Inlaid swords were valued partly for their assumed functionality in combat, as evidenced by damage on some examined blades, or they were valued for their inlays, which could have had fashionable or symbolical meanings bound to local beliefs.

The five categories of inlaid marks mentioned above are VLFBERHT-inlays, INGELRII-inlays, other inlays with Latin letters, letter-like marks, and geometrical and symbolical motifs. This article presents the swords with letter-like marks, which were found to be common in Scandinavia and especially in Finland. These inlays form a distinct group, which has not been studied before as such.

#### Classification of letter-like marks

The definition of letter-like marks involves two criteria. Firstly, the inlays do not show any

clear Latin letters or sequences of them, but only some resemblance. Secondly, the motif or motifs are not strictly geometric or in the shape of certain symbolic marks. Common to these letter-like designs is discontinuity at least on one side of the blade. The other flat of the blade, on the other hand, may contain even geometric motifs. In my thesis I divided the letter-like marks into subcategories depending on figures on opposite sides of the blade. To simplify, letter-like marks appear firstly with various kinds of lattices on the other side of the blade. Secondly, some marks appear with some other geometric symbols. Thirdly, in some cases letter-like marks are evident on both sides of the blade without any clearer patterns. Since the letter-like marks are fragmentary and also somewhat unique when compared with each other, the motifs on the opposite side of the blade have been used here as a device for grouping to make some sense with the assemblage.

Letter-like marks and figures were revealed on 33 blades from Finland (Fig. 4). Due to the highly fragmentary nature of the inlays, some of the marks classified as letter-like may have originally been actual Latin letters. They are very hard to interpret from radiographs of badly corroded blades. This paper is a short discussion of the swords bearing these letter-like marks as

Catalogue number	Inlays, Side A	Inlays, Side B	Material of inlays	Blade construction	Hilt type	Find context	Dating
KM 1120:1			twisted pattern-welded		H	inhumation grave	800-950
KM 1174:3			twisted pattern-welded		Z	cremation cemetery	950-1000
KM 1822:1			twisted pattern-welded		I	inhumation cemetery	800-950
KM 1822:2			twisted pattern-welded			inhumation cemetery	900-950
KM 2489:121			steel		disc-pommel	inhumation grave	1150-1200
KM 2548:196			twisted pattern-welded	plied from similar material	Q	cremation cemetery	900-950
KM 2939:1			twisted pattern-welded	other side of blade pattern-welded	disc-pommel	inhumation grave	1000-1150
KM 3301:1			iron		V	stray find	900-1000
KM 3575:1			twisted pattern-welded	pattern-welded	B	possible burial cairn	750-800
KM 4633:145			twisted pattern-welded		V (?)	inhumation grave	900-1000
KM 4633:165			twisted pattern-welded		H	inhumation cemetery	800-1000
KM 4923:1			twisted pattern-welded		X	possible burial cairn	900-1100
KM 5005			steel		disc-pommel	stray find	1000-1150
KM 5707:3			steel		brazil-nut pommel	stray find	1000-1150
KM 6227:1			twisted pattern-welded		Z	cremation cemetery	950-1000
KM 6753:51			twisted pattern-welded (9 layers: 5 iron and 4 steel)		H	cremation cemetery	800-950
KM 7220:2			twisted pattern-welded		B	stray find	750-800
KM 7472:2			twisted pattern-welded		H	possible burial cairn	800-850
KM 7752:1			twisted pattern-welded	pattern-welded	E	cremation cemetery	750-825
KM 8602:130			iron or steel		T	inhumation grave	1000-1150
KM 8896:25			twisted pattern-welded		H	group of finds	800-950
KM 9778			twisted pattern-welded (7 layers: 4 iron and 3 steel)		C	stray find	800-850
KM 10348:1			twisted pattern-welded (7-9 layers)		B	burial mound	750-800
KM 11831			steel		disc-pommel	inhumation cemetery	1000-1100




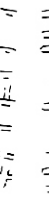






























Catalogue number	Inlays, Side A	Inlays, Side B	Material of inlays	Blade construction	Hilt type	Find context	Dating
KM 12033			twisted pattern-welded	disc-pommel		inhumation cemetery	1000-1150
KM 12687:1			twisted pattern-welded	silver-plated		inhumation cemetery	950-1050
KM 13399:3			twisted pattern-welded			cremation cemetery	1000-1200
KM 13419:2			twisted pattern-welded	H		inhumation cemetery	800-950
KM 15467			twisted pattern-welded	H		stray find	800-950
KM 16279			twisted pattern-welded	H		stray find	800-950
KM 17208:375			twisted pattern-welded	Z		inhumation grave	1000-1100
KM 18000:3860			twisted pattern-welded	X		inhumation grave	900-1000
KM 19801:202			pattern-welded or steel	disc-pommel		inhumation grave	1000-1050
KM 24740:242			twisted pattern-welded	H		inhumation grave	900-950
KM 26301			twisted pattern-welded	H		stray find	800-950
KM 30985:1			twisted pattern-welded	H		group of finds	900-1000
KM 37257			twisted pattern-welded	close to Z or Kirpichnikov's local type A		stray find	900-1000
AL 337-106			twisted pattern-welded	Special type 2		burial mound	775-825
AL 337-229			twisted pattern-welded	H		burial mound	800-950
Huittinen, Church			twisted pattern-welded	disc-pommel		possible inhumation grave	1000-1200

Fig. 4. Features of inlays with letter-like marks found in Finnish material. Plain letters in hilt type refer to Petersen's (1919) types. *Elaborated by M. Moilanen.*Ryc. 4. Przerzysy inkrustowanych znaków literopodobnych odkrytych na fińskich mieczach. Typy mieczy odpowiadaają klasyfikacji J. Petersena (1919). *Oprac. M. Moilanen.*

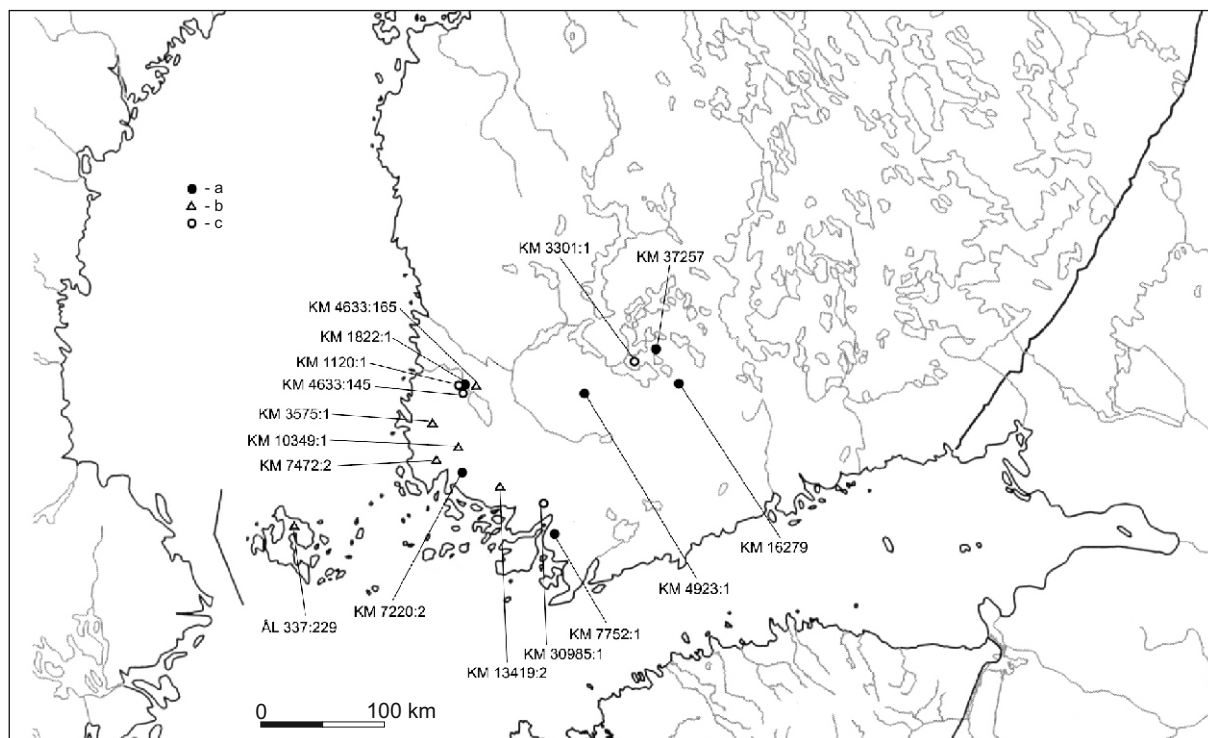


Fig. 5. Spatial distribution of swords with letter-like marks accompanied by various lattice patterns: a – single lattice; b – double lattice; c – lattice weave. *Elaborated by M. Moilanen.*

Ryc. 5. Rozmieszczenie znalezisk mieczy z literopodobnymi znakami współwystępującymi z motywem ukośnej kratki: a – pojedyncza kratka; b – podwójna kratka; c – spleciona kratka. *Oprac. M. Moilanen.*

divided by subcategories mentioned above. The abbreviations KM and ÅL refer to the collection, where the sword in question is stored. KM means the National Museum of Finland in Helsinki, whereas ÅL refers to the museum of the Åland Islands.

Also the hilts were documented and they are listed below in Figure 4. The classification was mainly done according to Petersen's (1919) typology, while additional references were sought after other classifications too. Worth mentioning is the silver-plated type, which is my own definition for a hilt resembling Petersen's Types T and Z, still having a distinctive manner of silver-plating and engraving as well as hollow iron grips too. Also disc-pommel hilts were divided into two categories according to the research of the Finnish scholar Leena Tomanterä (1978). According to her, there were Types A and B, somewhat resembling in shape to those defined by Ewart Oakeshott (1964). Furthermore, brazil-nut shaped pommels were listed by Oakeshott's as well as Alfred Geibig's (1991) types, to avoid treating them as a homogeneous group.

#### Marks accompanied by lattices

The first group are the marks accompanied by lattices (see Fig. 5). A total of four swords have

a single lattice on the opposite fuller of the one with letter-like marks (see Fig. 6). Stray find KM 37257 from Pälkäne has a simple lattice, as well as marks resembling rotated letters T and M on the other side of the blade, all made from twisted pattern-welded material. The silver-decorated hilt of this sword resembles Petersen's Type Z or Kirpichnikov's local Type A (Кирпичников 1966). The sword is dated to the 10<sup>th</sup> century. A sword from Shifford, Great Britain, with letter-like marks as well as an almost identical hilt must be noted here (Grove 1938, 255-256). KM 4923:1 from Urjala has been recovered from a possible burial cairn, and it has a similar-looking lattice but lined with vertical lines, one on each side. On the opposite side, the blade has a cross and a circle-like design between two V-shaped marks, all fragmentary and made from twisted pattern-welded rods. The hilt of this sword is of Petersen's Type X and the sword can be also dated to the 10<sup>th</sup> century.

A more complex design also including a simple lattice may be found in KM 7752:1 from Salo, found in a cremation cemetery. Here the lattice is lined with a cross and two vertical lines on both sides, with the motif beginning and ending in the crosses. The letter-like inlays also form a complicated motif, somewhat longer than average. The marks include

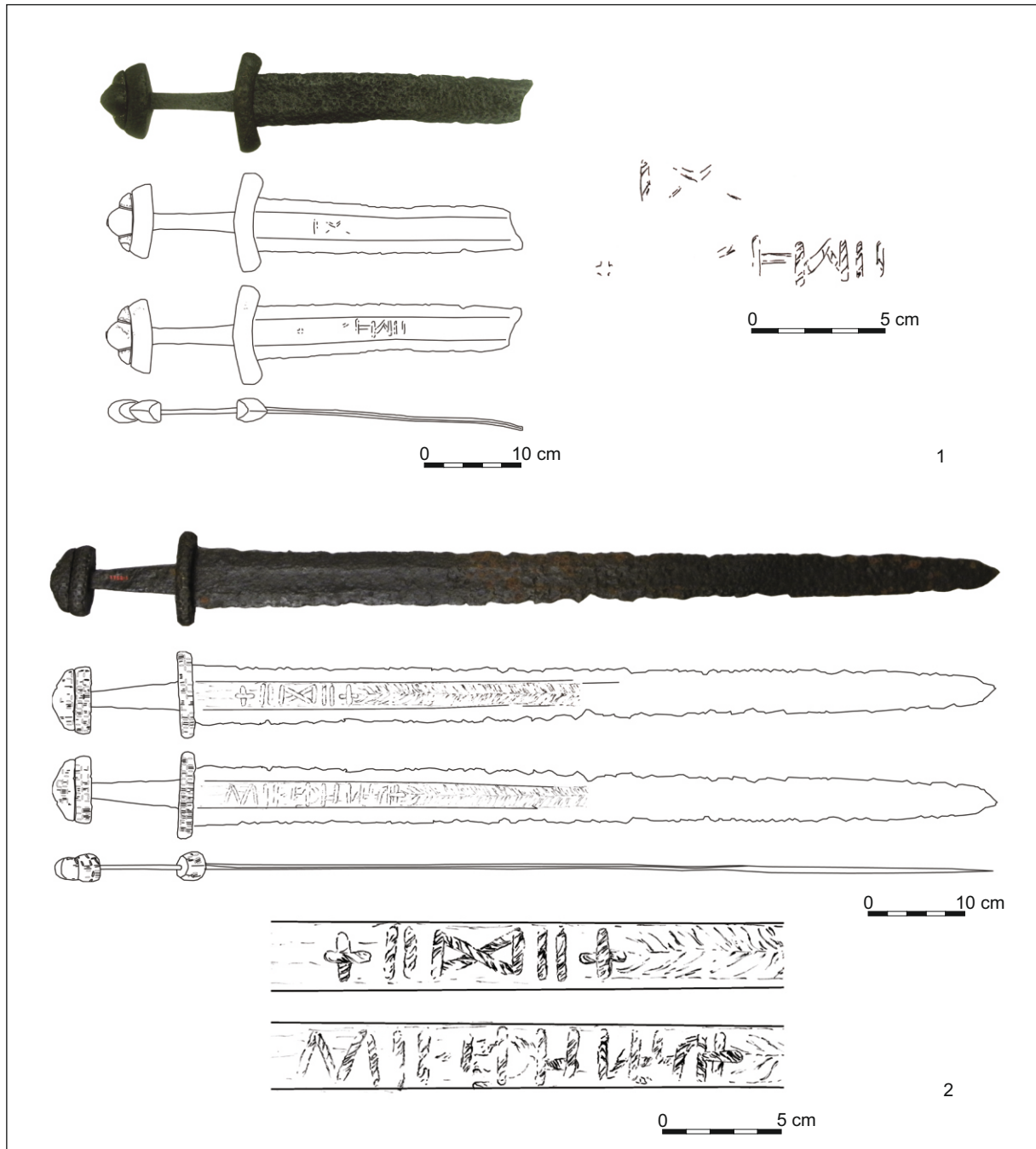


Fig. 6. Swords KM 37257 (1) and KM 7752:1 (2) showing single lattices. Drawing and photo by M. Moilanen.

