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ANCIENT HILLFORTS OF FINLAND

Problems of Analysis, Chronology and Interpretation with Special Reference to the Hillfort of Kuhmoinen

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Mirjami Tolonen

PREFACE

An extensive research project such as the present study requires consultation with experts in various fields. For this reason, I am indebted to many more than would normally be the case. I regret that I cannot separately express my thanks to all concerned.

Thanks are collectively due to all who participated in the excavations of the Kuhmoinen hillfort. Without the efforts of these volunteers, the project would not have progressed. The library of the National Board of Antiquities of Finland was of major importance for the work, and its staff has helped without sparing any efforts. The Finnish Antiquarian Society kindly accepted this study for publication in its series, and I wish to thank the members of the Society's board who approved and supported the translation of my work.

Financial support and grants from the Jenny and Antti Wihuri Foundation, the Finnish Cultural Foundation and A. Ahlström Oy made it possible to carry out the natural-scientific analyses which were of primary importance for my research. A grant from the Emil Aaltonen Foundation permitted a leave of absence from my administrative work at the National Board of Antiquities, for which my special thanks are due.

The methodological span of this study extends from the excavation stage to the conservation of artefacts and from pollen analyses to statistical mathematics. For this reason, I wish to thank a number of persons separately for their vital assistance.

Active in carrying out and organising the excavations at the Kuhmoinen hillfort were Mr. Hannu Kilpinen of Kuhmoinen, who discovered the first finds, the architect Seppo Rintala of Kemi, curator Janne Vilkuna of the Province Museum of Central Finland and via him the whole museum, Mr. Teppo Vihola, lic.phil., of the University of Jyväskylä and Lieutenant-colonel Pertti Huttunen of Turku. The army reservists of Kuhmoinen kindly let the excavation crew use their cabin during the excavation seasons.

I have also had the pleasure of co-operating with experts in various fields of the natural sciences. Professor Joakim Donner has kindly assisted me in many ways throughout the research project. Thanks are also due to Ms. Tuovi Kankainen, lic. phil., of the ^{14}C Laboratory of the Geological Survey of Finland for radiocarbon datings. Dr. Vagn Mejdahl of the Nordic Laboratory for Thermoluminescence Dating at Risø and Dr. Högne Jungner of the Radiocarbon Laboratory of the University of Helsinki provided the TL-datings. All of the above have also given valuable comments on problems related to dating. Docent Mirjami Tolonen of the Department of Botany of the University of Helsinki is to be thanked for her work in carrying out the pollen analyses of the Kuhmoinen region. She has also given expert guidance in discussions concerning these analyses. Mr. Veli-Matti Taavitsainen, lic. phil., kindly assisted me in problems concerning statistics.

During the course of this project, I had the opportunity to investigate the ancient hillforts of the parts of Karelia ceded to the Soviet Union after World War II. This was made possible by the expert assistance of Dr. Aleksanteri Saksa of Leningard and Dr. Svetlana Kočkurkina of Petrozavodsk. Saksa and Kočkurkina generously presented their material and the results of their research. On a similar study trip to Estonia and Latvia I was warmly assisted by Latvian and Estonian colleagues, especially Dr. Vello Lõugas of Tallinn.

Over the years I have learned much from my colleagues at the National Board of Antiquities and at home. Especially Mr. Matti Huurre, lic.phil., and Ms. Anna-Liisa Hirviluoto, mag.phil., have guided and assisted me not only in official matters but also

in questions related to my private interests in research. My colleagues, Markus Hiekkanen, lic.phil., and Mr. Tapio Seger, cand.phil., have participated in innumerable discussions and have helped me in many ways. With her assistance and expert knowledge, cand.phil. Leena Tomanterä, conservator of the National Board of Antiquities, has provided invaluable help in all stages of my research.

Docents Eljas Orrman and Jaakko Masonen have read the manuscript and have presented valuable comments, for which my respectful thanks.

Curator Pekka Sarvas of the National Board of Antiquities is to be thanked for his teaching and guidance during my early years. His advice left an indelible impression and has held me in good stead ever since. Professor Ari Siiriäinen provided expert guidance during his years in the service of the National Board of Antiquities, and I am especially indebted to him for valuable comments on the chapter on dating in this study. It was also possible to participate in useful discussions with Professor Richard A. Gould during his term as visiting professor of archaeology at the University of Helsinki.

I wish to express my gratitude to the translator of my study, Mr. Jüri Kokkonen , mag.phil., with whom I have had over the years the most varied and instructive discussions concerning archaeology. He has pointed out that "despite the attitudes of government officials regarding archaeology, the Finnish people have not lost interest in their own past." The generous volunteer assistance received during the course of this study proves that Kokkonen was right.

Helsinki, October 1990

J.-P. Taavitsainen

1. Introduction

In this study ancient fortifications or hillforts of prehistoric type are specifically defined as hills with steep slopes and walls of stone and/or earth protecting their accessible parts, or as outcrops of bedrock, and as hills and islands without walls, referred to with place-names indicating a fort or castle (Fi. linna), from which prehistoric finds have been recovered (on the problems of definition, see Appendix 4, p. 220–222). Contrary to generally held views, the ancient hillforts of Finland have been studied to a considerable degree. Within the present borders of Finland are a total of 70 hillforts.[1] Twenty-five are known from the area of Karelia ceded to the Soviet Union in World War II. Of the 95 hillforts, 36 have been excavated to varying extent (38 % of all known hillforts). In addition to this, many hillforts have been mapped. There is hardly any other group of antiquities in Finland that has been excavated to such an extent, at least in relative terms. Despite the relative extent of excavations and field work, not much is actually known about the hillforts. This has maintained the idea that they have not been studied to any major extent. Finnish archaeological literature usually mentions hillforts as belonging to the Late Iron Age and indicating social organisation and the joint efforts of communities for defensive purposes.

The reasons for this limited description of hillforts in the literature are understandable in themselves. Although extensive excavations of hillforts have been carried out, in some cases even uncovering over half of the available area, many of the excavations have been of limited scope and area with few finds. In 10 cases (28%) the excavations revealed no finds at all. Furthermore, in a number of cases reports or publications have not been prepared of the field work. Even the basic questions of the time of construction and period of use remain unanswered. Understandably, this has prevented the progress and development of research. Julius Ailio's (1921a 29) remarks from almost 70 years ago apply to present conditions as well: "Not much attention has been paid to questions such as the original shape and structure of the walls and the gates, the manner in which the forts were defended, the nature of shelters and dwellings, structures for cattle, the possible enemies against whom the forts were built, the organisation of administration and maintenance, the origin of various cultural influences etc. It is specifically with respect to cultural-historical problems such as these that the study of prehistoric forts must proceed in the future in a systematic manner."

The subject of this study is the Linnavuori hillfort of Kuhmoinen. The purpose will be to explain the origin of this hillfort and to elucidate its position among the other hillforts of Finland. Excavations carried out at the hillfort in 1983-88 revealed an exceptionally large number of artefacts and objects. Despite the moderate size of the excavations (total area 181 m^2), the field work carried out at the Kuhmoinen hillfort is exceptionally extensive for Finnish conditions.

The geographical locations and structures of hillforts indicate the need for defence. This study proceeds from the generally held assumption that hillforts were places of shelter and defence erected against the threat of enemies. Despite this basic starting point, other possible uses of these sites will be discussed as well.

Following Julius Ailio, the aims and goals of the study of ancient hillforts and fortifications can be briefly stated as follows:
1) *chronology*: time of construction, duration of use, time of abandonment;
2) *functional problems*: reasons and factors for the choice of the hillfort sites, structure of forts and methods of defence; activities including possible non-military ones;
3) *social questions*: who built the forts and against whom; organisation of administration and maintenance.

The available material is insufficient for a thorough review and discussion of all of the above problems and areas of enquiry. Therefore, this study will concentrate on the problems in relation to which the Kuhmoinen hillfort provides better material than previous studies.

[1] Excluded from the total is the Castle of Häme, mentioned in the list of hillforts and ancient fortifications in Appendix 4. The prehistoric finds from this site cannot be proven to have been related to an earlier uncertain fortification.

All comparative studies are based on chronology. In this connection we have at our disposal an exceptionally large series of radiocarbon and thermoluminescence datings. Also the uncommonly large and varied archaeological find material from the Kuhmoinen hillfort provides a solid basis for conventional artefact datings. In many archaeological studies where typological and related datings of finds are available, so-called natural-scientific datings are usually given a secondary role. Of interest in the case of Kuhmoinen is a definite conflict between these groups of chronological data – the datings based on scientific methods are clearly younger than those arrived at by purely archaeological means.

In this study, the main role is given to scientific dating methods. The usual roles are reversed and archaeological datings are now treated the same way as anomalous scientific ones when it is attempted to conform them to artefact chronology or to eliminate them.

This opposite procedure is useful on many levels. The datings obtained by natural-scientific means necessitate a review of the grounds for the archaeological dating of artefacts, especially in cases where the finds from the Kuhmoinen hillfort are dated with reference to closed burial finds. It is also necessary to re-investigate the standard practice of applying so-called cemetery dates as such in completely different contexts without regard to factors such as the possible chronological difference between the time of manufacture of an artefact and/or its period of use and the time of deposition in a different context. A central problem is posed by the question of whether a dating obtained in one context can be automatically transferred into another without a thorough review of the source-critical factors involved. In this connection, the aim is to demonstrate that questions of chronology cannot be answered without taking into account the natural and cultural variables affecting the processes of formation and preservation of archaeological material in different contexts. This question is naturally of wider importance for archaeological method in general.

The history of settlement and habitation is one of the main themes of this study. As hillforts are in all cases the products of settlement, they cannot be studied without an understanding of the development of settlement in the area concerned. The overall features of the history of settlement in Kuhmoinen must be investigated in order to obtain even general answers to the questions of social organisation related to the hillfort.

The region of Kuhmoinen offers a good opportunity for investigating the origin and formation of permanent settlement in a limited area. In late pagan times, Kuhmoinen belonged to the wilderness areas, while in the Middle Ages it already formed a separate entity within the administrative parish of Padasjoki. It had by this time its own broadly demarcated area of utilised resources with a uniform local place-name (Suvanto 1965 93).

Archaeological finds form a distinct cluster in the area of the present commune of Kuhmoinen. Known from the region of Lake Päijänne are so-called Lapp cairns – assumed burial structures of the hunting-fishing population. A large number of Iron Age stray finds have been found in Kuhmoinen, including the Papinsaari hoard, the cemetery island of Rautsaarenkärki, the Viking and Crusade Period cemeteries of the main village area and the hillfort as an indication of social organisation at an early stage. In addition to this material there are paleobotanical samples from the vicinity of the cemeteries and the hillfort which provide data on the history of farming in the region. The sampling locations for pollen studies were chosen from the main village near the sites of the cemeteries and several stray finds and in the originally wilderness surroundings of the hillfort in order to compare the history of resource utilisation between the area of pioneer settlement and its nearby wilderness. Samples from adjacent lakes were also intended to shed light on the duration of use of the hillfort.

Of special interest is the location of Kuhmoinen on the west shore of Lake Päijänne at Tehinselkä, a crossing of important Medieval wilderness routes, and the fact that Kuhmoinen was one of the Medieval parishes of Häme that utilised far-off wilderness resources. As late as the beginning of modern times, almost all of the villages of the parish had far-off hunting areas. In this respect, Kuhmoinen can be described as a kind of frontier region at the fringe of permanently settled areas.

According to historians, the history of settlement in Finland was regulated and controlled by the use of wilderness resources. These practices served to prepare the way for permanent settlement. In the economic conditions of ancient Finland settled areas were paralleled by utilised wilderness regions, often at distances of several hundred kilometres from the permanent settlements. In these outlying regions hunting and fishing was practised, tribute was collected from the nomadic Lapps and – according to written sources – slash-and-burn cultivation was also practised. This structure of the farming economy laid down the guidelines for settlement with permanent occupation following in the footsteps of the wilderness hunters.

Although similar views on the history of settlement have been touched upon in some archaeological publications, there have not been any specific studies on the relationship between the utilisation of wilderness resources and the formation of permanent settlement. One of the aims of this study is to

investigate the formation of permanent settlement in the "Wilderness Finland" of the Iron Age. The above concept formulated by historians is a model to which archaeological observations are referred and compared. Of special interest is the slash-and-burn cultivation of outlying areas. Recent paleobotanical studies suggest that this practice was more common and widespread than hitherto assumed. A further problem is the spread of farming settlements – whether this was a continuous and even process or whether it involved factors of push and pull with a resulting intermittent pattern in the spread of settlements. Also of interest are the effects of pioneer settlement on the local hunter-fisher populations and the role of the latter in the subsequent formation of the farmer-peasant population. This also involves the role of ethnicity in the changes of the mode of production.

In late prehistoric times the region of Päijät-Häme (i.e. the areas of Häme around Lake Päijänne) was an uninhabited wilderness area between the Satakunta-Häme settlements of the Kokemäenjoki River system and the Karelian settlements along the shores of Lake Ladoga and the River Vuoksi. Between these settled areas was also the extensive and uninhabited Lake Saimaa region. It is necessary to compare these uninhabited areas in order to define whether the history of settlement of Päijät-Häme and the factors leading to the construction of the Kuhmoinen hillfort were an isolated phenomenon or whether they were part of a broader scheme of development. This, however, requires an understanding of the historical development of the settlements of Satakunta-Häme on the one hand and Karelia on the other. Finds from the Kuhmoinen hillfort and Päijät-Häme in general include objects and artefacts of both eastern and western origin. In all of the above areas there are also hillforts which require comparisons. As the basic assumption is the need for shelter and defence, comparisons and classifications must take into account not only natural conditions, present in all cases, but also methods of warfare. The possible connections of the ancient hillforts with periods of fort and castle construction in the Baltic region must also be taken into account.

General works on Finnish prehistory as well as many specialist studies present the generally held view that late prehistoric Häme was part of the uniform West Finnish Iron Age culture. However, in connection with the history of settlement it must be noted that in the Crusade Period small penannular brooches of western type and oval tortoise brooches of eastern origin have been found only in the Päijät-Häme region and in the Lake Vanaja region of Häme. This suggests that Häme differed from both the western and the eastern cultural spheres of the late Iron Age. This observation and related discussion – together with other features of settlement history – are central to defining the political and economic factors involved in the construction and use of the Kuhmoinen hillfort as well as other hillforts.

2. The Linnavuori hillfort at Päijälä in Kuhmoinen and related studies[1]

2.1. Topography of the Kuhmoinen hillfort

The commune of Kuhmoinen is located on the west shore of the Tehinselkä body of open water in Lake Päijänne, approximately 70 km north-northwest of the town of Lahti.

The relief of the area varies. In the western parts are steep-sloped narrow inlets and numerous islands. The inland regions of the commune contain several lakes, which are especially numerous in the northern parts of the commune between areas of high and hilly ground. In the western and southwestern parts the terrain is more monotonous with lower hills separated by wider valleys. Long cavernous valleys are a special feature of the local topography.

Most of the area is at an elevation of 100–150 metres above sea level, i.e. 20–70 metres above the surface of Lake Päijänne. Because the shores of the lake are relatively steep and its surface is c. 78 metres above sea level, the area of shore below the 100-metre a.s.l. contour is relatively narrow. Especially in the northern parts there are elevations of up to 200 metres above sea level.

The bedrock of Kuhmoinen also varies. In the northern parts granite dominates. Other rocks present are gneiss-granite, phyllite and gneiss.

Although the bedrock is bare in many places, most of the area of the commune is under a cover of various types of soils with moraine predominating. This is followed by bog turf, although there are no wide open areas of bog. Areas of gravel and sandy soils are few in number and there are only short sections of ridges. The latter are to be found at Harmoinen, the church village and in the regions of Pihlajavesi and Lummene. There are small areas of clayey soils in the shore regions as extensions of bays. The largest farming areas are also in these parts (on the geology and vegetation of Kuhmoinen, see Mirjami Tolonen, Appendix 5; Virkkala 1965; geological maps of Finland – bedrock maps 2143 Padasjoki, and 2144 Kaipola). Land area suited to demanding flora and farming amounts to 20–30 % of the total area of Kuhmoinen (Kujala 1951 209), which indicates a relatively small proportion of arable land.

Kuhmoinen is centrally located along natural routes of communication. Water routes, roads along ridges, isthmuses and place-name data indicate a number of routes: from Hauho and as far as the Vanaja region of Häme in the west to Lake Päijänne along the Kuhmalahti-Kuhmoinen, Lummene-Kuhmoinen, Vesijaka-Kuohijärvi or Kuohijärvi-Padasjoki water routes. Kuhmoinen and Padasjoki are located in conjunction with these routes. The route of communication led across Lake Päijänne to the "deep waters" of Sysmä. It also crossed a water route passing north-south along Lake Päijänne (Jaakkola 1956 209–210; V. Voionmaa 1924a 5 & 1933 8–10; Suvanto 1965 74–80).

The hillfort of Kuhmoinen (local place-name: Linnavuori) is in the northern part of the commune on land owned by the local congregation. The site is c. 7.5 km north-northeast of the church of Kuhmoinen on an isthmus separating Lakes Saaresjärvi and Linnajärvi. The isthmus is locally known as Linnanmäenmaa and is among hilly terrain approximately 1.3 km east of the road leading from Padasjoki to Jämsä. Before the 18th and 19th century redivision of land the area in question was jointly owned and held by the Päijälä land-division unit and was later acquired by the residence-holding known as Korola belonging to the local chaplain (Suvanto 1965 82–83).

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[1] Basic survey map 2144 07 Karklampi
x = 6836 50, y = 563 60, z = 175.22 m
Field work: Mapping by Hj. Appelgren-Kivalo 1907; mapping and excavations by J.-P. Taavitsainen 1983–1988.
Finds: NM 22005:1–3, NM 22029:1–3, NM 22445:1–252.
Archive sources: C. A. Gottlund, Antiquariska Anteckningar I: Nylands och Tavastehus län; H. A. Reinholm's collections, No. 12, p. 138, 141–146, 149–150, 157; Information supplied by F. Lindén concerning antiquities in Kuhmoinen; Inspection report by Hj. Appelgren-Kivalo 1907; Photographs by A. Hackman 1918; Inspection report by A-L Hirviluoto 1962 (1963).
Published sources: Appelgren 1891 93; Appelgren-Kivalo 1907a 73–76; Linden 1925 5, Suvanto 1965 80–83; J. Vilkuna 1986.

Fig. 1. Aerial view of the Kuhmoinen hillfort. Photo Kai R. Lehtonen 1984.

The hillfort is at some distance from the present villages, and the surroundings of the site are barren (Fig. 1). The barren and hilly nature of the area does not permit permanent arable farming of any extent. There are only a few farms and small fields in isolated locations in the near vicinity (Fig. 2). In a letter, dated 2nd January 1909, Fabian Lindén lists the farms nearest to the hillfort and their ages. The tenant farms of Linnajärvi and Juuristo were at that time 90 years old, and the Kaiteri tenant farm was 100 years old. The Sarvataipale farm had been in existence for slightly over 200 years.

The near vicinity of the hillfort was however influenced by man. Burn clearing is indicated by the name of a hill rising to the southwest of the hillfort on the northern side of Lake Linnajärvi – Ohramäki (Barley Hill). Also the Linnamäki hill southwest of the fort had been under slash-and-burn cultivation at some stage. This is indicated by cairns of cleared stones and rocks on the hill. In his above-mentioned letter, Lindén mentions that Benjamin Benjaminin-poika, then 80 years old, had herded cattle at the old Paateri holding, in which connection he often went to Linnanmäki hill where he saw several cairns. The old farmer of Paateri called them a "giants' wall". Lindén mentions that the location was often burn-cleared and he suspects that the cairns had disappeared in the course of time. It is impossible to determine, whether the present cairns on the hill are those mentioned by Lindén or the result of later burn-clearing. In 1881 K. K. Talvinen surveyed the parish on a grant from the Finnish Antiquarian Society and his report mentions that slash-and-burn cultivation was still a common practice in Kuhmoinen at the time. According to Suvanto (1965–456), this was common in Kuhmoinen until the 1890s. Lindén also points out that none of his informants referred to the structures of the hillfort as the work of "giants", as in the case of the cairns.

Judging from the lack of prehistoric finds, the near vicinity of the hillfort was a wilderness area in the Iron Age. The list of Iron Age finds in Kuhmoinen (Appendix 3) shows that both cemeteries and stray finds are concentrated in the area of the main village. The nearest find to the south is from a distance of c. 6 km (stray find no. 2) and to the north from a distance of c. 7 km (stray find no. 6).

The hillfort was, however, close to local roads. The Padasjoki-Jämsä road, which went out of use in 1856 because of its hilly course, passed between Linnavuori hill, Lake Linnajärvi and the hillfort. This was the main road leading to Kuhmoinen from this direction. Suvanto (1965 338) suggests that the road was already used as a riding path in the Middle Ages. Appelgren-Kivalo (1907a 75) mentions having heard in Kuhmoinen that an old road leads from Lake Päijänne in the southeast along the Säynetjoki River to Juntto and past the hillfort to the Sarvataipale farm. According to him, this indicates communications in past times in the vicinity of the hillfort. The course of the path or route is shown in a number of maps of the antiquities of Kuhmoinen by Lindén. An example is the map shown in Fig. 2, which the Finnish Antiquarian Society purchased from Lindén on 13 December 1909.

To the east of the hillfort Lake Saaresjärvi (elevation 130 metres a.s.l.) discharges to the east into Säynätlahti Bay (78 metres a.s.l.) in Lake Päijänne some 6 km distant. Lake Linnajärvi (135 metres a. s.l.), to the west of the hillfort, discharges to the northwest into Lake Sarvajärvi at the end of which is Sarvataipale, the terminus of the above-mentioned route from Lake Päijänne. The place-name refers to a bypass and a route. Lake Sarvajärvi flows through

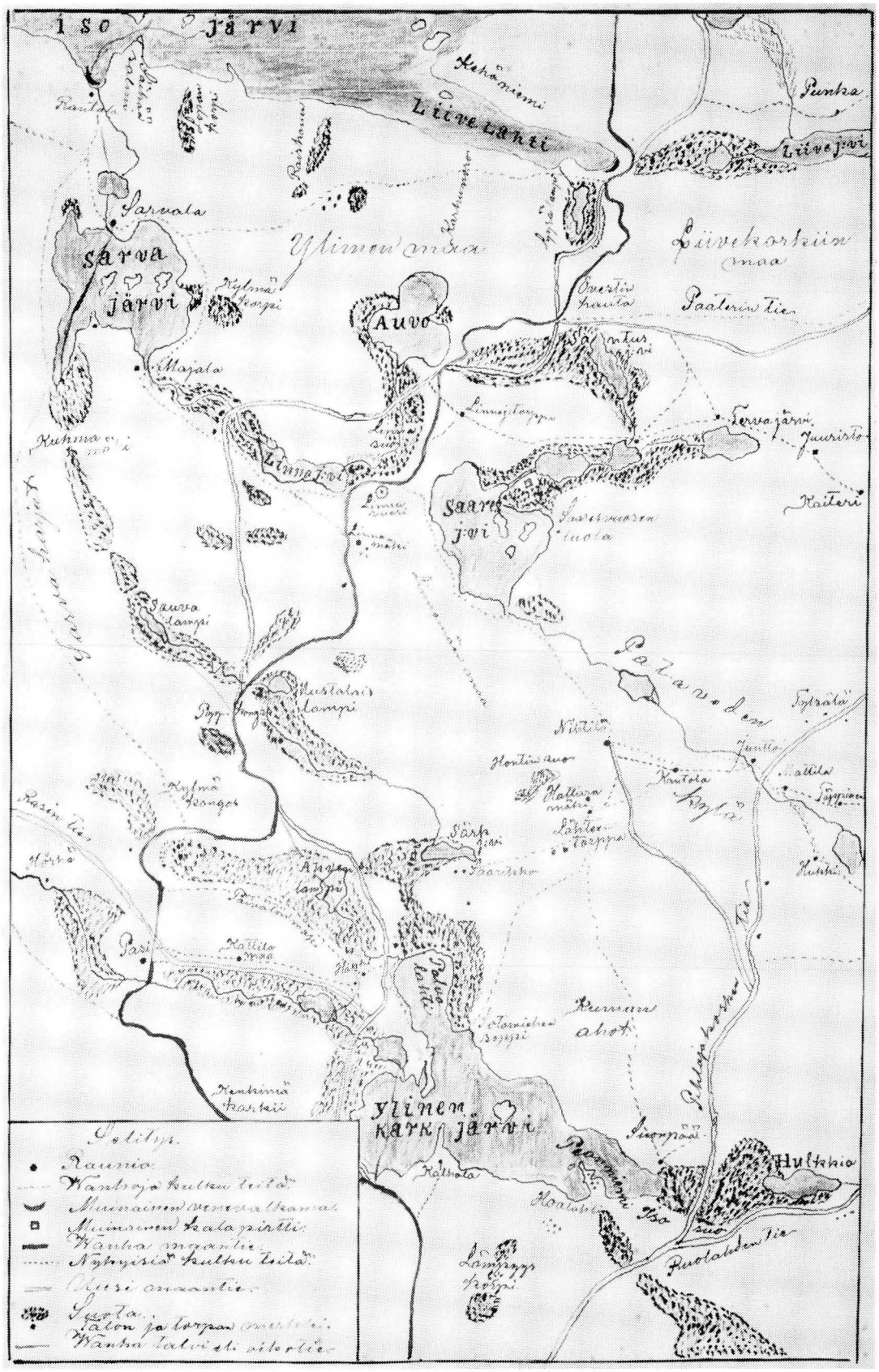


Fig. 2. Fabian Lindén's map (1909) of old and present tracks and roads Kuhmoinen. The tracks are marked with dashed lines and the old highway with a solid black line. The winter roads are marked with a thin line and the new highway with a pair of lines. Cairns are marked with small dots and a dot within a circle at the hillfort site. National Board of Antiquities / Archives of the Section for Prehistory.

Fig. 3. The southeast and east slopes of the hillfort. Photo Seppo Rintala 1985.

Fig. 4. The south slope of the hillfort. Photo Seppo Rintala 1985.

Sarvalampi Pond into the part of Lake Isojärvi known as Kiviselkä. Although Lake Isojärvi discharges through a number of small lakes to the east and into Lake Päijänne, it also provides easy access to the Lake Längelmävesi water route belonging to the Kokemäenjoki water system. Suvanto (1965 78) suggests the possibility that this water route was in use. From the west it passes first to the end of Lake Längelmävesi at Länkipohja and from there to Kuhmoinen and to Hirmupohja at the end of another long water route and from there again along Lake Isojärvi to Kiviselkä. The latter location provides access via Sarvataipale to Lake Sarvajärvi. From this point there is a short passage along a ridge to Lake Ylä-Karkjärvi in the near vicinity of the main village (Suvanto 1965 78). Also Väinö Voionmaa (1947 65) has stressed the central location of Lake Isojärvi, 2.5 km north of the hillfort, referring to the "Hämeentie" (Häme road or route) leading from Lake Längelmävesi and the end of Lake Isojärvi to the parish of Jämsä.

The hillfort was thus accessible from all directions.

The Kuhmoinen hillfort forms an area of veined gneiss (Ilkka Laitakari, bedrock map 2144 Kaipola, 1973). The actual hill is, however, of granite (Professor Heikki Papunen, Department of Geology and Mineralogy of the University of Turku). As it was of harder material than the rest of its surroundings, it became an elevated area after the Ice Age. The highest point of the hillfort site rises to an elevation of 175.22 metres a.s.l. and some 45 metres above Lake Saaresjärvi, over 40 metres above Lake Linnajärvi and 97.12 metres above the level of Lake Päijänne. Weather permitting, the eastern shore of Lake Päijänne can be seen from the crest of the hill.

The bedrock of the hillfort site displays clear cubic fractionation, with almost horizontal lines of cracking. In the direction of approach of the ice sheet (NW) is a boulder-mixed cover of base moraine extending to the crest and on the opposite side (NE) is a field of large boulders at the foot of the abrupt faces. Because of the favourable direction of cracking, the ice "hewed" several narrow terraces at different elevations on the southwest and northeast slopes.

In the crest area and on the east and southwest sides are relatively extensive outcrops of bedrock. The highest part of hill was not favourable for the stratification of loose soils and their thickness is only 5–50 cm. The forest growing on the western level area of the slope and the southeast terrace is mainly of blueberry-spruce type. Also growing in this area is aspen and on the terraces a dry forest type with pine is present.

The highest part of the hill measures c. 100 metres (NW-SE) by 80 metres (NE-SW) covering an area of c. 5,300 square metres. Access is rendered difficult by natural causes. To the northeast, east and southeast this area is delimited by vertical precipices, in places over 20 metres high. The south and southwest sides are partly abrupt, but in the middle part of the south slope are boulders permitting somewhat difficult access. To the northwest, in the direction of original approach of the ice sheet, access is easiest. In this location is a stone wall, c. 40 metres long which is overgrown with moss and in disrepair. The width of the wall is c. 1.5 –2 metres and its height is approximately half of the width. The wall ends at the northwest corner of the hill, although even here the slope can be climbed. According to Appelgren-Kivalo this part "no doubt contained an extension of the wall, although its stones have been cast down from the hill."

Between the wall and the outcrops of bedrock of various height to its east is a yard-like level area, the centre of which is moist and marshy in the spring with sphagnum moss. Also in other locations of the uneven crest area, terraces and level outcrops of bedrock form several "yards" of natural form.

Apart from the wall, the only clearly observable signs of human action observable among the vegetation are cairns on the crest area. Five of these have

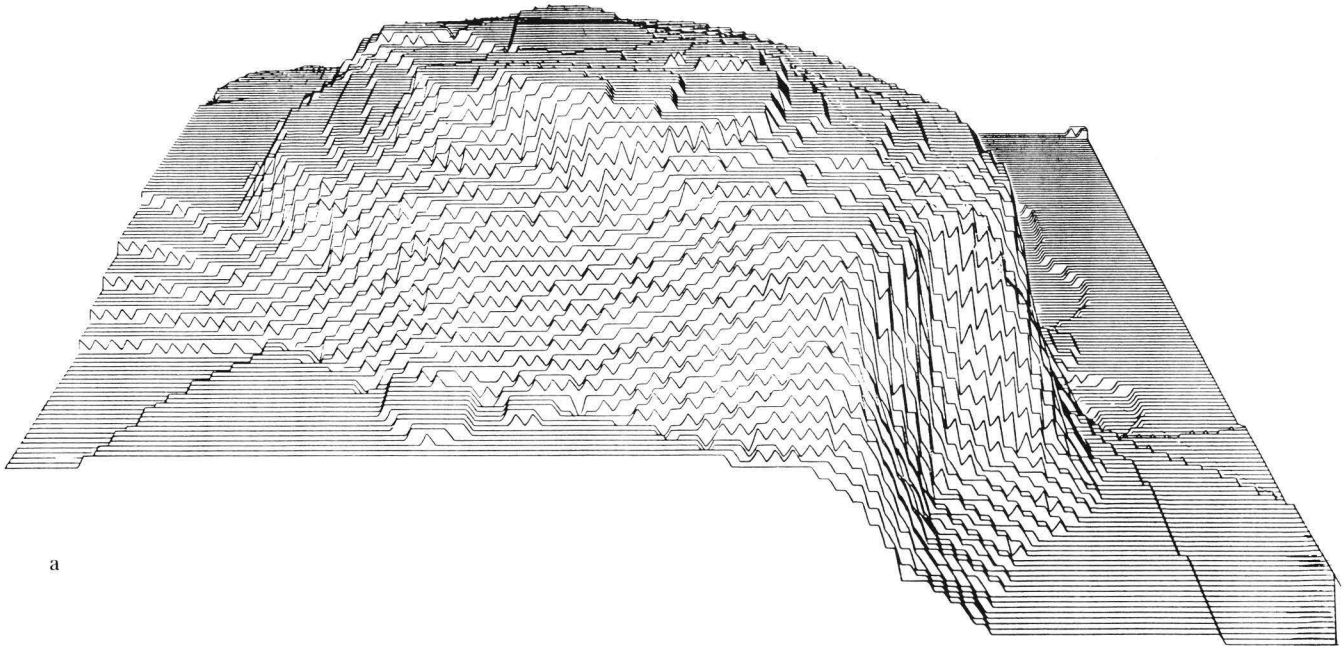
Fig. 5. The east terraces of the hillfort. Photo Seppo Rintala 1985.

Fig. 6. The northeast terrace of the hillfort. Photo Seppo Rintala 1987.

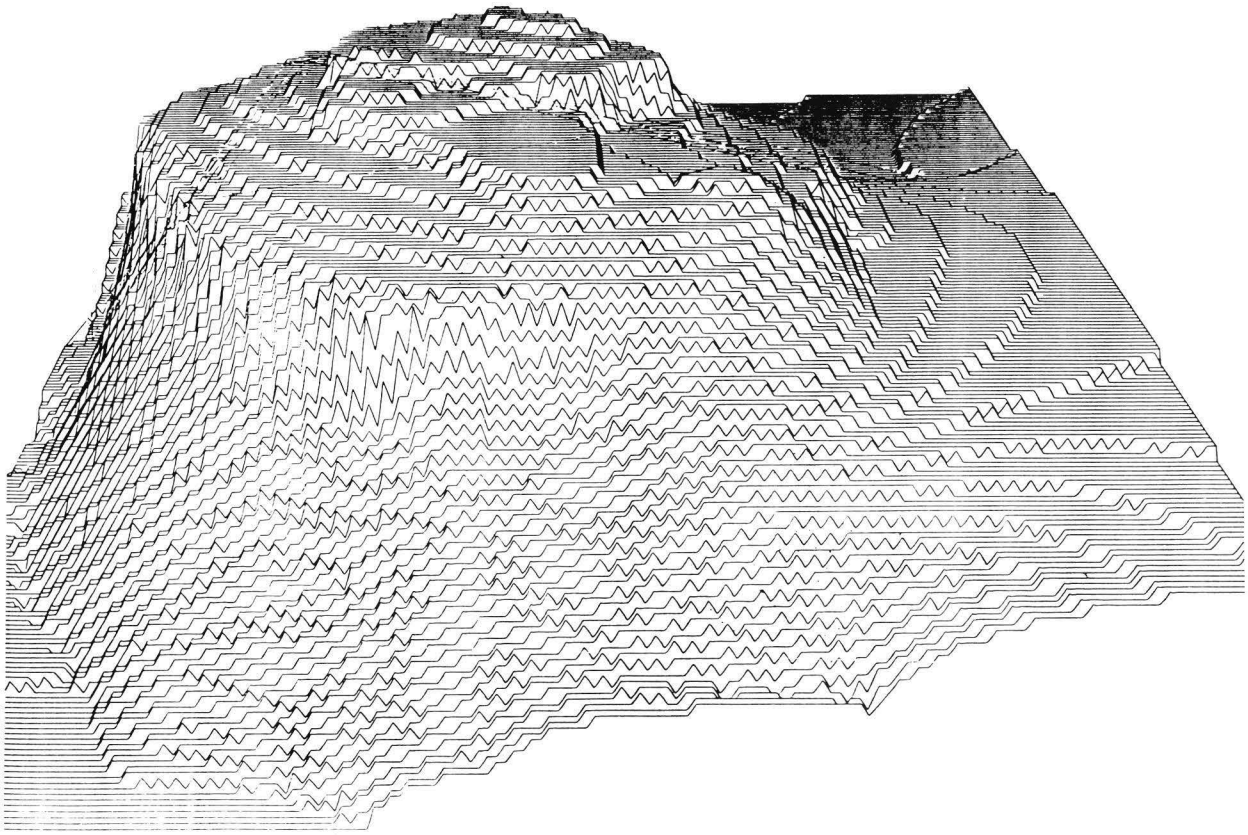
Fig. 7. The crest of the hillfort site. In the middle of the foreground is cairn no. 15 with cairn no. 14 next to the white post. Photo Seppo Rintala 1987.

Fig. 8. The level area behind the wall, seen from the south. The wall extends from the left of the photograph along the edge of slope and the level area. Photo Seppo Rintala 1988.

Fig. 9. View from the hillfort to the east across Lake Saaresjärvi. Photo Seppo Rintala 1985.



a



b

Fig. 10. Elevation models in perspective of the Kuhmoinen hillfort. Views from the south (a) and the north (b). Scale c. 1:1250.

been recorded with certainty in the "yard" and elsewhere on the crest and a total of 19 on the various terraces. Because of the high undergrowth all of the low cairns, 1.5 – 2 metres in diameter, have not necessarily been observed. It also appears that there are three mounds or protrusion on the wall.

Figs. 3 – 10 provide additional information to the above written description of the site.

2.2. History of research at the hillfort

The oldest known reference to the Kuhmoinen hillfort is in part three of the map of the Päijälä land-division unit from 1842 (National Board of Survey MHA H60 Kuhmoinen). The hillfort, and the "road" passing by it, are marked on the map. The site (Fi. Linnavuori) is recorded in Swedish as Linnavuoriberg.

Notes and material gathered by C. A. Gottlund (1796–1875) and H. A. Reinholm (1819–1883) contain highly different references to the hillfort. Gottlund mentions it by its unusually place-name of Suomutkanvuori, known in the Puukkoinen village which Gottlund visited and where he heard of the hillfort (letter from F. Lindén 22/9/1907; Appelgren 1907a 74). The Reinholm collection of the National Board of Antiquities contains information from the 1860s and '70s concerning the hillfort. The brief description of the location, appearance and fortifications of the site, presented by Appelgren in his dissertation in 1891, are based on this information.

Appelgren visited the site, however, only as late as the summer of 1907, apparently in connection with his inspection of the prehistoric cemetery of Ala-Rantala. The report of this visit to the site was published almost verbatim in the journal Suomen Museo in 1907. Appelgren mapped the hillfort (Fig. 11) and recorded 11 cairns in the crest area. He also mentions that Fabian Lindén, a local shoemaker interested in the history of the parish, had excavated some of these cairns and had found charcoal in them. Lindén also had photographs taken of the walls (Fig. 12). He recorded 14 cairns (Linden 1925 5), which at the time of Appelgren's visit were dug open. On the basis of his observations, the size of the stones and the charcoal, Lindén regarded the cairns as the remains of the hearths of "inhabitants of the hill". There is no mention of any finds.

The next visit to the site by an archaeologist is attested to by photographs taken by Alfred Hackman, marked with the year 1918 (Figs. 13–14). Judging from the year mentioned Hackman visited the site in connection with the excavations of cairns in the locality.

The archives of the National Board of Antiquities also include a report by A-L Hirviluoto concerning two inspections of the site carried out in 1962. The

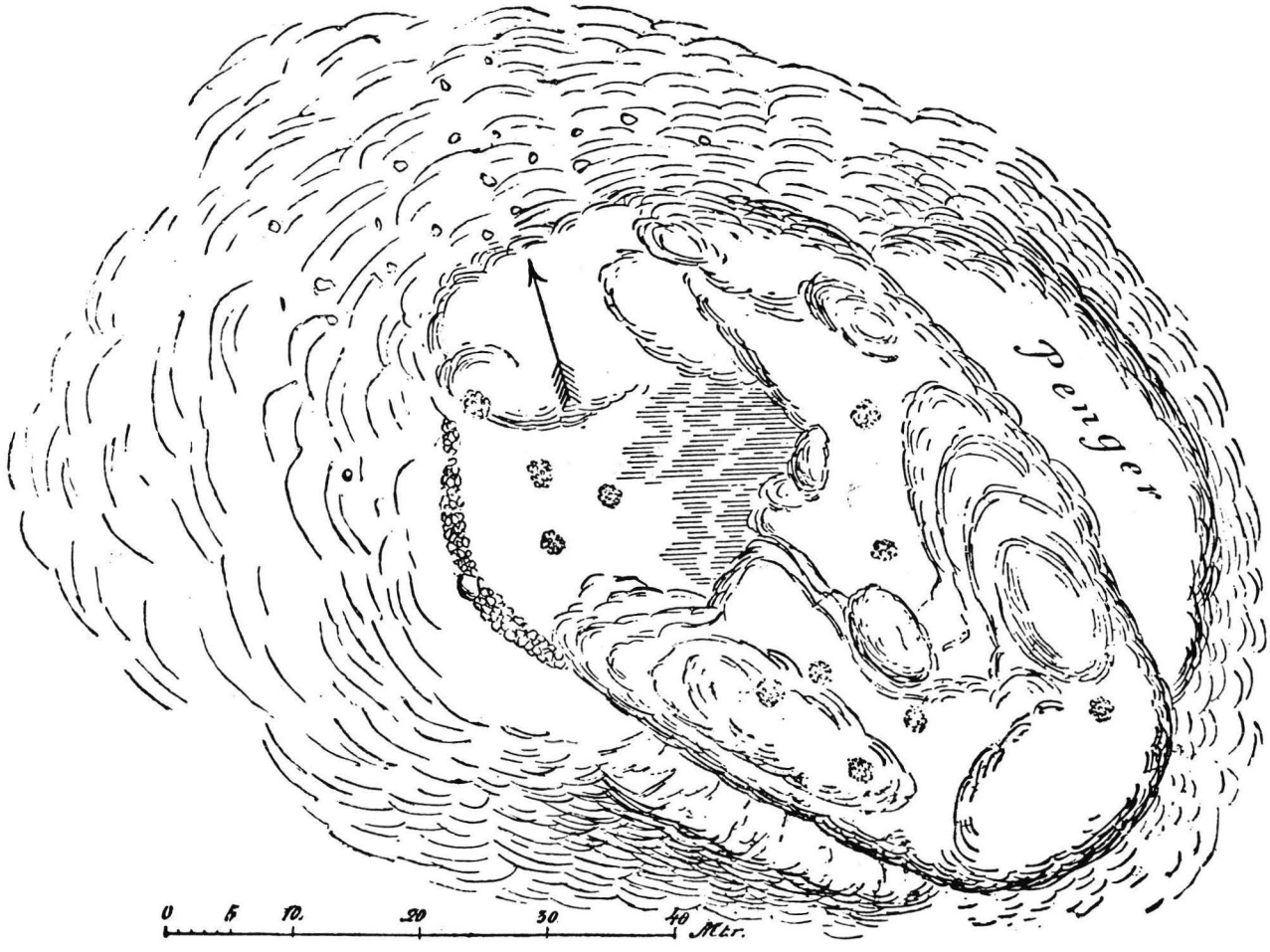


Fig. 11. Map of the Kuhmoinen hillfort prepared by Hj. Appelgren-Kivalo in 1907 (Appelgren-Kivalo 1907a).

Fig. 12. Section of wall at the Kuhmoinen hillfort. Photo National Board of Antiquities/Emil Brask, Kuhmoinen.

Fig. 13. The level area behind the wall. Photo National Board of Antiquities/ Alfred Hackman 1918.

Fig. 14. View from the hillfort to the east across Lake Saaresjärvi. Photo National Board of Antiquities/Alfred Hackman 1918.

reason for these inspections was a shooting-range which was to be built at the foot of the hill. In this connection, it was discovered that an unknown student of the Teachers' Seminar of Jyväskylä had been given the task of investigating the hillfort and had dislocated some of the stones of the cairns. There is no mention of any finds.

Unauthorised private investigations of the crest area were carried out by boys from the village in the early 1960s. While visiting a raven's nest on the hill the boys had found spearheads and iron artefacts at an outcrop above the nest immediately beneath the moss. The boys had thrown these objects from the hill and some of them into the forest on their way home.

Because of its present isolated and inaccessible location, the hillfort appears to have been saved from archaeological or unauthorised excavations despite the fact that in recent years it has been a local scenic site marked with a special sign. Before field work carried out in the 1980s, the hillfort has been almost untouched. Spearheads found by Hannu Kilpinen in the crest area (NM 22005:1–2) led to the excavations (Mapping and excavation work from 1983 to 1988 are presented in Appendix 1).

3. The dating of the Kuhmoinen hillfort

An exceptionally large range of methods can be used in the dating of the Kuhmoinen hillfort. Its unusually rich finds offer good opportunities for archaeological datings based on comparisons of materials. Also a number of charcoal samples were taken for radiocarbon dating as well as samples of burnt and fire-cracked stones for thermoluminescence dating. Pollen analyses and ^{14}C datings were used to provide data on the changes of vegetation at the site that may be related to various stages of use and the abandonment of the fort. The required sediment samples were taken from the turf on the crest of the hill, the bottom and detritus of Lake Linnajärvi to the north of the site and the turf of Linnasuo Bog to the northwest. Sediment samples were also taken from the bottom of Lake Saaresjärvi on the east side. It was attempted to date changes observed in the latter series through comparisons with the above-mentioned radiocarbon-dated sediments.

The radiocarbon datings were carried out at the ^{14}C Laboratory of the Geological Survey of Finland. The TL samples were dated at the Nordic Laboratory for Thermoluminescence Dating at Risø in Denmark. The measurements of background radiation required by the method were carried out by Dr Högne Jungner of the Radiocarbon Dating Laboratory of the University of Helsinki. The pollen analyses were carried out by Docent Mirjami Tolonen of the Department of Botany of the University of Helsinki.

In connection with standard archaeological dating of artefacts, the natural-scientific datings have in most cases, especially in the younger contexts, been limited to the control of the archaeological datings, their support and possible clarification. If the dating acquired by natural-scientific means was in conflict with the archaeological dating, it has either been ignored, proved unreliable or left without further comment.

This study however, proceeds from a different approach. The starting point for the dating of the hillfort is the one obtained by natural-scientific means, against which the standard archaeological dating is compared and reviewed. Where considerable discrepancies occur, the reasons for this will be discussed. It will thus be attempted to eliminate the discrepancy of the archaeological dating and/or to accommodate it to the one obtained by natural-scientific means.

This exceptional approach is useful in reviewing the basis of dating. The dating results obtained by scientific means require a discussion of the basis of archaeological datings. This especially applies to the standard datings based on cemetery finds applying to the artefacts from the hillfort as well as the standard practice of placing these directly in a completely different find context without thorough discussion or source criticism.

In terms of method and procedure, the natural-scientific dates obtained for the hillfort are independent of each other and of the archaeological datings. Accordingly, they are referred to as independent dates (see e.g. Dean 1978 226).

Although the actual methods of dating having nothing to do with archaeological theory or method, the samples and objects that archaeologists submit to experts for dating usually have connections with human activities and are assumed to be as old as these activities. For example, if we take a sample of a wooden structure, a hearth built and used by man, or an animal slaughtered by man, it will provide an opportunity to assess or evaluate the age of the place or activities in question. The potential usefulness of a sample is dictated not only by the anomaly-producing processes, but also the archaeological context concerned and the environmental and cultural factors that affected its formation. Recent studies have come to discuss these issues to an increasing degree (see e.g. Kristiansen 1987; Schiffer 1976 and 1987; Binford 1983).

The factors by which archaeological source material is formed will be referred to as formation processes. According to Michael M. Schiffer (1987 7): "Formation processes are of two basic kinds: cultural, where the agency of transformation is human behavior; and noncultural, in which the agencies stem from processes of natural environment". Schiffer goes on to define cultural formation processes "more concretely as the processes of human behavior that affect or transform artifacts after their in-

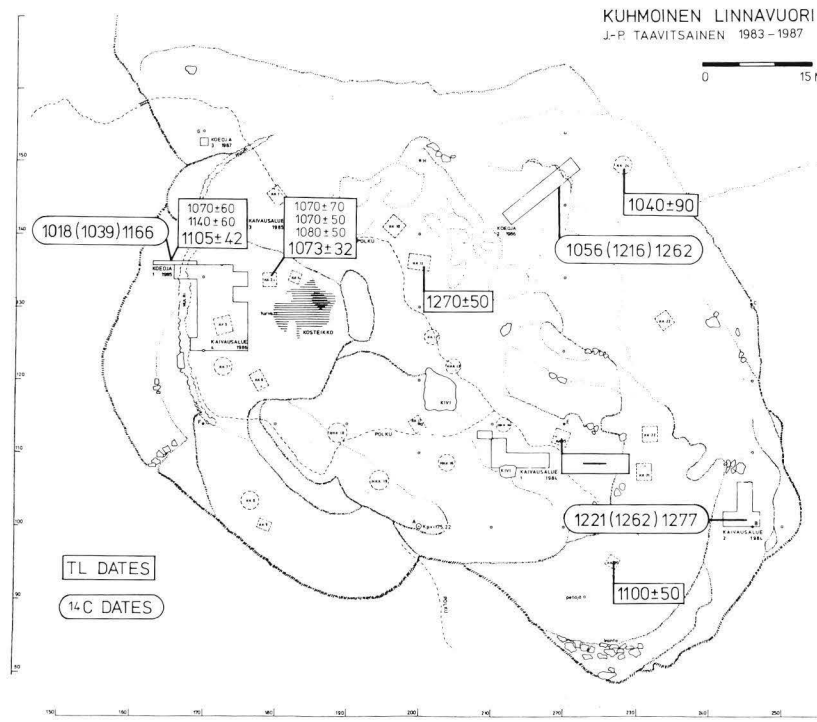


Fig. 15. Map of the sampling locations for ^{14}C and TL datings at the Kuhmoinen hillfort.

itial period of use in a given activity. Cultural formation processes are responsible for retaining items in systemic contexts (by reuse) to form the historic context, for depositing artifacts, thus creating the archaeological record, and for any subsequent cultural modifications of material in either record. Cultural formation processes, of course, also include the activities of the archaeologist in the recovery and analysis stages of research when materials from the archaeological record re-enter systemic context. Noncultural formation processes act on cultural materials at all times, both in systemic and archaeological contexts, and are responsible for what decays and what is preserved, for the collapse of structures and the accumulation of sediments, for a host of disturbances ranging from earthquakes to earthworms, and for deposition of evidence – ecofacts – relevant for inferring past environmental conditions." (Schiffer 1987 7).

The following discussion concerning natural-scientific and archaeological dates and their evaluation will especially address the problems related to noncultural and cultural formation processes.

3.1. Natural-scientific datings

3.1.1. Radiocarbon dates

Three radiocarbon dates were obtained (Fig. 15): 1) from test trench 1 on the outer side of the wall from a lens of soot and charcoal located between a layer of burnt stones and pulverized sand and a layer of red sand (Appendix 1, Fig. 18), 2) from the upper part of a lens of soot and charcoal under layers of burnt stones and discoloured soil in the northeast part of test trench 2 drawn across the northeast terrace of the site and 3) from a layer of soot and charcoal beneath the hoard or cache in connection with the hearth found in test trench 2.

A few thin layers of soot were observed when mapping the hearth stones. These were, however, so thin and so near the surface that the small amounts of material and the probability of contamination prohibited the sampling of all of them and no datings were obtained from any of the samples taken. Outside the north end of the wall was an apparently undisturbed streak of soot, but it did not contain enough charcoal for a dating. The location of the streak of soot was outside the wall, like the sample from test trench 1, which together with the context of layer formation suggests the same age.

The results of the datings are given in Table 1. The dates are calibrated according to Stuiver & Pearson (1986) with an automatic calibration program.

The success of calibration depends on the curve employed and the nature of the sample (see e.g. Mook 1983). Stuiver & Pearson's curve is based on timber samples of 20 year-rings dated both dendrochronologically and by radiocarbon means. In using this curve, each of the samples to be dated should – ideally – span 20 years with each of these years equally represented. The number of year-rings of the

Table 1. ^{14}C dates from Kuhmoinen Linnavuori. Calibration according to Stuiver & Pearson (1986).

Lab.no.	Locality	^{14}C age yr BP	Most probable date cal AD	68 % probability range cal AD	Relative area under probability distribution
Su-1570	Wall, trench 1	940±60	1039	1018–1166	1026–1068 .34 1071–1128 .46 1133–1158 .20
Su-1571	Hearth?, trench 2	840±70	1216	1056–1262	1057–1079 .12 1124–1134 .08 1156–1262 .80
Su-1414	Hearth, excavation area 2	770±60	1262	1221–1277	1204–1281 1.00

carbon samples from the Kuhmoinen hillfort is not known, but the bi-decadal calibration curve was used because the use of a "smoothed" curve might have led to a too simple impression of the true age. In this case, none of the calibrated dates are dependent on the curve applied. Regardless of the curve used, the date will change less than 20 years. However, there is a possibility that the charcoal contains material of considerably different age, e.g. stand-dried and originally fresh timber, which may bring about incorrect results in calibration. In practice, it is practically impossible to demonstrate the variation in age of the sample material.

A number of sources of error abound in radiocarbon datings (see e.g. Taylor 1987; HFA 1985; Dean 1978). Taylor (1987 15, 105–146) mentions 1) sample provenance factors that focus on the integrity of the association of sample materials with an event or phenomenon for which temporal placement is desired, followed by 2) sample composition factors, 3) statistical and experimental factors and 4) systemic factors. The three latter are geophysical and/or geochemical factors affecting the precision and accuracy of individual ^{14}C dates.

The discussion of Taylor's sources of error and the Kuhmoinen radiocarbon dates will be introduced by a brief review of the geophysical and geochemical sources of error. This section is followed by a more detailed discussion of the sample provenance factors involved.

In Taylor's terms, sample composition factors are variations in carbon isotope ratios due to contamination and fractionation effects. Contamination is partly dependent on the sample provenance factors involved. Isotopic fractionation was taken into account in the measurement and computation stage; the conventional C ages of the samples are corrected for isotopic fractionation using delta ^{13}C values, measured at the Geological Survey of Finland by Juha Karhu.

In connection with statistical and experimental factors, Taylor mentions constraints imposed by the nature of radioactive decay and methods of measurement. The Kuhmoinen samples were dated at the laboratory of the Geological Survey of Finland which uses the most modern technology available (Mäntynen et al. 1987). The datings carried out by the Geological Survey of Finland have been observed to be reliable in two international collaborative studies on calibration (Tuovi Kankainen, oral comm.).

Taylor's systemic factors include temporal and secular variations in initial ^{14}C concentrations in different geochemical environments. This, however, does not apply to the samples from Kuhmoinen, because the sample material derives from an ordinary terrestrial biosphere.

Sample provenance factors were taken into account in choosing the sampling sites. H. Jungner's (1977) comparison between radiocarbon ages and archaeologically estimated ages for samples from Finland indicates that the radiocarbon ages in many cases are younger than the estimated ages. The distribution of the samples in an estimated age/radiocarbon age diagram shows that a contamination of younger material can hardly have made any of the ages younger. The samples must therefore consist of young material mixed into the cultural layer. According to Jungner, one explanation for this may be that the cultural layers of the sites are very near the surface, often only about 0.5 m depth, and that they are in loose material, such as sand, which can easily be disturbed. Because of the possibility of the mixing of younger material and the risk of contamination, the samples were taken from context which appeared to be as undisturbed as possible and were not in direct contact with the humus layer. There were no observations of re-deposition caused by natural or human factors. Furthermore, all roots were removed in handling the samples and treatment by HCl-NaOH-HCl was used to remove humus acids and carbonates of different age from the charcoal samples.

In using radiocarbon datings it must be kept in

mind that radiocarbon dates on wood are time placement estimates of growth of the groups of rings. This phenomenon has been called presample-growth error or the inner wood problem (see e.g. Taylor 1987 44–46). In order to estimate the age of the wood itself it is necessary to find out, whether the samples are of small branches, sticks or shoots. In the case of a large piece of charcoal it must also be known, whether it contains the outer or inner year-rings of the timber in question. In the former case, it is possible to obtain a date closer to the time when the tree was felled or when it died than from a sample of the base or one including all of the year-rings. In most cases, it is impossible to ascertain these details from pieces and fragments of charcoal. Even if this were possible, wood charcoal contains several year-rings, which will always provide a somewhat older date. Also in the case of materials other than wood charcoal the dating will apply to the age of the sample only. The archaeologist must therefore attempt to define the chronological relationship between the age of the sample and the sampling location.

In the case of the Kuhmoinen samples inner wood error is probably not of any great significance, as the curvature of the larger samples indicates that the charcoal could hardly have been of core wood.

As it can be assumed that the dating samples were either of firewood or timber for construction, the actual use of the material must also be taken into account. Factors present in this connection are species and forest type, the intentional or accidental burning of forest and the degree of development of the forest in question. These problems will be discussed in further detail, but there are few possibilities for unequivocal conclusions.

The main problem is posed by the presence of stand-dried timber and timber from old houses and structures (old or dead wood problem). This, together with the inner wood error, creates great problems for the dating of archaeological sites and features and chronology based on radiocarbon ages (see e.g. Schiffer 1987 305–321). This problem has also been discussed in Finland. Ari Siiriäinen (1974 11; see also J. Donner 1985) has pointed out that the radiocarbon ages of certain Comb Ware Period II sites give a date for the beginning of the ceramic style that is approximately two hundred years older than that indicated by shore displacement chronology. Siiriäinen suggests as an explanation the age of the timber burnt in the hearths from which samples were obtained.

The Kuhmoinen samples are of wood charcoal – specifically pine (defined by Leena Tomanterä). Pine, like larch, oak and yew, is a dry standing species (Leikola 1978 286). Because sample no. 1 can be assumed to be from the timber breastwork and no. 3 is of firewood (sample no. 2 is of uncertain origin; both of the above are possible), we must know the practices related to the use of firewood and construction timber; especially whether freshly-cut timber or deadwood was used in either case.

For purposes of source criticism, the problem of dry standing will be discussed in further detail, although no concrete results are hard to achieve.

At present, dry standing timber or standing barkless deadwood occurs mostly in northern Finland and the presence of such material in dating samples is more probable in this area than in Southern Finland. Was the situation, however, the same in earlier times?

The only certain answer to this can be found in statistics concerning the state of forests, which are available from the present day to the 1920s. Also of use are statistics from the 1860s onwards concerning forest fires in state-owned forests. According to this material, all of the forests were burnt twice during the span of a century. According to Professor Matti Leikola (pers. comm.), fires caused by burn-beating added to the rate of occurrence of deadwood in Southern Finland. Statistics indicate that deadwood is more common in state-owned forests in Southern Finland than in Northern Finland. According to Leikola, the situation was reversed by effective fire-fighting measures introduced in the 1920s.

Thus, there was more deadwood in the Kuhmoinen region and in Southern Finland in general than in Northern Finland before the introduction of effective forestry measures.

The process of dry standing of pine has been studied in the Inari region of Finnish Lapland (Leikola 1969), where the natural death of pine normally occurs only after it has reached the age of four hundred years. Disregarding exceptions, pine dies before reaching the age of five hundred years. The oldest known pines from Finnish Lapland have reached the age of over 700 years. There is evidence that they remained standing for over a hundred years. In open and sandy terrain wind will in a short span of time fell stand-dried timber which is decayed at the base. However, a fallen tree or part of it will still be useful at least as firewood for a long period. Its rotting will take a few decades, but pitchy or resinous stumps can be preserved for over a hundred years. Carpelan and Kankainen (1989) have pointed out that after felling the process of rotting begins at the base from the core wood and surface and will leave an uneven shell of hard pitchy wood a couple of inches thick around a rotting or empty core (see also Leikola 1978 277–278).

The above observations concern Lapland and cannot be applied as such to conditions in Central and Southern Finland, where trees die at a younger age (Matti Leikola, oral comm.). In the south the period of growth is also longer and the deadwood has been

standing for a shorter time and has decayed at a faster rate in the form of fallen trunks and pitchy stumps. The often-recurring forest fires of Southern Finland may also have shortened the period of dry standing. In spite of these factors, it is nevertheless possible that the samples include originally dry standing deadwood. This may bring about differences of several hundred years between the age of the sample and its actual date of burning even in Southern Finland. However, the beginning of the decaying process from the core wood decreases the possibility of the oldest parts showing up in the samples.

The use of deadwood also affects the probability of its occurrence in various connections. Firewood must naturally be dry. Especially at temporary camp sites the most easily available dry timber is deadwood. However, the considerable amount of firewood required by permanent occupation and settlement had to be collected from the nearby forests where the timber was mainly young. Thus, the systematic use of young wood is more probable at sites of permanent occupation than at temporary camps. In evaluating ^{14}C samples it has been pointed out that we must take into account that if the charcoal comes from hearths or ovens, the datings will show little variation, since firewood for daily consumption would have consisted mostly of very young wood (HFA 1985 54). However, the following assumption can be presented as a counter-argument: In the initial stages of occupation and settlement the proportion of deadwood from local forests was larger than later and dry timber was first used. Accordingly, with time firewood will become younger with the change of the age-structure of the nearby forests. The change from dried pine to younger and thinner firewood has been demonstrated at the Nukkumajoki Lapp site in Inari (Carpelan & Kankainen 1989). Thus, an older date is more probable in the early stages of occupation, which must be kept in mind when evaluating the datings of this stage. This initial stage may also be "lost" among the numerous datings obtained from a long-term occupation site and thus indicate a continued dominance of fresh firewood.

The Kuhmoinen hillfort was more of a permanent occupation site than a camp and pollen analysis shows that its surrounding forests were not in any virgin state. Although slash-and-burn agriculture increased the rate of dry standing, it also affected almost all forests and accordingly their age. In the system of slash-and-burn rotation it was not possible for old forest to grow, nor was dried timber or deadwood left standing for long.

With exception of the northernmost regions and certain temporary structures such as barns, deadwood has not been used for building in ethnographic contexts in Finland (see e.g. Carpelan & Kankainen 1989). This was most probably the case in earlier times as well, for deadwood is not suitable or practical for construction purposes. Timber for building must be of even quality and easily worked. Unlike fresh timber, deadwood is hard to shape. The branches are firmly affixed and the material will easily splinter when carved. It is also of varying quality, often with hollows bored by parasites. In many cases the base is decayed or hollow.

It is hard to present any exact information on the re-use of timber from old houses and buildings. In most cases this involved the removal and erection of an old house at a new site. The material discussed below does not contain any indications of this.

A great deal of information on log structures and houses has been obtained from Novgorod, where the material shows that fresh timber was used for building (see e.g. Černyh 1972 95). It could not be used immediately after felling, for the wood still "lived". However, building timber was not stored for long periods. The maximum period of storage was 2–3 years, in order to avoid the formation of deadwood. In the dating of this material the old wood or deadwood problem is not a probable source of error. If the house or building had burnt, the radiocarbon dating will not indicate the age of the fire, but mainly the age of the fresh building timber. The proximity of the measured and computed age to the time of construction depends on inner wood error. It is also necessary to take into account the sources of error provided by various stages of construction and repairs.

Table 2 presents data on the ages of dendrochronological samples from the Medieval towns of Russia compiled from Kolčin & Černyh (1977). Although there is no precise information on how the material was collected, the table may be assumed to give some picture of the ages of building timber, despite the fact that it is not possible to assess the effects of settlement on the age structure of their surrounding forests. This would require in each case detailed information on the extent and type of the forests, the possibilities for transporting timber to far-off locations etc. The main factor appears to be the size of the town in question. Larger towns required more timber for building purposes, which in turn would increase the rate by which the building timber from the nearby forests became younger.

According to Table 2, there is a degree of variability in the use of timber younger than 50 years and material 51 to 100 years old. The proportion of the former varies from 8 to 88.4 % and the latter from 10.2 to 67.9 %. The extensive material from Novgorod has an effect on the means and averages of the whole material. Excluding Novgorod, the proportion of timber younger than 50 years rises to almost 52 % and that of material 51 to 100 years old

Table 2. Ages of dendrochronological samples from Russian towns according to Kolčin & Černyh (1977).

	−50 yrs	51−100 yrs	101−150 yrs	151−200 yrs	201−250 yrs	251−300 yrs	
Novgorod	1046 (24 %)	1743 (40 %)	1090 (25 %)	371 (8,5 %)	96 (9,2 %)	14 (0,3 %)	4360
Pskov	51 (58 %)	28 (31,8 %)	5 (5,7 %)	2 (2,3 %)		2 (2,3 %)	88
Smolensk	255 (52,9 %)	208 (43,2 %)	16 (3,2 %)	1 (0,2 %)	1 (0,2 %)	1 (0,2 %)	482
Toropec	130 (88,4 %)	15 (10,2 %)		2 (1,4 %)			147
Beloozero	81 (36,2 %)	71 (31,7 %)	32 (14,3 %)	24 (10,7 %)	16 (7,1 %)		224
Orešek	63 (38,9 %)	70 (43,2 %)	20 (12,3 %)	5 (3,1 %)	3 (1,9 %)	1 (0,6 %)	162
Käkisalmi (Korela)	2 (8 %)	14 (56 %)	7 (28 %)	2 (8 %)			25
Kirillov	10 (18,9 %)	36 (67,9 %)	6 (11,3 %)	1 (1,9 %)			53
Polock	43 (50,6 %)	31 (36,5 %)	10 (11,8 %)	1 (1,2 %)			85
Mstislavl'	67 (73,6 %)	24 (26,4 %)					91
	1748 (30,6 %)	2240 (39,2 %)	1186 (20,7 %)	409 (7,2 %)	116 (2 %)	18 (0,3 %)	5717

to over 88 %. Even with Novgorod included, the latter group was the most common material for building. A total of 69.8 % of the Russian dendrochronological material belongs to this group. On the other hand, we do not know which of the Novgorod or other samples were of house timbers and which were for example posts sunk in the ground, timber pavements etc, which may have had different requirements of quality than material for house building. The material does indicate, however, that the use of timber younger than 100 years was considerably more probable than that of very old material.

Zetterberg (1987 and pers. comm.) has pointed out that the ages of timbers in Finnish houses and structures form a different picture. Most of his samples were of timber 150−200 years old and even material over 300 years old was not rare. It appears that decay-resistant old timber of the best possible quality and dense grain was chosen for the building of dwellings.

It is difficult to project observations concerning building timber to the case of the Kuhmoinen hillfort, for we have no information or any later comparisons for the timber used in the structures of the wall and breastwork. The only possible exceptions are the fortification structures from Linnosaari in Valkeakoski and Tenhola in Hattula. Sarasmo mentions that the top area of the Linnosaari fort was encircled by a wall over two metres high which was *partly* built of very thick timbers 30−35 cm in diameter which did not appear to have been hewn. According to Sarasmo (oral comm.), the timbers included birch as indicated by preserved pieces of bark. The radiocarbon dates are of pine. This suggests that the fort was mainly built of locally available timber. The timbers of the first stage of construction of the Tenhola hillfort in Hattula were recovered in excavation. The excavation map indicates that the thickness of these timbers varied from 10 to 25 cm. It is quite certain that the timber cleared from the area of the Kuhmoinen hillfort was also used in building the breastworks. Thus, young and freshly-cut timber would be a characteristic feature of this site as well. It is not possible to assess the age of the Linnosaari timbers on the basis of their thickness alone. The minimum age is probably ca 50 years, but in conditions of poor growth a thickness of 30−35 cm may even have required several hundred years.

With reference to the Linnosaari hillfort, it does not seem probable that old buildings were moved as such to the site or that old timbers were re-used. The structure of the breastwork was probably such that timbers from old buildings and houses could not have been used as such in a different context. The other structures at the site were most probably not actual dwellings, but were mainly of a temporary nature.

Colonel G. Posse (1935−37 245) has presented an interesting observation concerning ancient hillforts. According to available sources, fire was often used to destroy the fortifications of a site under siege (see also Engström 1984a 41−47). Accordingly, Posse assumes that breastworks were built of fresh timber that was hard to set fire to and if they had to be kept in this state, they had to be replaced often.

Like the timber for construction, the firewood from the Kuhmoinen hillfort is more likely to have been fresh timber rather than dried deadwood. Although the biological age of the wood *always* provides for an older date in assessing the time of construction, the ^{14}C datings from Kuhmoinen do not necessarily require taking into account a very high age for the wood itself, especially as it is probable that the samples are not of the base. As there is not much of a possibility of younger material mixed with the samples, the Kuhmoinen hillfort can be radiocarbon-dated to the 11th century, the early 12th century and the 13th century. As there are only three datings, it must be kept in mind that the results imply only a certain probability.

3.1.2. Thermoluminescence datings

Five apparently undisturbed hearths and a part of the wall were selected for TL dating in the crest area of the hillfort. This method was used because of the fact that it is suited to burnt inorganic material, which was more readily available from controlled connections at the site than organic material. A special advantage of the dating method is that it is not disturbed by the age of the sample itself and unlike radiocarbon dating the method specifically indicates the time when the sample was burnt. TL datings thus avoid the old wood problem and inner wood error and can serve as a controlling factor for radiocarbon datings. The selection of the wall for sampling was dictated by a ^{14}C sample taken from the adjacent test trench no. 1. It was thus possible to compare two datings based on different methods from approximately the same depth and the same location. A further advantage is the fact that TL dating is an absolute method not requiring calibration.

The results are presented in Table 3 (see also Fig. 15).

Cairn no. 15 (southern part of the crest, grid square 112/218) was unfortunately unsuitable, as the sample stones had not been subjected to enough heat. Accordingly TL datings were not obtained from as large an area as originally desired.

Of the three datings from cairn no. 3 a weighted average was counted, as the stones were in the same location and had definitely been in fire at the same time. This is also shown by the small variance of the datings and it also indicates the reliability of the method. It was also necessary to count the weighted average of the two datings from the wall, as the ages are clearly similar within the margins of error given. On the other hand, it must be remembered that the simultaneous burning of wall stones is not as certain as that of hearth stones.

Even in the case of TL sampling, cultural and non-cultural formation processes, context and selection of material are important. In the sampling locations there were no observations of later disturbance or considerable natural changes, which could be assumed to have an effect on the results. Stone is an especially good material for TL dating, as it is not affected by the humidity of the sample or its surroundings which usually brings about disturbances. In order to minimize errors in sampling, the background radiation of the sampling locations was also recorded.

Although the material and its context were carefully chosen, there are several possibilities of error in connection with TL datings (see e.g. Aitken 1985; HFA 1983). The Kuhmoinen samples were dated at the Nordic Laboratory for TL Dating at Risø. One of the major achievements of this laboratory is its ability to date burnt stones from their content of alkalic feldspar grains. The most common sources of error in connection with Nordic archaeological samples are uncertainty of measurement, insufficient heating of material and short-term fading (Mejdahl 1987).

In order to take into account these sources of error, the laboratory has developed a number of methods which were also applied in the case of the Kuhmoinen samples. The main limiting factor in TL dating is the uncertainty of measurement. According to Mejdahl, uncertainty is composed of random errors arising from the inevitable scatter of the results of measurements and systematic errors caused i.a. by the limited accuracy of the determination of standards, e.g. the strength of standard radiation sources used for dose determination. The total uncertainty can be reduced to 4–5 % by taking the average of results for several individual samples.

Insufficient heating is usually revealed by the plateau test in which the age (or total dose) determined for small temperature intervals over the range 300–500° C is plotted as a function of temperature. The plateau test is carried out for all samples, and unless the plateau is satisfactory the sample is discarded.

The effect of short-term fading is that a TL age

Table 3. TL dates for burnt stones from Kuhmoinen Linnavuori (Mejdahl 1989).

TL no.	Locality	TL date	Weighted mean
R-871325	Cairn 24	1040±90 AD	
R-871313	Cairn 3	1070±50 AD	
R-871309	,,	1070±70 AD	1073±32 AD
R-871310	,,	1080±50 AD	
R-871319	Cairn 20	1100±50 AD	
R-871322	Wall, trench 1	1070±60 AD	
R-871323	,,	1140±60 AD	1105±42 AD
R-871315	Cairn 11	1270±50 AD	

will be estimated if the accumulated dose is determined by comparing the natural TL signal in which the unstable component has disappeared, with laboratory-irradiated samples in which the unstable component is present. The standard procedure for correcting TL ages for short-term fading has been to determine the fading by storing laboratory-irradiated samples for four weeks at room temperature and by comparing their TL signal with that from freshly irradiated samples. If the fading value of samples after fading measurements for storage is greater than 15%, the samples will be discarded.

Through recognizing and taking into account these sources of error, the majority of TL dates have been consistent and in agreement with other dating evidence (Mejdahl 1987).

The TL ages obtained for the Kuhmoinen hillfort fall into the mid-11th century, the latter half of the 11th century, the beginning of the 12th century and the latter half of the 13th century. Their distribution is approximately the same as that of the ^{14}C ages for the site.

3.1.3 Pollen diagrams

As a starting point for applying the pollen data from the environment of the hillfort was the idea that the surroundings had been cleared when construction was begun and that these events may also be reflected in the pollen material. Not much was expected beforehand, as it was assumed that the "background noise" of the extensive forest area would obscure any possible indications of clearing in the total pollen count. These expectations proved to be correct.

The turf of the marshy area on the crest of the fort offered some aid for chronology. This was not so much due to the actual pollen, but from an occurrence of diatoms indicating the transport of lake water at the 28–36 cm levels (see Appendix 5). The dating of this chronological level indicating the active use of the site is unfortunately within broad parameters. The layer beneath it was radiocarbon-dated to 652 (700) 804 cal AD (Su-1465) and the fire horizon above it was linked to a fire which is known to have broken out in 1730. This provides a thousand-year margin for the use of the fort, encompassing the end of the Merovingian Period, the Viking and Crusade Periods, the Middle Ages and the beginning of modern times.

The surrounding lakes and the nearby bog revealed indications of human activity and farming, but their connections with the hillfort are uncertain (see p. 60–61 and Appendix 5). On the other hand, the results of pollen analysis are not in contradiction with the datings obtained by scientific means.

3.2. The archaeological dating of artefact finds

3.2.1. Artefact datings based on cemetery-related dates

The datings of the finds from the hillfort are summarized in Fig. 16 and are based on the data presented in the section on the material (Appendix 1). In this connection, it was not possible to rely on verbal description and the artefacts are given absolute chronological limits. Because of the difficulty of converting certain statements of chronology into absolute years, the illustration must be regarded partly as a generalization and open to interpretation.

According to Fig. 16, the material from the Kuhmoinen hillfort can be divided into five groups:

1) artefacts in long-term use throughout the Iron Age or the Late Iron Age. For practical purposes, only the latter are listed,
2) Viking Period artefacts,
3) so-called 11th century artefacts of the late Viking Period and the Crusade Period,
4) Crusade Period material,[1]
5) later finds.

Excluding artefacts of long-term use, it can be seen that the hillfort contains material from the 9th-10th centuries to the 13th century. There are also a few finds of post-Medieval date.

It is difficult to determine the date of founding because of the broad margins of the ages of the oldest artefacts. It is not possible to state to which stage of manufacture or use an artefact of the 9th century or the early 10th century actually belongs.

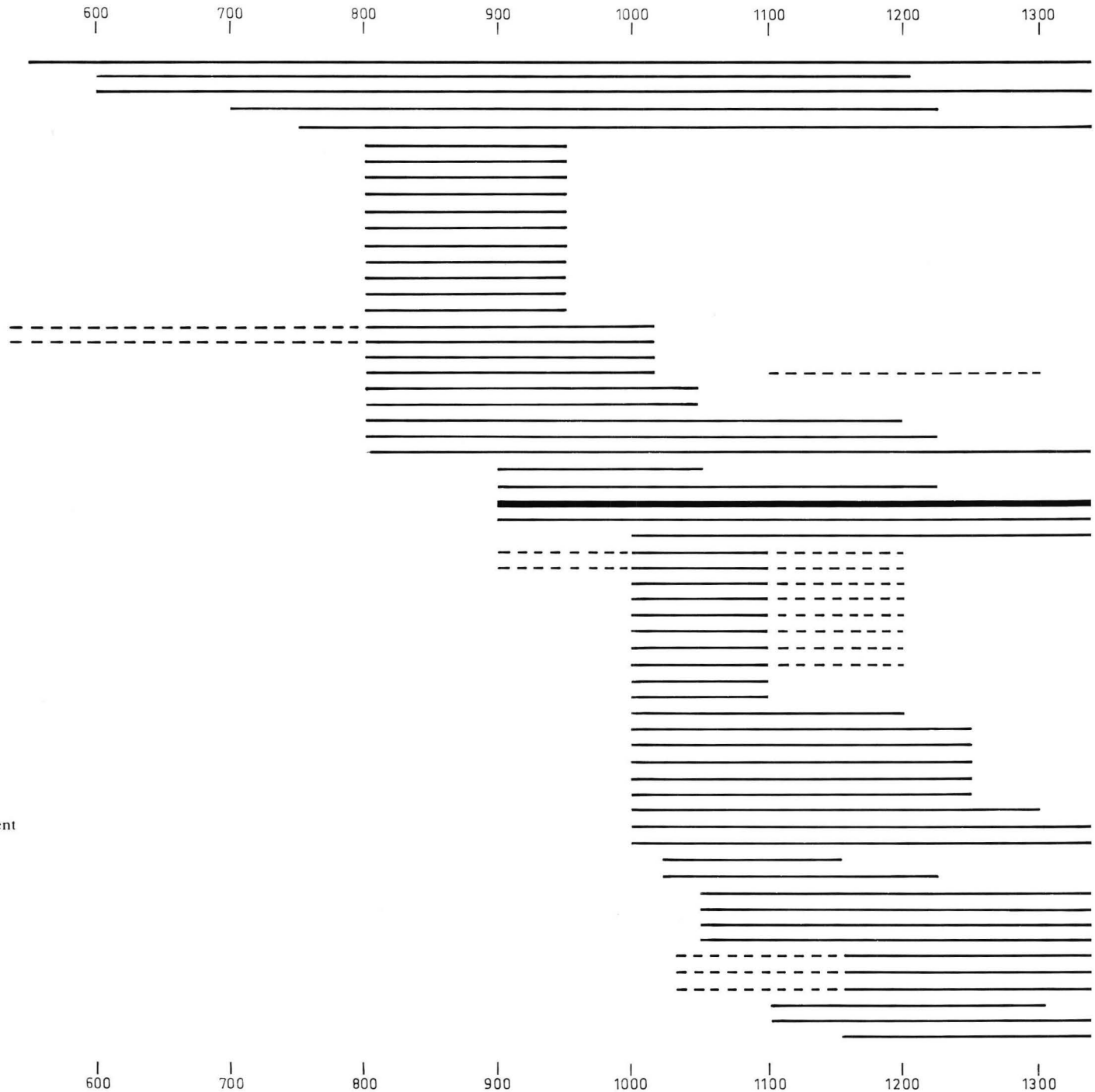
Abandonment of the site can be dated to the 12th and 13th centuries, to which the chronologically viable youngest artefacts can be classified. Later finds are of a sporadic nature.

Surprisingly enough, the artefactual dating based on cemetery material is – despite its partial overlap – older than that obtained by natural scientific methods and is partly in contradiction with the latter. According to the initial starting point, they must therefore be suspected as being unsuitable for further use and the discrepancy must be eliminated.

The grounds for datings of the artefact analysis (Appendix 1), however, appear to be reliable to such a degree that there is little room for doubt. Perhaps the problem does not involve the actual datings, but their transferral to another context. Artefact datings may be conformed to ones obtained by

[1] In this connection, the term Crusade Period also refers to the 13th century, i.e. the beginning of Medieval times, up to which P. Sarvas (1971) has demonstrated the continued practice of burials with grave goods in Western Finland.

Fig. 16. Artefact datings of finds from the Kuhmoinen hillfort.



other means, but this requires knowledge of the cultural and non-cultural formation processes affecting the find material at the site. Of special importance is a closer review of the basis of cemetery datings and the identification of the different formation processes with respect to the contexts of cementeries and hillforts.

3.2.1.1. The effect of postdepositional formation processes on the composition and distribution of the material from the Kuhmoinen hillfort

First to be reviewed are postdepositional, non-cultural and cultural formation processes which may be assumed to be of significance for the composition and representativeness of the material and the reliability of the datings.

As elsewhere in Finland, the main changes brought about by the environment at the site relate to the acidity of the soil, which accounts for the lack of organic material among the finds.

Conditions affecting the preservation of inorganic material may vary among different localities. The use of the metal detectors showed that there was a direct correlation between the number of finds and vegetation. Smaller numbers of finds in bare or lightly covered parts with bedrock may be a result of poorer conditions for preservation affected by weather, wear and oxidisation.

Artefacts can also be transported and relocated through natural factors. This mainly applies to vertical and horizontal dislocation. The main reason for the former is frost. This, however, does not play any significant role due to the thin soil cover and the remaining finds. The terrain – i.e. the slopes – together with erosion may have caused horizontal dislocation. With the exception of the north slope, this does not have to be taken into account, for the highest part and the terraces are mostly level.

Human factors are involved in the composition and distribution of the artefacts at the site. The hillfort is a scenic site and the finds of later and recent date suggest that it may have disturbed. The section on the history of research at the site contains examples of disturbances. According to one account, boys from the local village found artefacts which they threw down from the hill and took with them, and shows that finds and artefacts were dislocated in this manner and were completely removed. With the exception of a few disturbed cairns, of which there is local information, there is no evidence of any illegal excavations at the hillfort. Local tradition, however, does not mention anything concerning finds encountered in this connection. In the bare and uncovered locations visitors to the site may have discovered artefacts, which, together with poorer conditions of preservation, may be a reason for the smaller number of finds in these parts of the site.

Cultural formation processes also include archaeological excavations and the methods applied have a direct effect on the numbers of artefacts and their distribution. For example, small fragments of metal were found in greater numbers with the metal detector in area 4 and test trench 2 than in places where the turf had not been removed.

The above factors applying to the composition and numbers of artefacts have hardly had any effect on the functional distribution or range of the artefacts, as they include dislocated material. The objects that have been lost may represent some kind of scatter or dispersion of the overall range and composition of the material. With the exception of wooden and bone artefacts it can hardly be assumed that any special group or class of artefacts is absent. On the other hand, larger objects may have been easier to find than smaller ones and finds of large size – mainly weapons – may have been lost in greater numbers.

These remarks also apply to the chronological distribution and variation of the artefact material. Postdepositional formation processes have hardly had any considerable effect on the metal artefacts.

3.2.1.2. The composition of the artefacts from the hillfort and the distribution of functional, qualitative and chronological groups

A more involved study of the artefact datings from the site require a simple statistical review of the finds on the basis of 1) functional, 2) chronological and 3) qualitative (intact, damaged or broken[2], burnt, melted, unfinished etc.) groups and their distribution.

In the section on artefact analysis (Appendix 2) the material is divided into weapons, tools, household and construction-related artefacts, horse-gear, brooches and unidentified fragments of artefacts. Also presented in this connection are problems related to functional classification, especially the planned and actual use and function of an artefact.

In the initial stage the only available approach is to follow the division according to primary function, although its relevance will be discussed at a later stage.

Table 4 presents the functional division of the hillfort finds with the percentual proportion of each

[2] Defining material as broken or damaged was in some cases problematic. Because deposition in the ground has in some cases corroded and perforated the thinner parts of metal objects, the term intact is used of all objects, which despite small holes or other imperfections appear on the whole to be intact.

Table 4. Functional classification and condition of finds from the Kuhmoinen hillfort. * = with fire patina or possibly fire-worn, ** = melted finds.

	intact	unfinished	broken		total		percentage
WEAPONS							
Spearheads							
– type E	5	1*	2	8 (1*)			
– type G	1			1			
– variant of type G			1	1			
– type M	3 (1*)	1*	1	5 (2*)			
– East Baltic spearhead	1			1			
– unclassified	1			1	32 (5*)		
– barbed knife-like spearhead	1			1			
– unbarbed knife-like spearhead	1			1			
– fragments of unclassified spearheads		1	9 (2*)	10 (2*)		36 (7*)	10,7 %
– shaft ferrules	3			3			
Arrowheads							
– willow-leaf-shaped	1*			1*			
– unclassified	1*			1*	3 (2*)		
– transverse-bladed	1			1			
Whips							
– lash-ball			1	1	1		
TOOLS AND IMPLEMENTS							
Axes							
– Finnish-Russian axe	1			1			
– four-lugged axe	1			1			
– Finnish curved-backed axe	1*			1*	4 (1*)		
– Karelian axe			1	1			
Knives							
– knives	1		1	2			
– shingle-knife	1*			1*	29 (2*)		
– *puukko*-knives	6 (1*)		14	20 (1*)			
– sheath fittings	3		3	6			
Shears	1		3	4	4		
Wood-working tools						51 (4*) + 1791 gr	14,8 %
– chisel fragments			2	2			
– gouge	1			1	8		
– rivets	5			5			
Smithing tools and debitage							
– punch	1			1	1+1791 gr		
– slag	1791 gr			1791 gr			
Agricultural implements							
– sickle and scythe			1	1	1		
Fire-making implements							
– strike-a-light	1*			1*	2 (1*)		
– striking flint			1	1			
Trading equipment							
– weights	2			2	2		
BUILDING AND HOUSEHOLD UTENSILS							
Objects related to buildings							
– nails and clamps	2		12	14			
– shingle-holders	2 (1*)		1	3 (1*)	18 (1*)		
– key	1			1			
Cooking utensils						146 (9*)	43,3 %
– fragments of metal vessels			105	105			
– kettle-hanger fragments			23 (8*)	23 (8*)	128 (8*)		
HORSE-GEAR							
Bits							
– ring bit	1*			1*	2 (1*)		
– bar bit			1	1			
Horseshoes							
– ice-shoe	1			1		8 (1*)	2,4 %
– horseshoe			1	1			
– horseshoe nails	3			3	6		
– whip handle	1			1			

	intact	unfinished	broken		total		percentage
PERSONAL ORNAMENTS							
Brooches							
– round brooches							
– twin-animal brooches	1*			1*			
– penannular brooches							
– Salmo 7	1*			1*			
– Salmo 4	1			1			
– Salmo 13	4 (1*)			4 (1*)	11 (3*)		
– Salmo 16	1			1			
– Salmo 26	1			1			
– ring brooch	1			1			
– brooch pin	1			1			
Parts of chain-sets							
– eastern chain length	1			1			
– twin-spiral chain bearer	1*			1*	3 (1*)		
– rhomboid pendant	1			1			
Bracelets						22 (8*+1**)	6,5 %
– massive bracelet			1**	1**			
– simple bracelet with tapering ends			1*	1*			
– wide bracelet with tapering ends			1	1	4 (2*+1**)		
– simple bracelet of thin section with ridge			1*	1*			
Belt parts and fittings							
– perforated end-fitting	1			1	2		
– belt fittings and struck pieces	1			1			
Metal applications for clothing							
– bronze spiral			1*	1*	2*		
– bell pendant	1			1			
UNIDENTIFIED FRAGMENTS OF ARTEFACTS							
Fragments of bronze and copper objects			5 (2*+1**)	5 (2*+1**)	75 (6*+1**)	75 (6*+1**)	22,3 %
Fragments of iron objects			70 (5*)	70 (5*)			
FINDS OF LATER DATE	2			2	2	2	
	74 (13*)	3 (2*)	263 (20*+2**)	340 (35*+2**)	340 (35*+2**)	340 (35*+2**) 1791 gr	

group. It also shows the numbers and percentual proportion of broken artefacts, fragments and those definitely or possibly affected by heat and fire.

The largest group consists of finds related to buildings and household activities (146 – 43.3 %). The second-largest group consists of tools (50 – 14.8 %) and weapons form the third group (36 – 10.7 %). Personal ornaments were relatively few in number (22 – 6.5 %) and objects of horse-gear even fewer (8 – 2.4 %). On the other hand, the number of unidentified artefact fragments is considerable (75 - 22.3 %).[3]

A marked feature is the large proportion (79 %) of fragmentary artefacts and fragments of various size. There are also a number of objects definitely or possibly affected by fire (total 37 – 11.7 %). Excluded are kettles and holders used with heat.

Of interest are also the mean proportions of the functional groups per area units (see Appendix 2, Fig. 1). However, qualitative factors pose a number of problems in this connection. The comparison of intact artefacts and fragments is problematic in statistical terms as well. We cannot know, for example, how many actual kettles are represented by 105 fragments of copper plate. There are also significant variations between the number of finds in different areas of the site, e.g. 111 finds from the northeast terrace and only five from the southeast terrace. We can only state that almost all of the activities are represented in all of the areas. There is a relatively larger number of weapons from the lower east terrace and the eastern outcrops, while personal ornaments are numerous in the crest area. Kitchen utensils, in turn, are to some degree centered on the level area behind the wall, the northeast terrace and the north slope. On the other hand, with the exception of these areas the northern slope revealed a greater number of objects. There are no marked differences in distribution and proportions of the artefact groups apart from the fact that one could have expected a

[3] Two finds of definitely recent date are excluded.

larger number of weapon finds in the parts subjected to more fervent attack, i.e. the west slope and the level area behind the wall. However, this is not the case either in absolute or relative terms.

