

# Classifying Iron Age Bells, Pellet Bells and Bell Pendants

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## ZUSAMMENFASSUNG

*In Finnland existieren insgesamt 481 Funde von Eisenglocken, Schellen und Glockenschlägeln, die aus allen bedeutenden Grabstätten und Siedlungen des 10.–13. Jahrhunderts n. Chr. stammen. Dies lässt den Schluss zu, dass die Artefakte keine Gelegenheitsfabrikate der Hersteller waren, sondern sich im regelmäßigen Gebrauch befanden. Die Klangkugeln und Schlägel belegen, dass es sich bei den Artefakten unzweifelhaft um Instrumente für die Klangproduktion handelte und es sich damit um die ältesten Finnlands handelt. Mit der Zweischritt-Clusteranalyse kann man die Schellen in sechs Kategorien aufteilen, die Glockenschlägel in vier. Die weniger geläufigen Glocken lassen sich grob in zwei Kategorien einteilen. Alle diese Kategorien scheinen nach Datierung und Verteilung unterschiedlich zu sein. Ein Vergleich mit Verbreitungskarten anderer nordeuropäischer Glockenfunde zeigt, dass einige Glocken aus benachbarten östlichen Gebieten nach Finnland gebracht wurden, während andere in Finnland selbst fabriziert worden sind. In einigen Fällen ist es sogar möglich, Garnituren unverwechselbar identischer Glocken bestimmten Handwerkern zuzuschreiben, die im 10.–13. Jahrhundert in ihren eigenen Werkstätten im südwestlichen, östlichen oder im zentralen Bereich Finnlands arbeiteten. Diese Handwerker produzierten die Glocken nicht unabhängig nach eigenen Vorstellungen, sondern kopierten, imitierten und inspirierten sich gegenseitig, was auch zu Neuheiten führen konnte. In den meisten Fällen folgten sie technologischen Vorbildern oder Dekorweisen, die zusammen einen Stil oder eine Tradition bildeten. Beim Erstellen einer Typologie kann man die prähistorischen Handwerklichkeiten, die Art der Metallarbeit, die untereinander bestehende Kommunikation sowie die kulturellen Beziehungen und Handelskontakte mit weit entfernten Ländern rekonstruieren. Die Studien führen auch zu Erkenntnissen, die Aussagen über die Normen, Werte und Ideale der Menschen erlauben, die die Glocken fabrizierten und gebrauchten.*

## 1 INTRODUCTION

Every year archaeological excavations at Finnish middle and late Iron Age sites (A.D. 400–1300) bring forth fragmentary artefacts that resemble traditional European cattle bells or sleigh bells. The artefacts that are globular in shape appear to have pellets inside, whereas the conical ones seem to contain clappers. Certain small cones have the look of ordinary ornamental pendants. In spite of their reasonably large total number, these metal artefacts have not awakened archaeologists' interest. They have not been fully documented, described or tested as sound-producing devices. They have merely been mentioned in reports relating to particular research projects<sup>1</sup>. The organological value of the artefacts, however, is irreplaceable in a country where prehistoric musical instruments of organic material have decomposed. The artefacts could give answers to questions like what the soundscape was like in the Iron Age. How did people contribute to the soundscape? What kind of ideas of music-making did they have?

During the past five years, I have studied the aforementioned pellet bells, bells and bell pendants for my doctoral thesis. I have catalogued and classified all the Finnish finds and investigated them by means of sound analysis, elemental analysis, ethnological analogy and contextual archaeological methods. I have limited this paper to the field of typology. My purpose is to display the Finnish material in outline and to show how the material forms groups and subgroups. My other purpose is to present the material as a supplement to the earlier papers by Malm/Fehner<sup>2</sup>, Neubert<sup>3</sup>, Gräslund<sup>4</sup>, Malinowski<sup>5</sup> and Stassiková-Stukovská<sup>6</sup> on bells in neighbouring countries.

<sup>1</sup> Sarvas 1975, 37–38; Cleve 1978, 122–125; Kivikoski 1980, 28; Lehtosalo-Hilander 1982, 64, 116–117, 171; Luoto 1984, 75; Lehtosalo-Hilander 2000, 252.

<sup>2</sup> Malm/Fehner 1967, 133–148.

<sup>3</sup> Neubert 1969, 37–79.

<sup>4</sup> Gräslund 1984, 119–124.

<sup>5</sup> Malinowski 1994, 183–199.

<sup>6</sup> Stassiková-Stukovská 1994, 443–446.

Typology holds a key position in archaeological reasoning. It enables us to catch hold of data and to disclose its internal structure by dividing individual cases into smaller entities. The basis for obtaining a proper division is to find the most essential features in artefacts and to separate those features from the unessential or secondary ones. In this paper, the information on essential features is processed statistically or numerically by a cluster analysis procedure, parallels of which were employed earlier by several Finnish archaeologists<sup>7</sup>. The results of these procedures are, of course, logical and significant, but not necessarily more objective, since numerical coding of attributes can also imply a researcher's hidden preconditions and assumptions. It is important also to realize that statistical analysis is always the beginning of separation and has to be controlled continuously by different means, for example by comparing computed clusters chronologically and chorologically. Similarly, the types created by the researcher do not automatically correspond to the types created by individuals in the past. These larger entities, in which artefacts share stylistic characteristics, give yet another dimension to the typology. They open up far-flung vistas of ancient traditions: rules, manners and patterns of thought that affected the artisan's mind. Thus, making typology enables us to study statistically computed classes, their archaeologically verified counterparts, ancient styles and traditions and finally the individuals behind the artefacts<sup>8</sup>.

## 2 COLLECTING THE MATERIAL

Most of the prehistoric objects found in Finland are catalogued in the collections of the National Museum and certain provincial museums. The Archive of the Department of Archaeology at the National Board of Antiquities holds the main catalogues of all these collections as well as the research reports from all the archaeological research projects carried out in Finland. My first task was to find out the number of all possible bell-shaped or bell-like finds and then to compile a catalogue for analysis. Since subject indices didn't exist, this phase turned out to be very arduous. I had to search through the find catalogues of the most important settlements, cemeteries and hoards of the middle and late Iron Age, plough through archaeological literature and ask archaeologists for good tips on new finds. The bells had been given incoherent and inaccurate names in the catalogues over the last 150 years. They were listed variously as jingle bells, bell buttons, bronze beads, bronze cones, bell-shaped or pear-shaped objects, trinkets or – the worst – bronze pendants or ornaments.

Of this miscellaneous material, I tried to choose the artefacts showing signs of intentional sound production: 1) pellet bells, i.e. enclosed artefacts with pellets inside and sound holes in the walls, 2) bells, i.e. open conical artefacts with clappers inside, 3) bell pendants, i.e. open conical artefacts appearing in clusters, intended to jingle against each other<sup>9</sup>. Despite all efforts, I obviously could not find every single bell in the collections.

The data collected in the archive consists of 481 objects found in Finland or in those parts of Karelia, which were ceded to the Soviet Union after the Second World War. Although I most likely failed to incorporate all the bells from the chosen period, the sample is sufficient to represent the preponderance of the bell finds. In addition to the domestic objects, the Department of Archaeology proved to have nearly a hundred foreign bells derived from purchases or excavations in the late 19<sup>th</sup> or early 20<sup>th</sup> century in Russia and the Baltic region. These bells as well as eight medieval bells from the city of Turku were added to the study material for comparison.

I requested permission to examine all the bells thoroughly, but the realization was unfeasible. Part of the material had been deposited in provincial museums or lent to other museums for exhibitions. Some of the bells were either missing or under conservation, rusted into other ornaments or not yet catalogued. Of the total of 481 Finnish bells, I finally examined 355 and observed 49 in their display cases during expeditions to the National Board of Antiquities, the National Museum of Finland, the University of Turku, the Turku Provincial Museum, the Savonlinna Provincial Museum, the Pirkanmaa Provincial Museum, the Regional Museum of South Karelia, the Häme Castle, the Åland museum and the Vanhalinna Museum. As for the rest of the bells, I had to settle for secondary sources such as pictures and descriptions.

## 3 METHODS OF CLASSIFICATION

At the first stage of the examination, I measured all possible dimensions of the artefacts. I drew pictures, took photographs and observed different

<sup>7</sup> Pesonen 1996, 59–83; Lavento 2001, 62, 76–87, 145–147.

<sup>8</sup> Lavento 2001, 62, 76–87, 145–147.

<sup>9</sup> In addition to these objects, which show signs of intentional sound production, there is a large number of jingling chain arrangements, necklaces, neckrings, needles and crop handles among the Finnish middle and late Iron Age finds. Their sound, however, might also have been unintentional or secondary to the more practical function, and for this reason, they were excluded from the actual data.

ornamental, technological and structural characteristics, including the ones that seemed essential. Then I selected the most relevant and essential observations and coded them into variables for cluster analysis. Naturally, only parts of information could be coded. Numerical coding always simplifies data. Observations concerning pellet bells were divided into 24 variables, and observations on bells and bell pendants into 22 variables. For the most part, these two sets of variables corresponded with each other. While ornamental, morphological and technological characteristics were described by numerical values on a nominal scale, different dimensions and proportions of the artefacts were described by values on an interval or ratio scale. I calculated the proportions from the original measurements. I fed the multivariate data into an SPSS matrix file<sup>10</sup>, in which rows represent cases or bells, and columns represent variables or characteristics being measured. Cells contain values.

The Two-Step Cluster Analysis procedure<sup>11</sup> is an exploratory tool designed to reveal natural groupings within a data set. Like other cluster analyses, it classifies a set of observations into mutually exclusive groups, in which members of the groups share properties in common. In the first step, the procedure scans the records one by one and pre-clusters them into many small sub-clusters using a likelihood measure as the similarity criterion. In the second step, a model-based hierarchical technique is applied to cluster the sub-clusters into the desired number of clusters. The algorithm employed by the procedure has several desirable features: it is capable of finding the optimal number of clusters and handling both continuous and categorical variables with different scale units. The procedure provides the possibility to create a cluster identification number for each case and variable importance plots, which show the importance of each variable within each cluster. Furthermore, empirical internal testing indicates that the procedure is fairly robust to violations of distributional assumptions. The assumptions of normal and multinomial distribution, however, do not cause any major problem in this analysis, since there is no need to generalize the results.

A difficulty arises from the fact that the procedure takes into account only those cases, from which all attributes are coded. Thus, fragmentary artefacts with missing information can reduce the data set to a half or even to a fraction. To avoid this, the variables with a large number of cases with missing values were dropped from the analysis. Redundant and highly correlated variables or variables dependent on each other were naturally dropped as well. Nine variables were left over for the cluster analysis of pellet bells and eight vari-

ables for the cluster analysis of bell pendants. Bells that are 14 in number were not analysed statistically. A list of the variables is on display in Appendix 1.

After the statistical analysis, the National Board of Antiquities gave me permission to lend out 16 bells for elemental analysis. I chose three bells and thirteen pellet bells representing four different clusters. Four bell pendants had already been analysed by Tomanterä<sup>12</sup>. The artefacts had to be well-preserved and not too small, because rust or copper rust eats first into the smallest and thinnest artefacts. The elemental analysis was performed by mineralogist Seppo Hornytzkyj with an energy-dispersive XRF spectrometer (EDXRF)<sup>13</sup>. The instrument emits rays capable of passing through layers of corrosion and finding out the composition of the uncorroded metal. Since the results of a single bell, nevertheless, seemed to vary slightly with samples, I had to settle for indicative rough estimates. Despite this and the small sample size, the results could make a noteworthy contribution to the classification.

#### 4 PELLET BELLS

Using AIC<sup>14</sup> as a clustering criterion, the procedure classifies the 333<sup>15</sup> pellet bells into six clusters. Of the 191 valid cases, it assigns 38 to the first cluster, 27 to the second, 21 to the third, 20 to the fourth, 37 to the fifth and 48 to the sixth cluster. In all, 142 bells are excluded from the analysis due to missing values on one or more of the variables. In the following, I will describe the clusters, their most essential features and the most important variables within each cluster. I'll also add in those excluded and broken artefacts, which clearly share essential characteristics with the classified specimens. Since the types distinguished by cluster analysis are hypothetical, their possible existence is

<sup>10</sup> SPSS is a statistical data analysis software package. The SPSS TwoStep Cluster Component, <[http://www.spss.ch/upload/1122644952\\_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b](http://www.spss.ch/upload/1122644952_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b)>, retrieved March 1, 2008.

<sup>11</sup> The SPSS TwoStep Cluster Component, <[http://www.spss.ch/upload/1122644952\\_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b](http://www.spss.ch/upload/1122644952_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b)>, retrieved March 1, 2008.

<sup>12</sup> Tomanterä 1991, 43, 47, Fig. 13.

<sup>13</sup> ARTAX, Bruker-AXS.

<sup>14</sup> The Akaike Information Criterion (AIC). The SPSS TwoStep Cluster Component, <[http://www.spss.ch/upload/1122644952\\_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b](http://www.spss.ch/upload/1122644952_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b)>, retrieved March 1, 2008.

<sup>15</sup> 308 Finnish and 25 Russian and Latvian pellet bells.

further discussed by comparing them chronologically and chorologically. As a result, some clusters seem to split up into smaller entities<sup>16</sup>.