Ryc. 6. Miecze KM 37257 (1) i KM 7752:1 (2) z pojedynczą kratką. Rys. i fot. M. Moilanen.

figures resembling the letters V, E, D and H, among others, and the whole motif ends in a simple cross. All the inlays were made from twisted pattern-welded rods. Furthermore, the fuller of the blade is itself pattern-welded. The hilt is of Petersen's Type E and the sword may be dated to between 750 and 825 AD. At this point it is worth noting that pattern-welded blades with ferrous inlays are generally dated to between 750 and 800 AD (e.g. Geibig 1991, 155).

In addition, KM 7220:2 from Nousiainen has a single woven lattice, again from twisted pattern-welded rods. The other side has only a few fragmentary lines resembling the reversed and rotated letter L. The sword is a stray find with a hilt of Petersen's Type B and is dated to the second half of the 8<sup>th</sup> century. KM 1822:1 from an inhumation cemetery in Eura displays a similar-looking pattern as commonly observed in VLFBERHT blades, i.e. a woven lattice lined

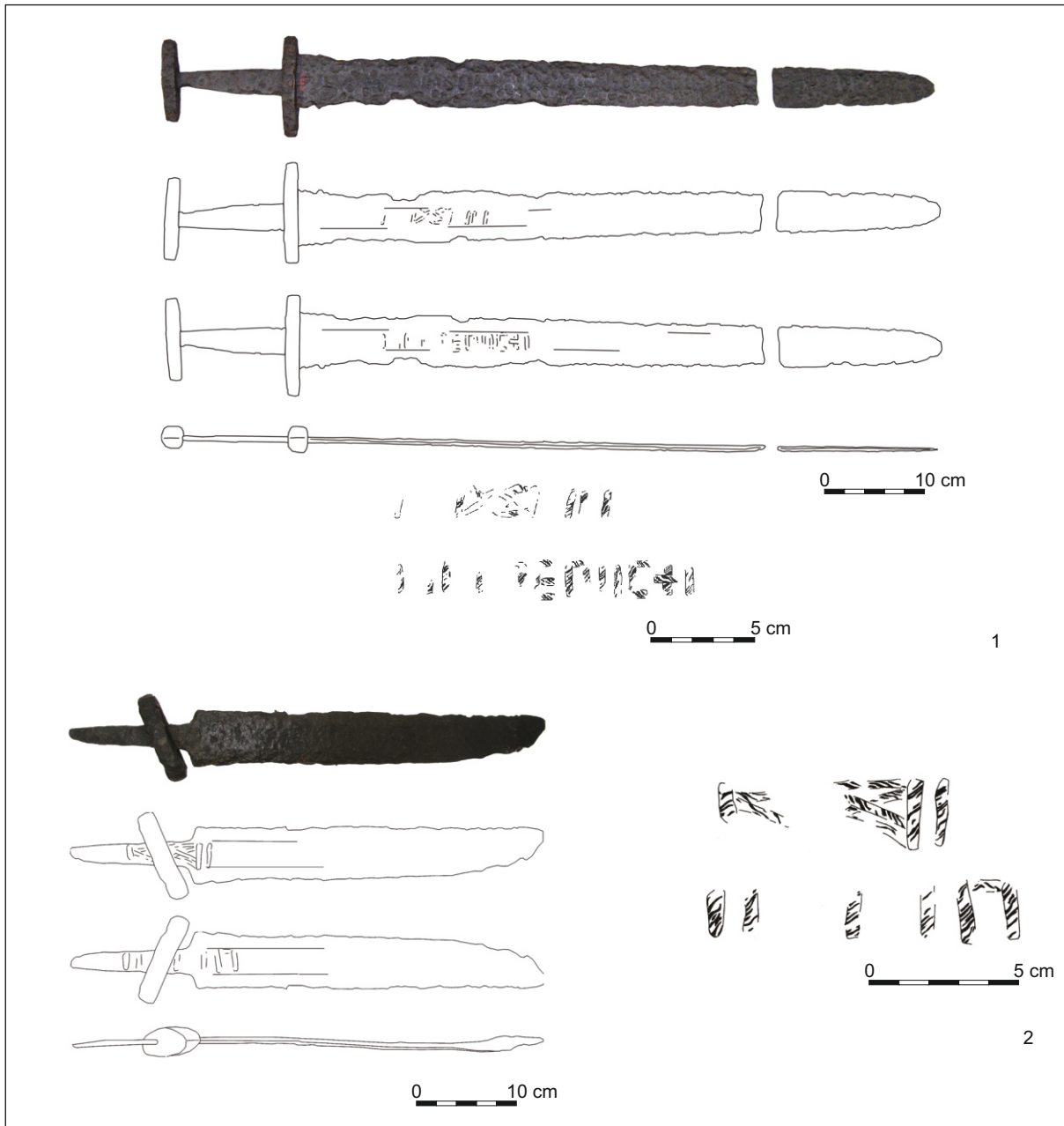


Fig. 7. Swords KM 1822:1 (1) and KM 16279 (2) with lattice and vertical lines. *Drawing and photo by M. Moilanen.*

Ryc. 7. Miecze KM 1822:1 (1) i KM 16279 (2) z kratką i pionowymi liniami. *Rys. i fot. M. Moilanen.*

with several vertical lines (Fig. 7). Actually the marks on the opposite side resemble the letters U and E, including a cross, plausibly making it a clumsy imitation of an VLFBERHT blade. The inlays are again twisted pattern-welded material. The hilt is of Petersen's Type I and the sword is dated to 800-950 AD. A third example of a woven lattice with vertical lines comes from Hämeenlinna (KM 16279), with highly fragmented letter-like inlays on the opposite side of the blade. It must be noted here that the interpretation of the inlays on this particular find is complicated and difficult,

because the inlays extend under the lower guard and on to the tang because the breakage and re-forging of the tang in the medieval past. This particular sword may have been damaged in combat. The sword is a stray find, and with its Type H hilt the sword may be broadly dated to 800-950 AD.

Six blades have double lattices on one side, and these may also be imitations of sword blades with actual Latin inscriptions such as VLFBERHT. Sword KM 3575:1 from Laitila has been found in a possible burial cairn, and it contains two simple



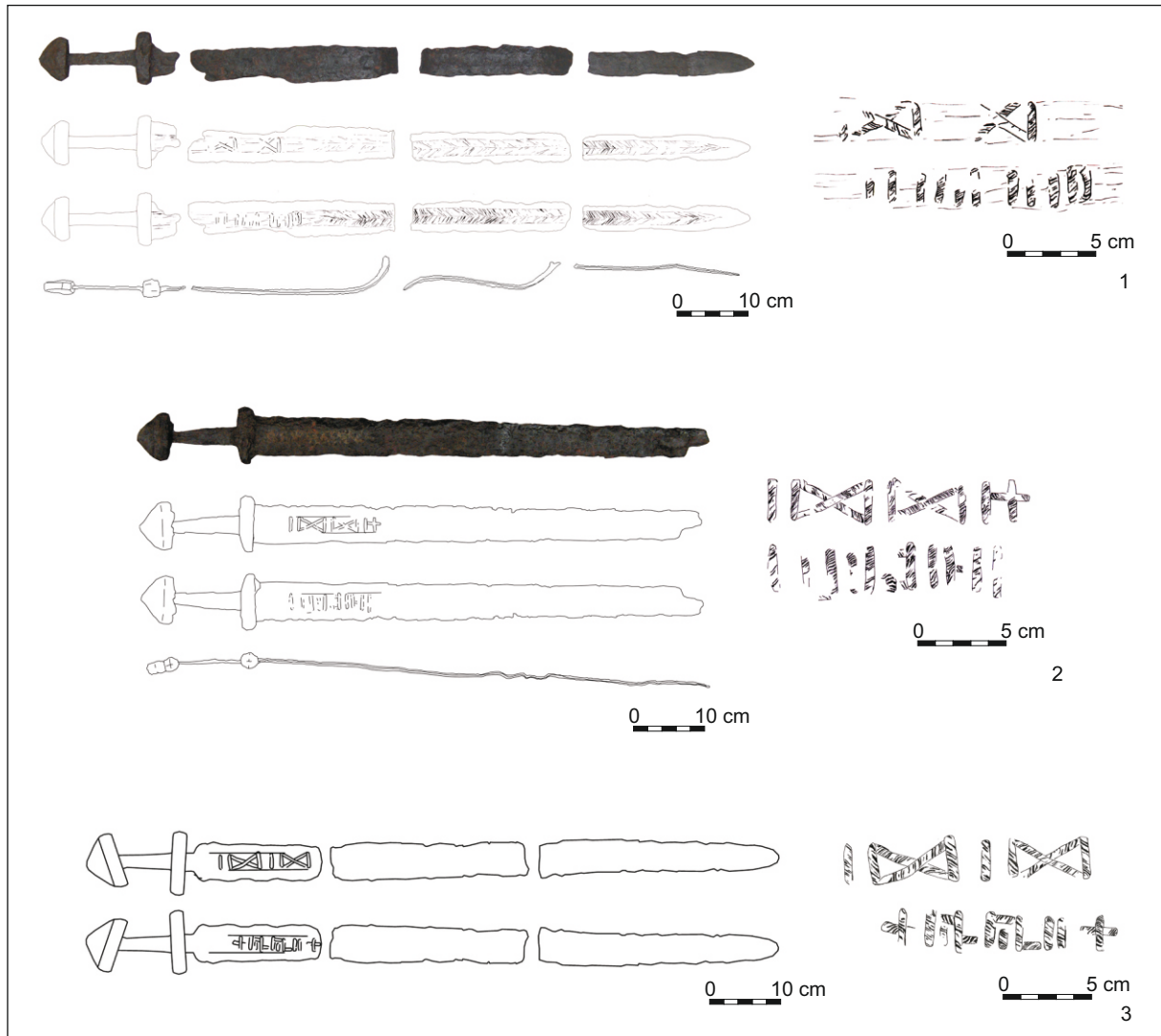


Fig. 8. Swords KM 3575:1 (above), KM 10349:1 (center) and ÅL 337:229 (below) showing a simple double lattice. *Drawing and photo by M. Moilanen.*

Ryc. 8. Miecze KM 3575:1 (1), KM 10349:1 (2) i ÅL 337:229 (3) z podwójną ukośną kratką. *Rys. i fot. M. Moilanen.*

lattices (Fig. 8). The marks on the opposite side consist mainly of vertical lines and one D-shaped figure, all twisted pattern-welded material. The fuller of the blade is also pattern-welded. The hilt is of Type B and the sword dates back to the second half of the 8<sup>th</sup> century. KM 7472:2 from Vehmaa is also a possible cairn find, and has two lattices with a vertical line between them and a horizontal line at the end of the motif. The marks on the other side consist of vertical lines, a reversed letter N and a rotated letter T, all made from twisted pattern-welded material. With its Type H hilt the sword dates back to the first half of the 9<sup>th</sup> century. KM 10349:1 from Nousiainen has been recovered from a mound, and also has two simple lattices, but now lined with two vertical lines and ending in a simple cross. The letter-like inlays consist of I, U, E and T-shaped figures, none of them

being a clear letter. The material of the inlays is a twisted pattern-welded rod containing seven to nine layers. The hilt is of Type B and the sword dates back to the second half of the 8<sup>th</sup> century. Highly similar to this is sword ÅL 337:229 from Saltvik, the Åland Islands, also with two simple lattices. This has been found in a burial mound dated to between 800 and 950 AD, and its hilt is of Petersen's Type H.