Nor can we observe any chronological emphasis on specific areas, and Viking Period, 11th century and Crusade Period artefacts have been found in all locations. Two possible hoards were found adjacent to each other from the stone setting at the base of the assumed palisade. One of these included a Viking Period willow leaf-shaped arrowhead and an M-type spearhead of the 11th century. Three metres to the south of this find was a Karelian penannular brooch of silver lodged among stones. In similar contexts in this area were a number of objects of different date. It must be noted, however, that the series of personal ornaments – susceptible to fast changes in fashions and customs – was not uniform from the beginning and middle of the Viking Period to the end of the Crusade Period and the beginning of Medieval times. Absent from the series were the types of the latter part of the Viking Period.

Damaged and broken artefacts were found in all parts of the site, perhaps in greatest numbers in locations with kitchen utensils and other finds. There is no clear emphasis in the distribution of burnt, melted, fire-worn and possibly fire-worn objects – not even in the vicinity of the hearths. These finds are of interest, as they may in principle be related to earlier stages of construction destroyed by fire. It was observed above that kettles and hooks will not be discussed in this connection, as they would be affected by fire even under normal conditions. There are also other artefacts in connection with which possible traces of fire and heat are not of primary interest. These include all the artefacts of iron and especially all of the bladed weapons, which were tempered. An example of fire patina caused by tempering and not other sources of heat is a knife (NM 22445:230), the tang of which included traces of a wooden handle, and an axe (NM 22445:81a–b) with traces of fire patina on the blade. The eye of the axes contained separate wedges of iron. These artefacts had been hafted when deposited in the ground.

The personal ornaments and other bronze artefacts related to apparel are the only group where fire patina is of significance. In normal use these should not be affected in any way by heat.

Presented in Table 5 are personal ornaments of different age and their condition.[4] The table shows that in all of the Viking Period specimens and in 60 % of the 11th century ornaments fire patina or other signs of fire could be observed. On the other hand, the Crusade Period personal ornaments, which was the largest group, included only one specimen which had possibly been in fire.

Table 5.

	Intact	Fragmentary	Total	With fire patina & possible signs of fire
Viking Period	2	3	5	5
11th century	4	1	5	3
Crusade Period	8	1	9	1
	14	5	19	9

The distribution shows that majority of the fire-damaged personal ornaments were in areas with numerous other finds, usually adjacent to and lodged with completely unburnt objects. It is strange that in none of the above cases could any signs of a fire layer be observed. The burning itself could not have been so restricted in area that the adjacent finds would not have been affected by it. Even in the case of a melted bracelet of massive type the immediate surroundings were devoid of any layer of soot or charcoal indicating a larger fire. Nor could the bracelet have melted in the adjacent cairn, as it was not a hearth. The nearest finds in the case were all unburnt: a blade of a rounded G-type spearhead of the 11th century and a horseshoe nail of Crusade Period or later date.

What then could have accounted for burnt personal ornaments among later artefacts in a context lacking any traces of fire? Furthermore, they were in such condition that most of them could not have been in use due to their melted or fragmentary condition. Artefacts and objects were no doubt lost during various occupations of the hillfort, but the presence of old, burnt and mostly unusable objects is an exceptional phenomenon requiring further explanation.

The traces of a possible fire or fires in the Viking Period have of course been removed, but clearing and new construction would have brought to light most of the older finds and they would have been recovered or become deposited in layers with later material. It is also strange that the melted objects do not include iron artefacts, although the majority of the finds are of this metal.

On the other hand, there is a large number of unmelted Viking Period spearheads, especially large specimens of type E. If the remains of a fire of the Viking Period had been cleared, the spearheads – due to their size – would have easily been found. This especially applies to the hoard discovered in the hearth in area 2 with its three E-type spearheads and

[4] In this connection 11th century types also include the penannular brooch with rolled ends which was in use from the late 8th century to the end of the Crusade Period. Excluded are a brooch pin, belt fitting and a chain length of possibly Eastern origin, which require more precise dating.

a knife. 11th century and Crusade Period objects found in the immediate vicinity indicate later activity in this location.

The distribution of the finds and especially the fire-worn personal ornaments and the hoards suggest that, despite varying age, the majority of the artefacts were deposited mainly during a single period of use. If there had been various stages of construction at the site and long-term occupation, such a large number of large weapons would not have been left in the crest area. The distribution of the finds indicates that most of the artefacts and finds must have been left in place more or less contemporaneously or at least during the span of a single chronological phase at the site.

3.2.1.3 Cemetery datings as the basis of the artefact datings of the hillfort material

There is a clear difference between the natural-scientific and artefactual datings for the Kuhmoinen hillfort. On the other hand, the distribution of finds indicates that the assemblage – with its components of varying age – was deposited more or less at the same time. This requires a review of the basis of artefact chronology.

In Finland only cemeteries provide closed entities of finds permitting sufficiently precise datings, and for this reason the Iron Age chronology of Finland is almost completely based on datings of grave finds. The situation is similar elsewhere.

The central role of cemetery datings has led to discussion concerning the basis of the chronological applicability of this type of archaeological context. A number of common features have been observed, despite the variety in human burial practices (see e.g. Huntington & Metcalf 1979; Tainter 1978; Humpreys & King 1981; Chapman et al. 1981; O'Shea 1984).

In the chronological utilisation of grave finds the principle has applied according to which the objects accompanying a burial are in most cases things which were in use at the same time. John Howland Rowe (1962) has called this principle Worsaae's law, after the first archaeologist to formulate it. Rowe lists three assumptions of the principle: 1) the ancients buried objects with their dead, 2) it was customary to place objects beside the dead only at the time of the burial and not at a variety of times earlier and later and 3) the objects accompanying a burial are presumed to be ones which were owned or used by the occupant or his friends at the time of his death. Rowe also discusses a number of special circumstances forming exceptions to the above conditions. With sufficient material, an archaeologist can find out exceptions to the prevailing pattern of associations.

Similar assumptions have been used in Finnish cemetery datings. At present, Iron Age grave finds are so numerous that the chronology rests on such a firm foundation that hardly any surprises are to be expected. In the material, old heirlooms and other anomalies can easily be distinguished. Especially the chronology of the later stages of the Iron Age is supported by a considerable number of coin-dated graves, analysed by Pekka Sarvas (1972). In recent years several more coin-dated graves have come to light, especially in the large cemetery of Luistari in Eura (Lehtosalo-Hilander 1982a,b).

Pekka Sarvas (1972) has discussed problems of method related to coin datings and has stressed that in his study he did not take into account the period of circulation of a coin prior to its placing in the grave. Thus, the dating applies to the assemblage of the grave and not the actual burial, which may be of later date. This error, i.e. the duration between the date of manufacture of an artefact and its deposition, applied not only to coins but to all artefactual remains. The assemblage of a grave does not consist of objects of precisely the same age, and to date all of them according to the coin or coins found in the gave will lead to false conclusions. These errors, however, can be corrected – at least partly – by analysing the find combinations of the whole set of material. In dating different artefact forms and types with the aid of coin finds the error is significant only in connection with the oldest and youngest finds of the group; with larger numbers of finds, the error will correspondingly lose significance. A grouping of finds in a clearly limited period indicates the reliability of the coin datings in question (P. Sarvas 1972 49–50).

However, coin datings do not offer much help in determining the end of the Crusade Period. With the decrease of burials with grave goods and their possible cessation and the corresponding lack of studies of Medieval artefacts, the actual date when many of the Crusade Period artefacts went out of use remains unknown.

3.2.1.4. Predepositional cultural formation processes: the problem of reuse and storage.

Because almost all of the Finnish datings are based on grave finds, the practice has come about of applying these mechanically in completely different contexts without due source criticism. A central question – hitherto not discussed in Finland – is whether a dating from a cemetery context can be transferred as such to another context. It is possible that customs and practices completely different to those of burial applied in other contexts with a corresponding effect on the formation of the archaeo-

logical source material. A result of this may be, for example, a considerable chronological gap between the time of manufacture and deposition of an artefact. This problem has only been touched upon in connection with hoards.

Archaeological source material is formed not only through postdepositional formation processes, but also by the original predepositional formation processes of the extinct context under study. These may be of considerable importance for the dating of the combinations concerned.

A natural explanation for the finds of older artefacts and objects at the hillfort is that after their normal period of manufacture and use they lost their original function and came to be reused.

The reuse of artefacts is a universal phenomenon, and one can hardly be mistaken if it is assumed that this was also the case in extinct cultures. Michael B. Schiffer who has studied reuse processes has stated: "The prevalence of reuse, a principal means of conserving sometimes scarce resources, is not difficult to understand: reuse is often less costly than securing new items or changing one's activities." Schiffer also observes that the manner in which societies retain artifacts in systemic context through reuse (and discharge materials to the environment through depositional processes) determines many characteristics of the archaeological record.

According to Schiffer (1987 28), reuse can be defined as a change in the user or use or form of an artifact, following its initial use. He divides the various forms of reuse as follows (1987 29–35):

1) *Lateral cycling*, involving only a change in the user.
2) *Recycling* as the return of the artefact after a certain period of use to the manufacturing process. In this connection Schiffer abides by Darnay and Franklin's (1972 2) definition of it as an activity whereby a secondary material is introduced as a raw material into an industrial process in which it is transformed into a new product in such a manner that its original identity is lost.
3) *Secondary use* implying new use without the need for extensive modification (Darnay & Franklin 1972 3).
4) *Conservatory process* as a form of secondary use that involves a change in the use of the artefact and its function with the intention of permanent preservation.

With reference to the functional grouping of the hillfort finds, the activities involved in their use show that they are related to war and household activities. Tools are all for general-purpose use and do not permit any precise definitions. It must also be kept in mind that the intended use of each object can be different than its actual one. Schiffer's various reuse processes are difficult to distinguish in the archaeological material. The easiest to observe archaeologically is recycling.

Does the Kuhmoinen material contain any possibly direct indications of activities requiring recycling?

Finds from the site include slag, the form and small amount of which as well as the lack of any traces of iron reduction, indicate the work of a blacksmith and field smithy (see Appendix 2, p. 199). The finds also include a punch used by blacksmiths (Appendix 2, p. 197).

The blacksmith needed metal for raw material, especially iron and to some degree bronze and precious metals. In Finland iron was locally acquired by the reduction or conversion of lake-bottom and bog ore, and it was also imported or melted from scrap metal. All of these methods of acquisition were without doubt used at the same time. Copper and precious metals were available only through import, and for this reason scrap metal was without doubt used as much as possible.

The making of iron was a laborious and time-consuming process. For example, lake-bottom ore first had to be gathered, dried on the shore and purified by fire. Melting required a great deal of charcoal and in turn the felling of large areas of forest. The amount of iron for five swords or ten axes required the burning of all timber in an area of 500 square metres. The process was by no means efficient. It has been claimed that the old methods provided only a quarter of the iron contained in the ore. There are also a number of references to how the method was often prone to failure (on the production of iron see e.g. Nikander 1929; Kautovaara 1986; Magnusson 1986).

It is thus understandable that broken and damaged metal objects were valuable and were gathered. Scrap iron was valuable also as a time-saving means, and scrap copper and other imported metals were valuable due to their original cost and the difficulties of procurement.

Historical sources give an indication of the value of copper, the most common imported metal. Copper kettles are listed for example in Medieval and 16th century estate inventories, silver tax lists and in Lapp inventories of the late 18th and early 19th centuries. In the late 15th century a 16-pound (c. 6.65 kg) copper kettle was valued at 2 marks – at the time the price of a cow was 2–3 marks (on the prices of raw materials see e.g. Oldeberg 1966 49). Not only intact vessels were costly. Judicial records mention coppersmiths at Sastamala who were often ordered to recompensate old copper objects which their customers had given to them for repair. The records also show that damaged and unusable cop-

per vessels were the coppersmiths' chief material (Jokipii 1952).

Scrap metal was used even by 19th century blacksmiths. Collectors of prehistoric artefacts, who were active at the time, often visited smithies with good results.

Archaeological and ethnographic evidence show that scrap metal was typical of smithy sites. According to Jorma Leppäaho (1949), old and unusable objects and pieces of scrap iron were reworked at the Hovinsaari smithy into new artefacts and objects, perhaps as nails. Leppäaho also maintains that there is no reason to assume any beliefs or corresponding reasons for this. In a local history, Fabian Linden (1925 14) mentions the Vinnilä farm at Suurijärvi in Kuhmoinen where field clearing revealed finds of soot from a smithy, iron slag and pieces of cut copper. No one in the locality had any recollection of blacksmiths at the site.

Oldeberg lists a number of Swedish smithy sites of prehistoric and Medieval date where pieces of copper plate have been found. At a site called Smiss in Gotland the blacksmith collected not only broken objects but also artefacts of considerable age (Oldeberg 1966 73–77). Also the smiths of Hedeby used "Altmetall" as raw material (Drescher 1983).

The reuse of metal was not only practised in the periphery of Finland, but was also an established custom in centres such as Gotland and Hedeby. There are also examples of metal reuse from Southern and Central Europe. In Pompeii old artefacts and pieces of metal plate were characteristic features of smithies (Gralfs 1988 11,19,75). In this connection, Hungarian studies have addressed the problems of the representativeness of documentary and artefactual sources and their conflicting data. According to historical sources, Medieval farmers in Hungary had metal objects and artefacts, but these are rare in the finds. It has been suggested that they were not discarded very often, for they could be reused (Kubinyi 1985 638–639).

The above examples from prehistoric to historically documented times indicate that the reuse of metals was a common practice regardless of time or place. The general characteristics of smithy sites are also indicated by the data: slag, old and broken artefacts and cut pieces of copper.

The material from the Kuhmoinen hillfort includes slag, broken and old artefacts as well as pieces and fragments of copper plate. A total of 79% of the material can be classed as scrap metal. Among this material are a number of objects which deserve to be discussed separately, for example an E-type spearhead (NM 22445:109), a blade fragment of an M-type spearhead (NM 22445:2a) and a fragment of a sickle or scythe blade (NM 22445:196b). All of these bear clear signs of beating, working and handling by a blacksmith and are unfinished specimens for new artefacts.

In addition to the pieces of copper kettles, many of which are for repair, many other artefacts show signs of having been broken into pieces and cut. Knives were cut in an almost systematic manner – or they were broken as the result of some special working method (tempering?) into three pieces: the point of the tang, the tang and the lower part of the blade and the point of the blade.

The slag and the punch – the direct indications of blacksmithing – were from different locations. The former was found in the south part of the level area behind the wall and the punch was recovered from the southeast terrace. The finds of the respective areas and especially the pieces of cut copper plate are concentrated in these locations. The majority of melted and unfinished objects were within a 14-metre radius of the slag and the punch.

The excavated squares with slag also contained a considerable amount of small pieces of iron objects and cut copper, including a rod of copper which appears to have been raw material. In excavation area 4, squares 132/172 and 134/172 contained a total of 33 fragments and pieces of iron and copper objects mainly among slag. The mean weight of these pieces was 3.41 g. The material consists of fragmented raw material. In test trench no. 2, next to the location of the punch, were seven finds with almost the same mean weight (3.61 g).

There appears to have been at least two locations of traces of smithing with scrap metal forming the majority of the finds. The finds indicate only the working and handling of iron, but the overall composition of scrap metal shows that the smith was also capable of casting bronze and repairing kettles.

The site of the smithy and the scrap metal pose a number of problems for the above-mentioned functional classification of the artefacts. The above-mentioned unfinished specimens and the systematically broken and cut fragments can be listed as raw material. Also the broken artefacts can be classed as scrap metal. However, it is not possible to separate among the intact objects ones that were intended for their primary use from those which had became scrap metal. This also applies to artefacts which were unintentionally lost in intact and/or damaged condition.

The fact that the spearheads were not hafted may indicate their use as raw material. Hafting can be observed through the presence of preserved rivets in the socket. In the ten cases with sufficient preservation of the socket, only two of the artefacts included rivets and even these were not intact (an E-type spearhead, NM 22445:36, and a G-type spearhead, NM 22445:4). Furthermore, in all of the spearhaft irons (NM 22445:48–49, 52, 190) intact nails

were preserved. However, the E-type spearhead (NM 22445:43) indicates that a partially preserved rivet is not sufficient proof of hafting. This spearhead belonged to a hoard or cache of three spearheads and a knife, and the spearheads could not have been placed among the stones if they had been hafted.

The caches with the E-type and M-type spearheads and the arrowhead can also be given an alternative explanation to that of a raw-material store.

It is strange that there were no caches of weapons at the hillfort in the event of emergency. On the other hand, it is improbable that the best and most recent weapons would have been stored at the site. It would be more reasonable to assume that stored weapons would have been older ones, possibly in poorer condition. However, stored weapons do not fit directly into Schiffer's concept of reuse. The nearest alternative would in this case be lateral cycling.

In his search for causal explanations for human behaviour, Richard A. Gould (1983) has compared defensive behaviour during the time of the Great Armada and the Battle of Britain. In Gould's terms defensive recycling is typical of a combatant on the defensive. This implies "urgent salvaging of weapons and/or strategic materials by the combatant on the defensive for immediate reuse during a period of perceived crisis. True recycling occurs when the component materials of archaeological discard items are transformed into new products that may not resemble the original item at all (Schiffer 1976:38). One can, however, also regard reuse as a form of recycling, especially when one can observe the transference of the item from one user to another – termed "lateral recycling" by Schiffer (1976:39, N.B. Schiffer uses the term "lateral cycling"). Both of these kinds of recycling characterize the defensive behaviour of the English during and immediately after each of these major military episodes." (Gould 1983 135–136).

In the following Gould's theoretical position is discussed in closer detail with reference to Nordic and European examples.

A useful example is provided by the mass-graves of the battle of Korsbetningen, fought in 1361 as a decisive encounter during Valdemar Atterdag's campaign in Gotland. The grave finds contain a large amount of armour and some weapons. According to Bengt Thordeman (1944 129; see also Thordeman 1939–1940), this equipment – worn in the same battle – represents a number of highly different stages of development. This is partly because of the fact that the Gotland troops, who were hastily called up, were provided with partly obsolete equipment and armour. These had to be taken into use in a situation where it was necessary to equip as many men as possible. On the other hand, the Danes had the most modern type of armour available. Variety is also accounted for by the fact that at this stage armour and equipment had not yet become standardised and were characterised by experimentation in different ways.

In his studies of 16th century weapons, Tapani Ahvenisto (1989 and cited sources) has presented a thorough discussion of the problems related to the dating of weapons. Listed below are a number of examples mentioned by Ahvenisto which demonstrate the long period of use of weapons.

Early historical sources in Norway mention that swords were used for several generations and were sometimes kept and preserved for future users by skipping over one generation. During the reign of Otto IV (1208–1215) of the Holy Roman Empire a ceremonial sword was made with a blade at least a hundred years old. Some four hundred years later at the wedding of King Gustavus II Adolphus of Sweden in 1620 the page-boys wore short swords which were placed in the royal armoury. In 1771 the blades of three of the swords were used in the coronation swords of the king and the crown prince. Meanwhile, they had been in storage for 150 years.

A long period of use was usually dictated by economic necessity, but Ahvenisto claims that in the above examples factors related to various beliefs may also have been present. In comparison, he mentions the swords of King Arthur, Charlemagne and Beowulf.

These considerations were hardly present when in 1807 the Swedish army adopted a new sword type for non-commissioned officers which could mostly be made from the blades of older swords, of the 1748 and late 17th century models. In 1832 a new sword type was approved for the navy which was made by shortening the 1685-model infantry swords which had been in storage. The production of this model had ceased in 1737 and some of them had been in storage for almost 100 years and other even longer. The 1685 model was still used without any changes in 1793, i.e. a hundred years after its introduction and 56 years after their production had ceased.

Also firearms were used for long periods. Their various parts were serviceable for different lengths of time and the more durable parts could be reused. For example, in 1805 the Swedish army began to produce a new assembled model from old muskets. Of the reused barrels and locks, the oldest ones were of the 1704 models and the latest ones of the 1762 model. These had been replaced by new models in 1716 and 1775 and in 1805 these parts were from 30–40 to 90–100 years old. In the 1840s the old flint-lock models were replaced by percussion locks and of the domestic types only the 1815 model was renewed. Of the imported firearms older ones were

renewed, including ones that had been acquired in 1808–1812. These were at least forty years old at the time. The conversion to percussion locks required the replacement of only two parts, but in any case this example shows that a forty-year-old firearm was by no means unserviceable. Nor is it today.

The above examples refer to military weapons. Because the owners of estates and holdings under obligation to provide a cavalryman for the service of the crown were also responsible for their weapons, cavalry weapons can be compared to civilian ones, which according to Ahvenisto were longer in use than military weapons. This is suggested by the long period of use of cavalry pistols. Whenever the estate owners had a say in the matter, it was preferable to repair old weapons than to buy new ones. Thus, in 1808–1809 pistols of the 1704 and 1716 models were renewed. At this stage they had been in use for at least 70–90 years and the models had been in existence for 90 or 100 years. Ahvenisto even mentions an example from mid-17th century Germany of a finely decorated firearm being fitted with a barrel 100 years old.

Ahvenisto discusses the relevance of these examples for weaponry in the 16th century. In this connection it is necessary to review the implications of Ahvenisto's examples, the Korsbetningen graves and Gould's theses for the dating of the weapons found at the Kuhmoinen hillfort, although the above examples refer expressly to firearms, swords and armour, none of which are present in the Kuhmoinen material.

Ahvenisto stresses that the durability of firearms hardly changed from the 16th to the 18th century as the materials remained the same. He also underlines the economic fact that it was difficult for soldiers to survive on their pay. Because they were required since the 16th century to pay for their own firearms and weapons, they no doubt attempted to manage with their old pieces until their repair threatened to become as costly as the purchase of a new one. Ahvenisto presents the conservative estimate that weapons were in use for several decades.

On the basis of these findings, Ahvenisto presents a number of theses related to the dating of weaponry. Of these, the following are presented in relation to the subject at hand:

1) due to long periods of use, military weaponry was never uniform at any stage. In discussing their dating, it must be taken into account that the overall range of weapons was accumulated over a relatively long period of time.
2) an archaeological find may become deposited at any stage of its use. It can either be new or it may have been in use for several decades.
3) due to the long period of use, the dating of a weapon requires the separate datings of the time of manufacture and the period of use.

There is no doubt that Ahvenisto's theses concerning the dating of weapons also apply to the finds from the Kuhmoinen hillfort. Gould's above-mentioned economic reasons and the general factors of crisis and stress also applied to the hillfort when it appears to have been necessary to prepare for defensive isolation. Thus, some of the weapons were not necessarily raw material for a blacksmith, but older weaponry reserved and stored for actual use. The problem remains, however, of separating these two classes.

The dating of the Kuhmoinen hillfort must therefore take into account predepositional formation processes, reuse and storage. The available artefacts are problematic in many respects. Weapons of long-term use and scrap metal consisting mainly of damaged artefacts of different age and poor condition cannot clearly date the founding of the hillfort.

An estimate of the abandonment of the site can be presented with the assumption that the majority of the finds are related to the last stages of occupation and use. Reconstruction or maintenance work was not undertaken, which would have led to the finding and recovery of most of the material. In this sense, scrap metal can be compared to hoards as a whole accumulated over a long period. The terminus post quem of the find location is obtained from the final finds. Following this principle, the abandonment of the hillfort can be roughly dated to the 13th century on the basis of fragments of a lash-ball.

It is clear that some of the artefacts were lost or mislaid while the fort was still in use. Lost objects permit estimates of not only the abandonment of the site but also its founding. This class of material consists most probably of unburnt and intact finds, or at least their majority. Because the chronologically problematic and possibly stored weapons are of no use for dating, personal ornaments are the only remaining group.

With reference to assumedly lost or mislaid personal ornaments, a rough final-stage dating of the 13th century is provided by the unburnt brooches with pins – mainly the Karelian penannular brooch and the ring brooch. This is agreement with the datings of the youngest artefacts of the scrap metal intended for reuse.

The founding of the fort can possibly be dated to as early as the second quarter of the 11th century on the basis of unburnt small penannular brooches and a belt fitting. On the other hand, it must be remembered that these types are of the Crusade Period and remained in use at least until early part of the 13th century. On the basis of artefacts, the date of founding remains purely a question of conjecture, as it is

not possible to determine at which stage of their use and at which age they were lost or mislaid. Nor do personal ornaments broadly belonging to a single period offer any possibilities for investigating possible stages of construction and/or use at the site.

3.2.1.5. The origin of reused metal: cremation cemeteries as "metal mines"

The oldest personal ornaments from the site offer a possibility to isolate the chronological parameters for its abandonment. Table 5 provides some indications regarding the origin of scrap metal for reuse or at least part of it.

In condition and appearance the personal ornaments are highly similar to material from cremation cemeteries. Also the broken and damaged weapons are similar to the latter finds, although they do not include completely damaged, fire-patinated or otherwise worn spearheads. The possibility arises of the systematic gathering of scrap metal from old cemeteries.

The main cemetery type of the Late Iron Age is a cremation burial ground laid on level ground (see e.g. Kivikoski 1966a 51–52). In most cases there are no signs above ground of these cemeteries other than isolated stones. In the cremation cemeteries grass and turf cover extensive stone settings, often several hundred square metres in area. Spread among the stones and sometimes on top of them and beneath them are the remains of the funeral pyre: burnt bones, artefacts, pot sherds, charcoal etc., often strewn over large areas. Fragments of single artefacts may be found at distances of several metres from each other. In some cases clusters of artefacts can be found, which were clearly placed in the ground at the same time and represent a single burial.

A basic feature of this cemetery type, however, is its disorganised nature. With reference to the need for scrap metal of blacksmiths, it can be claimed, however, that the present disarray of many cemeteries was not necessarily their original state, but a result of their use as "metal mines" over the centuries.

The peace of the dead is a universal rule in human burial practices, in most cases bound to severe sanctions. Because it is also a Christian custom, it can be assumed that the claims of respecting the dead also reflect the Christian cultural background of the scholars and authors concerned. However, graves were hallowed by the Germans and the Romans, among other peoples, as witnessed by old judicial norms and rules (e.g. Nehlsen 1978; Capelle 1978; Behrends 1978). This was no doubt of major significance when Christianity was adopted. It is also possible that these customs had an effect on Christian mores.

Finnish folk-beliefs contain numerous tales of how the dead would return weeping and wailing to reclaim anything that had been taken from a cemetery. When the flower, bone or piece of wood in question was taken away, the wailing would cease (Waronen 1895 21; see also Harva 1948 499–500 and Paulaharju 1924 168–169). These customs were especially preserved in Karelia where the cemeteries are believed to have preserved the memory of the ancient Finns' worship of the dead and their sacred groves (Laaksonen 1989 60). It was generally maintained that a cemetery was the abode of the dead, a hallowed place which was not to be disturbed by improper behaviour (see e.g. Siikala 1985 335).

Despite bans and sanctions, the dead were not always left in peace, and graves were robbed on different occasions (Jankuhn et al. 1978). There have always been grave-robbers, but other factors include periods of crisis, war and various stress factors resulting in disturbed trade relations, which may have led to the looting of graves. Also changes in religious beliefs may have played a role in such events.

According to Helmut Roth (1978 74; see also Koch 1973), who has studied the looting of graves in the Merovingian realm, "erst während der Merowingerzeit tritt eine ausgeprägte Totenberaubung in Erscheinung, die nur durch die Kenntnis und weitere Verbreitung des Christentums und dessen Gedankengutes erklärbar werden kann. Denn durch die allgemeine Kenntnis christlicher Glaubensvorstellungen, in denen Grabbeigaben für den Toten keinen Platz mehr haben, werden heidnischen Gebräuchen und Vorstellungen die alleinige Wirksamkeit genommen. Man könnte hieran die These knüpfen und zur Diskussion stellen, ob der Grabraub ein Indiz für den Beginn des sich durchsetzenden Christentums sein könnte."[5]

In the Kuhmoinen region inhumation burials displaying Christian influences began to spread in the 11th century and burials with grave goods ceased at some stage in the 13th century. The latter century may be regarded as the beginning of established Christianity in Finland, where the same religion and the same rules began to apply as in Merovingian-Period Germany. From the middle of the 13th century the situation prevailed where the possible tabus concerning pagan burials no longer applied and the looting of graves could begin.

It has been observed in German studies that

[5] The universal use of cemeteries as sources of metal especially in situations without religious restraints is indicated by the looting of metal-rich Indian cemeteries by North American settlers and the selling of this material to local blacksmiths (Wray 1985 102–103).

Christian objects and artefacts were left untouched in the looted graves (Roth 1978 68; Koch 1973). This may be paralleled in Finland as well. Lacking from the finds of burnt personal ornaments at the Kuhmoinen hillfort are late Viking Period (c. 1000 AD) types. Furthermore, only one of the Crusade Period specimens (of a type introduced in the 11th century) shows traces of fire. The year 1000 marks the time when inhumation cemeteries began to come into wider use. Accordingly, personal ornaments of this period occur in lesser numbers in the cremation graves. Because the Kuhmoinen hillfort finds represent a kind of random sample, the lack of late Viking Period is not necessarily a mere coincidence. It is possible that in Finland the inhumation burial custom, differing radically from cremation, was regarded as of such a markedly Christian character, that grave-robbers did not wish to disturb these graves and concentrated on cremation cemeteries. Also to be taken into account is the fact that pagan inhumation burials continued alongside Christian and unfurnished burials. It was also easier to loot cremation cemeteries.

The role of cremation cemeteries as "copper mines" has been presented already in earlier studies. In 1925 several dozen personal ornaments of bronze and their fragments were found at Kirkkovuori on the Hattelmala ridge in Hämeenlinna. The artefacts were of varying age, dating to the Merovingian and Viking Periods. None of them were in serviceable condition upon being laid in the ground. The ornaments were damaged, some of them were burnt and pieces had been cut from some of them. Julius Ailio (1928) interpreted the find as a coppersmith's store of scrap metal and maintained that at least the majority of the objects were from pagan cremation cemeteries. Ailio was of the opinion that the coppersmith would hardly have looted the cemetery where the ashes of his fore-fathers or contemporaries were laid. He felt that the artefacts had been looted from some other locality or from a cemetery which had been unused for a long time. Ailio also discussed the date of looting – whether it had occurred in Christian times when pagan graves were no longer under sanction or possibly in the latter stages of the pagan period when the lack of metal may have led to the looting of cemeteries.

Kivikoski (1955a 77–78) accepted Ailio's interpretation and stated that it was impossible to know whether the looting had occurred in pagan or Christian times. She felt that the latter date was more probable, for it was easier to imagine a Christian looting a pagan cemetery than a pagan. In no case could the looting have occurred prior to the 11th century. Kivikoski did not present any detailed argument in support of her *terminus post quem* dating. The date in question may have been chosen because of the fact that it was only then that inhumation burial practices displaying Christian influences began to spread into the region of Häme and pagan graves and cemeteries could have been disturbed. The fact that late Viking Period brooches are lacking from the Hattelmala find may point to Kivikoski's suggested date. Another explanation may be the above-mentioned contemporary interpretation of inhumation burials as Christian.

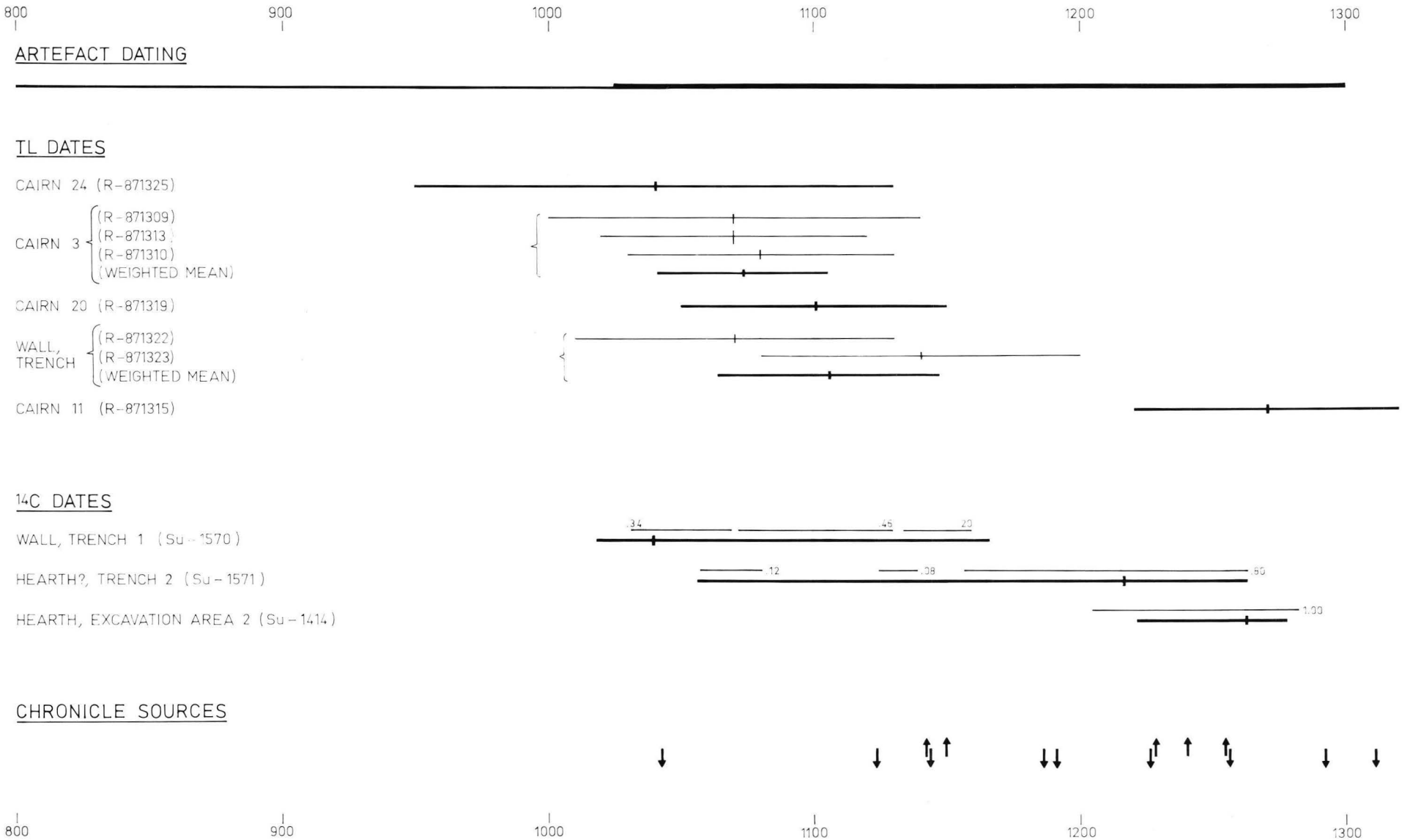
The Hattelmala find is not the only cache of this type. A similar interpretation can be suggested for two finds from Räisälä. At Niitynniemi, Hytinlahti in Räisälä seven Viking Period conical-ended penannular brooches of bronze were found (Salmo's group 10) as well as a part of an iron lock and a smith's hammer (NM 3693:1–3; C. A. Nordman 1924 122–123). Only one of the brooches contained a pin, two were broken into pieces and several of them showed signs of having been bent and kept in fire. Finds from the Niemipelto site at the Hoppendorf manor in Unnunkoski, Räisälä contained a total of 14 bracelets as well as fragments of bracelets, neck-rings and bronze rods (NM 2836:17, NM 2924:12, NM 3001:9, NM 3130:1–9, NM 3318; C. A. Nordman 1924 120–122). Some of the objects show signs of melting.[6]

3.3. The dating of the Kuhmoinen hillfort in the light of different chronological methods

In this study, the starting point for chronology was provided by the available natural-scientific datings. A result of this is that instead of mechanically transferring the archaeological dating of artefacts, based on cemetery material, the find context had to be taken into account together with the identification of its formation processes. Central theses in this connection are the use of scrap metal and the practice of storing arms. These factors, in turn, have a definite effect on the artefactual dating. Viking Period artefacts were brought to the site at a date later than that suggested by the cemetery datings. From all accounts, it appears that this occurred together with the Crusade Period artefacts. This is in agreement with the excavation results. Fig. 17 shows the Crusade Period dating, taking into account the context, together with the natural-scientific datings. It clearly shows that the artefact dating, which orig-

[6] Looting has not been taken into account in the study of prehistoric cemeteries, although this factor is significant for dating and the explanation of social conditions.

Fig. 17. Summary of artefact and natural-scientific datings for the Kuhmoinen hillfort. The thick line indicates datings where the effect of scrap metal is excluded. Upward arrows indicate expeditions to the east and downward arrows mark expeditions to the west.



inally appeared to be too old, is not in conflict with the ^{14}C and TL datings.

The available datings reflect upon the problem of the time of founding and abandonment as well as the continued or intermittent use of the site in several more or less intensive periods or with possible interruptions.

Approaching these issues is made problematic by the nature of the scientific datings. Due to margins of error, the three oldest TL datings must be regarded as contemporaneous. This, however, does not imply that they could not be of different age. The age difference cannot be demonstrated.

Fig. 17 lists the radiocarbon ages with the most probable date in each connection. These fall into the part where the relative area under probability distribution is the greatest. Despite this, the margins of error of the ^{14}C datings limit their use such as the ones in connection with the TL datings. Like the TL datings, the radiocarbon ages can be divided only into an earlier and a later group. The margins of error make it impossible to compare with any precision the ages based on two different methods. In comparing the datings it can only be stated that the oldest radiocarbon dating is contemporaneous with the oldest TL datings and that the two latest radiocarbon ages are contemporaneous with the later TL dating. Despite the emphasis of the TL datings on the latter half of the 11th century and the end of the 11th and the beginning of the 12th century as well as the 13th century, the small number of available datings do not provide any direct grounds for claiming that use of the site was less intensive in the 12th century. Nor is this problem solved by the archaeological finds. Because of the broad dating of the material to the Crusade Period, it is impossible to determine at what stage of their use-life separate finds were lost or mislaid. Pollen analyses relating to the crest area of the site do not shed any further light on the intensity of use, because of the broad margins of the datings and the complexity of the various factors involved.

In spite of the above, a point of interest is the fact that in both the older and the younger group of datings the probable ^{14}C ages are in all cases older than the average age of the TL datings. This may point to the age of the timber of the samples, even if the material in question was not deadwood or heartwood. It was demonstrated above that the samples from the hillfort are most probably not of old timber.

A further point of speculation is the comparison of radiocarbon and TL datings from the same location in the wall. If we assume that the charcoal found by the outside face of the wall was from a burnt breastwork originally on top of the wall and possibly from the first stage of construction, the time of construction was in the latter half of the 11th century, taking into account the insignificant age of the timber used. The weighted average of the TL datings of the burnt stones of the wall, 1105 AD ± 42 suggests that the timber breastwork stood for only a few decades and was destroyed at some stage in the first half of the 12th century. A streak of soot and charcoal found outside the wall in a test trench also indicates that the breastwork had fallen down. On the other hand, excavations in other parts of the crest area have not revealed any signs of fire or rebuilding.

The dating of the Kuhmoinen hillfort can be summarized briefly. The only certainty on the basis of available data is that the hillfort can be dated to a period from the second quarter of the 11th century to the end of the 13th and the beginning of the 14th centuries.

In conclusion, reference must be made to the main thesis concerning the reuse of artefacts as scrap metal and the storage of artefacts and objects. A cache of three E-type spearheads and a knife was found in a hearth in area 2 above a layer of soot and charcoal. Cemetery datings place the E-type spearheads to 800–950 AD. The radiocarbon dating for the charcoal layer in the location was cal AD 1221 (1261) 1277, to which the age of the wood must also be added. This combination of E-type spearheads and a radiocarbon dating to the latter half of the 13th century provide significant support for the thesis of reuse of artefacts either as scrap metal or as weapons and arms in storage.

The role of scrap metal also brings new light to the functional classification of the finds and makes the initial classification void of any significance. However, there is no need to present a new classification, for the use of objects as scrap metal can be posited only within a certain degree of probability. A good example of the problems of absolute classification is provided by the weights found at the northeastern terrace at the site. Oldeberg (1966 75–76) has pointed out that the finds from Mästermyr, Smiss and Tjele "include remains of scales and weights. This may indicate that the owners of the finds weighed their pieces or in any case the means for their payment, which was common in the Viking Period. It is also possible that products were brought for sale and the persons concerned were craftsmen and artisans in a very definite sense." In the presentation of the material the weights are listed as merchant's tools, but they could also have been used by blacksmiths either as tools or scrap metal. In the case of the Kuhmoinen hillfort the final classification of these artefacts cannot be resolved. However, the initial classification according to primary function has proven to be a useful means in identifying the formation processes affecting dating.

4. History of settlement in Kuhmoinen and the Lake Päijänne region of Häme on the basis of archaeological data and pollen analyses

4.1. The utilisation of wilderness resources as a preliminary stage to permanent settlement

The hillfort of Kuhmoinen must be placed in the perspective of settlement history, as hillforts are always the products of settlement. The starting point in this connection is the utilisation of wilderness resources, which has been assumed to have been a long-term phenomenon. It is especially stressed that the documentary references to slash-and-burn farming are not only related to the final stage of wilderness utilisation, but that long-range slash-and-burn cultivation had always been an essential part of the phenomenon.

According to presently accepted views, farming signifies the formation of permanent settlement and the origin of the present system of rural settlement. This phenomenon disrupted the millenia-long way of life based on hunting and fishing (on the types of settlement of the hunter-fisher population, see e.g. Carpelan 1973 and K. Vilkuna 1971).

The oldest definite indications of cultivation in the present area of Finland are from the Bronze Age (see e.g. J. Donner 1984; Meinander 1984).[1] At this stage hunting and fishing still played a major role in nutrition, which was also the case in the Early Iron Age (see e.g. Seger 1982a 34; K. Tolonen et al. 1979 59).

It is generally maintained that farming communities functioned in Southwest Finland already in the beginning of the Iron Age. In the three areas of this region, Finland Proper, Satakunta and Häme, technical development and social conditions were on the same level in the last centuries of the prehistoric era. On the other hand, Eastern Häme and Savo were uninhabited wilderness regions (Meinander 1980).

The sporadic and small farmed areas of the period from the Bronze Age to the Early Iron Age came to be replaced in the Middle Iron Age by indications of continued cultivation (Meinander 1984; J. Donner 1984; K. Tolonen et al. 1979). This has been interpreted as a shift to permanent arable cultivation.[2] In this connection settlement became more permanent and isolated farms grew into villages. In the beginning of the 8th century Southwest Finland experienced a number of other significant changes with a transition from an authoritarian to an egalitarian society and from scattered settlements to overpopulation (Meinander 1980 12–13). The latter somewhat vaguely formulated thesis of overpopulation may be based on the observation that the number of cemetery sites no longer increased. This finds support in Tapio Seger's statistical data on the numbers of cemeteries in chronological and regional terms (Seger 1982b 187).

It must also be kept in mind that our present overview of the Iron Age cultivation is insufficient in many respects and is based on a highly limited body of data. Many of Meinander's above-mentioned theses are still without further verification and, for example, excavations of dwelling sites and osteological studies, central for the study of means of livelihood are almost completely lacking.

However, the practice of wilderness hunting and resource utilisation, as described in written sources from Medieval and modern times, provides an exam-

[1] A grain of Hordeum vulgare from the Kiukainen Culture Stone Age site of Niskala in Turku is dated to 3620–3260 cal BP (calibration according to Stuiver & Pearson 1986). According to Vuorela & Lempiäinen (1988), the Stone Age dating is so far the oldest grain find indicating cultivation in Finland. However, the calibrated dating cannot be compared directly with the accepted dating of the Kiukainen Culture which is based on uncalibrated ages.

[2] J. Donner (1984 15) has pointed out, however, that the introduction of wind-pollinated rye alone could have caused changes in the frequency of Cerealia.

ple and a model relevant for the study of Iron Age conditions.

The phenomenon in question implies the economic utilisation of "demarcated" hunting and fishing territories, involving both the coastal regions of Finland as well as the inland. The historian Armas Luukko (1959 40) has described wilderness hunting and its significance in the following terms (see also G. Kerkkonen 1965; on wilderness utilisation as a cultural system, see Sarmela 1988): " Wilderness resources were of major importance for the Medieval economy of Finland. Even in the old localities of settlement the farmers did not limit their activities to cultivation and animal husbandry, but strove towards an effective use of the opportunities for hunting and fishing provided by the land. Because of Finland's numerous lakes and the long water routes, wilderness areas could be taken into use which were even as far as 250–300 kilometres from the home regions. The wilderness tracts were often private property and could be inherited, sold, exchanged or forwarded in other ways. The separation of such an area with its fishing waters from an original holding is mentioned in a document from 1390, referring to a donation by Magnus Kase, bailiff of the Castle of Häme, to the Cathedral of Turku. The bailiff donated to the cathedral the Kantala holding in the parish of Saarioinen (Häme) with the explicit exception of the "squirrel forests" (Fi. *oravimetsä*), fishing waters (Fi. *kalavesi*) and the Lapps to the north in Bothnia, which belonged to the holding (*vndan skilth thera jkornaskoga ok thera fiskewatn, som ligger noor i bothnen* etc REA, p. 197)."

The reference to the Lapps, from whom tribute was exacted, and information from other sources on the gathering of lake ore, tar-burning (e.g. Jutikkala 1958 31–32) and the use of far-off pastures (e.g. Luukko 1949 130) provide additional indications of the varied use of outlying areas. Also the coastal regions were involved. A good example of this is a dispute between the men of Hattula and the Swedish settlers concerning fishing waters in the present area of Uusimaa on the coast (Hausen 1910 540; Suvanto 1976 168). This study, however, is concerned with the use of resources in the inland regions.

Of the various means of livelihood in this connection, hunting for furs has been a main subject of interest, and scholars have even suggested the existence of a fur-hunting economy related to foreign trade (e.g. Jutikkala 1958 31).

Historians, however, have shown lesser interest in references to slash-and-burn cultivation and how "the farmers, prior to settling in the wilderness regions, already practised hunting and fishing there, as well as *slash-and-burn farming*" (V. Voionmaa 1947 215,303,499; see also Tegengren 1952 259; Jutikkala 1958 31; Luukko 1959 44). Mauno Jokipii (1967 65–67; 1966 59) has pointed out that the sites in the wilderness often had whole groups of buildings, in one case even 15. It does not appear probable that mere hunting camps would have required such a large number of buildings. Jorma Keränen's study on the history of settlement in Kainuu pays special attention to long-distance slash-and-burn farming as a main feature of the utilisation of wilderness resources alongside hunting and fishing (Keränen 1984 54, 56, 61–62).

Historians still seem to maintain that slash-and-burn cultivation marked the end of the period of wilderness use and signalled the advent of pioneer settlement (e.g. Soininen 1961 56; G. Kerkkonen 1965 23).

Wilderness resources were utilised not only by the families and kin groups, but also in the forming of freely organised associations with their own leaders for various purposes, e.g. for large-scale burn-clearing.

The practice of utilising outlying wilderness resources has been assumed to date back to prehistoric times, although available historical sources offer little direct support for this. There are, however, some indications of the prehistoric background of the phenomenon. The distance between the settled areas and the wilderness tracts in question appears in all cases to be directly related to the age of settlement and the practice of wilderness use. The central parishes of Häme on the shores of Lake Vanaja had the northernmost tracts, extending as far as the present province of Oulu, whereas the later settlements on Lake Päijänne laid claim to territories which were mostly in the same general region (Jutikkala 1958 30–31). The long history of the practice is also suggested by the fact that of the wilderness-hunting farmers of Upper Satakunta and the county of Sääksmäki, a clear majority lived in villages dating back to the Iron Age or early historical times (Suvanto 1970 52).

Also of interest in this connection is the history and changes of meaning of the Finnish word *erämaa*, meaning a tract or area of wilderness. The prefix *erä* originally meant a separate part and *erämaa* accordingly meant land that was separate or apart (Rapola 1936). This term, which has later come to mean an uninhabited, desolate or forested area, wilderness or a region far away from settlements, suggests that for a long period the whole country had been divided into parts (*erä*) belonging to the holdings of the settled areas or small-scale organised bodies. The system was maintained by numerous customs of property ownership related to the means of livelihood practised in the wilderness (Virtanen 1949), and it is possible that there were hardly any parts of Finland that had not been owned or used for long periods.

It is generally maintained that the use of wilderness resources and the formation of permanent settlement are linked. This view is clearly expressed in the following observation by Arvo M. Soininen (1961 29) regarding the origin of permanent settlement in Savo:"The use of wilderness resources in Savo, as almost everywhere else in Finland, served as a trail-blazer for colonisation and settlement. The utilisation of wilderness resources linked the uninhabited regions to the economy long before they became permanently settled. The ancient Finnish economy consisted not only of the permanently settled areas, but also of the wilderness tracts where the men of the settlements hunted, fished and exacted tribute from the nomadic Lapps, often at long distances from their homes. The fishing saunas of the wilderness hunters in the uninhabited areas were the first predecessors of permanent settlement."

"Of special importance for the spread of settlement is the fact that in Finland the above phenomenon was closely linked to farming. When farming no longer provided a sufficient means of livelihood, hunting and fishing had to be relied upon as additional means. Even when the fields and swiddens provided an adequate livelihood, the wilderness tracts were a source of wealth. Furs were articles of trade and were used for paying taxes. Taxes could also be paid in kind with fish. In cases where the same men – or in any case the men of the same farm – were both hunter-fishers and farmers, there was a combined farming and wilderness utilisation economy. In the areas of slash-and-burn farming, as in Savo, we may speak of a combined slash-and-burn/wilderness utilisation economy."

Soininen's views represent the consensus of opinion of Finnish historians, which is expressed in canonized form in volume I of *Suomen taloushistoria* (The Economic History of Finland): "In the history of settlement in Finland, an almost dominant feature is a spontaneous process of settlement based on the use of wilderness resources and carried out by single farming households or families." (Kaukiainen 1980 51).

Phenomena involving the utilisation of far-off areas occurred also in Sweden and Norway. These especially involved far-off pastures for cattle as well as hunting and fishing (G. Kerkkonen 1965 24–26 and cited literature).

Finnish archaeological literature mentions the use of wilderness resources in a few connections. The parts of Finland outside the area of permanent settlement indicated by cemeteries have been regarded as the domain of the Lapps and the wilderness-hunting Finns (e.g. Europaeus 1927; Äyräpää 1939 18; Rinne 1947a). It has also been assumed that there were separately built farms in the wilderness regions (Lehtosalo-Hilander 1982b 329) and trading posts (Huurre 1984 315). The practice of wilderness hunting and fishing is assumed to have continued throughout the Iron Age and the Middle Ages and up to the advent of modern times. Unto Salo (1984 223,246) suggests that this phenomenon dates as far back as the Bronze Age.

Christian Carpelan (1984 105) has discussed the utilisation of wilderness resources and its consequences in interesting terms: "At this stage (in the first century) the use of wilderness regions began among the farmer cultures of Finland, Sweden and Norway. The Proto-Samis, the original inhabitants of these regions and representatives of the eastern culture based on hunting and fishing, now came to be used as procurers and later for exacting tribute. The extent of these activities is indicated by archaeological finds from the wilderness regions: skis, oval striking stones, weapons and personal ornaments. In the eastern culture pottery and the manufacture of iron implements ceased soon after the introduction of this practice. I would assume that at this stage the Saami or Lapp culture began to change into a procuring culture for the products of the wilderness, and at the same time gave up some of its characteristic activities of the period when it was self-sufficient without any appreciable need to generate a surplus."

The relations of the wilderness-hunting farmers and the Lapps appear to have been mutually beneficial and almost symbiotic, rather than exploitative. For this reason, they can be assumed to have been non-belligerent as well. Under any other circumstances it would not have been possible to give up such central crafts as pottery and the making of iron (see also Taavitsainen 1986). The extensive tracts of wilderness provided ample room for all parties and their varied activities.

Thus, hunting and fishing, the procurement of furs and trade as well as taxation involving the Lapps have been regarded as the prime reasons for the above-mentioned expeditions. But there are also certain "anomalies", which have been explained with reference to the slash-and-burn cultivation of outlying tracts of land.

Oval striking stones have been found in large numbers outside the area of permanent Iron Age settlement, and their distribution has been seen as an indication of the extent of wilderness foraging and hunting (e.g. Kivikoski 1961 136). C. F. Meinander (1950 134–136) has pointed to the distribution of these artefacts in Ostrobothnia and the fact that the majority of the finds are from locations suited to cultivation. Meinander suggests that these fire-making implements were sacrificed and were relics of the period of slash-and-burn farming with its seasonally recurrent trips to the far-off plots. This assumption finds support in the fact that the striking stones are lacking from the archaeological record of

the archipelago. Long-range swidden agriculture has also been suggested as an explanation for the occurrence of early cereal pollen outside the area of cemeteries in Finland (K. Tolonen et al. 1979 53,59; Aalto et al. 1981 61; Rankama & Vuorela 1988).

The problem of the formation of permanent settlements as the result of wilderness hunting and resource utilisation has not been specifically addressed in studies. The only exception is A. M. Tallgren's (1935) article on early settlement history, which stresses the role of wilderness hunting and foraging as a prerequisite for the settlement and colonisation of northern Europe. In Tallgren's terms, "(the farmers) had in addition to the cultivated and permanently settled areas far-off territories to which yearly trips were made at fixed times to obtain furs, for sea fishing or seal hunting. Where the foraging farmers came into contact with the aboriginal peoples of the wilderness, the representatives of a more primitive kinship-based society, they subjugated the latter through their initiative and force to serve them, exacting tribute in kind and "recompensed" them with trinkets, and sometimes with raw materials such as metals. The local culture thus acquired new features, while its basis remained the same. This continued until the wilderness-hunting peasants began to settle permanently in the regions which previously – perhaps for several generations – had been the outlying territories of their home villages, and the colonisation of the wilderness regions began."

The farmers utilising wilderness resources roamed in the territories of the hunter-fisher cultures. The area of contact of two different economic systems can be termed *frontier*, i.e. where societies meet in a zone of mixture and interaction, the transitional area is known as a frontier [Waselkov & Paul 1981, 311; this is a variant of Frederick Jackson Turner's (1894) classic definition; see also Alexander 1977 and Green & Perlman 1985]. The contact areas of societies with different patterns of energy, matter and information flow are crucially important e.g. for the study of social change.

The archaeological record provides a perspective especially on the contacts of the wilderness-utilisation economy of the farmers of the settled areas, which dated back at least to the Iron Age, with the hunting-fishing economy of the Lapps and the effects of this on the formation of permanent settlement in the regions concerned. The process is also affected by ecological factors, the mode of production and ethnicity. First to be considered are the quantitative and qualitative development and distribution of the finds.

The relationship of the finds with routes of communication is briefly reviewed from the assumption that bodies of water served as routes of communication also in the Iron Age. Find locations and settlement of the 1560s are compared, as the earliest continuous settlement of historically documented times was located in the most fertile areas. Also reviewed is the relationship of finds with arable areas as well as the cultural ties and contacts indicated by the finds. Changes in the economy and society of the settled areas as well general economic and political factors are taken into account in connection with the development of the mode of production and ethnicity and also as factors causing possible changes. The history of settlement in Kuhmoinen – as one of the wilderness parishes of Häme located at the junction of wilderness routes – is compared with overall trends of development in the Lake Päijänne region of Häme as well as the settled areas of Häme and Satakunta to the west and Savo-Karelia to the east.

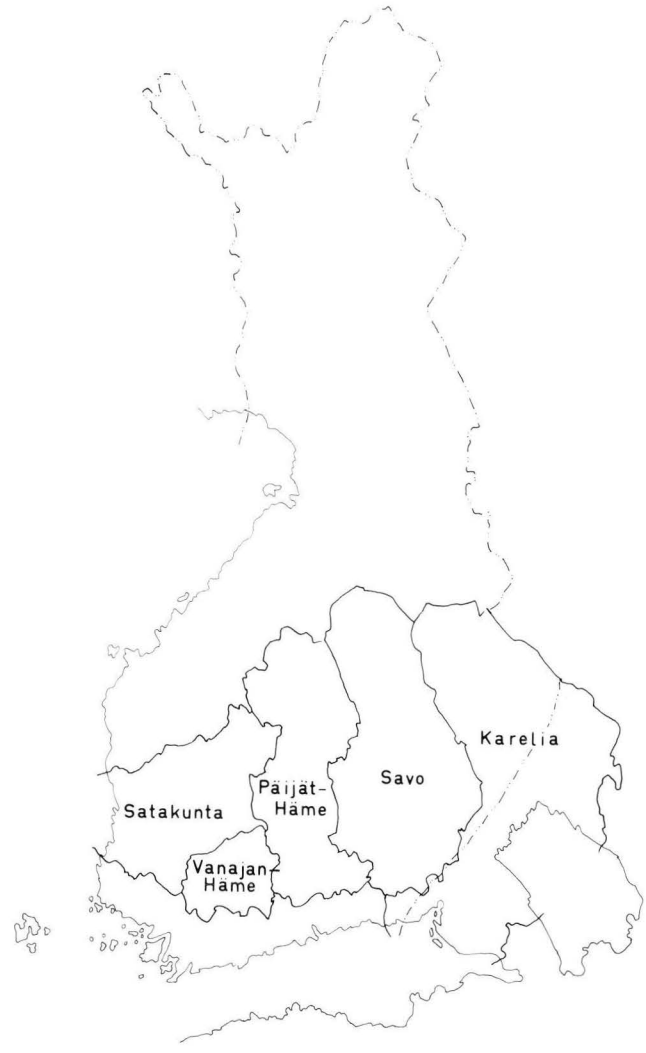


Fig. 18. The study area and areas of comparison.

The model of wilderness resource utilisation is suitable also for the reason that Eastern Häme was uninhabited wilderness in the Iron Age and for most of the Middle Ages. In this connection the Finnish geographical term Päijät-Häme will be used, meaning the part of the historical province of Häme

around Lake Päijänne. This region mainly corresponds to the ethnographical areas of Central Finland and the eastern parts of Häme (SKK 1976 16–17). The western boundary of the latter area is the same as that of the present zoning and land-use planning region of Päijät-Häme. The study area, thus defined, includes the lake-shore municipalities as well as other municipalities and communes in the overall catchment area and corresponds to the eastern parts of the historical province of Häme (Fig. 18).

4.2. Representativeness of source material

The available source material consists mostly of finds and related information on antiquities in museum collections. The archaeological material from Päijät-Häme is not very large, and most of it consists of *stray finds*. There are also a few *hoard finds*. Prehistoric sites are few in number, consisting of *cemeteries*. There are no clearly definable dwelling sites of precise date. The prehistoric sites are furthermore concentrated in the southern parts of the region. Also referred to are *cup-marked stones* of uncertain date. Available *pollen analyses* are also reviewed with respect to data on human action, especially slash-and-burn cultivation.

4.2.1. Representativeness of prehistoric finds

A central problem in this connection is whether the finds in museum collections form a chronologically representative and geographically comprehensive sample of the material aspects of past reality. Despite appearances, it is not at all certain whether the finds from the various parishes and communes of the region can be compared with each other. As in the case of the Kuhmoinen hillfort, the representativeness of the finds from Päijät-Häme must be discussed in terms of cultural and noncultural formation processes.

The main noncultural formation process that must be taken into account is the soil cover of the region which clearly accounts for the inorganic nature of the preserved material (see p. 35).

Present in this connection, however, are a number of cultural formation processes, which cannot be taken into account in the case of isolated antiquities and sites.

Of the post-depositional cultural formation processes directly affecting the number of finds, land-use is the major one, dependent not only on the size of the local population but also on prevailing means of livelihood and the form of settlement. Cultivation understandably increases the discovery of finds, but it may also skew their distribution by placing undue weight on a single environmental zone as opposed to others, especially when farming has been the main means of livelihood for longer periods. This, however, is balanced by changes in farming practices (e.g. giving up ploughing by horse which facilitates the discovery of objects) and the recent spread of other forms of land use. In recent years the number of semi-urban and industrial areas has increased in Päijät-Häme with principles and forms of land use completely different to those of traditional agriculture. Present-day leisure practices have brought to the fore environmental zones differing from the above. The planting of forest applies to almost all of the above zones. Thus, there are good possibilities for all types of environment to be represented in this connection.

A further question is to what degree objects and artefacts discovered in the various environmental zones have become available for study. This situation is above all affected by popular knowledge of archaeology and archaeological work in the areas concerned. With knowledge of archaeology, the finders of prehistoric objects, who represent different social and professional groups, will duly forward their finds to museums. This is related not only to the general level of knowledge of these matters, but also to local heritage interests, the activity of local museums and the possible proximity of larger museums.

The Päijät-Häme region was a subject of archaeological interest already in the 19th century. Of special importance in this connection are the Finnish Antiquarian Society's collectors of prehistoric objects, whose routes and principles of work are not known in detail. They are known, however, to have travelled also in the outlying regions. Professional archaeologists have carried out inspections and excavations, which in many cases have led to the discovery of new finds. Some of the parishes of the region have also been surveyed by archaeologists, albeit with work of varying quality. The available material consists of systematic surveys from different periods and brief surveys limited to the immediate terrain of previously known locations of finds. There are also detailed partial surveys of smaller areas as well as parishes or communes that have not been surveyed at all (on the problems of survey, see e.g. World Archaeology 1978).

Also to be taken into account are customs and practices of different times related to the use of objects and artefacts which may have furthered or prevented their deposition in different areas. Practices of this kind may bring about skewed regional dis-

tributions of the numbers of artefacts, and as a result the number of finds does not necessarily reflect any considerable degree of activity in the area concerned or vice-versa. In practice, it is often impossible to take factors of this kind into account. The majority of the material consists of stray finds, of which only the location is known, often only the parish in question. The contexts of these finds do not provide sufficient information for assessing formation processes or for judging whether the finds in question are primary or secondary in nature.

History of settlement is indicated by the diagrams for cemetery and stray finds. Increased numbers of finds have been assumed to indicate increased activity in the areas concerned. This assumption has been made despite the fact that archaeological data cannot be regarded as a direct reflection of past material culture in its entirety. Burial customs and the reasons for placing or losing objects in the ground may change, with ensuing effects on observed quantitative developments. There may also have been periods when grave goods were plentiful or correspondingly scarce. The diagram for the cemeteries, however, does not present information of this kind: a grave with a single object is taken into account in the same way as one with dozens of artefacts or a cemetery with hundreds of finds. If variations of this kind were of short duration, they should not be of much importance in the diagrams drawn up per period. It is hardly possible that there was a period of completely unfurnished burials and it was only in the Crusade Period that a period-long change in burial customs began, which may be of importance for the interpretation of qualitative and quantitative developments. Further control of the cemetery diagrams is provided by the diagrams for the stray finds, which indicate not only objects from assumed graves but also ones lost in the course of everyday life. Objects and artefacts were lost even in the period of burials with few grave goods.

There is not much data available on the contexts of the cemeteries. As they have not been excavated extensively, it is possible that the recovered material does not provide a correct picture of their periods of use. However, furnished and unfurnished burials are phenomena directly affecting the numbers of finds and their effects can be discussed in further detail. Meinander refers to the transition in the Merovingian Period from the cemeteries of single households to those of villages. A change of this kind is reflected in the diagrams of the numbers of cemeteries. Another significant change is the gradual transition to burials without grave goods. It has been suggested in several contexts that the Crusade Period situations of Western and Eastern Finland cannot be compared, since furnished burials ceased earlier in the west. Before the practice of placing objects in the graves ceased completely their numbers diminished to a considerable degree. This naturally affects the probability of finds coming to light. However, Pekka Sarvas (1971) has demonstrated that furnished burials continued in Western Finland up to the turn of the 12th and 13th centuries and possibly into the latter century. This again would permit at least a partial comparison of these regions. Päijät-Häme is located between the above regions. The problem of continued furnished burials is discussed in more detail below (see p. 84).

It is necessary to review in further detail the representativeness of the Kuhmoinen material. Although the prehistoric finds of the parish are mainly stray finds – the oldest case is from as early as 1830 – or isolated finds from mainly unexcavated cemeteries, Kuhmoinen is by no means an uncharted region in archaeological terms. Already in the 19th century prehistoric artefacts were collected and sought in the area. In the early years of the 20th century the shoemaker Fabian Lindén was especially active in Kuhmoinen, providing the Finnish Antiquarian Society with numerous reports, letters and maps concerning the antiquities and history of the parish (concerning Lindén, see Tallgren 1918b 13–14). Lindén searched for prehistoric objects and sites not only in the settled parts of Kuhmoinen but also in the backwoods and outlying villages. He also published a booklet on the results of his work (Linden 1925).

Lindén's activities were probably the reason for the first archaeological field work to be carried out in Kuhmoinen. In the early years of the 20th century the region was visited by Hj. Appelgren-Kivalo in 1907, A. Hackman in 1918 and A. Europaeus in 1921. In 1962 and 1963 A-L Hirviluoto and Timo Miettinen carried out trial excavations in Kuhmoinen. The parish was surveyed by Matti Huurre in 1970. There is also a local heritage museum in Kuhmoinen from where prehistoric finds have been forwarded to the National Museum of Finland. In the 1980s Hannu Kilpinen made extensive trips to various parts of Kuhmoinen searching for prehistoric objects with a metal detector. However, apart from the Rautsaarenkärki site no new Iron Age finds or sites were discovered. Kuhmoinen can be said to have been a location of considerable archaeological activity not only in relation to the rest of Päijät-Häme but also in comparison with the rest of Finland. A unique feature of the archaeology of Kuhmoinen is field work conducted in connection with the cairns of indefinite character in the outlying areas. Furthermore, Kuhmoinen, like all of the other communes bordering on Lake Päijänne, has a considerable number of summer cottages and villas, which increases the number of inhabitants in the summer season. This, in turn, is a factor potentially

increasing the number of finds, although to date summer residents have not reported any new finds.

4.2.2. Hunter-fishers as an archaeological problem

A question related to noncultural and cultural formation processes is the identification and verification of a possible hunter-fisher population in Iron Age Päijät-Häme. There are few direct indications of hunter-fishers, which may be the result of their different type of culture, different customs and their material culture, which has not been preserved by the noncultural and cultural transformation processes. It is also possible that the few remains of hunter-fishers are difficult to date and for this reason remain unnoticed.

Historical data on the taxation or exacting of tribute from the Lapps refer to their year-round settlement of the inland regions. There is no cause to assume that the situation was any different in the Iron Age. In this connection, the term Lapp refers to people living under a certain type of economy, i.e. the hunter-fishers of the Finnish inland regions, who may have been composed of various ethnic groups in the same way as the Lapps of historically documented times. It is especially stressed that the commonly maintained concept of a uniform Lapp culture, also shared by scholars, is mistaken (e.g. Pentikäinen 1973). Kustaa Vilkuna (1971 201,233) has consistently argued that most of Finland was originally divided into the village areas of the hunter-fishers, i.e. the "Lapp villages", and that these villages and the Lapp families were to a much greater degree bound to one place than for example the pioneer settlers of Savo. These Lapps came into contact with the farming population already at an early stage.

In Päijät-Häme there are cairns of loose stones, locally known as Lapp cairns, usually situated on bedrock at the capes of islands and promontories. The term shows that they are regarded as having been made by the Lapps who preceded the present farmers of the region. At present, 62 Lapp cairn sites are known from Päijät-Häme with a total of 76 separate cairns.[3] The cairns at Rautsaarenkärki in Kuhmoinen can be classed as Lapp cairns on the basis of their location and structure. There are also Lapp cairns to the south, east and north of Kuhmoinen in Padasjoki, Sysmä and Jämsä.

The function and age of the Lapp cairns are still unknown and they have been studied to only a small degree in Päijät-Häme as well as in the rest of Finland. Excavated – and mostly partly destroyed – Lapp cairns are known from Pyhäsalo in Konginkangas, Luojinniemi in Hankasalmi, Vallisaari in Kinnula, Taikinaisniemi in Korpilahti, Rantala in Viitasaari and Majakaarre in Pihtipudas. Finds have been recovered from the cairns at Kermamäki in Hartola, Skinnari in Nastola and Rautsaarenkärki in Kuhmoinen. The cairn at Vallisaari was completely devoid of any finds and at Luojinniemi a piece of copper plate was found. Despite finds, the function of the cairns at Majakaarre remains unknown. There, the only find providing even a general dating, a knife from one of the cairns, is dated to the Migration Period or later (Luho 1967 35). The other cairns are regarded as graves. At Pyhäsalo and Taikinaisniemi only burnt bones were found (J. Vilkuna 1982), but found in the vicinity of the latter were also an Early Roman Iron Age spearhead of iron and a knife (Salo 1968 77–78). Late Roman Iron Age objects were found in the Lapp cairn of Rantala (Europaeus 1927) and Viking Period artefacts were recovered from the cairns at Kermamäki and Skinnari. Viking Period objects have also been found in the near vicinity of the two Lapp cairns at Rautsaarenkärki in Kuhmoinen. They may have derived from a third cairn at the site which had been destroyed (See Appendix 3, p. 217). Dated finds from the assumed graves of the hunter-fishers of the inland regions range include objects from the Early and Late Iron Ages.

There are a number of Lapp cairn finds from Satakunta, the lake Vanaja region of Häme and Savo. A Roman Iron Age bracelet was found in the destroyed cairn at Kirkkosaari in Pirkkala (Salo 1981 225; Hackman 1925 29). At Late Roman Iron Age bracelet was found in a cairn at Urhatunsaari in Nokia and at Nuijaniemi in Pohjaslahti undated copper rings were found together with sherds of Sär 2 Ware. Sär 2 Ware has also been found in Savo in a cairn at Kuusikkolahdenniemi in Kuopio together with a bronze button and a fragment of copper plate. The latter combination and the fragments of an even-based flint arrowhead from a possible sacrificial Lapp cairn at Saunalahti in Siilinjärvi mainly indicate the Bronze Age (Pohjakallio 1978a,b; 1982). According to Salo (1981 226), the button resembles Baudou's type 3b, dated to period IV of the Bronze Age or to the transition from period IV to period V.

There is evidence of Bronze Age settlement outside the area of Päijät-Häme. The Lapp cairns of the research area indicate the Iron Age, the period following the Birth of Christ. The material is not sufficient for presenting any definite conclusions. Alongside burial cairns there are also other cairns of

[3] Asikkala 2 (3), Hankasalmi 1, Hartola 2, rural commune of Heinola 1, Iitti 10 (12), rural commune of Jyväskylä 6, Jämsä 3 (5), Kinnula 3 (6), Konginkangas 6 (7), Korpilahti 6, Kuhmoinen 1 (2), Kuusankoski 1 (?), Nastola 1, Orimattila 1, Padasjoki 1, Pihtipudas 1 (2), Rautalampi 1, Saarijärvi 1 (2), Sumiainen 2, Sysmä 5, Vesanto 1, Viitasaari 6 (8).

unknown function. An interesting detail, however, is the fact that Lapp cairns used for burial are a western feature in the regions of the eastern hunter-fisher culture. Perhaps this is a reflection of Bronze Age wilderness utilisation, as assumed by Unto Salo.

Sär 2 Ware found in some of the cairns belongs to the material culture of the eastern hunter-fishers and is dated to 1300 BC – 300 AD (Carpelan 1979). The people using this type of pottery had built at least some of the cairns. In the Päijät-Häme region Sär 2 Ware has been recovered from at least four dwelling sites (Kotasaari in Asikkala, Hiirola in Korpilahti, Autioniemi in Hankasalmi and Madeneva in Pihtipudas).

The Lapp cairns with their uncertain age and Sär 2 Ware with its broad chronological boundaries had to be excluded from the statistical survey of the chronologically definite Iron Age finds. These cairns and the finds of Sär 2 Ware show, however, that the region of Päijät-Häme was by no means uninhabited in the Bronze Age or the beginning of the Iron Age. Pottery went out of use in the Late Roman Iron Age, probably as the result of trade with the wilderness regions (Carpelan 1979 11), which makes it difficult to trace or identify hunter-fisher sites after this stage. On the other hand, Lapp cairns continued to be erected and there is thus no reason to assume that the original hunter-fishers moved out of the area. In this connection, we may apply Matti Huurre's (1983 324) observations concerning Northern Finland to Päijät-Häme as well as the other wilderness regions: "At the end of the Early Metal Period the inhabitants of the region appear to have lost their identity in the archaeological record. All of the datable objects are of outside origin and are mostly stray finds."

There is no doubt that Päijät-Häme was an area of human activity. This is especially indicated by Iron Age stray finds which here, as elsewhere, form the majority of the research material. A more problematic point, however, is to whom this material originally belonged. Where Lapp cairns have revealed objects and artefacts known from the settled areas, they are referred to in study reports as Iron Age burial cairns, and the topographically more correct term "Lapp cairn" or "cairn grave" is avoided. This may indicate a desire by scholars to search for a more precise definition of the function and dating of Lapp cairns, but it may also reflect an implicit idea of the background of the cairn-builders. In Finnish archaeological terminology, "Iron Age burial cairns" refer to the settled areas.[4]

The problem of the hunter-fisher population touches upon the question of means of livelihood in general, leading to a problematic question with respect to the hypothesis of wilderness resource utilisation. In connection with wilderness utilisation the variety of subsistence strategies among the farmers has been stressed. What if also the hunter-fishers availed themselves of a varied subsistence strategy? If the settled farmers hunted and fished alongside their main form of livelihood, could not the hunter-fishers have resorted to a minor degree of agriculture as well? Perhaps the differences between the settled areas and the inland were not as great as previously assumed. If this was the case, how can we identify and distinguish evidence of farming among these respective groups of people? This question will be discussed in further detail following the chapter on the find material.

4.2.3. Interpretation of pollen analysis results

The survey of settlement history in Päijät-Häme, based on pollen analyses, refers only to definite indicators of farming activities, i.e. mainly Cerealia pollen.

The pollen diagrams pose a number of problems of interpretation with the numerous factors present in their composition. Even pollen diagrams can be described as the result of cultural and noncultural factors. The preservation of pollen in sediments is affected by noncultural formation processes, while cultural formation processes apply to the actual method, interpretation and implicit purpose of the diagrams. Although it is impossible to define all the

[4] A cairn at Ruskeenkärki in Hattula contained an inhumation grave of a man and a woman, dated to c. 1000 AD. The grave-goods included weapons, personal ornaments, a scythe and bits. Oiva Keskitalo (1963) who investigated the find and published the material mentions that the cairn was made solely of stones without any earth fill. He also mentions that its topographical location was unique in relation to other Iron Age burial cairns. It was on a steep slope in a desolate environment far from any arable land. The structure and location correspond to those of Lapp cairns. Keskitalo does not refer to these, however, and describes the structure as a inhumation cairn. Not only were the location and burial type exceptional, but also the bodies in the cairn. One of the skeletons was preserved well enough for anthropological measurements. This body was of a very light, extremely long-skulled and small-brained individual, which does not at all correspond to our present picture of the men of Häme. Similar skeletons have been found at Käldamäki in Vöyri and Leväluhta in Isokyrö as well as in a twin grave at Ristiänmäki in Pälkäne. Keskitalo suggests that the male skeleton from Ruskeenkärki, with its racial features differing completely from those of the farmers of Häme, was – despite the small scythe – that of a trader, who perhaps had taken part in the Viking voyages to the east and was accompanied by his wife. This is suggested by the scales cup in the grave and the exceptional location of the cairn. As a parallel, Keskitalo mentions a cairn of approximately the same age from Kuusela in Pertunmaa which contained the remains of a cremation burial. These cairns are either Lapp cairns of the hunter-fishers or they must be seen as evidence of a similar burial custom surviving among the farming population. The problem of identifying the cairns of farmers from those of the hunter-fishers is discussed in further detail in footnote 66 on page 115.

sources of error of pollen diagrams in a comprehensive and critical way, the main sources of error are presented in the summary tables (Tables 6 and 8). Thus, the reader can also "evaluate" interpretations presented on the basis of cereal pollen (on the interpretation of cultural indicators, see e.g. I. Vuorela 1986; Hicks 1985; Berglund 1985 and related discussion).

Natural conditions have a number of effects on the sedimentation of pollen. The nature of the sampling site (bog, varved or unvarved lake sediment), its location, form, surroundings and vegetation must all be taken into account as "filters" or collectors through which the pollen passes before being deposited. Further problems are caused by the varying pollen production of different plants, transport by wind or insects and the problems of identifying certain pollen (e.g. the similarity of certain grasses and cereals in this respect).

A further result of these factors is whether the diagram indicates local and/or regional pollen. Sheila Hicks (1985), with reference to examples from Kuusamo in the northern Boreal forest zone, notes that the pollen representation largely reflects the regional rather than the local situation. Since this may present the area within a 10 – 20 km radius of the sampling site, the pollen indicators rarely represent just one type of activity but rather all the activities which are being practised in the region at that point in time. Pollen influx results suggest that an event is recorded distinctly only within c. 200 m of its occurrence. Hicks also points out that it seems clear that there is an obvious threshold in pollen influx which is exceeded if the activity is local, but not if it is regional and this is often obscured in the percentual presentation of results. The examples from Kuusamo cannot be applied directly to southern Finland, but they provide guidelines nonetheless (see also Huttunen 1980 4).

The main factor in cultural formation processes is the reason for preparing the diagram in question. The underlying nature of the diagram is dictated by whether it is intended to record "natural" changes in the environment or to outline human action. The material of this study includes analyses drawn up with both of these purposes in mind.

Also the method itself creates a number of problems. The distance between the computed levels (1 – 5 cm) naturally has an effect on the formation of the diagram, as also the number of pollen counted, which in the diagrams for Päijät-Häme varies between 150 and 1500. The number of counted pollen may vary even within the same diagram.

With respect to the hypothesis of wilderness resource utilisation we must also outline changes in the intensity of cultivation, and the Cerealia limits *sensu* Donner have been divided as follows: 1) absolute, i.e. the earliest presence of cereal pollen, 2) empiric or the beginning of the continuous pollen curve and 3) rational or an expansion of the relative frequency of cereal pollen. J. Donner (1984 14) points out that in some cases the empiric and rational limits are simultaneous. He also mentions that it is only later, a few hundred years ago, that the "rational" limit of the Cerealia curve reflects the beginning of intensive farming. As this is a very young event, its study with the help of pollen diagrams and radiocarbon dates does not add much to what is known from historical accounts (J. Donner 1984 15).

Donner's division is based on a long tradition of research and the three above-mentioned Cerealia limits are often given as C^0, C^+ and C^{++}. Verbal descriptions and definitions vary to same degree among authorities. Karl Bertsch (1942 44) was probably the first to define the limits in written terms in connection with pollen limits for trees, which has later been applied in other connections. It may, however, be difficult to apply limits for trees in other contexts due to the different nature of pollen production in trees and anthropogenic species. Bertsch stresses the haphazardness and minor significance of the absolute limit. The first occurrence may be the result of long-range wind transport or it may derive from the upper parts of a sediment. The empiric curve signifies a minor uniform, or almost uniform, pollen curve. It may be regarded as a minimum amount of pollen dispersal which in most cases indicates the occurrence of a certain tree in the near vicinity. The rational limit signifies a marked rise in the curve (on the definition of limits, see e.g. T. Nilsson 1968; I. Vuorela 1986).

It is clear that an almost uniform curve and a marked or significant rise in a curve are to some degree subjectively definable limits. Taking into account all of the above-mentioned noncultural and cultural processes affecting the formation of these limits, defining them must be regarded as somewhat pointless. The distance between analysed levels especially affects the thin empiric curve and its interpretation. If an interval of e.g. 5 cm is maintained, short-term interruptions cannot be observed, which may give a false picture of the continuity of farming.

The subjective nature of limits and their definition is shown by a comparison between archaeological and natural-scientific authorities, whose interpretations of the limits show considerable differences.[5]

[5] Examples of this are the diagrams for the sampling sites of Työtjärvi in Hollola and Ahvenainen at Koski in Häme (J. Donner et al. 1978; M. Tolonen 1978). According to Meinander (1984 12), the absolute limit for Työtjärvi is 1210 BC, while J. Donner (1984) maintains that this is the empiric limit. Meinander (1984 12) defines the absolute limit for Ahvenainen at 1470 BC, the empiric limit at 820 BC and the rational limit at 480 AD. Don-

In addition to the above three limits of cultivation, it would also be important to define the beginning of arable farming, but this appears to be impossible on the basis of cereal pollen alone (M. Tolonen 1978b 200). I. Vuorela (1986 53) has pointed out that it has also proven impossible to draw a sharp boundary between indicators of small permanent fields associated with the settled areas and those indicating solely slash-and-burn cultivation. Distinguishing between the indicators of the three stages of clearing, harvesting and grazing and between the periods of reforestation has also proved to be difficult.

Necessary in this connection are indicators of field erosion, which are the loss-on-ignition values obtained. Some of the sampling sites, however, are in such locations that their catchments were at no stage associated with permanently cultivated fields, and signs of erosion cannot be observed. For these reasons, the limit of field cultivation has not been discussed.[6]

Pollen analyses are of no interest if the observed Cerealia levels cannot be dated. This entails a number of problems especially as sediments are usually radiocarbon-dated. In terms of dating, bogs are generally regarded as more reliable than lake sediments, as the latter may contain old charcoal from erosion or redeposition of sediments. Datings of lake-bottom sediments should be controlled for example with turf datings from nearby bogs from the same period. However, parallel datings of this kind are usually not available. Comparisons are further impaired by the different thicknesses in the dated samples and their resulting variation of age. This must be taken into account in calibration, which is necessary in comparing the results of pollen diagrams with absolute archaeological chronology.

ner's (1984 15) corresponding limits are approximately the same: 3440 ± 100 BP (1490 BC), 2770 ± 100 BP (820 BC) and 1470 ± 100 BP (480 AD). However, Mirjami Tolonen (1985 87) suggests limits at 1442 BC, 40 BC and 913 AD. These examples show how views vary not only between archaeologists and pollen experts, but also among the latter as well. Nor can the differences between Donner's and Tolonen's results be explained by the fact that the former applied radiocarbon dates while the latter operates with year varves.

[6] Pollen experts also disagree in their definitions of the beginning of arable farming. M. Tolonen (1978 200) observes that the pollen from Ahvenainen in Koski precludes any definition of the beginning of arable cultivation, while Irmeli Vuorela (1982 54) has re-interpreted Tolonen's diagrams as indicating the adoption of field cultivation in 916 AD in Koski.

4.3. History of local settlement in Kuhmoinen in the light of archaeological finds and pollen analysis

4.3.1. Development of settlement in the light of archaeological data

Stray finds, hoards and cemeteries. The quantitative development of settlement in Kuhmoinen is reviewed with reference to the finds listed in Appendix 3. This material can be regarded as representative in Finnish conditions. The assumption is maintained whereby the increase of finds reflects the increased utilisation of the area.

In addition to the hillfort, the following Iron Age finds and sites are known from Kuhmoinen: 12 stray finds, one hoard and two cemeteries.

The finds can be presented as simple histograms. Problems present in this connection are finds which were in use over several periods (e.g. socketed axes) or ones falling into the transition from one period to another (e.g. C-type axes). These are placed in the diagram of Fig. 19 by dividing them among their periods of use.[7]

The histogram in Fig. 19 indicates a relatively minor degree of human activity in the region before the Viking Period. Only the Merovingian Period is shown as a slightly larger bar. One of the reasons for this is that – with the exception of one find – the bar for the Merovingian period marks finds from the transition from this period to the Viking Period. On the basis of the number of finds, the Viking Period is one of a great increase of activity in the region. The number of finds is almost seven times that of the preceding period. Also of interest in this connection are the number and high quality of the artefacts of the Papinsaari hoard.

Stray finds earlier than the Viking Period consisted only of tools and implements.[8] The Viking Period signifies an increase in the variety of material and weapons appear in the archaeological record along with men's and women's brooches.

The further subdivision of Viking Period finds is relatively even and none of the sub-periods are especially weighted. Included are finds from the above-mentioned transition stage and ones of overall Viking Period character, possibly with some stress on the early and middle stages and the 10th century.

[7] The chronologically problematic Papinsaari hoard is divided evenly among the Merovingian and Viking Periods.

[8] The Papinsaari hoard contains brooches which are not displayed in the diagram for stray finds.

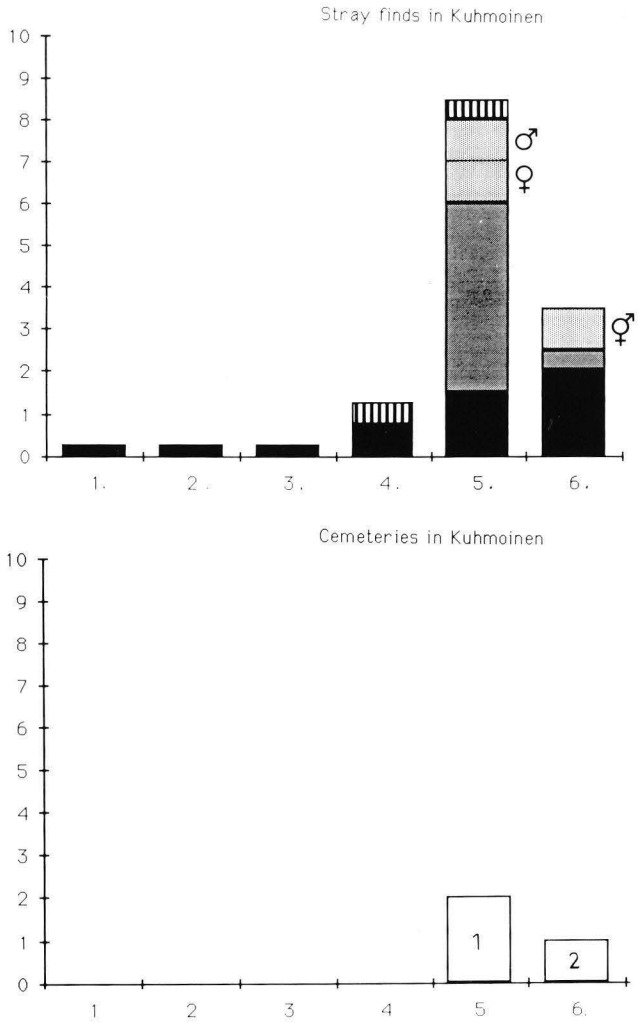


Fig. 19. Quantitative development of cemeteries and stray and hoard finds in Kuhmoinen. Key to symbols in Fig. 20.

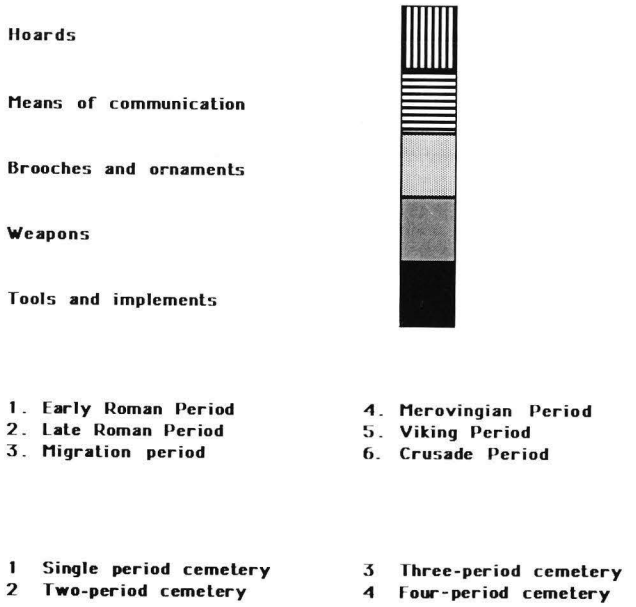


Fig. 20. Key to diagrams for the quantitative development of finds.