#### 4.1 CLUSTER 1

Cluster 1 includes pellet bells, whose body is globular in shape and large in size. The diameter of the body varies from 18 to 33 mm and thickness of the walls from 0.75 to 2 mm. An angular and strongly built suspension loop had been embedded in the body, and it seems that the whole artefact is out of a single cast. There are no discernible seams or joints on the surface. The body was decorated with a number of ringed dots, four in the lower part of the bell, eight in the middle and 2–8 in the upper part of the bell. The pattern is always the same. In seven cases out of ten, the crosswise slits serving as sound holes have tapering ends (Tab. 1, Pl. 1a).

According to the elemental analysis, the bells belonging to this cluster were made of copper (70–80 %) and lead (15–25 %) (Tab. 3). Surprisingly, they do not contain any tin, the most common additive in copper-base or bronze alloys. Although “material of the pellet” -attribute was not used in the cluster analysis, it seems to contribute to the formation of this cluster: all preserved pellets are of iron.

Pellet bells answering to this description number at least 48 in Finnish finds. They have been found in inhumation graves and barrows, which can be dated or coin-dated to the end of the 10<sup>th</sup> or to the beginning of the 11<sup>th</sup> century. All the graves are located in South-West Finland, in the historical provinces of Finland Proper, Satakunta and Åland (Appendix 2, Pl. 4a). The type does not appear to have spread into the eastern parts of the country. Since only one parallel has been found abroad, in Sweden<sup>17</sup>, it is possible that a place of manufacture for these bells existed somewhere in South-West Finland. The short period of use and the recurrence of the decorative pattern suggest that the bells could have been made in the same workshop, or in sphere of the same workshop tradition.

#### 4.2 CLUSTER 2

Cluster 2 includes pellet bells that are globular and somewhat flat in shape. Seen from the side, the body is not entirely round. Although the diameter of the body varies from 13 to 21 mm, the walls are always thin, only 0.5 mm. A suspension loop was made of a bronze bar, a few millimetres thick, which has been bent into a curve and soldered into the body. At least in one instance, there is a clearly

visible solder at the joint. A ringed dot pattern, occasionally accompanied by fragile line ornaments, occurs in the lower part of the bell. A star-shaped sound hole with narrow slits and a round opening at the intersectional point is also a characteristic feature for this cluster. The opening probably served for some practical purpose in the manufacturing process (Tab. 1, Pl. 1b).

Like the bells in the first cluster, these bells were made of copper (25–50 %) and lead (50–75 %) (Tab. 3). The proportion of lead, though, is much larger, even exceptional. Since lead softens the alloy and has an adverse effect on its tonal decay<sup>18</sup>, these bells must have had a relatively poor sound.

Pellet bells answering to this description number 34 in Finnish finds. Seven of them were found in a barrow from around A.D. 1000, but the majority stem from cremation cemeteries of the Viking period (A.D. 800–1050). All the finds, however, come from the inner parts of the country, from the historical province of Tavastia (Appendix 2, Pl. 4b). Since there are no foreign parallels, these bells, too, seem to be of local manufacture, made probably by a limited number of artisans who worked on their own special model. It should be noted that clusters 1 and 2 have distinctly different patterns of distribution, which do not overlap. While the former type is West Finnish, the latter is Tavastian.

#### 4.3 CLUSTER 3

Unlike the pellet bells above, these bells are sharp-edged and shaped like an octahedron. The height of the curve in the body is lower than average values, and the diameter varies from 10 to 30 mm. Technological characteristics also separate these bells from the bells in clusters 1 and 2. Casting seams, which run vertically on the opposite sides of the body and over a small-sized loop, indicate that the whole artefact was cast in a two-part or tripartite mould. The surface was left untouched after the casting. Decoration is always the same: the lower part of the bell is decked with oblique lines and the central part with a horizontal zone of straight lines. Sound holes consist of two crossing slits of unequal width and two round openings that were left over from pipes that supported a mould core in the manufacturing process (Tab. 1, Pl. 1c).

<sup>16</sup> Subgroups 1a and 3a, consisting of 3–4 specimens, are not discussed in this paper.

<sup>17</sup> Gräslund 1984, Fig. 13, 1.

<sup>18</sup> Westcott 1970, <<http://www.msu.edu/~carillon/batmbook>>, retrieved March 1, 2008.

According to the elemental analysis, the bells belonging to this cluster were made of copper (60–85 %), tin (5–25 %) and lead (5–25 %) (Tab. 3). The alloy is an ordinary one in Iron Age ornaments<sup>19</sup> and resembles the alloy, which Konovalov<sup>20</sup> found in exactly similar Russian bells. The percentage of lead is perhaps somewhat high, but otherwise the alloy appears to be suitable for sound production<sup>21</sup>. Preserved pellets are always of bronze. When broken artefacts are counted in, pellet bells of this kind number 29 in Finnish finds. They have been found in inhumation graves, hoards and cremation cemeteries, all of which can be dated to the 11<sup>th</sup> century. The area of distribution is scattered, but covers all centers of habitation of the period (Appendix 2, Pl. 4c). Exactly similar bells have been found in Western and Central Russia<sup>22</sup> and in the Baltic region: Estonia<sup>23</sup>, Latvia<sup>24</sup>, Lithuania<sup>25</sup> and Poland<sup>26</sup>. A few bells have been discovered in Sweden<sup>27</sup>. The distribution pattern suggests that these bells were mass-produced articles, spread by traders and travellers on the eastern routes. According to Ryndina<sup>28</sup>, the main centre of manufacturing was in Novgorod, where it was customary to copy artefacts using two-part or tripartite moulds and original ornaments as models.

#### 4.4 CLUSTER 4

Pellet bells in this cluster are globular and perfectly round in shape. This aspect plays an important role in distinguishing this cluster from cluster 3, since the two clusters have a number of features in common. The bells in cluster 4 are of the same width and thickness, and they display casting seams, which run vertically on the opposite sides of the body and over a suspension loop. The loop is only 2 mm thick. Decoration was carried out in the same way, except that the lowest part of the bell doesn't have oblique lines. A broad single slit, which served as a sound hole, is another characteristic feature for this cluster (Tab. 1, Pl. 1d).

Konovalov<sup>29</sup> has analysed a number of similar Russian bells and found that they are made of copper (90–93 %), tin (4–7 %) and lead (2 %). The alloy corresponds more or less to the one in cluster 3. Pellets are of bronze.

Of the 23 pellet bells assigned to this cluster, only six have been found in Finland. The others are from Russia and Latvia<sup>30</sup>. Three of the Finnish finds can be dated to the Crusade period (A.D. 1050–1300) and the rest roughly to the late Iron Age (Appendix 2). With certainty these bells, too, are imported objects from the east. Parallels are known along the ancient trade routes in Western and Central Russia<sup>31</sup> and in the Baltic region<sup>32</sup>. In

Russia, the bells in clusters 3 and 4 seem to occur in the same contexts and to be at least partly synchronous. The types come so close to each other also typologically, that they must have had cultural-historical connections. Possibly both were made by craftsmen in Novgorod<sup>33</sup>.

#### 4.5 CLUSTER 5

Representatives of cluster 5 are angular and shaped like a pyramid that stands on its vertex. The edges of the pyramid are sharp. The diameter of the body varies from 14 to 27 mm and the thickness of the walls from 0.5 to 1.25 mm. It is obvious that the body was made of a metal plate by shearing it in the shape of a star and bending the points down. A metal wire, for its part, was twisted into a suspension loop and stuck through a hole in the body. There is no decoration on the surface. Sound holes consist of interlacing slits, but in three cases out of ten, the slits have been decorated with triangular or round openings at the ends. Probably these openings were an attempt to imitate the ones found in cast bells, for example in the bells in cluster 3 (Tab. 1, Pl. 2a).

Due to the poor preservation, these bells were dropped from the elemental analysis. Half of them, however, seem to be corroded by rust and the rest by copper rust. Copper or bronze nodes on the surface of the rust-brown artefacts suggest that the iron bells were originally dressed with

<sup>19</sup> Oldeberg 1942, 216–217, 228–229; Konovalov 1969, 205–216; Konovalov 1972, 152–158.

<sup>20</sup> Konovalov 1972, 152, Ris. 2, Tab. 1; 2.

<sup>21</sup> Traditionally, a mixture of copper and tin, with four or five times as much copper as tin, has been regarded as the best combination to produce a good ringing tone. Sometimes a little zinc and lead are also added. Theophilus Presbyter mentions this “bell metal” already in the 11<sup>th</sup> century. Coleman 1971, 59–60; Westcott 1970, <<http://www.msu.edu/~carillon/batmbook>>, retrieved March 1, 2008.

<sup>22</sup> Ryndina 1963, 244–247, Ris. 24; Malm/Fehner 1967, 136, 142–145, Ris. 20, 1; 21; Kockurkina 1990, 51; Malinowski 1994, Fig. 8, 3.

<sup>23</sup> Mägi 2002, 190, 197, 204, Pls. 19, 6; 26, 1; 33, 6, 7.

<sup>24</sup> Apals *et al.* 1974, Tab. 49, 1; 53, 6; 56, 1; 61, 1.

<sup>25</sup> Radin's 2001, Ris. 8, 8, 9.

<sup>26</sup> Malinowski 1994, Figs. 3, 4, 15, 24, 25; 6, 1–6.

<sup>27</sup> Serning 1956, 124, 142, Pls. 18, 11; 42, 11; Jaanusson 1971, 99–104.

<sup>28</sup> Ryndina 1963, 247.

<sup>29</sup> Konovalov 1972, 152, Ris. 2, Tab. 1; 2.

<sup>30</sup> NM 2396:73, 5385:3859, 9315:1–7.

<sup>31</sup> Ryndina 1963, 244–247, Ris. 24; Malm/Fehner 1967, 136–137, 145–147, Ris. 20, 3; 21; Malinowski 1994, Fig. 10, 1–4.

<sup>32</sup> Apals *et al.* 1974 att. 145, 6, 7, 11, Tab. 56, 1; Jaanits *et al.* 1982, 350; Malinowski 1994, Fig. 3, 2, 10, 12, 16; Radin's 2001, Ris. 5, 2; Mägi 2002, 249, Pl. 85, 9.

<sup>33</sup> Ryndina 1963, 247.

molten copper or bronze, which filled up all inequalities and coated the bell, making it more solid and resonant<sup>34</sup>.

Altogether 73 pellet bells of this kind have been found in Finland. The large number of the finds and their regular occurrence in the 11<sup>th</sup> century inhumation graves point to the conclusion that the type was in common use during the 11<sup>th</sup> century. The wide area of distribution covers the provinces of Finland Proper, Satakunta, Tavastia, Ostrobothnia and Savo (Appendix 2). The type is also numerous among Swedish<sup>35</sup> and Estonian finds<sup>36</sup>, but rare in other Baltic countries or in the east. Since these bells were relatively easy to make, they were most likely made by local or itinerant blacksmiths, those who also made knives, sickles, shears, cauldrons and other articles for daily use.

#### 4.6 CLUSTER 6

Bells belonging to cluster 6 are globular and among the smallest. The bodies, which seem to be of uniform width, measure 10–14 mm. The bodies were made in two equal halves, which were soldered together, so that a clearly visible horizontal seam runs between the halves. A bit of thin wire was twisted into a suspension loop and stuck through a hole in the upper part of the bell. Sound holes in the lower part of the bell are also an important factor in characterizing this cluster: they consist of either one or two narrow slits ending in round openings. The openings appear to be scooped solely for decorative purposes (Tab. 1, Pl. 2b).

Four bells in this cluster were made of an alloy that contains copper (60–90 %), tin (5–30 %) and lead (2–10 %), and is rather similar to the alloy in cluster 3 (Tab. 3). Pellets, in the majority of instances, have become lost, because the two halves have come apart at the seams throughout time.

In Finnish finds, this type is somewhat common. At least 77 bells of the same kind have been found in inhumation graves, cemeteries and dwelling sites that date to the Crusade period (A.D. 1050–1300). Judging from 19 accurately dated graves, the type appears to be characteristic of the 12<sup>th</sup> century. The area of distribution covers the whole country, the provinces of Finland Proper, Satakunta, Tavastia, Ostrobothnia, Savo and ceded Karelia (Appendix 2, Pl. 5a). Foreign parallels are few: I know only a few from northern Sweden<sup>37</sup>. These bells, however, should not be confused with the numerous two-piece bells, whose rims at the seams slope outwards. These bells came into fashion in the 14<sup>th</sup> century, at least in Russia<sup>38</sup>, Sweden<sup>39</sup>, Finland<sup>40</sup>, Poland<sup>41</sup> and the

Baltic Countries<sup>42</sup>, and have been in use from medieval times to the present. According to Oldeberg<sup>43</sup> and Ryndina<sup>44</sup>, these bells were made using the press-sheet metal technique.

##### 4.6.1 Subgroup 6a

Twenty-one silver-gray bells, originally assigned to cluster 6, could be distinguished from the others and interpreted as subgroup 6a. These bells differ from the others in material and in the sound hole structure, which is made of a round or rectangular opening. Some bells do not have any opening, and it is questionable whether they should be regarded as pellet bells or beads. In all the other essentials, dating and distribution, these bells tally with those in cluster 6.

## 5 BELLS

Since the bells are few in number, there was no sense in classifying them statistically. Roughly speaking, they split up into two categories.

### 5.1 CAST BELLS

Cast bells, seven in number, are dissimilar to each other in several aspects. They are, of course, conical in shape, but the sides of the cone can slope straight or curve down. The width of the mouth varies from 30 to 70 mm and the thickness of the walls from 1 to 4 mm. In comparison with pellet bells and bell pendants, the bells are heavy, 50–150 g in weight. A suspension loop or a handle was for the most part embedded in the body, but occasionally it was also stuck through a pair of holes after the casting. Casting seams were either left untouched or rasped off. Only one of the bells bears ornamentation<sup>45</sup>. It has ringed dots all over the surface (Pl. 2c).