There are also simple lattices accompanied by letter-like marks on a blade from Saaremaa, Estonia (Антейн 1973, 53), and a sword from Trödje, Sweden (Thålin-Bergman, Kirpichnikov 1998, 500, 505, Abb. 4:1). Another Swedish find, from Arsunda, also has letter-like marks including a lattice and a cross, and a simple lattice lined with vertical bars on the opposite side of the blade (ibid., 500, 506, Abb. 5.2). Moreover, especially

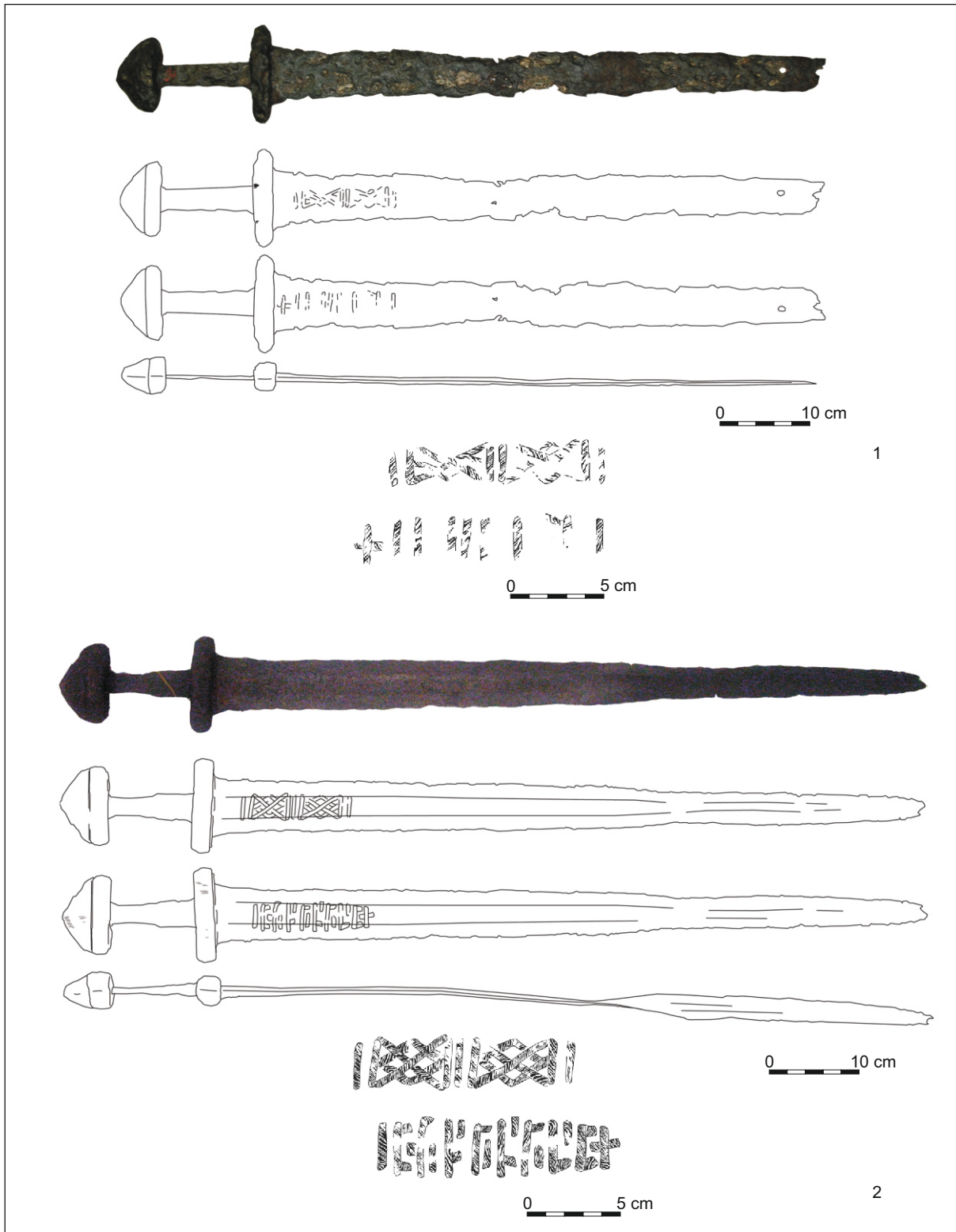


Fig. 9. Swords KM 4633:165 (1) and KM 13419:2 (2) with two lattice weaves. *Drawing and photo by M. Moilanen.*

Ryc. 9. Miecze KM 4633:165 (1) i KM 13419:2 (2) z dwiema rozdzielonymi splecionymi kratkami. *Rys. i fot. M. Moilanen.*

close to motifs on KM 3575:1 and KM 10349:1, a sword from Hjelmby, Norway has similar kinds of double lattice and letter-like figures on opposite sides of the blade (Lorange 1889, Tab. IV). Another

sword from Norway has only two plain pattern-welded lattices on one side and highly fragmentary marks on the other (Stalsberg 1994, 184, Fig. 38). A sword from Oljonsbyn, Sweden, has the same

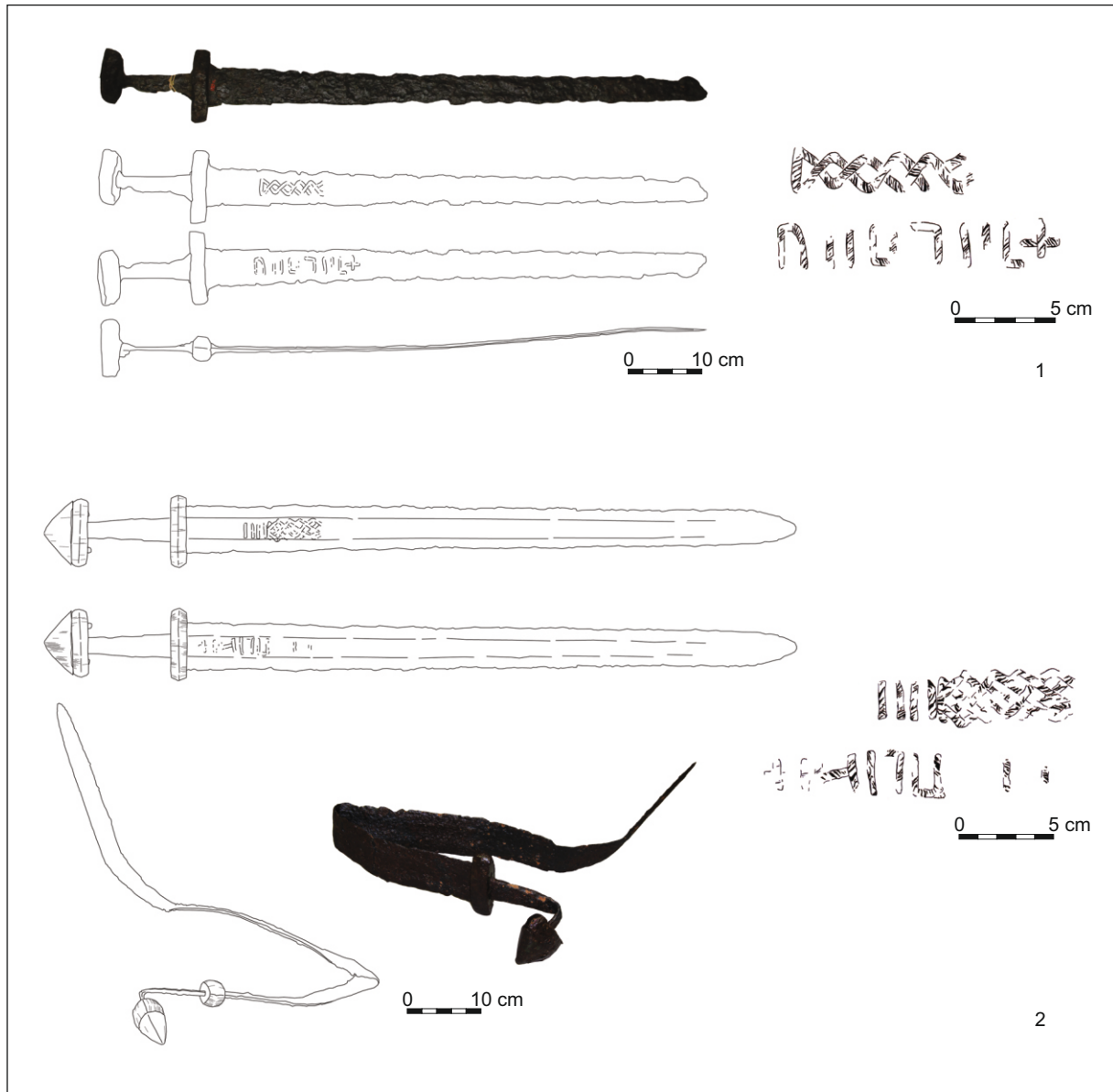


Fig. 10. Swords KM 1120:1 (1) and KM 30985:1 (2) showing long lattice weaves. *Drawing and photo by M. Moilanen.*

Ryc. 10. Miecze KM 1120:1 (1) i KM 30985:1 (2) z długimi wzorami splecionej kratki. *Rys. i fot. M. Moilanen.*

motif of letter-like inlays on one side of the blade and two plain lattices with a cross and other letter-like marks on the other side. All the inlays are pattern-welded and the blade is provided with a hilt of Petersen's Type Q (Thålin-Bergman, Kirpichnikov 1998, 501, 506, Abb. 5:3).

A sword from an inhumation cemetery in Eura, KM 4633:165, has two woven lattices lined with single vertical lines (Fig. 9). The marks are very fragmentary with mainly vertical columns and a cross at the beginning of the motif. All the inlays were made from twisted pattern-welded material. The hilt is of Type H and the sword can be dated only very broadly to the 9<sup>th</sup>-10<sup>th</sup> centuries. KM 13419:2 from an inhumation cemetery in Turku

also has two woven lattices lined with single vertical lines and having also one in between the lattices. The letter-like marks are well-preserved, consisting mainly of L-shaped figures with some of them reversed, the motif ending in a cross. All inlays were executed in twisted pattern-welded material. The chronology of this find is 800-950 AD, and its hilt is of Petersen's Type H. Similar kinds of motifs, though fragmentary, can be seen on the blade of a sword from Snartum, Norway (Lorange 1889, Tab. III). Motifs that are almost identical to those on KM 13419:2 have been found on a sword from Gnista, Sweden (Werner 1982, 17-20) and Berg, also in Sweden (Thålin-Bergman, Kirpichnikov 1998, 500, 506, Abb. 5:2). Also a third

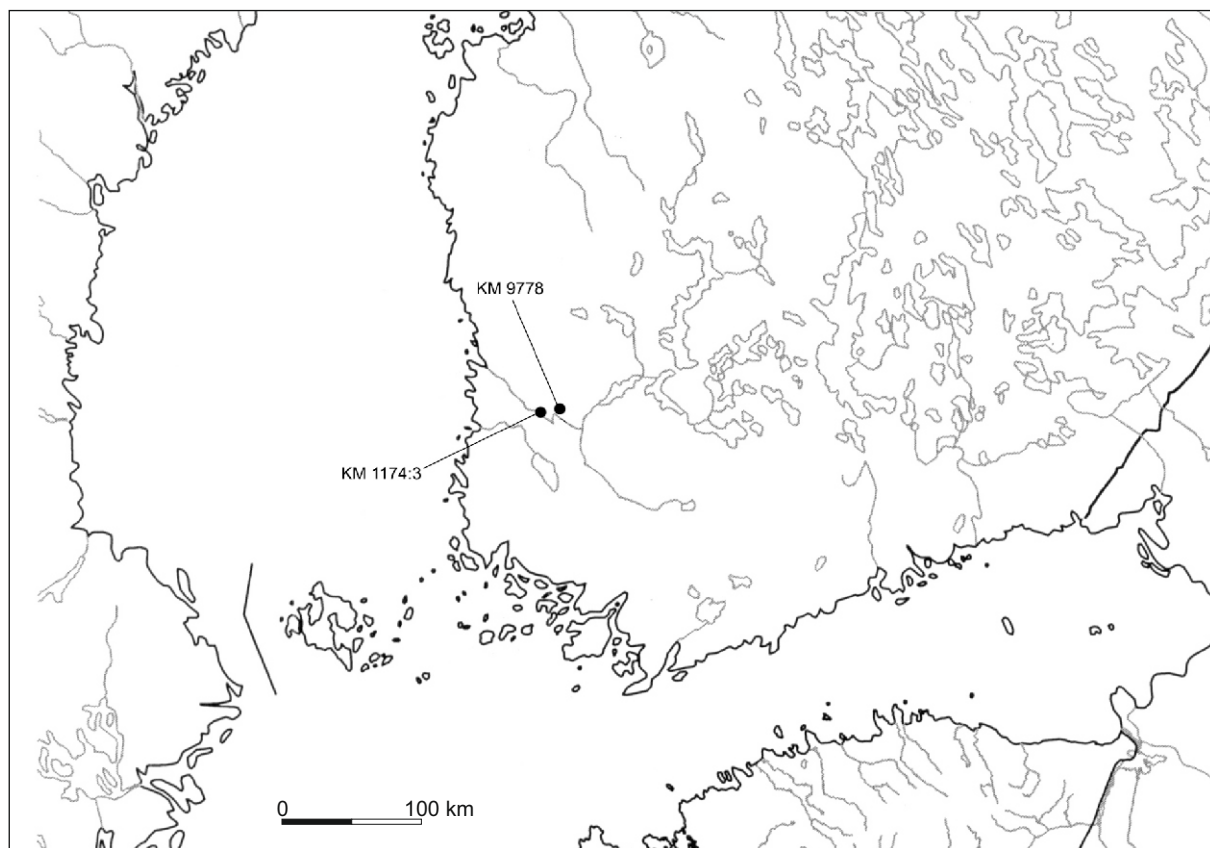


Fig. 11. Letter-like marks accompanied by other geometric figures than lattices. *Elaborated by M. Moilanen.*

Ryc. 11. Literopodobne znaki występujące z innymi niż ukośna kratka motywami geometrycznymi. *Oprac. M. Moilanen.*

sword from Sweden, more accurately from Altuna, has letter-like marks which are L-shaped and accompanied by two lattices on the opposite sides of the blade, a lattice that is more plain and a more complex woven one (ibid., 500-501, 505, Abb. 4:2).