Also included is a so-called 11th century artefact, the M-type axe (Fig. 21).

The diagram displaying the cemetery finds (Fig. 21) shows that the first cemeteries appear around the same time as the marked increase in stray finds. There are two Viking Period cemeteries: Rautsaarenkärki and Ala-Rantala. Assuming that the artefacts from Rautsaarenkärki form a closed find, it can be dated mainly to the 10th century. The oldest artefact from the later Ala-Rantala inhumation cemetery is from the end of the Viking Period (the beginning of the 11th century) and the latest ones are from the first half of the 13th century.

A further change set in during the Crusade Period, the last prehistoric period with a decrease in the number of finds. In spite of this, the number of finds is still almost two-and-a-half times that of the Merovingian Period. There were also slight changes in the composition of the material: weapons are no longer present, but there is a brooch used by both men and women. In the same way as the histogram for stray finds, the bar indicating cemeteries also shortens in the Crusade Period.

In most cases archaeological data provides a relatively broad and vague image of cultural relations. Nor is Kuhmoinen an exception in this respect. Many of the artefacts are of wide distribution, and even "international" character such as the weapons, or they are present throughout their whole period of use in all of the areas of Finland with permanent settlement. However, some of the finds permit a slight degree of speculation (see Appendix 3).

The Papinsaari hoard can be regarded to some degree as East Baltic in character. It also includes a Scandinavian artefact and so-called Permian artefacts. The East Baltic brooches of the hoard are found, however, also in Western Finland, especially in the Aurajoki River valley and in the region known as Vakka-Suomi. The chain fittings, however, are known only from Häme. Permian artefacts have been found in all parts of Finland and Scandinavian artefacts especially in the western regions.

The Viking Period brooches include two types which display clear centres of distribution in Upper Satakunta and Häme. The distribution of the Finnish curved-backed axes is also similar.

Among the relatively few Crusade Period finds, the weapons and the so-called Hanseatic bowl are types common to the whole of Northern Europe, but their common character and wide Finnish distribution permit their classification as domestic types. Of the tools, the Finnish curved-backed axes occur in Western Finland, and in especially large numbers in Upper Satakunta and Häme. Of the brooches the small penannular type is of western origin, but the finds also include a palmette-ornamented silver plate pendant which outside of Karelia occurs only in the Päijät-Häme region of Finland. The hillfort must

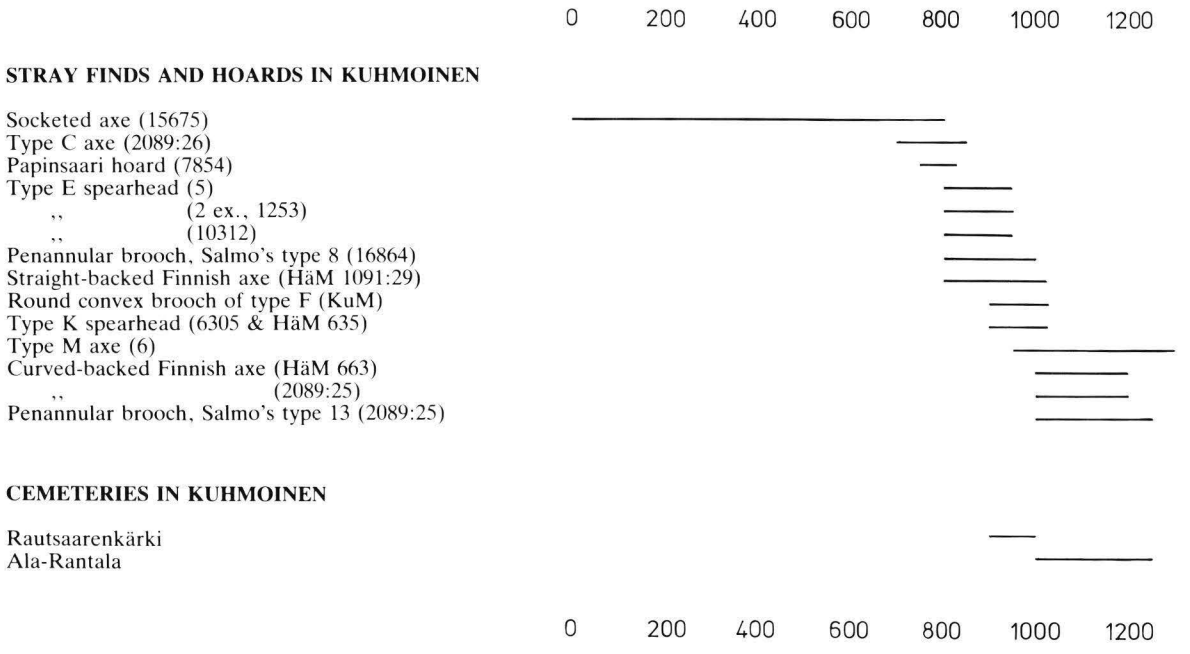


Fig. 21. Datings of finds from Kuhmoinen.

also be mentioned in this connection, for in addition to the West Finnish artefacts there are also eastern brooches, tools and weapons. Judging of the finds a change occurred in the cultural ties of the Kuhmoinen region in the Crusade Period. The region with its formerly western material culture now became an area where eastern and western elements of material culture mixed.[9]

Also the grave types reflect cultural ties and connections. The older cemetery at Rautsaarenkärki poses a number of problems in this respect. Assuming that the finds from the point of the island in question were originally from a cairn in the highest location at the site, the cremation and mound burials indicate a western origin. Cairns of stones mixed with earth are common throughout the settled areas of Southern Finland in the Early Iron Age. In Häme, most of these are from the middle stages of the Iron Age (Kivikoski 1955a 58–60). At Rautsaarenkärki the cairns are of stones. In addition to their structure, their location also resembles that of so-called Lapp cairns, which in turn indicates a local tradition. Kivikoski (1955 a 58) has underlined that in Southern Finland the form of the earth and stone cairns varies as well as the proportions of earth and stones used. In the vicinity of farmed areas it was natural for earth to become mixed among the stones over the course of centuries with the result that the cairn finally resembled a mound. In many cases it is hard to determine which part of the cairn is original earth and which is secondary fill. In the lake region in Häme cairns often resemble grassed-over mounds even when their interior consists solely of stones. As examples, Kivikoski mentions the turf-covered stone cairns of Antiala at Suotaala in Tyrväntö and Kirjakka in Lempäälä.

The later Ala-Rantala cemetery, dated to the end of the Viking Period and the Crusade Period, contains inhumation graves. This new custom spread to Kuhmoinen around the same time as elsewhere in Häme. In this respect, Kuhmoinen followed the course of development in progress in Western Finland. According to Kivikoski (1961 234), the Crusade Period material of the West Finnish area dislays a considerably smaller array of artefact forms and types than the preceding period. As one of the reasons for this, she suggests the spread of the "empty" custom of burial. The spread of Christianity was obviously reflected also in furnished burials through a decrease in the number of artefacts placed as grave goods. Changes in burial customs offer the most plausible explanation for the observed decrease in Crusade Period finds in Kuhmoinen.

Archaeological finds and routes of communication. The archaeological finds and antiquities of Kuhmoinen display definite connections with routes of communication, for the region is on the west shore of the Tehinselkä body of water belonging to Lake Päijänne. Suvanto (1965 43–44) has stressed the importance of this area as a crossing of north-south and east-west routes among the wilderness areas.

[9] More precise results concerning the origin of brooches and thereby the directions of wilderness utilisation and streams of settlement may be provided by a study of the possible identical features of their casting moulds. Unfortunately, this time-consuming task could not be undertaken. Af Hällström (1948 65) mentions an interesting example of how brooches with wreathed ornament from Konginkangas and Tuulos were completely identical.

Archaeological data and areas of clayey soils. It is also necessary to investigate the environments of find locations and especially the locations of arable land in addition to the qualitative and quantitative development of finds in the region. Clayey and fine silty soils with their retention of moisture, abundance of nutrients and lack of stones form Finland's main arable areas. Most of the areas of clayey soils are fields at present. They also provide good growth conditions for natural flora (Kalliola 1973 70). According to the soil map of the Kuhmoinen region clayey soils are concentrated in the area of the main village and in Harmoinen (Geological map of Finland – soil map 2143 1:100 000). Also the Iron Age finds are concentrated in the main village and along the water route leading to it. It must also be pointed out that two finds from the west shore of Lake Lummene (stray finds nos. 7 and 12) – far from Medieval villages – are also from small areas of clayey soil.[10] The clays of the Kuhmoinen region are post-glacial silty clays, which occur in Satakunta and Häme to the north of the extensive areas of glacial clays in Southern and Southwestern Finland. They do not form large or uniform areas of even elevation, but are dispersed among moraines and on the slopes of hills and river valleys (Aarnio 1939 143, 152–3). The link between clayey soil and the thick nutritient-rich soils that formed on top of it is clear except in the case of the Kuhmoinen hillfort. A strange feature in this respect is the lack of finds in the area of the village of Harmoinen.

4.3.2. History of cultivation in Kuhmoinen in the light of pollen diagrams

Pollen samples were gathered from the main village of Kuhmoinen and the vicinity of the hillfort. The selection of sampling sites was for to investigating and comparing the area of pioneer settlement with its adjacent wilderness hinterland in terms of settlement and cultivation history. From the main village there is a sample from Asilampi Pond and several samples were gathered from the vicinity of the hillfort. Different contexts were chosen for source-critical reasons. The aim was to link the radiocarbon-dated observations from Lake Linnajärvi to the west of the hillfort with changes in the diagram for Lake Saaresjärvi to the east of the fort. Also compared were results concerning the bottom sediments of the lake with bog turf results from Linnasuo Bog in order to control dating and to shed further light on the problem of the local or regional nature of the pollen. The results of all of the diagrams were furthermore compared with a sample from the marshy area on the crest of the hillfort with its fire horizons. The aim was to connect the fire horizons with those of a stand-dried stump from the crest area of the hillfort.

Mirjami Tolonen's pollen analysis results are presented in Appendix 5, and in this connection only the main results and observations are presented. In the dating of the significant Cerealia limits it was attempted to locate the ages on the basis of radiocarbon dates and the age/depth curve. Also taken into account was the aging effect of 200–400 years of the upper parts of the lake sediment, caused by accelerated soil erosion due to land use and resulting in an extra supply of allochthonous organic matter.

The first direct indication of cultivation in the main village area was observed at Asilampi and is dated to the beginning of the Bronze Age (c. 1350–1200 BC). Unfortunately, pollen analysis does not permit a further evaluation of the nature of this isolated and small-scale phenomenon. The lack of other definite indicators of cultivation sheds a degree of uncertainty upon the possible presence of local farming. This pollen in question may be local, but it may also have been transported by winds from further afar. The next occurrence of Cerealia pollen marks a relatively continued stage. The beginning of this empiric curve is dated to c. 200–400 AD. The presence of other cultivation indicators indicates local (and possibly also regional) cultivation. A strong increase of cultivation intensity, described as rational, has been dated to the Viking Period (800–1000 AD). The contemporaneous strong increase of Secale and NAP pollen and the rise of the ignition residue curve slightly higher up in the diagram indicate that the earlier practice of slash-and-burn farming was replaced by arable cultivation. Around the end of the Viking Period there is a drop in the Cerealia curve. Because of the above-mentioned problems and limitations of pollen analysis this occurrence cannot be directly linked to any decrease in cultivation or depletion of settlement. In fact, cultivation may even have increased, if self-pollinating grain species had had adopted around this time. From the end of the Crusade Period up to the present, cultivation continued at a strong rate. There was a decrease in pollen around 1700, but in this connection the fall in the Secale curve and non-arboreals indicates a change to advanced agriculture, which is also shown by the grey clay-gyttja of the sediment.

The history of land use in the vicinity of the hillfort is based not only on the analysis of samples from the marshy area of the crest, but above all on a combination of observations concerning the bottom sediments of Lake Linnajärvi and the turf of the adja-

[10] The possible connection of the Lahnalahti find in Puukkoinen (stray find no. 6) must remain unknown as there is no soil map (1:100 000) of the area.

cent Linnasuo Bog. The observations from Lake Saaresjärvi are not in conflict with the above. The first (absolute) occurrence of Cerealia in the region is from slightly before the birth of Christ on the basis of a calibrated radiocarbon date from below the occurrence and the age/depth curve. As in the case of the oldest indication of cultivation at the main village, also this indication is not of any clearly-defined nature. As there is insufficient evidence of local cultivation, the pollen may be a reflection of conditions elsewhere in the region – possibly in the main village, although there is no corresponding occurrence there from this time – or it may have been transported by winds. Regionality is also suggested by the lack of contemporaneous Cerealia pollen in Linnasuo Bog which is adjacent to Lake Linnajärvi and better suited to reflecting local pollen. The next occurrence of pollen in Lake Linnajärvi is from the level dated to 400 – 600 AD. From this stage onwards the Cerealia curve is unbroken. The first cereal pollen in Linnasuo Bog begin at the same time as in the nearby lake, but unlike the curve for the lake, the bog curve is not empiric and it shows a cessation of cultivation around 800 AD. Cerealia pollen, together with other human impact indicators of a general nature, clearly indicate slash-and-burn cultivation in the location from c. 400 to 800 AD. The transition to a more intensive arable culture in the vicinity of the hillfort occurred around 1700 AD.

A comparison of the diagrams of the Linnasuo Bog and Lake Linnajärvi are of interest for the interpretation of the pollen diagrams. Due to the nature of the sampling site, the interruption in the case of the Linnasuo Bog is more probable than the unbroken curve for the lake. The latter indicates regional pollen reflected in the lake sediment, the effect of which must be kept in mind in the interpretation of other lake sediments.

4.3.3. Medieval settlement in Kuhmoinen and the problem of continuity

The earliest historical sources concerning Kuhmoinen are from as late as the 15th century and, according to Suvanto, they are sporadic and lacking in information (Suvanto 1965 97). More detailed data is provided by the first land records (so-called Land Book) for Häme from 1539. According to this source, the area or quarter-division of Kuhmoinen contained the following villages and farms (given in brackets): the present main village with Anttula (4), Tapiala (7), Lästilä (7) and Äkämäki (3); Harmoinen (9); Löytäne (1); Suurijärvi (1); Päijälä (7); Kaukola (3); Valkiala (3) and Puukkoinen (3) – a total of eleven villages with 48 farms (Suvanto 1965 96–106). The map of settled areas of the 1560s shows approximately the same situation (SAK 1973).

Suvanto has investigated the origin of settlement with reference to the names of the villages, holdings and Medieval families, although he stresses that his results – interesting in themselves – cannot be regarded as scientifically valid. Upper Satakunta was of significance for the settlement of the region. The parishes of Pälkäne, Lammi, Padasjoki, Hauho, Hattula and Janakkala of Häme are clearly present, but of the old main parishes of Sääksmäki and Hollola there are only few indications in the above material. There are also Karelian names, although Suvanto does not place much weight upon these, as only two of them do not occur in West Finnish connections. Lapp-based names are rarer in Kuhmoinen than in the neighbouring parishes (Suvanto 1965 55–68).

Suvanto presents views concerning the direction of the stream of settlement on the basis of relics of wilderness ownership and utilisation. The Kuhmoinen region was the domain of the hunters of Hauho, Pälkäne, Kangasala and Pirkkala, i.e. Upper Satakunta and Häme (Suvanto 1965 78–80).

The cessation of furnished burials and the first sporadic historical sources leave an undocumented interval of some two centuries, which makes it difficult to keep track of the development of settlement. An inhumation grave covered with a stone setting, found at Fabian Lindén's lot, can be dated on the basis of its structure to this period and serves as archaeological evidence of the continuation of settlement into historically-documented or Christian times.

The problem of continuity can also be approached by comparing finds with the locations of Medieval villages. The map of settlement in the 1560s corresponds to the Medieval situation. Placing the finds on this map, we can see that they are concentrated along the water routes of Lakes Ylä- and Ala-Karkjärvi and the route leading to Kuhmoinen either at the locations of the Medieval villages of the present main village (Suvanto 1965 98) or in their immediate vicinity. There are only three finds from outside this area: stray find no. 6 which was found 15 km north of Lake Iso-Pihlajavesi and far from all possible settlement, even that of the 1560s, and stray finds nos. 7 and 12 from the shore of Lake Lummene 15 km to the southwest. The environs of the latter were not completely uninhabited in the 1560s. Three kilometres west of stray find no. 7 was a village of a single farm on the shore of Lake Vehkajärvi. Established Medieval and 1560s settlements correspond to each other in all locations except in the village of Harmoinen, from where no finds have been recovered so far. There is also a topographic con-

tinuity from prehistoric to historically documented times. Continuity of settlement is also indicated by the available pollen diagrams which show that there were no interruptions in the development of cultivation in the Medieval period with its few available sources.

4.3.4. Summary of the history of settlement in Kuhmoinen

Fig. 22 shows the occurrence of Cerealia pollen, Picea and sorrels as sensitive indicators of clearing, limits of cultivation and a diagram of the quantitative development of prehistoric finds. These factors reveal the following pattern. Before the Viking Period, the region of Kuhmoinen was not utilised to any great degree and its use was of a temporary nature. The Viking Period marks a clear "jump" in the scale of development, and permanence of settlement is indicated by an over eight-fold increase in the number of stray and cemetery finds. Although these finds are of artefact types common in Western Finland and around the Baltic, there is some emphasis on Häme and Satakunta as areas of origin. This is also indicated by place-names. During the Crusade Period the number of artefacts and finds decreases to some degree, possibly as the result of change in burial customs, but it is nevertheless several times that of the Merovingian Period. At the same time, new traits appear in the archaeological record with the introduction of Karelian artefacts.

In all of the periods concerned the finds are concentrated in areas of clayey soil. Thus, material evi-

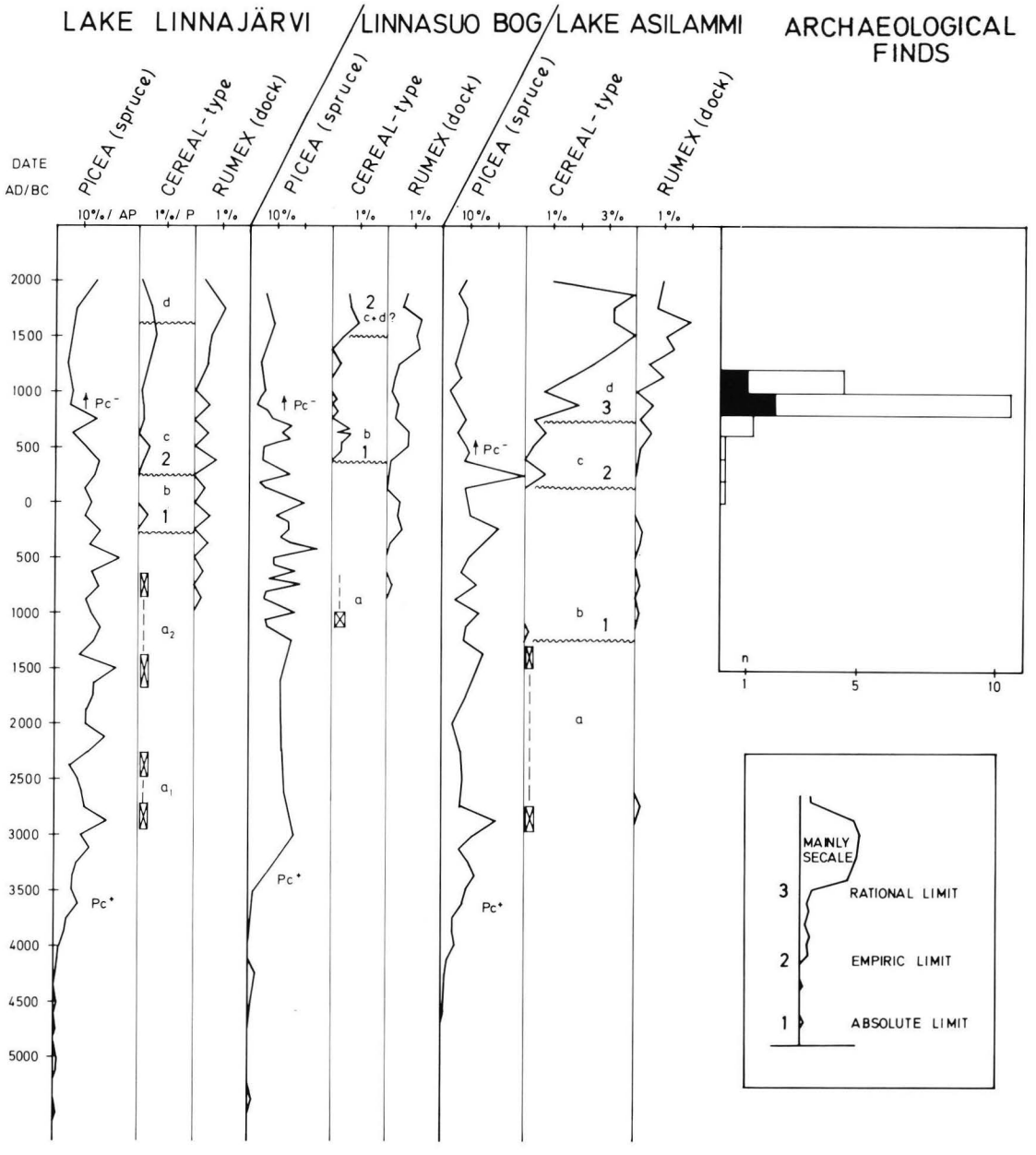


Fig. 22. Cultivation boundaries of pollen diagrams for Kuhmoinen and the development of finds.

dence is concentrated only on the fertile areas permitting cultivation based on a rapid course of slash-and-burn rotation and offering possibilities for arable cultivation and permanent settlement. This area is the same as that of settlement in the 1560s, which is a further indication of continuity.

Pollen diagram evidence indicates the same as the quantitative development of artefacts in the archaeological record. There are indications of small-scale cultivation already in the Early Iron Age, but the increase of farming and arable cultivation are evidenced only when the number of finds show their marked increase. Pollen data also indicates continued settlement, although the amount of cereal pollen decreases at the end of the Viking Period. This, however, does not necessarily imply a quantitative decrease in cultivation.

The pattern also includes the utilisation of the adjacent fertile wilderness hinterland of supra-aquatic areas not long after the beginning of cultivation in the present area of the main village. However, there is no material evidence of human activity in the former area. Unfortunately, our knowledge of the history of the utilisation of the nearby wilderness must remain incomplete as it was not possible to select sampling sites that would have served as examples of improbable locations for cultivation and farming.

The relevance of the Kuhmoinen pattern and its relationship with the working hypothesis concerning wilderness hunting and utilisation will be approached through a comparison with the history of settlement in the wilderness regions to the east of Päijät-Häme and the settled areas to the west.

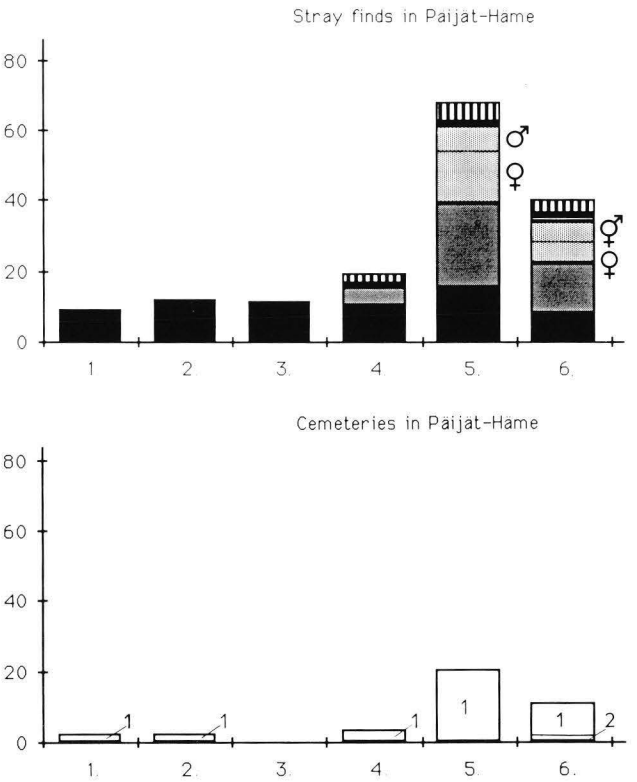


Fig. 23. Quantitative development of stray and hoard finds and cemetery and burial finds in Päijät-Häme. Key to symbols in Fig. 20.

4.4. History of settlement in the Lake Päijänne region of Häme with reference to archaeological finds and pollen analyses

4.4.1. Archaeological data on the history of settlement

Stray, hoard and cemetery finds. The quantitative and qualitative features of the archaeological material of Päijät-Häme are given in the diagrams of Fig. 23. All of the finds show movement in the area and its utilisation already before the Viking Period.[11] These finds are mostly of types that were common in the permanently settled areas of Western Finland. Also the small number of "international" weapons has a similar distribution. In some cases the areas of distribution extend to Upper Satakunta and Ostrobothnia.

Judging from their overall distribution, the artefacts found their way into the Päijät-Häme region as the personal property of West Finns hunting and fishing in the wilderness regions or as the result of their trade with the Lapps. The stray finds consist of weapons, means of transport and tools (mostly fire-striking stones and axes), implements necessary to anyone travelling in the uninhabited areas.[12]

The fire-striking stones, which account for the largest group of finds, are interesting with respect to their raw material. Although no petrological analyses are available, visual inspection shows that there is a distinct group of slate striking stones, which derive from Karelian formations of fine-grained quartzite and conglomerates (Fig. 24; Kari A. Kinnunen, oral comm.).[13] Despite the generally-held view that the fire-striking stones were related to the

[11] The diagrams show the Merovingian Period as a small peak. This is based on six artefacts used in both the Merovingian and Viking Periods, two artefacts in use from the Merovingian Period up to the Crusade Period and two that were in use even until the Middle Ages as well as two hoards dated to the transition from the Merovingian Period to the Viking Period.

[12] The diagrams do not show the brooches and personal ornaments of the Papinsaari, Kuhmoinen and Vehkosilta, Nastola hoards, dated to the transition from the Merovingian to the Viking Period.

[13] E.g. Tavilammenkangas, Kivijärvi (NM 4443); Kauppila, Hollola (NM 3910:6); Rimpipelto, Keuruu (NM 10789:6);

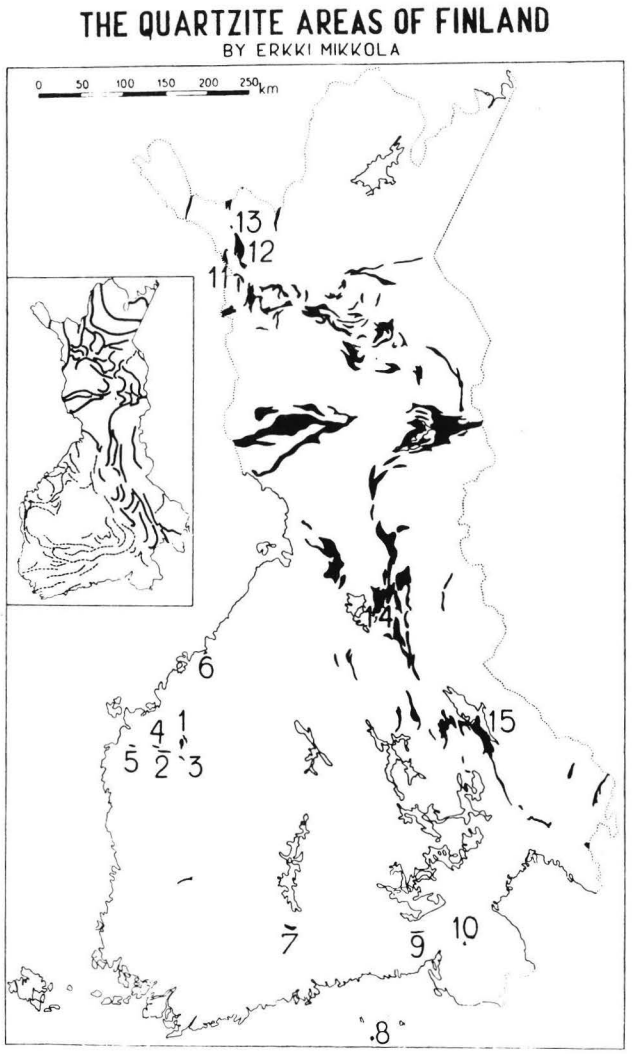


Fig. 24. Quartzite areas of Finland (Hietanen 1938).

wilderness voyages of the farmers (Kivikoski 1961 136), the raw material shows that they – or at least some of them – could be from the wilderness regions. Some of the rocks used may have been raw materials of the outlying areas and/or possible articles of the Lapp trade, specially made by Lapps.

The Viking Period shows a marked change in the numbers of stray finds, with an increase of over 3.6 times compared to the preceding period. This does not apply so much to means of transport or even weapons. Although the number of tools increases somewhat, the proportion of personal ornaments – hitherto lacking in the material – is considerable. Also the variety of the personal ornaments is interesting – more than two-thirds are women's ornaments and brooches.

With the exception of certain artefact types known throughout the Baltic regions (e.g. weapons), almost all of the stray finds are of West Finnish types. There are three groups of numerous objects of exceptional distribution, all from the end of the Viking Period. The convex-concave brooches of types E and F are limited in distribution to Upper Satakunta and Häme. The studded brooches, of approximately the same age, are found in Häme, Savo and along the southeast coast of Lake Ladoga.

Because of the broad chronological limits of the artefact types, it is difficult to say whether any specific phase of the Viking Period is prominent in the material. Finds from the transition to the Viking Period indicate increased activity in the area in the early stages of the period, which is followed by a generally even level of activity throughout the period, as indicated by stray finds.

The Crusade Period was also one of change, with a decrease in the number of artefacts, especially personal ornaments. In spite of this, the total number of stray finds is larger than before the Viking Period.

Also of significance are changes in cultural ties and contacts as indicated by the artefacts. The material still contains types common throughout the settled areas and in the Baltic regions. There is, however, a significant change in the composition of the personal ornaments. In addition to West Finnish types (small penannular brooches), there are also oval tortoise brooches of eastern origin with distribution in Häme and Savo-Karelia. Western brooches are the smallest group (9) and brooches from Häme and the east form two groups of eleven objects.

Along with the oval tortoise brooches there are also other finds of eastern distribution. The stray finds include a spindle whorl from Kärkölä, which was made of red slate originally belonging to a larger icon. The find is dated to the 12th century (Taavitsainen 1981 70). Also the hoards contain eastern artefacts. The Harakkamäki hoard in Nastola contained four silver-plate brooches of Gotland type, which have previously been found only in Savo and Karelia in Finland (C. A. Nordman 1924 10–11; Kivikoski 1955a 139). The Lipanmäki hoard in Sysmä included eleven palmette-ornamented silver-plate pendants with parallels from the Rantala cemetery in Kuhmoinen and Karelia (C. A. Nordman 1924 82–88; Kivikoski 1973 1130). The large proportion of Frisian coin fragments among the bit silver from the Kapatuosia hillfort in Hollola is a feature in common with the hoard finds of Karelia (Talvio 1982 36–37). By this stage, the research area had become

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Nyystölä, Padasjoki (NM 12663); Pirttisaari, Sysmä (NM 4611); Jämsä (NM 13191); Masonkoski, Padasjoki (NM 9771:2); Hautala, Keuruu (NM 1637); Löytänänjoki, Saarijärvi (NM2064:5); Mäkelä, Korpilahti (NM 2218:164); Kellosalmi, Padasjoki (NM 1894); Korpilahti (NM 22218:167); Keihari, Viitasaari (NM 2029:168); Siekkilä, Pihtipudas (NM 2029:170); Näreharju, Pihtipudas (NM 3354:83); Anjala (NM 17791:1); Kymijoki River valley (NM 6190:33); Esko, Sipoo (NM 6064). The distribution map shows a small occurrence of quartzite at Tiirismaa, but it can be distinguished from the Karelian formations because of its yellowish-red sillimanite nodules which can be seen with a loupe (Kari A. Kinnunen, oral comm.)

one where western and eastern artefacts intermingled.

The diagram showing the grave finds is almost identical to that of the stray finds. Cemeteries mainly come into use in the Viking Period, with a seven-fold increase in number over the preceding period.[14] Burial forms and customs, with cremation cemeteries, mounds and inhumation graves at the end of the Viking Period, as well as the artefacts from the cemeteries, are the same as in Western Finland. Chronologically the graves tend to fall into the middle stages of the Viking Period. The Crusade Period witnesses a similar decrease of material, as observed in the stray finds. Burial customs are still of a West Finnish character, but also the material of the cemeteries indicates the influx of eastern artefact alongside those from the wrest.

Archaeological finds and routes of communication. The relationship between archaeological finds in Päijät-Häme and routes of communication is difficult to determine because of the lack of studies concerning ancient roads and water routes. In principle all of the larger bodies of water in the region could have served as routes of communication. Almost all of the finds have been recovered along these routes or in their immediate vicinity. Only in the southern parts of the area were a few stray finds recovered from the headwaters of small rivers or creeks. They are, however, from the termini of routes – albeit minor ones – or from the vicinity of permanently settled areas. Areas with numerous stray and cemetery finds indicating permanent settlement formed at the starting points (e.g. Sysmä) or termini (e.g. Hollola) of water routes or along the routes (e.g. Nastola). Many of the permanently inhabited areas are on the bays of large lakes with access to smaller bodies of water higher up (e.g. Jämsä).

Archaeological finds, areas of clayey soil and arable areas. Comparisons of archaeological finds in Päijät-Häme with areas of clayey soil and silt, suitable for farming, are impaired by the lack of a uniform, modern soil map of the whole area in suitable scale.

Soil maps are available in scales of 1:20,000, 1:50,000, 1:100,000, 1:400,000, 1:1,000,000 and 1:2,000,000, but only the two latter ones cover the whole country. The others are still under preparation and none of them covers the whole of the research area. Because of this, the finds had to be mapped onto a soil map of the whole of Finland (1:1,000,000; Fig. 25), with a resulting generality of features and lack of smaller details. It can thus be assumed that only the larger areas of clayey soil are shown with the exclusion of smaller patches of clayey soil. For example, the site of the Saviniemi grave find in Paaso in the rural commune of Heinola is not shown as an area of clayey soil, although the Finnish place-name clearly indicates this type of soil. This problem is clearly shown by comparisons of the 1:1,000,000 map with maps in 1:100,000 scale where such are available. It can not only be seen that small areas of clayey soil are actually missing from the map of the whole of Finland,[15] but that the marking of clayey soils in the map is inconsistent.[16] Comparisons of soil maps and aerial photographs together with on-site inspections clearly show that the soil maps do not conform to reality in all respects (Kinnunen 1988 43–47).

There is a clear correlation between clayey soils, archaeological finds and cemeteries in the permanently settled areas with numerous finds (Koski, Hollola, Nastola, Iitti, Asikkala, Padasjoki, Kuhmoinen, Jämsä, Sysmä, Hartola). These are also the locations of the largest areas of clayey soil in the research area. The area in question covers most of the environs of Lake Vesijärvi and southern Lake Päijänne, i.e. the fertile central area of deciduous woodland of Hollola (Kalliola 1973 178). More problematic, however, is the association of stray finds, individual graves and cemeteries with clayey soils. Most of these are also close to clayey soils and, as shown by the examples of Saviniemi in Paaso in the rural commune of Heinola and those mentioned in footnote 15, the map of clayey soils (Fig. 25) does not completely correspond to reality. There is, however, a marked correlation between stray finds and clayey soils, although numerous exceptions are also possible. Stray finds and graves also correlate with the distribution of demanding plants, indicating good conditions for cultivation (Lukkala 1919, Map 11).

The association with arable land is also em-

[14] Cremation cemeteries indicating permanent settlement have been found in Asikkala and Padasjoki. Because the finds consisted solely of bone and pot sherds, they cannot be dated and had to be excluded from the diagram. Also the large number of stray finds in these localities suggests permanent settlement.

[15] An example is the Jousimatka find site (No. 7), mentioned in connection with the Kuhmoinen finds, where the adjoining clayey soils are not shown in the 1:1,000,000 map, but are marked in the 1:100,000 map. Other examples are the offering stone at Herrasmanni at Ahtiala in Hollola (Lahti) and the Ylä-Kokkola grave find with adjoining areas of clayey soils shown only in the 1:100,000 map.

[16] The 1:1,000,000 map shows an area of clayey soil at the site of the Niemelä grave find in Heinola, but the available 1:100,000 map (3112 Heinola) indicates silt. The marking of silt as clay in a soil map of the whole country is understandable, but this principle has not been followed consistently. On the western shore of Lake Huhdasjärvi (place-name indicating slash-and-burn farming) in Jaala, opposite to the Pukkisaari grave find, clayey soils are marked in the 1:1,000,000 map, while the 1:100,000 map shows gravel and sand in this location. According to this map there is silt along the lake shore, but it is not shown as clayey soil, but as moraine. The nearest areas of clayey soil on the 1:100,000 map, a few kilometres northeast, are not shown at all on the map of the whole country.

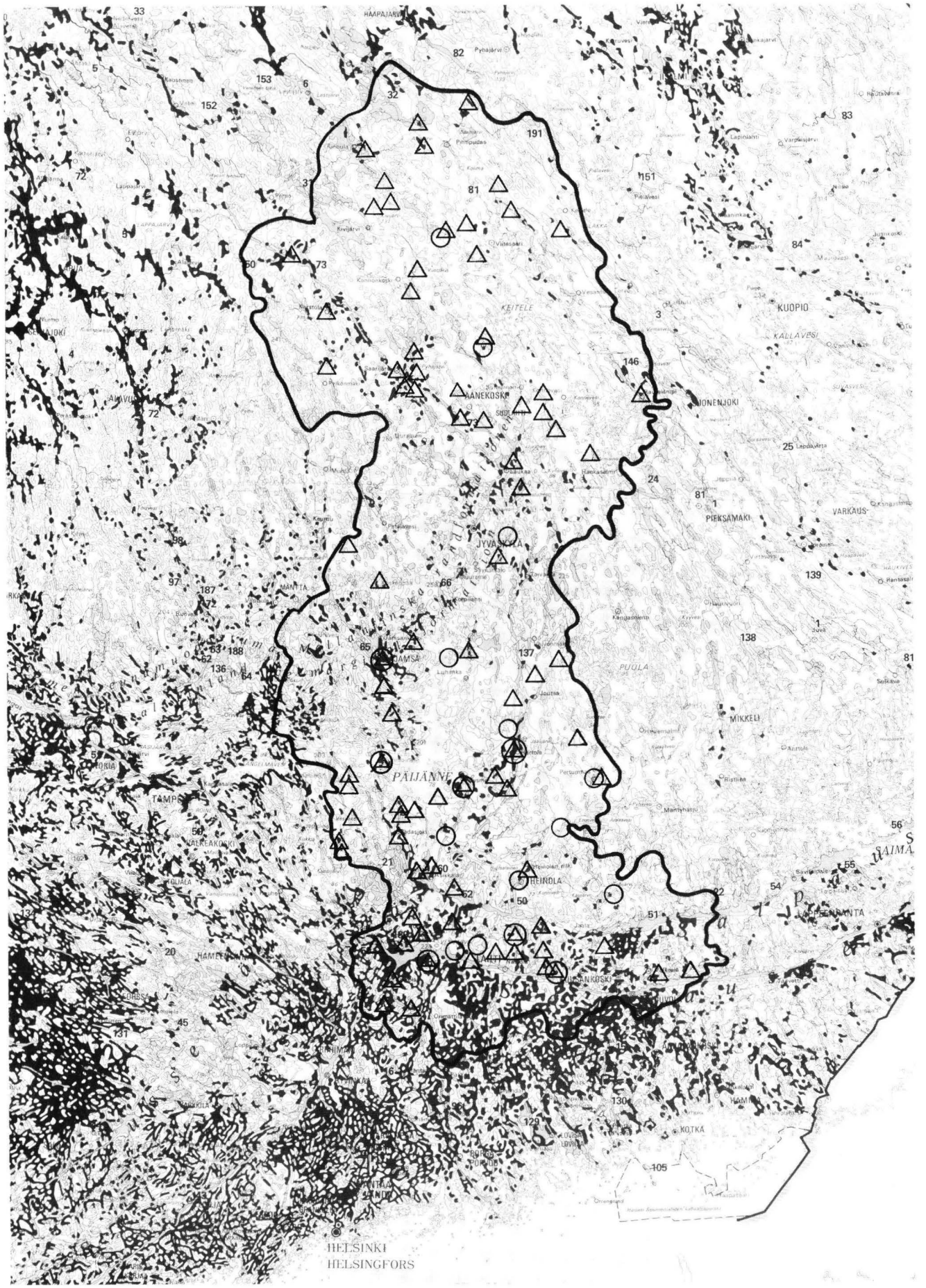

Fig. 25. Areas of clayey soils and finds from Päijät-Häme. Cemeteries marked with circles, stray finds with triangles and areas of clayey soils are marked in black.

phasized by the locations of the finds. Although there is insufficient information concerning many of the finds, most of them are from fields, which in turn is natural because of the way in which farming practices disturb the soil. But there is also information of a more varied nature. A curved-back Finnish-Russian axe (NM 2218:173) from Hänniahtianmaa in Alho, Jämsä was found in the ploughing of a burn-cleared plot, and a fire-striking stone (NM 2218:164) from Mäkelä in Ruotslahti, Korpilahti was found in an outlying burn-cleared plot. These finds are in a clear connection with far-off burn-beating plots and in this respect the large number of fire-striking implements and working axes from the wilderness areas is by no means a chance occurrence. These tools and implements played a major role in the rituals of magic related to slash-and-burn farming (Rantasalo 1912 1–7) and some of them are without doubt offerings deliberately left at burn-cleared plots. Meinander (1950 134–136) suggests this interpretation for the distribution of oval fire-striking stones in Southern Ostrobothnia (see p. 50–51).

In Päijät-Häme there are 36 locations of cup-marked or offering stones, large rocks or outcrops of bedrock into which small, shallow depressions of round form have been made. They are difficult to date precisely, but Aarne Äyräpää has pointed out that approximately a third of them are either in or near Iron Age cemeteries. He also mentions that even more often they are to be found in or near plots of arable land, as is the case in Sweden from where the custom is assumed to have spread to Finland. The distribution and locations of cup-marked stones has suggested an Iron Age dating for them in the settled areas of Southwest Finland. For the same reason, similar stones in Savo and Northern Karelia, far from known sites of prehistoric settlement, have been dated to historically documented times (Äyräpää 1942 180–182, 188). A cup-marked stone has been found in Tornio, outside the area of Iron Age settlement, at an elevation above sea level which precludes the possibility that it was made in prehistoric times. It can also be asked, whether all of the cup-marked stones found in the area of West Finnish Iron Age settlement are necessarily of prehistoric date.

There is also oral tradition suggesting the late use of cup-marked stones. Jouko Hautala (1960 97) observes, however, that this material is limited and in most cases it has disappeared completely from both the settled areas and from the peripheries of Savo and Northern Karelia. Various explanations regarding the purpose of the stones have been given, mainly on the basis of fragments of tradition and to a great degree because of their locations. In addition to the worship of the dead, they have also been linked to fertility rites. The first of all produce was offered to the stones, e.g. grain, offal, wool and the first milk after calving. The stones were also used for healing purposes (Äyräpää 1942; Hautala 1960 & 1965).

In Päijät-Häme the cup-marked stones display an unusual distribution. They have been found in Koski (2), Hollola (Lahti; 1), Iitti (2), Heinola (1), Sysmä (24) and Hartola (6). Although the majority of the stones are from the vicinity of cemeteries and areas settled in the Iron Age and the 1560s and are at the same elevations as the cemeteries and the stray finds, they did not occur – contrary to expectations – in the vicinity of the cemeteries and old arable areas of Nastola, Asikkala,[17] Padasjoki, Kuhmoinen or Jämsä. The reason for this may be only an apparent one; there may not have been any systematic searches for such stones (see Taavitsainen 1988 222–223).

The cup-marked stones at Kukkuramäki in the rural commune of Heinola and at Nuoramoinen in Sysmä are in exceptional locations. The former is far from Iron Age settlement, but in the midst of an area inhabited in the 1560s, while the latter is far from both Iron Age settlement[18] and settlement of the 1560s. Also a cup-marked stone at Perheniemi in Iitti can be described as being distant from local Iron Age settlement, despite the find of an oval fire-striking stone in the same area. The cup-marked stone at Kukkaromäki in Heinola is also anomalous because of its exceptional elevation (106–107 metres a.s.l.), some 20 metres higher than the cemetery and stray finds of the locality. It is not on clayey soil. According to the local soil map (3112 Heinola) the site is on moraine, while the top of the hill (125 metres a.s.l.) is bedrock and the lower areas are of silt. The top of the hill is close to the lower limit of the supra-aquatic area (c. 125 metres a.s.l. in Heinola). Cup-marked stones at high elevations are also known from areas permanently settled in the Iron Age. The cup-marked stone at Varjola in Iitti (elevation 106 metres) is 20 metres above the nearest cemeteries and stray finds of the locality. In Iitti the limit of the supra-aquatic area is c. 145 metres a.s.l. The cup-marked stone on Herrasmanni hill in Ahtiala in Lahti is at a considerably high elevation (121.5 metres a.s.l.). It is on moraine at a location close to the supra-aquatic limit (150 metres a.s.l. in the region of Lahti) with clayey soils at lower points. However,

[17] An uncertain cup-marked stone is known from Kuoppamäki hill (elevation 167.5 metres) at Viitaila in Asikkala. There are three depressions on the surface of the stone, which were originally in better condition, but have become worn and eroded because of fire. The stone was locally known as "the witch stone".

[18] There is a low mound in a pasture near the Koskuenmäki site in Nuoramoinen, from which a pot sherd has been found. The mound has been classed as an Iron Age grave cairn.

there is no marked difference of elevation with the nearest cemetery-type site (2 km distant) which is on sandy soil (Ylä-Kokkola, Ahtiala 118–119). At lower elevations the sandy soil is followed by clayey soils. It appears that there were fields at some distance from settlements, both in low-lying clayey locations as well as on high hills and hills near settlements. The latter are suitable, slightly leached slash-and-burn locations, near the supra-aquatic areas.

It is of course possible that both the outlying cup-marked stones and those at high elevations are from historically documented times. With the exception of the Nuoramoinen stone, they are associated with areas permanently settled in the 1560s. On the other hand, a prehistoric dating is not out of the question. If cup-marked stones were for some reason needed on the fields of the fertile low-lying areas, why should they not also occur in the slash-and-burn plots of the outlying areas, if such had been in use in the Iron Age? It appears that the underlying need was to ensure success in farming also in the latter type of environment. How else could they have been made in a way similar to that practised at the home fields. In view of the working hypothesis, it is natural to link the cup-marked stones of anomalous distribution with the slash-and-burn plots of the outlying wilderness areas. With respect to the plots in hilly terrain, this view is in conflict with the idea that the so-called **huuhta** burn-clearing method was a later development, especially suited to the clearing of hills with their stands of conifers. Kustaa Vilkuna (1948 103) suggests that this practice and burn-beating rye spread from the east into Savo along with the Karelians in the 12th and 13th centuries. Vilkuna points out, however, that it has been suggested that the burn-clearing of plots in coniferous forest was the most primitive form of slash-and-burn cultivation.

4.4.2. History of farming and cultivation in the Päijät-Häme region with reference to pollen analyses

Pollen diagrams are unique and individual cases and a function, above all, of their environment but also of the method employed. Furthermore, they entail an innumerable number of factors and variables which cannot all be taken into account. Accordingly, direct comparisons of pollen diagrams are never completely possible. Despite this, a comparison will be attempted, keeping in mind the most common sources of error, as discussed above. The presented datings are accepted as such, although lake sediment datings tend to be too old. With the exception of sediments from Lake Iidesjärvi in Tampere (Alhonen 1981 105), the datings are not questioned.

The available material consists of the above-mentioned Kuhmoinen diagrams as well as seven other diagrams relating to prehistoric cultivation. With respect to the Päijät-Häme region, the material is almost the same as that presented by J. Donner (1984).[19] The sampling sites are mostly in the southern parts of the area, where archaeological remains indicate signs of permanent settlement in late prehistoric times. Unfortunately, no pollen analyses have yet been published concerning the northern parts of the area.

Table 6 shows the Cerealia limits and their datings defined on the basis of information from M. Tolonen, I. Vuorela and J. Donner.

The pollen diagrams indicate isolated signs of cultivation already in the Bronze Age and in the Pre-Roman Iron Age. In only one case (Lake Työtjärvi in Hollola),[20] the curve is empiric from the Bronze age onwards. Usually the uniform empiric Cerealia curve begins in the Iron Age. In comparing the diagrams with the numbers of finds in the sampling localities, it can be seen that cemeteries and numerous stray finds, indicating established settlement, fall into the stage where the absolute curve becomes empiric or where the empiric curve displays its first marked bend. With the exception of the diagram for Lake Asilampi in Kuhmoinen, this increase of pollen cannot yet be defined as rational. In places where samples were taken from near the best arable areas and also from outlying parts, less suitable for cultivation (Lakes Työtjärvi in Hollola, Joutjärvi in Lahti, Taruslampi in Sysmä and Kaakotinlampi in Sysmä) it can be seen that in the outlying areas the empiric curve begins at a later date than in the central areas. In the outlying areas this begins not long after the archaeological material begins to indicate permanent settlement. The interval grows with the distance from the best arable lands.

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[19] The diagram for Lake Alasenjärvi in Lahti, belonging to Donner's survey (I. Vuorela 1978) is not discussed. In connection with excavations in the region in the 1980s a new sample was obtained from a deeper part of the lake. The previous sample was from a cove of the lake near the shore. Studies concerning this sediment are still in progress, and preliminary results suggest that there are certain unclear points in both the sedimentation and the dating of the sample (M. Tolonen, oral comm.).

[20] The early date of the empiric curve for Lake Työtjärvi is an exception. The site is near fertile areas of clayey soil which are numerous in the overall region. The size of the sampled lake and its elevation provide for a stronger reflection of regional pollen in the record than would normally be the case. It must also be pointed out that in the counted levels of the unvarved bottom sediment possible small interruptions cannot be observed.

Table 6. Cerealia-limits of pollen analyses from the Päijät-Häme region. Shown in the table are a number of variables which are of importance in evaluating the limits. Varved lakes marked in italics.

	Cerealia-limits			Age of the sample (moving average)	In the middle of a field or at its sides	In forest near habitation (< 2 km)	In forest isolated from habitation (> 2 km)	Area of permanent settlement (p) / Outlying area (o)	Lake (l) / Bog (b)	Size of the sampling location in hectares	Regional (r) and/or local pollen (l)	Sampling interval / cm	Number of counted pollen
	absolute	empiric	rational										
1. *Ahvenainen, Koski*[1] (M. Tolonen 1978bcd; Siiriäinen 1982)	c. 1400 BC	c. 700 AD	c. 1350 AD			x		p	l	7,8	l+r	1–2	400–1000
2. Asilammi, Kuhmoinen	c. 1350–1200 BC	300–500 AD	800–1000 AD		x			p	l	7	l+r	1–10	500–1300
3. Työtjärvi, Hollola (Donner et al. 1978, I. Vuorela 1982)	–	2950±150 BP (Hel–849) 1390 (1168) 960 cal BC	–	550		x		p	l	c. 140	r+l	5	1000
4. Kaakotinlampi, Sysmä[2] (I. Vuorela 1981)	Bronze/Iron Age	1270±130 BP (Hel–1211) 630 (756) 900 cal AD	–	800		x		o	l	c. 2	l+r	5	1000
5. Joutjärvi, Lahti (I. Vuorela 1978; 1982)	End of Pre-Roman Iron Age	1025±90 BP (St–6338) 926 (991) 1100 cal AD	c. 1500 AD	200			x	o	l	30	l+r	5	1000
6. Linnajärvi/Linnasuo, Kuhmoinen	c. 100 BC	400–500 AD	c. 1700 AD				x	o	l/b	9+2,5	l+r	1–10	500–1300
7. Haukkasuo, Valkeala[3] (K. Tolonen & Ruuhijärvi 1976)	End of Bronze Age	1670±140 BP (Hel–51) 220 (391) 540 cal AD	–	20			x	o	b	1000	r	2	350
8. Taruslampi, Sysmä (I. Vuorela 1981)	–	1360±120 BP (Hel–1209) 580 (654) 770 cal AD	Historical period	125	x			p	l	c. 2	l+r	5	1000

[1] The bottom sediment from Ahvenainen in Koski displays annual laminations. The profile contains short interruptions, which would not be otherwise observed in ordinary analyses of sediments or turf but would be masked by the uniform empiric curve. These are not taken into account in defining the empiric limits.

[2] The first absolute occurrence is of Avena, which is difficult to distinguish from Poaceae pollen.

[3] The curve for the Haukkasuo Bog is not strictly speaking empiric, as it is broken off in historically documented times. From cal AD 391 onwards it is, however, uniform up to historically documented times. Later interruptions may be the result of changes in agriculture or the introduction of new cereals pollenating in a different way.

4.4.3. Medieval settlement in Päijät-Häme and the problem of continuity

Although it is not possible to survey the Medieval settlement history of the Päijät-Häme region, it is nonetheless highly similar to the course of development in Kuhmoinen. There is an interval with no available source material between the latest artefact finds and the earliest written sources. If we assume, however, that the settlement of the 1560s corresponds to the Medieval situation, a clear topographic link can be seen between Iron Age finds and the settlements of the 1560s – with a few exceptions. Some of these exceptions are near areas of permanent and continuous settlement and they can be regarded as the normal reflection of such a locality into its environs.[21]

[21] Sysmä is an example of such an area. Find locations at a distance of over 5 km from sites inhabited in the 1560s (SAK 1973) are defined as outlying with respect to settlement. Outside the areas of active settlement the following finds are defined as outlying: grave find (NM 23200:1–7), Niemelä, rural commune of Heinola; arrowhead (NM 21261), Kurkela, Joutsa; grave find (NM 21262:1–26), Siilinranta, rural commune of Jyväskylä; E-type spearhead (NM 2942:2), Kärsäsaari, Kivijärvi; grave find (NM 15658:1–3, NM 16824:1–2), Taikinaisniemi, Korpilahti; spearhead of East Baltic type (Vaasa Museum 770), Lintulahti, Kyyjärvi; oval fire-striking stone (NM 9771:2), Suonenjoki, Padasjoki; oval fire-striking stone (NM 2929:170), Siekkilä, Pihtipudas; oval fire-striking stone (NM 3354:82), Siistola, Pihtipudas; penannular brooch and bracelet (NM 2929:201–202), Vorpaniemi, Pihtipudas; hoard (NM 2893:1–8), Multapakka, Pylkönmäki; penannular brooch (NM 14066), Kekkilänlahti, Saarijärvi; bracelet (NM 19647), Mantere, Sysmä.

4.4.4. Summary of settlement history in the Päijät-Häme region

The diagram presenting the finds from the Päijät-Häme region is similar in form to that for Kuhmoinen. The similarity is present in spite of the fact that the comparisons entail rural communes and built-up areas, areas surveyed in different ways as well as unsurveyed areas. This suggests the influence of similar formation processes. The pattern for Päijät-Häme displays limited, but nonetheless recurrent, use of the area before the Viking Period. The Viking Period shows a clear structural change in the numbers and composition of the finds. In the Crusade Period the number of finds decreases and the cultural ties and contacts of the region change with eastern artefacts appearing alongside western ones.

Throughout the Iron Age there is a clear association between finds, areas of clayey soil and routes of communication. The clayey areas are often at the ends of lake coves and bays. Acccording to Solantie (1988 11), the valleys of the larger lakes (Päijänne, Saimaa, Ladoga) were areas with the smallest climatic risks for farming. Before the onset of permanent settlement, the pollen record shows signs of sporadic cultivation with an increase of pollen together with established settlements. In the Crusade Period pollen data is no longer in agreement with the numbers of finds. There are no indications of diminishing cultivation in the last prehistoric period. The stray finds and burial finds display topographic associations with the settlements of the 1560s.

With respect to the working hypothesis outlined above, it is important to note that the pattern displayed by the pollen analyses concerning Kuhmoinen, as also the artefactual and soil patterns, represent in miniature conditions prevailing throughout the region of Päijät-Häme. Absolute and/or empiric occurrence of cereal pollen can be observed in all cases prior to archaeological evidence of permanent settlement. Because of the inadequacies of the method, the empiric curve is not necessarily empiric in all cases. Although most of the pollen material is from unvarved lake sediments, with their problem of possibly older dates, the chronological skewedness need not change the overall picture. If inwash causes disturbances in lake sediments, e.g. by transporting old particles of charcoal, could it not also redeposit old pollen and disturb e.g. the Cerealia curve? This is possible, but it is usually regarded as non-problematic, for the pollen is redeposited in younger layers and only continuity is obscured (M. Tolonen, oral. comm.). The Kuhmoinen pattern also displays early slash-and-burn farming far from centres of settlement in other areas than those of clayey soil. This is indicated by some of the "anomalous" cup-marked stones in Päijät-Häme and the diagram for Haukkasuo Bog in Valkeala. The pollen at Haukkasuo is regional, however, but even regional pollen is not necessarily associated with permanent settlement. Lake Joutjärvi in Lahti, reflecting local cereal pollen, is somewhat closer to centres of settlement, but not in connection with arable areas.

If the utilisation of wilderness resources included slash-and-burn farming, would it not have been detrimental to hunting, which is regarded as the main component of this phenomenon? Historical data on slash-and-burn farmers and settlers in Savo indicate a rapid disruption of conditions amenable to a hunter-fisher economy (Tegengren 1952).

The pollen diagrams for the outlying areas indicate the small extent of prehistoric slash-and-burn farming.

The structure and composition of the forested areas are the main factors controlling game stocks. Young forests in a natural state and at the beginning of their cycle of development, which are dominated by pioneer species such as birch, aspen and willows, are the main feeding environments of most of Finland's game species (elk, hare, willow grouse, hazelhen and black grouse; Seiskari 1958). With the exception of fox and ermine which feed on small rodents, this environment is not suitable to furry animals.

Present-day game conservation aims at providing a varied natural environment for game. Slash-and-burn farming had precisely this effect by increasing the proportion of deciduous forest and thus creating greater variety in the environment and better conditions for game (on the re-forestation of burn-cleared plots see Heikinheimo 1915). The various stages of swidden agriculture ensured a varied supply of nutrition, especially where burn-cleared plots of different stages of the process were close to each other. Pollen results indicate the possibility of such a situation in the wilderness regions of Päijät-Häme. The hunting and trapping routes[22] with their burn-cleared areas of different age provided excellent hunting sites of varied character. Also burn-cleared plots under cultivation provided hunters with game, for example black grouse can learn to come onto cultivated fields in a short time. The fields were accordingly good sites for passive means of hunting such as traps.

The suitable effect on game of burn-cleared plots of different age is part of the empirical knowledge of game of the farmer. Since it was understood that hunting benefited from burn-clearing, the latter practice was undertaken in the wilderness regions, especially as a good crop could be obtained at the

[22] The routes (Fi. *virkatie*) were often dozens of kilometres long with hundreds of traps.

same expense of labour. Among historic aborigines preparing pasture for wild game has been widely reported (Stewart 1956).[23]

4.5. Settlement history in other wilderness regions of Finland

Stray finds, hoards and cemeteries. To the east of Päijät-Häme are the regions of Savo[24] and Karelia which were permanently settled at a late date and with which the history of colonisation and settlement in Päijät-Häme must be compared (on the Iron Age settlement of Eastern Finland, see Huurre 1984). The diagrams for stray finds and cemetery material from these areas are highly similar to those from the Päijät-Häme region (Figs. 26 and 27).

The stray find diagrams for Savo and Karelia show that there was activity in the area with relatively even utilisation before the Viking Period. The Merovingian period can be seen as a small peak in both diagrams and it is somewhat more distinct in the case of Karelia.[25] The Viking Period displays dramatic changes. In both Savo and Karelia the number of finds grows over five-fold in comparison with the preceding period. At the same time the composition of the artefact material changes, due to the introduction of personal ornaments, hitherto lacking in the material (over half of the personal ornaments are those of women). The first cemeteries appear in Savo in the Viking Period. With the exception of sporadic burial finds of earlier date, cemeteries are introduced into Karelia also around this time. Their number is seven-fold compared to the Merovingian Period. Burial customs are the same as in Western Finland. Savo and Karelia display a number of chronological differences within the Viking

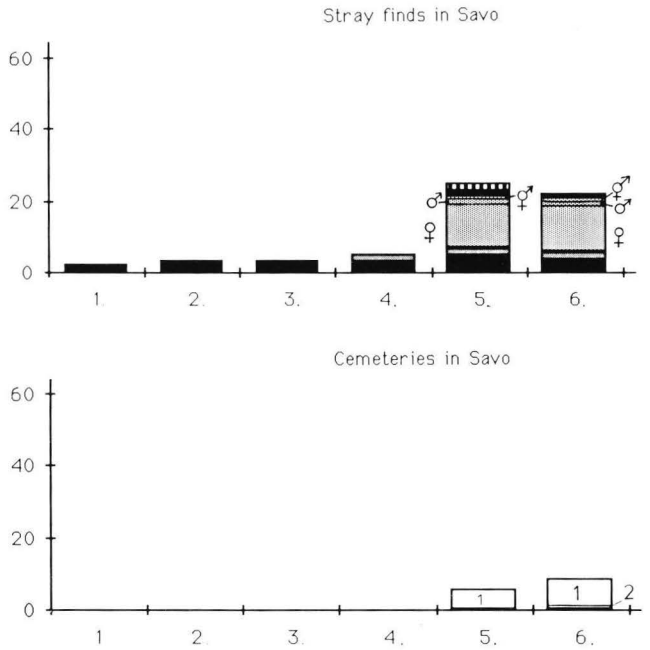

Fig. 26. Quantitative development of stray and hoard finds and cemetery and burial finds in Savo. Key to symbols in Fig. 20.

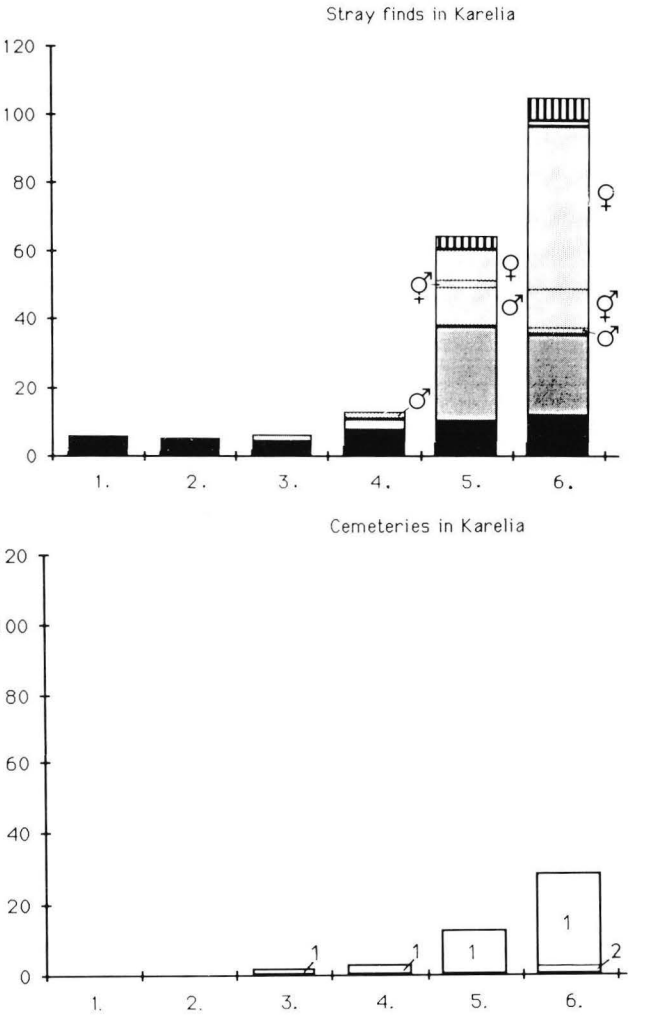

Fig. 27. Quantitative development of stray and hoard finds and cemetery and burial finds in Karelia. Key to symbols in Fig. 20.

[23] In this connection it is interesting to note a later example of a symbiotic relationship between slash-and-burn farming and another means of livelihood. J. Juhani Kortesalmi (1969 289–291, 294) has shown how in the reindeer-herding regions, at least in Kuusamo, a unique and practical combination of reindeer feeding and slash-and-burn cultivation developed so that two important economic practices could be served by the same felling and clearing of an area. Lichened timber was first felled for reindeer to feed on, and later the area was burned over.

[24] In this connection the term Savo refers to the historical province of Savo, including the environs of Lappeenranta. This area corresponds by and large to the ethnographic tradition areas of Northern and Southern Savo (SKK 1976 16–17). Thus, the research area covers the southern regions of Lake Saimaa and the central and southeastern parts of the so-called Lake District of Finland, mainly along the Vuoksi River system, but also in the catchment of the Kymijoki River system (Granö 1932 81–82). It must be pointed out, however, that the province was not limited to a single water system, nor does it cover the whole of the Vuoksi system.

[25] The reason for this is the same as in the case of Kuhmoinen and Päijät-Häme – finds from the transition from the Merovingian Period to the Viking Period.

Period. The diagram for Karelia shows a relatively higher increase during the Merovingian Period than in Savo, which implies increased activity in the beginning of the Viking Period. The phases following this stage are represented evenly (see e.g. Saksa 1985 39–40), except possibly the 10th century. The situation in Savo was somewhat different with a larger number of stray finds and graves at the end of the Viking Period (Taavitsainen 1988). The Karelian finds of the Viking Period resemble the Päijät-Häme pattern more than that of Savo.

Up to the Crusade Period the diagrams for Savo and Karelia were almost identical also with respect to the Päijät-Häme region. A number of changes occurred again in the Crusade Period with clear differences in the diagrams. In Savo the number of stray finds decreases, which is also the case in the regions to the west. This drop is even more distinct when the stray finds from permanently settled areas are excluded. With respect to the cemeteries, however, the course of development is completely opposite with a distinct rise in number. At the same time, their area shrinks to cover only the regions of Mikkeli and Lappeenranta. In Karelia, on the other hand, both stray finds and cemeteries increase in number. This cannot be explained solely with reference to the longer period and/or the survival or pagan burial customs. The course of development is clearly different from that in Savo or Päijät-Häme.

Also of significance are changes in cultural contacts and ties as indicated by the archaeological record. Previously the finds consisted of artefact types common in the permanently settled areas of Western Finland or of overall North European or West Finnish distribution. In some cases the areas of distribution were limited to Häme. In Karelia ornaments of Scandinavian type are slightly more numerous and the brooches and bracelets include types generally found in Western Finland but also along the southeastern shores of Lake Ladoga.[26]

In the Crusade Period the material culture of Karelia develops a singular character, distinct from that of the neighbouring regions. This new cultural sphere extended its influence into Päijät-Häme and was clearly reflected in the material from Savo where eastern or Karelian artefact forms predominated. There are still artefact types common to all of the settled areas, but the stray finds include only one Crusade Period artefact of West Finnish type (a penannular brooch from Joutseno). The mound cemetery of western type at Kyyhkylä in Mikkeli, dating back to the preceding period, still remained in use, but the artefacts are predominantly of Karelian type. This was also the case at the later cremation cemetery of Latomäki in Moisio. The new Crusade Period cemeteries can be regarded as Karelian in character, although the burial customs display certain minor differences. For example, the log frameworks, wire hair-pieces, shears and sickles found in Karelian graves are missing (Kivikoski 1961 270; P. Sarvas 1969 29).

Archaeological finds, routes of communication and clayey soils. The finds from Savo are mainly from routes of communication, as indicated by later timber-floating routes (Seppänen 1937). The finds also display clear associations with arable areas indicated by demanding plant species (Lukkala 1919). Stray finds and areas of clayey soil display correlations, although not as clearly as in the Päijät-Häme region. Areas of clayey soil are less common in Savo and they are mostly small. For this reason, some of them are not shown in the 1:1,000,000 soil map. On the other hand, cemeteries display a much clearer association with clayey soils. In Mikkeli local settlement formed near areas of clayey soil.[27] Permanent settlement as indicated by the cemeteries of Mikkeli and Lappeenranta appears to have formed on isthmuses near the termini of water routes with easy access to other routes and bodies of water (Taavitsainen 1988 220). Roads and winter routes also pass by these regions (Huurre 1984 314). Because of the lack of modern maps, similar investigations have not been undertaken in the case of Karelia. A glance at the distribution map of demanding plant species shows that also in Karelia settlements formed in fertile areas adjacent to bodies of water. Demanding plant species and clayey soils display distinct correlations. Detailed information is available from the region of Sortavala in Karelia. Erkki Kanervo (1937 24–25) has shown that Iron Age settlement in the area was below the shoreline elevation of the Litorina Sea and was concentrated in or near clayey areas on shores that had recently risen from the water.

Most of the finds are from fields, but there are also cases where the cultivated areas were far from any settlements. The material from Savo includes a number of working axes and a strike-a-light which were reported as having been found from fields or burn-cleared plots in uninhabited areas. These finds may have been implements left at clearing sites. It is

[26] Exceptions are Late Viking Period encolpion bracelets found in Lemi and Taipalsaari in Savo as well as in Karelia and along the southeastern shores of Lake Ladoga. The distribution of the studded brooches covers the above areas as well as Häme. These finds are indications of increased activity from the east.

[27] According to the 1:1,000,000 soil map the Mammonniemi and Vammonniemi cemeteries at Taipalsaari are on clayey soil. According to the same map, Haminalahti in Kuopio and Kappelinmäki in Lappee are not. Soil maps drawn to 1:100,000 scale (3133 & 4111 Ylämaa and 3242 Kuopio) show that the Kappelinmäki site adjoins an area of silt and Haminalahti is at the edge of an area of clayey soil.

hard to determine whether the sites were burn-cleared plots on clayey soil with deciduous trees or other fertile areas, as the locations or even the village in question are not known. The only exception is a Viking Period (West Finnish) working axe found in a burn-cleared plot at Marjamäki in Suojärvi in Nilsiä. The location is supra-aquatic.

Cup-marked stones. Offering stones of uncertain age have also been found in Savo and in Karelia (Hautala 1960 and 1965; Simola et al. 1984). Compared to the settled areas their distribution is exceptional. Most of them are on the island of Kerimäki and its near vicinity, but there are also cup-marked stones at Kangasniemi. In recent years, surveys have also revealed cup-marked stones in Pieksämäki. These examples show that in the future their known area of distribution will be larger than at present.

Cup-marked stones are at some distance from settlements, mainly in the supra-aquatic parts of high hills. Also in Karelia cup-marked stones occur not only in their common locations near cemeteries and fields, but also at Kesälahti near the island of Kerimäki. As there are no prehistoric finds from their immediate vicinity, they have been dated to historically documented times.

Pollen data. A pollen sample from Lake Suurjärvi in Kerimäki, near one of the many sites of cup-marked stones in the locality, shows the first cereal pollen and signs of slash-and-burn cultivation at 590 AD. The dating is based on varve chronology. This stage appears to have ended around 700 AD and the next signs of cultivation are from the 12th century, after which cereal pollen occurs only sporadically. Intensive farming is introduced in the mid-16th century (Simola et al. 1988). Although the earliest signs of cultivation cannot be directly linked with the cup-marked stones in Kerimäki, they provide certain indications of the early dating of these stones.

At present, pollen diagrams of varved lake sediments are available only from Southern Savo. The results of these studies are presented in summarized form in Table 7. The analyses show absolute indications of cultivation from the end of the Migration Period. Prior to the 14th century, the curve becomes empiric only at Lake Mustikkalampi in Sulkava (1100 AD) and at Kattilanlahti in Mikkeli (1280 AD). Elsewhere the change occurs at the end of the Middle Ages, at which stage settlers are known to have moved into the area.

With the exception of Mikkeli, there is no archaeological evidence of permanent settlement in the vicinities of the sampling sites. Contrary to expec-

Table 7. Main events of cultivation history in Savo according to varve dating of studied profiles (Simola et al. 1988). Cerealia = earliest definite occurrence of cereals (barley or wheat); Secale = earliest occurrence of rye; continuous cultivation = beginning of the continuous cereal pollen curve [the "empirical limit" of Donner (1984)]; expansion = marked increase of cereal pollen and extensive changes in vegetation ("rational limit"). All dates AD.

	Site	Cerealia	Secale	Continuous cultivation	Expansion
1.	Tervalampi Punkaharju	940	1260	1560	1700
2.	Suurijärvi Kerimäki/Savonlinna	590	1270	1500	1650
3.	Puutienlampi Enonkoski	1480	1780	1780	(1800)
4.	Pytärälampi Heinävesi	1320	1420	1650	1800
5.	Pakarinlampi Heinävesi	1400	1520	1520	1800
6.	Mustikkalampi Sulkava	1100	580	1100	1810
7.	Sotkulampi Juva	780	1300	1400	1500
8.	Kattilanlahti Mikkeli	1100	1120	1280	1600
9.	Kirvesjärvi Pieksämäki	1650	700	1650	1860
10.	Vuorijärvi Joroinen	1300	1550	1550	(1610)

tations, the diagram for Kattilanlahti in Mikkeli is exceptional. Whereas the other diagrams repeat the pattern of Päijät-Häme, according to which archaeological or written evidence of permanent settlement is preceded by sporadic cultivation or a thin empiric curve, the earliest evidence of farming at Kattilanlahti are several centuries younger than the oldest indications of permanent settlement in the locality. The site, however, is not in a peripheral location and Kattilanlahti is of central importance for the prehistory of the Mikkeli region. The Viking and Crusade Period cemeteries of Moisio, Tuukkala and Kyyhkylä are only 2–4 km south of Kattilanlahti and Visulahti, a major cemetery site, is c. 5 km to the northeast. Simola et al. (1988 22–23) point out, however, that the immediate vicinity of the site is barren ridge and bedrock terrain with few opportunities for farming. The local topography appears to have served as a filter for pollen. The structure of the sediment is also so irregular in places that a continuous varve count could not be undertaken. For these reasons, the age of the cultural phase in question remains uncertain and the estimate is a conservative one, preferably too young than too old.

Thus far, only a single pollen diagram with prehistoric cereal pollen concerning Karelia has been published. The sample is from Koiralamminsuo Bog at Oravilahti in Rääkkylä, the find location of the so-called Rääkkylä boat (I. Vuorela 1988; Naskali 1979). The earliest signs of cultivation were radiocarbon-dated to cal AD 1040 (1221) 1270 (Hel-1586). The occurrence of cereal pollen is, however, interrupted at a late stage in historically documented times and begins again at the very top of the diagram. There is no evidence of permanent Iron Age settlement from Rääkkylä and historical sources date the settlement and colonisation of the area to the 16th century (Saloheimo 1988).

Northern Finland was also wilderness with a situation similar to Savo and Karelia. According Matti Huurre, there are 51 finds (8) dating to before the year 800 AD and 182 finds (32) from 800 to 1300 AD. The numbers in parentheses indicate uncertain finds (Huurre 1983 328). In the northern regions Viking Period developments are similar to those in the southern wilderness zones with an increase in the numbers of artefact finds and changes brought about by the introduction of personal ornaments. In Northern Finland the artefacts originate from a larger area than in the south with areas of origin in Sweden, Norway, Southern Finland and Russia. In the mid-10th century Norwegian material appears to go out of use. The latter part of the Viking Period is more predominant and especially the West Finnish material of this phase (Huurre 1983 324–386). In the Crusade Period artefacts and objects from Savo-Karelia appear in the archaeological record. There are no published pollen diagrams indicating cereal pollen from these regions.

Archaeological finds and the settlements of the 1560s. Also in Savo, stray finds and the settlements of the 1560s correlate topographically. As there is no map of early historic settlement in Karelia, the situation there cannot be reviewed.

4.6. History of settlement in Satakunta and the Lake Vanaja region of Häme.

The settlement history of Päijät-Häme must also be compared with the nearest permanently settled areas – the province of Satakunta and the Lake Vanaja region of Häme. The distribution of a number of Late Viking Period finds in Päijät-Häme indicates these areas as points of origin.

The first cemeteries appear in Satakunta in the Early Roman Iron Age and their number approximately trebled up to the Merovingian Period. At the same the number of cemeteries in long-term use increased continuously. Because of the relatively small number of artefact finds from graves, the main period of change was in the Migration Period with 3.6 -fold increase over the preceding period. Changes also occurred in the Viking Period when the number of finds began to drop and continued to do so in the Crusade Period (Fig. 28).

The diagram for the Lake Vanaja region repeats the events observed in Satakunta with a small time-lag (Fig. 29). The cemeteries appeared at a slightly late date, in the Late Roman Iron Age, but the major change (a four-fold increase in the number of graves) occurred simultaneously in the Migration Period. Subsequently, the number of graves – and the number of long-term cemeteries – increased in "jumps", culminating in the Viking Period, which was the peak for settlement in the Lake Vanaja region. The decrease, in turn, begins slightly later than in Satakunta.

The diagrams for the permanently settled areas display a different course of development than in the wilderness regions.

In the wilderness region diagrams of stray finds indicate a similar development as in the case of graves, whereby a considerable increase in the number of graves coincides with an increase in the number of stray finds. This is not the case in the diagrams for Satakunta and the central areas of Häme. In these areas the relatively largest increase in stray finds does not coincide with grave finds and the former displays a considerably more even rate of increase. In Satakunta the relatively largest increase

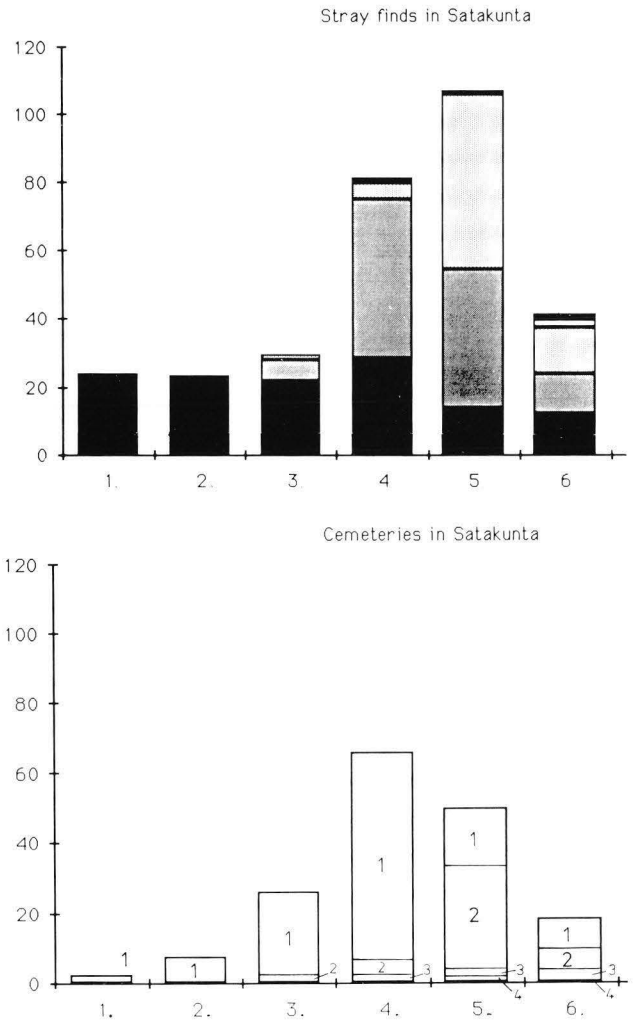

Fig. 28. Quantitative development of stray and hoard finds and cemetery and burial finds in Satakunta. Key to symbols in Fig. 20.

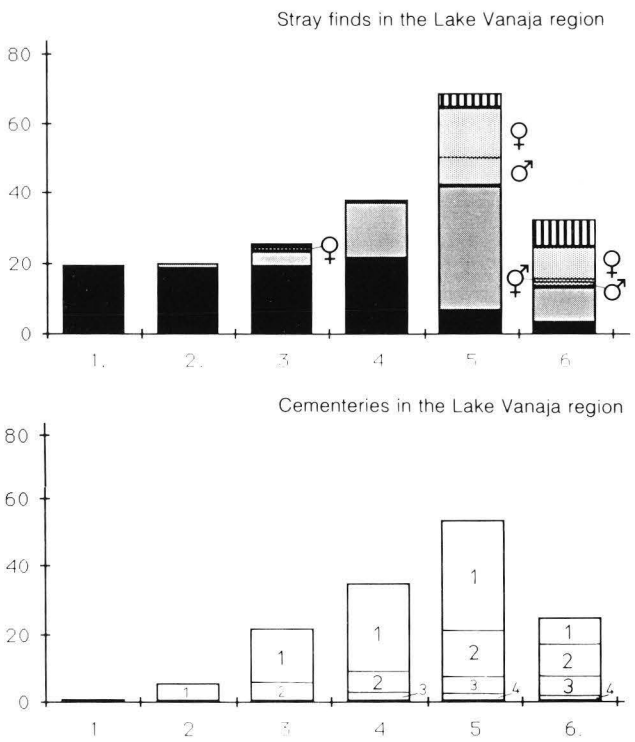

Fig. 29. Quantitative development of stray and hoard finds and cemetery and burial finds in the Lake Vanaja region of Häme. Key to symbols in Fig. 20.

of stray finds is in the Merovingian Period, which is also the culmination point for the number of cemeteries. In relative terms, the largest increase in the number of cemeteries occurred already in the preceding period. The diagrams display a completely opposite trend in the Viking Period. In Satakunta the number of grave finds drops markedly in the Viking Period (1.3-fold in comparison with the preceding period), while stray finds increase at the same rate (1.3 x). The same situation applies in the Lake Vanaja region where the relatively largest increase of stray finds does not coincide with the relatively largest increase of grave finds. This does not even occur in the following period, as in Satakunta, but only in the Viking Period. The trend, however, is similar, insofar as settlement reaches its peak in the Lake Vanaja region at that time. On the other hand, in the Lake Vanaja region the relatively larger increase of stray finds over grave finds occurs in the Viking Period.

A closer look at the Viking Period stray finds of Satakunta shows that many of them are from localities without cemeteries or from the villages of cemetery areas without other indications of permanent settlement. Furthermore, cemeteries begin to appear in areas where none had existed previously. A similar situation existed in the Lake Vanaja region. Also the number of Viking Period stray finds increased at a relatively faster rate than that of grave finds (1.8 times vs. 1.5 times). Thus, increased activity in the Viking Period, as displayed by the diagrams for the wilderness regions can also be observed in the wilderness zones close to settled areas.

In this connection, we must also keep in mind Meinander's suggestion that in the 8th century in the Merovingian Period outlying farms gave way to village-type settlement in Southwestern Finland (Finland Proper), Satakunta and Southern Häme. If this assumption is valid, the founding of village cemeteries could be seen in the diagrams as a drop in the number of cemeteries or as a point of standstill in their increase. This may explain the drop in the number of cemeteries in Satakunta in the Viking Period. In the Lake Vanaja region the increase of cemeteries up to the Viking Period may indicate that the above phenomenon occurred slightly later in this area. The differences between the Viking Period statistics and those for the Crusade Period in the Lake Vanaja region may of course be explained in the same terms. There can also be other explanations for the phenomenon, as it reoccurs in all of the areas of comparison with the exception of Karelia.

Especially in the Lake Vanaja region the Crusade

Table 8. Cerealia-limits of pollen analyses from Satakunta and the Lake Vanaja region of Häme. Varved lakes marked in italics.

	Cerealia-limits			Age of the sample (moving average)	In the middle of a field or at its sides / In forest near habitation (< 2 km) / In forest isolated from habitation (> 2 km)	Area of permanent settlement (p) / Outlying area (o)	Lake (l) / Bog (b)	Size of the sampling location in hectares	Regional (r) and/or local pollen (l)	Sampling interval / cm	Number of counted pollen
	absolute	empiric	rational								
1. Loimansuo, Huittinen (I. Vuorela 1975; 1982; Siiriäinen 1982)	>3400±130 BP (Hel-357)[1]	>1970±100 BP (Hel-356) 100 cal BC (27 cal AD) 120 cal AD <420±140BP (Hel-355) 1400 (1453) 1640 cal AD	420±140 BP (Hel-355) 1400 (1453) 1640 cal AD	100 50 60	x	p	b	>100	r+l	5	1000
2. Iidesjärvi, Tampere (Alhonen 1981)	–	2220±130 BP (Hel-370) 420 (292) 120 cal BC	–	140	x	o	l	c. 60	r	10	150–200
3. Rudanmaa, Noormarkku[2] (Aalto et al. 1981)	–	2320±70 BP (Su-849)[3]	–		x	o	b	< 1	l	5	1000
4. *Kissalampi, Pälkäne* (M. Tolonen 1981)	1300 BC	300 BC	End of 18th century		x	p	l	4,7	l+r	1	1500
5. Kantala, Sääksmäki (M. Tolonen 1978a)	2770±100 BP (Su-585) 1040 (915) 820 cal BC	< 1710±50 BP (Hel-584) < 249 (268,273,338) 393 cal AD	Historical period	20	x	p	b	c. 20	r	5–10	200–500
6. Armijärvi, Hattula (I. Vuorela 1975)	2270±110 BP (Su-510) 470 (358) 210 cal BC	1380±100 BP (Su-509) 560 (644) 750 cal AD	Historical period	500, 450	x	p	l	10	r+l	2,5–10	500
7. *Lovojärvi, Lammi* (Huttunen 1980)	400 AD	700 AD	800 AD		x	p	l	4,8	l+r	1–10	500
8. *Taka-Killo, Lammi* (Huttunen 1980)	626 AD	1072 AD	–		x	o	l	2,8	l+r	1	?
9. Piilosuo, Janakkala (K. Tolonen & Ruuhijärvi 1976)	1110±140 BP (Hel-53) 770 (900, 902, 953) 1030 cal AD	–	–	20	x	o	b	100	r	2	1100

[1] Because the sample is from a hiatus, the dating cannot be calibrated.

[2] Macrofossils suggest that the site was a field in the Bronze Age/Iron Age, but with no indications in the pollen. This may be the reason for Meinander's (1984) dating of the absolute beginning of cultivation to 1550 BC. Meinander's empiric date for the beginning – 250 AD – appears strange in this connection.

[3] The dating cannot be calibrated, for the rate of deposition cannot be assessed on the basis of a single dating. A further difficulty is the lack of the upper part of the turf column (present-day field).

Period signified not only a drop in the number of finds, but also changes in cultural contacts and ties. Burial customs and their development are mostly the same as in the west, with the exception of the possibly archaic nature of conditions in the Lake Vanaja region, indicated by the use of mound cemeteries still in the Crusade Period (Taavitsainen 1981 82–88). Small West Finnish penannular brooches and other West Finnish and Baltic-type artefacts of common distribution were used both in Satakunta and the Lake Vanaja region. However, in the Lake Vanaja region oval tortoise brooches appear in the material with no parallels or antecedents in the material of Western Finland, not even in Satakunta. These brooches fall into a Häme group and a Savo-Karelian group, both of which have been found in the Lake Vanaja region and the area developed into a crossing-zone of eastern and western artefacts in the same way as Päijät-Häme. In addition to the oval tortoise brooches, other eastern artefacts have also been found in the Lake Vanaja region, viz. chain lengths, ear spoons and crucifixes. The brooches of the Häme and Savo-Karelian groups entail a number of chronological problems, which, together with the distribution of eastern and western artefacts, will be discussed below.