<sup>34</sup> Coleman 1971, 41.

<sup>35</sup> Westin 1941, 84–101; Serning 1966, 56–57, Pls. 64, 6–10; 72, 14–17; 79, 5; Simonsson 1969, 72, Fig. 5; Neubert 1969, 52.

<sup>36</sup> Kustin 1962, 87, Tahvel XIV, 6; Mägi 2002, 214, 228, 234, 238, 242, Pl. 44, 22, 23; 60, 9; 67, 1–2; 71, 6; 76, 3.

<sup>37</sup> Serning 1956, 124, 142, Fig. 6a, Pl. 18, 13–14; 42, 6.

<sup>38</sup> Ryndina 1963, 244–247.

<sup>39</sup> Jonsson 1981, 1–21, Fig. 2.

<sup>40</sup> The eight medieval pellet bells from the city of Turku (TMM A 425, 549, 764, 767, 1366, L 400, 875) belong to this type.

<sup>41</sup> Malinowski 1994, Figs. 3, 23; 7, 7, 8, 13.

<sup>42</sup> Moora 1939 Joon. 73; Mägi 2002, 266, 274, Pl. 114; 128:7.

<sup>43</sup> Oldeberg 1966, 163, Figs. 444; 449.

<sup>44</sup> Ryndina 1963, 244–247.

<sup>45</sup> ÅM 404:143.

Three of the bells were made of an alloy, which contains copper (55–85 %), tin (5–30 %) and lead (5–10 %), and is similar to the alloy in clusters 3 and 6 (Tab. 3). Due to the varying mixture of tin and lead, the artefacts probably had a good or mediocre ringing tone. All the bells bear remains of the staples, by which the clappers were attached to the inside of the bell. Staples and clappers are both rust-brown and undoubtedly made of iron, the traditional material for clappers at all times<sup>46</sup>.

The bells have been found in the graves and the cemeteries of the Migration, Merovingian, Viking and Crusade periods (A.D. 400–1300). One barrow can be dated to the 5<sup>th</sup> or 6<sup>th</sup> century, the other to the 10<sup>th</sup> century and an inhumation grave to the 13<sup>th</sup> century. The finds also come from different parts of the country, which points to the conclusion that they are of various origin (Appendix 2). Quite similar bells have a wide distribution in early medieval Europe<sup>47</sup>. The most alike ones have been found in Birka<sup>48</sup>, Trelleborg<sup>49</sup> and Novgorod<sup>50</sup>.

## 5.2 BELLS MADE OF METAL PLATES

Six bells were not cast, but made of thin plates of metal. The plates were bent into a four-sided or cylindrical shape and riveted along the sides. In comparison with the cast bells, these bells are large: the width of the rectangular, rounded or oval mouth varies from 50 mm to 110 mm. A handle at the top of the bell is made of a ring, which serves as a handle above the bell and inside it as a staple where the clapper had been fastened. All the parts are rust-brown and probably of iron (Pl. 2d).

It is to be noted that traditional European cattle bells were made in an exactly similar way from prehistoric times to the present<sup>51</sup>. This fact brings about a basic difficulty. One of the Finnish bells was found in a barrow dating from the Viking period (A.D. 800–1050) and the other from a cremation cemetery from the same period. The rest of the bells, however, are stray finds from multi-layer sites that can be dated to the Iron Age, the Middle Ages or a later period (Appendix 2). Therefore, these bells could also be cattle bells of the last centuries lost at pasture. Bells of the same kind are known from Europe since the 3<sup>rd</sup> or 4<sup>th</sup> centuries A.D.<sup>52</sup> For example, the earliest church bells on the Continent or in the British Isles resemble these bells a great deal<sup>53</sup>.

## 6. BELL PENDANTS

Using AIC or BIC<sup>54</sup> as the clustering criterion, the Two-Step Cluster Analysis procedure classifies the 168<sup>55</sup> bell pendants into 4 clusters. Of the 122 valid

cases, it assigns 49 to the first cluster, 24 to the second, 26 to the third and 23 to the fourth cluster. In all, 46 bells are excluded from the analysis due to missing values on one or more of the variables. In the following, I will describe the clusters, their most essential features and the most important variables within each cluster. I have also added the excluded and broken artefacts, which obviously share essential characteristics with the classified specimens<sup>56</sup>.

### 6.1 CLUSTER A

Cluster A includes bell pendants, whose body is shaped like a truncated cone. The shoulders are sharp and the sides broaden distinctly towards the mouth. The contour of the sides is concave, straight or convex, an attribute which does not seem to contribute to the formation of this cluster. The width of the mouth varies from 12 to 26 mm. In the majority of cases, the suspension loop has been lost, but there is always a hole in the upper part through which it had been passed. Eight of the bells bear remains of metal wire, which was twisted into a loop or in the shape of an S and tied in a knot inside the bell. Two of the bells have pieces of leather strap in the hole instead. The artefacts are of rather coarse make, full of casting errors, and decorated in innumerable ways: with grooved or dashed lines, ringed dots or raised lists. The type appears so heterogeneous that it is difficult to find even two similar specimens (Tab. 2, Pl. 3a).

These bells were not included in the elemental analysis, but most likely, they were cast in bronze. The only clappers, chains of 3–4 bronze rings, are

<sup>46</sup> Westcott 1970, <<http://www.msu.edu/~carillon/batmbook>>, retrieved March 1, 2008.

<sup>47</sup> Neubert 1969, 40–79; Reiss 1994, 131, 300–301, 412–415, Figs. 7–9, Pl. 50A, 1.

<sup>48</sup> Arwidsson 1989, 72–73.

<sup>49</sup> Neubert 1969, 52.

<sup>50</sup> Povetkin 1992, Fig. VII.3, 16.

<sup>51</sup> Neubert 1969, 113–115; Sarvas 1975, 30–40.

<sup>52</sup> Neubert 1969, 40–79; Apals *et al.* 1974, Tab. 68, 4; Povetkin 1992, Fig. VII.3, 17; Malinowski 1994, Fig. 11, 4; Stankus 1995, Fig. 77, 7–9; Knific/Murgelj 1996, 45–68; Radin's 2001, Ris. 13, 15.

<sup>53</sup> Coleman 1971, 34–56; Bourke 1983, 464–468.

<sup>54</sup> The Akaike Information Criterion (AIC) or the Schwarz Bayesian Criterion (BIC). The SPSS TwoStep Cluster Component, <[http://www.spss.ch/upload/1122644952\\_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b](http://www.spss.ch/upload/1122644952_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beabed2b8b)>, retrieved March 1, 2008.

<sup>55</sup> 159 Finnish and nine Latvian bell pendants.

<sup>56</sup> Subgroups Ca and Da, consisting of 3–4 specimens, are not discussed in this paper.

found in three Latvian bells<sup>57</sup>. Since these clappers hang from internal parts of the suspension loop, a special staple of clapper was not needed. On the other hand, the bells hung from a cord or a leather strap were unlikely to have any clapper at all. They were either dumb ornaments or jingled against each other.

Although 49 bell pendants of this kind have been found in Finland, there are few grounds for accurate dating. One barrow can be dated to the 6<sup>th</sup> or 7<sup>th</sup> century, one hoard to the year 800 and three inhumation graves to the 10<sup>th</sup> and 11<sup>th</sup> centuries. The rest of the bells come from cremation cemeteries that date roughly from the middle and late Iron Age. The main area of distribution seems to be in South-West Finland; in eastern Finland, the type is rare (Appendix 2, Pl. 5b). In addition to the Baltic Countries<sup>58</sup>, parallels are known from Central Russia<sup>59</sup> and the Vepsian regions to the south and southeast of Lake Ladoga<sup>60</sup>. It seems that this long-lived type, which was relatively easy to cast, was made by a number of local smiths, who carried out experimentations, each to their taste.

## 6.2 CLUSTER B

Representatives of cluster B are conical in shape. The straight sides of the cone, however, slope down so steeply that the body becomes nearly cylindrical. The width of the mouth varies from 5 to 10 mm and the thickness of the walls from 0.5 to 1 mm. A suspension loop has the look of a separate, twisted metal rod, but viewing the matter more closely it becomes clear that it was embedded in the body, and fixed to it at a stage when both were wax models. Actually, also the 8-shaped links, through which the loops were connected further to animal-shaped or eared tubular ornaments, were shaped and fixed at the same stage, as wax models. This method, which enables casting a series of wax models in the same mould, is called the wax filigree technique<sup>61</sup>. It calls for great skill of the artisan. For some reason or other, the artisans used to leave the surfaces untouched and pegs and other irregularities resulting from the manufacturing process in their place. Most loops appear to have become thin through constant, hard and regular usage (Tab. 2, Pl. 3b).

According to Tomanterä<sup>62</sup>, the wax filigree ornaments were made of an alloy, which contains chiefly copper (44–84 %) and tin (9–51 %) (Tab. 3). The lead content, on the other hand, is rather insignificant (1–8 %). The reason for the relatively high tin content is perhaps that extra tin had to be added to make the alloy especially fluid for the complex mould. As a result, the alloy was

also ideal for sound production: an increase in tin heightens the rigidity of the material, speeds its vibration rate and prolongs the ring<sup>63</sup>. Since these bell pendants always appear in clusters, they were able to produce a sound by jingling against each other. They do not appear to have had clappers.

Taken all together, the bell pendants of this type total 28 in Finland. They have been found in inhumation graves and cemeteries, which date from the Crusade period (A.D. 1050–1300). The most accurately dated grave is from the years A.D. 1173–1225. The bells seem to have been especially popular in eastern Finland, in the historical provinces of Savo and Karelia. A few stray finds also come from Tavastia and northern Finland, the area controlled by Karelians (Appendix 2, Pl. 5c). The animal-shaped and eared tubular ornaments with bell pendants are regarded as deriving from the regions of Russia that were inhabited by Finno-Ugrian peoples. They have been found in Livonia<sup>64</sup> as well as Western, Northern and Central Russia, from the Ingrian region to the so-called Permian region<sup>65</sup>. According to Uino<sup>66</sup>, the typological or physical origin of the type can be placed in the Novgorod Land. In Finland, these ornaments were highly valued articles of international trade, repaired, recycled and reused repeatedly.

### 6.2.1 Subgroup Ba

Seven bell pendants, which come from hoards deposited around the year A.D. 800, should be sorted out from the cluster B. Besides forming a separate chronological entity, these bells are bigger than those in cluster C, 18–22 mm in width. A suspension loop was stuck through a hole in the body and twisted into another loop, which serves as a staple of clapper. One of the bells still bears an iron clapper in the shape of a double spiral. This clapper is the only one of its kind in Finnish finds. It attests that at least some bell pendants did not only jingle

<sup>57</sup> NM 9315:8.

<sup>58</sup> Apals *et al.* 1974 att. 84, Tab. 42, 22; 43, 6.

<sup>59</sup> Spicyn 1901, Tab. IX, 21, 22; XIX, 7; XXI, 1; Spicyn 1902, Tab. III, 8; XXXIV, 7.

<sup>60</sup> Kockurkina 1985, Ris. 10, 1–3; 17, 4; 21, 4; 22, 2; 23, 3–4; 51, 3.

<sup>61</sup> Tomanterä 1991, 35–49.

<sup>62</sup> Tomanterä 1991, 46–48, Tab. 1.

<sup>63</sup> Westcott 1970, <<http://www.msu.edu/~carillon/batmbook>>, retrieved March 1, 2008.

<sup>64</sup> Apals *et al.* 1974 att. 204, 11; Zarina 1974 att. 1, 9.

<sup>65</sup> Spicyn 1901, Tab. XXX, 18; XIX, 2; XXVII, 6; Spicyn 1902, Tab. XIV, 6; VI, 10; XI, 10; Kockurkina 1985, Ris. 64, 7; Oborin 1988, 28–29, Figs. 132–133; 195–196; Kockurkina 1990, 57; Rybina 1992, Fig. V.7, 15–18; Makarov 1994, Fig. 9.

<sup>66</sup> Uino 1997, 169, 192, 362–363, 366.



against each other, but could produce a ringing tone themselves. Otherwise, the bells in this category are similar to the bells in cluster B. The bells were probably made outside Finland, but I do not know of exact parallels.

### 6.3 CLUSTER C

While the bell pendants in the foregoing clusters are conical in shape, the bell pendants in this cluster are nearly globular. The extremely convex contour between shoulder and lip makes the artefacts resemble pellet bells. The width of the mouth varies from 9 to 17 mm and the thickness of the walls from 0.5 to 1 mm. A suspension loop is similar to that in cluster B: it has the look of a separate, twisted metal rod, but actually it was embedded in the body. The loops are often worn-out, equipped with protruding pegs and connected by 8-shaped links to animal-shaped or eared tubular ornaments, frequently in pairs or bigger clusters. Everything points to the assumption that these bell pendants, links and ornaments were cast in one piece using the wax filigree technique. The surfaces of the bells were left undecorated (Tab. 2, Pl. 3c).

In connection with other wax filigree ornaments, Tomanterä<sup>67</sup> happened to analyse four of these bells. The alloy contained copper (44–76 %) and a lot of tin (21–51 %), which makes the material resonant (Tab. 3). While examining these bells, I also noticed that a number of them jingled beautifully, when only touched with a hand. There are no clappers.