A lattice weave was present in four cases among all the examined ones. KM 1120:1, a sword from an inhumation grave in Eura, has a lattice weave accompanied by U- and L-shaped marks and a cross at the end on the opposite side of the blade (Fig. 10). The inlays are twisted pattern-welded rod. The chronology of this sword is roughly between 800 and 950 AD, on the basis of its Type H hilt. KM 3301:1 from Valkeakoski also has a lattice weave, this time made of iron. The inlays on the other side are very fragmentary, with a cross and designs resembling the letters N and I. It is possible that there was some combination of Latin letters on this blade, but this cannot be definitely stated. This sword is a stray find, and along with its type V hilt it can be dated to the 10<sup>th</sup> century.

Sword KM 30985:1 from Salo has a slightly more complex lattice weave that begins with three vertical lines. The marks on the opposite fuller

again include vertical lines as well as and T-shaped figures. All the inlays were made from twisted pattern-welded rods, and because of the bending of the blade, which prevented proper radiography, the lower portion of the figures and motifs cannot be defined. In principle, fragmentary figures could to some degree be comparable to common L-shaped figures of this category of letter-like inlays. The context of this sword remains unclear, but it may originate from a cemetery of some kind. The hilt is of Petersen's Type H and it dates back to the 10<sup>th</sup> century.

Somewhat similar to KM 30985:1 is Sword KM 4633:145 from an inhumation grave in Eura, with a complicated lattice weave lined by altogether four vertical lines. The marks on the other side are very fragmentary and only resemble letters, with a general appearance very similar to the above-mentioned sword from Salo. This sword has a possible Type V hilt, and it dates back to the 10<sup>th</sup> century. With regard to foreign material, the only properly studied example is from Gnezdovo, Russia, with pattern-welded letter-like marks on one side of the blade and a lattice weave on the other, the hilt being of Petersen's Type H (Kainov 2012, 28, 30).





Fig. 12. Swords KM 1174:3 (1) and KM 9778 (2). *Drawing and photo by M. Moilanen.*

Ryc. 12. Miecze KM 1174:3 (1) i KM 9778 (2). *Rys. i fot. M. Moilanen.*

### Marks accompanied by other geometric motifs

Other seemingly geometric motifs than lattices are quite rare (see Fig. 11). KM 1174:3 from Kokemäki has two crosses potent and a circle between them (Fig. 12). The figures on the other side of the blade consist of vertical lines and a figure shaped like the letter E. The marks on this side are, however, somewhat fragmentary, and their material is a twisted pattern-welded rod. This specimen is from a cremation cemetery, and with its Type Z hilt it dates back to the

second half of the 10<sup>th</sup> century. In similar fashion, a 12<sup>th</sup> century sword from Kurtina, Estonia has a circle between two crosses potent, and the motif of a central cross potent and two circles on the opposite side of the blade (Prank 2011, 71-72).

Another example is also from Kokemäki. This stray find, KM 9778, has Petersen's Type C hilt and dates back to the 1<sup>st</sup> half of the 9<sup>th</sup> century. The blade has a total of nine vertical lines and a diamond-shaped figure in the middle, perhaps imitating a lattice of some kind. The marks on the reverse side consist of L-shaped designs some

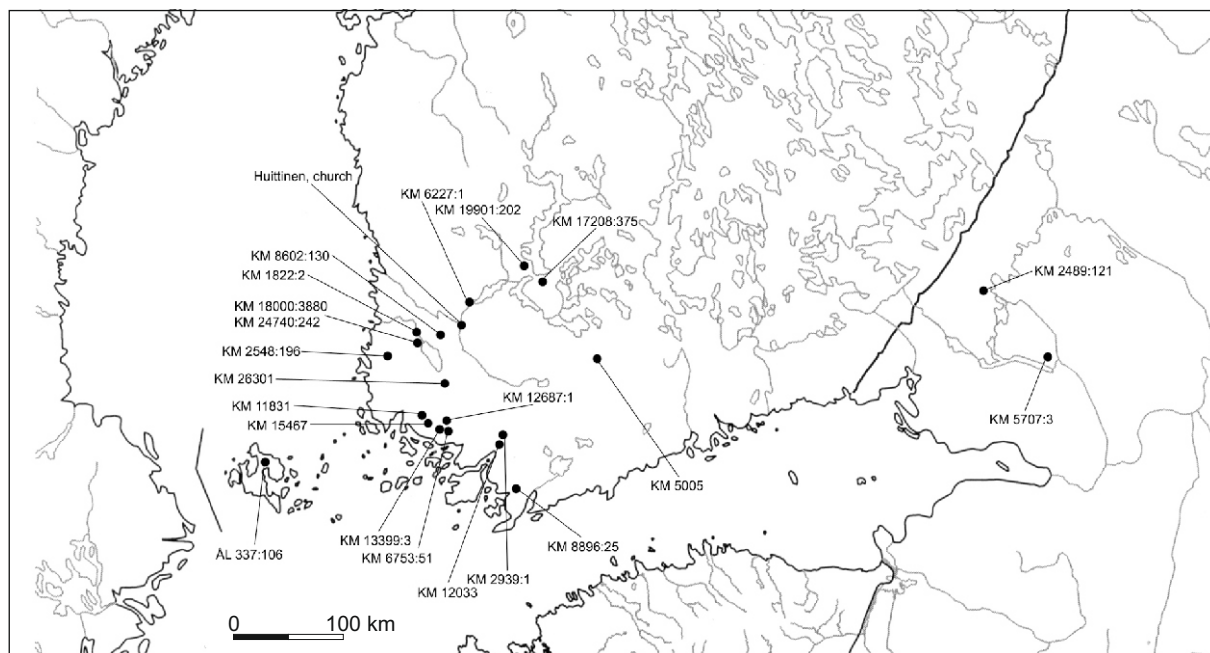


Fig. 13. Letter-like marks only on one or both sides of the blade. *Elaborated by M. Moilanen.*

Ryc. 13. Literopodobne znaki występujące na jednej lub po obu stronach głowni. *Oprac. M. Moilanen.*

of which are reversed, and the motif having a cross on both ends. All inlays are made from twisted pattern-welded material with seven layers, most of which are of iron. These marks strongly resemble those on KM 13419:2 from Turku (see above), which has two woven lattices on the opposite side of the blade, as well as marks on finds KM 1120:1 from Eura and KM 6753:51 from Turku. The motifs on the opposite side of KM 9778 resemble those found on a sword from Mainz, Rhineland-Palatinate, Germany, having a diamond-shaped design, vertical bars and V-shaped designs, also reversed (Geibig 1991, 127, 208, 283, Taf. 73).

#### Letter-like marks on both sides of the blade

These kinds of blades are the most common ones among the category of letter-like marks (Fig. 13). KM 1822:2 from an inhumation cemetery in Eura has figures resembling the letters I, R and L on one side, and highly fragmentary lines on the other, all made from twisted pattern-welded rods. This sword may be dated to the first half of the 10<sup>th</sup> century. KM 2548:196 from a cremation cemetery in Laitila has a motif consisting of alternately reversed E and T-shaped figures, and on the other side similar kinds of figures can be seen along with vertical lines, although these are quite fragmentary (Fig. 14). All the marks are again made from twisted pattern-welded material. The hilt is of Type Q and its chronology falls to the first half of

the 10<sup>th</sup> century. The only foreign finds somewhat resembling this are from Sweden (Jankuhn 1951, Abb. 2).

KM 6227:1 from a cremation cemetery in Sastamala has very fragmentary V, T and H-shaped figures on one side, and some fragmentary vertical bars on the other, all pattern-welded and twisted. With its Type Z hilt, the sword dates back to the second half of the 10<sup>th</sup> century. KM 6753:51 from a cremation cemetery in Turku has crosses and designs resembling the letters U, D, I and H on both sides of the blade, some of the figures being reversed or rotated. The material of the inlays is a twisted pattern-welded rod with nine layers, most of which are of iron. With its Type H hilt, the sword can be broadly dated to 800-950 AD. KM 8602:130 from Köyliö has Petersen's Type T hilt and also marks resembling the letters H and I, made from non-patterned material, which cannot be more accurately defined from the radiographs. This sword is from an inhumation grave, and can be dated to 1000-1150 AD. A sword from Tenhola, KM 8896:25, contains I, N, L and T-shaped figures, sometimes rotated, on both fullers. The figures again made from twisted pattern-welded material. The hilt is of Type H and the chronology falls between 800 and 950 AD.

KM 15467 from Raisio has only a few marks left, a cross and fragments of vertical lines on one side, and fragmentary lines on the other, made from twisted pattern-welded rods. This find may, of course, have also contained an actual

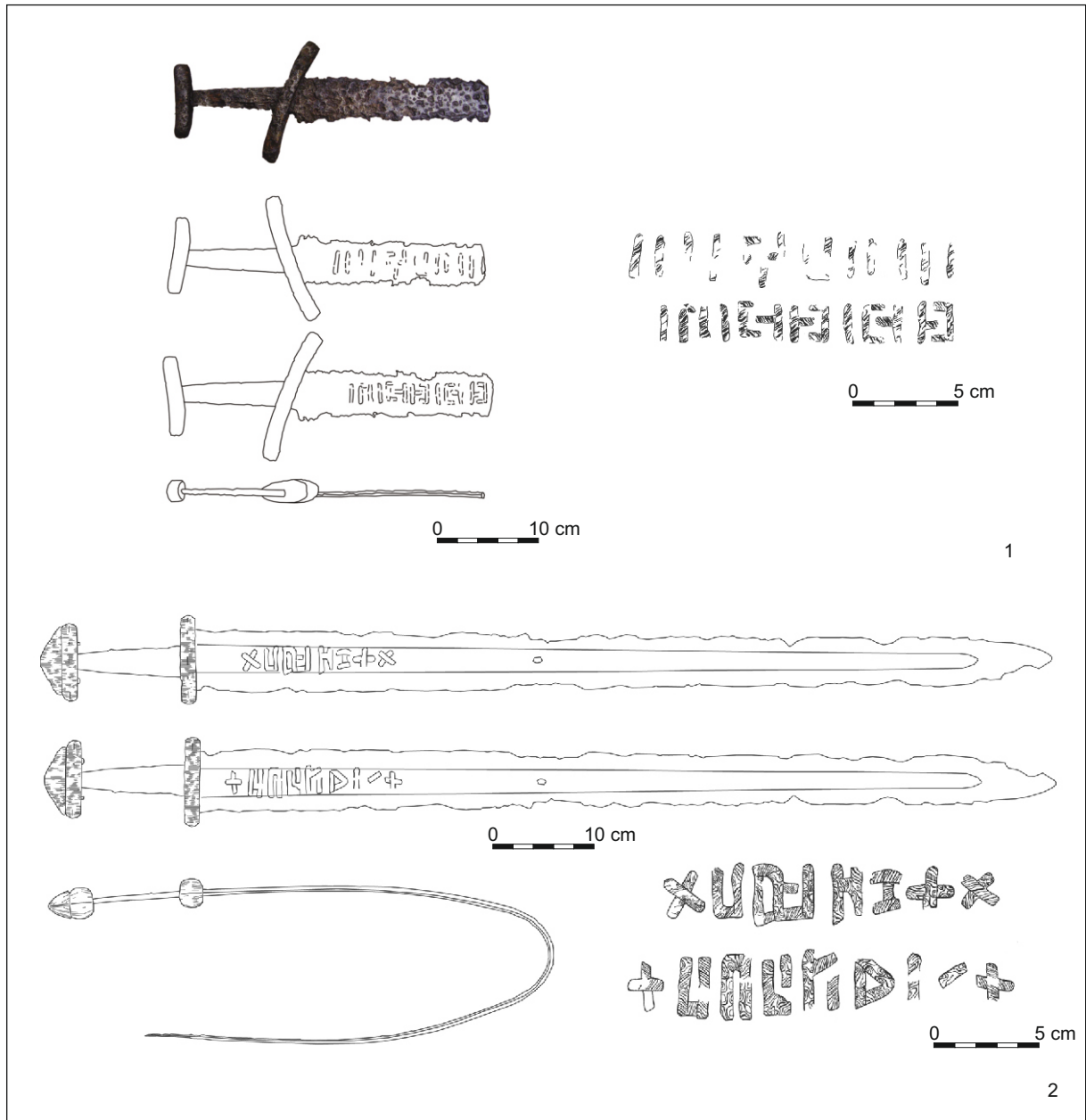


Fig. 14. Swords KM 2548:196 (1) and KM 6753:51 (2). Drawing and photo by M. Moilanen.