Archaeological finds, areas of clayey soil and routes of communication. In Satakunta and the central areas of Häme the clayey soils along the Kokemäenjoki River and Lake Vanaja display clear connections with Iron Age settlements. Routes of communication most probably followed these bodies of water.

Pollen analyses. Only three pollen studies have

been carried out in Satakunta, one of which is from the vicinity of an old centre of settlement (Loimasuo Bog in Huittinen; I. Vuorela 1975). Seven studies are available for the Lake Vanaja region. Table 8 shows the absolute, empiric and rational limits of Cerealia pollen. A comparison of pollen diagrams with stray and cemetery displays features similar to conditions in the east, i.e. the absolute and in some cases empiric curves precede the first signs of permanent settlement. On the basis of the datings of the Cerealia limits alone it is hard to say whether this happened earlier than in Päijät-Häme. The diagrams, however, are not in contradiction with other evidence of settlement, except in the Crusade Period. At this stage, neither the Satakunta nor the Häme curves show any correlation with the decrease in grave finds.

Archaeological finds and settlements of the 1560s. Settlement of the 1560s is clearly in the same areas as the archaeological finds and displays a distinct topographic connection.

4.6.1. Brooches of the Crusade Period

4.6.1.1. The uniform character of the West Finnish cultural sphere

"In the West Finnish area sketched out here, i.e. in Finland Proper, Satakunta and Häme, the culture remained fairly uniform. Small regional differences naturally occurred with local variants of artefacts. On the coast foreign types are naturally more common than in the inland and means of livelihood reflected environmental conditions. However, the differences were not so great as to indicate separate cultures in Häme or Finland Proper." This account by Matti Huurre (1979 163) is a fair description of the prevailing concept of late prehistoric Western Finland with its uniform material culture (see also Kivikoski 1961 209, 247 & 1951a 100–101; Meinander 1980 7). However, it was pointed out in the section on settlement history that artefacts appear in the archaeological record of Päijät-Häme and the Lake Vanaja region which do not have parallels or antecedents in the west – a situation clearly contradicting the prevailing view. This observation is not in itself new, but it has not been the subject of any further study.

The earliest historical sources do not support the archaeological view of a uniform West Finnish region. Martti Kerkkonen (1971 214; see also T. Itkonen 1972; Gallén 1984; Kirkinen 1984) has pointed to the use of two different terms in historical sources referring to the inhabitants of Finland: *finni* and *tavesti*, *finnar* and *tavester*, *sum* and *jem* and *suomi* and *häme*. The corresponding geographical terms are *Finlandia* or *Fenningia* and *Tavestia*, *Finland* and *Tavesteland*, *Suomi* and *Häme*. Kerkkonen also points out that the discrepancy of this fact with the idea of a uniform culture has not been studied and that the underlying contradiction has never been seriously addressed.

This problem was discussed in the author's licentiate study concerning Häme in the Crusade Period (Taavitsainen 1981). The starting point was the above-mentioned fact that in the 11th century oval tortoise brooches appear for the first time in the West Finnish area among personal ornaments particular to Häme. Oval tortoise brooches do not have antecedents in Western Finland and they include types particular to Häme and Eastern Finland. In addition to the above, the archaeological record of Häme also includes small penannular brooches of bronze and silver, which again are predominant in Western Finland in the Crusade Period. In Savo-Karelia to the east, oval tortoise brooches are the main brooch type of the Crusade Period and small penannular brooches are found only sporadically. In the above-mentioned study I chose as my research area the region, traditionally included in Western Finland, where small Crusade Period penannular brooches (Salmo's groups 13–16 and a few specimens not included in Salmo's typology)[28] occur

[28] Not included among the small penannular brooches of the Crusade Period are roll-ended iron or bronze brooches of Salmo's groups 3 and 4 which were in use for long periods (cf. Kivikoski 1961 234 and P. Sarvas 1971 50). This is a problematic material, as it was sporadically used still in the Crusade Period, and it is possible that its exclusion distorts the ratios of penannular brooches and oval tortoise brooches.

With respect to Western Finland, roll-ended penannular brooches of iron are not included, for they are dated in these parts to the Merovingian and Viking Periods (Salmo 1956 18,20; Lehtosalo-Hilander 1982b 100). The only exception is from Karelia, where a single specimen of a Crusade Period roll-ended penannular brooch of iron has been found (Salmo 1956 21). The oldest roll-ended specimens of bronze are from the 8th century and they remained in use throughout the Iron Age. According to Kivikoski (1973 1034 & 1951 50) they mainly belong to the Viking Period (see also Salmo 1956 23–25; Lehtosalo-Hilander 1982b 100–101). It is difficult to distinguish Crusade Period specimens within this chronologically extensive group, unless the find in question is from an inhumation burial. Most of the brooches are from cremation cemeteries. It may be possible to distinguish certain Crusade Period brooches on the basis of the form and decoration of the rod part. It was not, however, possible to undertake a thorough comparison. The lack of a few roll-ended specimens of bronze does not affect the statistics for Finland Proper and Satakunta. If they were taken into account, the sporadic nature of oval tortoise brooches and other types would only be emphasized further. Even in Savo-Karelia the roll-ended bronze brooches would not affect the ratio, as there is only one specimen dated to the Crusade Period (from Kallonen in Lapinlahti, Sakkola, NM 10229:1). Häme is a more problematic region, although most of the roll-ended specimens of bronze are from Viking Period contexts (see Salmo 1956 25,100–101). Only one has been found in an inhumation grave of the Crusade Period at Ristiänmäki in Pälkäne and only a few are from cremation cemeteries which include Crusade Period material (Raimaanmäki in Hattula, two brooches NM 3146:24; Männistönmäki in Hauho, NM 9766:22; Imatran Voima, Vanaja, NM 10896:4,73,104,253; Kiiliä,

together with oval tortoise brooches[29] (Figs. 30 and 31). This area corresponds mainly to the historic province of Häme, i.e. Päijät-Häme and the Lake Vanaja region, as defined in this study.

Sääksmäki, NM 10201:1). Problems of dating are also the reason why the brooches of Salmo's group 12 with round rods and facetted knobs were excluded (Kivikoski 1973 690, 1034; Salmo 1956 58). These objects have no effect on the ratio, even if some of them are from the Crusade Period. Only one specimen of the group has been found in Häme (Imatran Voima, Vanaja, NM 10896:282).

Small penannular brooches according to Salmo (1956) and the author's observations. Catalogue references apply to material in the collections of the National Museum of Finland unless otherwise stated.

Salmo's group 13

Finland Proper: Mustamäki Halikko (Perniö Museum), Rikala Halikko (19 specimens; 12549:65; 12690:100,136,141,153,220, 221,308,387,388; 12841:9,65,79,80; 13298:41,81,86,87,89), Haimionmäki Lieto (4 specimens; 13204:86,154,175; 13705:276), Ristinpelto Lieto [6 specimens; 5009:2,4 (3 specimens); Historical Collections 49112:63; Hist. Coll. 50109:4], Saramäki Maaria (5 specimens; 7874:14,37; 13725:22,151,200), Taskula Maaria (4 specimens; 10833:5; 10842:4,7,27), Virusmäki Maaria (6367:31), Humikkala Masku (29 specimens; 8656: Gr. 1:4–5; Gr. 9:5–7; Gr. 11:8,10; Gr. 15:1; Gr. 17:5,6; Gr. 31:9,10; Gr. 32:5–7; Gr. 33:6; Gr. 37:6,23,26,28; Gr. 38:3–5; Gr. 41:6–8; Gr. 43:2,3; Gr. 44:5), Franttilannummi Mynämäki (8911:105); Moisio Nousiainen (9 specimens; 9297:5,6; 9892:357,482,519,522; 10146:114,207; 12509:2), Nummenkylä Nousiainen (3978:9), Paarskylä Perniö (9859), Yliskylä Perniö (2912:67,68,85,96b,98,110, 111,116,127–129; 17381), Pappila Pertteli (14792:1), Pukkila Uskela (8797:2), Hulkkunanmäki Lieto (9695:25), Ojala Lieto (14090), Kalmumäki Kalanti (3 specimens; Uusikaupunki Museum; 8912:5; 9365:114), Linnaluhta Kalanti (3440:220), Nokkola Kalanti (9502:369), Pärkkö Kalanti (2 specimens; 2868:7; 21965), Mahittula Raisio (2 specimens; 19000:43,2684).

Satakunta: Tulonen Karkku (6671:17), Kalvomäki Kokemäki (3 specimens; 1763:20,45,46), Leikkimäki Kokemäki (2001:35), Vanhakartano Köyliö (8602A:87), Hakamäki Nokia (4 specimens; 7912:1; 7955:5,7; 8037:12), Vänniä Tyrvää (6338:41), Church of Tyrvää [4 specimens; Hist. Coll. 65078:4,6(atypical), 7–8], Mikkola Ylöjärvi (2 specimens; 14622:347–348), Vilusenharju Tampere (Messukylä) (15 specimens; 17208:131,134,186, 18–7,263,265,276,319,507,546,655,667; 18556: 627,629,631), Lempoinen Lempäälä (7221:10), Rukoushuone Vesilahti (13939:9), Luistari Eura (3 specimens; 18000:4151,4445,4580), Sammu Huittinen (2572:405), Church of Lempäälä (Hist. Coll. 84060:2).

Häme: Rantala Kuhmoinen (1266:1), Harju Kuhmoinen (2089:27), Linnaniemi Hämeenlinna (3090:3), Kinnari Hämeenlinna (Vanaja) (9119:5), Kirkkomäki Hattula (9563:2), Matkantaka Hauho (9698), Kiiliä Valkeakoski (Sääksmäki) (10201:14), Toppolanmäki Valkeakoski (Sääksmäki) (2 specimens; 10581:16,17), Hinnonmäki Hattula (Tyrväntö) (11393), Makasiinimäki Janakkala (12694:19), Kirkkomaa Janakkala (13287:6), Kirk'ailanmäki Hollola (Hist. Coll. 36077:49), Jyväskylän mlk (Museum of Central Finland), Kalomäki Hauho (18917:838), Imatran Voima Hämeenlinna (Vanaja) (10836:17), Linnavuori Kuhmoinen (4 specimens; 22445:56,126,140,177).

Savo: Kyyhkylä Mikkeli (10629:22), Tuukkala Mikkeli (3156).

Karelia: Lapinlahti Sakkola (7901:70), Old Castle of Käkisalmi [2 specimens; Käkisalmi Museum (missing); Kirpičnikov 1979 64,67], Kallioniemi Kuhmo (13094), Paaso Sortavala (Kočkurkina 1981 tab. 9:5).

Northern Finland: Lämsä Kuusamo (13350:10), Lautamäki Teuva (2 specimens; 14498:5–6), Kivisaari Suomussalmi (3 specimens; 15722:1,3,4).

Salmo's group 14

Finland Proper: Kalmumäki Kalanti (8912:29), Virusmäki Maaria (6659:7), Humikkala Masku (8656: Gr. 43:3).

Satakunta: Osmanmäki Eura (4633:74), Luistari Eura (4 specimens; 18000:1062,1063,1453,4537), Tulonen Karkku (2 specimens; 5853:105; 6671:2), Kalvomäki Kokemäki (1763:19), Vanhakartano Köyliö (2 specimens; 8602A:88; 8723:600), Vilusenharju Tampere (Messukylä) (17208:260,264).

Northern Finland: Lautamäki Teuva (14498:8).

Salmo's group 15

Finland Proper: Taskula Maaria (10833:4), Virusmäki Maaria (6645:6), Humikkala Masku (8 specimens; 8656: Gr. 11:7,11; Gr. 14:8; Gr. 31:9; Gr. 32:8; Gr. 35:4; Gr. 43:4; Gr. 47:4), Franttilannummi Mynämäki (9750:101), Moisio Nousiainen (6 specimens; 10146:108,110–113,156), region of Turku (5059:3), Vanhalinna Lieto (14318:319).

Satakunta: Vanhakartano Köyliö (8723:50), Hakamäki Nokia (2 specimens; 7955:4; 8037:9), Oinonlinna Vesilahti (8056), Vilusenharju Tampere (Messukylä) (3 specimens; 17208:188,264,277), Church of Tyrvää (18250:1–2), Church of Lempäälä (2 specimens; Hist. Coll. 84060:1,3), Luistari Eura (18000:4354).

Häme: Mutero Koski (3408), Pahnainmäki Kalvola (5960:8), Urheilukenttä Kalvola (11592), Vesitorninmäki Hattula (Tyrväntö) (17777:7), Toppolanmäki Valkeakoski (Sääksmäki) (10461:2).

Savo: Moisio Mikkeli (11070:52).

Karelia: Räisälä (2306:2), Likolahti Sakkola (4636:1), Virolainen Naskalinmäki Sakkola (7291:25).

Northern Finland: Niku-Pennala Töysä (5059:4).

Salmo's group 16

Finland Proper: Rikala Halikko (13298:88), Saramäki Maaria (13725:150), Humikkala Masku (8656: Gr. 38:6), Moisio Nousiainen (2 specimens; 9892:303; 10146:105), Yliskylä Perniö (2912:97), Kalmumäki Kalanti (8339:337), Mahittula Raisio (3 specimens; 19000:1264,1546,3232).

Satakunta: Hiidenvainio Huittinen (Hämeen museo 1225:14), Church of Karkku (Hist. Coll. 60127:32), Church of Tyrvää [2 specimens; 65078:3,5(atypical)], Mikkola Ylöjärvi (14626:96), Vilusenharju Tampere (Messukylä) (4 specimens; 17208:188,277, 287,514).

Häme: Pahnainmäki Kalvola (5960:7), Kinnari Hämeenlinna (Vanaja) (9110:2), Kiiliä Valkeakoski (Sääksmäki) (19201:4), Toppolanmäki Valkeakoski (Sääksmäki) (10461:1; 10581:2,10, 13,14), Retulansaari Hattula (Tyrväntö) (11739), Santahaudanmäki Koski (15463), Kalomäki Hauho [8256:34(atypical)], Linnavuori Kuhmoinen (22445:241).

Savo: Tuukkala Mikkeli (2 specimens; 2481:85,278).

Karelia: Hennonmäki Lapinlahti Sakkola (7754:45).

Northern Finland: Lautamäki Teuva (14498:7), Munakka Ilmajoki (Ilmajoki Museum), Vehmassaari Suomussalmi (21988).

Small penannular brooches which cannot be grouped according to Salmo (1956)

Finland Proper: Vanhalinna Lieto (3 specimens; 14318:284; University of Turku/Institute of Archaeology 38:78; 74:96).

Satakunta: Vilusenharju Tampere (Messukylä) (17208:510), Rukoushuone Vesilahti (13939:11), Church of Tyrvää (Hist. Coll. 65078:1).

Häme: Kivirikko Sääksmäki (6370:211), Kirk'ailanmäki Hollola (Hist. Coll. 35175:4; 36077:38), Perttola Iitti (19048:2), Ristiänmäki Pälkäne (22081:35).

Savo: Päivänkämmen Joutseno (14198).

[29] Crusade period oval tortoise brooches of Häme

C_1 – early animal-ornamented brooches

Finland Proper: Paarskylä Perniö (10794).

Häme: Pahnainmäki Kalvola (2 specimens; 5960:9–10), Männistönmäki Hauho (9766), Kiiliä Valkeakoski (Sääksmäki) (19201), Makasiinimäki Janakkala (11938:1), Keiteleenpohja Viitasaari (2605:1), Vanhakylä Urjala (7276:2).

Savo: Tuukkala Mikkeli (2481:209).

Karelia: Paaso Sortavala (Kočkurkina 1981 tab. 9:4), Kalpola Hiitola (3247:13), Tiuri Räisälä (4661:4).

E – Hauho or Rokosina-type brooches

Häme: Alvettula Hauho (9874), Ristimäki Nastola (8370), Vesitorninmäki Hattula (Tyrväntö) (2 specimens, 17777:4–5), Kirk'ailanmäki Hollola (2 specimens; 20450:h. V).

Uusimaa: Takapelto Porvoon mlk (24721).

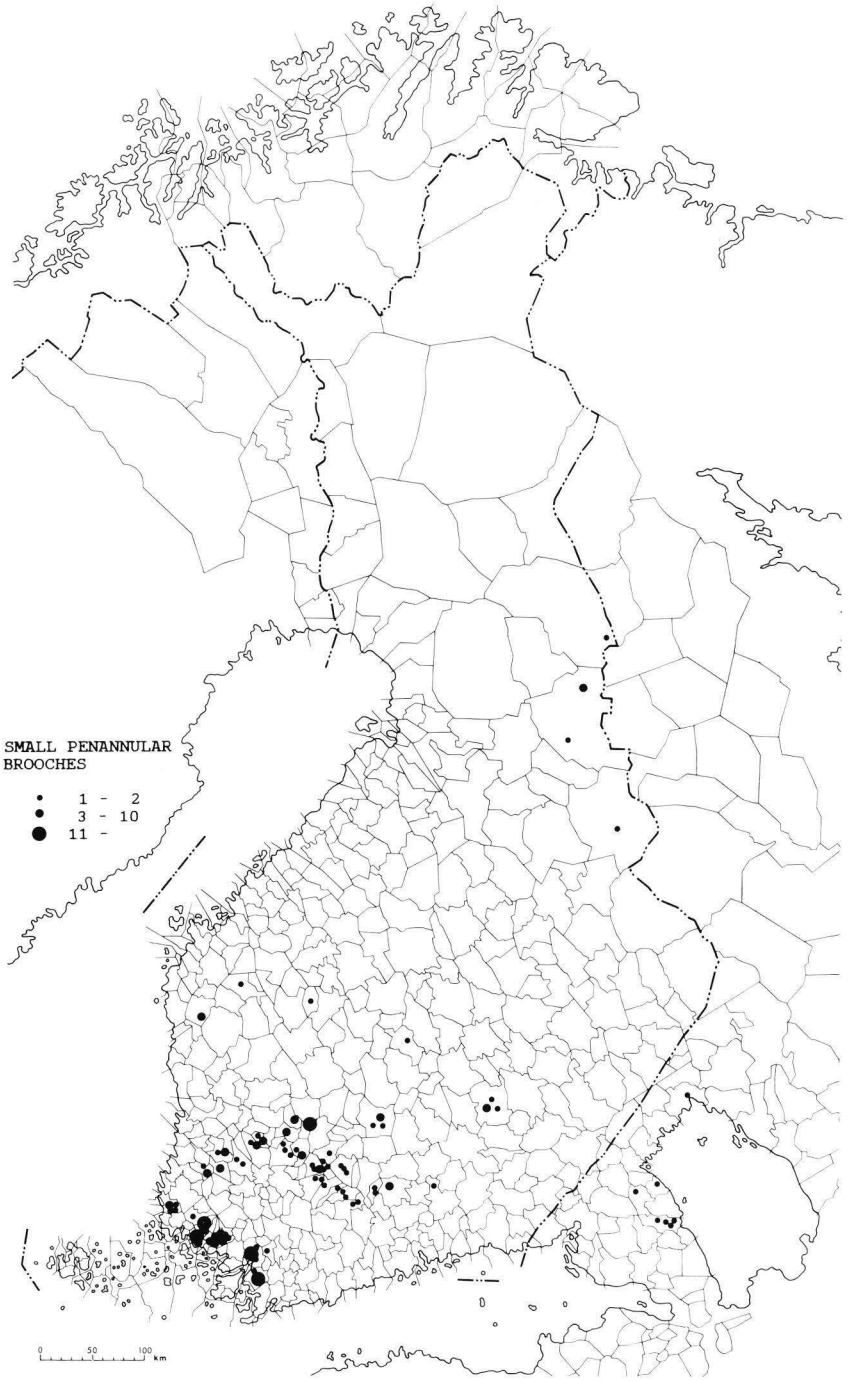

Fig. 30. Distribution of small penannular brooches of the Crusade Period.

Karelia: Rokosina Kaukola (2535:2).
Ostrobothnia: Lautamäki Teuva (2 specimens; 14498.1–2).

G – lily-ornamented brooches

Häme: Kevola Hattula (3008:6), Katinkivenpelto Hattula (Tyrväntö) (3863:1), Urheilukenttä Kalvola (2 specimens; 11592: 1–2), Heinäsuo Joutsa (13237), Mäkelä Hattula (Hämeenlinnan museo 3821), Nikkari Koski (Koski Museum), Koski.
Karelia: Pyhäjärvi Vl. (9172:2).

I – brooches with plaited ornament

Häme: Savolainen Konginkangas (2 specimens; 6579:5; 6709:1), Vähä-Kurki Janakkala (11578:1), Kirk'ailanmäki Hollola (20450)

J – brooches with wreath ornament

Häme: Savolainen Konginkangas (6579:6), Toivonniemi Tuulos (8116:2), Makasiinimäki Janakkala (11938:2).
Savo: Vehmaa Mikkeli (2162), Nikara Mikkeli (24667).
Karelia: Tiuri Räisälä (Kočkurkina 1981 tab. 4:2).

K – spiral-ornamented brooches

Häme: Toivonniemi Tuulos (8116:1).
Karelia: Räisälä (1922:422).

Crusade period oval tortoise brooches of Savo-Karelia

B – brooches with round ornaments

Savo: Tuukkala Mikkeli (2 specimens; 2481:128,174).

C_2 – and C_3 – late animal-ornamented brooches

Satakunta: Vilusenharju Tampere (Messukylä) (17208:132).
Häme: Koivuniemi Pälkäne (Häme Museum, type undefined), Kallio Kivijärvi (4340:45).
Savo: Tuukkala Mikkeli (5 specimens; 2481:50,279,284,324,329), Sakastinmäki Mikkeli (2 specimens; Mikkeli Museum), Visulahti Mikkeli (7 specimens; 13441:18,28; 13769:22,26,38,97,98), Lampila Mikkeli (2 specimens; 23180:1–2).
Karelia: Hovinsaari Räisälä (531), Suotniemi Käkisalmi (1992:411), Huiskunniemi Hiitola (2298:185,186), Suotniemi Käkisalmi (2487:46), Kekomäki Kaukola (6 specimens; 2489:70,78, 87,92; 2595:119,128), Leppäsenmäki Sakkola (2 specimens; 2494: 18,21), Juopunkumpu Hiitola (2520:40), Käkisalmi (2520:49), Tontinmäki Räisälä (2 specimens; 2592:6,16), Kulhamäki

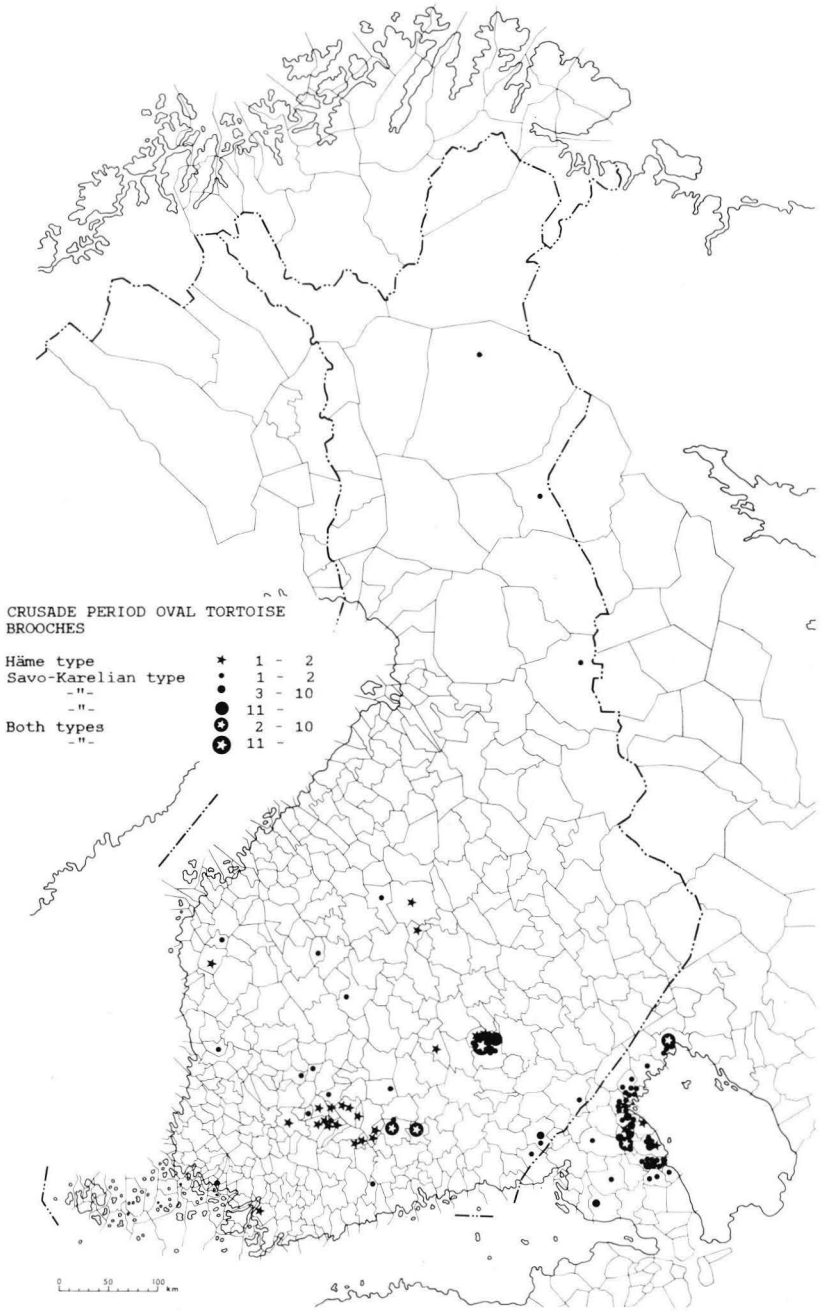

Fig. 31. Distribution of Crusade Period oval tortoise brooches.

Kaukola (2596:1), Naskalinmäki Sakkola (2924:10), Meura Kurkijoki (3108:4), Ollinaho Räisälä (2 specimens; 3130:10,11), Myttylä Ylämaa (14169:2), Kalmistoniemi Hiitola (9533:1), Lahnavalkama Pyhäjärvi (14134), Patja Sakkola (2 specimens; 10710:1a–b), Leinikylä Rautu (10691:1), Paaso Sortavala (Kočkurkina 1981 tab. 9:1), Old Castle of Käkisalmi (Kirpičnikov 1979 64,66).

Northern Finland: Jurva (Vaasan museo), Keskinen Suomussalmi (5335).

D – acanthus-ornamented brooches

Satakunta: Katakorvenkoski Pomarkku (2274), Räsälä Keuruu (3660:1).

Savo: Tuukkala Mikkeli (4 specimens; 2481:48,49,144,145), Tuusjärvi Juva (6455), Visulahti Mikkeli (13769:202), Kappelinmäki Lappeenranta (Lappee) (3 specimens; 13098:1,2; 13365:74), Armila Lappeenranta (16858).

Karelia: Tontinmäki Räisälä (2 specimens; 2592:60,77), Myttylä Ylämaa (14169).

F – band-ornamented brooches

Finland Proper: Luolavuori Turku (23586).

Häme: Ristimäki Nastola (2 specimens; 6955:1; 7088:1), Kirkonkylä Hollola (13955).

Savo: Tuukkala Mikkeli (4 specimens; 2481:51,52,240,241), Moisio Mikkeli (10874:9,10), Visulahti Mikkeli (13769:157).

Karelia: Kannas Sortavala (2231:26), Matomäennenä Hiitola (2298:188), Suotniemi Käkisalmi (2 specimens; 2487:49,65), Kulhamäki Kaukola (2488:7), Herrainmäenranta Pyhäjärvi (2520:48), Kekomäki Kaukola (2 specimens; 2595:82,85), Tortola Kurkijoki (2616:7), Lapinlahti Sakkola (4636:3), Sihvo Kaukola (4636:7), Kulhanpelto Kaukola (5174:395), Koukunniemi Metsäpirtti (6458:2), Uusikorva Kaukola (6910:30), Ukkosenpelto Sakkola (2 specimens; 10333:1,2), Paaso Sortavala (Kočkurkina 1981 tabl. 9:2), Old Castle of Käkisalmi (Kirpičnikov 1979 62–63,66), Tiuri Räisälä (2672:5).

Northern Finland: Pennalankoski Töysä (5059:5).

H – crayfish-ornamented brooches

Häme: Virmaila Padasjoki (1738), Lontilanjoki Toijala (Akaa) (2572:404), Ristimäki Nastola (2 specimens; 5374:1; 8115:1),

Other artefacts of eastern distribution[30] are concentrated to the same area (Fig. 32), but of major importance are the brooches, the largest single group. In addition to the above-mentioned brooch types there are numerous other Crusade Period brooches in the material.[31] However, especially in Western Finland they form small groups, which do not change very much the overall uniform character

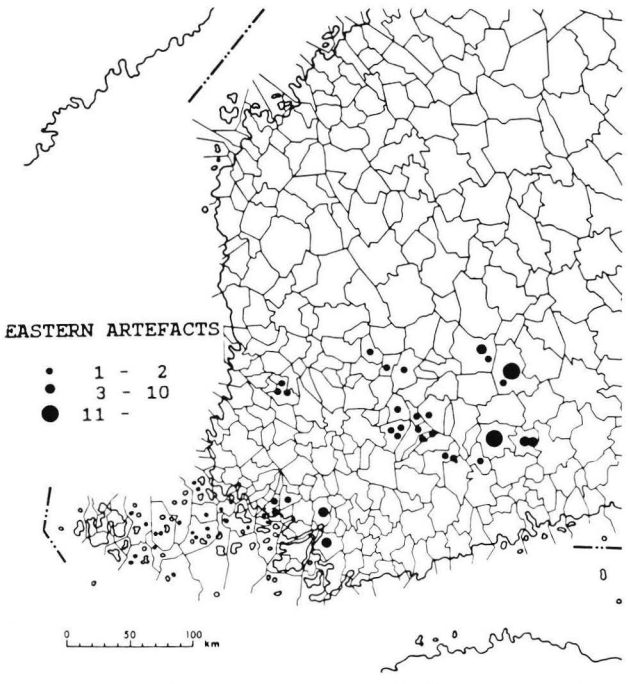

Fig. 32. Distribution of eastern artefacts in Finland Proper, Satakunta and Häme.

Syväranta Tuusula (8216), Kirk'ailanmäki Hollola (4 specimens; 10048:1–8, 20450: h. IV/1978), Lepaa Hattula (Tyrväntö) (Häme Museum).

Savo: Tuukkala Mikkeli (30 specimens; 2481:38–47,119,120,127, 146,156,159,170,172,189,190,208,226,227,257,298,337,339; 9969:2,3; 10631), Lenius Mikkeli (13917), Kyyhkylä Mikkeli (10862:66), Visulahti Mikkeli (13769:88), Moisio Mikkeli (11070:92), Pappilanhaka Mikkeli (20316), Kauskila Lappeenranta (Lappee) (2 specimens; 13365:21,26), Hämeensaari Ruokolahti (12050).

Karelia: Ivaskanmäki Räisälä (5 specimens; 1922:417–421), Naskalinmäki Sakkola (2 specimens; 4421:5, 4636:121), Lapinlahti Sakkola (1922:409), Virolainen Virolainen (5 specimens; 2520:32; 7291:18,21; 9415:1,2), Lallukka Rautu (7066:1), Hovinsaari Räisälä (5 specimens; 2491:17,21,39; 2592:152,156), Mikli Jaakkima (2 specimens; 4635:19; 5649:3), Käkisalmi area (2 specimens; 5832:1ab), Korpilahti Antrea (3310:29), Kilpola Hiitola (5237:8), Patja Sakkola (10817:24), Soskua Kurkijoki (2819:6), Räisälä? (11747), Säkkimäki Kurkijoki (2 specimens; 2053:2ab), Kekomäki Kaukola (2 specimens; 2595:17,28), Tervu Kurkijoki (2 specimens; 2011:14; 5446:1), Tattari Hiitola (5418:19), Putsinlahti Sortavala (2231:27), Kulhamäki Kaukola (3336:240), Noisniemi Sakkola (1922:410), Tiuri Räisälä (2 specimens; 4661:3; Kočkurkina 1981 tabl. 4:1), Kannilanjoki Muolaa (9454), Hympölä Sortavala (2 specimens; 3452:7,8), Suotniemi Käkisalmi (2487:47), Kuuppala Kurkijoki (10670:143), Paaso Sortavala (Kočkurkina 1981 tabl. 9:3).

Northern Finland: Kempele station (15500:1), Juikenttä Sodankylä (Finno-Ugric coll. 5606:319), Kallunki Salla (13687).

Unclassified and unidentified specimens

Savo: Iso-Pappila Mikkeli (20480), Visulahti Mikkeli (2 specimens; 13441:2,3).

Karelia: Kalmistomäki Kurkijoki (A. Saksa, oral comm.).

[30] In this connection other eastern artefacts found in Finland Proper, Satakunta and Häme are objects of Karelian and Slav-Russian type. Not included are the so-called Permian artefacts, which represent trade and exchange with the Finno-Ugrian regions of Russia dating back to the Bronze Age and even earlier. The Permian artefacts have a different pattern of distribution than eastern artefacts (Tomanterä 1991).

Perforated cruciform chain-bearers: Ristimäki Nastola (2 specimens, 6995:3–4).

Spiral chain-bearers of Karelian type: Grave V/1978 (Kirk'ailanmäki Hollola (20450).

Tubular eared ornaments: Ristimäki Nastola (2 specimens, 6995:2, 8115:2), Pyhäkoski Kokemäki (2360). Included here are only replicas and copies of wax-filgree objects, which are of Karelian manufacture (Tomanterä 1991). The others are classed as Finno-Ugrian.

Chain-lengths: Urheilukenttä Kalvola (2 specimens, 11592: 6–7), Pahnainmäki Kalvola (2 specimens, 5960:12), Grave IV, Toppolanmäki Sääksmäki (2 specimens, 9581:11–12), Grave V/1987, Kirk'ailanmäki Hollola (3 specimens, 20450), Siivolanpelto Sysmä (17181:4), Karlberg Hämeenlinna (3090:11), Niemelä Janakkala (16673B:5), Kangasala (2627), Grave Å, Rikala Halikko (2 specimens, 12690:394–5), Grave II, Yliskylä Perniö (3 specimens, 2912:74).

Ear spoons: Anttila Tyrväntö (6503:21), Linnavuori Kuhmoinen (22445:85, converted into a pendant).

Palmette-decorated silver plate pendants: Rantala Kuhmoinen (1232:4), Lipanmäki Sysmä (11 specimens, 12400:8–18).

Gotland-type silver brooches: Harakkamäki Nastola (4 specimens, 5408:1–4).

Eastern crucifixes and a pendant icon: Haimionmäki Lieto (13705:158), Kevola Hattula (2 specimens, 3146:1,3), Pyssylä Kärkölä (Hist. Coll. 7738; Taavitsainen 1981 70).

Kirk'ailanmäki pendants: Kirk'ailanmäki Hollola (2 specimens, Hist.Coll. 36077:45,46).

Bracelets wound of bronze thread or cast with winding design: Virusmäki Maaria (6649:3, cast), Rikala Halikko (12481:2, cast), Kalvomäki Kokemäki (1763:15, wound with two threads), Kirk'ailanmäki Hollola (4 specimens, Hist.Coll. 35175:5–7, 20, wound with three threads).

Knife-sheaths and fittings: Turku (Turku Museum 14740:429), Vilusenharju Messukylä (17208:173), Linnavuori Kuhmoinen (2 specimens, 22445:25, 236).

Karelian axe: Linnavuori Kuhmoinen (22445:113a).

Eastern swords and sword fragments: Rikala Halikko (5512:46), Mikkola Ylöjärvi (14553:1), Pahnainmäki Hollola (5960:1), Kirstula Hämeenlinna (11113), Hakoinen Janakkala (24440:132).

Lash-ball: Linnavuori Kuhmoinen (22445:38).

Karelian penannular brooch: Linnavuori Kuhmoinen (22445: 148).

The eastern character of some of these artefacts is uncertain. Knife-sheaths with acanthus ornament have been found in urban contexts in Central Europe (e.g. Knorr 1971; Cowgill et al. 1987). Bracelets wound with three threads were made in Novgorod, from where they spread to Estonia (Selirand 1974 169–170). According to Kivikoski (1973 748) wound bracelets are rare in Finland and Sweden, but common in the finds of Estonia, Ingermanland and Gotland. Many routes of import were thus possible and the possibility of copying must also be taken into account (e.g. the cast specimens). It has also been suggested that crucifixes similar to the one from Haimionmäki in Lieto were made in Eastern Latvia according to prototypes from Kiev (Hirviluoto 1971 21).

[31] Other Crusade Period brooches

Salmo's group 19

Finland Proper: Hyöri Kalanti (3585), Hinttermäki Nousiainen (9815), Myllymäki Nousiainen (10146:20), Viukkala Piikkiö (12258), Ristimäki Kaarina (14472.12).

Satakunta: Vanhakartano Köyliö (8723:577), Laurila Vesilahti (5473).

Häme: Makasiinimäki Janakkala (12694:1)

Savo: Tuukkala Mikkeli (2481:143).

Karelia: Korpilahti Antrea (8530:5), Kiiveri Jääski (11036), Ho-

of personal ornaments (e.g. Bergström et al. 1973 38). In Savo-Karelia the material is more nuanced (Fig. 33).

The reason why brooches are discussed in closer detail is their central importance for defining spatial and temporal aspects in the archaeological record. The beginning of Iron Age periods is defined on the basis of brooches and specific cultural areas are often delimited according to their distribution. They belong to the personal ornaments of dress, but they reflect not only fashions and cultural contacts, but also aspects of regional affiliation. Ulf Näsman (1984 122) and Rainer Christlein (1978 83–111; in Finland, Pihlman 1987) have underlined how different products spread in various systems of exchange. According to Näsman (1984 122), demarcation of possibly ethnic character can be seen in the ornaments of dress of the broader sections of society and in ceramic industries and isolation in many aspects of the basic means of livelihood and economy is probably accounted for by the low level of development of the system of trade and exchange. It must also be stressed that marriage patterns and networks were without doubt important for the distribution of various brooch types.

A further advantage of this material is that brooches are mainly found in graves and are thus easier to compare than other categories of finds, which may be more susceptible to changes in burial customs and may reflect e.g. regional differences in customs and economy. Even with the advent of Christianity, brooches are useful, since they still occur in Christian burials, as indicated by excavations of church-floors (e.g. P. Sarvas 1971; Hiekkanen 1986). This underlines the significance and usefulness of brooches as archaeological source material, but it also brings forth the problem – hitherto neglected – of chronological differences in the adoption of Christianity and its effects on comparisons between different regions in late prehistoric times.

Ella Kivikoski (1966b) classes the leather knife sheath with acanthus ornament from excavations in the City of Turku together with Karelian specimens of metal with similar designs. Acanthus ornament is highly common in Savo-Karelia, but rare in western contexts. In addition to the above find, Kivikoski

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vinsaari Räisälä (2 specimens; 2491:25; 2592:56), Särkisalo Räisälä (2386:16), Naskalinmäki Sakkola (7291:24), Papunkylä Salmi (4698:6), Hympölä Sortavala (3452:11), Myttylä Ylämaa (14169:3), Lappeenranta (20317), Räisälä (13310:2).

Salmo's group 20

Satakunta: Vilusenharju Tampere (Messukylä) (18556:632).
Savo: Rokkola Mikkeli (10630).

Salmo's group 21

Finland Proper: Myllymäki Nousiainen (2 specimens; 10146: 17–18).
Häme: Kirk'ailanmäki Hollola (Hist. Coll. 35175:16).
Karelia: Kappelinmäki Lappeenranta (Lappee) (13365:72).

Salmo's group 22

Finland Proper: Yliskylä Perniö (2912:119a).

Salmo's group 23

Finland Proper: Virusmäki Maaria (6649:1).
Satakunta: Kravi Nokia (7955:2), Vilusenharju Tampere (Messukylä) (2 specimens; 18556:632).

Salmo's group 24

Karelia: Naskalinmäki Sakkola (7754:61).

Salmo's group 25

Savo: Tuukkala Mikkeli (7 specimens; 2481:87–91,194,223).
Karelia: Kilpola Hiitola (3641:3), Kekomäki Kaukola (4 specimens; 2489:104,232; 2595:7,108), Kulhanmäki Kaukola (2 specimens; 2596:5,12), Tontinmäki Räisälä (2 specimens; 2491:32; 2592:2), Patja Sakkola (10817:26), Leppäsenmäki Sakkola (2 specimens; 2494:32,46), Sipilänmäki Sakkola (10663:7).

Salmo's group 26

Häme: Linnavuori Kuhmoinen (22445:148).
Karelia: Lapinlahti Sakkola (A. Saksa, oral. comm.), Hämeenlahti Kurkijoki (2613:26), Kekomäki Kaukola [7 specimens; 2489:118,274 (2 specimens), 326; 2595:11,80,135], Kulhanmäki Kaukola (2596:7), Säkkimäki Kurkijoki (2 specimens; 2053:3), Muolaa Muolaa (2744:7), Tontinmäki Räisälä (4 specimens; 2491:28; 2592:1,150,170), Patja Sakkola (3 specimens; 10817:17, 31,32), Rantue Sortavala (2 specimens; 8121:2,3).

Salmo's group 25 or 26

Savo: Visulahti Mikkeli (13769:114).
Karelia: Patja Sakkola (10817:17,39).

Penannular brooches with rolled ends and grooved decoration

Satakunta: Köyliö Eura (Cleve 1978 101).
Häme: Savolainen Konginkangas (6579:8)
Karelia: Kappelinmäki Lappeenranta (Lappee) (13365:14).

Silver plate brooches

Häme: Ruuhijärvi Nastola (4 specimens; 5408:1–4).
Savo: Tuukkala Mikkeli (6 specimens; 2481:82–84,155,188,224), Visulahti Mikkeli (13769:113).
Karelia: Suotniemi Käkisalmi (2487:50), Kulhanmäki Kaukola (2596:4), Kekomäki Kaukola (4 specimens; 2489:106,375; 2595: 14,78), Tontinmäki Räisälä (2 specimens; 2491:29; 2592:4), Tiuri Räisälä (2740:17), Leppäsenmäki Sakkola (2494:35), Sipilänmäki Sakkola (10663:2), Patja Sakkola (19817:46).

Brooches of shield-boss shape

Finland Proper: Yliskylä Perniö (13199).
Satakunta: Rukoushuone Vesilahti (13939:1).
Häme: Ilmoila Hauho (3539:10), Toppolanmäki Valkeakoski (Sääksmäki) (19581:8,9), Lipanmäki Sysmä (12400:2), Nisula Lammi (20449:1).
Karelia: Hovinsaari Räisälä (2592:4).
Northern Finland: Aatservainen Salla (2 specimens; 37).

Filigreed brooch

Finland Proper: Mahittula Raisio (19000:44).

Round concave-convex brooch

Finland Proper: Ristinpelto Lieto (5009:1).

Ring brooches with grooved ornament

Finland Proper: Myllymäki Nousiainen (10146:116), Mahittula Raisio (19000:25).
Satakunta: Luistari Eura (18000:1061), C-cemetery Köyliö (Cleve 1978 Pl. 14:210).

Ring brooches (Including ring brooches found in furnished graves or as stray finds in cemeteries with furnished burials)

Savo: Tuukkala Mikkeli (8 specimens; Heikel 1889 table; 9770:1; 9795:1; 9961:1; 10908:1), Visulahti Mikkeli (2 specimens; 13769: 3,52).
Karelia: Kekomäki Kaukola (3 specimens; 2489:187,244,331), Suotniemi Käkisalmi (3 specimens; 2487:2,19,72), Lahukka Rautu (7066:2), Hovinsaari Räisälä (2592:174), Naskali Sakkola (10267:5), Leppäsenmäki Sakkola (3247:1), Hennonmäki Sakkola (7754:69), Kirkkosaari Viipuri (1538:2), Hannukainen Hiitola (3247:16), Kauskila Lappeenranta (Lappee) (4 specimens; 13365: 24,25,77,183,204).

A palmette pendant worn as a silver plate brooch

Karelia: Tontinmäki Räisälä (2592:58).

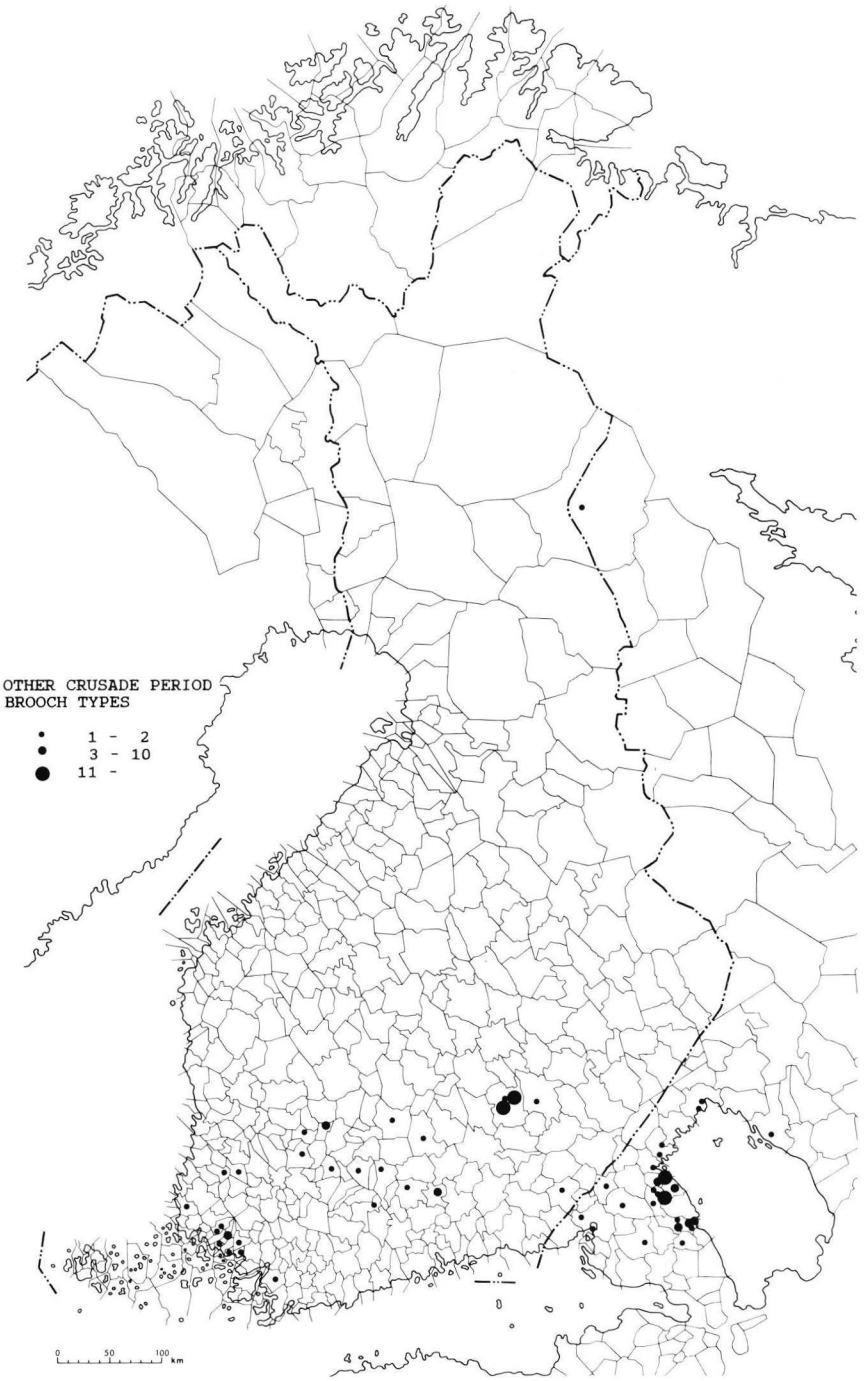

Fig. 33. Distribution of other Crusade Period brooch types.

mentions only one other acanthus-ornamented artefact from a western context – a belt fitting from Ristimäki in Kaarina. She also mentions a Karelian ear spoon with acanthus ornament from Anttila in Hattula (Tyrväntö) in Häme.[32] With the Turku find as her starting point, Kivikoski discusses the relationship between late prehistoric West Finnish culture with the culture of Karelia as well as their comparability.

According to Kivikoski, pagan burial customs came to an end in Western Finland around the mid-12th century, when the Crusade Period culture of Karelia was at its peak. Kivikoski feels that reliable grounds are lacking for any comparisons of the material culture of these areas – the material is quite simply lacking from Western Finland.[33] In the cited context Kivikoski presents all of the Karelian mater-

[32] The following West Finnish finds of acanthus-ornamented objects can be added to Kivikoski's list: a sword hilt from Rikala in Halikko (Björck 1883 61), a sword from Mikkola in Ylöjärvi (Koskimies 1973), a spoon Lammaistenkoski in Harjavalta (Räty 1987) and a spoon from Osmanmäki in Eura (Aspelin 1880 1355).

[33] This point has been discussed in earlier studies as well. For example, C. A. Nordman (1924 2) posed the question of whether the differences between Savo-Karelia and Häme-Satakunta-Finland Proper are only apparent ones and the result of differences in the rate at which pagan burial customs were abandoned in different parts of the country.

Table 9. ^{14}C dates of Hollola Kirk'ailanmäki. Calibration according to Stuiver & Pearson (1986).

Lab. No.	Grave No.	^{14}C age yr BP	Most probable date cal AD	68 % probability range cal AD	Relative area under probability distribution
Su-1721	V/1978	870±50	1169	1047–1226	1049–1087 .26
					1120–1141 .15
					1154–1224 .59
Su-1712	IV/1978	830±40	1221	1169–1253	1173–1248 1.00
Su-1722	I/1978	770±50	1262	1225–1275	1221–1277 1.00

ial found in Western Finland, suggesting that the cultures of Western Finland and Karelia had more features in common than hitherto believed by scholars.

Pekka Sarvas (1971) has demonstrated the survival of furnished burials in Finland Proper, Satakunta and Häme to the turn of the 12th and 13th centuries and possibly into the early 13th century. Sarvas (1971 52) quotes written sources, according to which the Bishop of Finland converted a large number of people in Finland (Proper) and its neighbouring provinces as late as the 1220s.

In addition to inhumation cemeteries of the late 12th – early 13th centuries there are also late cremation graves in Finland Proper and Satakunta. In Häme mound or barrow cemeteries occurred in addition to the above. Ring brooches, which were introduced in the late 12th century and the 13th century (see Appendix 2, p. 209), have been regarded as material belonging to historically documented times. In Finland Proper the transition from small penannular brooches to ring brooches can be seen in the finds from Myllymäki in Nousiainen, Saramäki in Maaria and in material from church excavations. In Häme, the inhumation cemetery of Kirk'ailanmäki in Hollola shows the transition from oval tortoise brooches to ring brooches. Grave IV/1978 of the cemetery with an oval tortoise brooch provided a radiocarbon dating with the end of the first quarter of the 13th century as its most probable date. Grave I/1978 with a pair of bracelets gave a most probable date of the latter half of the 13th century (Table 9).[34] There are inhumation burials in Savo-Karelia which contain both ring brooches and oval tortoise brooches. There are also coin-dated Savo-Karelian graves of the 13th century and even as late as the early 14th century.[35] In the east, pagan burial customs appear to continue longer than in the west. This, however, does not prevent comparisons between these regions, although the duration of the period concerned must be taken into account in reviewing the numbers of artefacts.

In addition to the overall dating of furnished burials, a number of closed finds concretely link the western material with that of Häme and the east.

Artefact forms characteristic of Häme and Western Finland occur together in the graves at Pahnainmäki and Urheilukenttä in Kalvola and Lautamäki in Teuva. These graves contained brooches of Salmo's groups 13, 15 and 16 as well as brooches with lily ornament, early animal brooches and brooches of the Hauho group.[36] Grave no. 24 at Vilusenharju in Tampere demonstrates the contemporaneity of West Finnish penannular brooches of group 13 and the late animal-ornamented brooches of Karelia (Nallinmaa-Luoto 1978 20–22). Grave no. 8 of the same cemetery contained a brooch of group 16 and a Karelian eared tubular ornament (Nallinmaa-Luoto 1978 10–11). Apart from the actual brooches, also other artefact groups show the contemporaneity of the brooches of Western Finland, Häme and Savo-Karelia. Chain lengths, found together with Häme-type brooches in a number of graves in Kalvola, have also been found in grave III of the Yliskylä cemetery in Perniö together with small penannular brooches (Appelgren-Kivalo 1907b 38). In Savo-Karelian graves they commonly occur together with oval tortoise brooches. Double-

[34] Calibration causes a number of problems in this connection. The samples were calibrated according to Stuiver & Pearson (1986), assuming an average age of 20 years for each sample. In the case of bones, collagen was dated, which forms in the body throughout an individual's life. Because the actual rate of collagen formation is not known, apart from the fact that it is at its peak during the first 20 years of life, we must calibrate according to the assumption of 20 years. According Milton Nunez (oral comm.), the body in grave V was in her twenties, the one in grave IV in her thirties and the one in grave I around twenty years of age. The latter was the youngest one. This – and perhaps her possible single status – was the reason, why no brooches were present in the grave.

[35] Grave 21, Patja at Lapinlahti in Sakkola (two coins: 1230–1250 and 1210/20–1260/70; P. Sarvas 1972 4); Grave 3, Kappelinmäki at Kauskila in Lappee (5 coins, types Malmer E, KrH Ä Ia, Ic, d, first quarter of the 14th century; B. Malmer 1980 26); Grave 3, Visulahti, Mikkeli (crown bracteate, possibly of the 13th century; P. Sarvas 1972 4).

[36] If the "crayfish-ornamented" sword from Pahnainmäki is also included, the small western penannular brooches, the early animal-ornamented brooches of Häme and the crayfish brooches of Savo-Karelia can be said to have been in use simultaneuously.

spiral chain-bearers, belonging to the sets of artefacts in the Kalvola graves, are commonly found together with penannular brooches in Western Finland and with oval tortoise brooches in Karelia (grave 1 and 6 at Hovinsaari in Räisälä, grave 6 at Kekomäki in Kaukola; Schwindt 1893). Grave IV/1978 at Kirk'ailanmäki in Hollola contained silver-plated bracelets of thin bronze with tapering ends, which are known from Western Finland, together with eastern crayfish brooches (Hirviluoto 1986 41; see also Appendix 2, p. 211).

The above examples demonstrate the contemporaneity of the material culture of Western Finland, Häme and Karelia. They also show that there is a definite basis for comparisons of artefacts and the distribution of the material provides grounds for conclusions. Before this can be attempted, we must first discuss the chronology of the oval tortoise brooches of Häme and Savo-Karelia.

4.6.1.2. The chronology of Crusade Period oval tortoise brooches

General features of dating. Oval tortoise brooches are a group of artefacts much discussed in Finnish archaeology. Julius Ailio was the first to undertake a thorough study of their typology and dating. Ailio classed the brooches into 11 groups, still accepted today and demonstrated how they derived from the Scandinavian convex-concave brooches of the Viking Period, dating them to the 11th century mainly on typological and stylistic grounds (Ailio 1922b). A couple of years later C. A. Nordman published his work on the Iron Age of Karelia with a critical review of Ailio's conclusions. Nordman (1924) took as his starting point the round silver plate brooches of Gotland with the result that he could justifiably date the oval tortoise brooches to the 12th century, especially its latter half and the 13th century. However, the chronological difference of over a hundred years between the oval tortoise brooches and their Scandinavian prototypes remained a distinct problem. Nordman (1924 192) points out that "a further possibility comes recurrently to mind: could these artefact types not have been of a national character also in Häme, from where they could have spread to the east?" The material available at the time did not demonstrate any likelihood of such a development, nor did it indicate that some of the brooches of Häme could be dated to the 11th century. Nordman (1924 150), however, did not feel that this dating was theoretically impossible. Also Aarne Äyräpää (1935 48) underlined the western distribution of certain brooch types, suggesting that "especially with respect to oval tortoise brooches, it seems – on the basis of the hitherto few specimens available – that they led to variants with mainly a western distribution."

With the growth of material, the number of western finds of the brooch type has increased with a centre of distribution in Häme in the case of a number of sub-groups. This fact and the chronological lag between the brooches and their prototypes provided the starting point for Olof af Hällström's study on oval tortoise brooches, published in 1948. Af Hällström demonstrated an 11th century dating for types A, C, E, G, I, J and K, small-sized brooches of western distribution. He did not question the later dating of the eastern brooches, as originally demonstrated by Nordman. Af Hällström's results placed the origin of the oval tortoise brooches in a completely new light. Now, there were both Häme and Karelian types. As the western brooches were even older, it could now be claimed that the group as a whole had originated in Häme. It could also be observed that in Savo-Karelia the oval tortoise brooches were artefacts of western, and not eastern, origin. Because, however, some of the prototypes were eastern, from the areas to the southeast of Lake Ladoga, af Hällström felt that Häme and Karelia as a whole should be regarded as their area of origin, unless it could be demonstrated that the prototypes, or at least some of them, had come to Häme from elsewhere than via Karelia. Af Hällström's results placed the whole early history of Häme and Karelia in new perspective – the chronological gap between the Scandinavian prototypes and the Savo-Karelian brooches was now resolved and a natural and chronologically uniform course of development could be demonstrated. Af Hällström's dating of the oval tortoise brooches is general accepted in Finnish archaeology (e.g. Kivikoski 1951a; 1955a; 1961; Huurre 1978; Lehtosalo-Hilander 1980a 248).

Af Hällström's work has been followed by four studies on oval tortoise brooches. Matti Huurre (1980) has studied the dating and typology of type A of the studded oval tortoise brooches which display an exceptional distribution (Häme, Savo and the southeastern shore region of Lake Ladoga), demonstrating that also their chronology clearly differs. The studded brooches may date back to as early as the latter half of the 10th century, but in any case to the 11th century, but not to the Crusade Period. P-L Lehtosalo (1966) studied the dating and typology of the Savo-Karelian crayfish-ornamented brooches (type H). Following af Hällström, she dates them to the beginning of the 12th century and possibly to the 11th century on the basis of their size, dimensions and stylistic features. Elvi Linturi (1980) has attempted to develop a more detailed classification of the animal-ornamented brooches (type C) with a search for local and chronological variability. Linturi

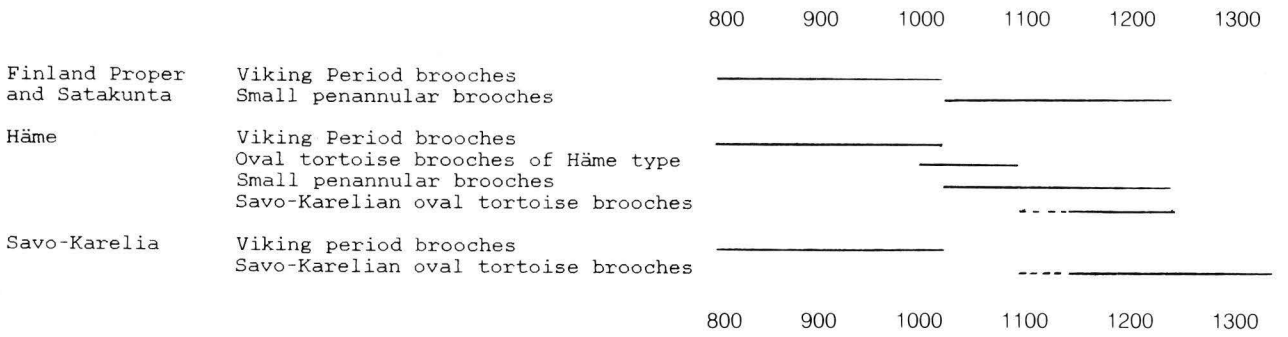

Fig. 34. Datings of Viking and Crusade Period brooches.

(1982) also applied this approach in her study of the band-ornamented brooches of type F. In Soviet Karelia, S. I. Kočkurkina (1978) has presented a general survey of oval tortoise brooches.

The material has grown somewhat since af Hällström's study and a number of new grave and cemetery finds of oval tortoise brooches have been published (e.g. Salo 1957; Paloniemi 1960; Keskitalo 1969; Nallinmaa-Luoto 1978 20–22; Hirviluoto 1986; Lehtosalo-Hilander 1980b). In studies concerning the types particular to Häme, af Hällström's chronology has been accepted. It can even be said that the oval tortoise brooches of Häme are the basis for dating finds. Nor have the datings of the brooches from Savo-Karelia been questioned.

Although there appears to be a consensus of opinion concerning the age of the oval tortoise brooches, the transition from the Viking Period to the Crusade Period, especially in Savo-Karelia, still remains a problem, cf. Fig. 34. Shown in the illustration are the datings for the Viking Period and Crusade Period brooches from Finland Proper, Satakunta, Häme and Savo-Karelia.

Fig. 34 shows how in Finland Proper and Satakunta as well as in Häme the Viking Period brooches fall out of use and are replaced by the small penannular brooches and the oval tortoise brooches. In Savo-Karelia, however, a gap remains between brooches of the Viking Period and those of the Crusade Period. Assuming standard definitions of periods and their datings, it can be seen that a period of no brooches in graves due to changing burial customs or a cessation of settlement occurred in Savo-Karelia. The gap may also be due to an error of method.

The gap or interruption may have been obscured by the uniform development of the brooches, as argued by af Hällström, although it cannot be actually demonstrated in the case of Savo-Karelia. A further reason is Nordman's "end of the Viking Period" which he places between the 9th and 10th centuries of the Viking Period and the Crusade Period. This sub-period consists of "a group of finds from the 11th century, the oldest components of which – albeit interred in the beginning of the second millenium – were made at an earlier date; the latest finds date back to the 12th century." (C. A. Nordman 1924 123). The finds include weapons, dated in the above discussion to the 11th century. The brooches, e.g. Salmo's group 8, even-armed brooches and other types, do not include any forms that could be dated to the 11th century, much less the Crusade Period. Reference to this chronological group has made the transition to the Crusade Period appear to be methodologically unproblematic.

The dating of the oval tortoise brooches of Häme. The dating of af Hällström's seven brooch groups from Häme is based only on three groups: the studded brooches, the lily-ornamented ones and the animal-ornamented brooches,

Af Hällström (1948 51) dated the studded brooches to the 11th century in accordance with the accepted dating of the Tchud culture of the southeast shore region of Lake Ladoga. Huurre (1980) has in a later connection shown that the oldest brooches may date back to the late 10th century, the main body of the material is mainly from the 11th century, but no longer from the Crusade Period. The number of finds has grown over the years, and the distribution of this material clearly shows that is not specific to Häme or Savo-Karelia, but must be classed into a larger group comprising Häme, Savo and the southeastern shores of Lake Ladoga.[37]

The lily-ornamented brooches are another datable group. The single chronological point of reference is a find of the 11th century from Hille in Gästrikland, Sweden, which includes a brooch of this variant. However, the chronological basis for this is uncer-

[37] Finds of studded brooches according to Huurre (1980): Työlaitos, Lammi (NM 9330); Männistönmäki, Hauho (NM 9794:1); Harviala, Hämeenlinna (Vanaja) (NM 12481); Iitlahti, Sulkava (NM 15097); Pukkisaari, Jaala (NM 19915:1); Vammoniemi, Taipalsaari (NM 20000); Penttinen, Juva (NM 20813). There is also a recent find from the Varikkoniemi site in Hämeenlinna.

tain, for – as pointed out by af Hällström – information on the older finds, such as Hille, in the State Historical Museum in Stockholm are not as detailed or definite, as to indicate that it was of a closed character (af Hällström 1958 55).

Thus, the chronology and dating of the brooches of Häme is based on a single group – that of the early animal-ornamented brooches.

Ailio classified the animal brooches into two forms: an early form of small size (C1) and a later one of large size (C2). Af Hällström (1948 57–58) went on to divide the smaller variant into four sub-groups, a – d, of which a and b had been found in Häme. A total of seven early animal-ornamented brooches have been found in Häme.

The early animal-ornamented brooches have been found as stray finds as well as in cremation and inhumation cemeteries. The dating is based on standard views regarding the age of cremation cemeteries and the sets of artefacts in inhumation graves.

Finds from cremation cemeteries. Four specimens have been found in cremation cemeteries (an early animal brooch from Paarskylä in Perniö, an unidentified specimen from Kevola in Hattula and a studded brooch with animal ornament from Männistönmäki in Hauho). According to af Hällström (1948 51), the context alone indicates the 11th century. It has been pointed out above that cremation was a standard practice well into the Crusade Period (e.g. Kivikoski 1973 10–15; P. Sarvas 1971; Taavitsainen 1981 82–83). Because of the central importance of the dating of the oval tortoise brooches, the cremation cemetery finds cited by af Hällström must be discussed in further detail.

The finds from the cemeteries are mainly of 11th century artefact types, but are not chronologically representative in character. Sakari Pälsi's excavations at the partly destroyed cemetery of Männistönmäki were not very extensive and the material in question consists of only three main catalogue entries with 40 sub-entries. Only a few of these objects are intact, identifiable and datable. In connection with the Männistönmäki site, af Hällström mentions as a feature distinctive of the 11th century the fact that the brooches were found in the cremation part of the cemetery, which also included inhumation graves. However, none of the finds can be definitely connected with the inhumation graves. The possibility remains that the inhumation graves originally lacked grave-goods and dated to Christian times, up to which cremations continued.

According to af Hällström (1948 52) a more definite dating is provided by the overall archaeological material of these cemeteries, even the missing ones. As an example, he mentions the cremation cemetery of Kevola in Hattula where, as he claims, a fragmentary oval tortoise brooch was found which was in an unidentifiable condition due to fire (it was actually a lily-ornamented brooch). A telling detail, according to af Hällström, was the fact that "the simple penannular brooches, which came into use by the mid-11th century at the latest, are completely lacking in the material". It must be pointed out, however, that brooches of this type have been found in other cremation cemeteries, e.g. brooches of Salmo's group 13 at Hinnonmäki in Tyrväntö (NM 11292) and at the Imatran Voima cemetery in Vanaja (NM 10896:17).

Two crucifixes are mentioned by af Hällström as the youngest finds from Kevola. One of these (NM 3146:1; Kivikoski 1973 1147) is an encolpion crucifix from Russia, which af Hällström (1948 52), with reference to a Swedish parallel, dates to the beginning of the 11th century. There are also two parallels from the excavations of the town area of Novgorod. One of these was found in a layer of the 1120s and 1130s and the other, which is a closer parallel, was found in layers of the 1170s–1190s (Sedova 1981 57).

The other crucifix from Kevola (NM 3146:3; Kivikoski 1973 1142) is of a type with a rhomboid centre and cross-arms ending in three rounded parts. Af Hällström (1948 52) regarded the pendant crucifix as Baltic in origin and on the basis of certain parallels dated it to the period from 1000 to 1200 AD. The closest parallel to this find is from Latvia, in connection with which Mugurevics mentions similar ones having been found in Hattula in Finland and in Kiev. According to Mugurevics it was a 13th century imported object from Russia (Mugurevics 1974 227, fig. 2:20).[38]

The Kiiliä grave find in Sääksmäki. After discussing the cremation cemetery finds, af Hällström goes on to review the inhumation burial finds. A reliable dating is provided by an inhumation grave found at Kiiliä in Sääksmäki. Af Hällström (1948 53) dates the grave to the 11th century according to an Urnes-style fitting or ferrule with ornamental parallels in sword hilts and spearhead sockets. Thus, af Hällström claims that the 11th century dating for the oval tortoise brooches of Häme is based on definite foreign parallels. In a later connection, Salmo (1956 63) dated the grave, with reference to the fitting and the oval tortoise brooch, to the end of the 11th century.

However, there is no need to accept only an indirect dating. Parallels to the Urnes-style fitting have been found in the town excavations of Lund and in

[38] The German summary of Mugurevics's study states that the pendant dates to the 14th and 15th centuries and that it was of local manufacture. This appears to contradict the text of the original. The reason for this may be that in the summary the illustration references for variants 1 and 2 are mixed.

other parts of Scania, as well as in East and West Götaland and in Själland. The best specimen of the group, from East Götaland, is dated to the mid-11th century, while the others, apparently with reference to this find, have been dated to the latter half of the 11th century (Blomqvist 1948 124, 126). The oldest finds from town excavations do not appear to be from layers providing precise datings. Where such contexts are available, datings of 1100–1150 have been obtained. The brooches in question are miscast specimens from smithies and fragments of casting moulds, which indicate their manufacture in the century in question (Bergman-Billberg 1976 206–208). There is also a find from Oslo of a fitting, dated to the first half of the 11th century (Wilson 1975 358). The Urnes style is dated to a period from the second quarter of the 11th century to the end of the second quarter of the 12th century (Wilson 1975 360).

In addition to the find from Kiiliä, another – albeit fragmentary – Urnes-style fitting has been found in Finland. The artefact in question (NM 19146:56) was found in grave no. 12 at the Myllymäki, Moisio cemetery in Nousiainen together with an iron knife and three beads. Myllymäki was in use as a cemetery up to the end of the 11th century or the beginning of the 12th century. The youngest parts of the cemetery contain Christian burials (Kivikoski 1955b 33,37). The cemetery was excavated by Helmer Salmo (1956 71–72), who dates it chiefly to the 12th and 13th centuries. Since grave no. 12 contained only a few objects and the surrounding graves were without grave-goods and apparently of late date, the grave may be dated to the 12th century.

With reference to the above, the fitting from Kiiliä can be dated to the end of the 11th century or preferably to the 12th century.

Af Hällström does not discuss any of the other finds from the Kiiliä grave, although – in addition to an early animal-ornamented brooch and the Urnes-style fitting – there were also a penannular brooch with rolled ends which was of a type that was in use for a long period (Salmo 4), as well as penannular brooches of Salmo's groups 13 and 16. Both of the latter types were in use throughout the Crusade Period, and according to Salmo brooches of group 16 were especially common in the 12th and 13th centuries (Salmo 1956 72; see Appendix 2, p. 207). Af Hällström felt that the lack of small penannular brooches in cremation cemeteries indicated that they were no longer in use in the 12th century. The cemetery of Kiiliä contains a part with cremation burials, the finds from which include a small bronze brooch with rolled ends (NM 10201:1) in which the section of the rod is rhomboid as in the small penannular brooches of the Crusade Period.

The inhumation grave of Pahnainmäki in Kalvola. Another datable inhumation grave is known from Pahnainmäki in Kalvola, dated by C. A. Nordman (1924 80–82, 143–146) to the first half of the 12th century or c. 1150. This was based on a round pendant of silver plate (NM 5960:5), with a parallel from grave no. 6 of the Yliskylä cemetery in Perniö. It is dated to the first half of the 12th century (C. A. Nordman 1924 80–81). Af Hällström mentions another parallel from grave no. 28 of the Vanhakartano cemetery in Köyliö, which – on the basis of a pair of round convex-concave brooches of type D and five Arabian coins – is dated to the first half of the 11th century (af Hällström 1948 54–55). Cleve (1978 113–114, Pl. 8) presents this pendant among his first group of pendants from Vanhakartano ("shield-shaped"), which he dates to a period from the end of the 10th century to the mid-11th century. It must also be pointed out that a neck ornament from Lehdesmäki in Hauho, coin-dated to c. 1090 or later, includes a pendant which is quite similar to that from Pahnainmäki (C. A. Nordman 1924 79; Bäcksbacka 1975 100–107; Talvio 1978 XXVIII). This type of silver pendant appears to have been in use for about two hundred years.[39] A coin found in the grave gives a dating to 990/1000–1050 (P. Sarvas 1972 41–42). The coin, however, is in worn condition and fitted with a loop for use as a pendant. Accordingly, the coin dating is probably too early.

With one exception, af Hällström dates the rest of the artefacts from the Pahnainmäki to the 11th century. These are an ear spoon and small penannular brooches. The grave contained brooches of Salmo's groups 15 and 16, dated to the Crusade Period, and especially to the 12th and 13th centuries, as suggested by Salmo (1956 71–72). For af Hällström, the fact that artefacts of this type are not found in cremation cemeteries pointed to the early 11th century. He seems now to have forgotten the possibility of a later dating for the penannular brooches, as the only artefacts mentioned by him as dating to the 12th century are chain lengths, but he goes on to suggest that they came into use earlier (af Hällström 1948 53–55).

A further problem is presented by the swords possibly included in the Pahnainmäki grave, which, together with women's personal ornaments, form an exceptional set of grave-goods. Nordman expressed doubts about associating the swords with a female burial. He referred to fire patina in the bronze hilt of one of the swords and the damaged condition of a sword with an orange segment-shaped pommel.

[39] Leena Tomanterä (oral comm.) has pointed out that, despite similarities, the brooches are difficult to compare. The Pahnainmäki specimen is of a different material and its decoration can possibly be compared to that of the bracelets from Kirk'ailanmäki in Hollola.

Nordman suggested that, like the sword blade fragments at the head of the grave, they belonged to the cremation cemetery part of the Pahnainmäki site, and dated them to an earlier period than the female burial, which he maintained was from the mid-12th century. The grounds for this appear to be based on the assumption that cremation had to be older than inhumation, and accordingly the swords were from c. 1100 (C. A. Nordman 1924 143–146). Af Hällström (1948 55) appears to concur with Nordman, as he does not mention the swords at all in his presentation of the grave. On the other hand, Sarvas feels that the swords belonged to the set of grave-goods. He refers to a find from 1968 of a female burial at Vesitorninmäki in Tyrväntö, which included one or possibly two swords (P. Sarvas 1972 41–42).

According to Leena Tomanterä (oral comm.) the hilt of the ornamented sword shows signs of melting. But otherwise the object does not appear to have been in fire. The slight curve of the blade may have been caused by the weight of the earth and fill in the grave. The other sword, with the orange segment-shaped pommel shows no signs of fire. It was, however, clearly broken in the manner of objects placed in cremation cemeteries. Appelgren-Kivalo's map of the finds from the site shows how the swords were laid crosswise, extending partly over the edges of the grave pit, and they were not carefully placed parallel to the form of the pit as is usually the case in graves with swords (cf. e.g. Luistari, Eura; Lehtosalo-Hilander 1982a). The reason for this may of course have been movement of earth in a barrow in the middle of a field, but on the other hand the set of personal ornaments of the deceased does not appear to have been moved or disturbed. At this point, it can no longer be established whether the swords actually belonged to the grave. If they belonged to the grave-goods, the crayfish-ornamented hilt would link the grave-goods – including animal-ornamented brooches of Häme type – to the eastern crayfish-ornamented brooches. This would indicate a different dating, since the sword is dated to the 12th century (Kirpičnikov 1966 54), as are also the crayfish brooches. Kivikoski (1955a 142) dates the sword to the very end of prehistoric times, however without any specific dates. The chronological limits are expanded by the find of a similar sword from grave no. 5 of the Kekomäki cemetery in Kaukola (Schwindt 1893 41–47, fig. 27; C. A. Nordman 1924 58). A sword from Kiviniemi in Sakkola has a similar pommel (Kivikoski 1973 1170). From outside the area of Finland, there is a find of the sword type from Isborsk to the south of Lake Peipus (Tallgren 1925 121, Taf. XI; Kirpičnikov 1966 54,86, Taf. XXIV, type IIA, refers to the site of the find as Maly). Tallgren dates the sword, in accordance with Nordman, to around 1100 and Kirpičnikov to the 12th century.

Also the sword with an orange segment-shaped pommel, unique in the Finnish material, is of a later type. Forrer (1905 15–16) dates it on typological grounds to the end of the 12th century or the 13th century. Bruhn-Hoffmeyer (1954 pl. 1X) dates the type to the last quarter of the 12th century and the first half of the 13th century. A Russian find from the former *gouvernement* of St. Petersburg is dated by Kirpičnikov (1966 54, 86, Taf. XXVII:3) to the 12th century. According to Kivikoski (1955a 142) the sword type is from the very end of prehistoric times.

If the swords belonged to the cremation cemetery part of the Pahnainmäki site, they would indicate the survival of cremation burials after the introduction of inhumation burial to as late as the end of the 12th century and/or the 13th century.

Following the publication of af Hällström's article, Kivikoski (1955b 38) has discussed the Pahnainmäki grave and suggested a dating to c. 1100 and not the 11th century, as claimed by af Hällström.

Grave no. 22 of the Tuukkala cemetery in Mikkeli and Voiskorovo in Inkere. From outside the area of Häme, a small animal-ornamented brooch of the early type was found in grave no. 22 of the Tuukkala cemetery in Mikkeli. It belongs to sub-group C1c, which does not occur in Häme. The grave also contained a crayfish brooch (Heikel 1889 31). According to af Hällström (1948 58), the grave is one of the oldest in the cemetery, dating back to the beginning of the 12th century. Another brooch of the same sub-group, from Inkere, also points to the 12th century. "It was forwarded to the National Museum along with several other objects, some of which were of much later date. The site of the find has not been investigated properly, and the objects are most probably from various graves of a large (?) inhumation cemetery. Therefore, the find in question does not provide any accurate datings. These finds indicate, however, that at least one of the sub-groups of type C1 was still in use in the early 12th century". Tallgren (1928 163) dated the whole cemetery to c. 1200.

Linturi's views on the early animal-ornamented brooches. The most recent study concerning this material is Elvi Linturi's graduate paper on animal-ornamented oval tortoise brooches (Ailio's groups C1, C2 and D). The study aimed at a typological classification displaying possible local and chronological variants. The starting point was Ailio's observation that the oval tortoise brooches derived from Scandinavian oval tortoise brooches of Jan Petersen's type 48B (JP 48B). The similarity of these brooches is really striking. Linturi aimed at a typology showing an unbroken chain of development from type JP 48B to the animal brooches.

Linturi classes the early animal brooches into

three groups: C1/a-b, C1/2, of which the first and last groups are present in Häme. The brooches from Hauho and Viitasaari belong to the first group and those from Urjala, Kalvola, Sääksmäki and Janakkala belong to the last group. In this connection, Linturi's classification is not discussed, but her datings for the groups are reviewed. Since Linturi mainly accepts af Hällström's datings, the points of criticism presented above are valid also in this connection. This applies especially to group C1/1a, dated on the basis of two brooches found in cremation cemeteries. As pointed out above, the form of burial alone does not justify an 11th century dating for the group.

There are no brooches of group C1/1b from Häme, but the group is an important one for the dating of all of the early animal brooches. One of the specimens was found in the above-mentioned grave no. 22 of the Tuukkala cemetery, dated to the beginning of the 12th century (af Hällström 1948 58) or to the 13th century (C. A. Nordman 1924 43). In addition to the Voiskero brooch, a specimen found later at Paaso in Sortavala suggests a similar dating. Linturi appears to regard the latter alternative as more probable, and with reference to the animal brooch from grave no. 22 at Tuukkala she observes the following: " In my opinion it is probable that the animal brooch from grave no. 22 is considerably older than the grave. A dating e.g. to the turn of the 13th century does not appear to be quite plausible, if we take into account the fact that it represents a typologically older stage than the brooches of group C1/2. The brooch in question is in poor condition, and it could have been preserved for a long time e.g. among scrap metal in a smithy, i.e. as stored raw material, or it may have been lost or discarded, found later and taken into use again." (Linturi 1980 72–73). Linturi's explanation does not seem very convincing. A similar explanation could be applied to all similar cases that are contrary to expectations. The brooch from Tuukkala cannot be regarded as a specimen in poor condition, and its appearance is due to the low relief of the ornament. This feature, in turn, is due to the technique of manufacture.

The graves at Pahnainmäki in Kalvola and Kiiliä in Sääksmäki are of importance for the dating of group C1/2. In discussing the former find Linturi presents a few careless formulations of argument. According to her, af Hällström had demonstrated the incorrect nature of Nordman's dating for the silver plate pendant of the grave (Linturi 1980 75). This is not the case, however, for af Hällström only expanded the chronological limits and showed that the pendant type was known already in the 11th century. Linturi (1980 74–75) also observes that the sword with an orange-segment pommel was from the turn of the 12th century. It is dated, however, broadly to the 12th century and possibly later. According to Linturi, the main chronological criterion for the Pahnainmäki grave is a coin, which places it in the latter half of the 11th century (Linturi 1980 75). P. Sarvas (1972 41) who has studied the coin datings, and whom Linturi quotes, dates the grave to the mid-11th century according to the coin, which is earlier than Linturi's dating. As the coin in question was fitted as pendant and was in worn condition, the main chronological criteria must be the penannular brooches of the grave (Salmo's groups 15 and 16) and the lengths of chains, which indicate the Crusade Period and possibly the period following the 11th century.

With reference to the Urnes-style fitting, Linturi dates the Kiiliä grave from Sääksmäki to the end of the 11th century or the beginning of the 12th century. Af Hällström dates it to the 11th century.

In spite of the similarity with type JP 48B, Linturi's typology for group C1 does not have any chronological fixed points which would unequivocally require a dating of the series to the 11th century.

Closed finds discovered after af Hällström's article. Four graves with oval tortoise brooches of the Häme type have been discovered after the publication of af Hällström's article (Urheilukenttä, Kalvola; Lautamäki, Teuva; Vesitorninmäki, Suontaka, Hattula and grave V/1978 at Kirk'ailanmäki in Hollola). These provide further material on the chronology of the brooches. With the exception of the lily-ornamented brooches (Ailio's group G) from the Urheilukenttä site, all of the above graves contained brooch pairs of the Rokosina or Hauho group (Ailio's E type).

At Lautamäki in Teuva the rich and varied gravegoods, possibly belonging to a male buried together with several females, included brooches of the Hauho group along with four chain lengths, bronze spirals, bronze rings and bells, four penannular brooches, two bracelets, two chain-bearers and chain pendants, a silver plate pendant, four glass beads and three bronze beads, axes, a fragment of a Hanseatic bowl, parts of knives, a scythe blade, three pieces of tinder flint and a strike-a-light (Paloniemi 1960). Paloniemi (1960 36) observes that most of the datable objects, such as the Hanseatic bowl, the oval tortoise brooches, the penannular brooches and the plate pendant justify a dating to the end of the 11th century. None of the finds provide definite evidence of the burial having occurred in the 12th century.

With reference to af Hällström and comparisons with Livonian brooches, Paloniemi dates the oval tortoise brooches to the 11th century. The simple, undecorated Hanseatic bowl is dated according to Grempler (1894) to 1050–1140, while the presently accepted dating is 1000–1300 (Poklewski's group

VI; Poklewski 1961 49). The 11th century parallels to the silver plate pendant of the grave, to which Paloniemi refers, do not include any acceptable parallels. The artefact must be dated according to the general period of use of this group either to the 11th century or later. Two of the four penannular brooches are of Salmo's group 13, one belongs to group 14 and one to group 16. All of the brooches are from the Crusade Period and are among the last brooch types to be used in prehistoric times. They also occurred in the 12th century and the beginning of the 13th century as pointed out above in several connections.

The grave also contained chain lengths, mainly of 12th century types (af Hällström 1948 55). The bracelets of the grave (Kivikoski 1973 748, 1087) and the Hanseatic bowl are of types, the oldest of which are from the 11th century and the youngest from the Middle Ages. The other finds are of long-term or late prehistoric types. Of the so-called Permian artefacts of the grave, the pendants with braided motifs were in use during a period corresponding to the Late Iron Age in Finland (Meinander 1973 147). A pendant with a horse-head ornament is dated to the 12th and possibly also to the 13th century (Rjabinin 1981 21; Golubeva 1979 45; Sedova 1981 30). The axe from the grave is of Petersen's type L, dated to 950–1050 (Petersen 1919 45). Around 1050 burials with grave-goods ceased in Scandinavia, and the further history of the artefact type cannot be followed.

The above shows that, unlike Paloniemi, we cannot explicitly claim that the grave in question is of the 11th century. Belonging to the Crusade Period, it could also have been from the two following centuries.

The Vesitorninmäki grave at Suontaka in Hattula (Tyrväntö) was already partly destroyed when investigated in difficult conditions in late autumn. It contained a pair of Hauho-type brooches as well as twin-spiral chain-bearer, a penannular brooch mainly of Salmo's group 15, a knife with fittings, a scythe blade and two swords (Keskitalo 1969).

Keskitalo (1969 95) dates the grave to the 11th century above all on the basis of a sword with a bronze hilt, which is dated to the second quarter or middle of the century. Of the sword he observes that "it could have been stored for a longer period, though not so long that the artefacts would not fit within the bounds of the 11th century."

Erik Nylén (1973) does not comment upon Keskitalo's dating, and appears to accept it. A similar sword hilt has been found in the Stevns River in Själland in Denmark, although the published illustration of it does not show the decoration in detail. It is dated to the end of the 12th century (Behrend 1970 94,96).

Damascening similar to that of the hiltless sword of the grave (Tomanterä's sword blade group III) can be found in disc-pommeled swords of the Crusade Period. Tomanterä (1978 40–43, 58), however, points out that none of the features clearly indicate the 12th century, and may even go back to the middle of the preceding century. This observation, however, is with specific reference to the Vesitorninmäki grave.

According to Keskitalo, the penannular brooch of the grave is of a type, occurring mainly in early inhumation burials of the 11th century.[40] This is, however, a brooch type occurring throughout the Crusade Period in the same way as the twin-spiral chain-bearer. On the basis of these brooches and the hiltless sword the grave could also be from the 11th century within the limits of the Crusade Period.

The ornamented sword poses chronological problems due to the re-use of swords and their various parts (see p. 42–43). Swords in women's graves are so rare that Keskitalo leaves open the question of whether the case in question was female burial or possibly a twin burial. Nylén (1973 165) suggests that the ornamented sword, which found to the side of the grave, may have belonged to another grave adjacent to it and destroyed in earth moving. This, however, does not explain the hiltless sword placed next to the body. Twin and triple burials of men and women, excavated in Karelia, offer an alternative explanation. If we imagine, for example, how grave no. 1 at Koverila in Kaukola (Schwindt 1893 16) would have looked if the part containing the sword had been removed by a digging machine, we would have a clear parallel to the Vesitorninmäki grave.

The third closed find is grave V/1978 of the Kirk'ailanmäki cemetery in Hollola (Hirviluoto 1985 29; 1984 94). The set of grave-goods consists of a pair of brooches of the Hauho group together with two twin-spiral pendants. They are joined by a chain of spiral band and beads. On the right-hand side of the chain set is a spade pendant. On the right hand of the body was a closed ring of simple form and on the left side an iron knife was found. The personal ornaments also included a necklace of small beads.

Hirviluoto (1985 29) dates the grave to the latter half of the 11th century with reference to the brooches and the spade pendant. The only known parallel to the latter is from a Late Viking Period grave of the Ristiänmäki cemetery in Pälkäne (Kivikoski 1973 772). A ^{14}C dating of the bones of the hand of the corpse gave a probable date of the latter half half of the 12th century (Table 9).

Two lily-ornamented brooches were found in the grave at Urheilukenttä at Kutinen in Kalvola. The

[40] This dating is slightly in conflict with Keskitalo's dating of the ornamented sword (second quarter or middle of the 11th century), which he regards as older than the rest of the objects in the grave.

grave also contained two twin-spiral chain-bearers and chain lengths as well as a penannular brooch of Salmo's group 15. The find is from 1946 and is mentioned in af Hällström's list of material (1948 48). However, he does not discuss it in connection with the dating of the lily-ornamented brooches. The reason for this appears to be that the grave was discovered after he had already completed his manuscript.

Both the chain-bearers and the penannular brooch are from the Crusade Period. According to Salmo (1956 71), the brooch is of a type especially common to the 12th century. Salmo (1956 71) dates the grave to the 12th century, while Kivikoski (1973 11) suggests an 11th century dating, apparently because of the oval tortoise brooches.