In all, 34 bell pendants of this type have been found in Finnish inhumation cemeteries. The seven untouched graves all date from the 12<sup>th</sup> and 13<sup>th</sup> centuries A.D. The bells seem to occur mainly in the same eastern provinces as the bells belonging to cluster B, meaning in Karelia, Savo and the wilds of northern Finland (Appendix 2, Pl. 5c). Like the bells in cluster B, these bells were probably articles of international trade, brought to Finland from the east, where they have been found along the Volga-Baltic waterway, along the Mologa, Sheksna, Volga and Kama rivers<sup>68</sup>. Despite the differences in shape, the bells in clusters B and C can be linked together technologically, chronologically and chorologically. Thus, they must represent the same, possibly Finno-Ugrian tradition.

### 6.4 CLUSTER D

The last cluster D includes bell pendants, which are conical in shape and bear a great resemblance to the bell pendants in cluster B. The sides of the

cone are fairly straight and slope down steeply. The width of the mouth varies from 9 to 11 mm. Technological characteristics, however, distinguish these bells from the ones in cluster B: casting seams on the opposite sides of the body and over a strongly built loop reveal that the bells were cast in two-part or tripartite moulds, not in solid, disposable moulds like the wax filigree bells. The walls are also more robust, 0.75–2 mm in thickness. Twisted S-shaped rods or rings, by which suspension loops were connected to eared tubular ornaments, were not cast in the same moulds as the bells and ornaments either, but added later. Anyhow, the bells hang from the ornaments in pairs or bigger clusters and could produce a sound by jingling against each other (Tab. 2, Pl. 3d).

Only 17 bell pendants of this type have been found in Finnish inhumation graves. Some of them can be dated roughly to the Crusade period (A.D. 1050–1300), others more closely to the beginning of the 13<sup>th</sup> century<sup>69</sup>. The type appears to be characteristic of the eastern provinces of Karelia and Savo and especially of the Mikkeli region, where eared tubes with small jingling pendants were an essential part of the “national costume”<sup>70</sup> (Appendix 2, Pl. 5c). Since there appear to be no foreign parallels, these tubes and pendants were probably of local manufacture, made by craftsmen who tried to imitate wax filigree artefacts, but who did not master the technique. Instead, they applied their own methods. According to Lehtosalo and Tomanterä<sup>71</sup>, ornaments from Karelia and Savo and especially the Mikkeli region include a great number of locally made replicas of other bronze objects, the prototypes of which were apparently outside Finland.

## 7 DISCUSSION

Of the total of 333 pellet bells and 168 bell pendants, the Two-Step Cluster Analysis procedure takes into account 191 pellet bells and 122 bell pendants and classifies them into ten mutually exclusive clusters. The number of excluded cases, bells with missing values on one or more of the variables, is regrettably large but not useless. By picking out the most essential characteristics within each cluster, it is possible to assign 122 of the

<sup>67</sup> Tomanterä 1991, 46–48, Tab. 1.

<sup>68</sup> Spicyn 1902, Tab. X, 7; XIV, 12–13; XXII, 8; Kockurkina 1985, 159, Ris. 43, 3; Kockurkina 1990, 58; Makarov 1994, Fig. 9; Uino 1997, 169, 366.

<sup>69</sup> Lehtosalo 1966, 90–91.

<sup>70</sup> Lehtosalo 1966, 78–81, 87; Uino 1997, 169, 173.

<sup>71</sup> Lehtosalo 1966, 78–81; Tomanterä 1991, 44–46; Uino 1997, 167.

excluded pellet bells and 22 of the excluded bell pendants to the same statistically computed clusters. Thus, 313 pellet bells and 144 bell pendants can be assigned to classes after all. Since the definitive number of anomalous, deformed or unexplored outliers is only 44, ten clusters and a couple of subgroups seem to describe the data fairly well<sup>72</sup>. The 14 bells were not analysed statistically.

Dating of the artefacts, based on closed finds or contexts, offers a further means of exploring the data (Tab. 4). It seems natural that the first manifestations or appearances of the bells are reckoned among the outliers. They begin to appear one by one in the course of the 5<sup>th</sup>–9<sup>th</sup> centuries. Then, in the 9<sup>th</sup> and 10<sup>th</sup> centuries, the number of bells suddenly starts to increase and reaches its peak in the 11<sup>th</sup>–13<sup>th</sup> centuries, to which the greater part of the artefacts and types can be dated. At that time, the pellet bells and bell pendants seem to have been particularly popular, probably more popular than ever before or later. In the 14<sup>th</sup> century, on the arrival of Christianity, the number of bells decreases abruptly again. Large cattle bells, of course, continued to be in use from that time to the present.

Distribution maps prove that during their period of use, the bells were popular throughout Finland: they have been discovered in all centers of habitation and in the most important cemeteries. The maps also show that the phenomenon was international: the custom of using bells and depositing them with the dead was known in the neighbouring areas and spread throughout Northern and Eastern Europe: Sweden, Estonia, Latvia, Lithuania, Poland, Slovakia, Russia and the Ukraine. Within this area, bells, silver coins, beads and other ornaments circulated in different directions. The bells belonging to clusters 3, 4, B and C, originating somewhere in the east, were carried by traders, warriors or Varangians, who crossed the seas and travelled along the river valleys deep into the inland. By local contacts these gifts, souvenirs or media of exchange could reach even the remotest corners and hunting grounds. Ideas and ideals were imported as well. The bells belonging to clusters 5 and D were made by local or itinerant craftsmen, who took imported objects as their models, but relied in the end upon their own techniques. Perhaps they were not in on all the secrets of bell making. Sometimes only minute details were borrowed: for example, the round openings, which in clusters 5 and 6 serve as ornamental elements, had originally played a practical role in the manufacturing process of cluster 4. Some makers, however, were innovators. The artisans, who made the bells in clusters 1 and 2, did not only copy or imitate, but elaborated new models adjusted to the local – Western Finnish or Tavastian – taste and conditions.

It is clear that the clusters, which come typologically, chronologically and chorologically close to each other, can be integrated into a larger whole. They represent the same style or tradition, something that individuals, not researchers, created in the past. For example, the pellet bells in clusters 3 and 4 had a wide distribution in the 11<sup>th</sup> century and the following features in common: line ornaments, thin walls, small loops, bronze pellets and casting seams, which reveal that the artefacts were cast in two-part or tripartite moulds. The bell pendants in clusters B and C have a wide distribution in the 12<sup>th</sup> and 13<sup>th</sup> centuries, similar loops, thin walls, unfinished surfaces, stanniferous alloys and signs suggesting that the artefacts were made using the wax filigree technique. It is hardly a coincidence, either, that the pellet bells of Finnish origin in clusters 1 and 2 have carefully finished surfaces, ringed dots and plumbiferous alloys, in which lead replaces the proportion of tin<sup>73</sup>. All these characteristics represent rules, principles or hidden manners, which together create a tradition or a style. An artisan, who is always part of a tradition, follows these rules more or less consciously, taking some for granted and some for insignificant trivia. According to Tomanterä<sup>74</sup>, the unfinished surfaces in late Iron Age objects indicate an East European bronze casting tradition, using wax and often copying other objects. Scandinavian bronze casting, on the other hand, always involved a careful finishing and polishing stage, which is discernible in the West Finnish bronze artefacts, for example in clusters 1 and 2. It appears from the examination that decoration and attributes of technology (material, seams, finishing, fixing of the loop and thickness of the walls and the loop) are the most decisive factors in characterizing these styles of bell making. The observations on the dimensions or the shape of the artefacts, contrarily, do not seem to be decisive. Within the same style, bells can differ in shape or size<sup>75</sup>.

<sup>72</sup> By replacing the missing values in continuous variables by mean values, the division into six clusters remains unchanged.

<sup>73</sup> West Finnish weights seem to have been made of a similar alloy: copper 67–85 %, lead 5–17 % and tin 0–3 %; Oldeberg 1942, 228–229.

<sup>74</sup> Tomanterä 1991, 35.

<sup>75</sup> Since the continuous variables (measurements and indices of the proportions) do not seem to contribute to the formation of the styles, I made an experiment on pellet bells. By dropping all the continuous variables from the analysis and considering only the categorical ones (attributes of decoration, technology and shape), the division into 6 clusters remained unchanged. It seems that the categorical variables alone can work out a solution that withstands close archaeological inspection. Critics of the SPSS Two-Step Clustering have pointed out that the procedure allows categorical variables to dominate the results by giving differences in categorical variables a higher weight than differences in

## 8 CONCLUSIONS

On examination, it was found that the Iron Age bells, pellet bells and bell pendants number at least 481 in Finnish finds. They have been found in all the important cemeteries and centers of habitation dating from the 10<sup>th</sup>–13<sup>th</sup> centuries A.D. This points to the conclusion that the artefacts were not occasional caprices of the makers, but in regular and established use. The pebbles, pellets and clappers, for their part, prove that the artefacts were indisputably instruments intended for sound production. As such, they are the oldest ones left in Finland.

By analysing information on the bells with the Two-Step Cluster Analysis procedure, it is possible to separate the pellet bells into six categories and the bell pendants into four categories. The bells, few in number, split roughly into two categories. Each of these categories seems to have a slightly different dating and a different distribution. The comparison with distribution maps of other northeast European bell finds indicates that some bells were probably brought to Finland from neighbouring areas in the east or southeast, while

others were made locally in Finland. In certain cases, it is even possible to attribute sets of distinctive, identical bells to some particular masters, who in the 10<sup>th</sup>–13<sup>th</sup> centuries operated in their own workshops somewhere in southwestern, eastern or interior parts of Finland.

The artisans, who made bells, did not act independently, but copied, imitated and inspired each other. They sometimes elaborated novelties. In most cases, they followed technological principles or manners of decorating, which together make up a style or tradition. Setting up a typology enables one to study prehistoric craftsmanship, metalwork, communications, cultural relations and trade contacts with far-away countries. It is also fruitful for understanding the norms, values and ideals of the people who made and used the bells.

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continuous variables. To the material concerned, however, this will not do any harm. Bacher *et al.* The SPSS TwoStep Cluster Component, <[http://www.spss.ch/upload/1122644\\_952\\_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beaded2b8b](http://www.spss.ch/upload/1122644_952_The%20SPSS%20TwoStep%20Cluster%20Component.pdf?PHPSESSID=d891c70fbf53e980e540a8beaded2b8b)>, retrieved March 1, 2008.

## APPENDIX 1

Coding of variables used in the cluster analysis of pellet bells:

- I Maximum width of the body (mm).
- II Thickness of the body (mm).
- III Height of the body/maximum width of the body.
- IV Height of the curve in the body/height of the body.
- V Shape of the body in vertical section.
  - 1. Round, no angles.
  - 2. Roundish, slight angles.
  - 3. Angular, sharp angles.
- VI Way in which the suspension loop was fixed to the body.
  - 1. Embedded in the body, no discernible seams or joints.
  - 2. Embedded or soldered in the body, discernible seams at the joints.
  - 3. Stuck through a hole in the body and tied in a bow or bent to the side.
- VII Traces on the body left from the manufacturing process.
  - 0. No discernible traces.
    - 1. Casting seams.
    - 2. Soldering seams.
- VIII Main ornamental element.
  - 0. No ornamentation.
    - 1. Ringed dot.

- 2. Grooved line.
- 3. Embossed line.
- IX Shape of the sound hole.
  - 0. No sound holes or small rectangular or round opening.
    - 1. Slit.
    - 2. Slit ending in round openings.
    - 3. Two crossing slits.
    - 4. Two crossing slits ending in round openings.
    - 5. Two crossing slits of unequal size, the larger ending in round openings.
    - 6. Two crossing slits, with a round opening at the intersectional point.
    - 7. Two crossing slits with tapering ends.
    - 8. Two crossing slits with widening ends.

Coding of variables used in the cluster analysis of bell pendants:

- I Maximum width of the body (mm).
- II Thickness of the body (mm).
- III Height of the body/maximum width of the body.
- IV Width of the shoulder/width of the mouth.
- V Shape of the contour between shoulder and lip.
  - 1. Concave.

2. Straight.  
3. Convex.
- VI Shape of the body in horizontal section.  
1. Round, no angles.  
2. Roundish, slight angles.  
3. Angular, sharp angles.
- VII Way in which the suspension loop was fixed to the body.  
1. Embedded in the body, no discernible seams or joints.
2. Embedded or soldered in the body, discernible seams at the joints.  
3. Stuck through a hole in the body and tied in a bow or bended to the side.
- VIII Traces on the body that have been left over from the manufacturing process.  
0. No discernible traces.  
1. Pegs resulting from cast holes.  
2. Casting seams.  
3. Soldering seams or riveted joints.