Ryc. 14. Miecze KM 2548:196 (1) i KM 6753:51 (2). Rys. i fot. M. Moilanen.

inscription, but this can no longer be observed. This sword is a stray find with a Type H hilt, dating back to between 800 and 950 AD. Another very fragmentary example is known from an inhumation grave in Eura, KM 24740:242, with fragments of vertical diagonal lines made from twisted pattern-welded material. This, too, may have originally contained an actual inscription as well. Again the hilt is of Type H, but on the basis of grave goods the sword may be dated to the first half of the 10<sup>th</sup> century. It is worth noting that this sword is very massive due to its abnormally large hilt parts, the total weight of the sword being ca. 2.3 kg.

KM 26301 is a stray find from Pöytyä (formerly Yläne), and bears figures resembling the letters V, I, F, D, H and L, implying a possible VLFBERHT imitation, except that the 'letters' are reversed, rotated and only 'resemble' actual letters (Fig. 15). The other side has fragmentary vertical and diagonal bars not forming any actual geometric motif. The material of the inlays is, however, twisted pattern-welded rod. The hilt is of Type H, giving a broad dating of 800-950 AD. Individual parts of the motif resemble a find from Randers in Denmark (Lønborg 1994, 10). Finds KM 12687:1 from Turku, KM 13399:3 from Masku and KM

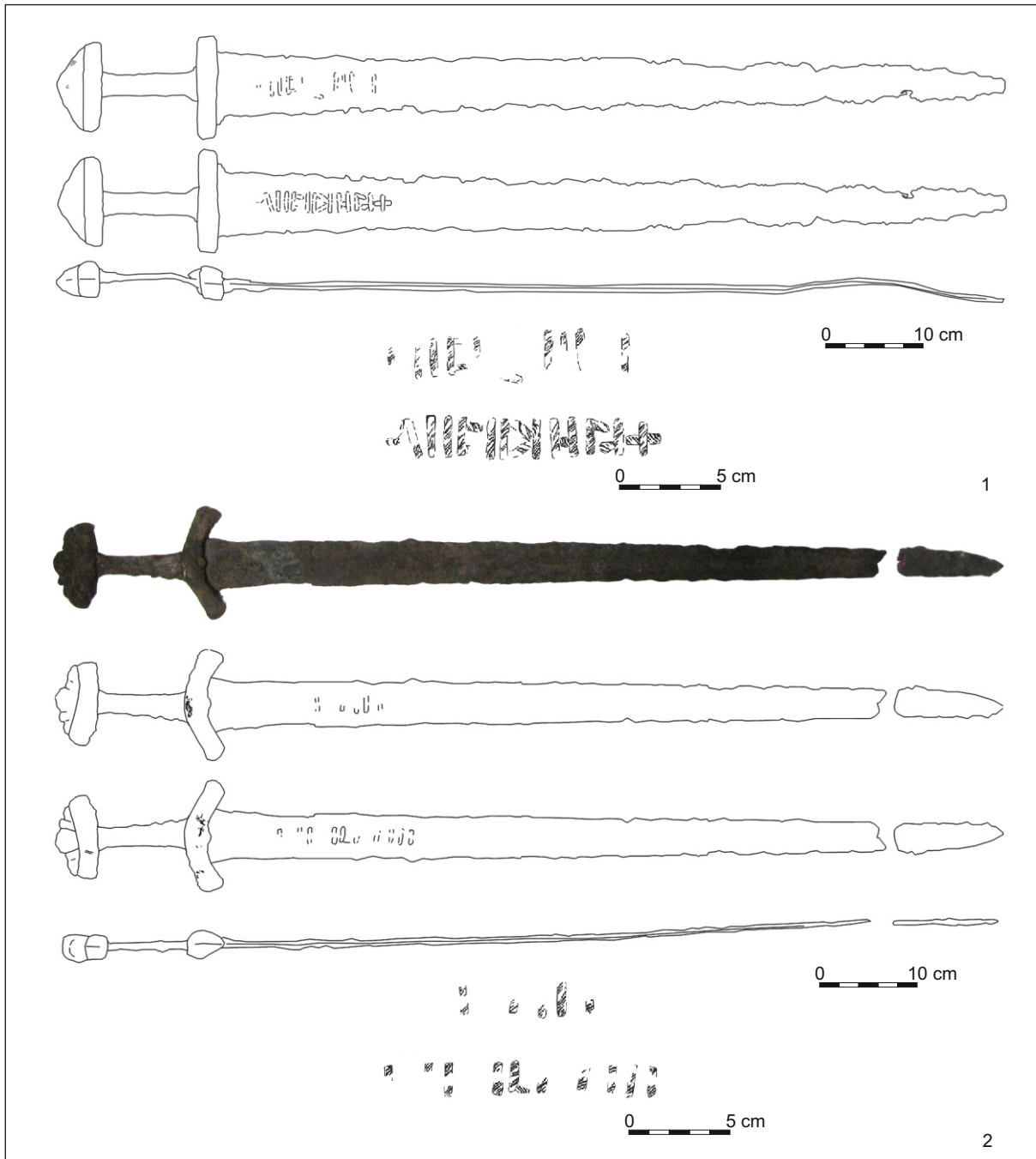


Fig. 15. Swords KM 26301 (1) and KM 17208:375 (2). Drawing and photo by M. Moilanen.

Ryc. 15. Miecze KM 26301 (1) i KM 17208:375 (2). Rys. i fot. M. Moilanen.

17208:375 from Tampere all have remains of pattern-welded letter-like marks on one side and bare vertical lines on the other insofar as the motifs have been preserved. KM 12687:1 has been recovered from an inhumation cemetery, and it bears a hilt of the so-called silver-plated type, which resembles Petersen's Types T and Z. The chronology of this sword is 950-1050 AD. KM 13399:3 is possibly from a cremation burial, and can be dated only very broadly to the

11<sup>th</sup>-12<sup>th</sup> centuries KM 17208:375 comes from an inhumation grave dating back to the 11<sup>th</sup> century. This sword has a hilt of Type Z.

This phenomenon is not unknown among foreign finds. Viking Age finds, for example, from Saaremaa in Estonia and Liškiava in Lithuania have letter-like fragmentary figures on both sides of their blades (Anteins 1966, 114-115, Abb. 2; Антейн 1973, 58). Also very crude ones are known from a sword found in Grof, Norway



(Lorange 1889, Tab. IV). In addition, a sword from Hemmesta in Sweden has similar kinds of motifs, actually close to those on KM 6753:51 (Werner 1982, 16-19). Another sword from Sweden, from an unknown find place in Central Sweden, has letter-like marks including some lattice-like, clumsy patterns in the middle on both sides of the blade (Thålin-Bergman, Kirpichnikov 1998, 501, 505, Abb. 4.3). A sword with brazil-nut pommel from Stade, Germany has long motifs on both sides of the blade consisting of marks resembling the reversed letters V, N and I (Müller-Wille 1977, 57, Abb. 14:5, 73; Geibig 1991, 127, 209, 354, Taf. 144). Another sword from Hamburg-Billwerder in Germany has marks resembling the letters H, N, E, M, L and I, reversed in some cases and lined with crosses potent on one side of the blade (Müller-Wille 1977, 57, Abb. 14:4, 72; Geibig 1991, 127, 210).

Letter-like marks are also found on post-Viking Age blades with narrower fullers and smaller inlays. These normally have similar kinds of marks on both sides of the blade. An essential point is that the marks resemble actual Latin letters, but their order is very random and the marks are often reversed. These facts imply that the motifs are most likely illiterate versions of, for example, the IN NOMINE DOMINI inscription.

KM 5005 from Janakkala has steel figures resembling the letters I, N and O on both sides of the blade, the other side being much more fragmentary. The hilt of this stray find has a disc-pommel, and its chronology can be broadly defined as between 1000 and 1150 AD. Another stray find, KM 5707:3 from Metsäpirtti in Karelia, has I, M and N-shaped figures, sometimes reversed and in random order, on both sides of the fuller (Fig. 16). Also crosses potent are present on one side, all inlays being made from non-patterned steel. The pommel is of brazil-nut shape and the chronology may again be defined as between 1000 and 1150 AD.

Similar steel inlays although fewer in number can be found on the fuller of Sword KM 11831 from an inhumation cemetery in Masku. This disc-pommel sword may be dated to the 11<sup>th</sup> century. Also KM 19901:202 from Ylöjärvi has I, O and N-shaped designs on both sides of the blade, being made from steel rods or even pattern-welded material. The sword has been found in an inhumation grave, and on the basis on its disc-pommel hilt and grave goods it may be dated to the first half of the 11<sup>th</sup> century.

The inlays with fragmentary crosses potent on KM 12033 from Salo are executed in a more confident manner with twisted pattern-welded

rods. This particular sword originates from an inhumation cemetery, and may be roughly dated to 1000-1150 AD with its disc-pommel hilt. The sword from the church of Huittinen has abnormally long motifs consisting of crosses potent and fragmentary letters resembling I, N and O, among others, all in random order and inlaid with steel rods. The context of this sword is problematic, since it has been preserved in the church of Huittinen, but its condition indicates an inhumation grave (Moilanen 2009a). Due to its disc-pommel hilt, the sword may be dated to the 11<sup>th</sup>-12<sup>th</sup> centuries. In foreign cases, a sword from Ludwigshafen am Rhein-Oggersheim, Germany has inlays in the form of CNNCINNMMIIN+ and NI...NCNI (Geibig 1991, 127, 208, 279, Taf. 69). Also German finds of swords from Kalkar-Niedermörmter (ibid., 127, 208, 306, Taf. 96) and from the River Rhine at Duisburg in North Rhine-Westphalia (ibid., 127, 208, 302, Taf. 92) have figures resembling the letters N, M, O and I in random order.

Some blades with smaller inlays have marks only on one side of the blade, perhaps intentionally, but this may also be caused by corrosion. KM 2489:121 from Kaukola in Karelia, has lines and a fragmentary O-shaped figure on one side of the blade, inlaid with small steel rods (Fig. 17). The sword has been recovered from an inhumation grave dating to the second half of the 12<sup>th</sup> century. The hilt has a disc-pommel which is decorated with silver wire inlays. A disc-pommel sword, KM 2939:1 from an inhumation cemetery in Salo, has I, O and N-shaped marks on only one side of the blade, possibly made from pattern-welded material. The other side of the blade is completely pattern-welded, while the chronology to this sword is between 1000 and 1150 AD. These may also be found among foreign sword finds, for example from Tornimäe (Prank 2011, 38-39) and Lõpi (ibid., 40-41) in Estonia. According to publications, it is hard to be sure whether the blades were examined and documented well enough to state that the opposite side of the blade actually lacked any inlays.

A similar phenomenon of possible one-sided letter-like inlays may be observed in Swords KM 18000:3880 from Eura and ÅL 337:106 from Saltvik, although neither one has been investigated with stereoradiography, thus leaving it possible that there are inlays on both sides of the fuller. KM 18000:3880 is a grave find from an inhumation cemetery, and on the basis of its Type X hilt and grave goods it may be dated to the 10<sup>th</sup> century. ÅL 337:106 has been recovered from a burial mound, dated to between