A close review of the basis of af Hällström's chronology and a survey of newer closed finds show that there are no grounds for claiming that the oval tortoise brooches of Häme are from the 11th century, and they must be given a broad Crusade Period dating. The find combinations of the graves suggest a certain emphasis on the 12th century. Of special note is the selective attitude of previous studies regarding the small penannular brooches. In some cases they are not discussed at all, while in others their absence is taken as evidence of an 11th century dating for the cremation cemeteries. In these cases the whole group of brooches was regarded as a late phenomenon. In most cases, however, the older dating for the penannular brooches was chosen, even when a different approach could have been possible or a broader dating could have been suggested.

The review of the chronology leads to a situation where C. A. Nordman's (1924 150) observations again seem called for and timely: "By no means do I wish to deny that the form in question came into use already in the 11th century, although this does not receive direct support from the finds, but I feel I can claim that they were common during the century that followed."

The early dating of the brooches of Häme has not always been adhered to in research. Even af Hällström (1948 58), with reference to grave no. 22 of the Tuukkala cemetery and the Voiskorovo find, has to admit that at least the c variant of the C1 brooch type, which was not known in Häme, was still used in the 12th century.[41] Kivikoski (1955b 38) dates the Pahnainmäki grave to c. 1100 and the cemeteries of Savolainen in Konginkangas and Ristinmäki in Nastola to the period following the first crusade to Finland (Kivikoski 1955b 37), although the cemetery finds include plait ornamented, wreath-ornamented and Rokosina brooches. Salmo, on the other hand, dates the Urheilukenttä grave to the 12th century, while Keskitalo (1950 42) dates the wreath-ornamented brooch from Makasiinimäki in Janakkala to the same century.

The dating of the oval tortoise brooches of Savo-Karelia. Three Savo-Karelian types of oval tortoise brooches have been found in Häme: late animal-ornamented brooches (C2), band-ornamented brooches (F) and crayfish-ornamented brooches (H). These groups and certain closed burial finds of later date provide the basis of a review of the Savo-Karelian brooches.

Late animal-ornamented brooches. There are no animal-ornamented brooches from chronologically certain contexts in the Lake Vanaja or Lake Päijänne regions of Häme. On the other hand, grave no. 24 of the Vilusenharju cemetery in Messukylä (Tampere), referred to above in connection with finds indicating contacts, contained a late animal brooch together with two brooches of Salmo's group 13 (Nallinmaa-Luoto 1978 20–22). Linturi classifies the artefact in her group C2/4, dated to the 12th century (Linturi 1980 89–91). Linturi also refers to Salmo and mentions that most of the brooches are of the 11th century, and few from the following century. On these grounds, she claims that the Vilusenharju find is the oldest of the C2 brooches, observing that this result is in agreement with the typological comparison of material.

Salmo (1956 62–63), however, maintains that "die meisten datierbaren Stücke entstammen dem ausgehenden 11, oder dem folgendem Jahrhundert." (see Appendix 2, p. 207). He goes on to point out that the brooch type belongs mainly to the Crusade Period and that the end of furnished burials makes it impossible to trace its further history.

There is also a late coin dating for the late animal brooches from grave no. 3 of the Visulahti cemetery in Mikkeli (NM 12441:16–44). The grave included a pair of animal brooches together with two eared tubular ornaments and two perforated cruciform pendants, a silver ring, a knife with a bronze handle and a Tallinn bracteate dated to 1265–1346 (P. Sarvas 1980 27, bild 4:7).

Ailio (1922b) divided the band-ornamented brooches into four sub-groups: F1 – F4. Of these, only the first group is found in Häme.

The brooches from Ristimäki in Nastola (NM 6995:1, NM 7088:1) are from a grave which included an eared tubular ornament, two perforated cruciform chain-bearers and an animal-ornamented pendant. The set of artefacts indicates Karelia and the dating is the same as that of the Karelian Crusade Period. Kivikoski (1955b 38) dated the cemetery as a whole to the period following the first crusade to Finland.

The size of the brooches is an interesting feature.

[41] According to Linturi (1980 13), this brooch is not of group C1, but forms a separate group (C3).

The F1 brooches from Häme are 7.7 – 7.8 cm long, and are only 0.2 – 0.3 cm longer than the largest oval tortoise brooches of the Häme type. The F3 brooches measure 6.2 – 6.3 cm, for which reason Ailio refers to these artefacts – not present in the finds from Häme – as miniature brooches. Nor are the brooches of sub-group F4 very large, as they are only 6.7 – 6.9 cm in length. The brooches of the two latter sub-groups are of the same size as the early oval tortoise brooches of Häme (5.0 – 7.5 cm). Their small size has been regarded as a chronologically significant feature, and especially one indicating their early date. Despite this, af Hällström, followed by other researchers, have not discussed the small size of the brooches and its possible implications for chronology. Af Hällström (1948 56) has only observed that none of the Savo-Karelian brooch groups can be dated to the 11th century.

Crayfish-ornamented brooches. Among the oval tortoise brooches the so-called crayfish-ornamented brooches form the largest group – also in Häme. In Häme they have been recovered as stray finds or from cemetery contexts without precise datings. Brooches of this type have been found in the above-mentioned Ristimäki cemetery in Nastola, which is dated to the period following the first crusade and is regarded as Karelian in character (Kivikoski 1955b 38).

The only grave with crayfish-ornamented brooches that was not disturbed prior to excavation is from the Kirk'ailanmäki cemetery in Hollola (grave IV/1978, NM 20450). In addition to a pair of crayfish brooches, the grave-goods included Karelian chain-bearers and length of mail chain connecting them and a chain possibly made of bronze spirals. The chain set also included chain lengths and a mosaic bead. Suspended from the right-hand chain-bearer was an ear spoon with sparse decoration and at the waist of the skeleton was an iron knife with a bronze sheath. At the wrists were bracelets of silver-plated copper. The grave also included remains of textiles and pieces of bronze spirals. The head ornament may have included a bead found near the skull (Hirviluoto 1985 30 & 1984 93; Lehtosalo-Hilander 1980b 66–68).

The grave contains both eastern features (brooches, chain-bearers, chain lengths and possibly also the ear spoon) and western elements (knife sheath, bracelets). Hirviluoto (1985 31) dates it to the turn of the 11th and 12th centuries or to the 12th century. Lehtosalo-Hilander (1980b 68) dates the grave to the first half of the 12th century. Both datings are based on the view that western artefacts and chain lengths are from the end of the 11th century and the beginning of the 12th century. However, these objects can also be given a broad Crusade Period dating. According to Lehtosalo-Hilander, the crayfish-ornamented brooches belong to a group (IC) assumed to have been made in the early 12th century (Lehtosalo-Hilander 1980b 69; Lehtosalo 1966 24–25).

The most probable radiocarbon age obtained for the shinbone of the skeleton is the end of the first quarter of the 13th century (Table 9).

Ever since Nordman's study, crayfish-ornamented brooches have been regarded as personal ornaments of the 12th and 13th centuries. In a later connection, Lehtosalo (1966), in accordance with af Hällström, has dated the older, smaller specimens of the type to the 11th century and the latest ones to the beginning of the 13th century. According to her, there are no certain cases of these brooches occurring in graves from the end of the 13th century. Slightly modifying af Hällström's classification, Lehtosalo divides the brooches into two groups: thin (main group I) and wide brooches (main group II). She also points out that the brooches of main group I are similar in dimension to the 11th century brooches of Häme. She does not, however, suggest any datings for groups IA and IB, as the material consists of stray finds. Also a stray find is a brooch from Lenius in Mikkeli, in which the typologically older fastening device (Ailio b) indicates, in Lehtosalo's opinion, the 11th century. According to her, the ornament of this brooch is not as unimaginative as in most other cases: "The sharp contours of the ornamental features and the tapering depressions create a play of light and shade on the surface of the brooches, with an overall impression much the same as in the West Finnish concave-convex brooches of types E and F. Thus, a dating to the 11th century is not out of the question and is even probable." (Lehtosalo 1966 24).

In addition to this visual impression, Lehtosalo also cites as evidence the Kalvola grave, dated to the end of the 11th century by af Hällström, with a sword decorated with the same type of ornament as the crayfish-type brooches. Lehtosalo claims that af Hällström demonstrated that the crayfish-ornamented brooches are a variant of the Hauho group and the other variants of the group (the lily-ornamented and plait-ornamented brooches) "are dated by him on fairly convincing grounds to as early as the 11th century." As further evidence in connection with her group I C, Lehtosalo refers to the Arkuntanhua grave at Sakkola, suggesting that it could be dated to the early 12th century. On these grounds, she presents the possibility that most of the brooches of the group are from the first half of the 12th century, although some of them – mainly the specimen from Lenius – may date back to the 11th century (Lehtosalo 1966 24–25).

With the lack of any definite points of chronology, Lehtosalo's datings appear to be uncertain. Casting technique producing a contoured surface is not

necessarily a chronological trait. The difference between low and high relief may well be the result of using a different brooch for the mould. This does not imply that brooches of low relief are necessarily younger than ones of high relief, or that they would have any appreciable difference in age. With respect to the Pahnainmäki sword, also cited as evidence by Lehtosalo, it must be pointed out that af Hällström does not mention it at all in his article. This may be due to oversight or – more probably – the fact that, following Nordman, he did not regard the swords found around the skeleton as belonging to the actual inhumation burial. In connection with the Pahnainmäki sword (p. 89) it was observed that in most studies it is dated to the 12th century.

The third basis for chronology is provided by the typologically older fastening device of the brooch from Lenius and the 11th century dating of the other variants of the typological prototypes of the crayfish-ornamented swords (the Hauho group). The latter dating was disputed in the above discussion on the brooches of Häme and was extended to include the whole of the Crusade Period. The method of fastening is rare among oval tortoise brooches, occurring only in the specimen from Lenius and in two other brooches. One of these, a half of a C1 brooch, was found among smithy debris and scrap metal at Kaukola (Ailio 1922b). The other specimen is a stray find from the cemetery of Inkere. Tallgren (1928 163) dates the cemetery as a whole to c. 1200. Even according to af Hällström (1948 58), the brooch from Inkere belongs to a sub-group which was in use in the beginning of the 12th century.

The small size of the oval tortoise brooches of Häme (5.0 – 7.5 cm) has become one of the main criteria for their early dating. If size is a chronologically significant feature, the round-ornamented brooches of Savo (B) and the above-mentioned types F3 and F4 of the Karelian band-ornamented brooches should be dated to the 11th century. Af Hällström (1948 64) observes, however, that none of the brooches of Savo-Karelian distribution can be dated to the 11th century. A concrete example of a 12th century dating for a small brooch is grave no. 3 of the Tuukkala cemetery in Mikkeli, which contained a round-ornamented brooch as the pair of a crayfish-ornamented brooch, dated by Lehtosalo to the same century (Lehtosalo 1966 34; Heikel 1889 23).

Lehtosalo (1966 23) states that the division of the crayfish brooches according to their dimensions into thin main group I) and wide (main group II) variants is not arbitrary nor possibly without significance. According to her, it can be observed that the lily-ornamented, plait-ornamented, Hauho-type and early animal-ornamented brooches of Häme, dated by af Hällström to the 11th century, can be classed in the first group according to their dimensions. On the other hand, the large band-ornamented brooches, acanthus-ornamented brooches and the later animal-ornamented brooches, i.e. the East Finnish forms, belong to the latter group. This division, however, does not cover all of the groups.

The minor significance of dimensions and size for chronology is unequivocally indicated by material from grave no. 22 of the Tuukkala cemetery, which contains a crayfish-ornamented brooch of type IIC2, dated by Lehtosalo to the 13th century together with an early animal-ornamented brooch (Heikel 1889 31). The dating of the crayfish brooch is based on grave no. 26 of the same cemetery which included a pair of II C2 brooches together with a silver plate brooch of Gotland type. Lehtosalo, quoting af Hällström, dates the early animal-ornamented brooch mainly to the 11th century. In fact, af Hällström (1948 58) dates this very brooch to the beginning of the 12th century. Lehtosalo points to the worn and old appearance of the brooch – as argued above, these features are assumed as having been caused by the technique of manufacture. She regards the presence of such an old brooch with a considerably younger type as exceptional. She also observes that Nordman's dating of grave no. 26 of the Tuukkala cemetery to the 13th century (C. A. Nordman 1924 43) cannot be placed under doubt. In footnote 43 of the cited article Lehtosalo, however, suggests that Nordman's chronology may have to be revised to some degree. She does not express any doubts concerning af Hällström's datings. In conclusion, Lehtosalo states that "the riddle of grave no. 26 may have to remain a task for future studies." (Lehtosalo 1966 34). The simplest solution may be that the so-called early animal-ornamented brooches and the crayfish brooches are of the same age, since they have been found together.

In a later connection, Lehtosalo-Hilander – and af Hällström (1948 57) before her – suggested the possibility that the round-ornamented Savo-Karelian brooches (Ailio's group B), resembling the studded brooches, as well as some other brooch types are of early date (Lehtosalo-Hilander 1988 184, 194, 201, 210). Grave no. 3 at Tuukkala, which contained a round-ornamented brooch and a crayfish brooch, is dated by Lehtosalo-Hilander (1988 194) to the 11th century on the basis of the above.[42]

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[42] It is interesting to follow how Lehtosalo-Hilander's views on the dating have changed. According to her, the oldest graves at Tuukkala are from the 11th century (Lehtosalo-Hilander 1988 194). However, in footnote 19 (op. cit. p. 241), she mentions only one grave (no. 3) that may probably date back to the 11th century. Grave no. 12 of the cemetery also contained a round-ornamented brooch, but for understandable reasons this damaged and destroyed grave is not mentioned, as it did not contain any other objects worthy of mention. In the footnote Lehtosalo-Hilander refers to her earlier publication (1980a 246–248) where, however, she does not date grave no. 3 to the 11th century, but claims that

The question of the chronological relationship of the brooches of Häme and Savo-Karelia is an interesting one. As the oval tortoise brooches of Häme can be given a broad Crusade Period dating and since burials in the areas of Häme and Savo-Karelia contain objects indicating contemporaneous use, it may not be out of the question that some of the Savo-Karelian brooches are from the 11th century.

If the eastern oval tortoise brooches were already in use in the 11th century, the above-mentioned broochless gap of this century, falling between the brooch types of the Viking and Crusade Periods, would be bridged. However, there is no direct evidence for this at present. It does not seem probable that brooches went temporarily out of use in an area surrounded by regions in which burials with brooches as grave-goods continued until late prehistoric times.

In the light of the 11th century coin finds of Karelia, a gap or interruption in settlement seems even more improbable: the main bulk of the coin finds falls into the 11th century and especially its latter half (Talvio 1979 16). Unfortunately, pollen analyses possibly indicating changes in the intensity of cultivation are not available at present. There are, however, smaller areas, where topographic continuity can be observed, and even cemeteries with both Viking and Crusade Period finds. There are several cemetery finds from Lapinlahti in Sakkola with material from the Merovingian, Viking and Crusade Periods (Naskalinmäki, Lapinlahti: Viking and Crusade Period finds;[43] Virolainen, Lapinlahti: Merovingian and Crusade Period finds; Pajamäki, Lapinlahti: Crusade Period material; Hennonmäki, Lapinlahti – 40 metres from Naskalinmäki: Viking and Crusade Period finds; Kallonen, Hennonmäki, Lapinlahti – 300 metres from the site of Äyräpää's excavations at Naskalinmäki: mainly Crusade Period material). A Viking Period cemetery is located at the foot of the Lopotti hillfort in Kurkijoki and there are Crusade Period finds from the top of the hill. The Viking Period cemetery of Helylä in Sortavala is next to the hillfort of Paaso, where Viking and Crusade Period material has been recovered. Stray finds from Visulahti in Mikkeli include a Viking Period even-armed brooch.

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it is from the beginning of the 12th century. Writing in 1980, Lehtosalo-Hilander refers to an earlier article (Lehtosalo 1966 34–35), in which grave no. 3 is dated to the first half of the 12th century at the latest.

[43] Finds from the Naskalinmäki cemetery at Lapinlahti in Sakkola include an even-armed brooch of the Viking Period (NM 7754:60) and a Crusade Period sword with a lenticular pommel (NM 6923). Oval tortoise brooches have also been found in a field adjacent to the site, but their connection with the above is difficult to determine. They may be from the same cemetery, which would indicate the presence of Viking and Crusade Period brooches in the same context.

It can assumed that no gap or interruption ever occurred and that the observation is based on an error of method. The oval tortoise brooches alone could, on the basis of the above, be dated to the Crusade Period, i.e. the 11th and 12th centuries and the beginning of the 13th century. In Karelia period extends into the following century. Af Hällström (1948 66) anticipated such a possibility: "The oval tortoise brooches of Savo-Karelia have, without exception, been dated to the period of the crusades. As these brooches were in use in Häme already in the 11th century, it seems probable that some of the Savo-Karelian specimens may be older than hitherto assumed. Graves containing objects of Karelian ornament and silver brooches of the Gotland type (e.g. no. 22 at Tuukkala in Mikkeli) may well be from the first half of the 12th century." With respect to ornament, an 11th century dating is also possible. Romanesque plant ornament was already present at that time, and for example the band ornament which was also applied in the brooches is known from 11th century contexts in Novgorod (Kolčin 1971 24, Pl. 9:2).

Lehtosalo (1966) has tried to prove af Hällström's prediction. However, her examples do not constitute proof, although she may be intuitively right – albeit with reference to the wrong brooches. It is possible that the graves which have been dated with reference to foreign material, viz. the silver plate brooches of Gotland type, indicate only one chronological horizon, which, in fact, is precisely what af Hällström suggests. It must also be pointed out that most of the parallels cited by Nordman are from hoard finds in Gotland. Hoards containing objects of different age entail a number of chronological problems. The final coin or final find is not necessarily indicative of the period of manufacture and/or the use of the rest of the material in a hoard.

A more precise chronology and typology for the oval tortoise brooches is a task for future studies. In this connection, their technique of manufacture, i.e. casting from moulds, must also be taken into account. The moulds, in turn, were made from existing brooches. The new mold shrank slightly when fired, but retained the details and features of the prototype, which were then passed on when the new brooch was in turn used for a mould. At the same time, its size diminished again, and so on (cf. the development of the size of Viking Period animal-head brooches, A. Carlsson 1983 80–83).

The technique of manufacture must also be kept in mind in connection with their size and dating, and in connection with e.g. the crayfish-ornamented brooches this may provide interesting details. Contrary to presently-held views, it is possible to claim, with reference to the technique of manufacture, that small size is more probably a late rather than an

Table 10. Loadings of Principal Component Analysis.

	Principal components			
	1	2	3	4
Small penannular brooches	0.61	−0.79	0.05	−0.01
Oval tortoise brooches of Häme type	0.02	0.01	0.05	1.00
Oval tortoise brooches of Savo-Karelian type	0.64	0.52	0.56	−0.05
Other brooches	0.47	0.31	−0.82	0.03
Coefficient of determination (r^2 %)	52	43	4	1

early feature. This, however, applies to the typological age of the artefacts, and implies that the chronological difference between the prototype and the specimens made from it is so small that it cannot be expressed in any absolute archaeological terms. However, it may be possible to devise some kind of "genealogy" based on the technique of manufacture, which, together with analyses of ornament and metallurgical content, may provide new perspectives on the chronology of the groups of oval tortoise brooches and their connections with the ornamental art of the Avar-Slav regions. This may place the accepted division into the Häme and Savo-Karelian groups in new perspective and may even eliminate it to some degree. For example, the early lily-ornamented brooches may have derived from poorly cast specimens of crayfish-ornamented brooches, otherwise regarded as later artefacts (cf. e.g. Ailio 1922b, figs. 18 & 22).

4.6.1.3. Distribution of Crusade Period brooches

The above discussion on chronology and finds indicating contacts permits a closer review of the distribution of the brooches of the Crusade Period. The groups of small penannular brooches are not discussed, as their distribution does not display any clear differences.[44] The oval tortoise brooches, however, fall into two main groups (those of Häme[45] and Savo-Karelia) and they will discussed both together and separately. To begin with, the Lake Päijänne (Päijät-Häme) and Lake Vanaja regions are reviewed as a single area. Because of the small number of finds, the regions of Ostrobothnia, Kainuu and Lapland are combined into an area covering the whole of Northern Finland.

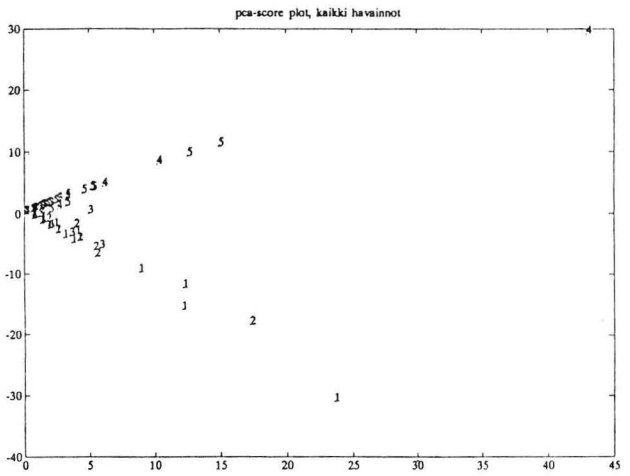
The brooches form such a large body of material that systematic differences and variation can be investigated with Principal Components Analysis (Anderson 1984). With this method, variability within a body of statistical material can be assigned to so-called principal components. The first principal component represents the direction in which variability is greatest, while the second component indicates variability which is statistically independent of the former and second in magnitude to the former. The following principal components are defined accordingly. By reviewing the location of observations on the principal component coordinate system (score plot), the principal components can be given logical interpretations. In this case, the observations consist of the frequencies of the various brooch types (each observation involves four variables: the numbers of penannular brooches, oval tortoise brooches of Häme, oval tortoise brooches of Savo-Karelia and other Crusade Period brooches).

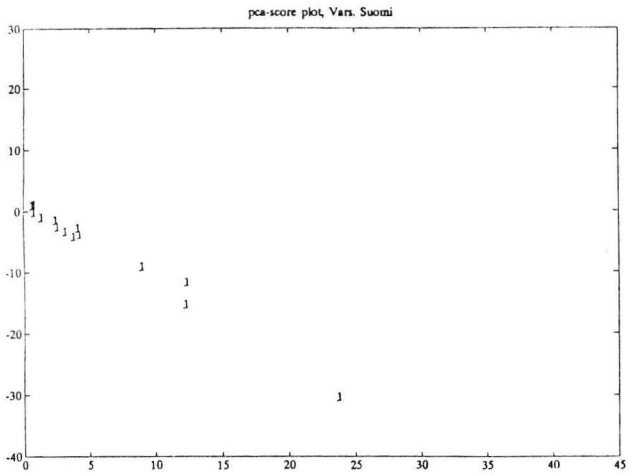
Projected onto the score plot of the first two principal components (Fig. 35), the material indicates a clear split into two branches. The interpretation of this dichotomy becomes apparent when geographical data is added (Fig. 35). The lower branch contains only observations from Western Finland, Häme and Northern Finland, while the upper branch contains observations from Eastern Finland, Häme and Northern Finland. Thus, Häme and Northern Finland are represented in both parts of the plot. A clearer view of variation in the occurrence of the brooch types is provided by the so-called loadings of the principal components. All of the four variables have their own weight or loading for each of the principal components (Table 10).

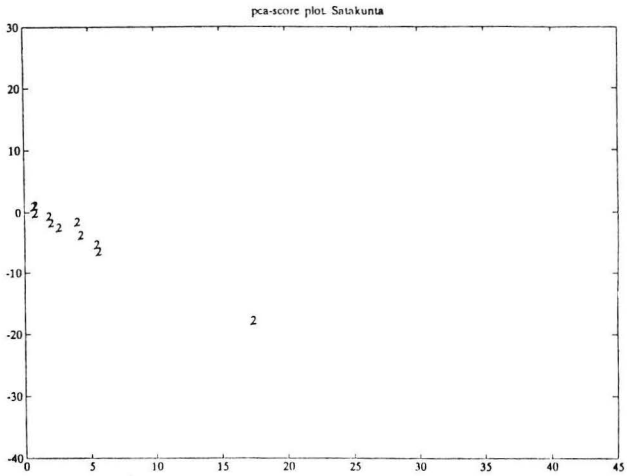
The table clearly shows that the first principal component represents the total number of brooches per observation (x- axis in Fig. 35). The second principal component represents east-west variability (y-axis in Fig. 35) and the loadings suggest that this component is dependent on the ratio of penannular

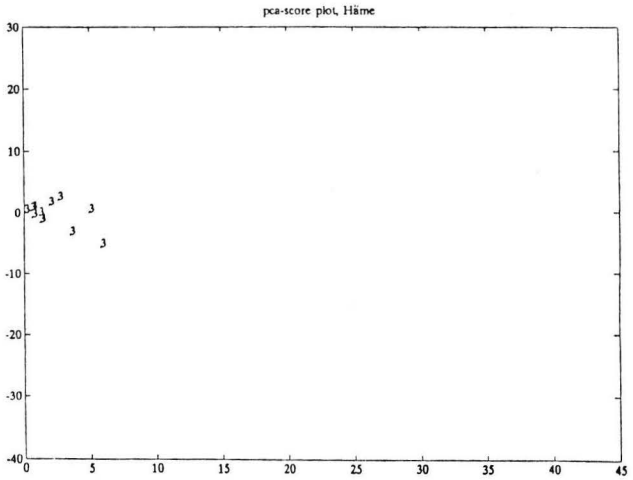
[44] Only the floral-knobbed brooches (Salmo's group 14) seem be limited to Satakunta and Finland Proper. A detailed stylistic and metallurgical study of the other groups may possibly indicate smaller sub-groups.

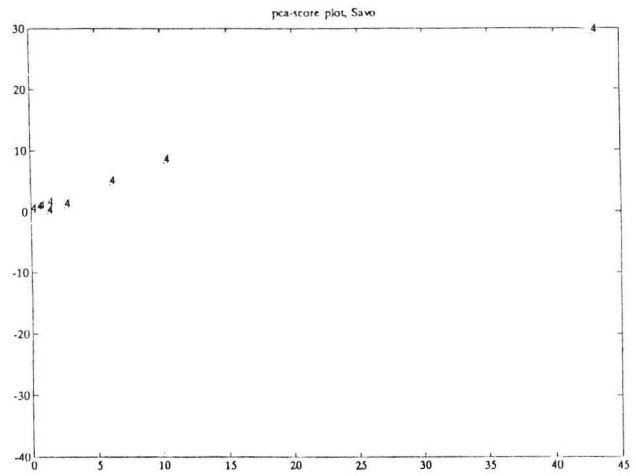
[45] It is not exactly correct to refer to this small body of material as Häme or Häme-type brooches. The situation can be altered by even a single new find. For example, two wreath-ornamented brooches (J) have been found in Häme and Savo and single specimen in Karelia. The overall centre of distribution is in the east. A technical-genealogical review of the distribution may form a different picture of the material.

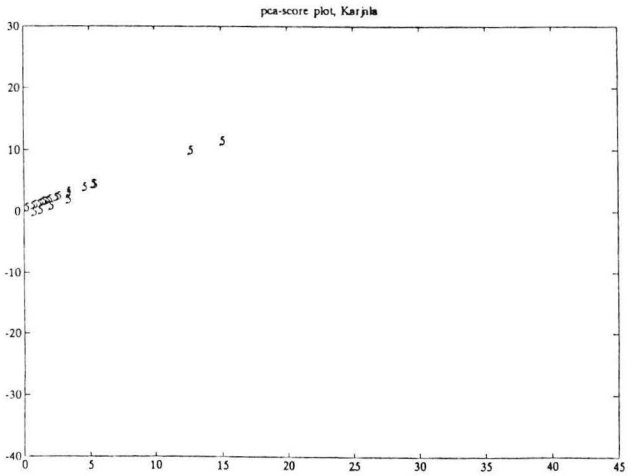












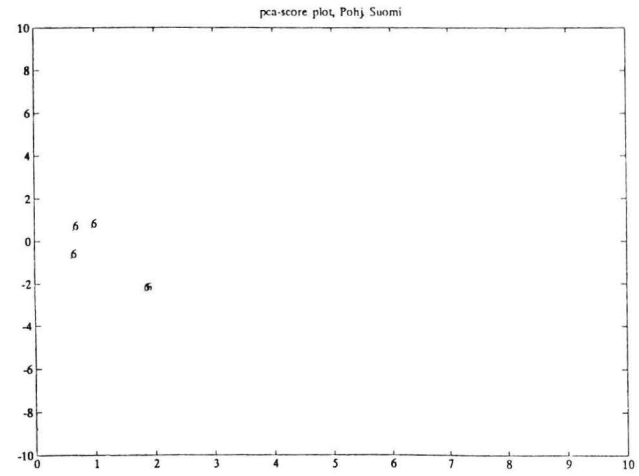


Fig. 35. Principal component plots: two first principal components of brooch type frequencies. The x axis is the first principal component (related to abundance, see Table 10). The y axis is the second principal component (related east-west pattern differences). In this connection, Häme includes both the Lake Vanaja and Lake Päijänne regions. Kaikki havainnot = all observations, Vars. Suomi = Finland Proper, Pohj. Suomi = Northern Finland.

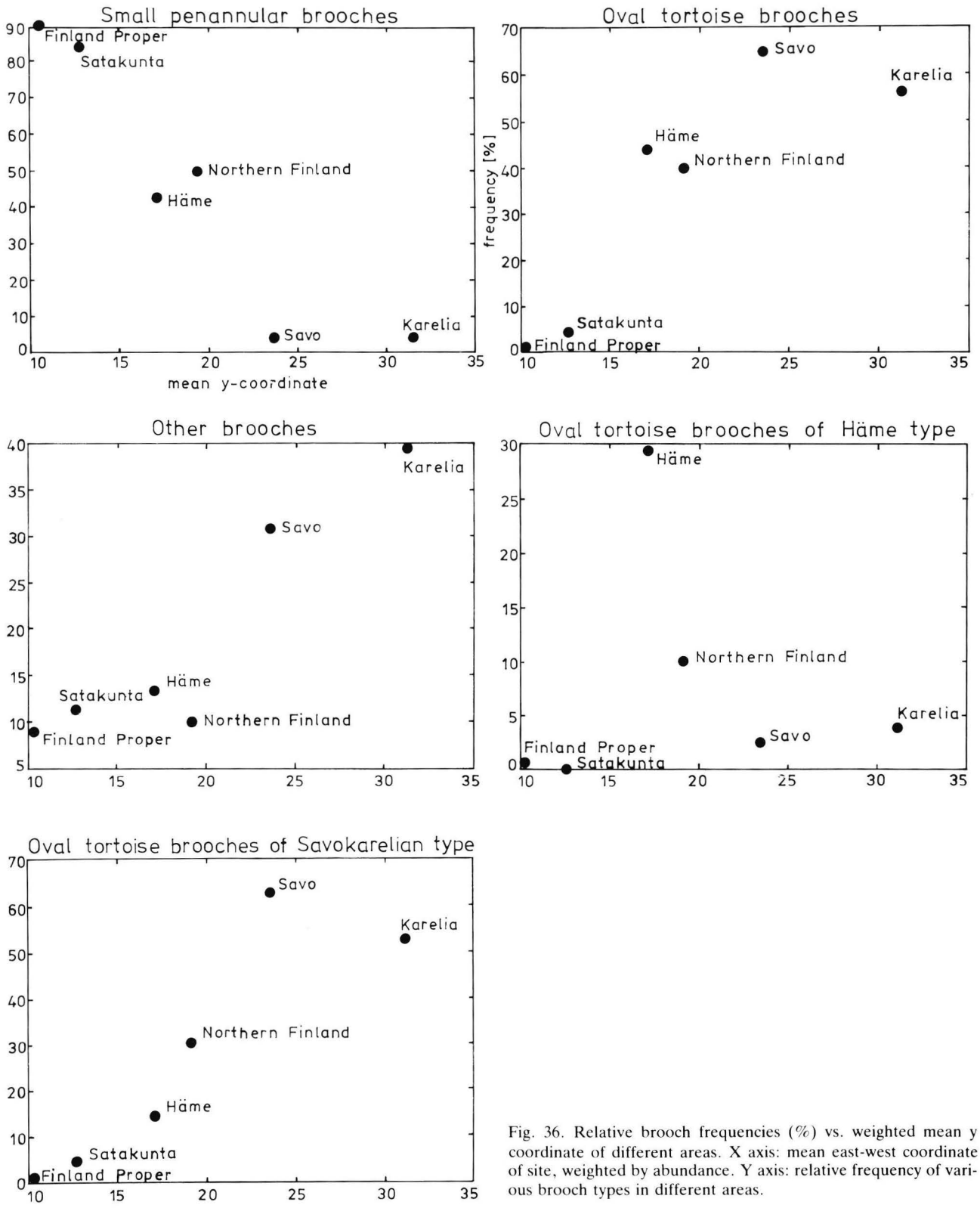


Fig. 36. Relative brooch frequencies (%) vs. weighted mean y coordinate of different areas. X axis: mean east-west coordinate of site, weighted by abundance. Y axis: relative frequency of various brooch types in different areas.

brooches vs. oval tortoise brooches and other types. The projetions of the brooch frequencies on this axis provide a kind of east-west index. It must also be noted that differences become more apparent with larger obserations (i.e. total number of brooches). The third factor possibly indicates variability within Savo-Karelia and the fourth refers to the variability of the oval tortoise brooches of Häme.

As east-west variability is the main feature (following the total numbers of finds) it is natural to survey the mean distribution of the various brooch types on the east-west axis. This was done by calculating relative (i.e. percentual) frequencies for the various brooch types in the geographic areas concerned and plotting this data as a function of the weighted mean east-west coordinate (Fig. 36). Fig.

36 clearly shows how the number of penannular brooches decreases towards the east and is approximately the same in Savo and Karelia. The oval tortoise brooches display an opposite trend. Other brooch types have a relatively even distribution from Satakunta to Häme, whereas Savo and Karelia have clearly greater numbers of them. Viewed separately, the two main groups of oval tortoise brooches display certain specific features. The brooches of Häme type are rare except in the actual area of Häme, although they are slightly more common in Eastern Finland than in the west. Savo-Karelian brooches are clearly more numerous in the east, but also Häme stands out with greater numbers of finds than in Finland Proper and Satakunta, where the brooches in question are few in number.

The statistical analyses show that in the Crusade Period Häme was an area where the eastern and western cultures mixed. Accordingly, it developed a material culture different to that of the rest of Western Finland. The pattern for Northern Finland is highly similar. Due to the relatively small amount of material, this area will not be discussed in the following. The case of Häme is interesting with respect to possible differences between the actual study area of Päijät-Häme and the nearest western area of comparison, the Lake Vanaja region.

As there are fewer finds from Häme than the rest of the permanently settled areas, statistical methods could not be applied in this connection.

The basic problem in the case of Häme is the small number of extensively excavated cemeteries. The available finds are mainly stray finds from destroyed cemetery sites and other contexts. The situation, however, has been somewhat exaggerated by scholars, and extensive excavations are rare in other areas as well. In spite of excavations in Karelia, which have been regarded as extensive (e.g. Kivikoski 1961 262), A. Saksa (1985 43–44) claims that even there only 22 undisturbed Crusade Period graves are known.[46]

Of the 29 cemeteries in Häme with finds of the Crusade Period, five[47] did not contain Crusade Period penannular brooches nor oval tortoise brooches. Of the remaining cemeteries, seven contained solely oval tortoise brooches[48] and six[49] revealed penannular brooches along with the former. The eleven remaining cemeteries[50] contained only penannular brooches. In these localities, with the exception of Vanaja, Kuhmoinen and Iitti, oval tortoise brooches of the Crusade Period have been found in other contexts as well. They have also been found in the parishes adjacent to Vanaja, Kuhmoinen and Iitti. Even taking into account the small number of cemetery finds and the predominance of stray finds in the material, the oval tortoise brooches appear to form a representative sample. The overall impression provided by the cemetery material is underlined by a survey of all of the localities and their stray finds.

Despite the small number of reliably excavated and recovered grave finds, the total number of all of the brooches and the proportions of the various groups provide important data on the grave-goods of men and women in Häme in the Crusade Period. Table 11 also presents as comparative material grave finds of the region of Tampere and the parish of Vesilahti, which have often been included in Häme. The table shows that in most cases the sets of grave-goods included small penannular brooches, oval tortoise brooches and chain-bearers. Also included are knives, belts, strike-a-lights and axes. Other categories of material are to such a degree irregular in occurrence that they cannot be taken into account.

Brooches and chain ornaments indicate in the case of Häme the presence of three typically different sets of Crusade Period brooches in burials: 1) one or two penannular brooches, 2) two oval tortoise brooches, a penannular brooch and one or two chain-bearers and 3) two oval tortoise brooches and two chain-bearers without a small penannular brooch. However, a simple review of brooch combinations does not suffice, as they belong to dress and practical functions. Where possible, brooches should be viewed together with remains of textiles. This data could provide indications of changes in costume and differences between the various areas and regions. Because of the small number of textile finds from Häme, this is not, however, possible.

As indicated by Table 11, the distributions of the three combinations of brooches in Häme are exceptionally interesting. The combination of a pair of oval tortoise brooches as the clasps of a shoulder-worn dress and a penannular brooch worn with a shirt or a cloak is lacking in the graves of Sääksmäki

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[46] Unlike Saksa, I have included the Patja site at Sakkola (1937) among disturbed grave finds.

[47] Mainiemi, Toijala; Linnaniemi and Karlberg in Hämeenlinna; Nisula, Lammi; Siivolanpelto, Sysmä. The finds from Karlberg and Siivolanpelto include, however, chain lengths (NM 3090:1, NM 17181:4) which were generally used together with oval tortoise brooches.

[48] Koivuniemi, Pälkäne; Kevola, Hattula; Katinkivenpelto, Tyrväntö; Vähä-Kurki, Janakkala; Männistönmäki, Hauho; Ristimäki, Nastola; Savolainen, Konginkangas.

[49] Kiiliä, Sääksmäki; Konginkangas Urheilukenttä, Kalvola; Vesitorninmäki, Hattula; Makasiinimäki, Janakkala; Kirk'ailanmäki, Hollola.

[50] Toppolanmäki, Sääksmäki; Ristiänmäki, Pälkäne; Kinnari, Hämeenlinna; Hinnonmäki and Kirkkomäki, Hattula; Imatran Voima, Vanaja; Kirkkomaa, Janakkala; Kalomäki, Hauho; Santahaudanmäki, Koski; Rantala, Kuhmoinen; Perttola, Iitti. The Kalomäki finds include, however, a chain length (NM 18468: 2071) generally occurring together with oval tortoise brooches and a palmette-ornamented silver plate pendant of eastern distribution (NM 1232:4) was found at the Rantala cemetery.

Table 11. Reliably documented inhumation burial sites of Tampere, Vesilahti, the Lake Vanaja region of Häme and Päijät-Häme. Excluded are the mass graves of four inhumation burials and two cremations at Kirk'ailanmäki in Hollola. One of the bodies had two bracelets on one arm and one on the other and a penannular brooch on the chest. Of the Vilusenharju cemetery only those graves are included which Nallinmaa-Luoto (1978) has dated to the Crusade Period. Abbreviations: H = Häme, SK = Savo-Karelian, W = West Finnish.

Site	Oval tortoise brooch	Penannular brooch	Shield-boss-shaped brooches	Twin-spiral chain-bearers	Cruciform chain-bearers	Chain lengths	Knife	Belt buckle	Strike-a-light	Sword	Axe	Other finds
Vilusenharju, Tampere gr.7							2	2	2			
,, gr.8		1							1		1	Eared tubular ornament.
,, gr.12											1	A sword, two spearheads, a bit, a scythe-blade and arrowheads were found outside the coffin in the cremation cemetery area. The coffin was nailed shut with a knife, arrowheads and nails.
,, gr.12a											1	Seven spearheads, a knife, a sword guard, a sword and kettle-hangers were excavated from the cremation cemetery.
,, gr.24	1(SK)	2										
,, gr.31		3					1					A silver ring, beads, textile remains and bronze spirals.
,, gr.32							1	1				A cruciform iron fitting, a silver filigreed bead, a piece of flint.
,, gr.39		4					2					Textile remains and spirals.
,, gr.39a							1		1			
,, gr.40		2										
,, gr.41							1					A silver coin, pot sherds etc. from fill that was most probably from the cremation cemetery.
,, gr.42												A scythe-blade, five arrowheads, a bronze kettle, a lock, eight weights, two silver coins, textile remains and spirals.
Rukoushuone, Vesilahti gr.I			1	1(W)			1					A bird pendant, six small bronze rings.
,, gr. II		2					1					Two bird pendants, a silver coin, beads, bronze rings.
,, gr.III							1	1	1			A piece of flint, a nail fragment and a spearhead.
Toppolanmäki, Valkeakoski gr. II		1					1		1		1	A ring.
Toppolanmäki, Valkeakoski gr. IV		1	2	2(W)		2						
Toppolanmäki, Valkeakoski gr. VI		2		1(W)								
Toppolanmäki, Valkeakoski gr. VII		2										A harpoon.
Toppolanmäki, Valkeakoski gr. VIII							1		1			Shears.
Kiiliä, Valkeakoski	1(H)	2										An Urnes-style fitting.
Pahnainmäki, Kalvola	2(H)	2		2(W)		2	1			3?		A silver plate pendant, a silver coin, an ear spoon, a bear's tooth pendant, a spiral ring, shears, a piece of bronze rod and bronze spirals.
Urheilukenttä, Kalvola	2(H)	1		2(W)		2						A piece of band, textile remains and a piece of iron.
Vesitorninmäki, Tyrväntö	2(H)	1		1(W)			1			2?		A sickle.
Kirkkomaa, Janakkala gr.1		1					1	1	1		1	A hanger with a fitting, a ring and a pot sherd.
Makasiinimäki, Janakkala		1					1					A bead and a fragment of an iron ring.
Kirk'ailanmäki, Hollola gr. 43		1										
Kirk'ailanmäki, Hollola gr.I/1978												A pair of bracelets.
Kirk'ailanmäki, Hollola gr.IV/1978	2(H)			2(SK)		2		1				The chain-set also includes iron rings, a bead, an ear spoon and other finds; bronze spirals, a bead and bracelets.
Kirk'ailanmäki, Hollola gr.V/1978	2(SK)					2	1					A chain-set consisting of spirals, beads and a spade-shaped pendant; a ring and a bead necklace.
Ristimäki, Nastola	2(SK)				2							An eared tubular ornament and a bird pendant.

(Valkeakoski) in Häme. Nor does it occur in Upper Satakunta. However, oval tortoise brooches are not completely lacking from Sääksmäki or Upper Satakunta. Three specimens are known, including a stray find of a crayfish-ornamented brooch from Pispala in Tampere. Grave no. 24 of the Vilusenharju cemetery in Messukylä (Tampere) contained an oval tortoise brooch and two penannular brooches. The oval tortoise brooch was used as one of the brooches clasping the shoulder-worn dress on the right-hand side (Nallinmaa-Luoto 1978 20). The Kiiliä cemetery in Sääksmäki included a grave with an early animal-ornamented brooch, two penannular brooches and an Urnes-type fitting. In this case, the

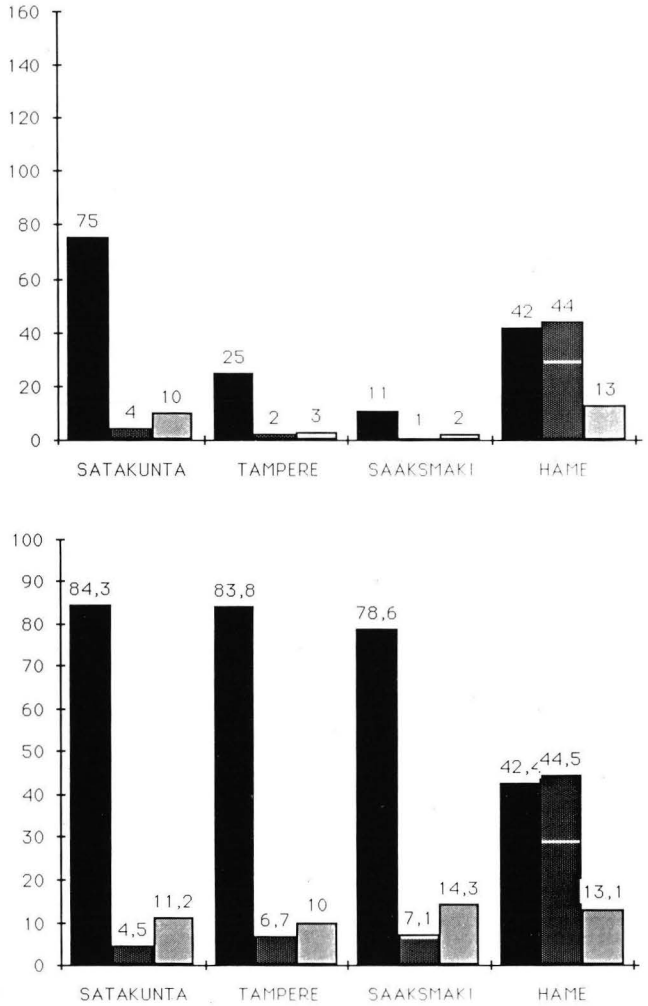

Fig. 37. Absolute (upper diagram) and relative (lower diagram) frequencies of Crusade Period brooches from Häme, Satakunta, Tampere and Sääksmäki. Black histogram = penannular brooches, hatched histogram = oval tortoise brooches, grey histogram = other brooch types. The part below the white line in the bar for the oval tortoise brooches indicates brooches from Häme and the part above the line brooches from Savo-Karelia.

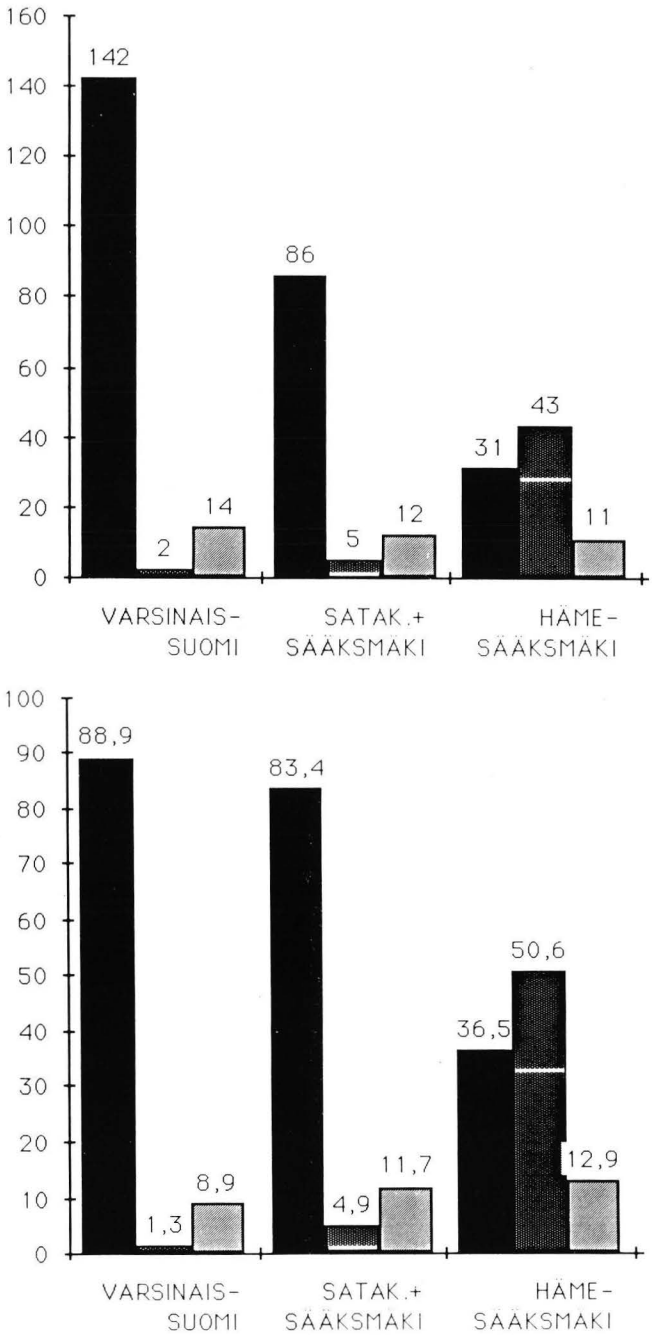

Fig. 38. Absolute and relative frequencies of Crusade Period brooches from Satakunta (Sääksmäki excluded) and Häme (Sääksmäki included). Key to symbols in Fig. 37.

finds were recovered by workmen at the site, and the exact combination of the brooches and remains of clothing cannot be known.

The "wrong" combinations and use of oval tortoise brooches suggests that it was foreign to Upper Satakunta and the locality of Sääksmäki and did not belong the "national" set of ornaments there.[51]

Of significance in this connection is the fact that there are no oval tortoise brooches from the late prehistoric Toppolanmäki cemetery of Sääksmäki which has been excavated extensively, with numerous finds of penannular brooches.[52] The brooch material resembles that from Vilusenharju.

Sääksmäki is thus an exception in the direction of Häme. It is significant insofar as no reference can be made to any small number of excavated cemeteries. In addition to Kiiliä and Toppolanmäki a number of other excavations have been carried out in the locality, and it has been the subject of wider anti-

[51] The Vilusenharju cemetery in Messukylä revealed other "anomalous" combinations of ornaments as well. Women's artefacts were found in three men's graves. Grave no. 8 contained an eared tubular ornament, grave no. 14 a D-type brooch on a cloak and another grave contained an F-type brooch also on a cloak (Nallinmaa-Luoto 1978 10,16,17).

[52] Grave IV at Toppolanmäki, however, contained two chain lengths, which occur together with round convex-concave brooches of shield-boss shape.

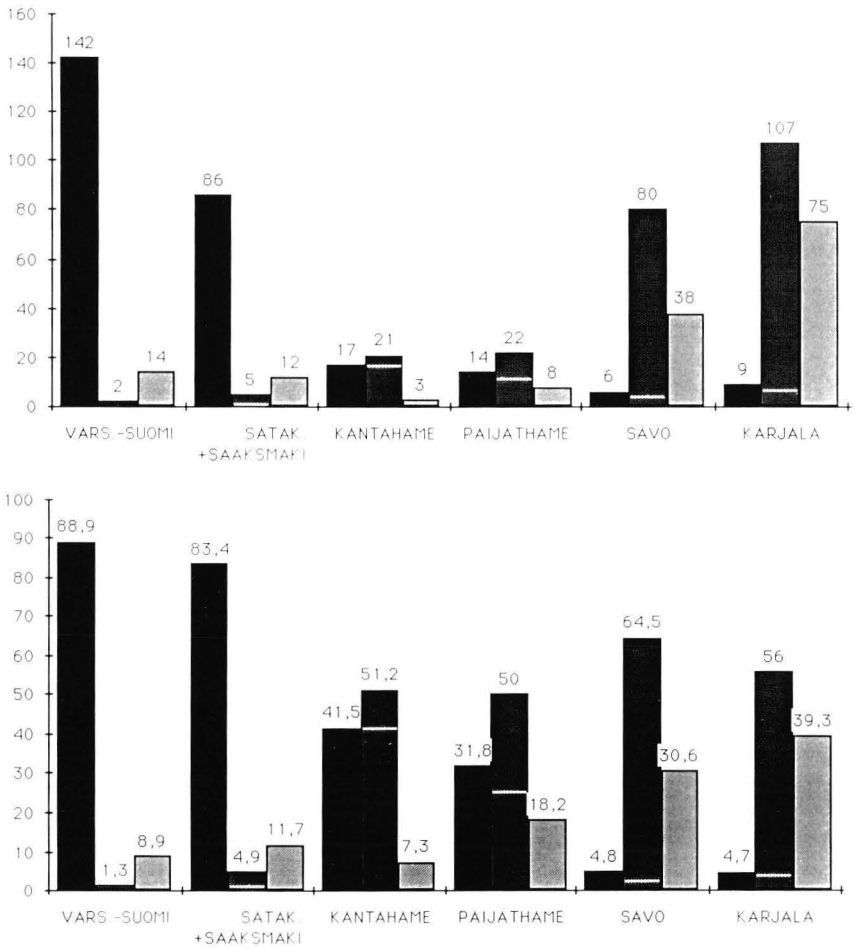

Fig. 39. Absolute and relative frequencies of Crusade Period brooches from Central Häme and Päijät-Häme. Key to symbols in Fig. 37.

quarian interest than other areas. Thus, the material from Sääksmäki is not based only a few stray finds. A comparison with the brooches from Tampere demonstrates the similarity of these areas. Further comparisons of these areas with the bulk of material from Satakunta and Häme show that they clearly belong to Satakunta (Fig. 37).

The finds from Sääksmäki can thus be excluded from the data for Häme and added to the Satakunta material. The new situation is shown in Fig. 38.

The combinations of ornaments can be further reviewed in the light of revised numbers. Häme is now divided into the original study area of Päijät-Häme and the central region of Häme, equivalent to the above-mentioned Lake Vanaja region with the exclusion of Sääksmäki.

Also the combinations of grave-goods must be reviewed in new perspective (table 11). Thus far, there are grave finds to the southeast of Upper Satakunta and Sääksmäki two or more penannular brooches. In all cases the brooches occur singly in the graves. Furthermore, the number of graves with oval tortoise brooches is twice that of those with penannular brooches. Fig. 39 shows clearly that penannular brooches form a minority in the finds from Central Häme and the Lake Päijänne region. A closer comparison of the numbers of brooches shows that there are slightly more penannular brooches in the western parts than to the east. Another interesting detail is the clear predominance of the oval tortoise brooches of Häme type in Central Häme and with correspondingly small numbers of Savo-Karelian oval tortoise brooches. The respective groups display even numbers in Päijät-Häme. Other brooch types are few in number in Central Häme, whereas they form a significant part of the material in Päijät-Häme.

According to table 11 penannular brooches occur either singly or together with oval tortoise brooches. As the single small penannular brooches – as well as penannular brooches in general – are mostly found in men's graves (see e.g. brooches listed in Lehtosalo-Hilander 1982b 105; A. Carlsson 1988 81), graves with only one penannular brooch can be classed as male burials in both of the above parts of Häme, unless the grave-goods include a woman's artefact. In both Central Häme and the Lake Päijänne region the personal ornaments in men's graves are of a West Finnish nature. On the other hand, the majority of the corresponding women's material differs from that of Western Finland. In Central Häme the small penannular brooches and the small number of other brooch types in the sets of ornaments link the area to the west. On the other hand, further to east in Päijät-Häme western broo-

ches no longer occur, and the graves contain only oval tortoise brooches.[53] The absence of small penannular brooches is an eastern feature. In Savo-Karelia they are replaced by other brooches, which have not been found so far in the preserved women's graves of the Päijät-Häme region. Silver plate brooches, worn by women, are included, however, among the finds of the Ruuhijärvi hoard from Nastola. The proportion of other brooch types is considerably greater in Päijät-Häme than in areas to the west, which is an eastern feature.

An eastern feature of Päijät-Häme is also the increase of Savo-Karelian brooches so that they occur in even numbers in comparison with those of the Häme type. Despite the lack of West Finnish penannular brooches and the other eastern traits of the women's graves of Päijät-Häme, they also contain western artefacts, e.g. western twin-spiral chain-bearers worn together with brooches of Häme type and West Finnish bracelets together with Karelian oval tortoise brooches.

With respect to the combinations of brooches, Central Häme and Päijät-Häme form two different areas. The former can be described as the western and the latter as the eastern part. Typical of Central Häme are oval tortoise brooches of Häme type and small western penannular brooches in the women's graves. In Päijät-Häme, the brooch combination consists of a pair of oval tortoise brooches of Häme or Savo-Karelian type without small penannular brooches. In both areas, men were buried according to the West Finnish custom with a penannular brooch.

The numbers of oval tortoise brooches and penannular brooches appear to reflect to some degree the above-mentioned combinations of men's and women's ornaments in graves and they lend support to the conclusions presented in this connection. In Central Häme oval tortoise brooches outnumber penannular brooches by a factor of 1.2. The corresponding figure for Päijät-Häme is 1.7.

An interesting example of how stray finds can reflect the combinations of ornaments in preserved graves is the ratio of Merovingian Period even-armed shoulder brooches and crayfish brooches. The former were worn in pairs as the clasps of a shoulder-worn dress and the latter were used singly as the clasp of a shirt. According to Kivikoski (1961 68), "the approximately one hundred crayfish brooches found in Finland are matched by roughly two times as many even-armed brooches – a ratio indicating that these brooches were generally worn in the manner observed in inhumation burials." (cf., however, Pihlman 1987). In Central Häme the ratio of small penannular brooches and oval tortoise brooches is not quite the same, as the penannular brooches were also worn by men. In Päijät-Häme, on the other hand, oval tortoise brooches should outnumber small penannular brooches by a factor of more than two, as the latter were not worn by the women of the region. This, however, is not quite the case. The figures may be skewed by the five brooches found at the Kuhmoinen hillfort, which is an exceptional location. This may unduly emphasize the number of penannular brooches in Päijät-Häme where the other brooch types are either from stray contexts or cemeteries. Excluding the above finds, we obtain a ratio of 2.86.

The combinations of brooches suggest a tempting possibility of redefining the boundaries of Päijät-Häme, despite the fact that the areas in question have not been the scene of excavations as large or extensive as in Sääksmäki, which has been proven to have belonged to the West Finnish cultural sphere.

A find from the parish of Koski on the western boundary of Päijät-Häme includes two penannular brooches and two oval tortoise brooches of Häme type, but no eastern oval tortoise brooches – a combination suggesting that Koski was more a part of Central Häme than Päijät-Häme (cf. Fig. 39). If Koski is included in Central Häme, the absolute and relative frequencies of small penannular brooches and oval tortoise brooches of Häme type in Päijät-Häme decrease with a corresponding increase in the proportion of Savo-Karelian brooches (and all oval tortoise brooches as well) in the region of Päijät-Häme. In Central Häme, on the other hand, the material from Koski has hardly any effect on the proportions of the brooch types (Fig. 40) which may indicate that Koski actually belongs to Central Häme.

The eastern boundary of Päijät-Häme is also difficult to determine. The Ristimäki cemetery in Nastola contained an oval tortoise brooches of Häme type and four of Karelian type, but no penannular brooches. The absence of penannular brooches and the large number of Karelian brooches and chain ornaments are eastern traits along with the clear lack of definitely western artefacts. On the other hand, the small penannular brooches were not replaced by any other brooch types, which is the case elsewhere in Päijät-Häme.[54] As the combination of finds from Ristimäki does not have any parallels, the

[53] An exception to this may be a mass burial at Kirk'ailanmäki in Hollola which consisted of four inhumations and two cremations. In this context, one of the deceased was fitted with a single penannular brooch. Bracelets worn on the arms of the body indicate that it was a woman. On the other hand, an inhumation burial from Untamala in Laitila was attributed to a man despite the presence of a bracelet among the grave-goods (K. Itkonen 1964 47).

[54] On the other hand, the Harakkamäki hoard in Nastola includes four silver plate brooches.

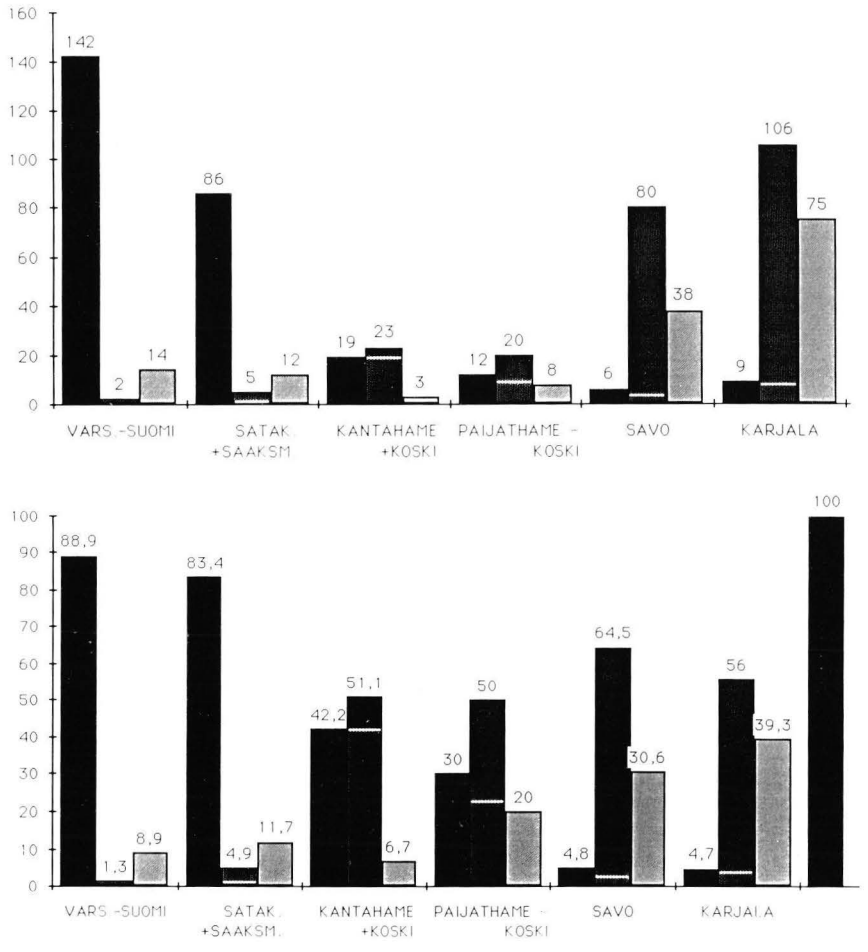

Fig. 40. Absolute and relative frequencies of Crusade Period brooches from Central Häme (parish of Koski included) and Päijät-Häme (Koski excluded).

problem of the eastern boundary of Päijät-Häme cannot be resolved in this connection, especially as finds from Iitti, immediately to the east of Nastola, include a small penannular brooch but no oval tortoise brooches.

Comparisons between Central Häme and Päijät-Häme require a review of the sets of grave-goods of Savo and Karelia and their common and differing features.

According to Kivikoski (1961 270–271), the sets of grave-goods from Savo are purely Karelian, but their combinations display certain differences. In the material from the Tuukkala cemetery in Mikkeli the *sykerö* head ornaments are completely absent and there are no finds of shears or sickles which are common in the Karelian cemeteries of the Käkisalmi region. Also the decoration of the belts is different. On the other hand, the numerous penannular brooches of silver and the heavy chain-sets as well as acanthus ornament and many other simpler Karelian forms link them to the material culture of Karelia.

The cemeteries of Tuukkala and Visulahti in Mikkeli, which have been the scene of the most extensive excavations in the region, have also stirred debate and discussion.

Kivikoski observes that the same forms of burial and artefacts are present at Visulahti and Tuukkala, but the overall impression of the former is considerably less affluent. The only silver artefacts are a few rings, and other personal ornaments are comparatively few. According to Kivikoski, the differences between these cemeteries are difficult to explain. In chronological terms they are partly simultaneously and partly close in time. It does not seem probable that the local population of Tuukkala was to such a degree more affluent than the people of Visulahti, that it would characterise the material of the cemetery.

Lehtosalo-Hilander (1988 210–211) defines as the set of ornaments of dress used in Savo the following: so-called shoulder-worn brooches, chain-bearers with various pendants, chains of rings and lengths with appended knives and brooches worn with shirts and veils, viz. silver plate and penannular brooches. The latter do not include penannular brooches of convex rods (Salmo's group 26) which were used in Karelia. Where Kivikoski underlines the less-affluent character of the Visulahti cemetery, Lehtosalo-Hilander refers to a significant difference in the accoutrements of the female burials at Visulahti and Tuukkala. At Visulahti three of the nine female burials had rings, while at Tuukkala none of the 16 women had rings. Lehtosalo-Hilander also points out that only two rings were found in the Tuukkala

cemetery as stray finds.[55] In her summary of the differences between Savo and Karelia Lehtosalo-Hilander (1988 223–224) mentions that in Savo women adopted Karelian-style ornaments for their dress, but decorated the textiles with bronze spirals in a different fashion. Like the Western Finns, the people of Mikkeli buried their dead in simple coffins and did not hold grave-feasts at the site. If the women's brooches, the men's necklaces and a few Karelian axes are excluded, the graves of Visulahti and Tuukkala could not be linked to Karelia, but to the late prehistoric inhumation cemeteries of Western Finland. According to Lehtosalo-Hilander, the Mikkeli region developed a specific material culture in the Crusade Period, the main features of which are by no means the same as in the Lake Ladoga region of Karelia.

Comparisons between the cemeteries of Mikkeli must be limited to the extensively excavated Tuukkala and Visulahti sites. The women's graves of Moisio and Kyyhkylä are more problematic due to the practice of cremation at these sites. The numbers of brooches from the latter cemeteries should be mentioned, however. At Kyyhkylä, one penannular brooch (Salmo 13) and one oval tortoise brooch were found, while at Moisio one penannular brooch (Salmo 15) and three oval tortoise brooches were found.

Of interest in this connection is a difference in the burial assemblages which researchers have overlooked in the past – the different sets of women's ornaments and brooches at Visulahti and Tuukkala respectively. This feature may be of significance. Especially textile experts underline the importance of difference in sets of personal ornaments, as they provide data on dress and changes in fashions (e.g. Lehtosalo-Hilander 1980a).

In the case of Tuukkala, two different combinations of personal ornaments can be observed in the intact women's graves (table in Heikel 1889 and later excavation reports): 1) oval tortoise brooches with chain-sets and a silver plate, penannular and/or ring brooch, 2) oval tortoise brooches and chains alone. The first combination occurs in six graves (40%) and the second combination in nine graves (60%) out of fifteen (Fig. 41). The stray finds from Tuukkala (Fig. 42) – five ring brooches, three silver plate brooches, seven penannular brooches and 16

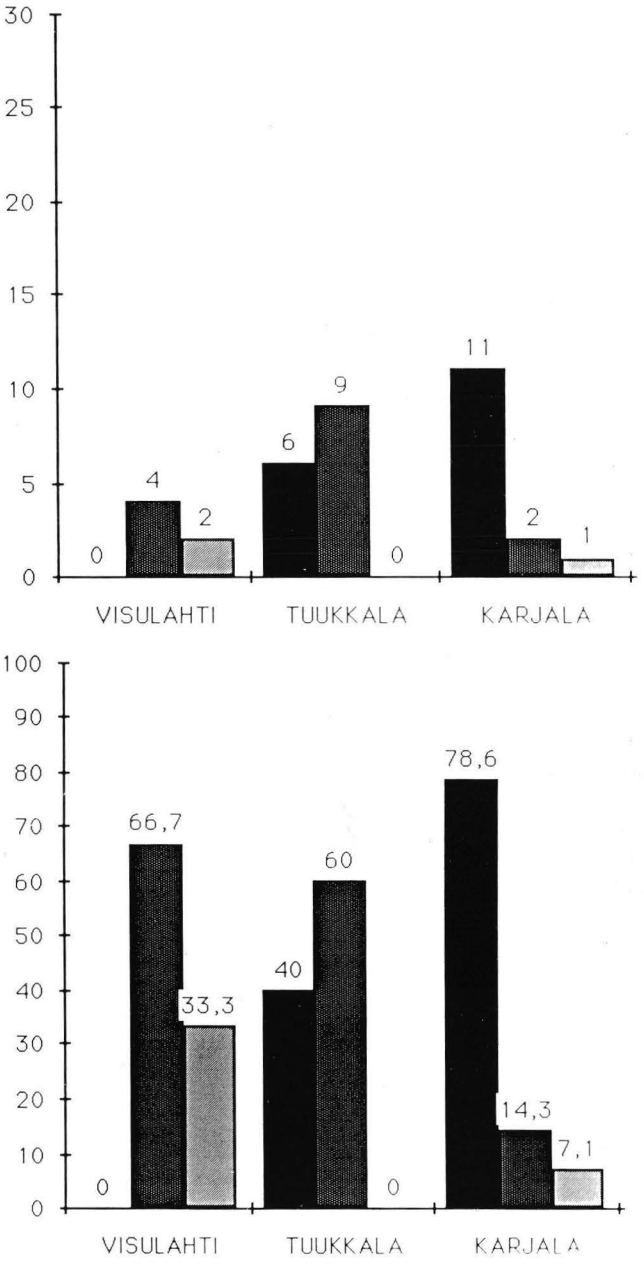

Fig. 41. Brooch combinations in women's graves from Visulahti and Tuukkala in Mikkeli and Karelian cemeteries. Black histogram = oval tortoise brooch + penannular, silver plate or ring brooch; hatched histogram = oval tortoise brooches; grey histogram = other brooches.

oval tortoise brooches – indicate a more even division among the groups, although the stray finds of ring and penannular brooches certainly include material from men's graves as well.

At Visulahti the first combination observed at Tuukkala is completely lacking (Fig. 41). However, the second combination was found in four graves (66.7 %) and two completely different atypical combination were also found (33.3%).[56] Although intact

[55] Lehtosalo-Hilander's reference to two stray finds of rings from Tuukkala undermines the significance of this observation. Albeit few, rings are nevertheless completely absent. Surprisingly, Lehtosalo-Hilander mentions only the stray finds of Tuukkala. There are also stray finds from Visulahti, but these do not include rings. If the stray finds from Visulahti would be taken into account, the differences between the cemeteries would be less marked. It must also be remembered that small objects like rings could have been overlooked as stray finds more easily than larger objects.

[56] Grave XVIII included the bent pin of a Karelian penannular brooch of silver (NM 13769:144),which was born on the shoulder in the same way as an oval tortoise brooch. A fragment of a round silver brooch (NM 13769:133) probably belonged to grave XX (a cremation burial).

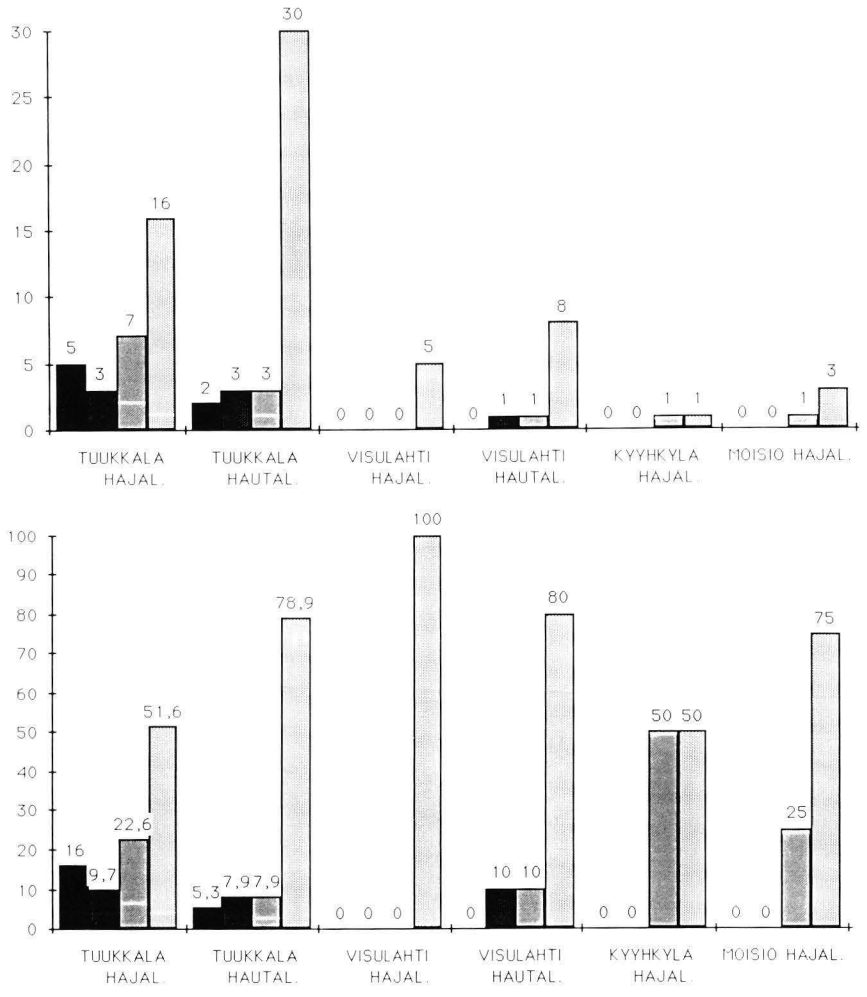

Fig. 42. Stray finds and brooches from women's graves in the excavated cemeteries of Mikkeli. Black histogram = ring brooches, dark hatched histogram = silver plate brooch, grey histogram = penannular brooch, light hatched histogram = oval tortoise brooch. The part below the white line indicates the frequency of western penannular brooches and oval tortoise brooches from Häme. hajal. = stray finds, grave finds = hautal.

graves were few, their number is still of significance, as there were no silver plate, ring or penannular brooches from disturbed graves or the stray finds (Fig. 42). These brooches were worn with the shirt, veil or cloak. This is clear difference with respect to Tuukkala and also explains the observed difference in the affluence of the grave-goods.

Fig. 41 lists information from A. Saksa (1985) on intact or only slightly disturbed women's graves in Karelia. As these are only a few of these graves, no cemetery-specific patterns can be identified, and the Karelian graves must be discussed as a single group. There are 14 completely intact graves,[57] of which 11 (78.6 %) contained the combination of a oval tortoise brooches with a penannular, silver plate and/or ring brooch. In two cases (14.3 %) there were only penannular brooches and in one case a single penannular brooch (7.1%).

Figs. 41 and 42 show how the women's graves of Mikkeli differ from the corresponding Karelian material in their combinations of personal ornaments. The Tuukkala cemetery differs considerably and the Visulahti cemetery is completely different in this respect. Although the actual ornament types are mostly the same, Visulahti with only oval tortoise brooches finds connections with the women's graves of the Päijät-Häme region. Tuukkala can be classed as somewhere in between the Karelian graves and those of Päijät-Häme. Because of the different nature of the cemeteries, the brooch combinations from Moisio and Kyyhkylä cannot be described with any accuracy. They appear to be more closely related to the Tuukkala pattern – and that of Karelia – than that of Visulahti. A difference with respect to eastern combinations of ornaments is, however, the fact that the penannular brooches from Kyyhkylä and Moisio are of small West Finnish types (Salmo 13 and 15) and not Karelian types. It is of course possible that the brooches were originally men's grave-goods. If this is the case, the combination in question would also indicate links with Päijät-Häme. Because of the nature of these two cemeteries and the small number of finds, further speculation is not possible. In the case of Tuukkala and Visulahti, however, a review of the ornament combinations is called for. Lehtosalo-Hilander (1988 210) has pointed that there are more finds of intact breast-worn brooches from the Mikkeli region than from anywhere else in Finland. She appears to mean

[57] The grave of Patja 1937 has been described as "disturbed" by Kivikoski (1942). Saksa classes it as intact.

Table 12. Eastern artefacts from Finland Proper, Satakunta and Häme.

	Fin. Proper	Satakunta + Sääksmäki	Central Häme + Koski	Päijät-Häme − Koski	
Number	10	8	13	39[1]	70
Sites	5	7	9	8	29
All sites	?[2]	65	58	48	>170
Nr./site	2	1.1	1.4	4.9	
Sites/total of sites	?	10.8 %	15.5 %	16.7 %	
Nr./total of sites	?	0.12	0.22	0.81	

[1] Excluded from the data for Päijät-Häme are fragments of Frisian coins from Kapatuosia in Hollola displaying similarities with the Karelian hoard pattern.

[2] Finland Proper is not included in the material for comparison. For this reason, diagrams of cemetery and stray finds have not been prepared, which would give the number of find locations as in the other areas. The hillforts, which are difficult to date, are also excluded with the excpetion of the Kuhmoinen hillfort which was definitely in use in the Crusade Period.

brooches that have been recovered as part of intact sets of ornaments.

There are also differences in the orientation of the graves. In Savo graves were laid in a west-east direction, which was usually the case in Häme and Western Finland. In Karelia, on the other hand, the dead were buried lying N-S with only a few exceptions (Kivikoski 1961 262, 270; Schwindt 1893 186; Salo 1957 51; Taavitsainen 1981 105).

In spite of the above-mentioned features of the Savo material that clearly refer to Päijät-Häme and a number of traits specific to the region, e.g. four local variants of oval tortoise brooches limited to the Mikkeli region (Lehtosalo-Hilander 1988 212–214), the region displays connections with Savo-Karelia with respect to the same brooch types and because of the sporadic occurrence brooches of Häme type among the oval tortoise brooches (Fig. 39).

Eastern artefacts. The geographical division discussed here is based exclusively on brooch material, but it can be assessed and discussed with reference to other categories of material as well. The distribution of eastern artefacts is shown in the map in Fig. 32.

Comparisons of the distribution of eastern artefacts pose a number of problems. Reference to the numbers of finds alone is misleading, as it will obscure features such as the fact that in an inhumation grave a chain-set is in fact a single whole. A more relative picture of the occurrence of eastern artefacts is obtained by reviewing their numbers per find location and the proportion of these locations of the overall number of sites. Table 12, with reference to the above comparisons, shows how the absolute numbers and relative proportions of eastern finds grow to the east of Satakunta. An especially clear trend is the west-east increase in eastern objects per find location. In this respect Central Häme and Päijät-Häme are clearly different, although the proportions of the find locations do not differ in the same way.[58] The distribution of eastern artefacts is not in conflict with the geographical division based on the brooch material.[59]

Western artefacts. Artefact types that are common throughout the lands bordering on the Baltic are not of interest for the problem at hand and will not be discussed in this connection. However, artefacts of West Finnish origin require further review and discussion. This body of material is of central importance for the geographical subdivision of Häme, the role of this region between east and west and for defining the eastern boundaries of the distribution of western material.

Western artefacts include above all weapons, tools and implements. The West Finnish finds of the Crusade Period cover a considerably smaller rage of types than in the Viking Period (Kivikoski 1961 234). This may be partly due to the influence of Christianity on burial practices and grave-goods.

Among the personal ornaments, the West Finnish brooches of shield-boss shape (Kivikoski 1973 1045–1046) are a problematic group because of their heterogeneous nature. They were made in both bronze and silver, either decorated or undecorated, with wide or narrow rims, and were either forged or

[58] In Finland Proper the ratio of eastern artefacts per find location is contrary to the above trend. This may be due to the fact that not all of the objects were from the east (see p. 81, footnote 30). It may also be the result of extensive excavations, e.g. at Rikala in Halikko, Yliskylä in Perniö, Haimionmäki in Lieto, Virusmäki in Maaria and in the city of Turku. If this possibility is taken into account in the case of other areas as well, it must be remembered that extensive excavations have also been carried out in Satakunta-Sääksmäki at Vilusenharju in Messukylä, Mikkola in Ylöjärvi and Toppolanmäki in Sääksmäki. On the other hand, there are been no large-scale excavations of Crusade Period cemeteries in Central Häme or in the parish of Koski. There has been only one extensive excavation of this kind in Päijät-Häme, at Kirk'ailanmäki in Hollola.

[59] On the other hand, not all of the East Finnish artefact types are present in the material from Häme. Such types are for example battleaxes found only in Eastern and Northern Finland (Wuolijoki 1972 29).

Table 13. Western artefacts from the regions of Häme and Savo-Karelia

	Central Häme + Koski	Päijät-Häme − Koski	Savo	Kar.
Knife ferrules	4	1	–	–
Wide-bladed battle-axes of Western type	2	–	1	–
Silver-ornamented battle-axes	1	1	–	–
East-Baltic spearheads	3	5	1	–
Convex shield brooches	2	–	–	–
	12	7	2	–

Table 14. Western artefacts from Häme regions and Savo-Karelia.

	Central-Häme + Koski	Päijät-Häme − Koski	Savo	Karelia
Number	12	7	2	1
Sites	9	7	2	1
All sites	58	48	31	135
Nr./site	1,3	1	1	1
Sites/total of sites	15,5 %	14,5 %	6,5 %	0,7 %
Nr./total of sites	0,21	0,15	0,06	0,01

beaten. Some of the specimens have silver overlay and different kinds of clasps were used. It is even questionable, whether this material can be classed as a single group. The forged specimens of this category with narrow rims and the pin joined to the boss-part can be regarded as a uniform Finnish group (Nisula, Lammi, NM 20449:1, bronze; Toppolanmäki, Sääksmäki, NM 10581:8–9, copper with tin overlay; Aatservainen, Salla NM 37, 2 specimens of silver; Rukoushuone, Vesilahti, NM 13939:1, silver rim fragment; Yliskylä, Perniö, NM 13199, silver). Also included among the above is a brooch of tin from Ilmoila in Hauho (NM 3539: 10, apparently a cast copy of a forged and beaten object with dented ornament, cf. Kivikoski 1973 1141).

Of the tools and implements, narrow knife-sheath fittings and ferrules with a fitting at the tip[60] are regarded as Western artefacts (Keskitalo 1950 45–46), and of the weapons silver-ornamented battleaxes (Tomanterä 1978 80–84).[61] Neither of these artefact groups has been found in Savo-Karelia.

Two find categories of weapons may also be mentioned despite their being found in Savo-Karelia, albeit that only one specimen of each has been found in the east. A single find cannot indicate Savo-Karelian character any more than an overall Finnish one, especially if we taken into account the long-term survival of rich furnished burials on Eastern Finland. Thus, a single find must be regarded as sporadic in the east, but in the west it must be given more weight.

These artefact groups, occurring sporadically in eastern contexts, are the spearheads of east Baltic type (see Appendix 2, p. 189 and Huurre 1987 73)[62] and the wide-bladed West Finnish battleaxes (Wuolijoki 1972 29).[63]

Although it is possible that some West Finnish artefact groups occurring in small numbers have not been discussed, there are hardly any significant artefact types or groups of the Crusade Period which were not present in Central Häme and/or Päijät-Häme, with the exception of wide knife sheaths of bronze plate with bronze furrows. According to Keskitalo (1950 45), these artefacts are more common in Western Finland than the thin type with a separate fitting at the tip. There are no finds of wide sheaths from Häme (Kivikoski 1955a 134). The objects in question are usually dated to the very end of the Viking Period and to the Crusade Period (Kivikoski 1973 968; Lehtosalo-Hilander 1982c 48–49; see however P. Sarvas 1972 47–48). As the wide sheaths occur already with Viking Period brooches, they must be classed among the artefacts of the 11th century, which are not discussed in this connection.

Table 13, presenting western artefacts found in the various regions of Häme and Savo-Karelia, and Table 14, with data on their relative distribution, demonstrate the sporadic nature of this material in Savo-Karelia. Although finds, find locations and artefact groups are slightly more numerous in the west of Häme than in the eastern parts, western artefacts display a relatively even distribution throughout Central Häme and the Lake Päijänne region.

[60] The finds from Häme consist of the following: Makasiinimäki, Janakkala (NM 598, NM 12694:22); Kirkkomaa, Janakkala (NM 13287:9); Vesitorninmäki, Hattula (NM 17777:3); Grave IV/1978,Kirk'ailanmäki, Hollola (NM 20450). This sheath form differs from those of Savo-Karelia only in details of ornament.

[61] Humikkala, Masku (NM 8658 H47:5); Vanhakartano C, Köyliö (NM 8723:195); Toppolanmäki, Sääksmäki (NM 10581:1); Rantala, Kuhmoinen (NM 1232:7); Linnaniemi, Hämeenlinna (NM 3090:8); Sarkaniemi, Posio (NM 9798).

[62] The following spearheads of East Baltic type have been found in Häme and in areas to the east and north: Seppälä, Pälkäne (NM 3013); Koivuniemi, Pälkäne (NM 14896); Mäkelä, Hattula (Museum of Hämeenlinna; Linnavuori Kuhmoinen (NM 22445:21); Sysmä, Joutjärvi (NM 12113:1); Soille, Sysmä (NM 18508:1); Tervanen, Iitti (NM 3548); Lintulahti, Kyyjärvi (Vaasa Museum 770); Pielavesi (NM 15870:1); Ämmänsaari, Suomussalmi (NM 19243).

[63] Kirkkomaa, Janakkala (NM 13287:11); Kirkko, Janakkala (NM 13091:1); Moisio, Nousiainen (NM 9892:485); Kirkkomaa, Kaarina (NM 12687:3); Saramäki, Maaria (NM 7874:69); Humikkala, Masku (NM 8656:2,11,13); Franttilannummi, Mynämäki (NM 9750:20); Hautausmaa, Mynämäki (NM 10707:1); Franttilannummi, Mynämäki (NM 11859:7,8); Arpalahti, Perniö (NM 3593:11); Yliskylä, Perniö (NM 2939:2); Tastula, Pertteli (NM 17858:1); Lempoinen, Lempäälä (NM 7219:1); Vilusenharju, Messukylä (NM 17208:118, Häme Museum 2463:158, 159, 166, Häme Museum 2538:92); Mustila, Elimäki (NM 17699) and Vuolinko, rural commune of Mikkeli (NM 11378:2).

4.6.2. Subdivisions of the western cultural area

It has been demonstrated that in the Crusadde Period Häme began to display differences with respect to the previously uniform material culture of Western Finland and grew into a zone of transition between western artefacts and those from Häme, Savo-Karelia and the east. Differences within the region were also observed. The boundaries of the original areas of comparison did not completely correspond to those of Häme-Karelian and eastern artefacts. It was also seen that Sääksmäki clearly belonged to the region of Satakunta and that Koski could not be regarded as a part of Päijät-Häme. The remaining areas of Central Häme (+Koski) and Päijät-Häme (-Koski) displayed a number of differences as well. In the former area the women's set of personal ornaments consisted of penannular brooches of western distribution and oval tortoise brooches of Häme type. In the latter area, to the east, the corresponding assemblage consisted solely of oval tortoise brooches either of Häme or Savo-Karelian type. Lehtosalo-Hilander' claim (1980a 248; see however Lehtosalo-Hilander 1984c 298), with reference to af Hällström, that "in Häme the oval tortoise brooches never became an exclusively leading fashion" is incorrect in the case of women's personal ornaments. Of the two regions of Häme, Päijät-Häme clearly displayed more marked eastern characteristics. This was demonstrated by the larger frequencies per location of eastern artefacts. On the other hand, in both regions men's ornaments were of western types, and other western artefacts occurred in roughly even numbers on both regions – or more correctly, they occurred in equally small numbers. None of the major artefact groups of the Crusade Period are absent from the Häme regions. On the basis of the above, both regions can be linked to the western cultural sphere of Finland. The significance of the brooch combinations is further underlined by the fact that the western, or northwestern,[64] boundary of Central Häme and the eastern boundary of Päijät-Häme can be regarded as the boundaries of the whole cultural sphere. To the west of the former, eastern artefacts occur in smaller numbers and the east of the latter western artefacts are found sporadically.

On the whole, there is a gradual decrease in the frequencies of Savo-Karelian artefacts towards the west. Even in Savo, located between Häme and Karelia, there is the Visulahti cemetery with its brooch combinations of Päijät-Häme type along with the Tuukkala cemetery where the brooch combinations are Karelian. The only difference between the material from Visulahti and Päijät-Häme is the fact that in the women's graves which did not contain a third brooch there is a pair of Savo-Karelian oval tortoise brooches instead of brooches of Häme type.

Finally, the mean frequencies and distribution of the brooch types were reviewed on the east-west axis on the basis of the revised geographical division (Fig. 43). Fig. 43 provides roughly the same information as Figs. 35 and 36. Central Häme (+ Koski) and Päijät-Häme (– Koski) are clearly in between the large frequencies of penannular brooches in Western Finland and the small frequencies of the corresponding material in Eastern Finland. In relative terms, Central Häme is clearly more similar to the west in this respect than Päijät-Häme (Fig. 36). With respect to the oval tortoise brooches, these areas are even in their position between east and west, but display a clearly more eastern bias than a western one (Fig. 36). Other brooch types indicate a somewhat different situation with Central Häme constituting a separate entity between Finland Proper and Satakunta, while Päijät-Häme is between east and west. Oval tortoise brooches of Häme type have been found in equally small relative frequencies in Finland Proper and Satakunta as well as in Savo and Karelia. On the other hand, Central Häme appears as a separate peak in the diagram, while Päijät-Häme falls between the westernmost parts of Häme and the frequencies for the rest of Finland. Savo-Karelian brooches occur in relatively small numbers in Central Häme, which is close to the westernmost parts of the country. Päijät-Häme, in turn, is between the large frequencies to the east and the small numbers of finds in the west. This is a feature separating this region from Central Häme. The statistical review of the material supports the above geographical division.