## APPENDIX 2

Catalogue of the bells, pellet bells and bell pendants found in Finland and ceded Karelia:

NUMBER	ARTEFACT	CLUSTER	SITE	CONTEXT	DATE
NM 8811:10	PELLET BELL	1	Eura Pappilanmäki	Stray find	913–(1125)
NM 3574:149	PELLET BELL	1	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3574:150	PELLET BELL	1	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 8242:217	PELLET BELL	1	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8242:218	PELLET BELL	1	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8338:53	PELLET BELL	1	Kokemäki Maamieskoulu	Cremation cemetery	550–1050
NM 8338:89	PELLET BELL	1	Kokemäki Maamieskoulu	Cremation cemetery	550–1050
NM 4572:32	PELLET BELL	1	Köyliö Tuhkanummi	Cremation cemetery	550–1050
NM 4572:58	PELLET BELL	1	Köyliö Tuhkanummi	Cremation cemetery	550–1050
NM 8602:31a	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31b	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31c	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31d	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31e	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31f	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31g	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:31h	PELLET BELL	1	Köyliö Vanhakartano	Stray find	800–1150
NM 8602:77	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave CB	975–1025
NM 8723:358	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C29	979–1025
NM 8723:425a	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:425b	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:425c	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:425d	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:425e	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:425f	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431a	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431b	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431c	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431d	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431e	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431f	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431g	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 8723:431h	PELLET BELL	1	Köyliö Vanhakartano	Inhumation grave C39	980–1025
NM 2550:111a	PELLET BELL	1	Laitila Pärkkö	Cremation cemetery	550–1050
NM 2550:111b	PELLET BELL	1	Laitila Pärkkö	Cremation cemetery	550–1050
TYA 38:39	PELLET BELL	1	Lieto Vanhalinna	Hillfort	?–1400
NM 9366:67	PELLET BELL	1	Lieto Merola	Cremation cemetery	400–1050
NM 4566:42	PELLET BELL	1	Maaria Saramäki	Cremation cemetery	0–1150
NM 11157:8	PELLET BELL	1	Raisio Pappilanmäki	Cremation cemetery	800–1050
NM 5204:12	PELLET BELL	1	Sauvo Myllymäki	Cremation cemetery	900–1050
ÅM 404:158	PELLET BELL	1	Sund Långängsbacken	Barrow 43	900–1000
ÅM 376:207	PELLET BELL	1	Sund Långängsbacken	Barrow 49	900–1000
NM 420	PELLET BELL	1	Sund Sundby	Barrow	550–1000
NM 14196:211	PELLET BELL	1	Yläne Anivehmaanmäki	Inhumation grave 58	925–975
NM 18000:2295	PELLET BELL	1a	Eura Luistari	Inhumation grave 118	880–950
NM 24740:131	PELLET BELL	1a	Eura Luistari	Inhumation grave 826	900–1000
NM 8242:205	PELLET BELL	1a	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8912:418	PELLET BELL	1a	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 26174:424	PELLET BELL	2	Hämeenlinna Tyrynoja	Dwelling site	0–1520
NM 19915:8	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050

NUMBER	ARTEFACT	CLUSTER	SITE	CONTEXT	DATE
NM 29097:39	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 29097:73	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 29097:501	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 29097:502	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 29097:503	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 29097:504	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:40	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:58	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:92	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:93	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:118	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:128	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:214	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:216	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 30871:255	PELLET BELL	2	Jaala Pukkisaari	Cremation cemetery	700–1050
NM 9392:201	PELLET BELL	2	Kangasala Jauhia	Cremation cemetery	800–1050
NM 9392:206	PELLET BELL	2	Kangasala Jauhia	Cremation cemetery	800–1050
NM 9392:209c	PELLET BELL	2	Kangasala Jauhia	Cremation cemetery	800–1050
NM 22445:17	PELLET BELL	2	Kuhmoinen Linnavuori	Hillfort	1025–1400
NM 31607:164	PELLET BELL	2	Nastola Skinnari	Cremation cemetery	800–1050
NM 8995:4	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:6a	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:6b	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:7a	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:7b	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:20	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 9102:22	PELLET BELL	2	Pertunmaa Kuusela	Barrow	1000
NM 32470:183	PELLET BELL	2	Ruokolahti Karoniemi	Dwelling site	800–1050
NM 32916:78	PELLET BELL	2	Sääksmäki Kokkomäki	Cremation cemetery	950–1050
NM 32916:147	PELLET BELL	2	Sääksmäki Kokkomäki	Cremation cemetery	950–1050
NM 32916:158	PELLET BELL	2	Sääksmäki Kokkomäki	Cremation cemetery	950–1050
NM 32916:192	PELLET BELL	2	Sääksmäki Kokkomäki	Cremation cemetery	950–1050
NM 18000:1668g	PELLET BELL	3	Eura Luistari	Inhumation grave 56	1000–1070
NM 18000:1668f	PELLET BELL	3	Eura Luistari	Inhumation grave 56	1000–1070
NM 18000:4634	PELLET BELL	3	Eura Luistari	Inhumation grave 408	1000–1070
NM 22346:102	PELLET BELL	3	Eura Luistari	Inhumation grave 444	1000–1070
NM 22346:693	PELLET BELL	3	Eura Luistari	Inhumation grave 520	1070–1130
NM 9766:32	PELLET BELL	3	Hauho Männistönmäki	Cremation cemetery	1000–1100
NM 3145:7	PELLET BELL	3	Hollola Juokko	Hoard	1000–1100
NM 10896:239	PELLET BELL	3	Hämeenlinna Imatranvoima	Cremation cemetery	800–1050
NM 32717:2	PELLET BELL	3	Jämsänkoski Kissakallio	Cremation cemetery	550–1050
NM 32717:26	PELLET BELL	3	Jämsänkoski Kissakallio	Cremation cemetery	550–1050
NM 32717:51	PELLET BELL	3	Jämsänkoski Kissakallio	Cremation cemetery	550–1050
NM 9220:57	PELLET BELL	3	Kangasala Jauhia	Cremation cemetery	800–1050
NM 9392:75	PELLET BELL	3	Kangasala Jauhia	Cremation cemetery	800–1050
NM 9392:76	PELLET BELL	3	Kangasala Jauhia	Cremation cemetery	800–1050
NM 8602:169a	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave CL	1014–1025
NM 8602:169b	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave CL	1014–1025
NM 8602:169c	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave CL	1014–1025
NM 8602:169d	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave CL	1014–1025
NM 8602:169e	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave CL	1014–1025
NM 8723:106	PELLET BELL	3	Köyliö Vanhakartano	Inhumation grave C10–11	800–1150
NM 33364:2457	PELLET BELL	3	Mikkeli Karilantie	Dwelling site	1000–1050
NM 9770:7	PELLET BELL	3	Mikkeli Tuukkala	Inhumation grave 49	1080–1300
NM 24868:2	PELLET BELL	3	Mikkeli Tyynelä	Stray find	1000
NM 9848:7	PELLET BELL	3	Pälkäne Ristiänmäki	Inhumation grave 1/1934	1000–1150
NM 11157:263	PELLET BELL	3	Raisio Pappilanmäki	Cremation cemetery	800–1050
NM 34548:36	PELLET BELL	3	Sysmä Ihananiemi	Cremation cemetery	800–1520
NM 18138:341	PELLET BELL	3a	Lieto Vanhalinna	Hillfort	?–1400
NM 2481:38c	PELLET BELL	3a	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:71b	PELLET BELL	3a	Mikkeli Tuukkala	Stray find	1080–1300
NM 6367:33	PELLET BELL	4	Maaria Virusmäki	Cremation cemetery	800–1150
NM 14676:199	PELLET BELL	4	Raisio Kansakoulumäki	Inhumation grave 7	1050–1200
Uino 2001g	PELLET BELL	4	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001h	PELLET BELL	4	Räisälä Rammansaari	Cemetery	1050–1300
NM 32291:675	PELLET BELL	4	Sysmä Ihananiemi	Cremation cemetery	800–1520
NM 32291:811	PELLET BELL	4	Sysmä Ihananiemi	Cremation cemetery	800–1520
TMM 13150:212	PELLET BELL	5			
NM 18000:1334	PELLET BELL	5	Eura Luistari	Inhumation grave 25	1000–1070
NM 18000:1346	PELLET BELL	5	Eura Luistari	Inhumation grave 25	1000–1070

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NM 18000:1350	PELLET BELL	5	Eura Luistari	Inhumation grave 25	1000–1070
NM 18000:2884	PELLET BELL	5	Eura Luistari	Inhumation grave 209	1000–1070
NM 18000:2886	PELLET BELL	5	Eura Luistari	Inhumation grave 209	1000–1070
NM 22346:324	PELLET BELL	5	Eura Luistari	Inhumation grave 475	1000–1070
NM 23183:3,4	PELLET BELL	5	Eura Luistari	Inhumation grave 481	
NM 22346:639	PELLET BELL	5	Eura Luistari	Inhumation grave 516	1000–1070
NM 22346:640	PELLET BELL	5	Eura Luistari	Inhumation grave 516	1000–1070
NM 23183:145	PELLET BELL	5	Eura Luistari	Inhumation grave 544	1000–1050
NM 23183: 222	PELLET BELL	5	Eura Luistari	Inhumation grave 655	1000–1070
NM 23183:291	PELLET BELL	5	Eura Luistari	Inhumation grave 575	1000–1070
NM 23183:385	PELLET BELL	5	Eura Luistari	Inhumation grave 613	
NM 23183:464a	PELLET BELL	5	Eura Luistari	Inhumation grave 640	1000–1100
NM 23183:464b	PELLET BELL	5	Eura Luistari	Inhumation grave 640	1000–1100
NM 23183:680	PELLET BELL	5	Eura Luistari	Inhumation grave 670	1000–1050
NM 25480:213	PELLET BELL	5	Eura Luistari		
NM 25480:347	PELLET BELL	5	Eura Luistari	Inhumation grave 1045	1000–1070
NM 22926:50	PELLET BELL	5	Eura Osmanmäki	Inhumation grave 8	800–1050
NM 22631:356	PELLET BELL	5	Kaarina Kirkkomäki	Dwelling site	800–
NM 27196:H35:62	PELLET BELL	5	Kaarina Kirkkomäki	Inhumation grave 35	1000–1200
NM 27196:H35:117	PELLET BELL	5	Kaarina Kirkkomäki	Inhumation grave 35	1000–1200
NM 9392:92	PELLET BELL	5	Kangasala Jauhia	Cremation cemetery	800–1050
NM 5203:65	PELLET BELL	5	Karkku Tulonen	Cremation cemetery	550–1050
NM 5868:20	PELLET BELL	5	Karkku Tulonen	Cremation cemetery	550–1050
NM 5868:28	PELLET BELL	5	Karkku Tulonen	Cremation cemetery	550–1050
NM 5868:29	PELLET BELL	5	Karkku Tulonen	Cremation cemetery	550–1050
NM 5868:65	PELLET BELL	5	Karkku Tulonen	Cremation cemetery	550–1050
NM 1763:29	PELLET BELL	5	Kokemäki Kalvomäki	Stray find	1050–1150
NM 1763:48	PELLET BELL	5	Kokemäki Kalvomäki	Stray find	1050–1150
NM 1174:33	PELLET BELL	5	Kokemäki Leikkimäki	Cremation cemetery	550–1150
NM 8602A:1	PELLET BELL	5	Köyliö Vanhakartano	Stray find	800–1150
NM 8723:112	PELLET BELL	5	Köyliö Vanhakartano	Stray find	800–1150
NM 8723:842	PELLET BELL	5	Köyliö Vanhakartano	Stray find	800–1150
NM 8723:980	PELLET BELL	5	Köyliö Vanhakartano	Stray find	800–1150
NM 2548:491	PELLET BELL	5	Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 2548:816	PELLET BELL	5	Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 13932:76	PELLET BELL	5	Lieto Haimionmäki	Cremation cemetery	550–1150
NM 11275:7	PELLET BELL	5	Maaria Taskula	Inhumation grave 9	1050–1200
NM 7874:40	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 7874:42	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 7874:118	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 7874:162	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 7874:163	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 7874:179	PELLET BELL	5	Maaria Saramäki	Cremation cemetery	0–1150
NM 6367:57	PELLET BELL	5	Maaria Virusmäki	Cremation cemetery	800–1150
NM 6367:72	PELLET BELL	5	Maaria Virusmäki	Cremation cemetery	800–1150
NM 6367:86	PELLET BELL	5	Maaria Virusmäki	Cremation cemetery	800–1150
NM 6367:106	PELLET BELL	5	Maaria Virusmäki	Cremation cemetery	800–1150
NM 6367:108	PELLET BELL	5	Maaria Virusmäki	Cremation cemetery	800–1150
NM 10874:17	PELLET BELL	5	Mikkeli Latokallio	Cremation cemetery	800–1150
NM 10874:18	PELLET BELL	5	Mikkeli Latokallio	Cremation cemetery	800–1150
NM 11070:4	PELLET BELL	5	Mikkeli Latokallio	Cremation cemetery	800–1150
NM 11070:48	PELLET BELL	5	Mikkeli Latokallio	Cremation cemetery	800–1150
NM 11070:55	PELLET BELL	5	Mikkeli Latokallio	Cremation cemetery	800–1150
NM 9750:13	PELLET BELL	5	Mynämäki Franttilannummi	Inhumation grave 1/1933	1050–1100
NM 10146:174	PELLET BELL	5	Nousiainen Myllymäki	Inhumation grave 7/1935	1167–1200
NM 10795:2	PELLET BELL	5	Perniö Paarskylä	Cremation cemetery	550–1150
NM 19000:11690	PELLET BELL	5	Raisio Mahittula	Cremation cemetery	550–1150
TYA 546:100	PELLET BELL	5	Raisio Siiri 1	Cremation cemetery	800–1025
NM 17208:649	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 17208:399	PELLET BELL	5	Tampere Vilusenharju	Inhumation grave 44	1100
NM 17208:401	PELLET BELL	5	Tampere Vilusenharju	Inhumation grave 44	1100
NM 17208:482	PELLET BELL	5	Tampere Vilusenharju	Inhumation grave 46	1100–1150
NM 18556:528?	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:529	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:530?	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:531	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:532	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:533	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 18556:534	PELLET BELL	5	Tampere Vilusenharju	Stray find	1050–1150
NM 13839:266	PELLET BELL	5	Yläne Anivehmaanmäki	Inhumation grave 12	1000–1100