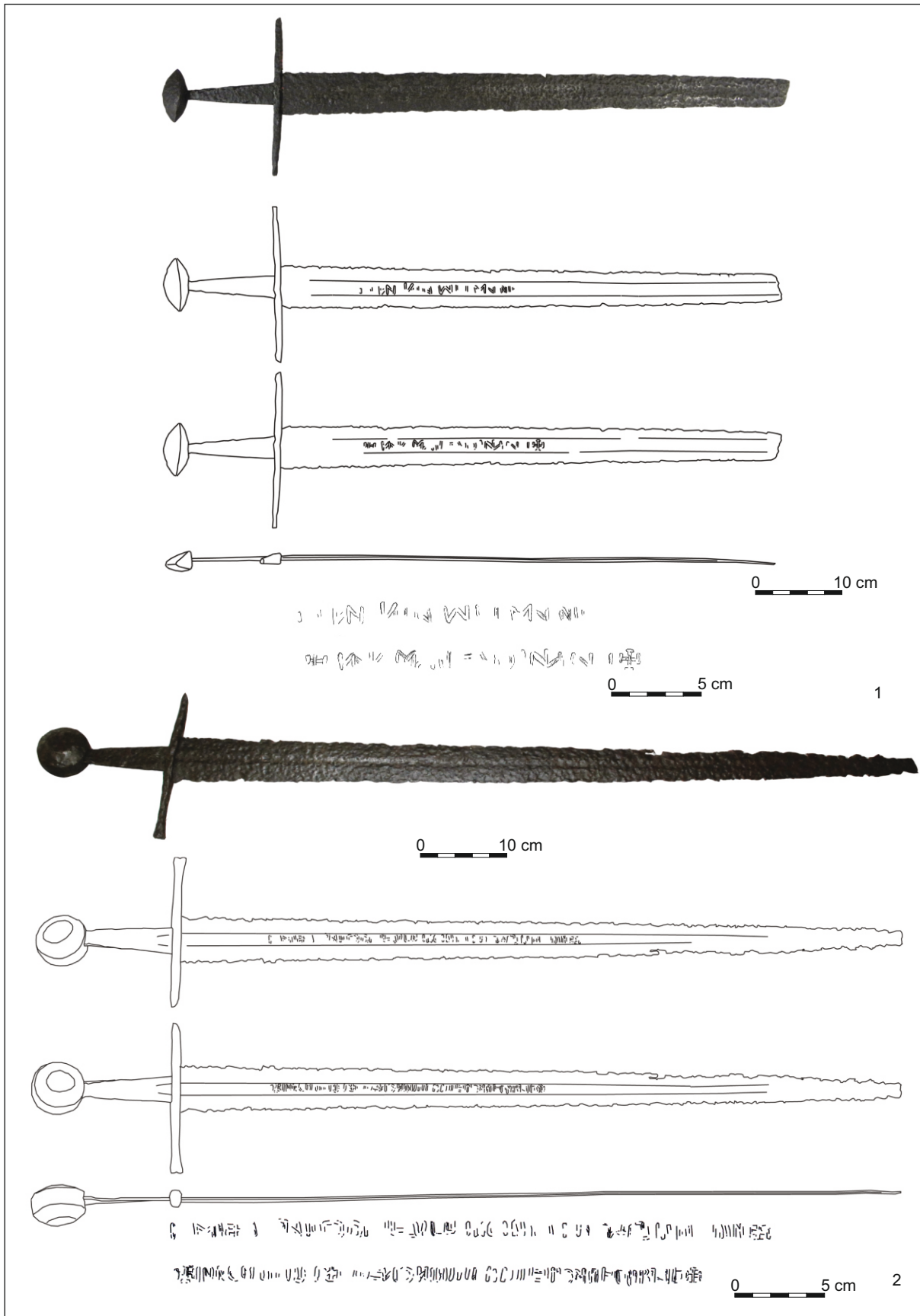


Fig. 16. Sword KM 5707:3 (1) and the sword from the church of Huittinen (2). Drawing and photo by M. Moilanen.

Ryc. 16. Miecz KM 5707:3 (1) i miecz z kościoła w Huittinen (2). Rys. i fot. M. Moilanen.

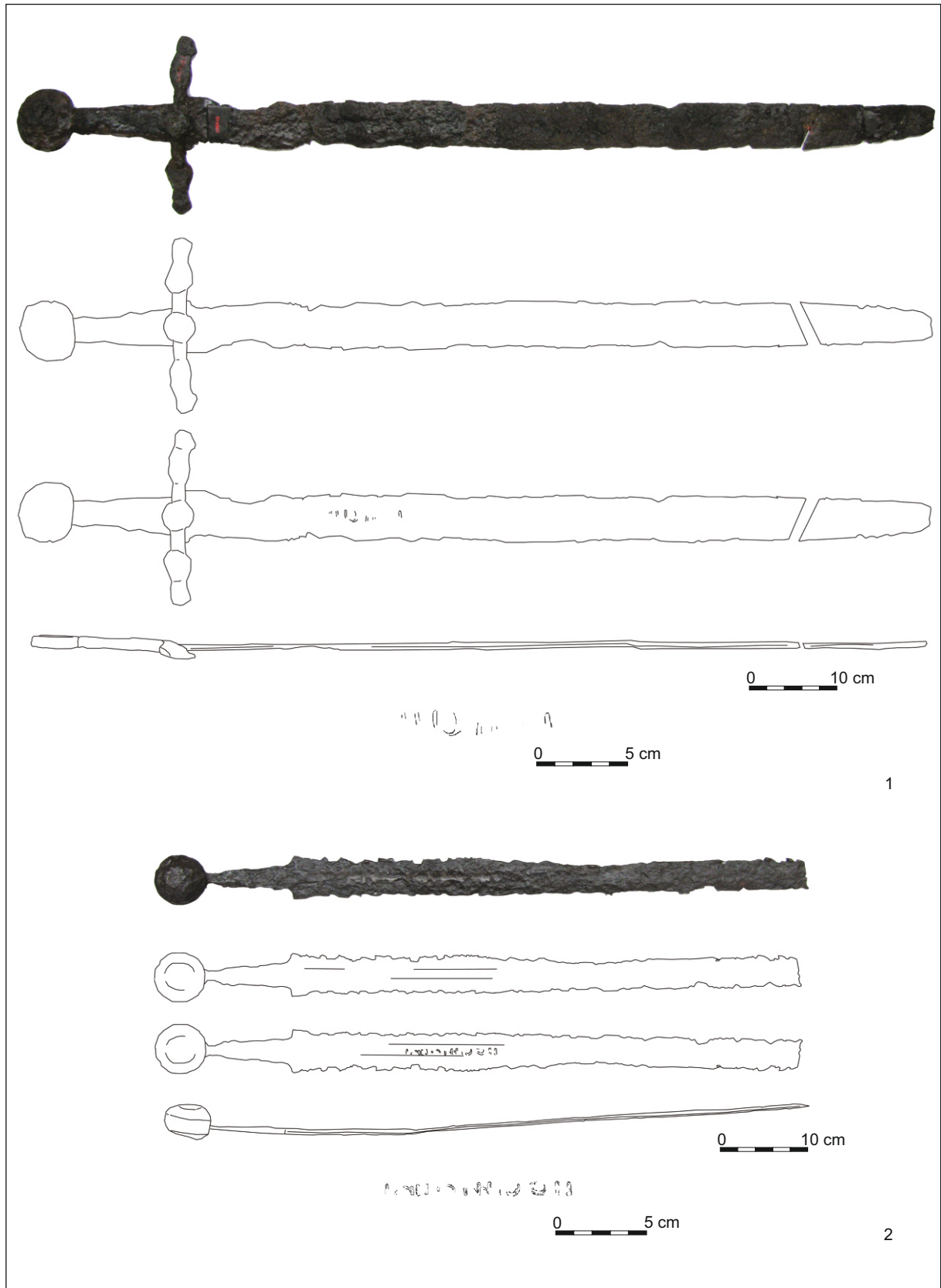


Fig. 17. Swords KM 2489:121 (1) and KM 2939:1 (2) with marks on only one side of the blade. *Drawing and photo by M. Moilanen.*

Ryc. 17. Swords KM 2489:121 (1) i KM 2939:1 (2) ze znakami tylko na jednej ze stron główni. *Rys. i fot. M. Moilanen.*

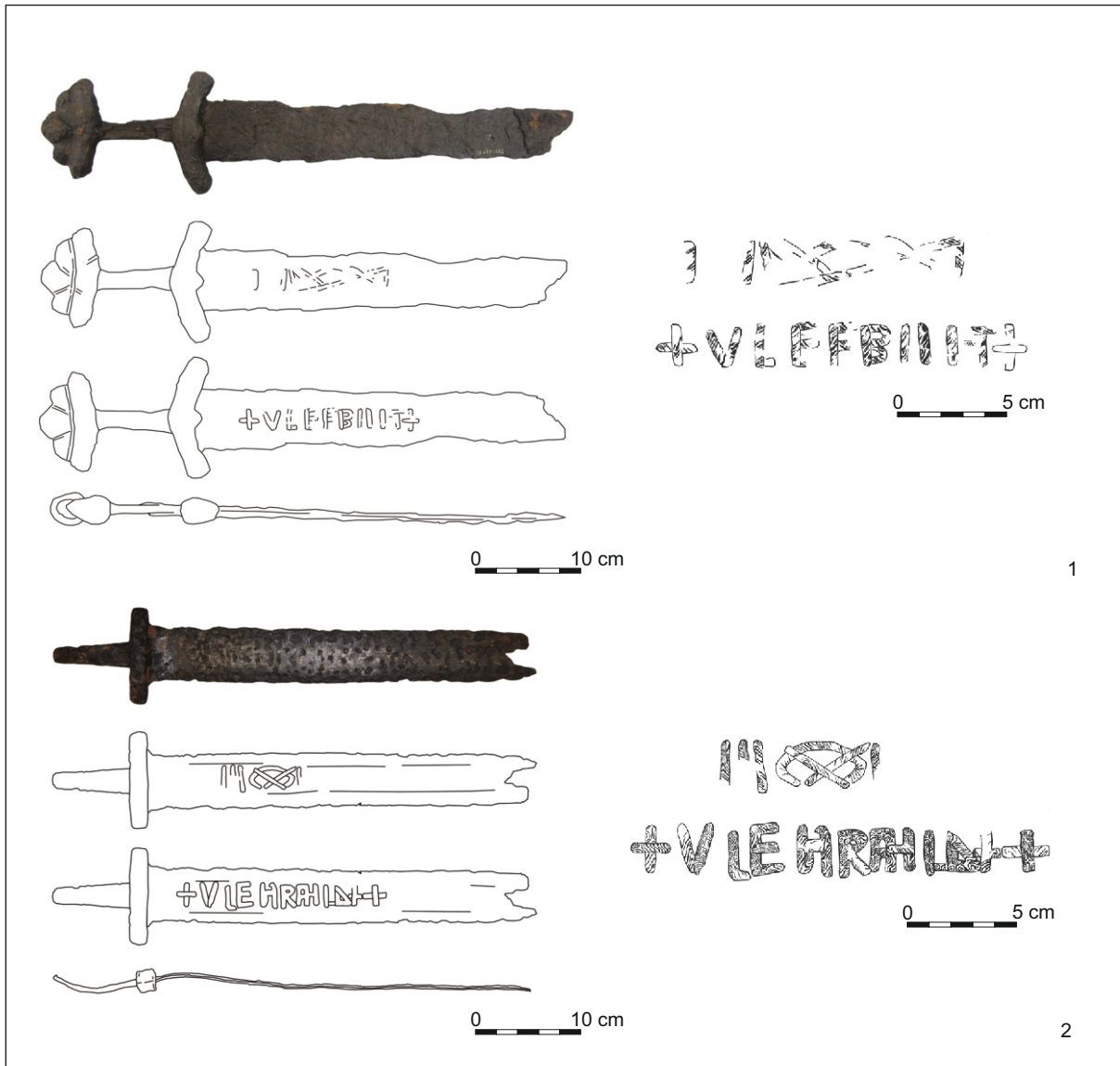


Fig. 18. Swords KM 13839:253 (1) and KM 10390:5 (2) as possible imitations of VLFBERHT text. *Drawing and photo by M. Moilanen.*

Ryc. 18. Miecze KM 13839:253 (1) i KM 10390:5 (2) z imitacjami napisów VLFBERHT. *Rys. i fot. M. Moilanen.*

775 and 825 AD. This chronology is in accordance with the sword's hilt, which is Petersen's Special Type 2.

#### Observations on letter-like marks and their chronology

In general, the letter-like marks in Finnish material seem quite unique when compared with each other. Marks are usually in random order, and in many cases they are preceded or followed by a simple cross, which can sometimes be seen at both the beginning and the end of the motif. We can surmise that these blades may be imitations of those with crosses in the Latin inscription, viz. VLFBERHT. The lattices and lines on the opposite side of the blade also suggest such an interpretation.

Among Finnish finds there are two examples of somewhat better imitations of VLFBERHT-blades. A sword from an inhumation cemetery in Pöytyä (KM 13839:253) has an inscription +VLEFBIIT+, which clearly implies an illiterate imitation of an VLFBERHT sword (Fig. 18). Another example is known from Vesilahti (KM 10390:5), and it bears an inscription looking like +VLEHRAHLDH+. In both these cases the inlays were pattern-welded like in correctly spelled ones. The sword from Vesilahti was found to be low-carbon steel in its cutting edge (Williams 2009, 138).

Another feature common to many letter-like motifs are figures shaped like the letter L and alternately reversed. Marks of this kind can be



observed on several blades. The best examples are Finds KM 9778 from Kokemäki and KM 13419:2 from Turku, a few marks of a similar kind also on Swords KM 6753:51 from Turku and KM 1120:1 from Eura. All four examples have different motifs on the reverse side of the blade. Motifs of almost a similar kind with reversed marks resembling the letter L have been found in Gnezdovo, Russia, with varying motifs on the opposite side of the blade (Kirpichnikov 1970a, 173, Fig. 3; 1970b, 62, Fig. 3; Антейн 1973, 52-53), and also from Gnista, Sweden (Werner 1982, 17-20) and Berg, Sweden (Thålin-Bergman, Kirpichnikov 1998, 500, 506, Abb. 5:2), which means that the situation is not different from that in Finland. The two Norwegian examples, one from Sæbø (Cat. No. 1622) and one from Langve (Cat. No. 3315) contain even more complex lattice weaves on their blades (Lorange 1889, Tab. IV). A sword from Malvik, Norway has similar L-shaped figures on both sides of the blade (Stalsberg 1994, 185, Fig. 39).

A Petersen Type C sword from Sæbø, Norway calls for special attention. In some cases, its figures have been interpreted as fragmentary runes. The inlays have been interpreted as 'OH MUP', meaning Thormuþ (Wegeli 1903-1905, 181). The swastika incorporated in the inscription has been seen as the symbol of Thor's hammer. Another interpretation is that the inscription is to be read 'OH ÞURMUP' meaning literally 'owns [owned by] Thurmuth' (Stephens 1866-67, 407). The opposite side of the blade has a complex lattice weave lined by vertical bars. Despite the runic interpretations, it seems more plausible that this blade is yet one more example of letter-like marks instead of clear runes.