It has been pointed in a number of connections above that the material culture of the West Finnish cultural sphere was uniform in the Viking Period. A minor indication of the incipient separation of Häme in terms of material culture may be seen in the West Finnish round convex-concave brooches of types E and F, of which the former has an area of distribution covering the Kokemäenjoki River valley and the area of Häme (Fig. 44). The youngest variant of type F, regarded as specific to Häme, has a more limited area of distribution than type E, with finds from Kangasala and Lempäälä in Upper Satakunta and from the area of the historical province of Häme (Fig. 45). The small frequencies of studded brooches (Fig. 46), of the same age as the brooches of types E

[64] Although it was necessary to exclude textile material from this study, it must be pointed, however, that star-shaped ornaments or crossing bronze spirals applied to cloak hems are an exclusively West Finnish trait (Vahter 1928 64–65). To my knowledge, the easternmost find of these ornaments is from Hauho. The phenomenon appears to follow the eastern border of Central Häme.

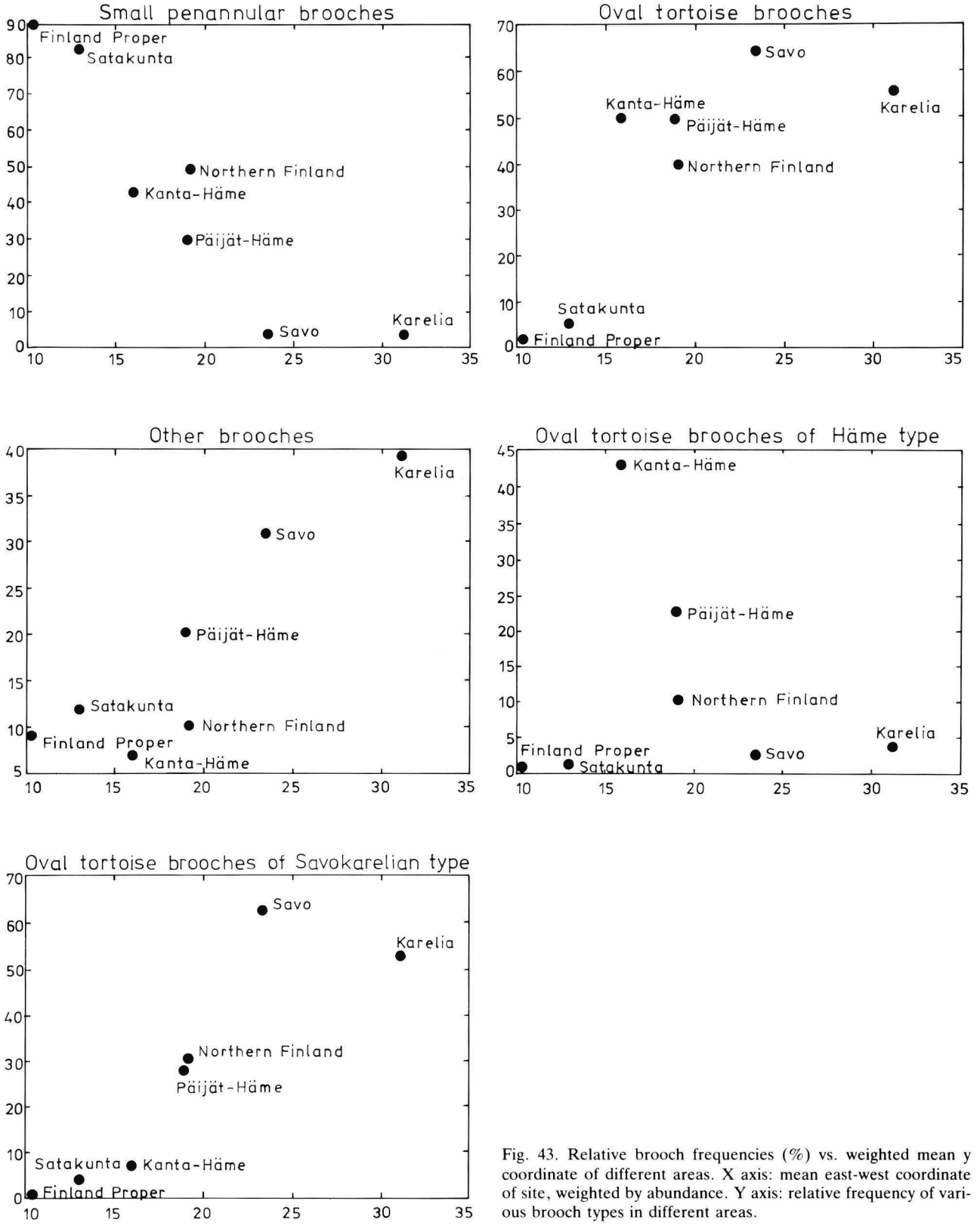

Fig. 43. Relative brooch frequencies (%) vs. weighted mean y coordinate of different areas. X axis: mean east-west coordinate of site, weighted by abundance. Y axis: relative frequency of various brooch types in different areas.

and F, as well as the limited finds of Scandinavian artefacts to the east of Satakunta (Lehtosalo-Hilander 1982 c 72, Fig. 14) also appear to anticipate the changes that occurred in the Crusade Period.

The three-part division of the region of Satakunta and Häme, which was formerly regarded as uniform and the demonstrated differences among the cemeteries of Savo point to another possibility. There may not have been any division of a uniform cultural area, and the phenomenon in question may derive from much earlier differences, hitherto overlooked in research. The prevailing burial custom of cre-

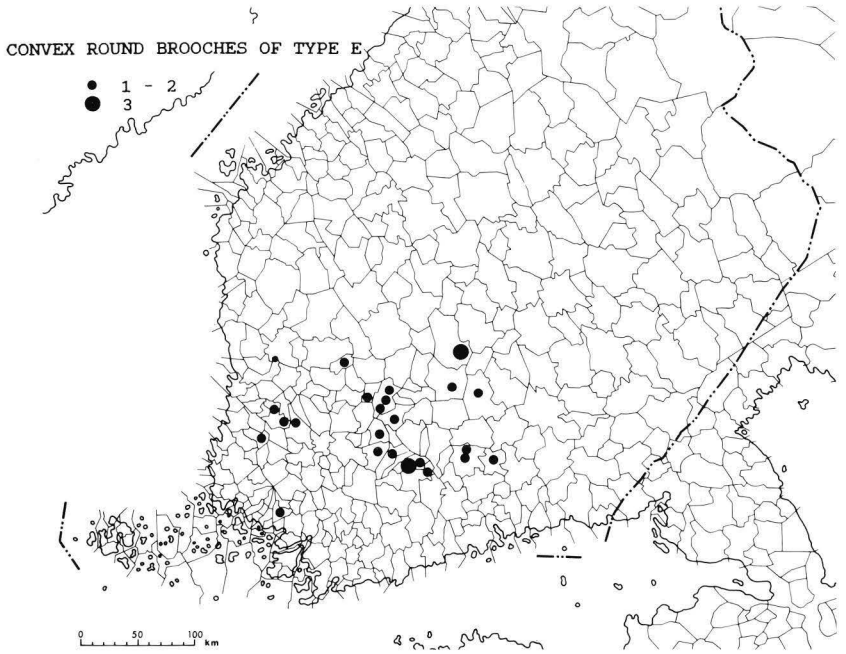

Fig. 44. Distribution of round convex-concave brooches of type E.

mation cemeteries does not permit the identification of uniform sets of grave-goods. A detailed statistical analysis of cemeteries and stray finds may reveal significant differences. If such results are then combined with data on the occurrence of inhumation graves, hoards and other archaeological phenomena, we may possibly obtain a much more detailed picture of the situation than at present. In her studies on the Iron Age of Finland Proper, Sirkku Pihlman (1987 27) has suggested that in the areas of Finland Proper, Uusimaa, Satakunta and Häme the settlements were divided into specific regional units that were smaller than the historical provinces of these areas. Unfortunately, Pihlman's studies do not extend to the Viking Period. If, on the other hand, the traditional concept of a uniform Viking Period material culture in Western Finland is correct, it would be interesting to try to explain why it became uniform in the Viking Period and again differentiated in the Crusade Period. A possibly more detailed view of the situation could also be compared with the background of the geographical terms *Häme* and *Suomi* of historical sources.

It may well be possible that, in addition to the Late Iron Age regions of Päijät-Häme and the Lake Vanaja area, as outlined by Jaakko Masonen (1988

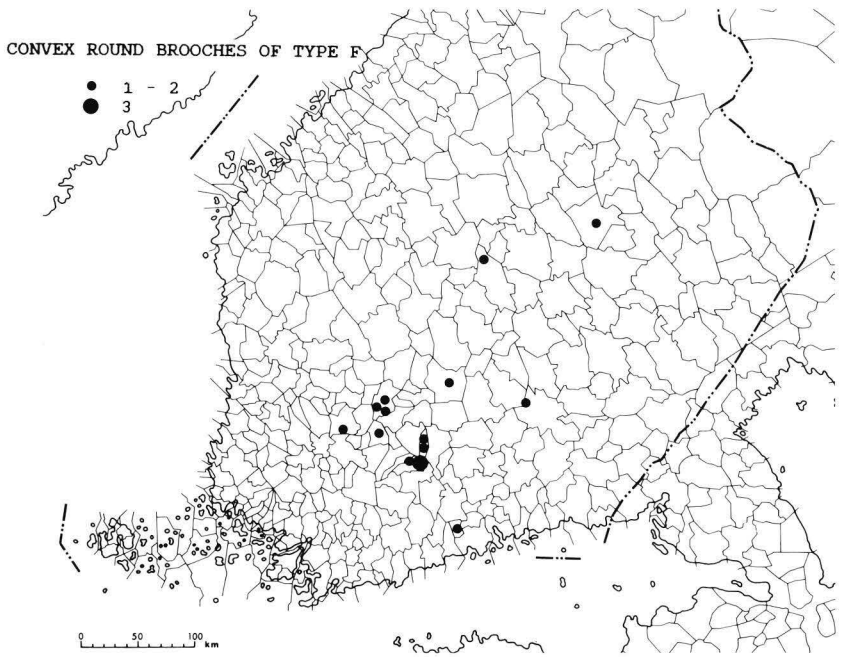

Fig. 45. Distribution of round convex-concave brooches of type F.

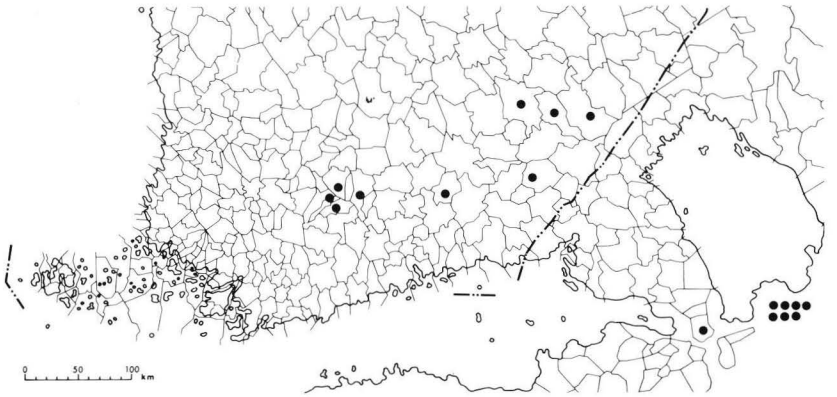

Fig. 46. Distribution of so-called studded brooches.

15), there were also the economic and communicational areas of Upper Satakunta-Pirkanmaa, Lower Satakunta-Kalanti, the Aurajoki River valley and the Uskelanjoki River valley with parallels in the archaeological record.

4.7. Intensification of wilderness utilisation in the Viking Period

There are differences in the diagrams of the finds from the settled areas and the wilderness regions. In the Päijät-Häme region the development of settlement was even up to the Viking Period, when there occurred a sharp step-wise progression together with the consolidation of settlements. The same can be observed in the diagrams for the permanently settled areas, though not as distinctly.

As it is not possible to ascribe the formation of permanent settlement in Päijät-Häme to a predestined gradual rate of expansion, other causes must be assumed for increased human activity in the area in the Viking Period and the formation of centres of settlement. These may include increased utilisation for reasons of trade, changes in the means of livelihood of the indigenous population with a resulting process of colonisation or a transition from transhumance to permanent settlement. The step-wise increase in the numbers of finds cannot be explained without reference to the situation in the permanently settled areas and the international relations of trade of the period.

Colonisation is often ascribed to outer and inner factors, sometimes referred to as factors of push and pull. It is difficult to class these factors, as they are in most cases interlinked to a high degree. In this connection, inner factors are population growth, changes in social organisation and technological innovations. Outer factors are environmental conditions (e.g. climate), conditions of trade and competition with other groups and areas (political factors).

As inner factors, population growth and social change, as referred to by Meinander (cf. p. 48) in connection with significant changes in Southwest Finland in the 8th century, were also present in the context under study.

Environmental factors can be excluded in this connection, although the deterioration of the climate may have had some effect on farming in marginal areas such as Southern Ostrobothnia (Solantie 1988 10–11), with resulting needs for relocation.

There were a number of changes in relations of trade. In the late 8th century trade increased among the lands around the Baltic and the eastern route leading from the eastern end of the Gulf of Finland via the rivers of Russia to the Islamic areas of the Orient opened up. Silver began to be imported into the Nordic countries. At its western terminus the route connected with Western Europe, where trade had developed during the reign of Charlemagne. Urban communities began to form and political systems evolved both in the sphere of the North Sea and along the eastern route. The West Asian "boom" came to an end in the mid-10th century along with the gradual demise of Abbasid power. This, however, did not reduce trade in the Baltic, where a western orientation set in – Western silver coins began to replace Cufic coins in the archaeological record. The Russian Empire was in the process of formation and towns were being established in Russia. Novgorod was rising to importance as a centre of trade, along with the formation of the Novgorodian state. Novgorod's expansion to the west began in the Early Middle Ages. In fact, but the 11th century the neighbouring areas of Finland had converted to Christianity. Finland – as also the Baltic lands – was left between three developing states, Sweden, Denmark and Novgorod and was subject to pressures from the Catholic and Orthodox churches. A political power struggle was in progress in the Baltic at this time. In the 12th and 13th centuries this process also came to involve the Germans, who by now had begun their expansion to the east.

The increase of finds coincides with significant

changes in the society of Southwest Finland as well as developments in foreign relations of trade. This occurred at a time when the climate may have changed to such a degree that, at least in places, it had effects on conditions for farming. The joint effect of these factors will be discussed in further detail below.

Increased economic and trade activities in the Viking Period were also felt in the "aboriginal trade" of the wilderness regions of Finland. It is also possible that surplus population moved into these areas and/or the local inhabitants remained in locations favourable for communication and farming along water routes. Permanent settlements formed especially in the fertile areas of clayey soil and silt in the southern parts of the study area on isthmuses and the junctions of routes and their near vicinities. These settlements were, however, so sparse that they cannot be regarded as a transition from wilderness utilisation to colonisation. The smaller fertile areas around the coves of lakes were separated by extensive areas of uninhabited wilderness. The settlements in question may have been "trapper stations" which were dictated by the needs of trade and required arable locations to ensure year-round occupation. During this period the subsistence-type wilderness utilisation economy, as defined by Väinö Voionmaa (1947 24–32) changed into a commercial wilderness economy characterised by the fur trade.

The same changes occurred in the wilderness regions of Savo, Karelia and Northern Finland. Even in Satakunta and the Lake Vanaja region of Häme nearby wilderness areas were utilised to an increasing degree. This appears to have happened somewhat earlier in Päijät-Häme and Karelia than in Savo. The formation of cemeteries in Savo coincides with the rise of Novgorod as a political and economic centre in Northwest Russia. Competition grew over Savo, located between Häme and Karelia, which by now had sufficient population for expansion and was strongly influenced by Novgorod. This led to the founding of trading stations along the water routes of Savo by the West Finns, who had previously utilised the resources of this area. The sites and stations were located on isthmuses and the crossings of routes in order to secure the age-old interests of the West Finns (Taavitsainen 1988 227). An early symptom of the new orientation of cultural and trade contacts in the Viking Period can be seen in the introduction of Scandinavian artefacts into Western Finland to a greater degree than in Häme (Lehtosalo-Hilander 1982c 72). Further evidence is provided by the studded brooches and the so-called Savo-Karelian encolpion bracelets, which now appear in Häme and Savo. These artefact types are also found along the southeastern shores of Lake Ladoga. Scholars have stressed the role of the Vepsians as intermediaries in the trade between the wilderness regions and the Islamic world and also their part in the formation of the Russian Empire (Stang 1981). The distribution of the studded brooches and the encolpion bracelets may be regarded as an indication of influence from the Vepsian regions.

A further indication of the intensification of wilderness utilisation and trade is the formation of the so-called Häme Oxen Road in the 9th century. This road connected the region of Turku with the Lake Vanaja region of Häme (Masonen 1989). It has been suggested that the Varikkoniemi site, located opposite to the Castle of Häme at the terminus of the road was a trading village built in the Viking Period (Schulz 1989). Present material, however, does not permit a closer review of this claim (see p. 166–167).

The formation of the Savo-Karelian cultural sphere is a major change occurring in the Crusade Period. A study of its influence on Päijät-Häme and also the central parts of Häme requires detailed data on the chronology of the brooch types of Häme and Savo-Karelia. Without such information there can only be speculation. For the time being, it can only be asked whether the brooches of Häme type are the older ones in the region, possibly being replaced by Savo-Karelian forms introduced at a later stage especially into Päijät-Häme. Or, in opposite terms, were the Savo-Karelian brooches the first ones to be known in Häme, with an ensuing development of local forms at a later stage?

The small proportion of Savo-Karelian brooches in the material from the central parts of Häme suggests that oval tortoise brooches of local type were made and used there throughout the period in question. In this context, the Savo-Karelian oval tortoise brooches of Päijät-Häme, which are present in approximately the same numbers as other types, may be interpreted as younger than the bulk of the local brooch material and as an indication of increased eastern influence in the area. This chronological relationship is also suggested by radiocarbon datings from the inhumation graves at Kirk'ailanmäki (Table 9). However, western contacts continued throughout the period and it must be pointed out that many of the western artefact types did not spread beyond the eastern boundary of Päijät-Häme, nor did many of the eastern types cross the western frontiers of Savo.

Numbers of cemetery finds and stray finds drop sharply in the Crusade Period in Päijät-Häme as in the settled areas of Western Finland. One of the reasons for this is the often-cited influence of Christianity on burial customs as well as the founding of village cemeteries. The same applies to stray finds in Savo. The diagram for Savo displays an interesting contradiction between stray finds and cemetery finds, with an increase in the number of cem-

etery sites. A closer review, however, shows that this happened only in the regions of Mikkeli and Lappeenranta, which may in fact indicate a reduction of the cemetery areas in comparison with the Viking Period. In the light of the above, the drop in the number of finds from the wilderness regions cannot be explained solely by changes in burial practices, and a more probable reason is the diminishing of competition over the area. Päijät-Häme remained in the hands of its former owners and Savo became the utilised wilderness zone of the Karelians. The latter development is suggested by the fact that there was no need to claim the area by colonisation,[65] nor have there been finds of graves of purely Savo-Karelian character in Päijät-Häme, where continued settlement can be observed in the areas settled in Viking Period. Elsewhere in Päijät-Häme only one new region had a cemetery established in the Crusade Period (Konginkangas; finds of brooches of Häme type). In Karelia, both stray finds and cemetery finds increase in number, which signifies a local discharge of surplus population. This may also explain why the wilderness regions of the Karelians were not colonised. The spread of pioneer settlement was not significant, as there was room for the expansion of the settlers of Savo in the Late Middle Ages and around the beginning of modern times. The colonisation of the wilderness regions, however, must also take into account questions of ethnicity.

4.8. Problems of ethnicity

In archaeology, the term culture has a special meaning. An often-quoted definition is that by David Clarke (1968 188) – "an archaeological culture is a polythetic set of specific and comprehensive artifact types which consistently recur in assemblages within a limited geographical area."(On the history of the culture concept in European archaeological literature, see Meinander 1981). As the archaeological entities or cultures were most probably multiethnic in character, it is not possible to link prehistoric find material to historical ethnic groups (for ethnographic and historical examples of the incompatibility of archaeological material culture and ethnos, see Tallgren 1937 and later Finnish discussion on the subject – Salo 1980; Siiriäinen 1980; Salo – Siiriäinen 1980). Even anthropologists and ethnographers working among aboriginal peoples have difficulties in providing unequivocal definitions of concepts such as ethnic group, ethnos, tribe, people, nation etc. (e.g. Barth 1969; Bromley 1984; Kelly & Kelly 1980). In situations where only incompletely preserved archaeological material is available it is not possible to match any of the anthropological or ethnological definitions of ethnic groups. Ethnic self-awareness, i.e. the fact that ethnic categories are categories in their own right, whose members see themselves as such, is part of most definitions. Linking this with material culture, brought to light in archaeological excavation as the product of various natural and cultural factors and further studied by archaeologists, is theoretically and methodologically impossible. Prehistorians can mainly devote their efforts to economy, relations of trade and the cultural contacts reflected by these phenomena. Together with anthropological models that take into account ecological factors defining economic structures, this evidence may permit attempts at ethnic conclusions. Thus, we may attempt to find new features and interpretations for the above diagrams concerning the Päijät-Häme region and demonstrate the difficulty of the ethnic attribution of material culture.

Earlier studies in anthropology stressed the nature of ethnic groups as isolated units, while later studies, especially by Fredrik Barth (1956; 1969) have underlined the importance of inter-ethnic contact and mutual dependence in the formation and survival of ethnic groups (see also Odner 1983 & 1985; Tegengren 1964). In the Päijät-Häme region and elsewhere in the wilderness zones of Finland the question of the boundaries of ethnic groups comes to the fore as well as the effects of ecological factors and different modes of production (the wilderness-utilising farmers and the Lapps of the initial working hypothesis).

Fredrik Barth (1956) has studied the interrelationship and distribution of ecological factors and ethnic groups, culture and forms of production in certain parts of Asia. In his studies concerning ethnic processes in Northern Fennoscandia, Knut Odner (1983 6; 1985) has convincingly argued that Barth's points of view are relevant for the situation in Northern Scandinavia as well. These provide further clarification for Carpelan's above-mentioned views on the relations between wilderness-utilising farmers and the Lapps. Listed below are Barth's conclusions in summary:

1) The distribution of ethnic groups is controlled not by objective and fixed "natural areas" but by the distribution of the specific ecologic niches which the group, with its particular economic and political organisation, is able to exploit.

[65] Historical sources, however, do not paint such a simple picture, although most of the archaeological finds of Savo are of eastern origin. According to Pirinen(1988) the northernmost parts of Savo were utilised by the people of Häme in the 14th century, who competed over the area with the Karelians of the Lake Ladoga region before the treaty of Schlüsselburg. A so-called East Baltic spearhead (NM 15870) belonging to a find from Joensuu in Pielavesi, Northern Savo, is an artefact of western distribution.

2) Different ethnic groups will establish themselves in stable co-residence in an area if they exploit different ecologic niches, and especially if they can thus establish symbiotic-economic relations.
3) If different ethnic groups are able to exploit the same niches fully, the militarily more powerful will normally replace the weaker.
4) If different ethnic groups exploit the same ecologic niches but the weaker of them is better able to utilize marginal environment, the groups may co-reside in one area.

Barth's conclusion no. 2 implies the same as the initial assumption of farmers exploiting the same area as the Lapps, as indicated by archaeological and historical evidence. This view especially stresses the importance of trade, which places doubts on the ethnic attribution of the material record. The Lapp trade in the 15th century is known to have included articles such as nets, axes, reindeer, foodstuffs, pots and kettles (V. Voionmaa 1912 61). Personal ornaments are not mentioned, but the lack of indigenous metallurgy and later examples of Lapp ornaments made by the silversmiths of the towns according to international prototypes and models suggest the possibility of an early trade in metal ornaments with the hunting-fishing population of the inland regions of Finland (cf. Indian trade, Quimby 1966). This must be kept in mind in attempting to explain the introduction of men's and women's ornaments in the material and the fact that they immediately formed the majority of the find material. This may indicate intensified trade and the procurement of "non-essential" goods following a period of an overall rise in affluence. It need not necessarily indicate the arrival of families of pioneer colonists in the uninhabited areas. Of interest in this connection is the ethnographic observation of how different ethnic groups did not always feel the need to indicate and communicate their specific character, but also their affinity, especially in cases of symbiotic relations between groups (Odner 1983 54–56). Such a need may have come about in the Viking Period in Päijät-Häme and in other wilderness regions through economic competition over the areas from both the east and the west. By their use of mainly western ornaments the Lapps could have demonstrated their affinity with their long-standing "associates".

Cemeteries provide better opportunities for speculation than stray finds, although some of the latter may have originally been in graves. In Päijät-Häme graves and cemeteries are in different geographic settings than the so-called Lapp cairns. This indicates the practice of farming and year-round occupation. Historical sources also mention how Lapps took up farming, in which connection they began to pay the farm tax of the Finns instead of their former Lapp tax (e.g. Ervasti 1978 143–151). In some cases Lapp farmers reverted back to paying the Lapp tax. Perhaps it was not impossible to change one's means of livelihood? Such a change may also have signified membership in a different ethnic group. It cannot be known whether the Lapps or the wilderness-utilising farmers were the first to settle permanently and till the soil in the Päijät-Häme region. The permanent settlements which formed along various routes and their junctions and stayed in existence up to historically documented times may have primarily been the activity of farmers utilising wilderness resources, as suggested above. But on the other hand, how do we explain the graves at Rautsaarenkärki in Kuhmoinen which were of the Lapp-cairn type in both location and construction? It would be tempting to explain these as the graves of Lapps who had adopted a farming way of life or who had remained in the environs of the hunting stations.[66]

An interesting question in this connection is the influence of the Lapp culture on that of the wilderness-hunting farmers. Because of the lack of suitable source material, especially dwelling-site finds, it must be left open. It should be kept in mind, however, that processes of acculturation are not necessarily one-sided.

The number of Viking Period grave finds shows, however, that this was not yet a period of a total colonisation of the region with a resulting detrimental effect on the Lapp way of life. This also applies to the numeric development of stray finds and cemeteries in the Crusade Period. The number of stray finds drops considerably if we take into account the finds of the permanently settled areas. The number of cemeteries is now smaller and also the area of settlement which they indicate diminishes.[67] At least in the permanently settled areas this is probably the result of changes in burial customs, as the pollen diagrams for these areas as well as the wilderness regions contain no indications that settlement activity decreased or ceased temporarily. Barth's conclusion no. 2 (and in the case of Päijät-Häme no. 4 as well) appears to suit the situation at hand. It appears that the Viking Period settlements which formed in the more arable areas of the south of Päijät-Häme and

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[66] As discussed above, it must be pointed out that the topographic features of the Lapp cairns and their wilderness-type locations may only be apparent features, as only the cairns in outlying areas have been preserved undisturbed. In the arable areas they may have remained among the field-clearing cairns, partly mixed with earth and devoid of their original charcter. Iron Age cairns in Satakunta and Häme include ones which are almost without earth fill and have only a covering of turf generated by leaves and dung (Kivikoski 1955a 58; Salo 1981 221).

[67] Cemeteries, which were in use in the Viking Period but no longer in Crusade Period, have been found in Jaala, the rural commune of Heinola, Pertunmaa and the rural commune of Jyväskylä. On the other hand, there are cemeteries of the Crusade Period but not older ones in the localities of Koski and Konginkangas.

at points of communication sufficed to secure the interests of the wilderness-utilising farmers from the west. These settlements may also have protected against possible pressure from the east. These settlers did not have to undertake a full-scale colonisation of the region; the safeguarding of traditional interests sufficed in this case. That it was not necessary to colonise can also be seen in the diagrams of finds from the Lake Vanaja region and Satakunta with their clear decrease of stray finds and cemetery finds. Even with the influence of Christianity, the diagrams would be different if there had been marked growth and consolidation of settlement in the area, which in turn would have required the colonisation of the wilderness regions. Of the latter regions, Savo had adopted the Karelian culture, but even there colonisation did not occur. In Savo the area of cemeteries decreases in comparison with the Viking Period to cover only the near regions of Mikkeli and Lappeenranta, although the diagrams show an increase in their actual number. On the other hand, the number of stray finds from the wilderness areas decreases. Karelian data on stray and cemetery finds show that population pressure found an outlet within the region with intensified settlement especially in the area of Käkisalmi, where cemeteries had first appeared already in the Viking Period. This process led to the final assimilation of the local Lapp population (Barth's conclusion no. 3). In Savo, on the other hand, the founding of permanent settlements and cemeteries at points of communication sufficed.

The archaeological record of the area displays a number of changes in the Middle Ages. The state and the church began to gain a firmer hold and social organisation developed. Written sources, however, are still so few that it is impossible to outline the history of settlement with reference to them alone. There does not appear to have been any major consolidation of settlement and a situation similar to Barth's conclusion no. 2, or at least no. 4, may have prevailed. Pollen analyses are of no help in this connection, for they apply only to the areas of Iron Age cemeteries and not the wilderness regions. The diagrams for Savo show a considerable increase in settlement intensity in the 15th and 16th centuries, when the final colonisation of Savo was in progress as the joint result of various simultaneous factors. This eastern flow of settlement extended also to Päijät-Häme and Northern Finland. H. Tegengren (1952) and K. Vilkuna (1971) have written of the disastrous effects of this process on the transhumant economy of the Lapps, whose best hunting and fishing sites were destroyed and/or taken over. The Lapps were faced with assimilation, although the crown tried to protect their means of livelihood. The Savo colonists brought an end to the symbiosis of the Häme farmers and the Lapps. The latter were prevented from following their traditional way of life and had to adopt the means of livelihood of the colonists. This led, not only in Päijät-Häme but in all of the inland regions, to the assimilation of the Lapps with the colonists and the inhabitants of the wilderness stations. The last indications of the Lapp population may be hoards or caches of kettles of the Late Middle Ages and early modern times, found in Päijät-Häme and Savo. These have been interpreted as symbols marking intra-group solidarity and differences with respect outsiders that were used by the weaker group in a situation of competition over the same resources (Taavitsainen 1986).

Creating symbols in a conflict of interests of this kind tends to occur where pressure is greatest. In such a situation, symbols can be seen as expedient signs of resistance. As the colonists threatening the old way of life were Christians, the production of symbols could have concentrated on the areas of religion and magic. In the 16th century the whole of the seasonally transhumant economy was threatened, and an object closely related to such a way of life – the kettle – may have become such a symbol of resistance. Preserving the traditional way of life required offerings of such objects to the god of the waters – especially as diminished catches of fish and beaver called for definite. The sacrifices and offerings, however, were in vain, and they remained the last artefactual evidence of the Lapps of the inland regions, whose final and irrevocable assimilation was then in progress (Taavitsainen 1986 40–41).

Conclusions of prehistoric developments with respect to the above may seem somewhat trivial. First of all, we may concur with the view of historians that the utilisation of wilderness resources preceded colonisation, making the resources and means of livelihood of the new environment familiar. Especially the slash-and-burn plots near the wilderness cabins were a concrete way of getting to know local farming conditions. It was also easier to clear old burn-cleared plots into fields than to expand into virgin forest.

On the other hand, permanent settlement does not appear to have expanded at an even rate. Initially, it consolidated around the farming regions of the permanently settled areas. Cemetery data show that the peak of growth was in the Merovingian Period in Satakunta and slightly later in Häme.[68]

[68] Cf. Seger 1982b. On the basis of cemetery data Seger has isolated various patterns of settlement history. These, however, cannot be compared with the simple diagrams presented here, which are based on a detailed study of the material of Häme. Furthermore, the areas of comparison are partly different. If the mainly Viking Period cemeteries of Päijät-Häme were lacking in Seger's data for Häme, the resulting curve would be considerable more similar to the one for Satakunta.

The course of development can be interpreted as follows: The Viking Period settlements of the permanently settled areas could no longer expand in their own areas alone and surplus population had to move out. As the inner and outer factors of push were matched by pulling factors, the wilderness regions – the contact zone or frontier of two different types of economy and culture – received permanent settlers in their central locations with clayey soils and silt which were suitable for farming. At the same time, the process of assimilation of the indigenous population began. Because of their greater efficiency in exploiting marginal resources, the indigenous population could co-exist for some time with the colonists (Barth's conclusion no. 4). With the continued consolidation of farming settlement, the final assimilation of the former could no longer be avoided. Further away from the new centres of settlement now in the process of consolidation, the old symbiotic relationship of niche-splitting continued.

When the opportunities of the new areas of settlement for the expansion of farming had been exhausted and with the introduction new factors of push and pull, the process began again with new outposts of permanent settlement. The hunting-fishing culture again lost ground and the process of consolidation proceeded.

As pointed out by A. M. Tallgren (1935): "The history of settlement is sociological history, although it can also be political history, which is often the case in its later stages. It is neither artefactual nor linguistic ethnography, but the history of society in the broadest sense of the term, at once biology and economics."

The wilderness-utilisation model and the archaeological material are in agreement with each other, and the former process provides a plausible starting point for investigating the processes of settlement history. It can also explain specific developments in the permanently settled areas of Satakunta and the Lake Vanaja region. As the consolidation of settlement in these parts occurred at an earlier stage, the related factors may, however, be different.

The model can be criticized for being too broad, which may also apply to its basic starting point – the claim that the farming population of the permanently settled areas had a varied subsistence strategy. Could this claim not also be applied to the hunter-fisher population of the inland regions? Their economy could also have been varied enough to include small-scale cultivation. If this was the case, how can we distinguish the pollen records of primarily hunter-fishers from those of long-range slash-and-burn farmers? Unlike in Southwest Finland, the hunter-fisher areas of Savo have not revealed any signs of minor and more or less continuous cereal cultivation from the Bronze Age or the Early Iron Age. At least in this region – as well as elsewhere in the areas of the hunter-fisher culture – subsistence strategies were not varied. Nor was farming a part of the economy of the Forest Lapps of Kemi even in the 16th and 17th centuries (Tegengren 1952). In Savo, the course of development of Päijät-Häme in the Viking Period, i.e. the intermittent or minor occurrence of Cerealia preceding permanent settlements, is a phenomenon of the transition to historically documented times or of the Late Middle Ages.

5. Comparisons of hillforts

A further understanding of the Kuhmoinen hillfort among the ancient hillforts of Finland requires comparisons and classification of the hillforts of Satakunta, Häme and Savo-Karelia.[1] The summary is based on the results of comparative studies on hillfort constructions by Hj. Appelgren (1891) and J. Voionmaa (untitled manuscript) as well as the appended information on hillforts (Appendix 4). The main body of information is presented in summarised form in Table 15 and 16.[2]

5.1. Structural features of hillforts

Geological-topographic classification. The majority of Finland's ancient hillforts are on bedrock.[3] Forts on ridge sites are an exception. Five sites of the latter type are known at present: Rapola, Sääksmäki; Linnamäki, Tenhola, Hattula; Linnamäki, Kankaantaka, Vanaja; Linnamäki, Kirkonkylä, Lammi and Kapatuosia in Hollola. Islands of sandy soil, comparable to ridge sites are Linnaluoto, Harola, Kokemäki; Linnosaari, Valkeakoski; Linnasaari, Tiuri, Räisälä and the old castle of Käkisalmi. Also outcrops and rises of bedrock on islands have been used as fortified sites – Arasalo, Isoröyhiö, Ikaalinen; Linnasaari, Virmaila, Padasjoki; Linnavuori, Turasalo, Taipalsaari; Linnavuori, Kuivaketvele, Taipalsaari; Linnavuori, Ihantsalo, Puumala; the Castle of Viipuri; Rantalinnanmäki, Korpisaari, Kurkijoki and Linnasaari, Tokkarlahti, Sortavala.

In most cases, the ridges in question are so-called lengthwise ridges, running NW-SE in the direction of the retreat of the ice sheet after the last glaciation. Small rises of bedrock are also worn in this direction. The lesser gradient is usually towards to northwest , and in some cases also the southeast slope is accessible. The gradient of the long northeast and southwest sides varies.

Finland is divided according to relief into four types of topographic areas. Typical of the first type are large rises with relatively sharp gradients; the second type consists of terrain with ice-worn valleys. In the third type, hilly terrain of varying elevation prevails and in the fourth type there is relatively even terrain with small variations in elevation (SK 1986 121:6). A map showing the relief of the whole country naturally implies a number of generalisations, and accordingly many small anomalies, which may locally significant, are lost among the statistical averages. In spite of this limitation, the map as a whole provides a reliable picture of the relief of Finland.

Placed on the map of the topographic areas of relief, the hillforts of Finland display an interesting pattern of distribution (Fig. 47). In the first area type there is only one ancient hillfort, Havukkakallio in Ilomantsi. In this area of high relief the small number of hillforts is understandable. There is no evidence of permanent Iron Age settlement in this region, and even settlement of the Early Middle Ages was scarce. The steep gradients of sites are not the main issue, however. Also the suitable site of a hill site is important. The extensive size of the areas of high land in the first topographic area type posed problems of fortifying sites and their occupation.

The majority of the hillforts are in the abovementioned second type of location, and there are also some in the third area. The locations of the sites in the latter context are interesting, as they are at the boundaries of areas 2 and 3. Outside these boundary zones are only a few hillforts.[4] According to the map, hillforts are few or completely lacking in areas where topographic conditions are unsuitable, such as

[1] In the case of Karelia only those hillforts with finds of artefacts are included (see Appendix 4, p. 222).

[2] With computerised map data it would be useful to define the common topographic features of hillforts in a region with searches for similar cases. It would be especially necessary to compare the features of undisputed hillforts with uncertain cases of fort-related place-names for hills and similar sites. This may provide new observations for classification and distribution. Unfortunately, this is not possible at present.

[3] Although the Castle of Häme is presented in the tables, it is not included in the comparison of material, as its possible prehistoric role is highly uncertain (see p. 231).

[4] A cluster of five hillforts in Laitila in zone 3 is an interesting phenomenon, but probably not related to the farmer population of the end of the Iron Age (Luoto 1984a 156).

Table 15. Terrain and features of hillforts.

	Outcrop of bedrock	Ridge	Island	Elevation/metres a.s.l.	Elevation/metres above lake level	Area in square metres	Walls of single course	Double walls	Moat or ditch	Stone walls	Walls of earth	Walls of earth and stone	Outward gateway structures	Inward gateway structures	Adjacent to habitation	Isolated from habitation	By a road[1]	By a water route[1]	Cairns and mounds	Piles of missile stones	Hearths	Buildings connected with walls	Different types of house floors	House floors with hearths	Stone settings	Levelled terrain with stone paving	Construction in two stages	Remains of timer breastworks
Linnaluoto, Harola, Kokemäki		x	x	43	8	2400									x						x							
Linnavuori, Kauttua, Eura	x			57,5	12	1200		x		x	x	x			x							x						
Räätikäsvuori, Sampu, Huittinen	x			82,5	40	2500	x			x					x													
Linnavuori, Kojola, Vammala (Karkku)	x			112,5	55	4150	x			x						x	x								x?			
Arasalo, Isoröyhiö, Ikaalinen	x		x	105	22	2300	x			x				x		x		x							x			
Linnavuori, Siuro, Nokia	x			117	56	15000	x			x				x	x													
Pirunlinna, Kuivaspää, Lempäälä	x			135	30	3400	x			x			x			x												
Linnankallio, Kaakila, Vesilahti	x			107,5	30	3950	x			x					x													
Linnamäki, Valkkinen, Vesilahti	x			127,5	30	5200		x		x						x			x		x		x					
Linnosaari, Valkeakoski (Sääksmäki)		?	x	87,5	5	1150			x							x		x	x		x		x				x	x
Rapola, Valkeakoski (Sääksmäki)		x		145	65	52000	x	?[2]		x		x			x					x				x				
Linnamäki, Tenhola, Hattula		x		142	65	1700	x				x	x	x		x				x	x		x				x	x	x
Aulanko, Hämeenlinna	x			150	70	6500	x					x			x						x		x				x	
Hämeen linna, Hämeenlinna		x	x	?	?	?									x													
Mantereenlinna, Mäskälä, Hämeenlinna (Vanaja)	x			131,6	50	11000	x			x				x	x													
Linnanpää, Kankaantaka, Hämeenlinna (Vanaja)		x		125	25	15000		x		x[3]		x			x													
Unikkolinna, Kernaala, Janakkala	x			110	29	5000	x			x						x												
Teponlinna, Lautsia, Hauho	x			105	20	600	x			x						x												
Laurinkallio, Juttila, Tuulos	x			125	40	7800	x			x					x													
Linnamäki, Kirkonkylä, Lammi		x		150	51	1300									x							x				x	?
Kapatuosia, Kirkonkylä, Hollola		x		137	56	1400									x								x			x		
Linnamäki, Hankaa, Hollola	x			137	50	15000	x			x						x												
Linnasaari, Virmaila, Padasjoki	x		x	107,5	30	3200	x			x						x		x										
Linnavuori, Päijälä, Kuhmoinen	x			172	45	5300	x			x						x	x		x	x	x	?					x	
Pukinvuori, Moiskala, Jämsä	x			122	80	1200	?			?					x													
Linnasenmäki, Jämsänkoski	x			136	40	9000	x[4]			x			x			x		x	x	x								
Linnankallio, Kalkkila, Nastola	x			100	15	2650	x			x					x													
Linnavuori, Vatila, Mikkelin mlk	x			120	30	6500										x												
Linnavuori, Sairila, Mikkelin mlk	x			120	40	8800	x				x				x					x								
Linnavuori, Ohrala, Mikkelin mlk	x			116	40	4800	x			x						x		x										
Linnavuori, Turasalo, Taipalsaari	x		x	100	25	5000	x			x						x		x										
Linnavuori, Kuivaketvele, Taipalsaari	x		x	117	40	31000	x			x						x		x										
Linnavuori, Ihantsalo, Puumala (Juva)	x		x	110	30	4750	x[5]			x						x		x										
Linnavuori, Pisamalahti, Sulkava	x			130	55	8300	x			x						x		x	x									
Linnasaari, Tiuri, Räisälä		x	x	?[6]	7	11000	x			x									x				x	x				
Viipurin linna, Viipuri	x		x	?	?	?					x											x	x				x	x
Vanha linna, Käkisalmi		x	x	?	?	10000	?			?												x						
Rantalinnanmäki, Korpisaari, Kurkijoki	x		x		>24	3810		x		x	x																	
Linnavuori, Hämeenlahti, Kurkijoki	x			47	42	5600		x		x									x								x	
Linnavuori, Lopotti, Kurkijoki	x			?	?	11100	x			x									x					x				
Linnavuori, Suur-Mikli, Jaakkima	x			?	?	2300	x			x									x									
Paasonvuori, Helylä, Sortavala	x			79	73	4700	x					x												x				
Linnasaari, Tokkarlahti, Sortavala	x		x	?	25	4950	x			x																		
Linnavuori, Mäkisalo, Impilahti (Sortavala)	x			?	62	2700	x			x			x	x														
Havukkakallio, Parppeila, Ilomantsi	x			190	30	3000		x			x	x																

[1] Applying only to hillforts isolated from habitation.

[2] At Rapola there are other fortifications only on the southeast slope. These consist of a terrace and a trench.

[3] The stone walls of the north part are joined by walls.

[4] At a lower elevation on the slope is an outer fortification, possibly with walls, from which quartz flakes and debitage have been found.

[5] One of the sections of wall is below the precipice forming a walled-in passage.

[6] Due to the lack of reliable maps, the elevations of the Karelian hillforts cannot be given.

Table 16. Finds from hillforts. ( ) Fragmentary, * Fire patina, ** Melted

	Weapons						Tools and implements							
	Swords	Seax or combat knives	Spearheads and angons	Arrowheads	A lash-ball	A cannon-ball	Fishing gear (harpoons, a fish-hook, net weights)	Axes	Knives and razors	Shears	A bone handle	Fire-striking implements (including striking flint)	Whetstone fragments	Grinding stone
Linnaluoto, Harola, Kokemäki			(1)						3			1	3	
Linnavuori, Kauttua, Eura		(1)												1
Linnavuori, Valkkinen, Vesilahti				2(1)					1					
Linnosaari, Valkeakoski (Sääksmäki)				3								1	x	
Rapola, Valkeakoski (Sääksmäki)			(1**)											
Linnamäki, Tenhola, Hattula	(1**)		(1)			1							3	1
Linnamäki, Kirkonkylä, Lammi														
Kapatuosia, Kirkonkylä, Hollola									(1)			3		
Linnavuori, Päijälä, Kuhmoinen			32(17,5*)	3(2*)	(1)			4(1)	29(22,2*)	4(3)		2(1*)		
Pukinvuori, Moiskala, Jämsä	(1*)[1]													
Linnavuori, Vatila, Mikkelin mlk								1*[1]	(1)			1[1]		
Linnasaari, Tiuri, Räisälä	x		x	x				x	x			x	x	
Viipurin linna, Viipuri	(2)		(1)					(2)	1					
Vanha linna, Käkisalmi			x	x			x		x		x		x	
Rantalinnanmäki, Korpisaari, Kurkijoki														
Linnavuori, Hämeenlahti, Kurkijoki				3			2	(2)	9(2,1*)	1		19	20	
Linnavuori, Lopotti, Kurkijoki			1	2					1		1	2	13	1
Linnavuori, Suur-Mikli, Jaakkima												3		
Paasonvuori, Helylä, Sortavala	(1)		2(1)				1	6(1)	43(11)	1?		52	34	
Linnasaari, Tokkarlahti, Sortavala													1	
Havukkakallio, Parppeila, Ilomantsi							2							

[1] From the foot of the hillfort site in question

	Personal ornaments and clothing													
	Women's brooches	Men's brooches	Brooches used by both sexes	Brooch pins	Beads	Pendant ornaments	Parts of chain-sets	Ring-pins	Belt parts and fittings	Neck-rings	Bracelets	Rings	Bronze spirals	Clothing rivet
Linnaluoto, Harola, Kokemäki	2(1*)		1		1				1					
Linnavuori, Kauttua, Eura														
Linnavuori, Valkkinen, Vesilahti														
Linnosaari, Valkeakoski (Sääksmäki)														
Rapola, Valkeakoski (Sääksmäki)														
Linnamäki, Tenhola, Hattula					2					(4**)			1	
Linnamäki, Kirkonkylä, Lammi		(1**)												
Kapatuosia, Kirkonkylä, Hollola	(1)				13(12)		(1)				(1*)	2		
Linnavuori, Päijälä, Kuhmoinen	1*	1*	8(1*)	1		1	2(1*)		2		4(2*,1**)		1*	
Pukinvuori, Moiskala, Jämsä														
Linnavuori, Vatila, Mikkelin mlk														
Linnasaari, Tiuri, Räisälä	x		x		x	x	x		x		x	x	x	
Viipurin linna, Viipuri	(2)				(1)	1						1		
Vanha linna, Käkisalmi	x		x		x	x			x		x	x		
Rantalinnanmäki, Korpisaari, Kurkijoki														
Linnavuori, Hämeenlahti, Kurkijoki			3	3	10(1)	(1)	(1)		2			3		
Linnavuori, Lopotti, Kurkijoki			(1)		4(3*)		2				16**			
Linnavuori, Suur-Mikli, Jaakkima														
Paasonvuori, Helylä, Sortavala	6(2**)		14(2,1*,1**)			16(6,1**)	14(6,2*,1**)	8(4,1**)		(5**)	(1)	36(3**)		1
Linnasaari, Tokkarlahti, Sortavala														
Havukkakallio, Parppeila, Ilomantsi														

Tools and implements							Building and household implements										
Smithing tools	Slag and an iron bar	Clay whorls	Weaving equipment	Carpentry tools	Agricultural implements	Weighing equipment	Nails, rivets and clamps	Shingle-holders	Locks and keys	Hinges and door fittings	Pot sherds	Pieces of copper kettles	Kettle-hangers	Pieces of iron pots	A frying pan	An icon lamp	A bell clapper
	2238 g	66					3		1		64+3369 g						
	>17,2 kg	2					1				123						
	500 g										942						
							x										
											2						
	382 g	1			1						2094						
							6(3,2**)										
1	1791 g			3(2)	(1)	1	19(14)	2(1*)	1			105	23(8*)				
												1[1]		3			
	x																
x	x		x		x		x		x		x	x					
	x						x		2			x					
x	x		x	x							x	x				x	
	445 g+1		4				6(1,1*)	(1)	4		781	24	2				1
1	37 g+7						4	1	1	1	110	3		2			
											8						
8	741		7	2	7(6)	4	23(8)	2	6(1)	2(2)	927	40	1				
												1					
	x																

	Horse-gear							Miscellaneous finds									
Leather footwear	Ice-shoes	Horseshoes and horseshoe ferrules	Bits	Whip handles	Spurs	Bell pendants	"Studded ferrules"	Pieces of burnt clay	Bone fragments	Unidentified iron objects and fragments	Unidentified bronze objects and fragments	Coins	Hoards or caches	Pieces of amber	Fragments of stone artefacts	Fragments of bone artefacts	Clay objects
								5238 g	151 g	19							
									x	1							
									440 g			1					
									x								
								9 g	>198,2g	2							
					(1)				570 g	5(1*)	45(12**)		x?				
	1	4(1)	2(1,1*)	1		1*				70(4*)	5(2*,1**)						
										2[1]							
	x	x						x	x	x			x				
x		x							x	x	x						
		1						1708 g	1278 g	24	1	5					1
								x	x	2[3]		x					
	9	2	2(1)				4		x	172(155)	19			2	1	1	1

Table 16 cont'd.

	Miscellaneous finds						
	Fragments of red ware pots	Fragments of glass	Dice-cube	Coins of later date	Nails of later date	Assorted later finds	Pieces of brick
Linnaluoto, Harola, Kokemäki	1	1				1	
Linnavuori, Kauttua, Eura							
Linnavuori, Valkkinen, Vesilahti							
Linnosaari, Valkeakoski (Sääksmäki)			1				
Rapola, Valkeakoski (Sääksmäki)							
Linnamäki, Tenhola, Hattula							
Linnamäki, Kirkonkylä, Lammi							
Kapatuosia, Kirkonkylä, Hollola	2	1		2		2	1
Linnavuori, Päijälä, Kuhmoinen				1		1	
Pukinvuori, Moiskala, Jämsä							
Linnavuori, Vatila, Mikkelin mlk							
Linnasaari, Tiuri, Räisälä	x	x					
Viipurin linna, Viipuri							
Vanha linna, Käkisalmi						x	
Rantalinnanmäki, Korpisaari, Kurkijoki							
Linnavuori, Hämeenlahti, Kurkijoki		4					
Linnavuori, Lopotti, Kurkijoki	2					6	1
Linnavuori, Suur-Mikli, Jaakkima							
Paasonvuori, Helylä, Sortavala		1		2	151		
Linnasaari, Tokkarlahti, Sortavala							
Havukkakallio, Parppeila, Ilomantsi							

Satakunta and Ostrobothnia. There were, however, defensive sites in low-lying locations, if natural conditions provided other possibilities for this. With the lack of high terrain and hills, the islands of the Kokemäenjoki River were suitable places of defence. One of the few ancient hillforts in Satakunta is the Linnaluoto Island at Harola in Kokemäki – albeit of uncertain defensive nature. The site is in the middle of the river. Historical sources indicate that islands in the river were fortified in the Middle Ages (Isoluoto and Linnaluoto, Forsby, Kokemäki).

The effect of natural conditions on the locations of hillforts is especially clear in the hillforts of the Lake Vanaja region, where they follow the inhabited eastern and western shores of the lake. On the west shore the forts are on a series of high ridges running adjacent to the lake and on the east shore they are on outcrops of bedrock.

The region of Sysmä, belonging to the second zone mentioned above and located opposite to Kuhmoinen on the east shore of Lake Päijänne, was permanently settled in late prehistoric times. The area can be expected to display both topographic and demographic conditions suitable for the building and maintenance of hillforts. This, however, is not the case. The generalising map of relief does not clearly indicate what can be observed first hand along the shore of Lake Päijänne: the east shore is considerably more even in relief than the west shore. This was due to the effects of the continental ice sheet. The east shore appears to have been located contrary to the movement of the ice, while the west shore was not abraded by the ice. Accordingly, the east shore is flat and of gently sloping profile. On the west shore the situation is the opposite. An analogy is the formation of glaciated rocks (J. Donner 1976 19).

There are no maps of the relief of the areas of Karelia ceded to the Soviet Union in World War II. There is, however, information on elevation. Jorma Heinonen (1972 32) has observed that no ancient hillforts of undisputed character have been recorded on the Karelian Isthmus. According to him, the high hills and outcrops of bedrock typical of the northwest shore of Lake Ladoga are lacking in this area, and defensive locations could be built only on sandy hills and the islands of the Vuoksi River system (see also Nissilä 1937). As the crests and higher parts of these hills were mostly arable land, the ancient walls and structures have disappeared from them in the course of time. As an example, Heinonen mentions Appelgren's report of a stone walls at the hillfort of Vehmainen in Rautu, which were destroyed in connection with burn-clearing at the site (Appelgren 1891 97).

Size. The size of the hillforts varies considerably,

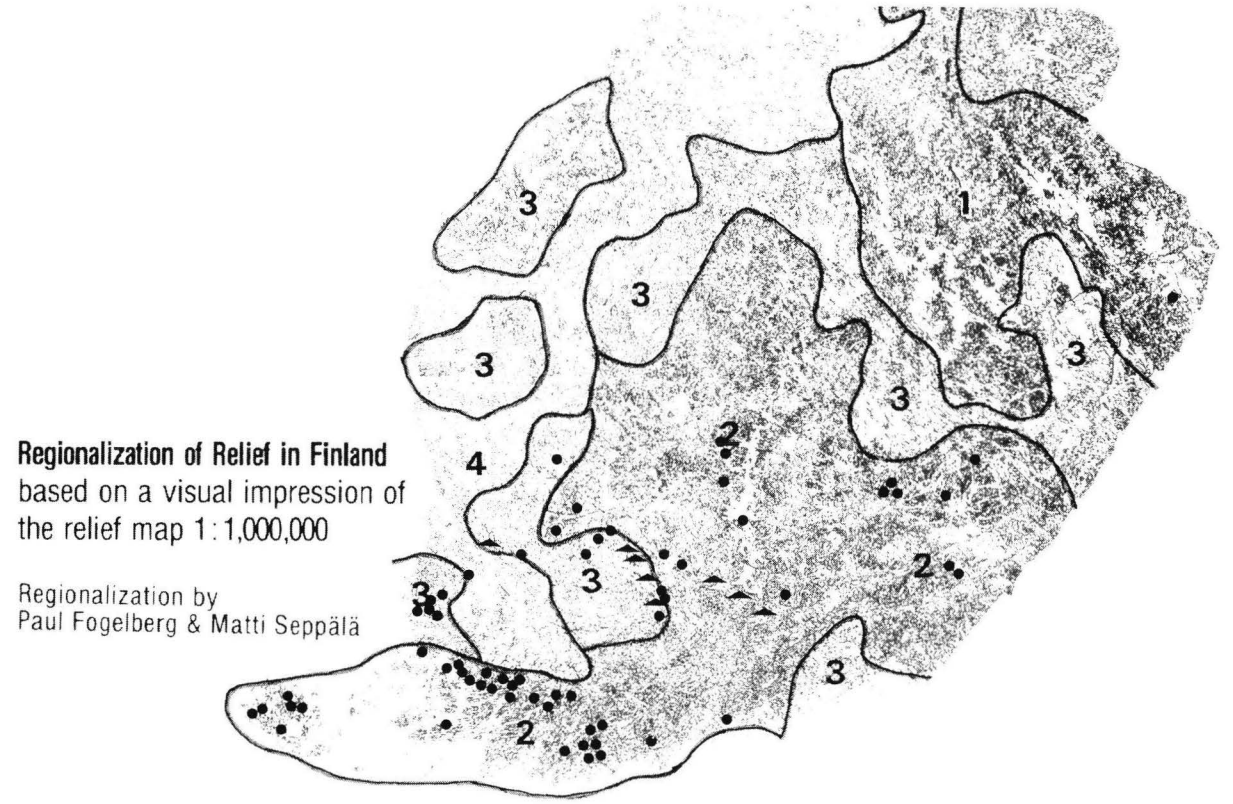


Fig. 47. Hillforts and relief of Southern Finland. Fort sites on outcrops of bedrock marked with circles and forts on ridges or islands of gravel are marked with triangles.

i.e. the area of the crest bounded by walls and precipices. Of exceptionally large area is the Rapola ridge fort, with maximum dimensions of c. 380 x 200 metres. The area in question is over five hectares. Hillforts covering over a hectare can be classed as large. Sites of this extent are Linnavuori, Siuro, Nokia (c. 1.5 ha); Mantereenlinna, Mäskälä, Vanaja (c. 1.1 ha); Linnanpää, Kankaantaka, Vanaja (c. 1.5 ha); Linnavuori, Hankaa, Hollola (c. 1.5 ha); Linnavuori, Kuivaketvele, Taipalsaari c. 3.1 ha); Linnasaari, Tiuri, Räisälä (c. 1.1 ha); Linnavuori, Lopotti, Kurkijoki (c. 1.1 ha) and the old castle of Käkisalmi (1 ha). The smallest hillfort site is Teponlinna at Lautsia in Hauho, measuring 40 metres by a maximum of 25 metres (area of crest 600 m^2). The remaining hillforts vary in size from over 1,000 m^2 to c. 9,000 m^2.

Location of walls. At fort sites on hills the walls are located on the lesser gradients and in other places of easy access, e.g. to close the entrances formed by ravines. In most cases they are located in places of natural formations of stones and rocks. Inspection reports and published studies often suggest that walls on bare bedrock may have been torn down in the course of time or they may have fallen down of their own accord. This may explain why in certain cases the walls end in the middle of an outcrop of bedrock and do not appear to form any consistent defensive system (e.g. the Linnankallio hillfort at Kaakila in Vesilahti). On the other hand, the wall of the hillfort at Kuivaketvele in Taipalsaari ends in the middle of a gentle slope, where stones could not have been rolled downhill. A similar situation has been observed at the hillfort of Hankaa in Hollola. At these sites the incomplete walls are, however, in places suitable for defence. A further possibility may be the interruption of work at the site.

It appears that the location of the walls and hillforts in general – including the "unfinished" cases – were largely dictated by the original topography and terrain. Appelgren (1891 XLIII) has pointed out that "the forts were usually built in the shape and form dictated by nature."

Structure of walls. At fort sites on bedrock the walls were mostly built of stones and rocks. In some cases large rocks that had separated from the bedrock were used and/or round-worn stones from local ridge and moraine sediments. The availability of rocks and stones naturally dictated the technique used. One of the best examples of the use of raw material from the site is the Pirunlinna hillfort of Lempäälä, where the wall surrounding the crest was built in a natural stone formation (on the problems of distinguishing natural formations from man-made structures, see Appendix 4, p. 220). Sites on bedrock also have walls of earth or earth and stones. Even in these cases the structure of the walls depends on the available materials. There are often stones and stone

fields at the boundary of the bare crest and the slope, and the slopes often contain ridge deposits, shore formations or walls formed by creep soil. At some sites sufficient deposits of moraine formed on the slopes for the construction of walls of earth or of earth mixed with stones (Aulanko, Hämeenlinna; Linnavuori, Sairila, Mikkeli; Castle of Viipuri). This feature can especially be seen at certain sites with walls running in double courses. For example at the Kauttua hillfort in Eura, the upper sections of wall, running intermittently, were of stone or earth mixed with stones, while the lower sections of wall, on a ridge-like slope, contained only earth. At Havukkakallio in Ilomantsi, the upper walls were of earth mixed with stones and the lower ones were of earth. At Rantalinnanmäki in Korpilahti, Kurkijoki, the upper walls were of stone and the lower ones of stone and earth. There are also forts on outcrops of bedrock (Linnamäki, Valkkinen, Vesilahti and Linnavuori, Hämeenlahti, Kurkijoki),[5] where both the upper and lower walls were built of stones alone. This was due to the availability of suitable stones in the area and the absence of moraine at the site.

Fort sites on ridges display the same association between the structure of walls and the available raw material. At these sites the walls are of earth, supported by rocks and small boulders occurring in the moraine deposits. Forts on ridges have both single and double series of walls. For example, there is a twin series of walls on the northern slope of the Linnapää hillfort (a ridge site) at Kankaantaka in Vanaja. At this site, there are also stones along the slope which were used to build a double series of walls with an exceptional connecting wall between them. On the southern slope, where there were few stones, a single section of wall was built on the ridge. There are also apparently separate outer fortifications on one of the slopes of the Rapola hillfort. These features include an embankment and a ditch. The walls of earth built on both sides of the moat or ditch at the Linnosaari site in Valkeakoski can also be regarded as twin walls. At ridge sites archaeologists have observed signs of the levelling of the edges of the ridge, as well as man-made steepenings of the gradient and the supporting of the outer side with stone settings even in places without actual walls. These sites were fortified also along their steeper slopes, which is understandable in view of the fact that there cannot be vertical gradients along ridges. The hillfort of Kapatuosia in Hollola has no walls at all and a levelling of the edges of the ridge appears to have sufficed.

A common structural feature of most wall structures at bedrock and ridge sites is the building of the outer side of the walls to as perpendicular a form as possible (cf. the levelling of the sides and edges at ridge sites). The crest area is often slightly concave in relief, but otherwise level. In many cases there are gates in the walls, the sides of which were strengthened by a widening of the structure. At a number of sites (Isoröyhiö, Arasalo, Ikaalinen; Linnavuori, Siuro, Nokia; Pirunlinna, Kuivaspää, Lempäälä; Linnamäki, Tenhola, Hattula; Mantereenlinna, Mäskälä, Vanaja; Linnasenmäki, Jämsänkoski and Linnavuori, Mäkisalo, Impilahti) the walls display as a special feature gate-side constructions extending outwards or inwards, depending on the terrain. These served to form passes leading to the gates, forcing an attacking enemy to move into the pass where defence was more feasible.

In Western Finland the stone walls of the forts were built of rocks and boulders in their natural state, while regular wall structures are regarded as a feature specific to the hillforts of Karelia. Juhani Rinne (1932 262; see also Rinne 1914 61 & 1947b 103–104; Europaeus 1928 1495) observed that many of the latter forts display features that are rare among prehistoric fortifications in Finland and appear to reflect the features of mortar-built Medieval buildings. "These features include perpendicular faces, the even seams of the outer surfaces, supporting the walls with buttresses and the intentional use of right angles." The local bedrock must be taken into account in this connection. Especially the regions of Sortavala and Kurkijoki belong to a zone of slate rocks where pieces removed from the bedrock can be used with much greater ease in the building of walls with the above characteristics than the more-or-less irregular rocks and boulders of ancient shore formations and moraines. As pointed out above, the latter material was also used to build similar upright walls, and the same was attempted at the ridge sites as well.

The available map of Finnish bedrock (scale 1: 1,000,000, Simonen 1980) poses the same problems as the maps of soils and relief. The general nature of the information supplied does not reveal, for example, "slate lenses" occurring in the granitoid areas outside the slate zone. These can occur in Savo and even in areas to the west. Nor does the map reveal granite outcrops with favourable properties of cracking which "produced" slabs suitable for building purposes and the construction of "Karelian" walls. Also local environments in Karelia which produced "West Finnish" walls are overlooked in the map (e.g. Lopotti, Kurkijoki; see Rinne 1947b 103).

Other structures. Structures on top of the walls. It

[5] At the Linnasenmäki hillfort in Jämsänkoski, there is an "outer fortification" in the lower part of the western slope with stone settings that may have been the foundations of walls. The connection of this part with the walls higher up at the site is, however, uncertain. Flakes of quartz have been found at the "outer fortification", but there are no finds from the area of the crest.

is generally assumed – with reference to the chronicle of Henry of Livonia and its description of the ancient fortifications of Estonia and Livonia – that the walls supported breastworks of logs. The stone walls have not revealed any clear traces of such structures. However, remains of log breastworks have been found at the Castle of Viipuri, Linnamäki at Tenhola in Hattula, Linnosaari in Valkeakoski and possibly also at the hillfort of Aulanko in Hämeenlinna. They are the remains of the first stage of construction, which, according to Jouko Voionmaa, may also have been the case at Linnamäki in Lammi. At the Kuhmoinen hillfort evidence of two stages of construction were observed, but no remains of log fortifications, unless finds of charcoal from the base of the wall are interpreted as such.[6]

Other building remains. In almost all cases, the remains of houses and buildings found at fortification sites are extremely difficult to interpret. In addition to the Kuhmoinen hillfort, stone settings adjacent to the walls have been found at the Linnamäki hillfort of Tenhola in Hattula and at the hillfort of Lammi. The features may be the floors of houses or small buildings built with the three walls supported by the timber joints of the defensive wall in order to save time and labour.

At some hill sites, stone settings of indefinite character suggest the there may have been buildings in the area of the crest. According to Voionmaa, houses or small buildings at hillforts lacked hearths. Exceptions to this rule in the region of Häme are the Rapola and Linnosaari sites in Sääksmäki and possibly also Linnamäki in Lammi. In Eastern Finland, field work at Tiuri in Räisälä, Lopotti in Kurkijoki and Paasonvuori in Sortavala revealed circles of stones with hearths, interpreted as house-floors. Timber frameworks have been excavated at the old castle of Käkisalmi and the Castle of Viipuri. There were no hearths at the former site, and from the latter site there is no information concerning any possible hearth structures.

Hearths. Hearths are the most common structure found at hillforts. At most sites, excavated cairns turned out to be hearth structures. Voionmaa suggests that a special feature of certain hearths, an upright slab of stone (Rapola, Sääksmäki) was intended to support the cooking vessel and to direct the wind. He also suggests that at the hillfort of Valkkinen in Vesilahti fire-cracked stones, charcoal and soot were deposited next to the hearth, creating cairns, the largest of which are up to 2–3 metres in diameter and over 50 cm high. Voionmaa claims that similar cairns at hillforts with small amounts of charcoal and soot were possibly created in the same way.

Piles of missile stones. In some cases there are piles or cairns of stones near the walls which are not hearths. Because of their location and the size of the stones, they have been interpreted as piles of missile or throwing stones. Features of this kind have been observed at least at the hillforts of Rapola in Sääksmäki, Tenhola in Hattula, Päijälä in Kuhmoinen, Jämsänkoski and Sairila in Mikkeli.

Wells. Wells or similar reservoirs of water could be expected to have belonged to ancient fortifications, especially as the supply of water was one of the major problems of the use of the site at least under siege in snowless conditions. Wells were naturally difficult to dig at bedrock sites. Of the ridge forts only Rapola may have had a well. There is also a possibly water reservoir of stones at Mantereenlinna in Vanaja. At some of the hillforts there are areas of marshy ground, which could have been used as water reservoirs as in the case of the Kuhmoinen hillfort. Most of the hillforts, however, are in the immediate vicinity of lakes, ponds or rivers. At Kuhmoinen there is a spring at the foot of the hillfort.

Occupation layer. Excavations have shown that, with the exception of a few Karelian hillforts (Paaso, Sortavala; Tiuri, Räisälä; the old castle of Käkisalmi and Lopotti, Kurkijoki), no actual occupation or cultural layer formed at the fort sites compared here. At bedrock locations this is completely natural. Jouko Voionmaa has observed the same in his excavations of ridge forts, even in cases where artefacts were found.

Lack of structures. The material includes three fortification sites with no signs of structures or constructions: Linnaluoto, Harola, Kokemäki; Pukinvuori (Linnavuori), Moiskala, Jämsä; Linnavuori, Vatila, rural commune of Mikkeli. The fortified nature of the first-mentioned site is questionable, as excavations have not revealed any unequivocal evidence of fortified use and the island site has been used by man throughout historical times. At Pukinvuori in Jämsä there is a stony field, the exact nature of which can be revealed only by future excavations. There are no walls at the Vatila site, and of the finds only a knife tang was found in the crest area. In spite of this, these islands and hills must be regarded as evidence of the possibility that naturally sheltered sites could have been used as such for purposes of refuge or that possible defensive structures do not always leave archaeologically identifiable remains.

Ancient hillforts and settlement. With respect to local prehistoric settlements the hillforts can be classed into three groups. In cases where a hillfort is in the midst of a settled location or at its boundary

[6] It is also possible that a streak of soot observed in test trench no. 3 at the Kuhmoinen hillfort may be related to burn-clearing, which can be assumed to have occurred prior to the building of the walls (Damell & Lorin 1985 232).

at a maximum distance of three kilometres from known cemeteries or concentrations of stray finds, it is defined as a nearby fort within the context of local settlement. At distances of over three kilometres from evidence of permanent settlement, the site is defined as an outlying fort. In the present material, the outlying forts form a slightly smaller group than the former (16 out of a total of 33, with Karelia excluded).[7] Outlying forts are those of Isoröyhiö, Arasalo in Ikaalinen, Kuivaspää in Lempäälä, Valkkinen in Vesilahti, Linnosaari in Valkeakoski, Kernaala in Janakkala, Lautsia in Hauho, Hankaa in Hollola,Virmaila in Padasjoki, Linnasenmäki in Jämsänkoski, Vatila and Ohrala in Mikkeli, Turasalo and Kuivaketvele in Taipalsaari, Ihantsalo in Juva and Pisamalahti in Sulkava. Even these sites can be said to be at a reasonable distance from local settlements. With the exception of the hillforts of Savo, which are in actual wilderness locations, the maximum distance is only 8 kilometres (Valkkinen, Vesilahti).

Ancient hillforts and routes of communication. Because the forts of the settled areas are naturally adjacent to land and water routes, there is no need to survey this connection any further. On the other hand, the outlying hillforts are of interest in this connection. The hillforts of Ikaalinen, Valkeakoski, Padasjoki, Jämsänkoski, Taipalsaari, Sulkava and Juva are located along water routes. Only the hillforts of Kuhmoinen and Karkku are next to roads that date back at least to the Middle Ages. There are also certain cases where the hillforts have no connection with land or water routes (Table 15).[8]

The connection with water routes may be only apparent and a result of topography. In the vicinity of lakes with numerous islands and rivers, islands were naturally used for defensive purposes. This can be clearly seen in the region of Lake Saimaa and in the Sortavala area on the shore of Lake Ladoga, which is not discussed in any further detail in this connection.

It can be claimed that routes of communication and ancient fortifications have hardly any systematic associations.

5.2. Finds from ancient hillforts and the activities of the occupants

In reviewing finds from hillforts and the activities reflected by this material, reference must again be made to noncultural and cultural formation processes. The review is naturally impaired by the fact that only some of the sites have been excavated. Even at excavated fort sites, the local environment has had varying effects on the preservation of finds. At bedrock sites, objects stand a poorer chance of being preserved that at forts on ridges. At forts on bedrock the soil cover varies considerably in both extent and thickness. A location close to settlement increases the possibility of disturbance, with removal of objects and material from their original contexts.

Also excavation techniques and the extent of archaeological excavations affect the representativeness of finds. There is no reason to compare cases where respectively 1 % and 60 % of the crest area has been excavated. Furthermore, metal detectors have been used at certain sites, with an ensuing effect on the selection of finds on the basis of their material.

No specific patterns could be calculated for this material. However, the finds are compared with respect to functional classification, on the basis of the principles applied in connection with the material from the Kuhmoinen hillfort. The Iron Age finds from ancient fortification sites are presented in Table 16. In connection with the functional groups of finds, numbers of single categories are not listed. Only the number of hillforts is given where there is evidence of the activities indicated by the find or finds in question.

The material from some of the hillforts includes Stone Age and Epineolithic artefacts, which do not provide unequivocal definitions of function.

The largest category consists of finds related to *buildings and household activities* (17/21). Pot sherds have been found at 11 hillforts. There are also fragments of copper kettles from several sites (9/21). Nails and rivets are also a significant group within this category (10/21).

Tools and implements have been found in a large number of cases (17/21). Most of these are general-purpose tools: knives, axes, shears, whetstones[9]

[7] Karelia is excluded because it was not possible to review in any detail the associations between fortifications and settlements.

[8] Niitemaa (1955 227; see also Oja 1945) has studied the locations of ancient hillforts and fort-related place-names along the Late Medieval routes of communication leading from Häme to the Gulf of Finland, suggesting that they have close associations. He interprets these "forts" as obstructions, points of securing defence and warning sites along roads and regards them as evidence of the use of these routes already in late prehistoric times. However, not one of the forts is actually adjacent to any roads or within sight of a road, which would be a requirement for obstructing passage. Furthermore, Niitemaa's outlined road network, based on place-names indicating stages of journeys or places of communication, does not conform to a critical review of the material, as only some of the place-names can be connected to central routes of communication. Jaakko Masonen (1989 78–80, 107–108, 148-152) is critical of the claimed links between ancient hillforts and roads.

[9] Included among the whetstones are a large grinding stone of sandstone from the Tenhola hillfort in Hattula (NM 11968:66) and a stone slab from the Kauttua hillfort in Eura (NM 11638:3) which is marked in the finds catalogue as the base of a flour-grinding stone.

(15/21) and fire-striking implements (10/21). The latter may include fragments of later striking flint. There are few finds of agricultural implements, carpentry tools, fishing gear or weaving equipment.[10] Also smithing tools are few in number, although finds of slag are almost as numerous as general-purpose tools (13/21). Clay discs have been found at three sites. These objects are often classed as loom-weights, but they could also have been in bellows (Serning 1979 87–88).

Weapons have been found at fourteen sites. The most common ones are spearheads and angons (9/21). Other weapons are swords (5/21), arrowheads (7/21), a combat knife or sceax (1/21) and a cannon ball (1/21).

Personal ornaments have been found at eleven sites. The most numerous ones are brooches (10/21) and beads (8/21). Other ornaments and articles of clothing are bronze spirals (4/21), belt buckles (6/21), pendants (6/21), parts of chain-sets (6/21), bracelets (6/21), a small bell (1/21) and a necklace (1/21). The ornaments were used by men and/or women.

There are few finds of *horse-gear*. The most numerous ones are horseshoe-nails and fragments of horseshoes (15/21). Other finds are ice-shoes (3/31), bits (2/21) and a whip handle (1/21).

Of the other categories, bone is common (11/21) and also burnt clay (5/21). Burnt clay is often found together with slag and it often includes fragments of discs. Metallurgy is indicated finds of small pieces of melted and unmelted bronze (5/21). Hoards of silver objects have been found at two hillfort sites and pieces of iron artefacts have been at several sites (11/21). There are also numerous other finds of varying type, most of which are probably of later date.

5.3. Chronology

The section on chronology is introduced by the direct artefact datings. This, however, does not mean that the cultural formation processes which are of significance for the dating of the Kuhmoinen hillfort are completely overlooked. They will be discussed in further detail below, as they apply to other sites and forts as wells. With respect to natural formation processes reference will only be made to points presented above.

Stone Age artefacts and material of similar type which cannot be given any precise dating have been found at the following fort sites: Linnaluoto, Harola, Kokemäki; Arasalo hillfort, Ikaalinen; Pirunlinna, Lempäälä; Linnamäki, Tenhola, Hattula; Kapatuosia, Hollola; Linnasenmäki, Jämsänkoski and the Lopotti hillfort in Kurkijoki. Of these finds, arrowheads from Pirunlinna are not necessarily associated with the actual hillfort, a stone adze from Tenhola in Hattula is of somewhat uncertain type and a number of flakes from Linnasenmäki in Jämsänkoski are not from the crest of the hill but from the "outer fortification".

Epineolithic ceramics have been found at Linnosaari in Valkeakoski and possibly also at Linnasaari, Tiuri, Räisälä.

Of the Iron Age finds, chronologically problematic cases are objects and artefacts that are known to have remained in use for long periods, viz. ceramic vessels, e.g. finds from many of the sites include hand-turned ware of dark colour and coarse temper. This material is generally dated o the Early Iron Age. Similar ware was found at the Vemmellahti dwelling site in the rural commune of Pieksämäki. TL-datings of this material indicate continued use up to the Early Middle Ages or even longer (see Appendix 4, p. 223). According to Luoto (1984a 117), some of the similar material from the Vanhalinna hillfort in Lieto is of Medieval date and at the Liinamaa hillfort in Eurajoki it is possibly part of a late 14th century context (Luoto & Pihlman 1980 44–45). Periods of such duration are of little use in the dating of hillfort sites.

In a number of cases Soviet archaeologists have assessed the periods of use of hillforts on the basis of ceramics. With reference to the dark and coarse-tempered ware mentioned above, the Karelian datings must be treated with caution, especially as the views of the Russian scholars are for the time being based on unverified results. A closer review of the situation is also impaired by a lack of basic studies concerning the Iron Age pottery of Finland. Assessments of the periods of use must be based on other categories of material and a few datings obtained by the methods of the natural sciences.

Artefact groups of long-term use are also to be found among the other categories of finds: spiral bracelets, penannular brooches with rolled ends, even-tipped arrowheads of uncertain type and pieces of copper kettles. In cases where these long-used artefacts occur together with finds providing more precise datings and their periods of use overlap, the former are assumed to be contemporaneous with the latter. The datings of the artefact finds are presented in Table 17.

The earliest finds date back to the Merovingian Period and have been recovered at the following sites: Linnaluoto, Harola, Kokemäki; Kauttua, Eura; Rapola, Sääksmäki; Tenhola, Hattula; Kapatuosia, Hollola and the old castle of Käkisalmi. Viking

[10] Spindle whorls are classed as weaving equipment. Similar discs of bone could also have been used in borers.

Table 17. Artefact datings from Hillforts.

	Finds from the Stone Age or of Stone Age type	Epineolithic finds	Early Roman Iron Age	Late Roman Iron Age	Migration Period	Merovingian Period	Viking Period	Crusade Period	Middle Ages
Arasalo, Isoröyhiö, Ikaalinen	x								
Pirunlinna, Kuivaspää, Lempäälä[1]	x								
Linnasenmäki, Jämsänkoski[2]	x								
Linnaluoto, Harola, Kokemäki	x					x	x x		
Linnavuori, Kauttua, Eura						x			
Linnamäki, Valkkinen, Vesilahti							x		
Linnosaari, Valkeakoski (Sääksmäki)		x							x
Rapola, Valkeakoski (Sääksmäki)						x			
Linnamäki, Tenhola, Hattula	?					x	x		x
Hämeen linna, Hämeenlinna						x		x	
Linnamäki, Kirkonkylä, Lammi							x		
Kapatuosia, Kirkonkylä, Hollola	x					x	x	x	
Pukinvuori, Moiskala, Jämsä[3]								x	
Linnavuori, Vatila, Mikkelin mlk[4]								x	
Linnasaari, Tiuri, Räisälä		?					x	x	x
Viipurin linna, Viipuri								x	x
Vanha Linna, Käkisalmi						x	x	x	x
Rantalinnanmäki, Korpisaari, Kurkijoki								x	
Linnavuori, Hämeenlahti, Kurkijoki	?						x	x	
Linnavuori, Lopotti, Kurkijoki	x						x	x	
Paasonvuori, Helylä, Sortavala							x	x	
Linnavuori, Tokkarlahti, Sortavala								x	

[1] Flint arrowheads from a cave on the slope of the site.
[2] The quartz flakes and debitage are not from the crest of the site but from an "outer fortification" lower down on the slope.
[3] The finds are from a terrace below the highest part of the site.
[4] The finds are from the foot of the hill.

Period finds form the oldest component of the material at the hillforts of Valkkinen in Vesilahti, Lammi, Tiuri in Räisälä, Hämeenlahti in Kurkijoki, Lopotti in Kurkijoki and Paaso in Sortavala. Use beginning in the Crusade Period is indicated by the material from Pukinvuori in Jämsä, Vatila in the rural commune of Mikkeli, the Castle of Viipuri and Rantalinnanmäki in Kurkijoki. The finds from Linnosaari in Valkeakoski can mainly be described as Medieval.

Few hillforts display evidence of continued use. There are eight cases of use and occupation within a single chronological period (Merovingian Period: Kauttua, Eura; Rapola, Sääksmäki. Viking Period: Valkkinen, Vesilahti; Lammi. Crusade Period: Pukinvuori, Jämsä; Vatila, Mikkeli; Rantalinnanmäki, Kurkijoki. Medieval: Linnosaari, Valkeakoski). Although not indicated directly by Table 17, there are several cases where there are chronological gaps even within a single period (Tenhola, Hattula; Kapatuosia, Hollola; see Appendix 4). Artefact types indicate continuity from the Merovingian Period to the 11th century (Linnaluoto, Harola, Kokemäki), from the Merovingian Period to historically documented times (old castle of Käkisalmi), from the Viking Period to the Crusade Period (Lopotti and Hämeenlahti, Kurkijoki; Paaso, Sortavala), from the Viking Period to historically documented times (Tiuri, Räisälä) and from the Crusade Period to historically documented times (Castle of Viipuri). The forts could thus have been in continued or intermittent use from the Merovingian Period onwards or only for the duration of a couple of periods. In most cases there is continuity from the Viking Period to the Crusade Period. In only three cases is there clear continuity from the prehistoric periods to historically documented times.

Fig. 48 presents the numbers of stray and cemetery finds per period from the parishes of Kokemäki, Eura, Sääksmäki, Hattula, Hollola and Käkisalmi, where hillforts and similar fortifications were founded in the Merovingian Period. The diagrams show that there are no stray or cemetery finds of the Merovingian Period from Käkisalmi (there are no Viking Period finds either and only one cemetery dating back to the Crusade Period). In Hollola, cemeteries of the period are also absent and there are only a few stray finds of the Merovingian Period. The situation is similar in Hattula where there is only one cemetery of the period and an insignificant num-

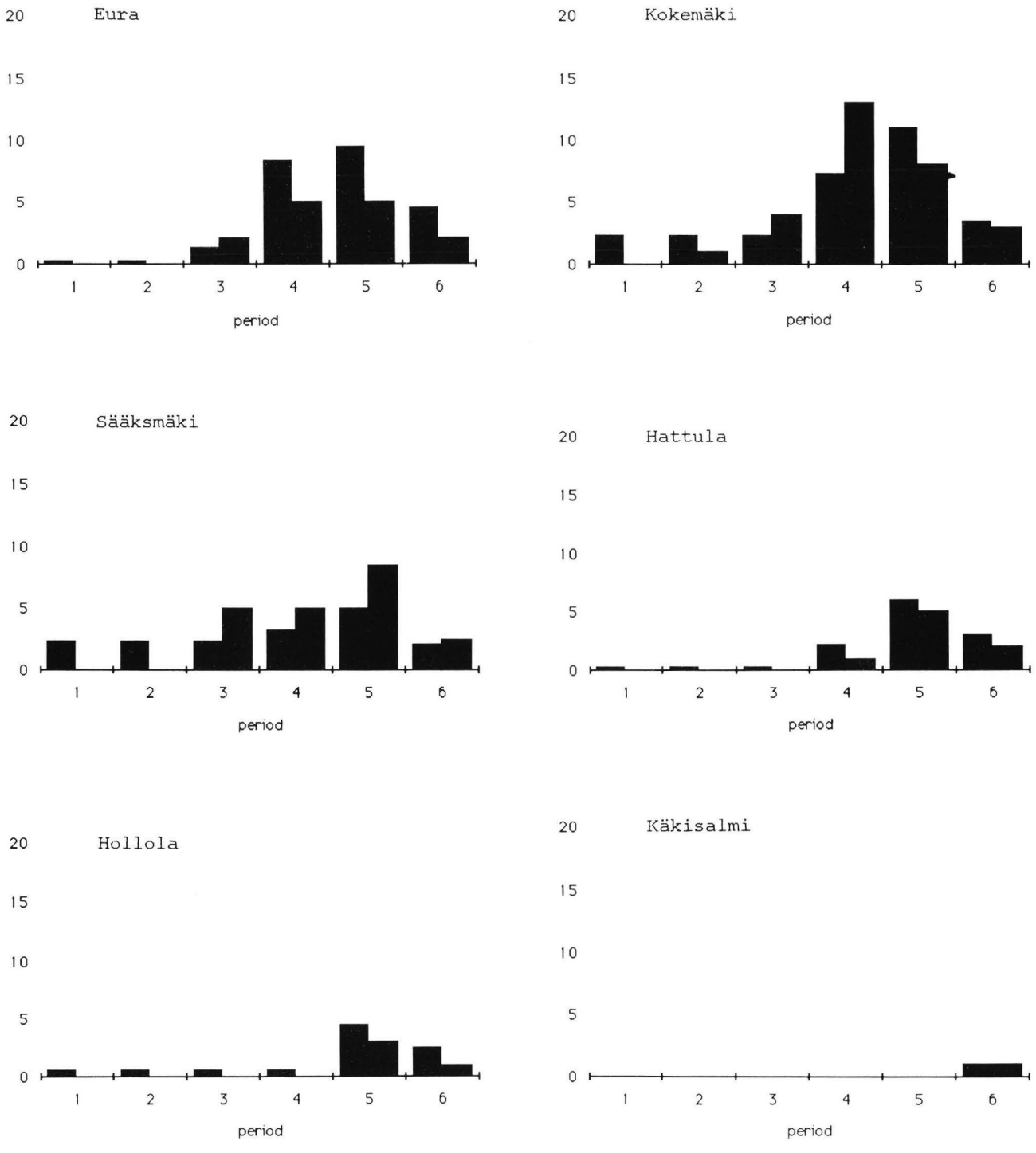


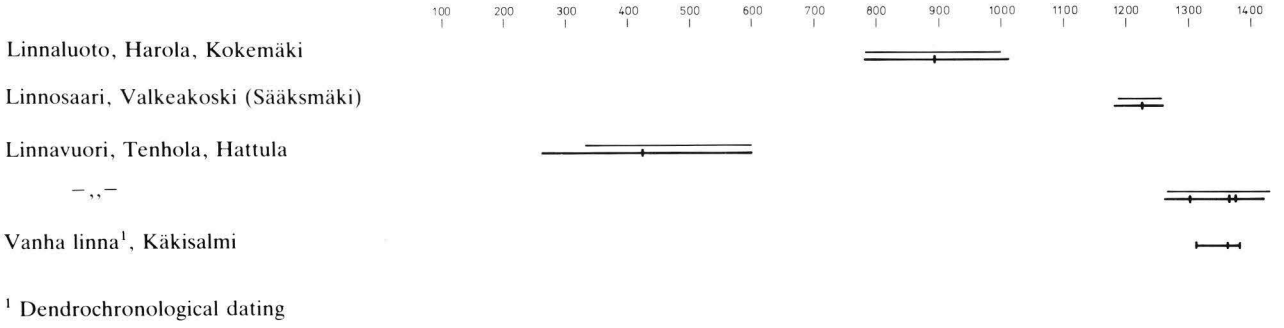
Fig. 48. Quantitative development of stray finds and cemeteries in Eura, Kokemäki, Sääksmäki, Hattula, Hollola and Käkisalmi.

ber of stray finds. Different conditions prevailed, however, in Kokemäki, Eura and Sääksmäki. These parishes were permanently settled already in the Merovingian. Half of the cases where hillforts have been dated to the Merovingian Period are in conflict with artefact datings in terms of local settlement history. In Hattula, Hollola and Käkisalmi there was not population for the construction of hillforts in the Merovingian Period.

A comparison of the artefact datings with the few available natural-scientific datings (Fig. 49) displays a trend similar to that observed at the Kuhmoinen hillfort: the latter datings are partly the same and/or younger than the artefact datings.