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NM 18000:3838°	PELLET BELL	6	Eura Luistari	Inhumation grave 345	1070–1130
NM 18000:3838b	PELLET BELL	6	Eura Luistari	Inhumation grave 345	1070–1130
NM 18000:3838c	PELLET BELL	6	Eura Luistari	Inhumation grave 345	1070–1130
NM 23183:177	PELLET BELL	6	Eura Luistari	Inhumation grave 553	1070–1130
NM 23607:4	PELLET BELL	6	Eura Luistari	Stray find	
NM 12690:470	PELLET BELL	6	Halikko Rikala	Stray find	1050–1200
NM 12690:87a	PELLET BELL	6	Halikko Rikala	Inhumation grave 5	1050–1200
NM 12690:87b	PELLET BELL	6	Halikko Rikala	Inhumation grave 5	1050–1200
NM 12690:192	PELLET BELL	6	Halikko Rikala	Inhumation grave 12	1050–1200
NM 12690:255	PELLET BELL	6	Halikko Rikala	Inhumation grave 16	1050–1200
NM 12690:256	PELLET BELL	6	Halikko Rikala	Inhumation grave 16	1050–1200
NM 12690:257	PELLET BELL	6	Halikko Rikala	Inhumation grave 16	1050–1200
NM 12690:310	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:311	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:312	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:313	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:315	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:316	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:317	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:318	PELLET BELL	6	Halikko Rikala	Inhumation grave 21	1100–1200
NM 12690:399	PELLET BELL	6	Halikko Rikala	Inhumation grave 26	1050–1200
NM 12690:-	PELLET BELL	6	Halikko Rikala	Inhumation grave 27	1050–1200
NM 12841:47	PELLET BELL	6	Halikko Rikala	Inhumation grave 34	1050–1200
NM 12841:33	PELLET BELL	6	Halikko Rikala	Inhumation grave 37	1050–1200
NM 12841:30	PELLET BELL	6	Halikko Rikala	Inhumation grave 38	1050–1200
NM 12841:31a	PELLET BELL	6	Halikko Rikala	Inhumation grave 38	1050–1200
NM 12841:31b	PELLET BELL	6	Halikko Rikala	Inhumation grave 38	1050–1200
NM 12841:59	PELLET BELL	6	Halikko Rikala	Inhumation grave 39	1050–1200
NM 13298:62	PELLET BELL	6	Halikko Rikala	Inhumation grave 41	1050–1200
NM 2489:129a	PELLET BELL	6	Kaukola Kekomäki	Inhumation grave 1a	1100–1300
NM 2489:129b	PELLET BELL	6	Kaukola Kekomäki	Inhumation grave 1a	1100–1300
NM 18507:3,4	PELLET BELL	6	Lempäälä Lempainen	Stray find	1050–1225
NM 8656:H10:-	PELLET BELL	6	Masku Humikkala	Inhumation grave 10	1025–1150
NM 8656:H10:-	PELLET BELL	6	Masku Humikkala	Inhumation grave 10	1025–1150
NM 8656:H10:-	PELLET BELL	6	Masku Humikkala	Inhumation grave 10	1025–1150
NM 8656:H21:7a	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:7b	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:8a	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:8b	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:8c	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:8d	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:9a	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:9b	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:10a	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:10b	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 8656:H21:10c	PELLET BELL	6	Masku Humikkala	Inhumation grave 21	1025–1150
NM 33364:1350	PELLET BELL	6	Mikkeli Orijärvi	Dwelling site	1000–1300
NM 9961:5	PELLET BELL	6	Mikkeli Tuukkala	Inhumation grave 57	1080–1300
NM 13769:151	PELLET BELL	6	Mikkeli Visulahti	Inhumation grave 28	1080–1300
NM 9750:102	PELLET BELL	6	Mynämäki Franttilannummi	Stray find	1050–1225
NM 9190:1	PELLET BELL	6	Nokia Hakamäki	Stray find	1050–1150
NM 15357:40,43	PELLET BELL	6	Raisio Kansakoulumäki	Inhumation grave 24	1050–1200
NM 15357:47,48	PELLET BELL	6	Raisio Kansakoulumäki	Inhumation grave 24	1050–1200
NM 15357:49	PELLET BELL	6	Raisio Kansakoulumäki	Inhumation grave 24	1050–1200
NM 15357:57,64	PELLET BELL	6	Raisio Kansakoulumäki	Inhumation grave 27	1050–1200
NM 15357:67	PELLET BELL	6	Raisio Kansakoulumäki	Inhumation grave 27	1050–1200
NM 32291:770	PELLET BELL	6	Sysmä Ihananiemi	Cremation cemetery	800–1520
NM 17208:187a	PELLET BELL	6	Tampere Vilusenharju	Inhumation grave 31	1100–1150
NM 17208:187b	PELLET BELL	6	Tampere Vilusenharju	Inhumation grave 31	1100–1150
NM 17208:409	PELLET BELL	6	Tampere Vilusenharju	Inhumation grave 44	1100
NM 17208:444	PELLET BELL	6	Tampere Vilusenharju	Inhumation grave 44	1100
NM 17208:445,447	PELLET BELL	6	Tampere Vilusenharju	Inhumation grave 44	1100
NM 14498:20a	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20b	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20c	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20d	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20e	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20f	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20g	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20h	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125

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NM 14498:20i	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20j	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20k	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20l	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20m	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20n	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:20°	PELLET BELL	6	Teuva Lautamäki	Inhumation grave	1075–1125
TYA 38:84	PELLET BELL?	6a	Lieto Vanhalinna	Hillfort	? –1400
NM 2486:4	PELLET BELL?	6a	Hiitola Hannukainen	Inhumation grave 1	1100–1250?
NM 2489:181	PELLET BELL?	6a	Kaukola Kekomäki	Inhumation grave 1b	1100–1300
NM 2489:210a,b	PELLET BELLS?	6a	Kaukola Kekomäki	Inhumation grave 1b	1100–1300
NM 8656:H23:3a–d	PELLET BELLS?	6a	Masku Humikkala	Inhumation grave 23	1025–1150
NM 13769:151	PELLET BELL?		6a Mikkeli Visulahti	Inhumation grave 28	1080–1300
NM 2647:1a–k	PELLET BELLS		6a Sortavala Kirkkoveräjä	Stray find	1250–1400
NM 12690:354	PELLET BELL		Halikko Rikala	Inhumation grave 22	1050–1200
ÅM 405:10	PELLET BELL		Jomala Karrböle	Barrow 3	900–1000
NM 2294:15	PELLET BELL		Kokemäki Leikkimäki	Cremation cemetery	550–1150
Kock. 1981,t.4:17	PELLET BELL		Räisälä Tiurinlinna	Hillfort	900–1300?
NM 32292:4	PELLET BELL		Sysmä Pappila	Stray find	
NM 14530:5	PELLET BELL		Janakkala Mäntylä	Hoard	800
NM 18000:2290	PELLET BELL		Eura Luistari	Inhumation grave 118	880–950
NM 8680:122	PELLET BELL		Finström Törnebolsta	Barrow 1	600–1000
NM 29474:1f	PELLET BELL		Hämeenkoski Kylmäkoski	Hoard	1000–1100
Mäkisen kokoelma	PELLET BELL		Lieto Mäkinen	Stray find	1000
THM 14844:27	PELLET BELL		Maaria Taskula	Cremation cemetery	550–1050
NM 13769:40	PELLET BELL		Mikkeli Visulahti	Inhumation grave 6	1080–1300
NM 10369:24	PELLET BELL		Nousiainen Hinttermäki	Cremation cemetery	550–800
Kankkunen 2005	PELLET BELL		Padasjoki Karolanmäki	Cremation cemetery	0–1200
NM 34565:1	PELLET BELL		Sysmä Manterempelto	Dwelling site	
NM 32291:762	PELLET BELL		Sysmä Ihananiemi	Cremation cemetery	800–1520
NM 34552:1	PELLET BELL		Sysmä Lopperi B	Dwelling site	
NM 14644:602	PELLET BELL		Lieto Vanhalinna	Hillfort	? –1400
NM 14644:824	PELLET BELL		Lieto Vanhalinna	Hillfort	? –1400
NM 3131:16	BELL PENDANT	A	Akaa Haittilanmäki	Hoard	1000–1200
NM 18000:2424	BELL PENDANT	A	Eura Luistari	Inhumation grave 139	920–950
NM 18000:2672	BELL PENDANT	A	Eura Luistari	Inhumation grave 141	880–950
NM 25480:613	BELL PENDANT	A	Eura Luistari	Stray find	
NM 1913:10°	BELL PENDANT	A	Eura Osmanmäki	Stray find	400–1125
NM 1913:10b	BELL PENDANT	A	Eura Osmanmäki	Stray find	400–1125
NM 18837:8	BELL PENDANT	A	Halikko Iso Riiehenmäki	Cremation cemetery	800–1050
NM 18837:707	BELL PENDANT	A	Halikko Iso Riiehenmäki	Cremation cemetery	800–1050
NM 3574:156	BELL PENDANT	A	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3574:157	BELL PENDANT	A	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3574:158	BELL PENDANT	A	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3574:159	BELL PENDANT	A	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3574:160	BELL PENDANT	A	Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 8242:83	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8242:212	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8339:160	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8912:240	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8912:420	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8912:541	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 8912:914	BELL PENDANT	A	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 11138:47	BELL PENDANT	A	Karjaa Hönsäkerskullen	Cremation cemetery	600–800
NM 11138:244	BELL PENDANT	A	Karjaa Hönsäkerskullen	Cremation cemetery	600–800
NM 8607:4	BELL PENDANT	A	Kokemäki Maamieskoulu	Cremation cemetery	550–1050
Aspelin 1877,1383	BELL PENDANT	A	Kokemäki Äimälä	Cremation cemetery	550–1150
NM 7854:10	BELL PENDANT	A	Kuhmoinen Papinsaari	Hoard	800
NM 8723:140	BELL PENDANT	A	Köyliö Vanhakartano	Inhumation grave C15	1025–1150
NM 9831:10	BELL PENDANT	A	Köyliö Vanhakartano	Stray find	800–1150
NM 2496:210	BELL PENDANT	A	Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 2548:488	BELL PENDANT	A	Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 2548:640	BELL PENDANT	A	Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 13932:415	BELL PENDANT	A	Lieto Haimionmäki	Cremation cemetery	550–1150
TYA 90:24	BELL PENDANT	A	Lieto Pahamäki	Cremation cemetery	550–1150
TYA 90:107	BELL PENDANT	A	Lieto Pahamäki	Cremation cemetery	550–1150
NM 9222:434°	BELL PENDANT	A	Lieto Merola	Cremation cemetery	400–1050
NM 9222:434b	BELL PENDANT	A	Lieto Merola	Cremation cemetery	400–1050
NM 7275:264	BELL PENDANT	A	Maaria Saramäki	Cremation cemetery	0–1150