In the European context, marks of these kinds seem to be surprisingly common, and they may have been more common than studies show since almost all of them concentrate on actual inscriptions instead of unrecognizable figures. To summarize, these kinds of figures and marks have been found at least in Norway, Denmark, Russia and Estonia (Lorange 1889, Tab. III; Антейн 1973, 52-53; Lønborg 1994, 10).

The chronology of letter-like marks is as follows, according to the Finnish material (see also Fig. 4). During the second half of the 8<sup>th</sup> and first half of the 9<sup>th</sup> centuries, letter-like marks start to appear on blades. These are, during the earliest period of their appearance, connected to lattice patterns on the opposite side of the blade. During the second half of the 9<sup>th</sup> century these marks become more common, and are found on blades provided with hilts of Petersen's Types C, H and I. In the

11<sup>th</sup> and 12<sup>th</sup> centuries the imitation of Christianity-related words and sentences led to a great number of letter-like marks.

### On the materials of marks and blades

Since the blades with letter-like marks are considered as imitations or perhaps local products, their technology is of great interest. To approach the blades first, some have been analysed in detail through metallographic research. Among the analysed finds in my doctoral thesis, a sword from Laitila (KM 2548:196), bearing clear letter-imitating marks, was entirely made of low-carbon steel (approximately 0-0.3% C) (Fig. 19). The microstructure exhibited ferrite and some pearlite, and also coarsely ferritic areas. The hardness of the blade was on average 131 HV (99-195 HV), and the blade had been thoroughly annealed, most likely on the cremation pyre. Having a very low carbon content, it is unlikely the sword was designed for use in combat. On the other hand, it may simply have been a weapon of poorer quality, sold as a quality sword because of its inlaid marks.

From foreign material, a Petersen Type H sword from Randvere, Saaremaa, Estonia (IIE-K 85:129) had two lattices and vertical lines on one side of the fuller, and letter-like marks on the other side (Антейн 1973, 53). The blade was piled from three layers. From its cross-section it was noted that the centremost layer had a higher carbon content (approximately 0.4-0.8% C), suitable for an effective combat weapon. The flats were made of lower-carbon steel (ca. 0.2-0.4% C). The centremost layer reaches the cutting edges, making them hard while the flats are softer. All structures showed ferrite and pearlite, and the blade had been hardened to make it functional in battle.

Some of the blades analysed by Alan Williams (see Williams 2012 for conclusions of his studies) may be included in the same category of letter-like marks. A sword from Donnybrook, Ireland (Nottingham Castle Museum T608) has been interpreted as having marks resembling Latin letters, some of them inverted (Williams 2009, 140). Williams analysed samples from both near the centre and from the edge. The centre sample contained only 0.2% C and a hardness of 250 HV on average, while the edge had carbon content of 0.3-0.4% C and a hardness range of 520-550 HV. The blade microstructure indicated possible quench-hardening. A sword from Gnezdovo with letter-like marks was found to be entirely ferritic (Колчин 1953, 133-134).

Also two swords from Mikulčice, Czech Republic exhibit letter-like marks, both also

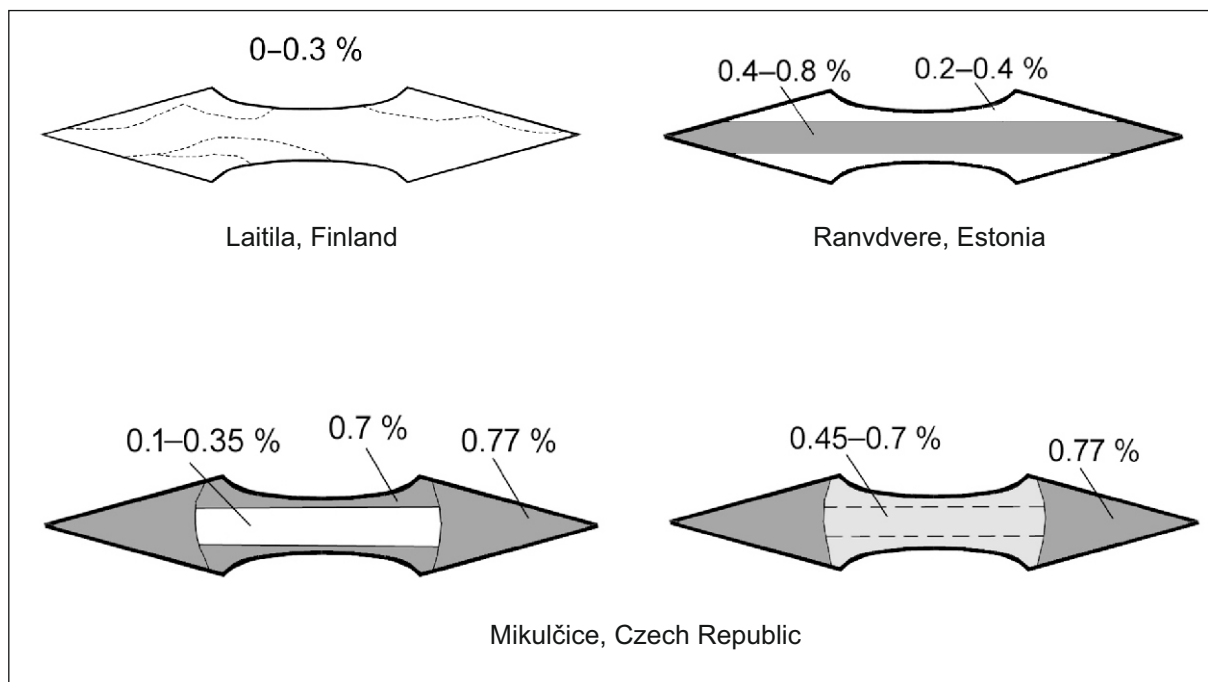


Fig. 19. Cross-sections of blades bearing letter-like marks: KM 2548:196 from Laitila, Finland; IIE-K 85:129 from Randvere, Estonia; two blades from Mikulčice, Czech Republic. The percentages indicate the average carbon content in each part of the blade. *Drawing by M. Moilanen.*

Ryc. 19. Przekroje główki mieczowych z literopodobnymi znakami: KM 2548:196 z miejscowości Laitila, Finlandia; IIE-K 85:129 z miejscowości Randvere, Estonia; dwie główki z Mikulczyc, Republika Czeska. Procenty oznaczają zawartość węgla w różnych partiach główki. *Ryc. M. Moilanen.*

having piled blades with separate cutting edges. The core part of Grave 438 sword was 0.1-0.35% C steel (115-228 HV), the surface parts had 0.7% C and a hardness between 376-466 HV, and the cutting edges had 0.77% C and a hardness between 458-495 HV (Košta, Hošek 2014, 131-134). Steels of 0.45% and 0.7% C were used to compile the central part of sword from Grave 723, while its edges had a carbon content of 0.7%. The hardness of the core was between 131-185 HV, while the values for the edge were between 259-413 HV (*ibid.*, 185-191). Both of these blades were hardened, the latter one only in its lower portion though.

The marks themselves were pattern-welded in the majority of all inlaid blades. It is traditionally said that in pattern-welding, iron and steel are forge-welded together. More accurate measurements of pattern-welded materials exist in the form of metallographic analyses on various kinds of pattern-welded objects of the Iron Age (see Moilanen 2015, 117-120). The most common combination is pure or fairly pure iron forge-welded to low-carbon steel. The second observed combination of pattern-welded layers is iron forge-welded together with high-carbon steel. In some cases the carbon content of the steel layers in pattern-welded rods was as high as 0.7% C (Ypey 1980, 198). The third alternative is to

weld together low-carbon steel and high-carbon steel, the patterns having no pure, carbonless iron (e.g. Thålin-Bergman, Arrhenius 2005, 31).

Besides carbon, some other elements are present, the most important being phosphorus. In some analysed pattern-welded rods from Merovingian Period sword blades, the carbon contents of the laminated layers were not considerably different. Instead, there were differences in the phosphorus content of the laminates (Salin 1957, 66; Lang 2007, 66-67). In all blades analysed by Lena Thålin-Bergman and Birgit Arrhenius (2005) phosphorus was present in iron or strips with lower carbon content. Similar phenomenon was observed by Košta and Hošek in Czech swords, the phosphorus contents varying between 0.6-1% P in one element of pattern-welded bands (Košta, Hošek 2014, 69, 86-87, 163-167, 232-234). While forge-welding together pure iron and carbon steel, the carbon contents of these materials will be evened out to some degree, and the danger of losing the pattern is great, especially with carbon contents of similar levels. If materials with some phosphorus are used, the preservation of the pattern is more certain, and the pattern will be even more contrasted (Thålin 1967, 236). Phosphorus-rich material will also etch more brightly.

Unfortunately the study of the pattern-welding of inlays, using metallographic analysis, has only



Fig. 20. The most plausible method for making ferrous inlays on a sword blade: 1 – letters and marks formed from pattern-welded rods; 2 – sinking the rods by hammering them cold against the hot blade; 3 – attaching the sunken inlays by forge-welding; 4 – inlays welded into a blade blank; the inlays have not been considerably flattened, but only sunk into the blade; 5 – a completed, polished and etched blade. Photo by M. Moilanen.

Ryc. 20. Najbardziej wiarygodna metoda wykonywania żelaznej inkrustacji w głowniach mieczowych: 1 – formowanie liter i znaków ze skręconych prętów żelaza; 2 – wklepywanie chłodnych prętów młotkiem w rozgrzaną głownię; 3 – łączenie inkrustacji z głownią poprzez zgrzewanie; 4 – inkrustacja zgrzana z głownią; inkrustacja nie została jeszcze całkowicie spłaszczona, a jedynie połączona z głownią; 5 – kompletna, wypolerowana głownia. Fot. M. Moilanen.

been occasionally and randomly undertaken. The definition of materials has been somewhat sketchy. For example, a Petersen Type L sword from the Netherlands was stated to bear inlays pattern-welded from 'iron' and 'steel', based on an evaluation from polishing and etching (Willems, Ypey 1985, 106). The laminates used in the pattern-welded inlaid rods differ in their composition to create the contrast, as in the case of other artefacts with pattern-welding which are known from the Iron Ages.

Alan Williams analysed a small part of an inlay from a Norwegian VLFBERHT sword, and it appeared to be almost pure iron (Williams 2009, 126, 150). The Latvian researcher Alekšis Anteins analysed some of the pattern-welded inlaid rods of a sword from Durbe, Latvia (MIL-KRM 2023:1), and concluded that the laminates contain 0.2–0.3% C (Антейн 1973, 54). In addition, one studied example of the use of phosphorus-rich iron is an VLFBERHT sword from Öland, Sweden (Thålin-Bergman, Arrhenius 2005, 100–101). In the case of the above-mentioned sword from Durbe, more phosphorus was present in the low-carbon steel used in pattern-welding than in the iron layers (Антейн 1973, 54).

The cross-section analyses conducted for my doctoral thesis included eight blades with pattern-welded inlays, in six of which the materials used in the patterns could be examined from the cross-section of the blade. In all cases where the inlay was intact enough to permit elemental analysis, the brighter component of the pattern-welding contained an elevated amount of phosphorus. This can also be deduced from the relatively high hardness measurements compared to the darker-etching component of the pattern-welding. The darker layers naturally contain more carbon than the brighter layers. It is also noteworthy that phosphorus-rich material was used in every studied case here, no matter what the inlays were, or how the blade was constructed. In other words, the contrast created with the help of phosphorus-rich material must have been widely known among contemporary bladesmiths, both skilful and less skilful ones.

#### The manufacture of marks in practice

There are many theories about the actual technique of inlaying iron on sword blades; some are based on the inspection of archaeological finds while others are purely hypothetical. To balance



the matter, some experimental work has also been done during the 1990s and later, with results of varying quality (e.g. Andresen 1993; Hansen 2007). Especially the work done by non-academics and commercial blacksmiths usually lacks the basis of archaeological knowledge.

I conducted a series of experiments for my doctoral thesis, producing thirteen inlaid sword blades (see also Moilanen 2009b). The resulting methods all combine two variable factors: the method of embedding the inlay and the stage of manufacture of the blade itself. One technique seems to be the fastest and appears to produce the result that is the most similar to the majority of the archaeological finds. In this method cold inlays are first embedded into the hot blade blank by mere hammering, after which they are hammer-welded one blade flat at a time (Fig. 20).

Alternatively, inlaid wires could have been embedded by carefully punching grooves for them. No archaeological find supports carved grooves, although this cannot be ruled out due to the very small number of finds analysed in sufficient detail. With these means also post-Viking Age smaller inlays could be produced relatively easily.

Larger inlays could also have been made by forge-welding the rods directly on the surface of the blade, but this requires more skill and accuracy, as well as shorter inlaid motifs to succeed. Pattern-welding on the inlays was also experimented with and was found to be relatively easy and similar to that used earlier to construct mid-sections of sword blades, only in smaller scale. This stage, too, may be carried out with different methods and tools, while the principle of pattern-welding remains the same (Fig. 21).