Radiocarbon datings have been obtained from Linnaluoto, Harola in Kokemäki, Linnosaari, Valkeakoski in Sääksmäki and Linnamäki, Tenhola in Hattula. There is also a dendrochronological dating from the old castle of Käkisalmi. The oldest age obtained is for one of the samples from Hattula, but this dating to the Roman Iron Age and the Migration Period [cal AD 261 (429) 600] cannot be

Fig. 49. Natural-scientific datings of hillforts.



[1] Dendrochronological dating

used (see Appendix 4, p. 230). At Linnaluoto, Harola in Kokemäki a Viking Period dating was obtained [cal AD 780 (894) 1010]. This also falls within the period of use indicated by the finds of artefacts. A problem with this site, however, is the possibility that the artefact datings or the radiocarbon ages are not necessarily associated with the use of the island as a place of refuge.

The ^{14}C dating for the Linnosaari fort site in Valkeakoski [cal AD 1180 (1225) 1260] is in agreement with the finds of artefacts. On the other hand, one of the two datings from Tenhola in Hattula [cal AD 1260 (1300,1365,1374) 1420] is considerably younger than the oldest finds from the site and most probably older than the cannon ball found there. A considerable discrepancy is also displayed at the old castle of Käkisalmi by the dendrochronological dating of construction to the period 1310–1360 and the Merovingian and Viking Period material found in the same layer.

The contradictions may be explained with reference to cultural formation processes. The starting point in this connection is the Paaso hillfort in Sortavala, although in this case the oldest artefact finds are not in conflict with the evidence of local settlement history.

As in the case of Kuhmoinen, the finds of the Viking Period are in different condition than later objects, which clearly indicates a cremation cemetery. There are also a few fragments of burnt bone from the crest of the hillfort site. According to Kočkurkina (1981 73–87), the fragmentary and burnt Viking Period artefacts are not associated with the hillfort (dated to the 12th and 13th centuries) but with a cremation cemetery older than the time of construction of the fort. However, this view is not supported by the distribution of finds at the site and the fact that human bones are lacking from the material (see Appendix 4, p. 244). The crest of the Paasonvuori site would have been an exceptional location for a cremation cemetery. There are no cases from Western or Eastern Finland where a cemetery of this kind is in a location of the above type.

The difference in condition of the older and later finds is the same as in the case of the Kuhmoinen hillfort. It is possible that the older and damaged objects are due to the same reason as well – scrap metal for recycling.

Excavations at Paasonvuori have revealed the remains of a forge, smith's tools and slag. This combination is by no means unique. A. N. Kirpičnikov (1979) points out that the old castle of Käkisalmi was a site for various crafts, especially the manufacture of personal ornaments of bronze. Smith's tools and slag have also been found at Tiuri in Räisälä and Lopotti in Kurkijoki.

Metallurgical practices are also indicated by finds of slag (Linnaluoto, Harola, Kokemäki; Linnavuori, Kauttua, Eura; Linnavuori, Valkkinen, Vesilahti; Linnavuori, Tenhola, Hattula; Linnavuori, Vatila, Mikkeli; the Castle of Viipuri; Linnavuori, Hämeenlahti, Kurkijoki; Havukkakallio, Parppeila, Ilomantsi). Of the 21 fortification sites with finds (Table 16), 13 (62 %) have revealed direct evidence of smithing.[11] Further evidence of smithing are clay whorls or discs possibly used as the nozzles of bellows, burnt clay, whetstones, scales equipment as well as damaged objects and "silver hoards" suitable for use as scrap metal.

Table 16 clearly shows the considerable proportion of damaged and fragmentary objects in the material. Included are numerous unidentifiable fragments of iron and bronze artefacts, melted pieces of bronze and pieces of copper plate, which are regarded as evidence of smithy sites (see p. 41). There is also a hoard of silver objects from Tiuri and the material from Kapatuosia may include the remains of a similar hoard. Excavations of the location of the Tiuri hoard revealed burnt clay and slag, whetstones and damaged artefacts. At Kapatuosia the fragments of coins and silver objects were cut into exceptionally small pieces and Talvio suggests that apart from the purpose of storage they were intended for melt-

[11] After the completion of this manuscript field work revealed finds of slag on the terraces of the Kiianlinna site in Janakkala, which was originally excluded from the material due to its lack of finds and wall structures.

ing (see Appendix 4, p. 234). At Kapatuosia the same excavated locations also revealed fragments of bronze and copper artefacts cut into small pieces. They include a fragment of a Scandinavian oval tortoise brooch and a damaged Merovingian Period bracelet, possibly burnt. The rod of the bracelet displays signs of being cut. Apparently also bronze debris was gathered for melting.

In addition to the Kuhmoinen hillfort, the presence of fire-worn, broken and damaged objects is a typical feature of other hillfort sites as well.

The hillfort finds of the Merovingian and Crusade Periods are reviewed in further detail. A combat knife or sceax from the Kauttua hillfort in Eura is in fragmentary condition. An angon found at Rapola in Sääksmäki was broken at one end and hammered at the other and shows signs of having been in fire. A fragmentary knife blade from Tenhola in Hattula shows signs of fire patina and cut fragments of a bracelet found together with pieces of slag were damaged by fire. The older finds from Hollola were discussed above. The finds from the old castle of Käkisalmi are fragmentary and show signs of melting. A half of an Abbasid coin was found at Valkkinen in Vesilahti. A brooch found at the hillfort of the village of Lammi was bent and the rod shows signs of having been cut. The older brooches from Tiuri in Räisälä are in similar condition as the finds from the old castle of Käkisalmi. The condition of the above objects clearly indicates their use as scrap metal and their origin from cremation cemeteries.[12] The fragment of an angon from Rapola clearly shows that it had been worked upon.

If we add to the list of hillforts with finds of slag and scrap metal the sites with finds of only scrap metal (Rapola, Sääksmäki; Lammi; Kapatuosia, Hollola; Pukinvuori, Jämsä and Tokkarlahti, Sortavala), evidence of smithing is present at 18 sites (86 %) out of a total of 21. It must also be pointed out that slag has been found at hillforts not included in the areas of comparison [e.g. Slottsbacken,[13] Botby, Helsinki; Vanhalinna, Lieto and Huttala, Piikkö (Luoto 1984a 134–135, 156)].

The presence of scrap metal at a fort site prevents the direct use of artefact datings. If we assume that scrap metal accumulated over long periods of time in the same way as hoards into closed finds datable according to their youngest components (see p. 43), a broad dating to the Crusade Period is obtained. If we also assume, as discussed above, that some of the intact and unburnt objects, especially personal ornaments, were lost at the fort sites, we may estimate possible times of founding and abandonment (see p. 43). The result in this case is the Crusade Period or the Crusade Period and/or the Middle Ages. Problematic in this respect are hillforts with only single finds of scrap metal (Kauttua, Eura; Rapola, Valkeakoski; Linnamäki, Lammi) or objects of long-term use (Valkkinen, Vesilahti). These finds are of use only for *terminus post quem* datings.

A precise chronology of hillforts would ideally require natural-scientific datings for all sites. These could be further compared with artefact datings, which in turn could be revised and narrowed. The few natural-scientific datings of Finnish and Karelian hillforts that are available at present indicate the 13th and even the 14th centuries, periods slightly later than those suggested by the artefact material.[14] Even the youngest datings from the Kuhmoinen hillfort do not extend as far as the 14th century.

Formation processes apply not to the artefact datings for Kuhmoinen but to other hillforts as well, and are in fact of central importance for the overall dating of this whole category of antiquities. The storage and use of scrap metal explain the contradiction between settlement-historical data and the early datings obtained for the forts of Käkisalmi, Kapatuosia in Hollola and Tenhola in Hattula. On the basis of the joint evidence of artefact chronology and natural-scientific datings and with reference to the formation processes involved, we must reject the idea that the hillforts and ancient fortifications of Satakunta, Häme and Savo-Karelia belonged to the Merovingian and Viking Periods. Their time of use must be dated to the Crusade Period and the Crusade Period and/or Middle Ages. Reliable datings show that scrap metal intended for re-use and evidence of smithing place doubts on early datings even in cases where local settlement could have made the construction of the forts possible in the originally assumed periods. All that remains is their *terminus post quem* dating, which is in agreement with a period of use falling into the Crusade Period and the Middle Ages. Finds of ceramics indicate that in Karelia the forts may have remained in use even longer, but in this connection ceramic-based chronology will not be discussed in further detail (see p. 127). A cannon ball found at the hillfort of Tenhola in Hattula, Western Finland, suggests a late period

[12] The sceax fragment from Kauttua shows no signs of fire, but cremation burial was not practised in the region.

[13] The finds from Slottsbacken include fragments of bricks, whereby it should be excluded from the present material. However, there has been a brick factory adjacent to the site and the crest area was often used for local festivities. Accordingly, the finds of bricks have been regarded as secondary. Fortifications were built along the slopes of the hill during the First World War. This may account for various finds of uncertain age, e.g. a piece of slag (NM 19270:13).

[14] The radiocarbon age for the Linnaluoto site at Harola in Kokemäki is exceptional, but it may be associated with other activities on the island. The nature of the island as a fort and a defensive location is questionable.

of use falling into the transition from the Middle Ages to modern times.

The presence of scrap metal at the old castle of Käkisalmi and the Tiuri hillfort in Räisälä implies that a prehistoric period of occupation need not be assumed in these cases, and they can be regarded as forts of historical date in spite of prehistoric finds. Accordingly, there does not have to be any contradiction between the dendrochronologically dated layer of the period from 1310 to 1360 at the old castle of Käkisalmi and the finds of Merovingian and Viking Period brooches. Kirpičnikov's explanations of the reasons for the presence of older objects, their dislocation, long periods of use or re-introduction may not be required, as scrap metal for re-use is a normal occurrence at centres for various crafts. Nor do the finds from Tiuri preclude a 14th century dating for the fort, as suggested by Soviet archaeologists, although the age of bottom layer is still unknown.

There are no finds of Stone Age or Epineolithic type from the Kuhmoinen hillfort, although finds of this kind have been recovered from ten other hillforts (Table 17). The main problem is whether they are primary or secondary in nature. Excluding finds from along the slopes, uncertain objects and a sherd of Sarsa Ware from Linnosaari in Valkeakoski, which is hardly related to the fort, three sites remain: Arasalo in Ikaalinen, Kapatuosia in Hollola and Lopotti in Kurkijoki, i.e. three cases (14 %) among 21 hillforts with finds. Quartz flakes and scrapers were found at all of the above, but actual lithic artefacts were present only in the case of Lopotti. Quartzes are chronologically problematic. At least in Northern Finland, quartz remained in use well into historically documented times and there are cases of West Finnish Iron Age graves where pieces of quartz were intentionally included among the grave-goods (Huurre 1984 306). However, the quartzes from graves are not scrapers – they may have been used for striking fire or as amulets of some kind. On the whole, quartz is an atypical material among the Iron Age finds of Western Finland. At Kapatuosia burnt bone was found in the same locations as quartz. The composition of these bones (elk and beaver) indicates Stone Age rather than Iron Age refuse fauna, which was mainly that of domestic animals (cf. e.g. the Tenhola hillfort in Hattula; Taavitsainen 1982 32– 33). On the other hand, stone axes were found at the Lopotti hillfort. Although they cannot be given precise datings, they are nonetheless evidence of Stone Age occupation at the site. Because of their number, they cannot be regarded as amulets. There is some evidence of lithic artefacts intentionally placed in Iron Age cemeteries for purposes of magic (Kivikoski 1961 243). As late as historically documented times, stone axes were placed under buildings to protect them from fire and other hazards (Harva 1948 96).

The listed sites are not the only locations where quartz flakes and scrapers have been found on the crests of ridges and outcrops of bedrock. In Päijät-Häme, a quartz scraper, flakes and fragments of burnt bone were found at the Kulhanvuori (Kulhanlinna) site in Mahlu, Saarijärvi. Similar sites in Savo are Kökkövuori at Jysmä, Iisalmi and Heiniemi in Ristiina, a high sandy hill of even crest and steep slopes.

Stone Age dwelling sites are mostly at shoreline locations, but the above are completely different. Some of them were at elevations higher than the oldest shorelines, while some had been islands, although most of them were islands at such an early stage that their use as dwelling sites is questionable. It is of course possible that the undated quartzes are from the earliest stage, but they may with equal likelihood date from later times. The Kulhanvuori site had never been an island and there was a Stone Age dwelling site at the foot the hill, which is also the case at Kökkövuori and Arasalo, Ikaalinen. The connection of these sites with the finds from the nearby hills seems plausible. It can be seen that the crests of the hills were also the sites of Stone Age activities, possibly as watch posts, places of refuge or lookouts (cf. Pälsi 1916 73–74).[15] There are no observations of structures on the crests of ridges. However, a levelling of the Heiniemi and Kulhanvuori sites is not completely out of the question, as they are of distinctly level appearance (Taavitsainen 1982 32–35). At hill sites with both finds of

[15] Luoto (1984a 160–161 & 1988 166–167) does not accept this explanation. He claims that I have linked the ridge-top sites with the so-called giants' churches (built formations with stone settings). This is incorrect, as I have explicitly pointed out that the giants' churches, which were built monuments are distinctly different from the sites on ridges (Taavitsainen 1982 35). Nor do I suggest the same explanation for the latter sites and the giants' churches, as implied in Luoto's text. Luoto links the giants' churches, apparently for reasons of topography and because of the lack of occupation layer, with the Porokirkko site on Ärjänsaari Island in Lake Oulunjärvi. This site lacks walls and because of the place-name (literally "Reindeer Church") Luoto regards it as a reindeer round-up site. He goes on to quote Olof Möller's study (1979; see also Haraldsen 1982 8), in which the ancient fortifications of Sweden along the Gulf of Bothnia are linked with Bronze Age elk hunting. Luoto feels that Möller's views lend some kind of support to his views that the ancient fortifications and giants' churches of Northern Fennoscandia were related to reindeer herding and hunting. Luoto, however, does not discuss the varying size of the giants' churches, which is incongruous with the assumed function of these sites. The smallest known case measures only 4.5 x 6 metres. Luoto goes on to apply his explanation to ridge sites and a number of Stone Age sites at high locations. According to him fences were built for driving the animals into a small area and finally to within the bluffs and walls where they were slaughtered. This explanation does not take into account the behaviour of elk, which lives in small groups. It has been suggested that it is not even possible to hunt elk by driving them over a precipice or bluff, as the animal will boldly jump fen-

Stone Age type and Iron Age material there have been no observations of structures related to the former. On the other hand there were walls of stone and Stone Age type finds at the Arasalo hillfort, and it is possible that there is a connection between them.

5.4. On Early Medieval warfare

War and warfare in archaeology have been discussed by Sl. Vencl (1984). The problem of warfare in this connection is the fact that it is one of the activities which leave few material traces. The archaeological study of warfare entails the major overall problem of the relationship between the preserved and non-preserved components of past reality. The fact that archaeological research cannot approach activities which provide little material evidence but are of wide-ranging social consequence has led to a distorted vision of the past from the so-called archaeological perspective, in Vencl's terms, "bordering sometimes absurdity". The distorted view would maintain that the main activities of prehistoric man were the manufacture of ceramics, lithic artefacts and objects of bone. Where the total archaeological material of an area can be compared with all available written sources, the peripheral nature of archaeological data is clearly seen and its secondariness with respect to the totality of past human activity. Vencl proposes that the structure of archaeological facts can only be understood through wide-ranging extra-archaeological comparisons and parallels.

One of the a priori starting points of this study was the connection of fortified outcrops of bedrock, hills and islands with warfare. Accordingly, antiquities of this type can be comprehended and classified only by knowing the methods of warfare involved. Relevant data is provided by written sources referring to the end of the Iron Age and the Early Middle Ages, the period when the forts in question were in use. Further information is provided by accounts of popular uprisings in the Middle Ages and modern times. The latter will be referred to only in connection with the type of organisation related to the hillforts.

Historical sources on Finland or Häme are few and their references to warfare are scarce. Runestones of the early 11th century indicate that military expeditions were undertaken to the areas in question. There are also brief account in the sagas (Gallén 1984). The Russian chronicles contain several references to expeditions and campaigns from Karelia and Novgorod into Häme and to raids and expeditions from Häme towards the east (Hausen 1910 passim; Lind 1977; Kirkinen 1984). These, however, indicate in most cases only the year of the event, sometimes the time of year, but only rarely is there information on the number of troops, the course of the expedition and the events involved. On the other hand, 13th and 14th century sources concerning Livonia contain numerous and detailed accounts of expeditions and campaigns including accurate descriptions whereby routes can and actions can be recreated. On the basis of this material Friedrich Benninghoven (1970) has carried out studies of the technique of that military campaigns and expeditions in the East Baltic region as practised by the Prussians, Lithuanians, Curonians, Latgalls, Seels, Semgalls, Livonians and Estonians as well as their neighbours, the Poles, Russians and the Danes and Swedes from across the sea. Benninghoven's results are briefly summarised in the following.

Benninghoven classes the expeditions and campaigns into two basic types. The first type of campaign aimed directly at military gains, in most cases to conquer and occupy a dominant military objective, usually a castle. The method in question was that of siege. The second type involved expeditions purely for the purpose of plunder and destruction. The military goals involved were indirect, the aim was to damage and weaken the economic and military power of the enemy by extensive plunder and havoc.

Historical sources refer to the latter campaigns as "*Reisen*" (*reysa*, *expedicio* or *herevart*). Classic military history calls them "campaigns of havoc", in the rarer cases when such are mentioned as a strange and secondary method of warfare. Benninghoven demonstrates, however, that these campaigns were not for the sole purpose of indiscriminate plunder. On the contrary, they involved deliberate and planned military objectives aiming at rendering the enemy defenceless by undermining its economic potential. Plunder and havoc also allayed psychological resistance and broke the will to fight by removing part of the population and holding them hostage, which further weakened the enemy's economy. In

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ces and is not afraid of charging men (Taavitsainen 1978; see however Granlund 1940). Ridges and hills are unsuitable hunting sites for elk, because they stand out from their surroundings and the behaviour of the animals makes it difficult or impossible to drive them into such places (Kaarlo Nygren, oral comm.). Large-scale construction work was hardly undertaken at least for hunting elk, because the most productive method of hunting them has always been on skis in late winter. The fences or corrals used in deer hunting were probably built of poles and sticks without observable remains (Granlund 1940 7). There is no data on stone structures for these purposes. If such had existed, they would hardly have been erected in unsuitable places, e.g. across a gentle slope to prevent the hunted animals from moving to the top of the hill. Luoto's explanation for the ridge sites does not seem convincing. However, these sites may have played some other role in hunting practices, e.g. in the Yukon Indians used higher sites and ridges for surveying the movements of wild game (M. Nunez, oral comm.).

Medieval military history the expedition or "*Reise*" was an instrument of warfare equal in importance to the classic pitched battle and in fact much more common than the latter. Benninghoven (1970 650) stresses that the bombing tactics of the Second World War deep behind the enemy lines and the various forms of guerilla warfare of the 20th century aimed at the same goal: "Lahmlegung der Wirtschaft und Zermürben des gegnerischen Widerstandswillens durch eine von kleinen Abteilungen angewendete, rasch aufführbare und mit überraschungseffekten arbeitenden Zerstörungstechnik " (cf. e.g. E. Seppänen 1971; Mao Tse-Tung 1965 & 1966).

According to Benninghoven, the campaigns were mostly in winter, when travel was fast and easy over the frozen lakes and bogs. This time of year had other advantages as well. It was probably the best time with respect to the working year of the invaders. Furthermore, especially late winter was the best time to achieve maximum effect. Stores of food for the winter had depleted at this stage and possible stores from outlying areas had been brought into the villages, also the cattle was in one place and it could not be taken to any place of refuge in cold weather. The second most popular time for campaigns and expeditions was around harvest time in July and August, which was also a good season in which to wreak havoc.

The factors of population density in the region attacked, the structure of its economy, the depth of penetration into enemy territory, the season of the campaign, the number of troops and the needs of supply were all interdependent. Large formations of troops included 1,000 – 3,000 men and sometimes even 5,000 – 8,000 men. A day's marching distance was c. 20 kilometres, and small mounted detachments could cover over 40 km in a day. Benninghoven's example of the Lithuanian campaign against Estonia in the winter of 1218–1219 extended over 800 km.

The expeditions or campaigns of havoc did not last over a month, and usually took only two weeks. The troops were usually divided into a vanguard, a main body and a rear guard. When the objective was reached camp was set up (*maia*) and tribute could then be exacted from the local populace. Patrols or detachments of 10–20 men would leave the camp for expeditions of a day's duration into different areas within a 10 km radius to plunder, exact tribute and to take prisoners. The methods are described as follows: "Forttreiben des Viehs, aller Vorräte wie Kleidung, Behälter, Nahrungsmittel, Werkzeuge, Geräte bis zu Haushaltsgegenstanden, Kesseln, Töpfen, Bettzeug. Das Mobiliar und irdene Geschirre wurden zerschalgen oder mit den Häusern und Scheunen verbrannt. An Gefangenen brachte man meist nur Frauen und Kinder ein." When the local villages were plundered and the booty was gathered, the patrols returned to camp. After a brief period of rest, another region was invaded where the same events were repeated.

Defensive counteraction varied and precautionary measures were also taken. In some cases, the area was evacuated before being invaded. All of the East Baltic tribes as well as the Teutonic order and the bishops of Livonia had their own border guard systems, which included guards and informers patrolling the border roads. When news of impending attack was received, the villages and farms were evacuated within a few hours. Livestock, people and possibly also removable stores were moved to far-off hideouts. The best protection was provided by the extensive forests, bogs and lakes. Benninghoven does not mention any cases of people gathering from a large area to take refuge in a fortification. However, the chronicle of Henry of Livonia refers to this practice in two passages (HCL 1982 XXX:4,5). It was apparently not the only means of evacuation, nor the most common one for an area under attack.

Julius Ailio (1915 339–340; see also Suvanto 1952 233) has described Early Medieval campaigns and expeditions of warfare in much the same terms as Benninghoven.

Ailio presents a relatively lengthy account of the campaign of the Novgorodians into Häme in 1311. This was a typical "*Reise*", proceeding from one objective to another. The surrounding villages were burned, the chiefs were taken prisoner and the livestock was slaughtered. The chronicle also refers to events which occurred when the invaders came to a hillfort, the Castle or Fort of Vanai. The Novgorodians first tried to storm the fort. The outer fortifications were taken and burned, but it was impossible to storm the main fort, on a high hill of bedrock. The fort was under siege for three days and three nights. During the siege the near vicinity was razed and plundered. It appears that the main objective was not to take the fort, but to wreak havoc on the locality. The attempt to burn the fort is in agreement with the descriptions of sieges in the chronicle of Henry of Livonia, where fire was used in almost all cases (HCL 1982 passim; see also Engström 1984a 46–47).

After the events of 1311 the next reference to an expedition into Häme from the east is from 1496 (Suvanto 1952 232–236). Even at this stage, the campaign followed the same scenario as before, and the only difference was its longer duration. The campaign was begun on the 17th of January and the Russian returned to Novgorod on the 6th of March. In earlier cases there are few references to the numbers of troops, and even where such information is given there is room for doubt (400 men in 1142, 1,000 in 1149, over 2,000 in 1228). The reference to

a body of 200 men taking part in the 1496 campaign is plausible.

Chronicle sources on Häme do not provide much information on defence. There are some mentions of invaders being killed or boats lost. In connection with the winter campaign of 1496 there is only a mention of a body of troops sent out against the Russians and destroyed by them. When the Russians had arrived in Häme and news of the havoc caused by them reached Turku, troops were mustered and sent into Häme. The enemy, however, did not do battle and the pursuit was given up after they had covered a distance of 24 leagues.

The most interesting piece of information on defensive measures is provided by the oldest source, the saga account of the plundering campaign of St. Olaf into Finland, which Olavi Heinonen (1971 37–39) describes as a class example of offensive defence. The saga mentions how the invaders, returning to their ships, "came to a forest where people gathered around them from all directions, they were shot at and they were severly harried. The king ordered his men to take cover. But before he could get out of the forest, he had lost many men, and many were wounded."

5.5. Classification of ancient fortifications

The classification of ancient fortifications has not been unequivocal in Finland, Scandinavia or elsewhere in Europe (see e.g. Appelgren 1891 XLVII–XLIX; Luoto 1984a 159; Ambrosiani 1964 176–180; Hyenstrand 1984 87–89; Olausson 1987; Engström 1984a 85–92 and cited literature; Lillehammer 1973 31; Haraldsen 1982). The problem is how "bei Burgen bedeuten Form, Zuordnung und Funktion ein Dreiecksverhältnis, wobei die Gewichte dieser Determinanten fallweise verschieden sein können". (v. Uslar 1979 126, 187–193). Or in slightly different terms, "fortifications show by their spatiotemporal and typological diversity that they most often belong to the archaeological, not historical realm of data. Obviously, they may represent similar archaeological manifestations of different historical and behavioral phenomena, even if we omit considerations of the employment of components of military architecture in structures of profane or sacred character." (Vencl 1983 312 & 1984 127–128).

Luoto (1984a 159–161) suggests that certain hillforts were sanctuaries, cemeteries, and hunting sites as well as sites for rounding up reindeer. Engström (1984a 92) refers to the following non-military fort-like places of refuge and fenced enclosures in Sweden: fenced cemetery sites, cult sites, *ting* sites, judicially delimited areas for trade and crafts, hunting systems and corrals protecting livestock against wild animals and thieves.

It is difficult to demonstrate fortified or other possible functions solely on the basis of a classification of the Finnish hillfort sites with reference to geological and topographic details, size structural features, chronology of finds, activities indicated by artefacts, distance from settlements etc. Only in cases where a rich occupation layer exists with numerous finds and indications of activities as well as remains of buildings can the trading and craft centres on islands (Tiuri, Räisälä; old castle of Käkisalmi) be reliably distinguished from the bulk of the remaining material.

The locations of hillforts were dictated above all by natural conditions providing suitable sites. Suitability did not imply only a protected location, but also suitable size for the community which built, maintained and defended the site. The upper parts must not be too large for effective defence, nor must the fortification structures require undue amounts of labour. Places meeting these requirements are not necessarily found adjacent to settlements or in locations that are suitable in military terms. Dependence on natural conditions and topography is one of the reasons why the locations of fort sites and their connections with settlements appear to be haphazard and hard to classify.

The review of geological and topographic factors showed how local conditions and natural raw materials had such an influence on the location, size and structure of hillforts that even the construction of such an important feature as the gate pass, which is closely related to certain fortified concepts, was possible only where sufficient amounts of stone were available. Nor can the carefully constructed unmortared walls, regarded as Karelian, be defined as an ethnic or chronological feature. Walls of this kind can occur outside the Karelian slate zone and walls of completely different structure can also occur within the Karelian region (Hämeenlahti, Kurkijoki; Tiuri, Räisälä; Castle of Viipuri). We must also be cautious about the idea that walls of earth are a chronological feature of the Middle Ages and that walls of earth and stones indicated a transition in technique to the former (see e.g. Rinne 1914 63).

With the exception of the fortified trade and craft centres, there are no significant groups within the material. For example, fort sites with finds of Stone Age type and Iron Age material older than the Crusade Period occur in Satakunta, Häme and Karelia. These older finds have been recovered from ridge sites, forts on bedrock hills and fortified islands, as well as hillforts with both extended and unextended gate structures, single or double courses of walls, hillforts at both short and close distances from routes of communication and forts both near

and far from settlements etc. Because of topographic features, conditions of preservation, the varying extent of excavations and differences in field work methods, finds and the often obscure remains of buildings are so few in number that no significant groups can be observed. Identifying different activities is impaired by the presence of scrap metal. Spindle or borer whorls of bone and ceramics have been found at some of the Karelian hillforts, not only the fortified trade and craft centres of Tiuri and the old castle of Käkisalmi. For obvious reasons, these finds cannot be classed among scrap metal.

Although the ancient hillforts have been regarded as pertaining to warfare, the small number of weapon finds from these contexts is surprising. However, the absence or small occurrence of this category of material is not sufficient proof of non-military use. In most cases, weapons were plundered when a fortified site was stormed (e.g. Vencl 1983 314 & 1984 123, 126).

The final result is that thus far no significant chronological, spatial, topographic, structural or functional groups can be defined, apart from the division between hillforts and fortified trade and craft centres. With the available data, only military sites can be identified with any certainty.

The presented classification does not shed any light on the military use of the sites apart from the need for shelter. It is, however, possible that their locations are practical ones and they can be classified with reference to Early Medieval methods of warfare.

All military operations can be roughly classed as either defensive or offensive, although the division is often blurred. Engström (1984a 92; see also Vencl 1984 128) has kept to this division. Problems entailed in this connection are the limitations of the natural environment, the lack of a clear dichotomy between offensive and defensive operations and the possible multifunctional purpose of hillfort sites.

The fortifications are first discussed from a defensive point of view. Sudden attack aiming at surprise, which was typical of Medieval warfare, required certain safeguards and protective measures. Accordingly, hillforts are generally regarded as places of refuge and bases of defence. A main feature pointed to in this connection is their distance from settlements. Ancient fortifications with difficult access from settlements have been called refuge forts (called outlying forts above) where people could gather in times of invasion and attack. Kivikoski (1961 249) has also pointed out that also forts adjacent to settlements served this purpose.

The accepted views concerning the hillforts of Finland and their function are well expressed in Juhani Rinne's description (1947b 97; see also K. Vilkuna 1938 269) of the ancient fortifications of Savo: "(The hillforts) did not have houses or buildings serving permanently located troops, nor were they built by some outside power to ensure control over an area. They were bases of protection and defence built in co-operation by the local populace where in times of danger women and children could be sent along with small amounts of movable property. These sites were guarded and defended by a relatively small number of men. Thus, the majority of the male population was able to concentrate on the defence of the home regions, until they were possibly outnumbered and forced to retire to the forts, which could then be defended more effectively and kept. As long as the defence of the forts remained effective, the enemy could not gain complete control, as there was the constant possibility of surprise attacks by the defenders. The enemy's superiority in force could finally be depleted in repelled attacks, thereby saving the defenders."

This explanation of the role of the forts is suited to sites in the vicinity of stray finds and cemeteries. However, outlying refuge forts cannot be fitted into the scenario. It is hard to understand how women, children, livestock and the most valuable property could be transported over long and unnegotiable distances, sometimes over stretches of water or over ice and snow to a refuge fort, using the same routes as the enemy.

Jorma Heinonen (1971 49–50) has criticized this view, regarding it as impossible in many respects. He maintains that such a course of action was possible only in the case of a few forts. To begin with, the availability of water and fodder was a main problem.[16] In some cases, smaller animals could have been kept within the walls of the fort as a living supply of food, e.g. sheep and goats. According to Heinonen, the so-called refuge forts could have been used only in densely populated regions under the risk of surprise attack. Perhaps the only site conforming to Rinne's description is Rapola in Sääksmäki.

In Finland outlying cabins have been places of refuge in times of war throughout history and there is a considerable body of oral tradition on the subject. Heinonen (1971 49–51) suggests that refuge was taken in outlying cabins rather than forts. If preparations had been made beforehand in case of

[16] A modern-day dairy cow drinks 110–150 litres of water per day and a horse will consume some 50 litres of water. These figures do not directly apply to livestock of the Iron Age. The daily water consumption of native-bred cows can be estimated at slightly less than 50 litres (veterinarian Laura Kulkas, oral comm.). Despite the general nature of these figures, they give some indication of the needs for water at hillforts in situations where large numbers of livestock are kept there. Because of the snow, the problem of water supply was not the same in winter, when military expeditions were usually undertaken. However, some degree of labour is involved in melting snow for drinking water.

attack, the livestock could have been moved to outlying areas, where they could not reveal their location. Especially in Northern Finland livestock was moved to islands in bogs which could be reached only by those familiar with the marshy terrain. If time could not be spared, the livestock had to be moved somewhere in the near vicinity and prevented from making noise. Benninghoven (1970 639) presents similar data concerning the East Baltic in the Early Middle Ages. In the areas to the south of the Gulf of Finland, the best protection for people, livestock and property was provided by bogs, forests and lakes as well as caves. According to Europaeus (1928 1500), outlying cabins came to be used as places of refuge when military action was initiated and led by a foreign power, as had begun with the Swedish invasion. The common people were forbidden to bear weapons and they had to retreat to the cabins of the outlying areas in times of war.

Because the objectives of military expeditions were to plunder and cause havoc on as large a scale as possible, it does not seem plausible that the defenders would have responded by accumulating at a single site the material which the enemy specifically aimed at destroying or looting. Such a course of action would have endangered their whole means of livelihood and the basis of their wealth, depending on the outcome of a single attack by the enemy. It was clearly better to split up the livestock and property, placing it not only in the fort near the settlement but also in other locations and hope that the enemy would not succeed in finding all of the cabins and places of hiding. As looting in a single area did not usually last very long, there was always the possibility that some of the caches would be preserved for the community. Outlying cabins were thus a functional feature already in prehistoric times. The saga of St. Olaf refers to this practice in the reference to people retreating into the forests and taking away all of their property. It is certain that the outlying cabins were retreated to when the enemy did not have the advantage of a surprise attack, when refuge had to be taken at the forts.

In times of invasion and attack hillforts served not only as places of refuge but also made the enemy concentrate troops. A hillfort amidst or adjacent to settlement would serve to disperse the enemy's forces, reducing the numbers of plundering parties. If a fort was not placed under siege, the possibility of rear-guard attacks would have to be taken into account. Heinonen (1971 38) suggests that the defenders maintained a body of troops at hearing distance or within sight with a fortified base at their disposal. According to Heinonen, the large number of ancient hillforts at some of the densely populated locations of Iron Age settlement supports this assumption (e.g. three hillforts in the Hämeenlinna region). The defenders could thus have divided their forces among various forts, thus preventing the enemy from taking any one of them. It is possible that the dispersal of enemy forces to lay siege on several forts – given suitable topographic conditions – was a tactically better alternative than the defence of a single fort. If the enemy disregarded the other forts it was left open to an even greater risk of attack from the rear. Because of the short time available for looting and plundering the defence of the hillforts may not have been an impossible task. It made it possible for even a small number of defenders to generate effective resistance for a few days.

Of special interest is the defensive role of forts located far from settlements. Documentary sources on the practice of gathering defensive forces in peripheral areas, preferably close the enemy's route of retreat are of interest in this connection. Easily fortified and steep-sloped hills of bedrock served as suitable and easily found places for assembling troops. It is also possible and probable that some of the unfortified hills bearing fort-related place-names were used in this way. They could have been effectively defended with the aid of temporary defensive structures, which of course do not leave any archaeologically identifiable traces in the terrain. The unfinished walls of some hillfort sites may be indications of short-term attacks by enemy forces interrupting fortification work which was not recommenced.

Approximately half of Finland's ancient fortifications are in peripheral locations and a large number of them are relatively close to routes of communication. Contrary to Luoto's (1984a 160 & 1988 167; see also p. 132) explanation of refuge forts (in this connection: outlying forts) as the remains of hunting sites, a more plausible explanation is that they served as bases where in times of surprise attack the local populace prepared counter-attacks. It is, however, too categorical to say that only the outlying forts were related to counter-attack, as this was possible also from forts closer to settlements, although the element of surprise was lost in this connection.

It can be assumed that the bases for counter-attack were manned by males. A gender-based analysis of artefacts from hillfort sites is impaired by the undifferentiated nature of the material. Most of the objects are evidence of everyday household and economic activities without further evidence of the gender of their users. It is also difficult to isolate male and female activities on the basis of material that is mostly scrap metal.

Weapons and horse-gear (Tables 15 and 16) were suitable for military use, and hardly all of these artefacts were scrap metal. Scrap metal and smithing slag are indications of men's work and they have an understandable role among the finds of a base for

military activities. The repair and possible manufacture of weapons were central activities in times of siege and in preparing for counter-attack.

The personal ornaments and brooches can be divided into objects used by males, females and both sexes. Women's ornaments are most numerous among the scrap metal consisting of older artefact types. The later ornaments, which are not of equally clear scrap-metal nature, also include objects of all three groups. It must also be pointed out that women's brooches have especially been found at hillfort sites close to settlements (Tables 15 and 16). The brooches from the Kuhmoinen hillfort are of types used by both sexes.[17]

Traditional women's artefacts are spindle whorls of bone or ceramics, which cannot be included among the scrap metal (Table 16). However, similar whorls or discs have been used in borers. Spindle whorls have been found at the fortified trading and craft centres of Karelia and also at hillfort sites close to settlements.

The use of ceramics at sites comparable to military encampments was limited (Ulf Näsman, oral comm.). In field conditions metal vessels were more functional than pots which were easily broken. In Finland vessels of wood and bark were also used. Accordingly, we may expect fewer finds of ceramics from outlying forts than from sites in the vicinity of settlements. This may explain the complete absence of ceramics at the Kuhmoinen hillfort, although in other cases the presence of ceramics does not appear to be dependent on the distance of the sites from settlements (Tables 15 and 16).

On the whole, the material from hillfort sites does not contradict the suggested classification according to methods of warfare, and even appears to support it. The lack or insignificant degree of occupation layers at these sites shows that both refuge forts and forts for counter-attack were used only temporarily as defensive outposts.

But are there also fort sites that were suited to offensive purposes? According to Engström (1984a 92), an offensive function can be assigned to forts controlling water routes, roads or boundaries or serving as signalling posts and bridgeheads. Also included are forts established in a region by a central authority and places for mustering troops (see also Vencl 1983 315). Engström's classification demonstrates the arbitrariness of a division between defensive and offensive forts and is more indicative of their multifunctional purpose, as some of the sites listed as offensive by him are described above as defensive outposts. Only the bridgehead forts are possibly related to enemy activity in invaded territory. A requirement for the location of such forts is the possibility of advancing and retreating from them.

The hillforts of Savo include two sites of exceptional location – Ihantsalo in Juva (Puumala) and Pisamalahti in Sulkava. There are no cemeteries or concentrations of stray finds in the vicinity of these sites – the closest stray finds is from a distance of 26 km from Ihantsalo and c. 4 km from Pisamalahti. Furthermore, the latter find dates back to the Early Iron Age. Even in the 1560s settlement in the region of the forts was sparse. The nearest villages were approximately four kilometres way, but the settlements were small and with few inhabitants. Still today, there are few farms or fields near the hillforts, which is understandable as there are no clayey soils or other features of arable land in the near region. It is not probable that cemeteries will be found in the area even in the future. The present location of the sites is mainly wilderness (Taavitsainen 1988 221).

The specific locations of the hillforts are of interest: Ihantsalo is at the mouth of a water route leading from Lake Lietvesi to Lake Luonteri and Pisamalahti is at the confluence of an eastern water route from Lakes Lepistönvesi and Tuohistonvesi and a southern route leading from Lake Enonvesi. The historian Pekka Lappalainen (1970 35–39, 40, 49) has stressed the strategic location of these fort sites. As geological and topographic factors indicate much more suitable island sites on Lake Saimaa both along central water routes and adjacent to them, we must regard the locations of these forts as having been deliberately selected.

Fortifications at the junctions and crossings of water routes may have been bases related to older or newer claiming or colonisation of the areas concerned. This is a more plausible explanation than the idea of bases for counter-attack, although the latter is not completely out of the question. The hills of Ihantsalo and Pisamalahti are in veritable wilderness conditions from a defensive point of view and not in the outlying rear areas of settlements. Lappalainen (1970) classes these forts as "Karelian", as I have also done with reference to their "Karelian" technique of construction (Taavitsainen 1988 222). However, the material used cannot be regarded as an indication of ethnicity.

Similar bases may also be the forts at Taipalsaari (Taavitsainen 1988 222). Also the Linnosaari site at Valkeakoski, which is in the middle of a water route must also be mentioned, although it is not in a wilderness location in the same way as the forts of Savo. The location in question can best be described as the outlying area of a settled region. The artefact material from the fort, dated to the first half of the

[17] Along with the intact ornaments there is a pendant made of woman's ear spoon, which is the only find directly linked to women. This somewhat strange re-shaped object may, however, have been scrap metal. There are also finds of beads from a few hillfort sites. These were not worn or used solely by women, as there are also finds of beads from purses in men's graves.

13th century, is in many respects exceptional. Unlike other fort sites in Häme, the finds from Linnosaari include armour-piercing arrowheads and a bone dice-cube. This combination occurs in many Medieval castles and forts built by conquering troops and/or serving administrative purposes [Vanhalinna, Lieto; Koroinen, Kuusisto; Hämeenlinna; Viipuri (Rinne 1914 121; Taavitsainen 1980 47; Tjulenev 1982a 31)]. Because of its strategic location and its combination of find material, the Linnosaari fort can be explained as control point at a site central to communication established in order to secure interests in a new area.

The hillfort of Tiuri and the old castle of Käkisalmi, both of which were classed above as fortified centres of trade and crafts, and the Castle of Viipuri, regarded as an ordinary fortification, are all at locations where other functions can also be taken into account. The Castle of Viipuri is on Suomenvedenpohja Bay on the Gulf of Finland, with access to both Lakes Saimaa and Ladoga. The western branch of the mouth of the River Vuoksi connected Lake Ladoga with the Gulf of Finland. At the Lake Ladoga end of the route was the old castle of Käkisalmi and Tiuri was in the middle part of the route. Battles mentioned in historical sources especially in connection with the castles of Käkisalmi and Viipuri clearly demonstrate the importance of these sites as bridgeheads for invading forces (see Appendix 4, p. 240).

The above attempt at classifying the hillforts and ancient fortifications can be summarised as follows: In geographic relation to settlements the forts can be classed into nearby and outlying forts. In functional terms, they can be grouped as defensive forts, bases for defensive counter-attack or offensive purposes and fortified centres or villages for trade and crafts. The nearby forts are defensive sites with the aim of tying down and dispersing enemy forces. They could hardly have been places of refuges, except for part of the local population in case of surprise attack. The outlying forts were bases used by defenders for the active harrying of the invaders by counter-attack. In cases where such forts were in very far-off wilderness locations, they may have been the offensive bases of invaders enlarging their sphere of influence. The fortified centres of trade and crafts form a separate group because of their thick occupation layers and evidence of the above activities. Because sites of this kind are known only from Karelia, their relation to contemporary settlement is not known. Also of interest is the fact that they are on islands. Trade and craft centres need not have been fortified for the same reasons as other fort sites. Walls may have been needed to prevent theft or other undesired activities, to ensure undisturbed working conditions or to demarcate a special area. It is also possible that some of the fort sites served varied functions.

5.6. Ancient fortifications of Finland Proper, Scandinavia, Estonia and Russia

Because of similar bedrock conditions, the hillforts of Satakunta and Uusimaa, located outside the area of comparison of the Kuhmoinen hillfort, are also similar. Environmentally determined similarities are not limited to the area of Finland alone. According to Aarne Äyräpää, the design of the hillforts of Finland is associated with that of forts in the bedrock terrain of Fennoscandia, viz. Sweden and Norway. The area can also be said to include the island of Bornholm in Denmark. Apart from these parallels to the Finnish forts, topographically different types occur in Southern Scandinavia, Gotland and Öland. The latter consist of the "plain forts" (Flachlandsburgen; Engström 1985 281). Similar forts also occur in the areas to the south of the Gulf of Finland and in Russia.

In this connection, the structural features of the hillforts of the Fennoscandian zone of bedrock will not be discussed, as the association between structures and environmental conditions clearly applies in the areas to the west as well. Because of the lack of Finnish parallels it is also unnecessary to discuss in any greater detail the structural features of the forts built on flat land. However, the chronology of both the hillforts and the "plain forts" is discussed in order to isolate the possible connections of fort-building in Kuhmoinen and its comparison areas in the Crusade Period and the Early Middle Ages with general trends of contemporary military architecture in neighbouring regions. Of special interest are Iron Age stages of construction. The discussion regarding the function of the fortifications, which, due to similar conditions of topography, also applies to Finland, has been referred to above.

In connection with the datings and function of the ancient fortifications of the Baltic regions formation processes must also be kept in mind. A further consideration of these factors may serve to revise some of the presently accepted views on the subject. However, the lack of sufficiently detailed publications of source material precludes any deeper discussion of this theme, and it is touched upon only in connection with the Vanhalinna hillfort in Lieto, SW Finland.

There are no datable finds from the hillforts of the Uusimaa region and such finds are also rare at the hillforts of Finland Proper.

Early Metal Period material has been recovered from the Lautkankare hillfort in Sauvo and from the Hautjärvi hillfort in Laitila (Luoto 1984a 155–156; Meinander 1954 184–185). Iron Age finds of uncertain date consist of potsherds from Rikala in Halikko, ceramics and slag from Huttala in Piikkiö

(Luoto 1984a 156) and an arrowhead from the Repola hillfort in Nousiainen. The latter artefact can be dated to any of the periods of the Iron Age (Hiekkanen 1979 108, 150).

The Vanhalinna hillfort in Lieto, which was taken over by the Swedes and built into a Medieval fort, is in many respects exceptional in the Finnish material. Excavations have revealed a large body of material, indicating three stages of construction (Luoto 1984a 150–153). There are no datings based on natural-scientific methods. The first stage of construction is dated to the Late Bronze Age, the second stage is from 500 to 800 AD and the third stage is from 1000 to 1370 AD.

The first stage, most probably unfortified, is clearly indicated by numerous finds of ceramics. Luoto places in this connection a fragment of a casting mould for a round neck-ring. Thus, the Vanhalinna site is seen to display not only chronological but also functional similarities with the fortifications of Scandinavia and Estonia. However, in this author's opinion the object in question does not resemble a casting mould fragment, and is more likely to have been the impression of a twig on clay (cf. e.g. Vassar 1939 79; Meinander 1954 Taf. 30:k; see also Rinne 1914 204–205). As there is no certain evidence of metalworking, the function of the Vanhalinna site may be different than that of Scandinavian or Estonian parallels.

According to Luoto, the only other Finnish hillforts of the second stage of occupation (500–800 AD) are Kauttua in Eura and Rapola in Sääksmäki (Luoto 1984a 163). The finds, however, are most probably scrap metal for smithing, offering only a *terminus post quem* dating. Evidence of blacksmithing was clearly observed at the Vanhalinna hillfort with finds of five casting crucibles and 8,557 g of slag (Luoto 1984a 126, 134–137). It appears that the smith at the site also had scrap metal at his disposal, which must be taken into account in the dating of the hillfort.

According to Luoto (1984a 151), the clearest evidence of the second stage of occupation are a so-called flanged spearhead, a spoon-like brooch with ornament of Salin's style I, a shepherd's-crook pin[18] and two so-called Permian fittings. Luoto (1984a 75) is not familiar with any direct parallels to the latter finds. This author would not presume to define the fragments as those of Permian fittings, nor would I date on the basis of assumed Permian character.

All of the artefacts of the second stage of occupation are in fragmentary condition. Furthermore, they were found in locations of slag or in areas adjoining features of slag. The finds in question are in such condition that they can also be classed as scrap metal. As I have not seen these objects, I have been unable to make any observations regarding possible signs of beating or fire.

The find context of the flanged spearhead is especially interesting. The area in question (I) contained four concentrations of slag. In the same layer (III:a) were four small round stones of possible ritual significance and an iron chain made of lengths in the shape of the figure eight, with parallels, according to Luoto (1984a 92) from the Viking Period and the end of the Iron Age. Luoto, however, does not comment upon a combination of an older and a newer find also recovered from this layer. Also of interest is layer II:a, located above the former and containing a crucible (Luoto 1984a 33). The indications of smithing are very marked.

According to Erä-Esko (1965 85), the Salin I-style brooch was not originally a brooch, but a fitting converted into a brooch. Luoto (1984a 68; 1988 155) accepts this view. The object in question was in secondary use, which must be taken into account in assessing its chronological potential. It is of significance only for a *terminus post quem* dating.

Luoto maintains that in the second stage of occupation a major change occurred at the hillfort site, which was covered with a clayey layer of earth, with the exception of the highest ridges of the outcrops of bedrock (Luoto 1984a 151). The dating of this event must be viewed with caution, especially as the whole stage of occupation is questionable because of its few finds and their relatively small proportion of all dated finds as well as the above remarks concerning the recycling of materials. Unfortunately the unclear description of the site and the ambiguity of the stratigraphic observations prevent further discussion of the subject.

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[18] The fragment of a shepherd's-crook pin is from area K of the site, which also contained slag. In Estonia, shepherd's-crook pins appeared already in the Early Roman Iron Age (Lõugas 1971). With reference to the finds of ceramics from the Vanhalinna site, Luoto (1984a 81) observes that there are no finds of pottery that can be clearly dated to the Pre-Roman or Roman Iron Age periods. This may only be apparent, however, as ceramics of these periods contained few chronologically specific traits. The finds of undecorated ware with scratched and textile-impressed surfaces may, in Luoto's opinion, well date from this period. If this is correct, the shepherd's-crook pin would be a plausible feature of the first period of occupation.

Also found at the site was a sherd decorated with comb-stamp impressions, which Luoto (1984a 109, 226) maintains is Typical Comb Ware. Valter Lang of Tallinn (oral comm.) disagrees with Luoto, pointing to finds of similar ceramics from the Tallinn region, specifically in association with shepherd's-crook pins. Remotely similar sherds have also been found at the Linnasaari site in Tiuri, Räisälä (Appendix 4, p. 240). Further parallels for the ornament of the Vanhalinna sherd have been found at the fortified dwelling sites of Russia (Stankevič 1955 tab. XXI:5).

Comb-stamp ornament was also used in the Early Metal Period pottery of Finland, e.g. in the pot sherds from Hautvuori in Laitila (Meinander 1954 Tf. 29:f-h).

On the basis of the above, Luoto's claim of a Comb Ware Period stage of occupation of the Vanhalinna site can be rejected.

The majority of the datable artefacts belong to the third stage of construction and occupation, from the end of the Viking Period in the early 11th century to the 1360s (Luoto 1984a 151–152). The dating is based on a large body of material, including coins and brooches. Although it has not been possible to review this material in order to identify scrap metal and pieces worked upon by blacksmiths, the suggested dating appears to be well-founded. There may perhaps not be grounds for placing the beginning of the last period of occupation in the Viking Period part of the 11th century. A more probable dating would be the Crusade Period part of the 11th century, with reference to the absence of Late Viking Period brooch types and the available coin datings. Coin finds indicate that the Vanhalinna hillfort ceased to be used in the 1320s and 1330s.

It appears that the Iron Age history and development of the hillforts of Finland both in the comparison area of the Kuhmoinen hillfort and outside the area follow a similar course – they came to be built in the Crusade Period and they remained in use throughout the Early Middle Ages.

Some 1,000 ancient fort sites are known from Sweden, of which 300 are in the province of Södermanland. Although Engström maintains that the ancient forts of Sweden have provided Bronze Age datings and display evidence of use throughout the Iron Age, he clearly outlines two intensive periods of fort building – viz. an earlier one covering the Late Roman Iron Age and the Migration Period and a later one comprising the Viking Period and the Early Middle Ages (Engström 1984a 89–90).[19]

Almost 300 hillforts are known from Norway (Lillehammer 1973 30). They are dated to the Late Roman Iron Age or to the Migration Period (Lillehammer 1973; Østmo 1978), but there are also a few Viking Period datings (Ringstad 1985). On the island of Bornholm excavations have been carried out only at the Gamleborg hillfort, the finds from which indicate a dating to the Migration Period (Klindt-Jensen 1957 152). On the mainland of Denmark the oldest wall structures, corresponding to the hillforts of other areas, date back to the Pre-Roman Iron Age. There are also wall structures dated to the Viking Period (Engström 1984a 91–92; La Cour 1972).

To the south of the Gulf of Finland the oldest forts, or fortified dwelling sites, of Estonia date to Bronze Age and the Pre-Roman Iron Age. Forts were not used to any great degree in the first centuries of our era, and they were mainly places of refuge. Inhabited forts came into use around the middle of the first millenium, remaining in use up to the Middle Ages. There is some discussion in the archaeological literature concerning the classification of fort sites and the periods of use of the various types (Moora 1967; Jaanits et al. 1982; Selirand 1989; see also Luoto 1984a 161).

In Russia the forts, or gorodišče, were mainly river-bank sites with walls and can be classed as fortified dwelling sites. They were introduced at the end of the Bronze Age, and remained in use until the Early Middle Ages (Tretjakov 1966).

The brief review presented above indicates three significant periods in the history of ancient fortifications: 1) the end of the Bronze Age and the beginning of the Iron Age, 2) the Migration Period and 3) the end of the Viking Period and the Early Middle Ages (see also Luoto 1984a 166).

According to Luoto, the Vanhalinna hillfort is associated more with the Baltic than with conditions in Finland, although the above-mentioned periods find parallels among the hillforts and ancient fortifications of Finland listed by him. The finds from Lautkankare and Hautjärvi are of the first period and Rikala, Huttala and Repola are from the second and/or third period. Outside the area of Finland Proper, Luoto (1984a 163) mentions the hillforts of Kauttua in Eura and Rapola as being contemporaneous with the second period of use of the Vanhalinna hillfort.[20]

Common to a number of forts in Finland and the Baltic region is an Early Metal Period stage of occupation, which in Finland was possibly of a different function.[21] A differentiating factor is occupation in the Late Roman Iron Age and the Migration Period, which has not yet been demonstrated at any of the hillforts of Finland. There is also a minor difference in connection with the last significant period of use and occupation. Unlike in Scandinavia this stage does not begin in the Viking Period in Finland, but slightly later in the Crusade Period, although these stages are otherwise mainly contemporaneous.

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[19] The Swedish chronology is mostly based on ^{14}C datings. Following Engström's study a considerable number of new datings have been obtained, which not only support earlier views, but also show that the fort sites were used in Neolithic times and around the transition from Medieval to modern times (Engström 1984b; Damell & Lorin 1985; Hemmendorf 1985; Engström et al. 1986; Lindman 1986; Göthberg 1986; Engström et al. 1987).

[20] Luoto's information is imprecise in this connection. He suggests a parallel between the 6th–8th-century period of the Vanhalinna site (encompassing the end of the Early Migration Period and the Late Migration Period or Merovingian Period) with the intensive period of fort occupation in Sweden in the Migration Period. In Sweden, however, the Migration Period implies the period from 400 to 550 AD. Thus, the second period of occupation at the Vanhalinna hillfort is mainly younger and the finds from Kauttua and Rapola are clearly later than the Swedish Migration Period and its stage of hillfort occupation.

[21] Because of the lack of precise datings, it is not possible to discuss in further detail the chronological association of Stone Age-type artefacts found at certain hillforts and high ridge sites with the Early Metal Period occupation of hillforts in Finland Proper.

6. Hillforts and prehistoric society

6.1. Starting points for evaluating social factors

"Hillforts were an essential feature of prehistoric society in Finland. They are evidence of social organisation and co-operation in repelling threats to the community. It is obvious that the growth of society created the need for a permanent system of defence and security, which was accomplished by joint efforts. The hillforts can be seen as an indication of purposeful action, regardless of the type of leadership involved. If we also take into account the type of wide-ranging co-operation required by the signalling system of Häme, we may speak of a system of defence common to a larger entity of population, i.e. a tribe." The above remarks by Ella Kivikoski (1961 251) are a typical example of the understandably cautious approach taken by archaeologists in discussing the social role and significance of ancient fortifications and the underlying organisation of Iron Age society.

Archaeologists have usually avoided problematic interpretations of mental structures on the basis of material remains. On the other hand, ethnographers and historians have been bolder and more detailed in their approaches, and hillforts often play a major role in their assessments of past social conditions – especially in the history of early parishes and local forms of organisation.

In his survey of the history of political organisation, Eino Jutikkala (1972 7) has observed that the views of scholars regarding prehistoric society in Finland are to such a degree conflicting that only guesses can be presented on most subjects. In the following, the various central views on prehistoric society are presented to permit comparisons with the concept of this study regarding the communities that built and maintained the hillforts.

A main problem of approaching the organisation related to hillforts is the fact that they are not only a function of the underlying organisation but also of varied interdependent and mostly indistinguishable factors.

The conditions and prerequisites for the emergence of hillforts must be viewed as a whole involving the following variables and factors (cf. Vencl 1983): 1) topographical conditions, 2) methods and techniques of warfare, 3) economy (means of production), 4) social organisation and structure. As the subject involves a period from which there are written sources we must also taken into account 5) the political-historical situation. In the foregoing, topography and methods of warfare have already been discussed as well as economic and political-historical factors. Finally, social organisation will be reviewed as a separate theme. Where necessary reference will be made to previous conclusions regarding the other factors. Unfortunately, a merging of the various factors cannot be completely avoided in connection with the views of other scholars regarding the economic and social reasons for the emergence of hillforts.

A special problem of the organisation related to hillforts is the relationship of the forts with settlement. This may be expressed in the following "ambiguous" terms – do hillforts tell of the settlement of a region or does settlement provide information on hillforts? Both relate to each other, but which is the more reliable basis for projecting information onto the other?

A further problem is the difficulty of defining the exact periods when the forts were in use, which obscures any possible relation with local units of settlement. The beginning of the period of construction co-occurs with changes in burial customs, as evidenced by a drop in the numbers of cemeteries. Accordingly, archaeological finds do not reflect conditions of settlement in the same away as before. The period when hillforts went out of use is, in turn, a period without data from archaeological or written sources. Also to be taken into account is the distinct probability that there are still undiscovered hillfort sites.

We must again underline the role of topography and methods of warfare. Together, they serve to define the spatial relationship of hillforts and settlements much better than economy alone.

A basic problem of organisation is whether the

building and maintenance of a hillfort was the responsibility of a temporary organisation set up or formed for this specific purpose alone or whether it was carried out by a permanent social unit, such as a village or parish, and whether these units were possibly united or combined into larger administrative areas, i.e. greater parishes or provinces. Furthermore, the old hypothesis of the large amount of labour required for building a hillfort can be compared with the opposite hypothesis that they could be fortified in a short period of time by a small group of men.

The case study of the Kuhmoinen hillfort provides a suitable starting point for reviewing questions of organisation, and it can serve to eliminate the problem of combining hillforts with units of settlement.

In the Lake Vanaja region of Häme settlement spread in a relatively uniform chain and within this region there are small areas (e.g. Hämeenlinna) with several hillforts. It is theoretically difficult to link the latter with definite cemeteries and units of settlement. On the other hand, settlement along the shores of Lake Päijänne was concentrated on coves and bays forming a natural topographic entity. This was also the case in Kuhmoinen. Although the Kuhmoinen hillfort was at some distance from the area of cemeteries and stray finds, there is no reason to doubt its connections with the finds from the main village of the area, especially as it cannot be regarded as an offensive outpost built by an enemy intent on conquering new territory. A fort erected for such a purpose would not be expected to be located in the middle of a wilderness area. Summer and winter traffic to the fort would be too open to attack. A fort built for the purpose of conquering territory should in fact be built at the edge of a settled area, in a place from where retreat or advance could be easily effected. The Kuhmoinen hillfort is not completely inaccessible, for it was next to an old road and also had access to the water routes of Lake Päijänne. In spite of this, it does not meet the requirements of an offensive hillfort, but could well have served the needs of active defence.

6.2. Socio-economic and political factors

In his explanation of the emergence of hillforts and other ancient fortifications, Jukka Luoto has applied a general socio-economic model. This model does not, however, address specific problems of organisation.

Luoto (1984a 166) has stressed the role of changes in Iron Age society as a reason for building hillforts, although he does not completely deny their association with exceptional needs of defence. Luoto mainly searches for reasons within the community concerned, while traditional views ascribe the need for building hillforts to pressure brought about by an outside enemy. Because the Kuhmoinen hillfort is dated to the end of the Iron Age and to the Early Middle Ages, the present discussion will involve only the socio-economic explanations suggested for Luoto's third fortificatory period (1000–1350 AD). Luoto presents similar interpretations for the earlier fort-building periods of the Bronze Age and the Migration Period.

Luoto ties the emergence of hillforts to a phenomenon which he calls the process of dissolution of Iron Age society. According to him, the process of change is marked by a distinct drop in the numbers of cemeteries. This, however, does not imply a drop in population or a dispersal of settlement. It would perhaps be more correct to refer to a process of dispersal rather than dissolution, which contains a number of other connotations. Hoard finds are also related to this stage.

Luoto assumes an expansion of settlement, following the adoption of winter feeding of livestock. This permitted the continued use of fields. Other innovations were the rotation of fields and more effective drainage. These changes reached the various provinces of Finland at different times: Ostrobothnia around 800 AD, the Åland Islands around 1000 AD, Satakunta around 800–1000 AD, Häme between 1000 and 1150 AD, Finland Proper around 1000–1100 AD and Karelia around 1300 AD.

Unto Salo (1985) and Tapio Seger (1985; Luoto 1984b & 1986) have presented well-argued criticisms of Luoto's interpretations (see also Masonen 1989 104–105).

Space does not permit a thorough review of Luoto's views. The issue is further obscured by the fact that Luoto's views are based on partly unpublished studies. Therefore, only two of Luoto's theses are discussed: hoard finds and the drop in the number of cemeteries in relation to the dispersal of settlement. Views presented here are partly the same as those of Salo and Seger.

Luoto's basic thesis is problematic. How can an expansion of settlement, obviously implying increases in population and settled areas, be evidenced by a decrease in the numbers of cemeteries during the existence of non-Christian burial customs? Furthermore, how can the dispersal of settlement as such be a factor predestinating a need for building forts? Changes in burial customs are of course possible, but completely unfurnished burials are not probable (see p. 53 and 95).

Luoto presents information on Häme that contradicts his own views. He maintains that in Häme the period when hillforts were used was clearly older

than the Crusade Period, i.e. the Viking Period. Basing his argument on this dating, Luoto criticizes the idea of linking hillforts solely to periods of unrest. Evidence of the latter in Häme dates from the 11th century, i.e. from after the period of the hillforts. On the basis of this information, viz. the incongruent relationship between times of unrest and the period of use of the hillforts, Luoto presents the conclusion that the fortificatory period is related to "the process of dissolution of Iron Age society". Typical of this period of change is a sharp drop in the numbers of cemeteries. Surprisingly enough, Luoto does not date this period in Häme to the time when forts were in use according to him (i.e. the Viking Period) but to the Crusade Period – the very time when, according to Luoto, the Häme Finns took part in the disturbances of the 11th century (Luoto 1984a 170).

Luoto's claim that the number of cemeteries decreased in times of crisis is correct, not only in the case of Häme but also in other provinces of Finland (see Seger 1982b and Figs. 23, 26–29; on the explanation of the diagrams with reference to the working hypothesis see p. 53). However, other explanations for the phenomenon can also be suggested. In this connection, the diagrams of find material from Päijät-Häme and the comparison areas are referred to.

The earliest changes were in Satakunta where the number of cemeteries decreased to some degree in the Viking Period. The process continued in the Crusade Period, which in the light of Luoto's theory would be interpreted as a continued dispersal of settlement or a deepening of the process of change. If settlement had dispersed in Satakunta during the Viking Period, one would expect the emergence of cemeteries in the new areas taken over by expanding settlement, which in turn would be evidenced by an increase in their numbers. Luoto does not appear to claim that the old areas of settlement were abandoned. Even assuming a drop in population in these areas with an ensuing drop in the number of cemeteries, it could be assumed that the newly colonised areas would account for their numbers remaining the same or even cause a rise in their total number. Of interest in this connection is the amount and distribution of stray finds. In the settled areas one would expect a drop in number with a corresponding increase in the newly colonised regions. Luoto does not address this problem.

The dispersal of settlement is nevertheless a possibility that must be taken into account in explaining the drop in the number of cemeteries, but not in the sense proposed by Luoto. In Luoto's term's, the dispersal of settlement occurred most probably within the settled regions and their adjacent hinterlands, e.g. within the same river catchments in Finland Proper. However, a further possibility is that all of the arable areas of "light clays" that could be cultivated with the farming technology of the period had been taken into use (cf. Orrman 1987 184) with the result that population pressure discharged into the outlying wilderness regions. The diagram for Häme shows growth of population in the area that may have originated from outside the area, possibly in the form of colonists and settlers from Satakunta. In these areas find locations and areas of clayey soil display a clear association. Thus, the area of origin in Satakunta did not have to undergo any reduction of population. Concentration of settlement may have led to new forms of organisation, e.g. increased cooperation among units of settlement and the formation of some kind of village system. The village cemeteries, as assumed by Meinander (1980) had now formed, which can be seen as a drop in the overall number of cemeteries in the diagrams. A direct interpretation of this would suggest decreased population and abandonment of settlements. In Satakunta, the number of stray finds does not decrease in the Viking Period and even shows a slight increase. This suggests that nothing happened – or at most increased utilisation of nearby wilderness areas.

Changes in burial customs should also be considered in evaluating the small number of Crusade Period cemeteries in Häme, Satakunta and even Finland Proper. The diminishing of grave-goods material due to the influence of Christianity reduces the probability of graves being found. Furthermore, the marked increase of Viking Period cemeteries in Häme may indicate that the apex of settlement "permitted" by light-clay farming technology had now been reached, as had occurred in Satakunta in the preceding period. This, in turn, led to increased colonisation of wilderness areas and the emergence of village-type communities in the areas of origin together with village cemeteries. The possible joint effect of these two phenomena may have occurred together with the changes in burial customs brought about by Christianity.

Luoto claims that in Karelia the period of change set in around 1300 AD. This requires further explanation and evidence, because the practice of furnished burial also ends at this time. Without additional historical data we cannot claim that the cessation of furnished burials signified a dispersal of settlement. The situation is similar in the Åland Islands and in Ostrobothnia. The connection between the end of furnished burials and the dispersal of settlement, as claimed by Luoto, raises a number of doubts. Well-argued claims of depopulation should not have been overlooked (cf. Luoto 1984b & 1986; Seger 1985; Hellberg 1980).

Also the connection of hoard finds with the crisis

or period of change of the Iron Age, as claimed by Luoto, raises a number of question. Although the times of deposition of the hoards do not correspond in detail to the posited crises, Luoto feels that they were generally cached in the period of crisis.[1]

Luoto stresses that the hoards of Karelia are considerably older than the period of crisis and change. It should also be pointed out that the periods of crisis and the times of deposition of the hoards do not follow the same chronological order. In Satakunta and Finland Proper the time of deposition is 1045, although the preceding crisis in Satakunta occurred in the Viking Period (800–1000) and the following one (in Finland Proper) was in the period from 1000 to 1100. The hoards of Häme are older (1024), although the period of crisis occurred later (1000–1150) than in the former areas. In Ostrobothnia, the hoards are dated almost half a century older than the period of crisis and change and in the Åland Islands they are over half a century older as well. The region of Uusimaa is not mentioned at all, although the situation there is the same as in Ostrobothnia with the disappearance of cemeteries in the Merovingian and Viking Periods, interpreted as depopulation or dispersal of settlement *sensu* Luoto. The material from Uusimaa includes a hoard from Hankoniemi Cape with four Arabian coins, dated approximately to the 860s (Granberg 1967 173), i.e. over half a century earlier later than the marked drop in the number of cemeteries. The site of the hoard is at a considerable distance from the nearest cemeteries, and it has been linked with the eastern route of the Vikings passing by Hankoniemi Cape (Hirviluoto 1978 5:4).

A review of the hoard finds shows that in most cases the claimed period of crisis and the times of deposition of the hoards do not coincide or that hoards associated with permanent settlement do not exist. In two cases out of seven they fall within the broadly defined period of crisis, but even in these cases the hoards of the later period of crisis are in fact older than those of the older period of crisis. In conclusion, it is hard to understand how this phenomenon is in any way related to the dispersal of settlement.

The hillfort chronology presented in this study differs in some respects from that proposed by Luoto. The hillforts of Häme are dated to the Crusade Period and the Early Middle Ages, which is also the case in Karelia. Also the Iron Age occupation of the Vanhalinna hillfort in Lieto is dated to the Crusade Period. The hillforts and other fortifications of Satakunta cannot be unequivocally dated to an earlier period. Throughout the areas in question the hillforts are more or less of the same age, both in the settled areas of Häme as well as in the colonised outposts of the wilderness regions of Päijät-Häme. Together with the differences in settlement rate as shown by the diagrams, this fact suggests that the emergence of hillforts was in no way predestined to any definite stage of settlement history, and that explanations have to be sought elsewhere. However, permanent agricultural settlement formed the basis for building hillforts. It created a body of wealth and property, the defence of which required permanent defensive structures (e.g. Ailio 1928 51).

The above brings to mind the "natural explanation, whereby the hillforts were an answer to dangers from within and without" (e.g. Salo 1985 140), which was overlooked by Luoto.

The hillforts also fall into the period when the Baltic regions began to be claimed by the rising states of the time and the eastern and western churches (see p. 112). This period extended from the second quarter of the 11th century in the Crusade Period to the 14th century. Eastern Finland developed a material culture different from that of Western Finland and Häme became an area where eastern and western artefacts occurred together. From the early 11th century onwards historical sources begin to appear with direct references to events in the present area of Finland (Gallén 1984; Lind 1977; Kirkinen 1984). Many of the sources contain only names of regions and references to peoples. Discussed in this connection are sources referring to military expeditions into the area of Finland.

The Swedish source material is limited in this respect, and documents have been preserved only from the latter half of the 12th century onwards. The material of the 13th century consists mainly of annals of few words. The only sources directly referring to the prehistory of Western Finland are the rune-stones, a couple of which mention persons killed in Finland or Häme. This succinct data tells little of the of the purposes of the expeditions on which the persons in question were killed. The question arises of whether the rune-stones should in all cases be linked to military expeditions. Death could just as well have come on trading voyages through illness or in a fight among partners. Because of the limited source material, nothing definite can be said about the possible warlike nature of Swedish activity in Finland. Sweden may not have posed any appreciable threat, or if such occurred it would have been limited to the early 11th century. This may well be the case, especially if we accept Suvanto's claim that the so-called first crusade to Finland possibly never occurred (Suvanto 1987a). Meinander (1983) has stressed the age-old interaction of the Finns and Swedes, as indicated by numerous loan-words in

[1] Luoto uses the term "use of hoards" which would imply their deposition and caching and not the finding of hoards. A "used" hoard cannot be observed archaeologically.

both languages. Also danger from the inland regions has been suggested. Tallgren (1931 232; see also Oja 1945), with reference to the geographic distribution of hillforts in Finland Proper, has presented the interesting suggestion that they were intended to repel an inland enemy and not one advancing from the coastal regions. Masonen (1989 152), however, rejects this possibility.

Finland is mentioned to a greater degree in the Norse-Icelandic sagas and the Danish chronicles, which also contain information on Swedish interests vis-à-vis Finland. These sources mention military expeditions to Finland in the 10th and early 11th centuries. Gallén (1984 258) is cautious with respect to the latter information. The Viking voyages were not carried out by Swedes alone. It is suggested that Olaf the Holy of Norway undertook an expedition to the Uusimaa region of Finland around the year 1010 (Gallén 1984 255–256).

Gallén (1984 260) has also emphasized the activity of the Curonians and the Estonians (especially the inhabitants of Saaremaa [Ösel]) as a continuation of the Viking voyages and extending from the mid-12th century to the 1220s. These expeditions wreaked havoc in the coastal regions of Denmark, Sweden and Finland Proper. In the late 12th century also the Danes undertook expeditions to Finland.

The clearest and most numerous references are, however, in the chronicle of Novgorod regarding expeditions into and from Häme. The first mention is from 1042 and the last one is from 1311 (Lind 1977). In some cases Finns are mentioned among the invaders from the west. The expeditions of the Karelians and the Novgorodians were not limited to Häme alone, but also extended further abroad. In 1187 the Karelians razed the town of Sigtuna (Lind 1977 174–177). Following the campaigns into Häme, the Russians burned down the town of Turku in 1317.

The dating of the Kuhmoinen hillfort and the forts of Häme corresponds to the duration of the last-mentioned expeditions. In Karelia hillforts came into use around the same time, but may have remained in use for a slightly longer time. Also in Finland Proper the history of the Vanhalinna hillfort in Lieto begins in the early 11th century, continuing from all accounts up to the destruction of Turku, after which the situation in Finland appears to have been pacified as a result of the Treaty of Schlüsselburg.

Still to be discussed is the possibility that the hillforts of the Päijät-Häme region were related to conflicts of interest among the wilderness farmers and the Lapps. These events do not coincide with the marked increase of settlement, at which time – as well as slightly later when the hillforts were being built – there were sufficient opportunities and room in the region of Päijät-Häme for the peaceful coexistence of different groups. The diagrams for settlement history show a different situation in Karelia, where the emergence of hillforts and the consolidation of settlements coincided, and a situation of conflict was possible. On the other hand, there was no fort-building period in the Lake Vanaja region of Häme during the main phase of intensified settlement. Notwithstanding the differences in settlement-historical data, the contemporaneity of the hillforts of the Lake Vanaja region, Päijät-Häme and Karelia proves that the forts were not related to any definite phase of settlement. The emergence and use of hillforts may best be explained with reference to the political events outlined above.[2]

6.3. The parish system

In research hillforts have in various ways been connected with concepts of lower-level local organisation, i.e. parishes (Fi. *pitäjä*).

Of Finland's archaeologists, only A. M. Tallgren (1933) has made a concrete attempt at defining the main features of the social and settlement history of late prehistoric society in Finland. Although presented by an archaeologist, the data concerned is mainly based on place-names in Finland Proper. Tallgren gathered special place-names from villages with late prehistoric finds that formed uniform groups or parishes. These were then compared with neighbouring parishes with the result that in the pagan centres of Finland Proper *hiisi* and *moisio* place-names consistently re-occurred.

The place-name *hiisi* referred to the religious centre of a community. Exceptions to the rule were

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[2] Competition among the Catholic and Orthodox churches and the spread of Christianity in the Baltic regions present the possibility that the hillforts were occupied by the Christians of pagan areas and that they had come about as a result of pagan reaction. This does not appear probable in military terms. Both Christians and the unconverted had the same knowledge of local topography, and a possible retreat of Christians to an outlying site such as the Kuhmoinen hillfort could not have happened without the use of routes familiar to their possible opponents. People moving to such a fort could easily have been killed during such a retreat.

The hillforts were built in the early 11th century. Would any Christians of that period have had the need to build a place of refuge, e.g. in Kuhmoinen in the middle of a wilderness zone? It is more likely that converts to the new faith did not meet with any initial resistance. Reactions usually set in only when the new faith begins to claim sacrifices (Suvanto 1985 42). It is hardly possible that the founders of the Kuhmoinen hillfort were Christians in the second quarter of the 11th century or that it was later taken over by the supporters of the new faith.

In theory, the hillforts or at least some of them, may be related to religious conflict. In such a situation the best location for a fort would be immediately next to a settlement. Archaeological data cannot indicate which of the hillforts were possibly occupied by Christians (or pagans).

hiisi place-names in outlying parts which were interpreted as the sanctuaries of wilderness-hunting farmers. Tallgren assumed that the term *moisio* referred to a large farm of late pagan times, as indicated by examples from Estonia. These place-names were, however, less common than the *hiisi* place-names in the areas of Iron Age settlement. Tallgren interpreted their relatively smaller proportion in interesting terms – they could not be regarded solely as the centres of ancient parishes.

With reference to the forts, Tallgren states that the available material does not tell whether they were related to a broader system or whether they were the work of temporary agents.

On the basis of the *hiisi* and *moisio* place-names, as well as the fort sites, Tallgren divides the area of Finland Proper into communities with specific names. Tallgren's concept of the parish gives the impression that it was a spontaneously formed lower-level regional community involving religious and secular features (cf. Jutikkala 1972 8).

The ethnographer Kustaa Vilkuna (1964a) linked the emergence and formation of parishes to danger from outside. Vilkuna's argument is based on historical sources from Estonia and etymological data. The conquered Karelian regions of the Treaty of Schlüsselburg are referred to with the term *kihlakunta* (present meaning: county) which is based on the Germanic word *gissla*, meaning hostage. The taking and rendering of hostages was a common practice, of which Vilkuna presents examples, with special reference to the chronicle of Henry of Livonia who mentions the taking of hostages and to Paul Johansen's (1950) studies. The regular rendering of hostages involved an organisation which was empowered to do so and was literally a "hostage body" as implied by the original meaning of the work *kihlakunta*. According to Vilkuna, each *kihlakunta* had at least one fort, forming the centre of the area. In the conquered parts of Karelia, it was also a district of exacting tribute in the form of hostelry services or hospitality , which – having rendered hostages – kept to its agreements and assured undisturbed eating and drinking for the conqueror and his entourage. This suggestion is supported by the Karelian regional term *pogosta* (from the Russian *pogostit*, meaning "to entertain"). In the document of the Treaty of Schlüsselburg the *pogosta* and *kihlakunta* regions correspond to each other.

Vilkuna claims a similar origin for the West Finnish term *pitäjä* (present meaning "parish"), deriving from terms for feasting and entertaining. These relate the *pitäjä* to the *pogosta* and furthermore to the *kihlakunta*.

In his studies of the relationship of Early Medieval church and administrative parishes with Iron Age settlements, the historian Seppo Suvanto (1973a 26–70) has presented a number of additions to Tallgren's views. Suvanto maintains that the identifying features of late prehistoric parishes are: pagan cemeteries, forts, *ting* sites, cult centres, evidence of the farms of Iron Age chieftains, old church property assumed to have been taken over from the prehistoric community and interspersed ownership of wilderness areas. Only three parishes (Eura, Kokemäki[3] and Pirkkala) contain all of the above features, albeit in somewhat problematic locations. For example, the village of Pirkkala does not display the signs of an ancient parish centre, and the hillfort and *ting* site are in a completely different part of the parish. The remaining parishes (Köyliö, Huittinen[4], Sastamala, Kyrö and Vesilahti-Lempäälä) contain only a few of the features mentioned by Suvanto.

A number of problems are also related to Suvanto's and also Tallgren's features of prehistoric parishes, and Vilkuna applies Estonian data directly to the Finnish context.[5] The absence of a fort is not in itself decisive, because its existence depends completely on local topography. More problematic, however, is place-name data, which involves a number of difficult source-critical questions. The same also applies to early ownership of land by the church or the state. An example is the site of Käräjämäki ("*Ting* hill") in Eura with its ring of "judges' stones" (Suvanto 1973a 27). Matti Huurre (1970) has pointed out that, apart from its name, this old burial site has no connection with local tradition or documentary sources. Huurre refers to G. J. Lindström (1850) who was the first mention the site and its ring of stones as "the strange play of chance upon words and metaphors". The name may be related to a popular attempt at etymology in connection with a singular burial site.

Erik Anthoni (1970 23) is cautious in his dating of the *moisio* place-names. Despite the convincing arguments presented by Tallgren, Anthoni maintains

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[3] The fortificatory nature of the Linnaluoto site at Harola in Kokemäki is uncertain (Luoto 1984a 157).

[4] Suvanto points out that there is no hillfort in Huittinen, although he suggests the possibility that a site known as Ripovuori was fortified. Later, the Räätikäsvuori site, to the north of Ripovuori, has been identified as a hillfort.

[5] A generally held view, based on the chronicle of Henry of Livonia, is that the regional entities consisted of the land (Fi. *maa*) and the province or *kihlakunta*. Both were headed by elders, *seniores terrae* and *seniores provinciae*. The chronicle refers to other titles as well, e.g. *princeps et senior* (K. Vilkuna 1964a 22). These terms have been the subject of recent Estonian studies, which point out that e.g. the first-mentioned ones do not refer to any specific category of nobility, but to all local elders regardless of their status (Selirand 1989 165). It has even been stressed that the degree of social and economic differentiation was relatively low (Selirand 1989 166). Early Medieval Estonia, used as a model for the study of early social organisation in Finland, may not have been as organised a society as hitherto assumed. Also Swedish scholars have suggested that social organisation in late prehistoric times was not of any high level (Lönnroth 1977 passim & 1982).

that there are a number of cases where the place-name came about at a much later date.

Anthoni has also pointed to contradictory features of early land-ownership, regarded as significant for the subject at hand. He maintains that many of the locations claimed to be the farms of chieftains were in fact the holdings of bishops and one was said to have been a crown-owned holding. In his opinion, this does not support any claims of an unbroken chain of use by local chieftains (Anthoni 1970 48–50). It is of course possible that the holdings were confiscated by the church or the crown, but the relationships of ownership do not completely correspond to expectations. This was especially the case in connection with cult-related properties (*hiisi*), which, due to their nature, would have been taken over by the church as ordered by the Papal Bull of 1229. Nothing of the kind ever happened. Already at an early stage, the holdings in question were owned by the nobility and only a few of them were first mentioned as belonging to the church (Anthoni 1970 49–50).

Scholars have also studied the relationship of the outlined ancient parishes with the later parish system. According to Vilkuna (1964a 39) the same regional community, which provided the tax-like feasting services, also built the local churches and paid the priest (cf. also V. Voionmaa 1912 234–236 and Oja 1955). To my understanding, also Suvanto assumes a correspondence between the Early Medieval ecclesiastical and secular parishes and the parishes of late prehistoric times.

Ecclesiastical and secular parishes cannot, however, be combined in all cases. Exceptions in this respect are the regions of Köyliö, Säkylä and Yläne in Satakunta.

In his studies of the history of the parish system, Veikko Litzen (1977) proposes three stages in the history of parishes: 1) late prehistoric parish, 2) ecclesiastical parish and 3) tax parish. Litzen also underlines the changing nature of parish formations. In fact, there were various types of parishes for different purposes. Litzen suggests that judicial areas may indicate the "most natural" and original parishes better than areas of church administration, which he regards as highly problematic (see also Taavitsainen 1987 99).

All in all, the situation is highly diffused, reflecting no doubt the impermanent nature of the parish system of late prehistoric times and its arbitrariness. There was most probably no ready or established organisation that could have taken over when the country was "conquered". Co-operation for various ventures was arranged in the form of temporary organisations.

6.4. The Kuhmoinen hillfort as a project of construction and defence.

A starting point for approaching questions of organisation is provided by assessments of the required time of construction of the Kuhmoinen hillfort and its number of occupants. Recent Swedish studies have specifically addressed the first-mentioned issue (e.g. Engström 1984a). This problem, as well as the number and organisation of the defenders, have been the subject of earlier studies in Sweden as well (Schnell 1932; Posse 1935–37). Johan Engström has emphasized that "modern man cannot evaluate the time it took for our forefathers to build mounds, barrows, hillforts etc. This is based on a low estimate of their efficiency and technical know-how" (Engström et al. 1986 165).

The Kuhmoinen hillfort is a good example to be used for assessments of the above kind. Its size, topography and structure are all typical of hillforts in general. Only the proximity of a road and the exceptionally large number of finds are differentiating features, which, however, occur in connection with certain other hillforts as well. The uncommonly large number of finds can be explained as "supra-normal".[6]

Estimates of the numbers of builders and occupiers of the fort must be compared with the population of Kuhmoinen. The latter, however, is almost impossible. It must be undertaken, however, for it is the only way of obtaining even a rough guess of the size of local settlement.

Estimates of population in early historical times in Finland rely on documents related to taxation. Jutikkala (1957 150) has stressed that the purpose of these documents was not to give officials – much

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[6] The objects left in place at the Kuhmoinen hillfort suggest that the site was given up in some dramatic event – possibly a battle. Looting and plundering have always been seen as part of warfare, but the composition of the finds from the Kuhmoinen hillfort suggests that it was not looted. The large number of objects and artefacts may result from the possibility that when the fort was abandoned all of the material was simply left there. On the other hand, it is hard to imagine that the local populace would have left such a large amount of scrap metal strewn about the site as later discovered in the excavations. The large number of finds may well be explained by the time when the fort was attacked.

The expeditions in question were carried out in winter conditions. Weapons could have been lost in the snow in the heat of battle. Accordingly, they were hard to find and there was possibly little time to look for them. On the other hand, the finds from the hillfort are mainly of scrap metal and older weapons. Although scrap metal was valuable, the intact artefacts were possibly of more interest to the enemy, whose transport capacity was limited, and only intact and newer objects were taken as booty (cf. the battle of Korsbetningen, p. 42). Following the defeat the hillfort may have become a place feared and avoided by the local inhabitants. After the melting of the snow, undergrowth and bushes would soon have covered and hidden the strewn objects. As the site was never refortified, the objects remained in their locations.

less historians in a later era – information on the actual size of the population. By its very nature, this source material involved a temptation to cover up facts, and, accordingly, taxation records entail laborious methods in calculating population and lead to highly varied results. The earliest available records, so-called land registers, are from 1539, followed by census lists of the 17th century. Suvanto (1965 199) emphasizes the unreliability of the latter material, but nevertheless estimates the population of Kuhmoinen in 1634 as 550 persons (242 in the census lists). This estimate takes into account Jutikkala's (1957) comments on the ratio between census data and the actual number of inhabitants in a region. The land register of 1539 lists 48 farms or holdings in Kuhmoinen (Suvanto 1965 199). Suvanto, however, does not present any estimates of population in the parish, which may be the result of the even greater difficulty of interpreting land registers. In spite of this, the present estimate of population in Kuhmoinen in the Late Middle Ages is attempted on the basis of the 17th-century estimates.

According to Jutikkala (1957; Suvanto 1965 199), the number of inhabitants per farm in Häme in 1634 was 10.1. The corresponding figures for the parish of Padasjoki were 9.4 and 10.8 in the county of Hollola. A multiplication by ten of the number of farms or holdings in Kuhmoinen gives a population estimate of 480. Over a third were children and less than 10 percent were elderly people (cf. Jutikkala 1957 176). Some 270 persons constituted the working adult population, half of which were males.

It would be too bold, at least on the basis of the above estimate, to present estimates of population in 1050, 1100 and 1200. There is cause to assume that the growth of population was not even over this 450-year period.

At the end of prehistoric times, there were indications of permanent settlement only in the main village of Kuhmoinen, with 21 farms or holdings in 1539.[7] Applying the above estimates, a population of 210 is obtained, comprising a working adult population of c. 120 persons. It is highly probable that in the areas colonised and settled in the Crusade Period and Early Middle Ages the number of inhabitants was considerably smaller than in the 16th century.

The estimates of the numbers of defenders or troops stationed in hillforts appear to be large even in relation to estimates of population in the 16th century. Colonel Posse presents as an example a middle-sized Swedish hillfort, 300 metres in circumference. Half of this perimeter is on a steep unassailable bluff and the remaining section (150 metres) is protected by defensive structures. The fort also includes an outer fortification 60 metres in length. Taking into account the range of weapons and the space required, the defence of the outer fortification and the main part open to attack as well as the need to secure the steep slopes together with a reserve within the fort and a body of troops operating outside the fort, Posse (1935–37 250) estimates the required force at 170 men.

Although the example cited above is from Sweden, it can also be applied to Finland because of similar conditions of topography. However, each hillfort is unique because of differences in local terrain. The perimeter of the Kuhmoinen hillfort measures c. 270 metres, of which only c. 45 metres were protected by a wall. It was possible to attack the fort from the north and south ends by circling around the wall. However, these parts of the site show no signs of defensive structures. It was no doubt difficult to build walls on the relatively steep slopes of the hill. Log barriers were most probably erected along the 100-metre section open to the north and along a section of 50 metres along the south side of the fort.

Lieutenant-Colonel Pertti Huttunen, who was responsible for the mapping of the Kuhmoinen hillfort, has drawn up an estimate of the required number of troops from the perspective of modern warfare (see appendix to excavation report on the Kuhmoinen hillfort, National Board of Antiquities). Applying principles similar to those presented by Posse, Huttunen estimates the minimum body of troops at 85 men together with 20–30 persons participating in other aspects of defence. The estimates of population in Kuhmoinen are not taken into account.

The estimates are completely different in evaluating the number of persons needed for fortifying the site. This is surprising in view of earlier views stressing the laborious nature of such projects – albeit without absolute figures.