NUMBER	ARTEFACT	CLUSTER	SITE	CONTEXT	DATE
NM 10795:33	BELL PENDANT	A	Perniö Paarskylä	Cremation cemetery	550–1150
NM 19000:11130	BELL PENDANT	A	Raisio Mahittula	Cremation cemetery	550–1150
TYA 546:15	BELL PENDANT	A	Raisio Siiri 1	Cremation cemetery	800–1025
ÅM 404:234a	BELL PENDANT	A	Sund Långängsbacken	Barrow 113	900–1000
ÅM 404:234b	BELL PENDANT	A	Sund Långängsbacken	Barrow 113	900–1000
ÅM 416:44	BELL PENDANT	A	Sund Östergård	Barrow 27	550–1000
NM 32291:769	BELL PENDANT	A	Sysmä Ihananiemi	Dwelling site	800?–1520
NM 5580:17	BELL PENDANT	A	Uskela Palomäki	Barrow	500–600
NM 6366:267	BELL PENDANT	A	Lieto Ylipää	Cremation cemetery	550–800
NM 6366:272	BELL PENDANT	A	Lieto Ylipää	Cremation cemetery	550–800
NM 2491:44	BELL PENDANT	A	Räisälä Tontinmäki	Inhumation grave 3/1886	1100–1250
NM 19133:11	BELL PENDANT	A	Tyrvääntö Myllymäki	Cremation cemetery	400–800
NM 3247:14	BELL PENDANT	B	Hiitola Hannukainen P.	Stray find	1100–1300
NM 2595:94a	BELL PENDANT	B	Kaukola Kekomäki	Inhumation grave 5	1100–1300
NM 2595:94b	BELL PENDANT	B	Kaukola Kekomäki	Inhumation grave 5	1100–1300
NM 2595:94c	BELL PENDANT	B	Kaukola Kekomäki	Inhumation grave 5	1100–1300
NM 2595:94d	BELL PENDANT	B	Kaukola Kekomäki	Inhumation grave 5	1100–1300
NM 2595:94e	BELL PENDANT	B	Kaukola Kekomäki	Inhumation grave 5	1100–1300
NM 6709:5	BELL PENDANT	B	Konginkangas Savolainen	Inhumation grave	1050–1150
Kock.1981,t.8:39	BELL PENDANT	B	Kurkijoki Linnavuori	Hillfort	800–1500
NM 2481:71a	BELL PENDANT	B	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:229	BELL PENDANT	B	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:232a	BELL PENDANT	B	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:232b	BELL PENDANT	B	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:232d	BELL PENDANT	B	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:232e	BELL PENDANT	B	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 13769:89	BELL PENDANT	B	Mikkeli Visulahti	Inhumation grave 15	1080–1300
NM 2592:80	BELL PENDANT	B	Räisälä Tontinmäki	Inhumation grave 5/1888	1100–1250
NM 26387a	BELL PENDANT	B	Salla Kenttälampi	Stray find	1050–1300
NM 26387b	BELL PENDANT	B	Salla Kenttälampi	Stray find	1050–1300
NM 26387c	BELL PENDANT	B	Salla Kenttälampi	Stray find	1050–1300
NM 26387d	BELL PENDANT	B	Salla Kenttälampi	Stray find	1050–1300
NM 13939:14	BELL PENDANT	B	Vesilahti Rukoushuone	Inhumation grave 2	1173–1225
Uino 2001 <sup>o</sup>	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001b	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001c	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001d	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001e	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
Uino 2001f	BELL PENDANT	B	Räisälä Rammansaari	Cemetery	1050–1300
NM 13939:2e	BELL PENDANT	B	Vesilahti Rukoushuone	Inhumation grave 1	1150–1225
NM 14530:4a	BELL PENDANT	Ba	Janakkala Mäntylä	Hoard	800
NM 14530:4b	BELL PENDANT	Ba	Janakkala Mäntylä	Hoard	800
NM 14530:4c	BELL PENDANT	Ba	Janakkala Mäntylä	Hoard	800
NM 8780:89	BELL PENDANT	Ba	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 9365:619	BELL PENDANT	Ba	Kalanti Kalmumäki	Cremation cemetery	600–1200
NM 7854:11	BELL PENDANT	Ba	Kuhmoinen Papinsaari	Hoard	800
NM 9192:2	BELL PENDANT	Ba	Uskela Lukkarinmäki	Hoard	800
NM 2481:57	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78a	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78b	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78c	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78d	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78e	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78f	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:78g	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:79a	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:79b	BELL PENDANT	C	Mikkeli Tuukkala	Stray find	1080–1300
NM 13769:17a	BELL PENDANT	C	Mikkeli Visulahti	Inhumation grave 5	1080–1300
NM 13769:17b	BELL PENDANT	C	Mikkeli Visulahti	Inhumation grave 5	1080–1300
NM 13769:27a	BELL PENDANT	C	Mikkeli Visulahti	Inhumation grave 5	1080–1300
NM 13769:27b	BELL PENDANT	C	Mikkeli Visulahti	Inhumation grave 5	1080–1300
NM 13769:206	BELL PENDANT	C	Mikkeli Visulahti	Stray find	1080–1300
NM 3130:14a	BELL PENDANT	C	Räisälä Ollinaho	Stray find	1150–1250
NM 3130:14b	BELL PENDANT	C	Räisälä Ollinaho	Stray find	1150–1250
NM 3130:14c	BELL PENDANT	C	Räisälä Ollinaho	Stray find	1150–1250
NM 3130:14d	BELL PENDANT	C	Räisälä Ollinaho	Stray find	1150–1250
NM 31396:177	BELL PENDANT	C	Suomussalmi TB:n ranta	Dwelling site	1000–1200
NM 2481:173	BELL PENDANT	C	Mikkeli Tuukkala	Inhumation grave 11	1080–1300
NM 2481:330a	BELL PENDANT	C	Mikkeli Tuukkala	Inhumation grave 40	1080–1300
NM 13769:62	BELL PENDANT	C	Mikkeli Visulahti	Inhumation grave 9	1080–1300

NUMBER	ARTEFACT	CLUSTER	SITE	CONTEXT	DATE
NM 2491:45a	BELL PENDANT	C	Räisälä Tontinmäki	Inhumation grave 3/1886	1100–1250
NM 2491:45b	BELL PENDANT	C	Räisälä Tontinmäki	Inhumation grave 3/1886	1100–1250
NM 2491:45c	BELL PENDANT	C	Räisälä Tontinmäki	Inhumation grave 3/1886	1100–1250
NM 2491:45d	BELL PENDANT	C	Räisälä Tontinmäki	Inhumation grave 3/1886	1100–1250
NM 14498:17a	BELL PENDANT	Ca	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:17b	BELL PENDANT	Ca	Teuva Lautamäki	Inhumation grave	1075–1125
NM 14498:17c	BELL PENDANT	Ca	Teuva Lautamäki	Inhumation grave	1075–1125
NM 13939:2a	BELL PENDANT	Ca	Vesilahti Rukoushuone	Inhumation grave 1	1150–1225
NM 13939:2b	BELL PENDANT	Ca	Vesilahti Rukoushuone	Inhumation grave 1	1150–1225
NM 13939:2c	BELL PENDANT	Ca	Vesilahti Rukoushuone	Inhumation grave 1	1150–1225
NM 13939:2d	BELL PENDANT	Ca	Vesilahti Rukoushuone	Inhumation grave 1	1150–1225
TYA 160:231	BELL PENDANT	D	Lieto Pahamäki	Cremation cemetery	550–1150
NM 33364:1572	BELL PENDANT	D	Mikkeli Karilantie	Dwelling site	1000–1300
NM 2481:38a	BELL PENDANT	D	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:38b	BELL PENDANT	D	Mikkeli Tuukkala	Stray find	1080–1300
NM 2481:228c	BELL PENDANT	D	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:232c	BELL PENDANT	D	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:325b	BELL PENDANT	D	Mikkeli Tuukkala	Inhumation grave 40	1080–1300
NM 2481:330b	BELL PENDANT	D	Mikkeli Tuukkala	Inhumation grave 40	1080–1300
NM 2592:250	BELL PENDANT	D	Räisälä Tontinmäki	Inhumation grave 13/1888	1100–1250
NM 2494:17a	BELL PENDANT	D	Sakkola Leppäsenmäki	Inhumation grave 4	1100–1200
NM 2494:17b	BELL PENDANT	D	Sakkola Leppäsenmäki	Inhumation grave 4	1100–1200
NM 2494:22a	BELL PENDANT	D	Sakkola Leppäsenmäki	Inhumation grave 4	1100–1200
NM 2494:22b	BELL PENDANT	D	Sakkola Leppäsenmäki	Inhumation grave 4	1100–1200
NM 2481:228a	BELL PENDANT	Da	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:228b	BELL PENDANT	Da	Mikkeli Tuukkala	Inhumation grave 26	1200–1250
NM 2481:325a	BELL PENDANT	Da	Mikkeli Tuukkala	Inhumation grave 40	1080–1300
NM 13769:29	BELL PENDANT	Da	Mikkeli Visulahti	Inhumation grave 5	1080–1300
NM 6097:17	BELL PENDANT		Hauho Adenius	Cremation cemetery	550–650
NM 17208:513a	BELL PENDANT		Tampere Vilusenharju	Inhumation grave 8	1075
NM 17208:513b	BELL PENDANT		Tampere Vilusenharju	Inhumation grave 8	1075
NM 6366:186a	BELL PENDANT		Lieto Ylipää	Cremation cemetery	550–800
NM 6366:186b	BELL PENDANT		Lieto Ylipää	Cremation cemetery	550–800
NM 6366:186c	BELL PENDANT		Lieto Ylipää	Cremation cemetery	550–800
ÅM 335:214a	BELL PENDANT		Saltvik Kvarnbacken	Barrow 49	600–800
ÅM 335:214b	BELL PENDANT		Saltvik Kvarnbacken	Barrow 49	600–800
ÅM 337:307, 308	BELL PENDANT		Saltvik Kvarnbacken	Barrow 69	800
ÅM 337:309	BELL PENDANT		Saltvik Kvarnbacken	Barrow 69	800
Kock. 1981,t.9:18	BELL PENDANT		Sortavala Paasonvuori	Hillfort	900–1300
Kock. 1981,t.9:23	BELL PENDANT		Sortavala Paasonvuori	Hillfort	900–1300
NM 3149:57a	BELL PENDANT		Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3149:57b	BELL PENDANT		Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 3149:57c	BELL PENDANT		Huittinen Hiukkavainionmäki	Cremation cemetery	550–1050
NM 2548:543	BELL PENDANT		Laitila Kansakoulumäki	Cremation cemetery	550–1050
NM 283	BELL PENDANT		Saltvik Syllöda	Barrow	550–800
NM 1896:1a	BELL PENDANT		Ähtävä Storholmen	Barrow	400–600
NM 31813:4	BELL PENDANT		Vöyri	Stray find	
NM 2996:35a	BELL PENDANT		Vöyri Gullydynt	Cremation cemetery	550–800
NM 2996:35b	BELL PENDANT		Vöyri Gullydynt	Cremation cemetery	550–800
NM 10904:8a	BELL PENDANT		Sortavala Hernämäki	Barrow 1	900–1050
NM 10904:8b	BELL PENDANT		Sortavala Hernämäki	Barrow 1	900–1050
NM 10904:8c	BELL PENDANT		Sortavala Hernämäki	Barrow 1	900–1050
NM 2613:35	BELL		Kurkijoki Linnavuori	Hillfort	800–1500
Kirpiönik. 1979,70	BELL	Of plate	Käkisalmi Vanha linna	Hillfort	700–1700
Mäkisen kokoelma	BELL	Of plate	Lieto Mäkinen	Stray find	
NM 6196:24	BELL	Of plate	Saltvik Rihagen	Barrow 3	800–1050
Kock. 1981,t.12:8	BELL	Of plate	Sortavala Paasonvuori	Hillfort	900–1300
ÅM 365:A105	BELL	Of plate	Sund Stenhagen	Barrow 17	550–
NM 32291:792	BELL	Of plate	Sysmä Ihananiemi	Dwelling site	800–1520
NM 2502:4	BELL	Cast	Kalanti Nohkola	Cremation cemetery	550–1150
NM 2489:23	BELL	Cast	Kaukola Kekomäki	Inhumation grave 1	1100–1300
NM 8885:56	BELL	Cast	Kurkijoki Kalmistomäki	Stray find	950–1300
ÅM 404:143	BELL	Cast	Sund Långängsbacken	Barrow 43	900–1000
NM 30445:2	BELL	Cast	Sysmä Nykulla	Stray find	800–1150
NM 12693:131	BELL	Cast	Sääksmäki Hirvikallio	Barrow 25	400–600
NM 18250:5	BELL	Cast	Tyrvää Vanha kirkko	Stray find	?–1520

Dating of the sites is based on research reports in the Archive of the Department of Archaeology at the National Board of Antiquities.

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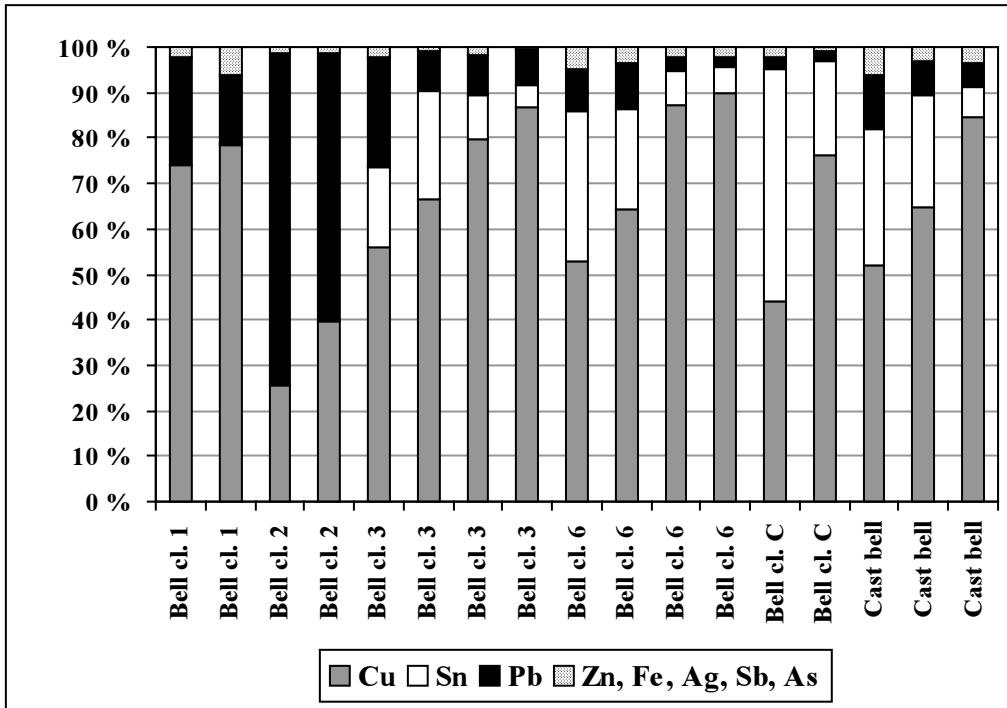
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	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Variable I	25,8	16,2	20,9	18,8	19,6	13,4
Variable II	1,0	0,6	0,6	0,7	0,8	0,6
Variable III	0,93	0,82	0,91	1,01	0,82	0,91
Variable IV	0,47	0,56	0,39	0,49	0,90	0,51
Variable V	1	2	3	1	3	1
Variable VI	1	2	1	1	3	3
Variable VII	0	0	1	1	0	2
Variable VIII	1	1	2	2	0	0
Variable IX	7	6	5	1	3	4

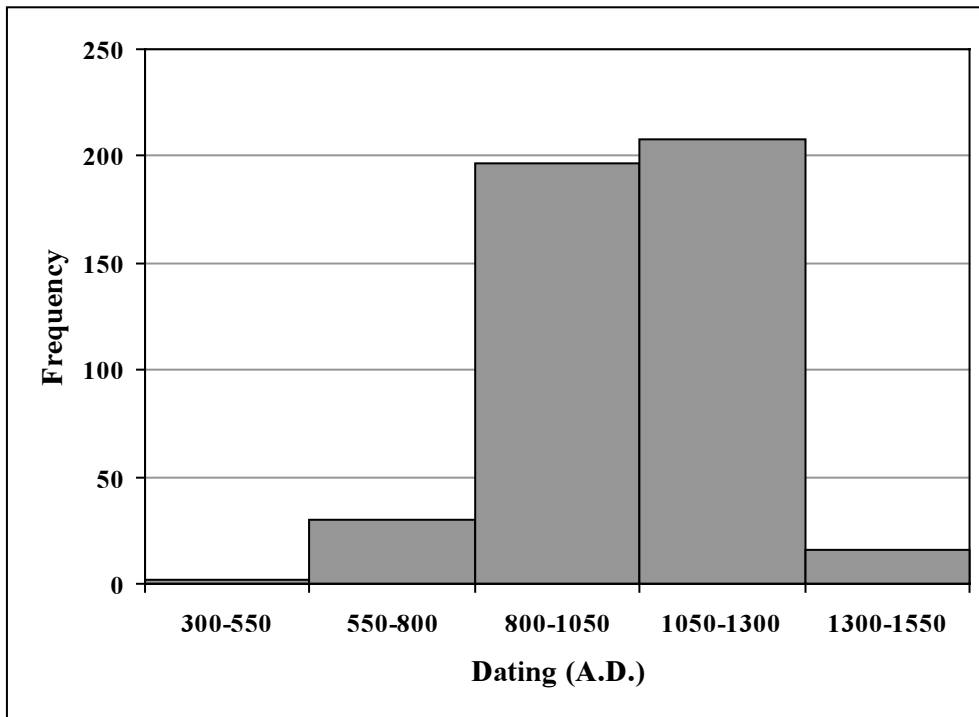
Tab. 1 Means and modes for clusters 1–6.