To conclude, the results of the experiments support the idea that inlays were produced by a number of smithies and makers. The inlaying process may have been carried out with slightly different methods and it could also have been done in various stages of sword manufacture. These facts make it plausible that various blacksmiths could have deduced some of these above-mentioned combinations of techniques to produce their own versions of inlaid blades after they had seen a completed inlaid sword.

Some Arab writers have incorporated information of peoples producing swords during the Late Iron Age. For example, Al-Nadim and Al-Biruni have connected Latin letters to Frankish swords, and Al-Kindi has stated that patterned swords were produced also outside Frankish areas (Zeki Validi 1936, 20-26). These accounts do not mention specific kinds of inlays, but in some cases descriptions interpreted as referring to

pattern-welding of blades. What is evident from these sources is that they claim swords being made by various peoples and in various places in Europe (ibid., 22-29). For example, Arab writers could have used the term “Rus” to describe Scandinavian people in general producing swords like Franks did. These interpretations would support the theory of Scandinavian manufacture of swords in general.

In addition, in the experiments conducted in my thesis, it was noted that inlays – as well as complete blades – could have been manufactured with very simple tools. Also the order in which the blade was forged into shape could be altered to meet the skills and conventions of the blacksmith. Similarly, inlays could be produced in variable ways – some faster and easier and some slower and more difficultly – again in accordance with the personal habits and ingenuity of the maker.

#### **Discussion on the meaning and interpretation of letter-like marks**

Letter-like marks as a whole seem to be characteristic of Scandinavia, the Baltic countries and Russia, the majority of them being from Sweden, Norway, and according to my doctoral study, also Finland. It must of course be realised that due to the unsystematic nature of research on blade inlays, the observations presented here reflect only the situation as studied so far. Thus it remains somewhat speculative to draw any conclusions on the origin of the blades on these grounds. Nonetheless, it may be stated that letter-like marks and imitative and obscure motifs have been found more often in northern areas – Scandinavia, Baltic countries and Russia – than other parts of Europe. This clearly implies that imitative motifs were manufactured in the north, and that according to the study of details and materials, the manufacturing was carried out by several makers. This may have been the case even within the Frankish realm, as directly indicated by various makers’ names. The picture is distorted by the fact that the majority of Viking Age sword finds have been discovered outside the Frankish areas, because Christian burial traditions prevailed in the western Europe at the time.

The examination of how inlays – letter-like or some other motifs – were understood in Europe, especially in Scandinavia and Finland first requires an understanding of the language that was used during the Late Iron Age. In the Frankish areas in Continental Europe Latin had been the common written language even before the Carolingian era, and literacy and writing were promoted during the Carolingian renaissance in the 8<sup>th</sup> and 9<sup>th</sup> centuries, especially during the reign of Charlemagne. The



Fig. 21. The making of a pattern-welded pack for ferrous inlays: 1 – a pack made from alternating sheets of iron and steel, bound together with iron wire and ready to be forge-welded as solid; 2 – flattening the welded pack by hammering; 3 – cutting a strip from the flattened pack with a chisel; 4 – twisting a strip with the help of tongs; 5 – a pattern-welded rod almost halfway in the process of being ground, polished and etched, showing its patterns. *Photo by M. Moilanen.*

Ryc. 21. Sposób wykonania dziwerowanego pakietu używanego do inkrustacji główki mieczowych: 1 – pakiet wykonany z naprzemiennie ułożonych kawałków żelaza i stali, związanych żelaznym drutem, gotowych do zgrzania w jedną sztabkę; 2 – spłaszczanie złączonego pakietu przez młotkowanie; 3 – odcinanie wąskich pasków ze spłaszczonego pakietu za pomocą przecinaka; 4 – skręcanie paska przy pomocy szczypiec kowalskich; 5 – dziwerowany pręt po wypolerowaniu z uwidocznionym wzorem. *Fot. M. Moilanen.*

picture, however, is mixed, because a vast number of dialects, both Germanic and Romance-based, were spoken in the Frankish territories in this period (e.g. McKitterick 1989, 7). It has been suggested that the skills of reading and writing were limited to certain classes of society such as clergy and administrative organs, but this matter is under debate.

In the case of Scandinavia, a generally accepted term is “common Scandinavian”, a quite

uniform mixture of dialects spoken in Scandinavia from the Late Merovingian Period to the end of the Viking Age (e.g. Wolf 2004, 41). The language was divided between East and West Scandinavian, the former consisting of Old Swedish and Old Danish, and the latter, also known as Old Norse, comprising old versions of Norwegian, Icelandic and Faroese. It is still uncertain where Finland stands in this setting. It is commonly claimed that some kind of proto-Finnish language belonging to



the Finno-Ugric group of languages was spoken in Finland already during the Early Iron Age, but it seems likely that, due to trade contacts, at least East Scandinavian was familiar to these contemporary residents (e.g. Barnes 2008, 280).

Writing itself was not a widespread skill. In Sweden, numerous rune-stones stand as witnesses of the runic alphabet, which prevailed from the Early Iron Age onwards (e.g. Stenberger 1964, 810-811). Some Finnish finds also show names and marks executed with runes. During the Viking Age the Latin alphabet was not yet familiar in Scandinavia. Writings on birch bark strips dating from the 11th century onwards have been found in considerable numbers in Novgorod in Russia, showing an early form of Cyrillic alphabet as well as ancient Russian language and some Baltic Finn language (e.g. Uino 2003). It is necessary to mention here a sword found in present-day Ukraine with pattern-welded inscriptions of Cyrillic appearance transliterated as 'KOVAL' and 'LJUDOTA', meaning a blacksmith named Ljudota (e.g. Кирпичников 1966, 41; Антейн 1973, 48). This particular sword has been dated to the 11<sup>th</sup> century (Stalsberg 1989, 19-20), contemporaneous with the oldest birch-bark texts. Because these particular sword blade inscriptions are fragmentary, their nature as Cyrillic letters has been questioned too (e.g. Androščuk 2003).

It is obvious that in the light of the above, the majority, if not all, inhabitants of the present area of Finland, were unable to read Latin letters, since they were not yet known in Scandinavia during the Viking Age. Of course the possibility of the presence of immigrants of higher social status from Continental Europe cannot be excluded. Either the language was a form of Old Scandinavian or something else, but Latin texts were most likely incomprehensible. Thus, ferrous inlays in swords were regarded as perhaps magical symbols (e.g. Kivikoski 1961, 245) or then as mere evidence of good quality.

It may have been so that in the first stages when ferrous inlays on swords were a fresh phenomenon, such weapon were acquired as status artefacts of a kind to reflect societal position or wealth, for example. In general, blacksmiths' names could have been understood as signs of high quality (e.g. Stalsberg 1989, 22). The situation may have changed due to Christian missionaries, but still the large number of misspelt inscriptions as well as imitative series of Latin letters suggests that in many cases the texts remained still not understood. Perhaps the best examples are swords signed by Gicelin, all having also the inscription 'in nomine domini', 'in the name of the Lord' (e.g. Oakeshott

2002, 9). This same phrase has many variations and possible abbreviations, some of which are likely to be imitations in order to falsify the origin of the sword and/or to gain some element of religious power.

Letter-like marks have been recognised to imitate some Latin letter combinations, perhaps a name like Ulfberht or Ingelrii, the maker being some illiterate blacksmith selling the swords to illiterate people (e.g. Cowen 1934, 181; Jankuhn 1951, 216; Kirpichnikov, Stalsberg 1998, 509). Judging from the number of these kinds of motifs, these false, misspelt names were actually acquired by customers. In this case, the wrongly spelled names did not have any effect on buyers, since other values dictated the meaning of the inlays, as was stated above.

According to Anatoly Kirpichnikov and Anne Stalsberg, the production of these imitative, though quite qualified blades in some cases took place somewhere in Northern Europe, since these scholars have found twelve from Norway, nine from Sweden, two from Finland, one from Estonia, and three or four from Russia (Kirpichnikov, Stalsberg 1998, 512). The number of Finnish examples in this category is far larger as indicated by the present study (a total of 33 examples), and thus supports the hypothesis of Scandinavian origin of these blades, although it cannot be ignored that the majority of sword finds have been found in Scandinavia due to the prevailing pagan burial rites at the time, as has been mentioned earlier too. Taking into account the Finnish situation, systematic research may reveal more marks and motifs of these kinds elsewhere in Scandinavia.

It is interesting to note that no runes were ever forge-welded on sword blades, which may be due to the fact that runes were no longer used in Continental Europe at that time (e.g. Ellis Davidson 1962, 43). One sword from Borge, Norway (Museum of Trondheim T.15018), has been claimed to exhibit signs resembling runes (Kirpichnikov, Stalsberg 1998, 511), but to me these are more like letter-like marks since no clear runes are evident. The lack of runes on sword blades reflects the fact that people were seeking blades with patterns, symbols or Latin letters – everything that looked Frankish – and runes would have indicated that the blade was of local manufacture and thus perhaps not as good as the Continental ones. This leads one to assume that local manufacture for instance in Scandinavia was perhaps kept secret, and the products were claimed to originate from Continental Europe. On the other hand, runes may have not been

considered as ‘powerful’ or ‘meaningful’ as symbolic motifs and Latin letters, which were then attempted to be replicated in local products.

In Finland, it is very likely that Latin texts in blades were incomprehensible, even during the Crusading Period, when there was still a large number of vague combinations of Latin letters in the swords, which may have been originally intended as abbreviations of Christian sentences and invocations. From a basic perspective, the inlays – whether inscriptions or other motifs – were regarded as marks of quality, allowing the smith to ask for a higher price for the sword. Other, symbolic meanings can also be surmised.

In a technical sense, inlays, especially pattern-welded ones may have been seen as trademarks, signs of blacksmith’s skills and the high quality of the blade in question. The technical complexity of the inlays may have been a way to prevent their copying (e.g. Rätty 1983, 181), although according to the experiments discussed above, it is relatively simple to inlay a sword blade with pattern-welded rods, and with various techniques. It seems evident that during the Late Iron Age, both skilful and less skilful swordsmiths were present in Scandinavia and its immediate surroundings producing iron inlaid blades.

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## NIEUDOLNE IMITACJE I TOWARY LUKSUSOWE: LITEROPODOBNE ZNAKI NA FIŃSKICH WZESNOŚREDNIOWIECZNYCH GŁOWNIACH MIECZOWYCH

### Streszczenie

Głownie mieczowe zaopatrzone w żelazne inkrustacje pojawiły się ok. 700 r. i były wykonywane w przybliżeniu do ok. 1100 r. lub nawet dłużej, szczyt popularności uzyskując w okresie wikingim, ok. 800-1025 r. według chronologii fińskiej. Powszechnie znaki te wykonywano na powierzchni zbrocza w pobliżu oprawy, zwykle na obu stronach brzeszczotu. Inkrustowane napisy interpretowano z reguły jako imiona kowali lub mieczników, spośród których najbardziej popularne były VLFBERHT i INGELRII. Po okresie wikingim pojawiły się chrześcijańskie sentencje i napisy inwokacyjne – najbardziej rozpowszechnione wśród nich „in nomine domini”, „w imię Boga”, w różnych skrótach i błędnych lekcjach. Do-

datkowo istnieje spora liczba geometrycznych i symbolicznych motywów oraz znaki literopodobne.

Ten artykuł powstał w oparciu o dysertację doktorską (Moilanen 2015), która poświęcona jest mieczom z żelazną inkrustacją znalezionym na terenie Finlandii. Metodologicznie pracę uznać należy za multidyscyplinarną, uwzględniającą osiągnięcia radiografii, metalografii, archeologii eksperymentalnej uzupełniające tradycyjne metody archeologiczne.

W artykule omówiono 33 fińskie znaleziska głowni z literopodobnymi znakami. Według definicji motywy te nie odzwierciedlają w pełni formy łacińskich liter bądź ich sekwencji, ale nie są również

ściśle geometryczne bądź w kształcie konkretnych symboli. Zresztą drugi płaz głowni może zawierać motywy geometryczne. Znaki literopodobne można podzielić na podkategorie związane z kształtem znaków na drugiej stronie głowni. W pierwszej elementy literopodobne pojawiają się niezwykle często z różnymi rodzajami kratek. W drugiej niektóre znaki występują z różnymi motywami geometrycznymi. W trzeciej zaś emblematy literopodobne występują po obu stronach brzeszczotu bez dostrzegalnego układu.

Generalnie, w porównaniu z materiałami z krajów ościennych, znaki literopodobne występujące na mieczach z Finlandii wydają się dość wyjątkowe. Nieco podobne przykłady znane są z terenu Norwegii,

Danii, Rosji i Estonii. Technologia wykonywania głowni noszących znaki literopodobne różni się pomiędzy poszczególnymi egzemplarzami – od okazów bardzo prostych, po niezwykle wyrafinowane, zważywszy na funkcjonalność w warunkach bojowych. Co zaskakujące, w większości egzemplarzy same znaki były również dziwerowane. Wydaje się prawdopodobne, że te głownie były wykonywane w Skandynawii, a proces inkrustacji, co pokazały badania eksperymentalne, był stosunkowo prosty i wymagał jedynie użycia prostych narzędzi. Ich występowanie na głowniach mieczowych było najpewniej związane z wyższą ceną uzyskiwaną za te produkty, statusem właściciela bądź lokalnymi lub powszechnymi wierzeniami.