	Cluster A	Cluster B	Cluster C	Cluster D
Variable I	16,6	9,8	13,3	9,8
Variable II	1,0	0,8	0,6	1,3
Variable III	0,93	1,74	0,92	1,36
Variable IV	0,40	0,64	0,42	0,47
Variable V	2	2	3	2
Variable VI	1	1	2	1
Variable VII	3	2	2	1
Variable VIII	0	1	1	2

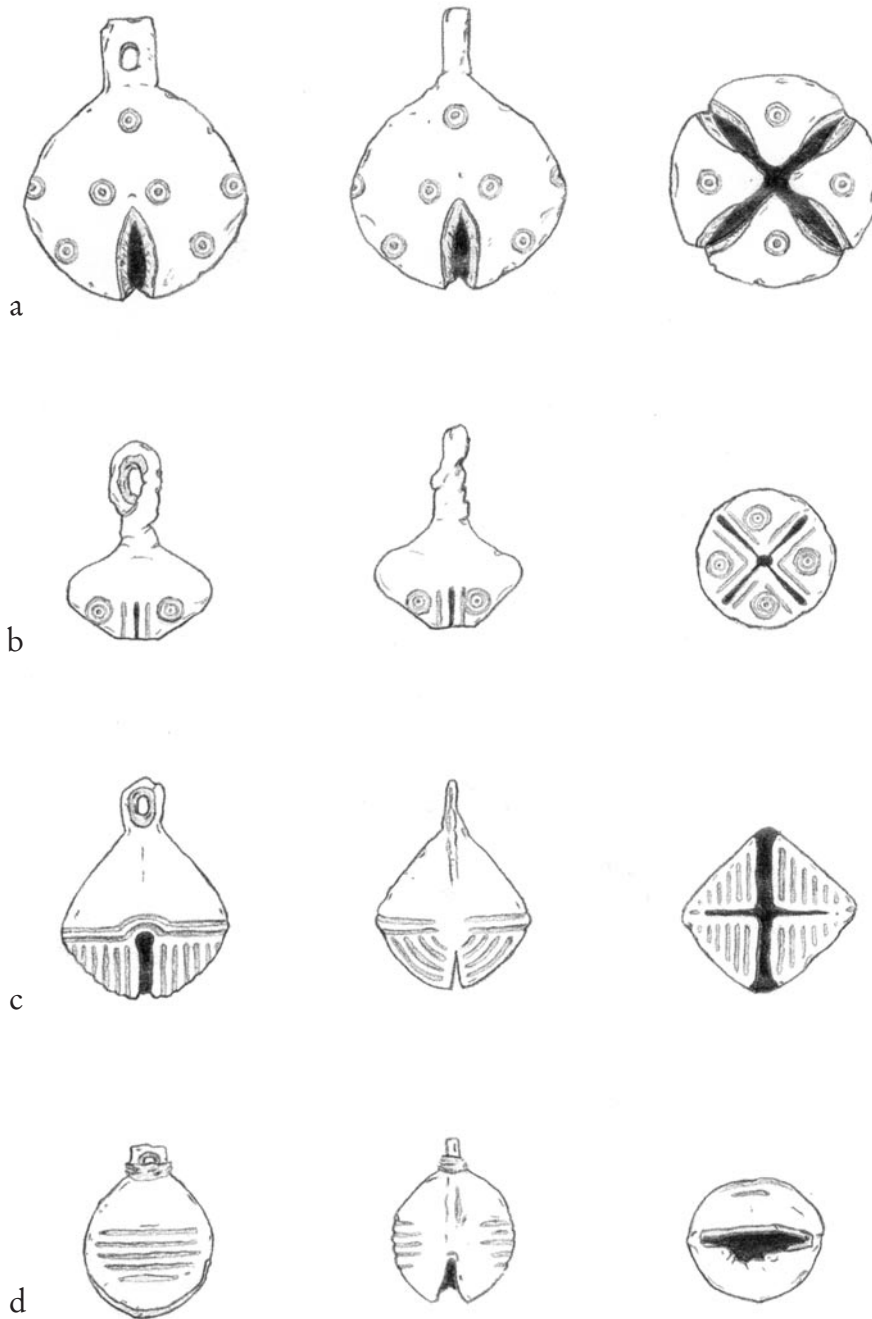
Tab. 2 Means and modes for clusters A–D.



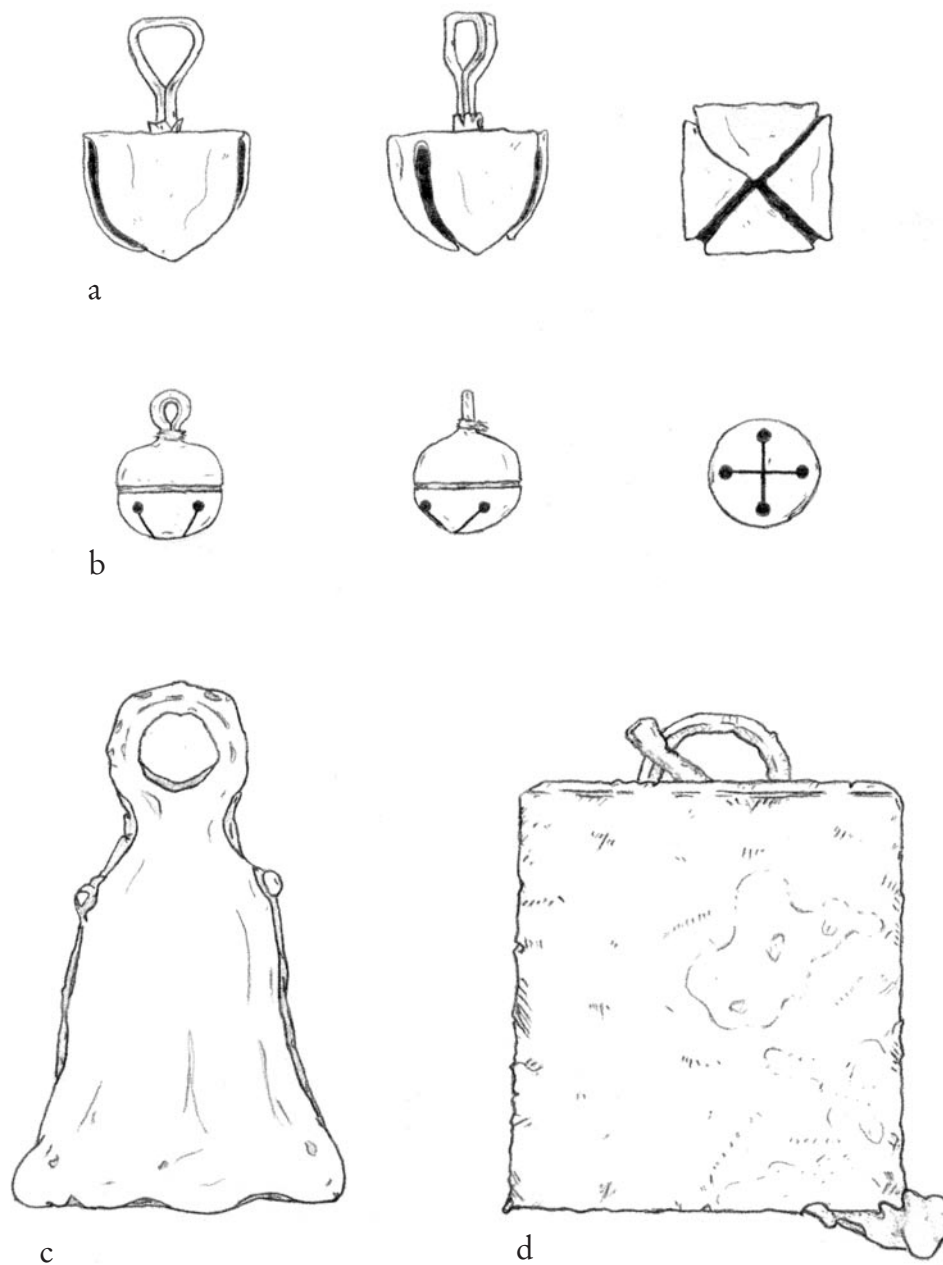
Tab. 3 Results of the elemental analysis.



Tab. 4 The period of use of the bells found in Finland.

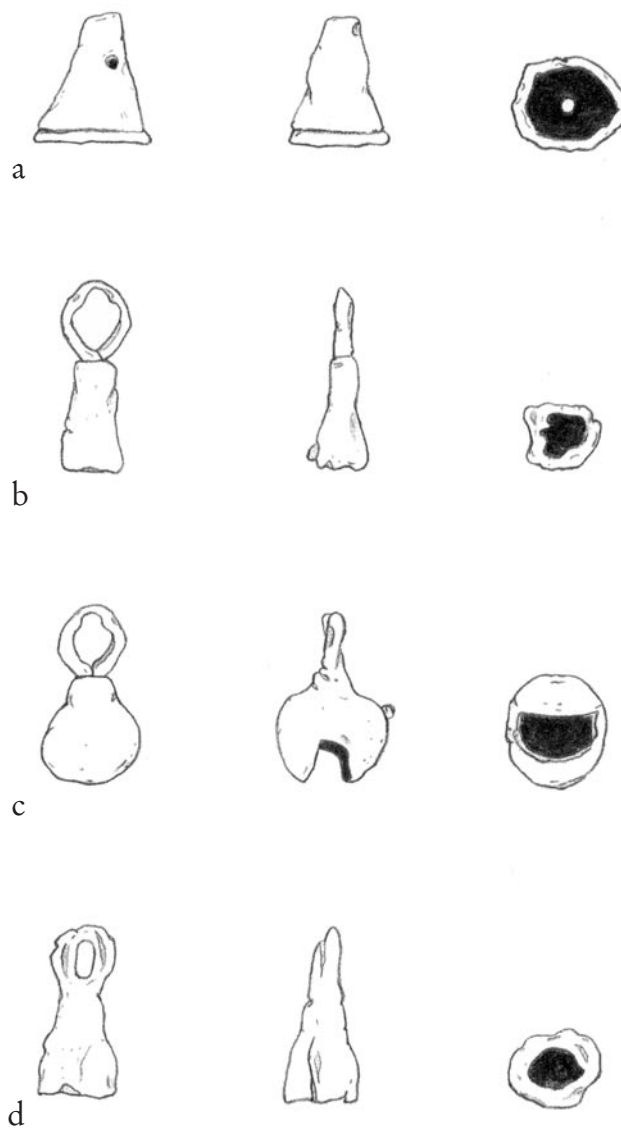


Pl. 1 Pellet bells representing clusters 1–4. a: cluster 1 (NM 8602:31); b: cluster 2 (NM 9102:20); c: cluster 3 (NM 32717:2); d: cluster 4 (NM 14676:199). Scale 1 : 1.



Pl. 2 Pellet bells representing clusters 5–6 and bells. a: cluster 5 (NM 18000:2884); b: cluster 6 (NM 8656:H21:9); c: cast bell (NM 30445:2); d: bell made of sheet iron (NM 6196:24). Scale 1 : 1.





Pl. 3 Bell pendants representing clusters A–D. a: cluster A (NM 3574:158);  
 b: cluster B (NM 6709:5); c: cluster C (NM 2481:79); d: cluster D (NM 2494:17).  
 Scale 1 : 1.



Pl. 4 Distribution of the pellet bells in Finland. a: cluster 1; b: cluster 2; c: cluster 3. A small dot = one artefact, a large dot = 10 artefacts. Scale 1 : 8000000.



Pl. 5 Distribution of the pellet bells and bell pendants in Finland. a: cluster 6; b: cluster A; c: clusters B, C, D. A small dot = one artefact, a large dot = 10 artefacts. Scale 1 : 8000000.