The architect Seppo Rintala, a member of the field crew, estimated that the stone foundation of the wall and the log breastwork built on top of it required c. 135 12-hour working days (Table 18). The work could thus have been carried out by ten men in a month. Not included is the time required for the construction of obstacles, hearths (see Appendix 3, p. 219) and other structures possibly erected at the site. There are no doubt other factors as well which have not been taken into account in this connection. Despite these limitations, the estimate shows that the task was in no way a considerable one.[8]

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[7] Not all of the farms were in the same village group, and the list of masters of households shows that already in the Middle Ages at least two holdings were established in their present locations in divided land further afield. They retained their rights to the lands of the older villages and for this reason were listed among them (Suvanto 1965 98–99).

[8] "It is strange that ancient folk poetry contains hardly any references to these fortifications, which played an important role in the life of the people." (Äyräpää 1959 88). This, in fact, sup-

Table 18. Construction time required by the log breastwork of the Kuhmoinen hillfort. The assumed length of the wall is 45 metres and the breastwork is assumed to have been 2.1 metres high. (Wd = one working day).

Task	Amount of material or work required	Working days
Foundation of wall	45 m^3 [1]	9 wd[2]
Felling of timber	112 cuttings[3]	2 wd[4]
Erection of breastwork	423 metres	124 wd[5]
		135 wd

The breastwork could have been erected by two men in 68 days (4 men in 34 days, 6 in 23 days, 8 in 17 days and 10 in 14 days).

[1] The amount of stones was estimated from two cross-sections of the wall and from measurements of its width and height.

[2] Estimate used: 1 d = 5 m^3. According to Engström (1984a 59), experiments at Torsburgen in Gotland showed that limestone was quarried, carried 10–20 metres and laid at a rate of 0.4 cubic metres/h by inexperienced labourers (i.e. 4.8 m^3 in a twelve-hour day). In another connection, Engström arrived at slightly different results: 4.56 m^3/8 h (6.84 m^3/12 h). Limestone is easier to use in construction than stones and rocks of varying size and shape. Engström et al. (1987 169) refer to an early 19th century military estimate of the construction of a wall of greystone at a rate of one cubic metre/day where stones are available. This estimate appears to be low and probably refers to a structure similar to a churchyard fence, which is not the case at the Kuhmoinen hillfort. Also large rocks and stones *in situ* were used. In restoring the excavated cross-section of the wall and the excavated area at Kuhmoinen two men, working at "a normal pace", replaced the stones removed from the wall and its near vicinity in a couple of hours. A conservative estimate of this work is c. 0.5 m^3/man/h.

[3] The required timber is assumed to have been obtained from the immediate surroundings when the site was cleared. For this reason the time required for clearing has not been estimated. It is assumed that the wall was 2.1 metres high and the timber was of a mean diameter of 30 cm. The breastwork required seven layers of logs, i.e. 7 × 45 m (= 315 m). Supports were needed at the ends and at 6-metre intervals (6 layers with a mean width of 2 metres, i.e. 9 × 6 × 2 m (= 108 m). The total timber requirement was 423 m, involving 112 cutting of standing and felled timber.

[4] According to Engström (1984a) the cutting of a 30-cm log takes 12 minutes (0.2 h).

[5] The time needed for erecting the breastwork is estimated from the time needed for building the church of Petäjävesi. According to the local vicar 12 men built the church in 35 days, i.e. it required 423 working days (Pettersson 1986 72). It is assumed that the building rose in even layers of logs. The amount of timber for the walls is estimated at 1425 metres (3.4 m/d) and the work in question required skill. The breastwork at Kuhmoinen could hardly required such a pace, as the walls of the Petäjävesi church were over six metres high and laid in even layers. The height of the breastwork at the hillfort is estimated at 2.1 metres.

Nor did the restoration of the Ohrala hillfort in the rural commune of Mikkeli, carried out by the local garrison in 1955, require any considerable amount of time. Unfortunately, the excavation report and related newspaper articles do not give the cubic volume of the stones used, although the number of workers and the time expended are mentioned. Fifty-five soldiers were able to complete work on the restoration of two smaller breastworks by noon in a single working day and a larger one an hour later (Länsi-Savo 23.7.1955).

Rintala's clearly low estimates can be compared to information on corresponding tasks from ethnographic material, which gives an indication of the pace of construction work in pre-industrial conditions. Work of this kind is referred to briefly in the footnotes of the table and related information was used, partly directly and partly indirectly, in the estimates presented above.

There is, however, no information on building tasks or projects completely corresponding to hillforts. Examples cited are the construction of a salmon-weir and church-building. Salmon-weirs were large structures requiring the working of timber and also to some degree stone in exceptional circumstances. Kustaa Vilkuna (1974 146–160) describes the construction of such a weir in 1947 at Tervola on the Kemijoki River in northern Finland. Certain details of this description deserve to be mentioned in this connection. Various kinds of wood were needed in the constructions, mainly young, straight-trunked birches. The required 2,250 birches were felled in the spring before they grew leaves and, with their branches, were gathered on the river bank at the site. A corresponding amount of withes of three sizes were needed to tie the constructions. These were prepared in the winter. The most time-consuming stage was, however, the placing of the thickest timbers forming the frame of the weir.

The actual erection of the weir was carried out by two teams of men working from the shore and from an island in the stream. It was customary to try to keep the same men on the teams, so that each was familiar with his place on the site. The work was headed by a foreman supervising 20 men. The weir was thus erected in flowing water in six working days. The length of the structure from shore to shore was 225 metres. Although the time required for felling timber, preparing withes and transport was not taken into account, the work proceeded at a surprisingly fast pace. At hillforts, the material was already available at the site.

The erection of the nave and shingle roof of the 18th-century church of Petäjävesi was estimated by the local vicar as requiring the work of twelve carpenters for 48 days. This estimate did not include boarding or decoration of the interior. According to the vicar, the work was completed in the summer of 1763 in 35 days, but the number of workmen is not known (Pettersson 1986 72). The nave required some 16 overlaid series of timbers, rising to a height of c. 6 metres, upon which the roof was erected. The

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ports the idea that the hillforts were in no way central to the life of the community and that their construction was not a memorable event.

total length of the walls was c. 68 metres and the building had 12 jointed corners. Although the logs were already at the site, they had to be hewn. All of this was achieved in the time specified.

Surprising estimates have also been presented concerning the time required for building prehistoric fortifications. A good example is the fort of Torsburgen in Gotland, one of Europe's largest prehistoric fortifications. The fort covers an area of 112.5 hectares and the wall, in places 7 metres high with a base 18 metres wide, was two kilometres long. With reference to experiments, Engström (1984a 54–84) has estimated the number of working days required for building the fort with tools based on archaeological finds. In one of Engström's experiments (1984a 64–65) a section of wall four metres long, 2.85 metres high and two metres wide was built be eleven persons using limestone and timber. A ramp-structure of 13 square metres was added to the wall. The work was completed in a single day, not including the time required for quarrying stone and felling timber. It must be pointed out that the experiments were carried out by students, who were hardly used to work of this kind. Engström compared the results of his experiments with information on corresponding work by Roman legionnaires and Swedish military engineers as well as with data on large-scale building projects of the 18th and 19th centuries provided by agricultural associations in Sweden. On the basis of this information, together with estimates of the time required for quarrying rocks and felling timber, Engström suggests that the wall at Torsburgen could have been built by 100–200 men in two months.

Other recent studies have also stressed the fast pace of fortification work. Vencl (1983 313; cf. Engström 1984a 66–69) regards as evidence of the fast rate of such work the fact that "the Greek and Roman armies enclosed themselves in ramparts even for a single night or in a few moments after an enemy of superior numbers came in sight, indicates that an erection of a simple dumped-earth rampart with a moat was a matter of hours for an experienced crew." Livy mentions 131 fortified encampments in the area of Samnium, which were built by two Roman armies in five months in 297–296 BC. The ruins of these forts could still be seen in Livy's time 300 years later. The size of the armies is not mentioned.

Roman armies were, however, considerably larger than the troop formations of Early Medieval times. Despite this, the building of forts cannot be regarded as an overly time-or labour-consuming task.

In 1539 it would have taken the c. 135 men of Kuhmoinen a day to build the fort or two days for the 60 men of the four villages of the centre of the parish.

On the other hand, estimates of the numbers of defenders are so large that even the whole male population of 16th-century Kuhmoinen would not have formed a body sufficient for the defence of a middle-sized hillfort, nor would there have been sufficient numbers of men in the main village area to defend the Kuhmoinen hillfort. The explanation for this is most probably the fact that the number of required defending troops has been overestimated in the same way as the construction requirements.

Estimates are based on the military capacity of modern states with ample resources, reserves, strategies and tactics at their disposal, which was hardly the case in the Iron Age. The local inhabitants were not professional soldiers, operating according to set tactics or using weapons in a definite manner. The situation was mainly one of an individual and intuitive method of warfare by experienced hunters with historical parallels in peasant uprisings, e.g. the so-called Club War (Fi. *Nuijasota*) and earlier uprisings and the methods of the Reds in the Finnish Civil War of 1918. These examples, however, suffer from the fact that in the above cases the enemy forced the combatants to attempt to adapt themselves to the means of professional warfare. The rebels were to a varying degree under a central leadership, but were mainly "amateurs" called up to do service and mostly incapable of large-scale disciplined operations. It is hard to imagine that the farmers and hunters of the prehistoric and early historical past were able to wage battle in a modern sense. Defence was most probably improvised according to available resources, using what weapons were at hand and with the manpower available in the local village.

However, a re-assessment of the numbers of defenders will not be attempted, and reference is only made to the above comments. Roman data is not of use for estimating numbers of hillfort occupants, and information is scarce on troops stationed in the Medieval castles and forts of Finland. In the 16th century the fort of Vardöhus, defending the interests of the King of Denmark on the shores of the Arctic Ocean, was manned by a body of 24 men. Although by this stage, military architecture, firepower and organisation had reached a much higher level of development, the figure is still surprisingly small. In the light of such information a similar-sized body of troops at a hillfort does not appear ineffective. Taking into account information on Medieval warfare, the number of defending troops did not have to be very large. Expeditions of plunder were of short duration. Small detachments of troops were used and the defenders required bases for counter-attack by their own detachments of troops.

6.5. The underlying organisation of the Kuhmoinen hillfort and the parish system

The above estimates of the small amount of labour required for the building of the Kuhmoinen hillfort and the small number of defending troops, show that there is little basis for assuming that the hillforts required co-operation at least on the inter-village level. Ivar Schnell's (1932 5) following comments in the fort of Mälby in Sweden can be applied to Finland as well: " The fort of Mälby is one the largest of its kind on the Swedish mainland. Insofar as its construction can be reduced to an insignificant task of seasonal labour by a few men, the whole problem of the c. 500 hillforts of Sweden can be reduced from a part of world history with battles between the Swedes and the Goths to a number of episodes in the history of local regions. The temporary threat of a roving enemy led to the construction of fortifications in the most severely attacked villages, which provides as explanation for the mysterious lack of regularity of planning in the selection of these sites and the large number of forts in certain regions, above all in Södermanland. The majority of Sweden's hillforts cannot be said to have been the result of strategic planning, but were clumsily-erected peasant refuges, often displaying a similarity with traps where the enclosed animals were the defenceless game of hunters. If, however, the Mälby fort was built in 1,000 working days, the majority of the small forts in Södermanland – as opposed to Rome – could easily have been built in a day by local people summoned to the task, and the plan of such hastily-erected fortifications often left much to be desired."

The amount of co-operation providing the number of builders required was considerably smaller than previously assumed. Sufficient for the task were small crews or temporary associations of men, as indicated by later ethnographic sources on joint ventures. It may even have been possible for an extended family unit to fortify a site.

A variety of working associations (Fi. *yhtiö*, *seura*) are known from ethnographic contexts. These were used in almost all tasks where the joint efforts of several persons were of use (K. Vilkuna 1964a). Associations or bodies of this kind were formed among the working male population for certain tasks, often of very short duration. The most common ones were formed for hunting, net-fishing and burn-clearing among the men of a village. The members elected a leader, called *kuningas* ("king"; e.g. "net king", "clearance king"). Originally, the term meant a leader or chief in various working associations (K. Vilkuna 1964a 29; the Estonian meaning of word is the same; see Selirand 1989 165). Co-operation under an elected leader for a set period or for a temporary purpose was a natural practice and was especially common among men hunting, fishing or clearing land in the wilderness areas far from their permanent dwellings.

The Karelians of Ilomantsi formed special bands or associations for the hunting of various species of game. For example, it may have been heard in the evening that elks had been seen in the locality, whereupon a group of men would touch thumbs and promise to take part in the hunt the following morning. After the hunt the catch was divided equally among the members and the group was disbanded (K. Vilkuna 1964a 130–131). The same may have occurred in late prehistoric or Early Medieval Kuhmoinen with news of the approach of an enemy. A group of able-bodied men – probably from a single village – could have formed an association or body under an elected leader (*kuningas*) for fortifying a suitable hill or similar site as their base. Experience of co-operation of this kind had been acquired on hunting expeditions in the wilderness. It is also possible that agreements were maintained, whereby associations set up for burn-clearing, fishing or hunting, took upon themselves defensive tasks in times of danger.

In the same way as a small hunting party in the wilderness, a defensive group could possibly meet a similar group from a neighbouring village or elsewhere in the region. These contacts would not lead to disputes, but to the formation of a larger body with possible additions from other groups. Such a body could strike camp together and disperse in the morning, after having agreed upon the place where the members would meet the following evening (cf. K. Vilkuna 1964a 131). If long-term hostilities were feared, the associations could possibly agree upon co-operation for a longer period.

Historical sources contain information on associations or bodies set up for military purposes. An example is the so-called David uprising from 1438 when a revolt broke out at Vesilahti in Upper Satakunta. There is also information on rebellions in Häme and Karelia.

According to the sources, David of Aniankylä, a well-respected member of a prosperous farmer family which also owned wilderness tracts, raised himself to the status of a peasant or farmer "king" (*huilchenn hade wpresth sigh för enn bonde Konungh*; Blomstedt 1937 24, 27; see also Suvanto 1987b 274–275 & 1973 360–362). There is agreement among historians that this refers to a survival of prehistoric customs, whereby the Finns elected a "king" when setting out to wage war (e.g. Blomstedt 1937 31; Jaakkola 1950 523). The same custom is also referred to in a pledge made a few years earlier by the Finns to the Council of State of Sweden, according

to which they would not elect chiefs of their own (Hausen 1890 459). Heikki Ylikangas (1977 139–140) is prone to regard the election of Jaakko Ilkka as the head of the rebels of the Club War (1596) as a survival of the ancient custom of "electing kings".

Of interest in this connection, are the clear connections of the elected "king" with wilderness utilisation. Because of his personal ownership of wilderness tracts, David of Aniankylä no doubt had experience in leading various hunting and other organisations.

Ethnographic and historical examples suggest that there was no hereditary aristocracy of military leaders. This appears to be in agreement with Meinander's suggestion (1980 12–13) that Late Iron Age society was egalitarian.[9]

This also indicated indirectly by historical data. Erik Anthoni's (1970 12–26) views on the formation of the early nobility in Finland implies a number of doubts concerning the existence of a Finnish leading class owning large chieftain estates. Anthoni does point out that there were obviously social differences and that the more affluent farmers could have become members of the lower sections of the nobility. Jutikkala (1943 43) maintains that the Finns certainly had "kings", but only as temporary leaders. This system did not grow into a permanent institution of government before the country was headed by a strong bishop.

On the basis of the above estimates of labour and numbers of defensive troops at hillforts as well as historical and ethnographic examples, it appears that the building, occupation and maintenance of a hillfort required only a small and temporarily formed group or association. Hillforts did not necessarily require any permanent unit of administration, as has usually been assumed. The counter-argument can be presented that a small amount of required labour does not eliminate the existence of a parish-type organisation, for even a small joint project can require co-operation. On the basis of the above, however, there can be no question of extensive co-operation being based on laborious and time-consuming work.

If the construction of hillforts did not require much time, could it not have been possible for an enemy to fortify sites in connection when attacking an area? The Romans are known to have transported parts of palisades and they also had reserves in case of harassment (Engström 1984a 67). The chronicle of Henry of Livonia does not mention forts built by attacking forces, nor are they mentioned in other historical sources applicable in this connection. Knowledge of local conditions and topography poses a problem for an invader – a place otherwise suitable for advance or retreat may not necessarily have suitable hills or other sites of a similar nature, nor could palisades have been transported. In fortifying hill-top sites invaders would leave themselves open to attack from defenders and would have to deploy part of their strength to secure construction, which was hardly possible for the relatively small bodies of troops in question. In connection with expeditions or *reise* Henry of Livonia refers only to encampments, which were no doubt fitted with obstacles and barriers. Suitable for this purpose may also have been a group of houses which could be protected in various ways. An enemy can be assumed to have built forts only in situations where permanent conquest was intended. This would have required locations in uninhabited regions or at periphery of settled areas. The latter alternative would also have required the subjugation of the local populace.

A parish-type organisation cannot be completely excluded as a possible community or body responsible for building forts, especially as hillforts are in certain cases located at the boundaries of old units of common land. The latter have been interpreted as signs of local organisation and old common property. According to Seppo Suvanto, however, the hillforts of Satakunta do not appear to be located on old land boundaries, whereby they could not have dictated the regional system of the ancient parishes. Suvanto points out that the situation is different in Häme, where forts are more numerous and some of them are associated in an interesting way with the land-division system of the parishes. On the other hand, with the exception of the parish of Lammi, the county of Hollola in Häme does not display any connections between the hillforts and the regional division of the parishes (Suvanto 1972 88–97).

Though interesting, Suvanto's observations do not cover all available cases, including uncertain fort sites even in the Lake Vanaja region of Häme. Topography must be taken into account in connection with boundary markers. Points of terrain standing out from their surroundings have been popular

[9] Finnish studies on prehistoric social structure based on archaeological material, and especially grave finds, are still so few that the issue cannot be discussed in further detail in this connection. Grave finds are open to a variety of interpretations, and it can even be suggested that they are of little use in approaching questions of social structure. Lehtosalo-Hilander (1982c) has attempted to outline the way in which a Viking Period cemetery reflects its parent community. With reference to changes in burial customs and by assuming that the burials are a direct reflection of the past material culture of the community, she suggests that the community of Luistari in Eura grew both more affluent and egalitarian in the Viking Period (Lehtosalo-Hilander 1982c 36). The above discussion on the numbers of cemeteries has touched upon the possibility that burials as cultural manifestations are not necessarily a direct reflection of material culture or the status of the individual, but may also entail a symbolic meaning and one that reflects new social situations (see e.g. Hodder 1982). Sirkku Pihlman (1987) has suggested a different interpretation of Lehtosalo-Hilander's observations in symbolic archaeological terms. Pihlman sees the change of burial customs as the sign of a new and broader form of economic organisation.

boundary signs in all times. Even without any fortificatory function, hills and ridges can be assumed to have served as boundaries. The boundary locations of certain hillforts, suggesting joint ownership, may derive from the above-mentioned associations formed among men of different villages.

In the following, the region of Kuhmoinen is reviewed with reference to the views of Tallgren and Suvanto, although a critical position is maintained regarding the use of place-names as indicators of parishes.

In addition to prehistoric cemeteries and the hillfort there is also in Kuhmoinen a prehistoric site of worship, the Papinsaari or Tapialansaari island. There are also place-names (including *hiisi* names) associated with pagan beliefs. Papinsaari is furthermore an example of an old cult site taken over by the church (Suvanto 1965 83–88). In spite of the lack of a *ting* site or a chieftain holding, the region has many of the signs of a prehistoric parish.

In the Finnish context parishes are usually regarded as the smallest units of regional co-operation. In Kuhmoinen, the area meeting the above-mentioned requirements of a parish is very small, covering only the shores of the cove of Kuhmoinen and the present main or church village. The area in question has a radius of some two kilometres. Although there were four smaller villages in the main village area in the 16th century, it is usually referred to as a single whole, i.e. the main or church village (Suvanto 1965 98). This was an area where the inhabitants were in day-to-day contact and knew each other. It can be assumed that the local inhabitants regarded their cove as a village or extended village, which surprisingly enough corresponds to the features outlined by Tallgren and Suvanto.

A village is a regional unit where the use of fields, meadows, fishing waters and tracts of outlying land required co-operation. With the increase of the original farms and holdings of the new settlers and their division through marriages and inheritance, co-operation also increased. The cessation of the increase of the number of cemeteries, as indicated by the diagrams, has been interpreted as a sign of the formation of villages. This was specifically spontaneous co-operation arising from the needs of the local populace and was not influenced by higher authority from outside the community, by the church or by an enemy. It seems hard to believe that there would even have been any need or desire for any other kind of broader organisation or co-operation. Temporary co-operation for specific purposes sufficed and it could be arranged on a small scale. The opportunities for settling in outlying areas and the wilderness-based economy served to resolve possible situations of conflict. Fishing, hunting and slash-and-burn farming in connection with the wilderness economy were controlled by a varied and nuanced system of customary law, originally dating back to prehistoric times (Virtanen 1949 & 1951). This permitted the settlers to carry on means of livelihood in outlying areas without the existence of permanent institutions of government.

The above scenario finds support in legal history. According to H. T. Klami (1981 3–4), there were hardly any prerequisites for the formation of fixed rules of law. This does not imply that there were no views on legal matters, based on convictions and customs. According to Klami, the administration of justice, even when it is not based on organised authority, will of necessity become more or less random or accidental. In cases of disputes the legal process involves discussion and providing proof, and not adherence to given or established rules. This point is not in contradiction with the fact that the Finnish term *käräjät* (present meaning: "court sessions") was not adopted from the Swedish language. Justice was administered without set laws or judges, and was based on customary law. In comparison, Klami points out that for example the Finnish terms *laki* (law) and *tuomari* (judge) are Swedish loans.

Klami does not believe that a system of government emerged in Finland prior to the period of Swedish rule. This, however, does not imply that the Finnish tribes were incapable of creating social institutions. Klami's starting point is the concept that a system of government requires a certain stage of development in the relationship between man and his environment with a need to define the human relations with respect to the environment and the means of production. In the sparsely settled areas underlying factors of production, above all the availability of land, had not yet reached a stage where administration was needed or where it was necessary to define the relationship of authority and the governed in terms of legal institutions. Simple conflicts could be resolved through co-operation and consensus. The transition to the Swedish legal system was carried out according to the conditions of Finnish society, by preserving old norms, by freely applying Swedish rules of law and if necessary by searching for completely new methods.

Also the diffuse nature of the parish concept, as pointed out by Litzen, suggests that no fixed system of government had developed by the beginning of the Middle Ages. If such a system had existed, it could be thought to have been reflected in some way in sources on the early stages of ecclesiastical and state organisation. The existence of numerous early parishes, organised for different purposes and of a more or less permanent character, supports the concept of accidental and temporary co-operation.

The example of Estonia is to varying degrees implicit in all of the views stressing the existence of late

prehistoric parish-type organisations in Finland. There is, however, need for caution in applying this model directly (see footnote 5 on page 147). There were considerable differences between Estonia and Finland. Estonia was much smaller and was completely colonised with lands under cultivation. The *Liber Census Daniae* suggests a population estimate of c. 150,000 for Estonia in the 13th century. On the other hand, there are few opportunities for estimating the population of Finland in the Middle Ages. Here, permanent settlement was in a narrow horseshoe-shaped zone in the western parts of the country. The Lake Ladoga area of Karelia was also settled and in between were large tracts of wilderness. For these reasons, the economy was not based on farming to the same degree as in Estonia. If we assume that social conditions defined the applied legal system, there was consequently a need for a more closely defined control and regulation of the factors of production in the areas to the south of the Gulf of Finland than to the north. In Finland, villages, often with the assumed features of parishes, and customary law sufficed. This does not exclude the possibility of temporary associations or bodies, based on mutual agreement and set up for various purposes, with members from a larger area.

The Medieval expeditions of warfare are evidence of a need for organisation from outside the community. The taking of hostages applied to various villages and the hostages were not rendered but taken by force. At a later stage, when payment for hostages was arranged, the various villages formed associations or bodies for the purpose (Fi. *kihlakunta*, cf. above p. 147) of negotiating with the enemy. These were the first signs of co-operation extending beyond the immediate community, and they formed the basis for the later formation of church and state organisation.

6.6. Hillforts and the historical provinces of Finland

Hillforts have been seen as a factor in the emergence of the prehistoric province system of Häme, as outlined by historians.

In the Finnish context, the term province in its historical sense (Fi. *maakunta*) is closely related to the concept of tribe or nation (Fi. *heimo*), which was adopted by Finnish historians to correspond to the concept of *Stamm* in Central European social history especially in connection with prehistoric and early historical tribes. A tribe consists of people living in the same part of the country, speaking a common dialect and adhering to common customs. Accordingly, a province was the area inhabited by such a tribe. In referring to ancient Finnish tribes, Väinö Voionmaa – one of the creators of the concept – gives it a political dimension of common leadership and a primitive system of government (V. Voionmaa 1925; K. Vilkuna 1959). The tribe-concept, created for the purposes of research, spread into everyday use in Finnish with a corresponding change in its meaning. A few centuries ago the term *heimo* was used in Southwestern Finland in connection with family ties based on marriage (K. Vilkuna 1973).

It is generally maintained that late prehistoric Finland consisted of three ancient tribes: the Finns, the tribe of Häme and the Karelians. According to K. Vilkuna (1959 70), old popular terminology referred to six areas and their inhabitants, known as *kunta*: Suomi, Häme, Kainuu, Karelia, Savo and Lapland. The word Kainuu was often used instead of Ostrobothnia, whereas Satakunta and Uusimaa are missing from the list. The latter were provinces which came about in historically documented times, and were not part of the old oral tradition. Further back in time, only the three first-mentioned provinces remain, of which Karelia is the youngest. The earliest historical sources mention only two regional entities, Suomi and Häme (see p. 77).

Provinces were by no means static phenomena and they did not remain the same throughout the centuries. They were formed by various factors and new provinces came about in later centuries. According to K. Vilkuna (1959; see also V. Voionmaa 1925 117), Finland's present provinces are again "ethnographic" and "historical", without administrative features, because they do not correspond to the regional divisions of government or church administration.

Häme, as part of the oldest stratum of provinces, is a good example. According to certain scholars it originally extended from "the salty sea to the salty sea" (e.g. V. Voionmaa 1913 13; see however Suvanto 1957 240–241) and it was reduced over the centuries to the historical province of Häme through various ecclesiastical, political, administrative, economic and settlement-related factors (e.g. M. Kerkkonen 1971; Niitemaa 1955 201–214).

The province system, hillforts and topography. Evidence for a politically defined ancient province of Häme has been seen a specially formed military system capable of both defensive and offensive action, as indicated by the numerous hillforts and historical sources on eastward expeditions from Häme and attacks on the area by the Karelians (e.g. V. Voionmaa 1925 121; K. Vilkuna 1959 72). It has also been assumed that the forts along Lake Vanaja were built according to a uniform plan. It has even been suggested that Finland's largest hillfort, Rapola in Sääksmäki which is part of the chain, was the central

fortress of Häme (e.g. Ailio 1921a 45–46). The geographical distribution of hillforts has been used as evidence of a boundary between Häme and Satakunta and also as an indication that the province of Satakunta dates back to prehistoric times (Salo 1967).

Unto Salo (1967 100–104) suggests that the main reason for the emergence of the province system was the need for organising defence. A situation of constant outside threat may have led to the creation of a military and judicial-administrative organisation, i.e. a province. Salo has pointed to the small number of hillforts in Satakunta. According to him, most of the forts are small and reflect random needs for organising defence. The forts are so isolated that they cannot be assumed to have formed any kind of defensive system. In Salo's opinion it is of interest that the hillforts of Lempäälä and Vesilahti adjacent to the border of the province of Häme are both typical refuge forts, situated c. 10 kilometres from the nearest settlements.[10] The defence of these sites involves completely different principles than that of the forts on the Häme side of the border, nor can they can assumed to have belonged to the same system of defence as the latter. In Salo's opinion, the forts in question show that the southern boundary of the parishes of Vesilahti and Lempäälä was also the boundary of a system of defence, i.e. a province boundary, at the time when the forts were built.

Fig. 47 shows clearly how the forts of Häme and Upper Satakunta are clearly concentrated on the boundary of relief zones 2 and 3. In most of Satakunta, which is outside the above area, topographic conditions for the building of forts were poor. Only two forts are known from the remaining area, and one of them is on an island in the Kokemäenjoki River.

Because of visibility from one fort to another, it has been assumed that the hills and ridge-tops of the Lake Vanaja region formed a signalling system where fires were lit or smoke-signals were given when an enemy approached. The signalling chain was tested in 1934. Although visibility along the chain was suitable, the signal-fires could not be seen along the whole line (Kivikoski 1955a 74).[11] Working with place-name data Jouko Voionmaa (1945 & 1959 514) has added to the fort chain a signalling system covering the whole of Southern Häme.

The central areas of settlement of the province of Häme form a chain along Lake Vanaja. Running alongside the lake is a chain of easily fortifiable ridges and hills of bedrock. Accordingly, the chain of forts along Lake Vanaja is not necessarily a provincial system of defence, but the result of exceptionally good topographic conditions.

Hillforts and silver hoards. Salo also discusses hoard finds, as they are usually seen as related to conditions of war and unrest. According to him, the province boundary indicated by the hillforts finds support in the geographic distribution of 11th-century silver hoards (Salo 1967 104).

Hoards of silver objects have been found in Western Finland in Satakunta (1), Finland Proper (11) and Häme (16). The distribution of the hoards of Finland Proper is especially interesting, as there are no finds from the region of Kalanti (Salo 1967 107). According to Salo, the boundary of the area with no hoard finds in Finland Proper also marks the boundary of the original part of Finland and the region of Kalanti.

Salo maintains that also in Häme the hoard finds form a clearly demarcated area of distribution. The hoards from along Lake Vanaja and the Hauho

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[10] Of the hillforts listed by Salo (1967 102), the following are excluded from this study: Hiukkasaari, Kaukola, Tyrvää and Talosenlinna, Ikaalinen. Included in this connection, but not mentioned by Salo, are the Linnankallio hillfort at Kaakila in Vesilahti and Räätikäsvuori in Huittinen, which cannot be regarded as an outlying fort and therefore contradicts Salo's argument.

[11] Relatively reliable information on war-time fire-signalling is available form historical and ethnographic sources in Finland and neighbouring countries (Äyräpää 1955; Arbman 1943). The use of sound-signals has also been suggested (Heinonen 1971 40–49). The information, however, is in conflict with the results of experiments, which have been carried out also in other regions than along the chain of forts on Lake Vanaja (Luoto & Huttunen 1987).

Fire-signalling is a topographic phenomenon which is not adaptable to conditions of settlement or the forts concerned. In covered terrain villages and dwellings are where they happen to be located, while fire-signalling requires high hills with possible long distances between the settlements and the signal posts. This, in turn, decreases the effectivity of maintenance and signalling. The signalling system has to be continuously manned in both summer and winter, and such a system of maintenance in sparsely settled areas and in peace-time conditions – especially in winter when warring expeditions were more common – does not seem probable.

Despite the conditions of manning signal-posts, factors of climate may prevent signalling or form an unpredictable source of disturbances. Fog, snow, rain, clouds and winds can ruin the whole operation, especially as conditions may vary along a signalling chain. Furthermore, provisions must be made for bright and cloudy weather and night-time conditions. In the day-time smoke was required and correspondingly light in night-time conditions. These signals are not necessarily produced by the same fire, and at least two fires were needed. The use of fire-signalling is also impaired by the fact that it is a static system, which cannot be adapted to conditions of crisis. In the light of methods of warfare, it does not appear to serve its intended purpose. The enemy aimed at surprise attack, which was also the intention of the defenders. Why should a defensive force planning a counter-attack use smoke- and fire-signals and thus let the enemy know it had been observed?

The failure of the experiments is not surprising and it is even possible that signal-fires were not even used in prehistoric times. Half of the highest crest area of the Tenhola hillfort in Hattula has been excavated. If large signal-fires had been burned at the site, it can be assumed that the remains of them would have extended into the excavated part of the site. However, no such remains have been uncovered.

water route form a dense chain of finds, but they extend only to the Satakunta border in the same way was the hillforts. The only exception is the hoard find of Jara in Lempäälä, which is in Satakunta some ten kilometres north of the border.

Salo points out that the caching of hoards is a "Finnish" or "Häme" phenomenon, while their absence from the archaeological record is a feature typical of Satakunta and Kalanti. Salo goes on the discuss the relationship of the original distribution of the hoards and the pattern of finds, pointing out that there were suitable conditions for the custom also in the areas without hoard finds. These areas were inhabited and grave finds show that silver was also used. Thus, the absence of hoards is not only apparent, but the result of differences in customs in the areas in question, in turn the result of different conditions. Hoards may or may not have been cached for religious reasons. Salo, however, rejects this possibility and suggests as an explanation danger from outside, as indicated by the hillforts and historical data. The region of Satakunta was not adjacent to the eastward route and it was also outside the sphere of influence of Novgorod (Salo 1967 104–119).

The geographic distributions of hillforts and silver hoards display, however, a contradiction, also noted by Salo. There are hillforts in Kalanti, but no silver hoards. Although Salo (1967 100) claims in an earlier part of his article that hillforts were mainly built in the latter part of the Iron Age, he now observes that "because the age of the forts of Kalanti is not known, they cannot be proven to have been built or used in the 11th century." (Salo 1967 114).[12]

In accordance with traditional views, Salo regards war as the only explanation for the hoards (see also Salo 1985 141). Recent studies have stressed, however, the common nature of the practice of caching hoards and its varied reasons in the past, of which war was only of a number of economic and trade-related factors (e.g. P. Sarvas 1968; 1970; 1981; M. P. Malmer 1973; Herschend 1979 & 1980). Sarvas (1970 116) observes in a somewhat pessimistic vein that it is much easier to explain coin finds with historical sources than to use them as historical sources and as the basis for historical conclusions.

Tuukka Talvio (1987 96) gives an example of the limitations of the traditional approach. Applied to the 9th and 10th centuries, it would suggest that the whole of the Finnish mainland lived in peaceful conditions, while the Åland Islands were a troubled area, as almost all of the significant coin finds of the period are from the latter. Talvio points out that it is obvious that the finds from the Åland Islands are primarily an indication of commercial activity associated with the eastern route of the Vikings. Also the inhabitants of the mainland engaged in trade prior to the 11th century, but silver does not appear to have been as important as in later times. Talvio also mentions that there are no coin hoards of the 12th or 13th centuries from the mainland of Finland. This must be especially kept in mind in the case of Häme, which is known to have been an area of varied military operations. Accordingly, Talvio feels that the absence of hoards from Satakunta in the 11th century is in no way exceptional.

In discussing the economic significance of hoards a starting point is provided by the following remarks by P. Sarvas (1970 147): "Coin hoards are found mostly in areas which in the period in question still lived in what was mainly a barter economy. In these parts coins from outside the area were a measure of wealth that could not be used in everyday life and were gathered in hoards, often deposited in the ground." It is possible that the area without hoard finds was more prosperous and that the capital formed by the coins could be put to effective use.

In addition to hoards, material related to trade and the weighing of silver includes scales and weights. In discussing the conditions and prerequisites for the caching of hoards in Satakunta, Salo (1967 112–113) points to the interesting fact that cemetery finds from the region include parts of at least eleven scales, which is more than from the rest of Finland. The finds also include over a hundred weights. There is only one find of scales from the historical province of Häme.[13] Archaeological research in Satakunta and Finland Proper has been approximately of the same level of intensity, and the figures are thus comparable. However, the number of scales from Häme is clearly smaller and it cannot be explained by a smaller degree of archaeological research in the region. The number of scales supports the claim, referring the lack of hoards, that the area of Satakunta was affluent and economically developed in relation to neighbouring areas (Taavitsainen 1981 126; cf. however Talvio 1987 96; Masonen 1989).

Kalanti, where no hoards have been found, must still be discussed in this connection. The area of Kalanti, as defined by Salo, mainly covers the present parishes of Kalanti and Laitila. A set of scales and fifteen weights have been found at the Kalmumäki cemetery in Kalanti and six weights have been re-

[12] Salo also mentions finds of Early Metal Period ceramics from the Hautvuori hillfort in Laitila.

[13] Accoring to P. Sarvas (1964 34) a total of 24 scales or parts of scales have been found in Finland. Thirteen of them have been found in Satakunta and eleven from other parts of Finland. Some of the finds may of course be older than the 11th century, which is also pointed out by Salo. The number of finds of scales and weights has no doubt increased since Sarvas's study (Kivikoski 1973 823–825 mentions two finds of scales from Häme; see also Lehtosalo-Hilander 1982b 66–72 & 1982c 75).

covered from the two cemeteries of Laitila (P. Sarvas 1964). The figure is by no means exceptionally large. It is, however, still possible that despite the small number of scales finds even in this area, the lack of hoards was due to more developed conditions caused by trade. The nature of this activity was possibly different in this area, which was the "economic region" closest to Birka, than further afield in the Kokemäenjoki River valley (Taavitsainen 1981 126).[14]

There are no grounds for defining a province boundary in the manner of Salo on the basis of only two groups of antiquities interpreted as signs of restless times. For reasons of topography, the distribution of hillforts cannot be used as the basis for defining the boundary, not can a chain of forts be seen as a basis for outlining a system of defence. Furthermore, war was not the main reason for caching hoards.

The areas of Finland Proper and Häme, brought under a system of organisation by danger from outside, as argued by Salo, leave between them an area lacking the main feature of organisation. In spite of this, Salo is prone to define the area of Kalanti and Satakunta as an early province, or more specifically as three provinces (Kalanti, Lower and Upper Satakunta). With reference to Kivikoski (1937), Salo shows that Kalanti had contacts with Birka and the Lake Mälar region of Sweden and that it also had economic interests in Satakunta and Häme. Contacts with the Lake Mälar region are indicated by the name of Satakunta (with the prefix *sata* meaning hundred), which Salo regards as a translation of the Swedish *hundare* (on criticism of this point, see Masonen 1988).[15] Salo sees the lack of hoards as an indication of peaceful co-existence and relatively peaceful relations between these provinces and the Lake Mälar region, which were based on mutual agreement. In his discussion of the emergence of the province system, Salo finds "violent" reasons for organisation and, in connection with his main subject of study, concludes that organisation was based on mutual agreement and did not involve the element of violence, which again is in conflict with his starting point.

Rapola as the central fort of the tribe of Häme. Also the size of hillforts has been seen as a basis of province-type organisation.

The hillfort of Rapola in Sääksmäki is of exceptional dimensions among the hillforts of Finland. It covers an area of c. 5.2 hectares and the encircling wall runs a total course of 985 metres. Ailio (1921a 45–46) suggests that Rapola may have been the central fort of the tribe of Häme. "The size of the fort of Rapola with its considerable requirements of maintenance as well as the large number of dwelling remains suggest that it was no ordinary village fort." This observation apparently became the basis for oral tradition concerning the status of Rapola as a tribal fort and for repeated – albeit cautious – similar comments in published studies (e.g. Jutikkala 1934 78; Tallgren 1931 330; K. Vilkuna 1959 72 & 1970 4; Hirviluoto 1987 29; Schulz 1989 18). A background factor can also be found in the central fort sites of Estonia (*maalinnad*). However, a number of problems are entailed in using the Estonian situation as a direct model for Finland (see p. 155 and 147).

An estimate of the time and labour involved in building the fort of Rapola provides a basis for reviewing its possible role in the province. As background information we may quote Engström's examples of extensive fortification work. As pointed out above, the construction of the two-kilometre stone wall of the 112.5-hectare fort of Torsburgen was estimated by Engström as having required the labour of 100–200 men for approximately two months. A further example is Alesia of the time of Caesar, which was a 20-km long rampart with moats, assault constructions, towers, camps and earthworks. The construction of the fort is estimated to have taken the Romans a couple of months (Engström 1984a 72–76 and cited literature).

In the light of the above examples, the fort of Rapola with a perimeter of less than a kilometre was a minor task. It involved the levelling of the easily shovelled sandy soil of the edge of ridge and the steepening of the sides for the log breastworks, the material for which was available at the site. Where stones and rocks were available, e.g. in the northwest part of the fort, they were also used.

The architect Seppo Rintala has estimated the amount of labour required for erecting a log breastwork around the perimeter of the fort of Rapola at 3,171 working days (Table 19). This is a crude estimate, not including the construction of possible obstacles, hearths and buildings, among other features. Accordingly, the breastwork could have been erected by 10 men in 317 days, 15 men in 211 days, 20 men in 159 days, 25 men in 129 days, 30 men in 106 days, 40 men in 79 days and 50 men in 63 days. In this perspective, the task does not appear to be as immense as previously imagined.

It is difficult to estimate the number of troops or

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[14] The explanation is, however, contradicted by the fact that hoards have been found at Birka.

[15] The explanation of a translated loan-word has been especially popular among historians. The name of the province has been regarded as clear evidence of the influence of Uppland on Finland, or at any rate of familiarity with the society of Uppland. Linguists have taken a much more cautious view of this theory. In a recent study, Olli Nuutinen (1989) has convincingly argued that the origin of the name as a translated loan-word or its formation on the basis of an entity of a hundred units is highly unlikely. Nuutinen links the name to a Germanic loan-word meaning shore or landing place.

defenders required at the Rapola hillfort. A rough estimate can be obtained by assuming that defenders had to be placed at intervals of 10–20 metres with larger numbers at the sections of wall.

The Lake Vanaja region near Hämeenlinna provides a good comparison to the Rapola hillfort. In this region there are three certain cases of hillforts within a radius of five kilometres. Although two of them are above average size, their total area is still not equal to that of Rapola. As a task, however, the building of fortifications at three different locations may have been equal to the work carried out at Rapola. However, these closely situated forts have not inspired speculations of tribal centres such as Rapola (cf. however K. Vilkuna 1970 6).

On the basis of estimates of labour, the Rapola hillfort did not require province-wide co-operation. A smaller group sufficed, perhaps only a fort association involving a somewhat larger body of men than in normal cases.

A possible explanation for the Rapola hillfort may be the fact that it is located at some distance from the boundary of profile zone 2. Suitable ridges or hills were no longer available in the area in question, as was the case at the boundary. This made it necessary to fortify a ridge-top site larger than normal. However, fortifying the site would hardly have been an overwhelming task for a fort-building association formed among the local populace (the minimum estimate of population in Sääksmäki in 1634 is 1,154 persons).

Rapola is apparently the only hillfort in Finland that could have served as an actual refuge fort. It had room for a large number of people and livestock, for which water was available also in snowless times from the depressions on the ridge. For reasons of security, it is not probable that all of the livestock and the local inhabitants were gathered at one site and if the locality was under attack this would have been impossible over long distances. A refuge fort was hardly needed, as it was senseless to gather everything of value in one place where it was under the most certain threat of destruction. Nor was it feasible in practical terms to gather at Rapola from all parts of the province of Häme and thus endanger the whole of the property and livestock of the tribe.

On the other hand, it must be taken into account that the bottom parts of the ridge depression were good pastures also in times of peace. The fortified area could well have been used as an enclosed pasture in peacetime conditions. Two uses could thus have been served at the same expense, and Rapola is thus a potential example of the multifunctional nature of hillfort sites.

Julius Ailio (1921a 45–46) is in fact cautious in his estimates. He points out that Rapola was not a central fort, at least in the sense that it could have provided shelter and protection to a large area. This was due to long distances and the fact that attack usually came by surprise. Ailio also notes that the nearest forts are as close as Tyrväntö, Lempäälä and Hauho. On the basis of the above, it is difficult to imagine that even a larger community would have continuously manned the ridge-top with an effective body of troops. This would have led to the formation of occupation layer as a sign of permanent settlement, which has not been observed in excavations despite finds of house-floors. It has also been suggested that work of the fort was never completed.

According to Ailio, the status of Rapola as a central fort in a political sense depends on whether the adjoining locality had a leading role with respect to other areas. This would also require information on whether the hillforts of Häme were built according to some uniform plan, as indicated by a fire-signalling system. The existence of such a system would thus suggest a jointly maintained fort system. Ailio suggests that the leadership of such a system was at Rapola.

Factors of topography, experiments in fire-signalling and the estimates of the amount of labour required at Rapola do not provide support for Ailio's thesis. Nor does an analysis of routes and networks of communication support any suggestions of a cen-

Table 19. Construction time required for the log breastwork of the Rapola hillfort in Sääksmäki. The assumed length of the wall is 985 metres.

Task	Amount of material or work required	Working days
Foundation work		
– gravel	1,926 m^3 [1]	387 wd[2]
– stones	100 m^3	20 wd
Felling of timber	2,450 cuttings[3]	41 wd[4]
Erection of the breastwork	9,259 metres	2,723 wd[5]
		3,171 wd

The breastwork could have been built by 10 men in 317 days (15 men in 211 days, 20 men in 159 days, 25 men in 129 days, 30 men in 106 days, 40 men in 79 days and 50 men in 63 days).

[1] Three profile sections of J. Voionmaa's excavations of the wall give an average amount of 2.06 m^3 per metre of wall. In the northwest part of the site the wall is of stone and its length has later been estimated at 50 metres with 100 m^3 of stone.

[2] Transport of gravel is estimated at 5 m^3/wd. According to Engström (1984a 78) loose soil can be transported at a rate of 1 m^3/1.3 h (9.23 m^3/12 h). It is assumed, however, that the gravel at Rapola was not "loose", and Engström's figures are correspondingly raised. On the time required for the transport of stones see footnote 2, Table 18.

[3] See footnote 3, Table 18.

[4] See footnote 4, Table 18.

[5] See footnote 5, Table 18.

tral role for Sääksmäki in the province (Masonen 1989).

A three part division of late prehistoric Finland is indicated mainly by brooch material. The western area consists of Finland Proper and Satakunta-Sääksmäki. Häme (Sääksmäki excluded) forms an area where the western and eastern cultures mixed and the eastern area consists of Savo-Karelia. Häme is further divided into western and eastern parts.

Various regional divisions can be suggested on different grounds and they provide interesting comparisons with the areas of material culture (cf. Masonen 1989 118–119).

In geographical terms, Finland can be divided into several areas (e.g. Granö 1932). Topographically, Häme consists of the regions adjoining Lakes Vanaja and Päijänne and their catchment areas, which correspond mainly to the division of material culture.

Divisions according to dialect areas can also be presented (Rapola 1969). Their comparison with the archaeological record is, however, difficult, because dialect areas can reflect with any certainty only the situation when they were defined. It is possible and even probable that they contain older strata, but it is difficult to establish chronology. At any rate, the area of the Häme dialects of Finnish extends into Satakunta and is larger than the historic province of Häme or the area of Häme outlined by the material culture of the Crusade Period. On the other hand, the northern parts of Häme belong to the area of the Savo dialects, which however spread into the region in historically documented times.

The distribution of hoards does not correspond to the geographical areas of brooch types. In the area of western types hoards were either cached or not cached. The boundaries of the hoard areas are however of interest in this connection. The distribution of hoards in Häme ending at the boundary of Satakunta, as pointed out by Salo, can be extended into Satakunta. To the northwest of Satakunta only the Jara hoard in Lempäälä was found, which remains an exception proving the rule on the Satakunta side of the boundary outlined by Salo.[16] On the other hand, the distribution of hoards extends into Savo-Karelia past the eastern boundary of Häme.

Compared with the prehistoric provinces, the brooch areas do not display convergence with Finland Proper and Häme is divided into two parts. On the other hand, Savo-Karelia corresponds to prehistoric or ancient Karelia. Häme corresponds mainly to the historical province of the 16th century, and only Sääksmäki is outside the area.

Despite later criticism, V. Voionmaa's (1913) views on the prehistoric origin of the Medieval regional division of Häme are compared with the brooch-type areas. According to Voionmaa, the three counties (Fi. *kihlakunta*) of Häme, Sääksmäki, Hattula and Hollola, were based on ties dating back to prehistoric times. The county of Hollola corresponds to the East Häme brooch area, with the exception of the environs of Hauho. Hattula mainly matches the West or Central Häme area and Sääksmäki belongs mostly to the West Finnish penannular brooch area.[17] A problem in the case of Sääksmäki and Upper Satakunta is that the brooch material from these parts does not display any clear differences with that of the other parishes of Satakunta.

V. Voionmaa (1913 26) presented a further division of the counties into five greater or original parishes: Greater Sääksmäki, Greater Vanaja, Greater Hattula, Greater Hauho and Greater Hollola. In the light of present material, Greater Sääksmäki is part of the undivided West Finnish area of penannular brooches, while Greater Vanaja, Greater Hattula and Greater Hauho correspond to the area of Central Häme. Greater Hollola covers East Häme with the exception of the area of Koski, which can mainly be linked to West Häme.

The most interesting comparison, however, is provided by the economic and communication areas outlined by Jaakko Masonen (1988 & 1989). In the case of Häme these consist of the Lake Päijänne and Lake Vanaja regions which in turn correspond the two brooch areas outlined in Häme.[18] On the other hand, Masonen's regional division splits the uniform area of penannular brooches into four areas of economy and communication: Upper Satakunta-Pirkanmaa, Lower Satakunta-Kalanti, the Aurajoki River valley and the Uskelanjoki River valley. It was pointed out above that the area of small penannular brooches may be divided into smaller units. On the other hand, there is no correspondence with respect to the hoard finds.

A further economic phenomenon to be considered is Medieval church taxation, which provides indirect evidence of the Medieval economy in general (Pirinen 1962). Finland had two separate systems of procedures of church taxation laws: grain tithes in the coastal regions and Finland Proper and taxation

[16] A hoard has also been found on Selkäsaari island in Sääksmäki, but the site is in the middle of Lake Vanajavesi and cannot be directly linked to Sääksmäki.

[17] In addition to Sääksmäki, the deanery district also included Saarioispuoli, Akaa, Kylmäkoski and Pälkäne. An oval tortoise brooch has been found in Akaa. An oval tortoise brooch and a penannular brooch have been found in Pälkäne. These areas are accordingly linked to the southeastern region and not to the northwestern region.

[18] Sääksmäki is also in this connection a problematic area and apparently a differentiating factor.

based on mutual agreement in the inland regions. The former is further divided into two main groups: Finnish and Swedish law. This was a form of taxation applied to arable farming, and a different type of economy prevailed in the inland regions. In the latter parts of Finland there were further differences between the taxation of the inhabitants of Häme and Karelia. Four systems of tax laws were applied in the area of taxation based on agreement, each specific to the areas of Kyrö, Häme, Savo and Karelia. The Kyrö and Häme systems were almost identical. According to Pirinen (1962) the system applied in Häme was younger and was a modernised form of the system applied in Kyrö. Taxation based on mutual agreement was applied in areas where arable farming was complemented by long-range utilisation of wilderness regions. Karelian tax law applied in the area of transhumant slash-and-burn cultivation, where also the system of Savo applied. The latter was, however, based more on the example of the Häme system, albeit with a number of changes.

Information on Medieval taxation does not correspond completely to Masonen's regional division. The area of Kyrö tax law covered not only Upper Satakunta, but also parishes where grain tithes were collected (e.g. Kokemäki) and the area of Häme tax law is divided into two parts. The remaining regions of Finnish and Swedish law fall into three areas of economy and communication.[19] On the other hand, the Medieval history of taxation displays changes from one legal system to another according to need, which makes it difficult to compare taxation systems with Masonen's regional division or the areas of material culture.

Because of topographic and strategic reasons, the above divisions cannot be compared with the locations of hillforts. The hillforts, however, may provide information on a much-disputed boundary. In several connections, V. Voionmaa (1912 159–160; 1946a & 1946b) stresses that Sääksmäki and Upper Satakunta formed a single region of settlement and property rights dating back to prehistoric times. Evidence of this was seen in the interspersed ownership of wilderness tracts and the fact that at the advent of modern times the church parishes of the Sääksmäki region belonged to the same deanery district as the parishes of Upper Satakunta. Also the combinations of brooches in the finds link Sääksmäki to Upper Satakunta and the whole of the West Finnish cultural sphere. However, the contemporaneity of brooch distributions and the boundaries of ecclesiastical administration cannot be demonstrated. It is nevertheless interesting that the old boundary of the deanery district corresponds to the northwest boundary of the area of distribution of the oval tortoise brooches. Furthermore, Rapola, Finland's largest hillfort, is also on this boundary, although the most plausible explanation for its construction is based on topographic factors.

The division of material culture, as the starting point of the survey, reflects the various cultural areas, within which contacts and interaction were pursued to a greater degree than with other areas These regions may indicate areas of marriage networks (cf. the term *heimo* as implying kinship through marriage). The women of the same marriage network had similar trousseaux with similar brooches. Similarities in brooch fashions are a reflection of close contacts, while fashion was not only conservative and based on tradition, but also open to new features and capable of transforming them. Thus, we may not disregard areas of uniform fashions. They reflext not only old ties of affinity but also new influences via trade and other cultural contacts. The phenomena in question may have been of very short duration. Furthermore, they area difficult to compare with later regional divisions, as the chronology involved entails a number of source-critical problems. The points of comparison may be completely or partly contemporaneous, or they may represent completely different chronological strata.

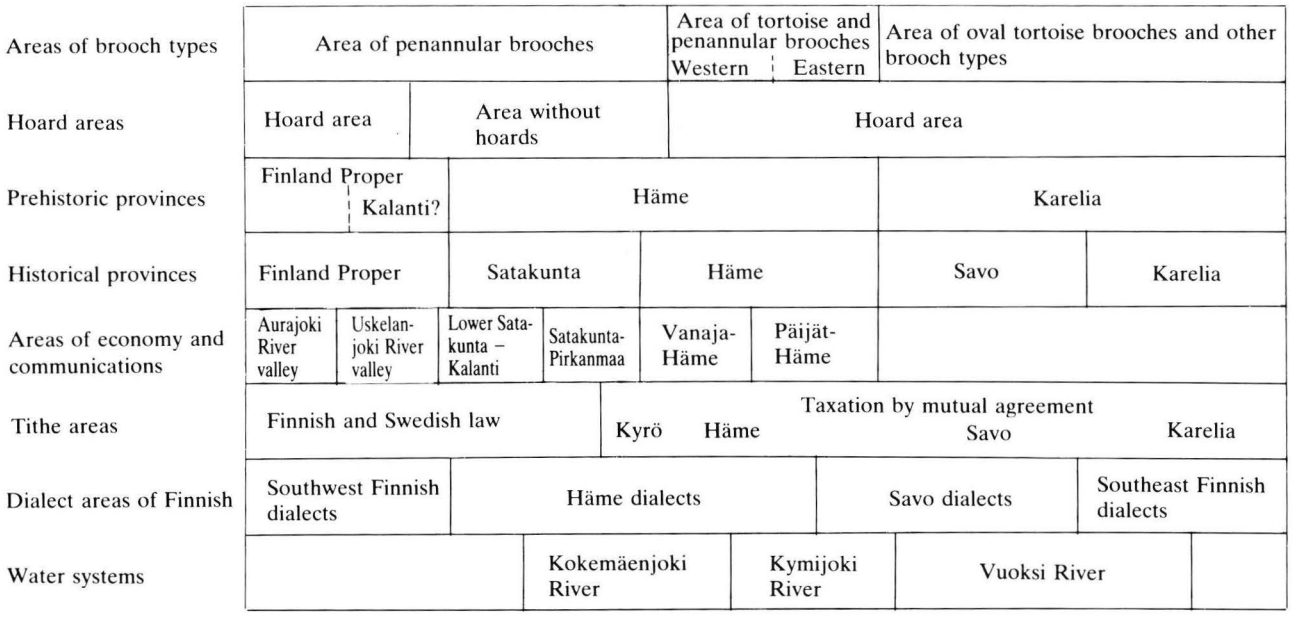
Comparisons of the above regional divisions appear to be confusing (Fig. 50). This impression, however, is due to the fact by choosing different cultural and material phenomena, areas are created which do not necessarily coincide. The archaeological, economic and administrative divisions demonstrate the fact that regional divisions were in a continuous process of adaptation to new situations and developments.

In spite of the existence of regions and areas indicating various forms of interaction and co-operation, there were probably no late prehistoric administrative organisations on the provincial level, any more than there were organised tribal communities. The existence of such organisations is in no way supported by the available data on hillforts. In fact, the large number of hillforts, their clustering in certain localities, the small amount of labour required in their construction, their often peripheral location and the fact that they did not form any kind of defensive system all show that they belonged to a time devoid of any broader degree of political unity (cf. Nylén 1962 97).

Only the fact remains that various forms of organisation existed in late prehistoric times and that ethnic and tribal boundaries were relative and in a continuous state of flux. They are hard to identify with archaeological means.

[19] Actually four areas, as Masonen regards Karjaa as a separate economic area. It is not discussed in this connection, as there are no Crusade Period finds from the area.

Fig. 50. Various regional divisions of Finland



6.7. Hillforts and the conquest of Häme

East-west conflicts indicated by historical sources have brought forth the question of possible major border crossing through Häme.[20]

The historian Jalmari Jaakkola accepted the possibility of a border predating the Treaty of Schlüsselburg, suggesting that it extended northeast from the end of Halikonlahti Bay to Lake Päijänne and along the Vetelinjoki River to the Gulf of Bothnia (Jaakkola 1926 13–44). This view has been sharply criticized (e.g. Niitemaa 1955 205–207; Gallén 1969 207). There is no archaeological support for this claim.

Martti Kerkkonen (1962) has interpreted the old boundary in Häme of the three counties, as mentioned in sources of the 15th and 16th centuries, as a border between Sweden and Novgorod which had formed by the beginning of the 14th century at the latest, running from "the salty sea to the salty sea". The border began at the Kymijoki River, cutting off the county of Hollola to the southwest and continuing to Lake Päijänne, from where it continued to the sea.

Seppo Suvanto (1973b; M. Kerkkonen 1973; Suvanto 1974 & 1986 50–52) has presented convincing criticism of Kerkkonen's theory. There is no archaeological support for Kerkkonen's views, and the suggested border passes through the West Häme area of oval tortoise brooches.

Suvanto (1986) has recently presented his own views regarding the course of the border in Finland between Sweden and Russia prior to the Treaty of Schlüsselburg. Suvanto's starting points are realistic. He sees no imperative need to divide Häme between Sweden and Russia. A different matter is the possibility that Novgorod may at times have had control over the whole of Häme in the same way that Sweden exacted taxes and tribute from Western Finland long before the time of Earl Birger. Suvanto underlines that such events did not require agreements or the demarcation of borders. He also stresses the temporary nature of the possible taxation of Häme.

The situation was different in Karelia, which is mentioned in sources as an ally of Novgorod in 1143 and on several occasions later. Co-operation and possibly a tax-based relation were continuous with the exception of the 1260s and 1270s when Karelia tried to break off from Novgorod. This stage was, however, brief. Suvanto concludes that the pre-1323 border between Sweden and Russia is to be sought at the points of conflict between the areas used by Häme and Karelia, which had become the outer periphery of the spheres of influence of Novgorod and Sweden by the mid-13th century. Further points of departure are the interests of the Karelians and the Novgorodians and especially information on routes into Häme and the means of securing access.

Suvanto traces his suggested border on the basis of settlement and wilderness-utilisation history, oral

[20] It has also been suggested that already before the third crusade to Finland (1293) a frontier of some kind had formed between Sweden-Finland and Russia, running from the parish of Johannes on the eastern shore of the Bay of Viipuri to the southern shores of Lake Saimaa (Rosén 1945; Paloposki 1966).

tradition and place-names retaining the tabu-like nature of borders. Also presented are place-names of Karelian origin.

According to Suvanto, the Russians often came into Häme by crossing the Kymijoki River or by advancing from the coast of Uusimaa to the west of the Kymijoki River. In the same period (c. 1040–1240) Karelian cultural influences were prevalent in Häme, but no actual Karelian colonisation or settlement can be proven. The Russians had in some way secured their route to the mouth of the Kymijoki River and possibly at points further north where the river was crossed. It is also possible that the Russians occupied hillforts, in the vicinity of which they settled Karelians. The boundary of the spheres of utilisation and interests would thus have been in the regions of the Kymijoki River and in the areas to the south of Lake Päijänne. On the other hand, we may also assume that the Karelian influence resulted from settlers fleeing increased taxation in the 12th century.

In the Lake Päijänne region the border follows a staggered course.[21] The present areas of Asikkala, Padasjoki and Sysmä were controlled by the inhabitants of Häme, while already Kuhmoinen and Jämsä show signs of regional divisions between the people of Häme and the Karelians. Leading to these regions is an unbroken water route from the heartlands of Savo to Orijärvi at the boundary of Joutsa and Luhanka, with a portage passage to Lake Hauhajärvi in Luhanka and from there to Tammilahti Bay on Lake Päijänne (see map, Suvanto 1986 55). According to oral tradition, the Jämsänjoki River marked the border between Finland and Russia. From this location Suvanto traces the course of the border with *pyhä* (sacred, holy) place-names to Vaajakoski and Lake Pyhäjärvi in Äänekoski. In the north the Perhonjoki or Vetelinjoki River, traditionally regarded as the old border, marked the frontier. The Karelians had access to the river either via Saarijärvi or via Viitasaari further to the north.

Suvanto suggests that the boundaries of spheres of wilderness-utilisation interests were in no way long uniform lines, and that they formed in places where conflicts were marked and continuous. The question arises, however, of possible jointly utilised areas, as in later times in Lapland. Suvanto dismisses the possible existence of an unbroken and uniform border between Finland and Karelia, supported by Novgorod, and he accepts the theory of an expansion of the Karelians in the Crusade Period to the west or northwest. At least in Southern Finland, this expansion would have had the support of Novgorod. Suvanto points out that in recent years also Kirkinen (1976 12) and Vahtola (1980 97–99, 321, 387) have presented similar views.

In a much earlier connection, V. Voionmaa (1924a 13), with reference to place-names, suggested that Karelian power or even the governmental authority of Novgorod extended into the Lake Päijänne region for some time. Terho Itkonen (1980 13–14) has observed that the Southeast Häme dialects of Finnish contain eastern strata of such a distinct nature that the area in question must have been subjugated to eastern rule at some stage.

Of interest in the context of the above data is the discussion concerning history of the church of Hollola. Iikka Kronqvist, who was responsible for the restoration of the church regarded it as an exceptional case among Finland's Medieval churches. In Kronqvist's opinion, this building, originally one of the country's largest parish churches with exceptionally rich decoration of the interior, cannot be regarded in church-political terms as an ordinary parish church but as the representative of the Catholic church at the frontier of a different faith (Kronqvist 1937 88–89). Juhani Rinne presented sharp criticism of Kronqvist's views (Rinne 1938a-c; Kronqvist 1938a-b). Lars Pettersson (1955 592–594) has later observed that Rinne's polemic was in many respects unfounded, but also points out that despite their interesting aspects, Kronqvist's hypotheses cannot be regarded as convincing. Antero Sinisalo (1985) has recently taken up the themes of this discussion, pointing out that no definite answer can be found. The only certain fact is that the church was a more impressive building than usual for a large parish. On the other hand, Sinisalo (1985) does not exclude the possibility that the parish of Hollola could have maintained the tradition of an outpost of the Catholic faith, although the actual situation had changed when the church was built.

Of interest in this connection is the fact that the Päijät-Häme region, the eastern part of Häme in terms of material culture, corresponds precisely to the area discussed above. The regions of Lake Vesijärvi and the Kymijoki River display the strongest eastern influences in the archaeological record of Häme. Also to be mentioned is the Kapatuosia hillfort adjacent to the church of Hollola where the finds included coin fragments displaying a Karelian-type composition (Talvio 1982). It must be stressed, however, that available cemetery finds are still few both in Hollola and Nastola. The material displays both eastern and western features as well as ones particular to Häme.

[21] The course of the border may explain why individual find locations and cemeteries in the Päijät-Häme region display features particular to the Lake Vanaja region, Upper Satakunta and Savo-Karelia. The areas may have been utilised by the people of Häme, the Savo-Karelians and the people of Upper Satakunta. The present brooch-type pattern was thus a summation or average of these interests. The small number of finds precludes further speculation on this point.

Unfortunately, the brooch material from the rest of Päijät-Häme is even smaller, which makes it difficult to review Suvanto's views in closer detail. Oval tortoise brooches have been found only at Padasjoki, and they are completely lacking from the finds of Kuhmoinen, Sysmä and Jämsä. Small penannular brooches have been found only in Kuhmoinen.[22] Because of the large number of areas from where no brooches have been found, it is not possible to comment upon Suvanto's theories, according to which eastern influences were not as marked in the region of Sysmä as in parts further to the south, and were again more evident around Jämsä. However, other eastern artefacts are not unknown in this area.

Possible chronological differences between eastern and western material must be reviewed in order to identify the beginning and end of eastern influences and their possible changes of intensity. Opportunities for this are few, for there are limited prerequisites for a detailed chronology. In connection with the brooches, a technical-genealogical-typogical approach may provide new perspectives (see p. 96).

In the Crusade Period the historical province of Häme thus included an area which was orientated towards the east. Its western parts were perhaps under a greater degree of western influence, while the eastern parts maintained relatively intensive contacts with the east, displaying a correspondence with the eastern area of interest as outlined by Suvanto. It may be possible that the latter area was in a closer tax-based relationship with the east than the western part of Häme.

Problems related to the conquest of Häme. The question of the state border is closely tied to that of the so-called conquest of Häme. It is generally maintained that Finland Proper adopted Christianity and became part of the Swedish realm in a gradual manner without dramatic events (e.g. Anthoni 1955; Klami 1981).

The expedition of Earl Birger into Häme in 1238 or 1239 (Gallén 1946)[23] may, however, be an example of brutal conversion by the sword. Related to this event is the papal crusade bull, in which the actions of Bishop Thomas are described. Thomas and his predecessors are said to have converted the tribe of Häme to the Catholic faith and placed priests among the people of Häme. The people of Häme are now said to have reverted to paganism because of the influence of enemies of the cross living nearby and to have destroyed the planting of the congregation of God together with some barbarians. The bull also contains an account of the cruelty and brutality of the people of Häme. The mission is undertaken and it ends in the victory of the Swedes and the building of the castle or fort of *Tauestahus* in Häme. The chronicler states in exultant terms:"*thet sama land var alt cristith; jag tror at ryzka konungen mistit*" ("This land was all Christian; I believe the Russian king lost it").

The chronicle of Erik has been the subject of much source-criticism. For example, Lind (1977 295) suggests that the above passage was mainly a reflection of the political realities of the time of writing. The problem of the eastern border had, however, existed prior to these events. Despite the obscurity and/or changes in many of the details of the mission or expedition of Earl Birger in the span of less than a hundred years, it seems probable that its main purpose was still remembered.

According to G. A. Donner's (1930) studies on the baptism of the people of Häme, historical conditions exclude the possibility of conversion by the sword. The wording of the papal bull of 1229 (Hausen 1890 3) relates to peaceful conversion, which the Russians tried to impede in all possible ways. Donner feels that it would have been an extremely unwise policy for the Novgorodians to wage war against the people of Häme, if the latter had been forced by threat of arms to adopt the new faith.

The expeditions of the Karelians and Novgorodians into Häme began in 1042, continuing throughout the 12th century. These were violent campaigns for exacting taxes and tribute, which can be seen as indicating only temporary conquest, and not permanent authority over the area (Kuujo 1975; see also Saskolski 1973 10–13). The Catholic church must certainly have made use of this situation. The missionaries could hardly have refrained from pointing out the protection that the church could offer against the Karelians and the Novgorodians (G. A. Donner 1930 15). Even the people of Häme are regarded as having utilised the situation; subordination to the new faith was only a pretext to obtain help in times of danger (cf. Klami 1981 6).

According to Donner, western missionary activity apparently bore fruit. In 1227 Prince Jaroslav conducted a campaign against the people of Häme, whom the Russian princes had not previously dared to attack. This effort of unprecedented scale by Novgorod may have been the result of the success of Bishop Thomas in converting the people of Häme.

In the late 1230s the Mongol threat to Russia created a new situation, and also events in the Baltic lands may have had an indirect influence on Häme. The defeat of the Sword-Brothers in 1236 at the hands of the Lithuanians may have encouraged possibly increased dissatisfaction in Häme with the progress of the Catholic church and the founding of new

[22] See Table 12 footnote 2 on page 107.

[23] The date of the expedition has been the subject of debate (see e.g. Suvanto 1967; Vahtola 1984 10–15).

parishes. The less-appealing features of the new organisation had now become apparent with the obligation of building and maintaining churches, priests' tithes etc. (Suvanto 1985 42). It is also possible that the effects of the westward expansion of Novgorod had diminished as the result of the Mongol invasion and that the people of Häme, who had taken recourse to Sweden against Novgorod and the Karelians, now saw an opportunity to free themselves of the Swedes as well. This course of action was hardly left without reprisals.

The new faith was usually propagated together with leaders and the rising state. At the time, however, Sweden was still a loosely-knit political entity, where the royal authority was consolidated under Earl Birger somewhat later. The organising of expeditions of warfare was still carried out on the basis of the *ledung* system, which scholars maintain was the situation when the second crusade was undertaken. Assistance was required for the expedition and it was also provided by the far-off Bishop of Rome, who upon hearing of the brutality of the people of Häme had declared the crusade. This, in turn, helped in mustering troops.

The above hypothesis must be reviewed in the perspective of the hillforts. The fort of Hakoinen is not included in the material, because of finds of brick. The method of construction, alien to Finnish conditions of the period, and the name of the site suggest the work of foreign builders. The placename of Hakoinen has been shown to be derived from the Swedish *haga*, which Erik Anthoni (1947) has demonstrated as being related to crown-owned manors near forts. There are no finds of prehistoric artefacts from the fort. Despite this, many scholars have suggested that the fort was manned and used already in prehistoric times.

The location of the fort of Hakoinen is interesting. It is in Janakkala, a former subdivision of the parish of Vanaja (V. Voionmaa 1913 22), at northwest end of Lake Kernaalanjärvi in a locality which must be regarded as the southeastern perimeter of Iron Age settlement in the Lake Vanaja region of Häme. Flowing from various directions into Lake Kernaalanjärvi are the headwaters of Lake Vanaja – from Kalvola in northwest, from Loppi in the west and from as far as Lammi and Koski from the east. There was easy access to the south to the shore of the Gulf of Finland. Topography and the local environment provided a good site for a fort at a strategic location. Rinne (1914 282) describes Hakoinen as a frontier outpost (see e.g. Jaakkola 1926 22; G. A. Donner 1930 21). The fort provided control over communications and trade into Häme as well as good opportunities for advancing with troops. It was also easier to retreat from the fort than from sites in the more central parts of Häme.

But the question remains of the *Tauestahus* built by Earl Birger. The Castle of Häme is first mentioned in written sources in 1308. Does this refer to Hakoinen or the present-day Castle of Häme in Hämeenlinna? Listed in Appendix 4 (p. 231, 236–237) are the main points of chronology of both sites. Discussed in this connection are two concrete facts: the chronicler's description of the destruction of the fort or castle of Vanai in 1311 and the coin finds from both sites.

The chronicle of Novgorod (Hausen 1910 265) relates how the Novgorodians advanced along the Mustajoki River to the castle or town (*gorod*) of Vanai. They took the town and burned it, but the *njemtsi* took shelter in the fort (*djetinets*). This was a strongly fortified site on a high mount, with no access from any side. The Novgorodians laid siege for three days and three nights while burning down large villages etc. In the text, the defenders of the fort are referred to as *njemtsi* (mutes or Germans) and there is no mention of the *Jem*, which would have been the term used by the Novgorodians as the local populace (Ailio 1917 88). Thus, the site was manned by others than the people of Häme. Ailio (1917 88) underlines that the fort did not appear to have had a large contingent of troops, as there was no counter-attack. The defenders only sent their greetings and requested peace.

In Rinne's (1914 279) opinion, the fort or castle in question was Hakoinen. The account of the chronicle is to such a degree characteristic that we may assume that the chronicler was informed by eyewitnesses. Nor does Rinne doubt the mention of a trading village referred to as a town in the chronicle, as it was common for larger bodies of people to settle in the vicinities of forts and castles at sites where in later times towns grew. In Rinne's opinion the populace appears to have included Swedes as well, as suggested by the chroniclers reference to "Germans". The "town" was most probably on the ridge adjacent to the hillfort at the present site of the manor of Hakoinen and its grounds where several centuries of human activity have removed all remains of the site. According to Rinne, some finds may have been recovered from the site.

Ailio (1917 88–89 and cited sources), though not disagreeing with the connection of the castle of Vanai with Hakoinen, criticizes Rinne's direct interpretation of *gorod* as referring to a town. According to Ailio *detinets* meant the main or inner fort (Rinne translates it as fortress), while *gorod* in Old Russian could mean an enclosure, rampart or fortress. In the case at hand it appears to have been used as general term for fort. This view is supported by the use of the term in another chronicle account of the same expedition and the same fort. Ailio also mentions that the chronicle of 1310 uses the term *gorod* in

connection with the building of the Castle of Käkisalmi.

Other interpretations of the chronicle text have also been presented by scholars. Knut Drake (1967 & 1968 11) links the castle or fort of Vanai with the Castle of Häme in present-day Hämeenlinna. He bases this claim on the fact that the oldest part of the latter, a single-storey greystone fortress with an encircling wall, which he dates to the period 1260–1290, was built on a steep-sided hill of grave rising 12 metres above its surroundings. According to Drake, this was the strong fortification mentioned in the chronicle. The *gorod* of the chronicle would accordingly have been a small community of wooden houses at the foot of the fort, or an early outer fortification surrounded by a log breastwork or palisade.

Eeva-Liisa and Hans-Peter Schulz (1989 18–20) have suggested that the Vanai castle of the chronicle was the Varikkoniemi site located opposite the Castle of Häme in Hämeenlinna. The Schulzes have carried out excavations at the site and they interpret their finds of dwelling remains as evidence of a craft or artisan centre and a trading site. According to the Schulzes, the site was originally on a densely populated peninsula extending into Lake Vanaja. It was 5.5 hectares in area and included a harbour or landing. Surrounding the site are the remains of walls. The site is dated a period ranging from the 9th to the 13th century. At present, only a single brief article is available on the Varikkoniemi site, the views of the Schulzes concerning its nature and function cannot be discussed in further detail.[24] In this connection, only the possible connection with the chronicle source are reviewed.

The Schulzes refer to the fact that the Castle of Häme is listed among forts and castles entrusted or donated by Earl Birger to his brothers in 1308. This source is assumed to prove that the Castle of Häme existed at the time, whereas the fort of Hakoinen did not exist, because it is no longer mentioned. Apparently with reference to Drake, the Schulzes suggest that in its early configuration the Castle of Häme corresponded well to the fortress or inner fortification of the chronicle account, which was described as a strong fortification on a high rocky hill. To my understanding, the Schulzes link the *detinets* of the chronicle to the Castle of Häme, while Varikkoniemi was the nearby *gorod*. This is indicated by the fact that the Schulzes go on to quote the chronicle of Erik with its account of how the Swedes made a landing at a harbour,[25] fought and overcame the local forces. According to them, the account matches the Varikkoniemi site better than the fort of Hakoinen. The site is claimed to have been destroyed in 1311. This theory is supported by the available ^{14}C datings.

A number of counter-arguments are suggested by the way in which the Schulzes and Drake link their castles or forts to the high cliff or rocky hill of the chronicle. Drake (1967) maintains that it is irrelevant whether the location was a hill of gravel or cliff – a detail hardly considered by the Novgorodians. There is reason to doubt Drake's claims. In Russia forts were mainly walled formations on high river banks, i.e. locations completely different from cliffs or rocky hills. It can be assumed that a cliff site would have been more of a point of interest for the invaders than the Varikkoniemi site with its "Russian" topography.

The walled trading sites of Birka and Haithabu also had their own forts. According to the Schulzes the Castle of Häme on the west shore of Lake Vanaja had been the fort or castle of Varikkoniemi. Another possibility is the Aulangonvuori hillfort, located closest to the site on the east shore of Lake Vanaja. In a situation of siege it would have been necessary to break through to the hillfort over two kilometres away, which seems to be an unlikely scenario. Access to the Castle of Häme would in turn have required rowing across a stretch of water over 200 metres long. This can be assumed to have raised so much attention that it would have been mentioned by the chronicler. No events of this kind are,

[24] Thus far, only c. 1.5 % of the total area of the site has been excavated, which is insufficient for any wide-reaching conclusions. A craft centre and trading site (on the criteria of trading sites, see Masonen 1989 133–137) should be compared with dwelling sites of the period. As only a few of the latter have been studied so far, their specific archaeological pattern remains unknown. It must also be kept in mind that late prehistoric and Early Medieval farmhouses were economic units of a highly varied and multifunctional character. Like later farms, they undoubtedly included smithies as well, with ensuing remains of metalworking. Thus, the indications of smithing should not, at least without careful source-criticism, be linked to the possible existence of a trading and craft centre.

It must also be pointed out that Medieval forts and castles included other fortificatory structures than the actual castle, e.g. palisades in water (e.g. Alopaeus 1984). It is hard to believe that the approach to the Castle of Häme, located by a narrow stretch of water, would not have been fortified in some way. Thus, we may not overlook the possibility that the nearby castle may provide an explanation for the fortifications at Varikkoniemi. The radiocarbon datings of the site may shed further light on this problem.

Interpretations of the observations should also take into account the influence of a later sawmill and a military depot on land-use at the site.

[25] The Schulzes (1989) place a great deal of importance on the harbour with its excavated basin and dam. A harbour of this kind in a Finnish lake setting would be exceptional. Vessels without keels would not even have needed a harbour as such.

The logs of the Eklöf sawmill were no doubt stored in rafts in the shore waters of the mill, as was the common practice. This may have required dredging of the shallow shore, in turn the most plausible explanation for the "harbour basin". The publication does not mention to what degree documents of the Eklöf sawmill were used in identifying later stages of construction at the site.

It must also be pointed out that the Castle of Häme was built of brick and the necessary clay also had to be excavated.

however, mentioned in the written sources. It must also be underlined that the other source referred to by the Schulzes, the chronicle of Erik, was written between the years 1322 and 1332, i.e. over 80 years after the campaign of Earl Birger. Accordingly, a critical view must be taken of the details of the chronicle (Jokipii 1965). The chronicle does not mention the taking of the castle, but the founding of a fort or castle after the victory of the Christians.

The chronicle of Novgorod appears to be reliable and its geographic description suits Hakoinen better than the environs of the Castle of Häme. The chronicle mentions how the Novgorodians came to the *gorod* along the Mustajoki River. Hakoinen is on the shore of Lake Kernaalanjärvi into which several rivers discharge from different directions. There are no rivers near the site of the Castle of Häme, nor are there roads along ridges.

The Schulzes refrain from mentioning information according to which Hakoinen was still in use in the 14th century. A coin of Birger Magnusson (1290–1318) has been found at Hakoinen, which Rinne supports the connection with the castle of Vanai of the chronicle. Also Drake (1967) suggests that Hakoinen was in use in the 14th century and perhaps even in the following century. He bases this claim on a hearth with a flue mentioned by Rinne. According to Drake, hearths of this type came into use only around the year 1300 in places as central as Visby.

The above supports the claim that the fort of Hakoinen was still in use in the beginning of the 14th century and that the chronicle specifically refers to this site. Further support is given by Drake's opinion that *gorod* may also mean an outer fortification, which is present at Hakoinen but not at the Castle of Häme.

The time of founding of the fort is still an open question. Finds of artefacts indicate a broad 13th-century dating. Thus far, there are no finds of prehistoric date or of material that can be definitely associated with the indigenous population.

The question remains of the age of the castle of Häme. The two prehistoric finds from the castle cannot be regarded as evidence of prehistoric use, and the remaining find material has not been analysed in detail. The coin finds from the castle have been studied and identified (Keeper Pekka Sarvas, Coin Cabinet of the National Museum of Finland). The latter finds provide a more concrete basis for chronology than architectural studies based on the history of style, which can easily lead to circular reasoning (Lilius 1971; Taavitsainen 1989).[26]

Of interest in this connection is the fact that the oldest coins from the Castle of Häme are from the time of Magnus Eriksson (1319–63), from which there is an unbroken succession of coins up to recent years. This material supports the views of Rinne (1914 289) and Tuulse (1947 26) regarding the age of the castle.

The available material indicates that Hakoinen was most probably the fort or castle established by Earl Birger and that it was still in use around the year 1311. Furthermore, the founding of the Castle of Häme was possible from the 1310s onwards.

These points of chronology provide a useful starting point for an assessment of the conditions related to the conquest of Häme. The Mongol threat and the altered situation in the Baltic required rapid action by Sweden.[27]

At this time, Sweden was not yet a unified state capable of mobilising sufficiently effective armed forces. The situation required the Pope and the declarations of crusades to be undertaken. In due time, the Swedes arrived in Häme, and battles were possibly fought. It may also be possible that warfare was not needed. According to G. A. Donner (1930 20–22), the chronicle of Erik shows that there were no greater conflicts. The Swedes built their fort at a site providing good control over communications and trade with Häme. The fort also offered protection against possible enemy attack via Lake Kernaalanjärvi (cf. e.g. Jaakkola 1926 23). This location at the point from where continuos settlement of Häme began was also good for securing the advance of the Swedes. A fort site in the central parts of the Lake Vanaja may not even have been as interesting, because it would have offered a more difficult route of retreat than from the immediate vicinity of settled areas. The new fort could not, however, have served to pacify the local populace who could easily have destroyed it. The Swedes did not have the background support of any settlements under their own influence (cf. however Suvanto 1967 17). The preservation of the fort of Hakoinen suggests that the local population benefited in a real way from the Swedes. This is supported by the fact that following this time there is no information in the source material concerning the harassment of Christians (cf. G. A. Donner 1930 21). As early as 1240 the people of Häme are mentioned together with the Swedes and the Finns as the participants of a military expedition against Novgorod. A joint campaign, achieved in such a short time, does not suggest any major antagonisms with the Swedes. A close parallel can be found in Ailio's reference to the pledge given by Meinhard, the apostle of the Livonians, after a cam-

[26] Also coin datings pose problems. In the case at hand, only one coin has been found at Hakoinen and there has been no detailed analysis of the actual locations of the coin finds of the Castle of Häme.

[27] See however Vahtola (1984), who stresses the interests of the Teutonic Order.

paign of havoc by the Lithuanians. After the enemy had retreated, Meinhard promised to have a fort built for the people of Ykskylä, if they would agree to be baptised. The fort was duly built and it withstood a new attack by the Lithuanians. Soon after these events, the people of Ykskylä saw fit to revert to their old faith and banish the priest from the fort.

The island site of Linnosaari at the head of the Valkeakoski rapids presents an interesting parallel to the subject at hand. The combination of finds from the site is similar to those from Medieval castles. It is radiocarbon-dated to the mid-13th century, and early tax record list it among the property and holdings of the Castle of Häme. Furthermore, the island is in a central location with respect to routes of communication. It may have been manned by the Swedes who, at least in times of crisis, could have guarded against enemy movement from Lake Längelmävesi. Thus, the Lake Vanaja region could have been protected from both the north and the south.[28]

The late datings obtained for the hillforts of Häme and their partial chronological overlap with the fortifications of the Swedes do not indicate a total subjugation of the local population (Fig. 49). Also in Livonia the "aboriginals" who allied with the Germans had their own forts at first. The terror propaganda of the papal bull can be disregarded, for the bulls were drafted according to a set model, containing many exaggerations of the gross acts committed by non-Christians.

There were military expeditions to and from Häme in the latter half of the 13th century and still in the beginning of the 14th century, which made hillforts necessary. The last expedition mentioned in the chronicles was in 1311 when Hakoinen was under siege and the nearby villages were plundered. Plundering most probably extended from the fort of Vanai to the central parts of the Lake Vanaja region to the present area of the town of Hämeenlinna. Why should the fort not have been built in a central location, if an opportunity existed for this?

The central role of the Lake Vanaja region has long been suggested. For example, V. Voionmaa (1938 33,41) maintains that "we have reasons to assume that the old village settlement of the Hämeenlinna region was one of the central locations of the old tribal life of Häme and especially a commercial centre, as indicated by the Late Iron Age Linnaniemi find from Hätilä with its silver chains and foreign coins of silver." The importance of trade is also underlined by the so-called Häme Oxen Road (Fi. *Hämeen Härkätie*), the terminus of which was already in the 9th century at the site of the castle opposite Varikkoniemi (Masonen 1989; cf. Taavitsainen 1981 134). Somewhere in this area may have been a *turku*, a seasonal trading site.

The emergence of a trading site is in agreement with the data of the diagrams statistics displaying intensification of wilderness activities in the Viking Period and increased trade (Figs. 23 & 29). The founding of trading sites can be expected in such a situation and there may be sites of this type also in other areas than the Lake Vanaja region.[29]

Interesting radiocarbon dates were obtained from the Varikkoniemi site, and at present 20 are available. It is not, however, possible to present a source-critical review of this data, and we discuss the results without an evaluation of the samples. The results include a separate sample dated to the Migration and Merovingian Periods [Hel-2650 cal AD 450 (605) 660; Stuiver & Pearson 1986].[30] There is a uniform series of dates from the Viking Period to the 13th century.

The youngest dating thus far is cal AD 1252 (1279) 1384 (Hel-2461), which the Schulzes (1989 20) regard as support for the assumption that Varikkoniemi was the fort or castle of Vanai. This date was obtained from charcoal situated next to the wall of a house, and it provides an estimate of the age of the building material – most probably freshly-cut timber (cf. Schulz 1989 11). It does not indicate the time when the building burned down. The result, however, does not contradict the possibility that Varikkoniemi could have burned down in 1311. This may have happened when the Novgorodians laid siege on Hakoinen and destroyed the nearby villages.

An efficient expedition of havoc into the central area of settlement and the razing of the villages provided the Swedes with an opportunity to move their border and outpost line deeper along Lake Vanajavesi into permanently settled regions and to a site suitable for a fort or castle serving administrative purposes. The Swedes were aided in this decision by the burning of the outer fortification at Hakoinen. Over a period of 70 years, the people of Häme had become accustomed to co-operation with the Swedes, and there were no suspicions regarding them after the damages brought about by the Nov-

[28] It has been demonstrated that there were Swedish colonists in Medieval Häme, who even had family ties with Sweden (V. Voionmaa 1924b 13–24, see also Anthoni 1944 111–129). It is possible that Swedish troops manning the castles and forts of Häme were part of this population.

[29] Al Idris's geography of the 12th century mentions Häme (Tbst) with the town on Dgw'da (Gallén 1984 257). The placenames of Arabian travellers' accounts are mostly in unidentifiable form, for which reason many sources have remained unchecked and unverified (Rytkönen 1989 9). Also Dgw'da must remain unidentified.

[30] The sample was from a hearth. The probability of stand-dried timber in hearths is greater than among building material. Furthermore, there is a greater probability of old dates among the older datings from sites (see p. 30).

gorodians. The central parts of Häme opened up to the ally.

If it had been burned down, the possible trading site (*turku*) of the Lake Vanaja region – either at Varikkoniemi or elsewhere – was no longer rebuilt, but was moved to the site of the Castle of Häme.

The kingdom of Sweden, now in a strengthened position, could set upon the task of governmental organisation. The loosely-knit local communities and temporary bodies of various type began to be replaced by permanent ecclesiastical and administrative parishes of a permanent nature. Also provinces emerged and the time came for Satakunta to separate from Häme.

The outposts of Swedish rule extended along the coast further and further to the east. In 1297 the Castle of Viipuri was founded or conquered from the Karelians. The rivalry between Sweden and Novgorod was coming to an end, and the situation was stabilised by the Treaty of Schlüsselburg in 1323. The forts of the inland regions now started to become unnecessary. Häme had become a part of the Swedish realm.

Through a review of the hillforts and the history of settlement and colonisation we have arrived at an assessment of the significance of the hillforts in organisational terms and the related problems of the joining of Finland to Sweden. The above view concerning the chronology, classification and social significance of the hillforts is only one possibility among many. Julius Ailio's (1925 89) remarks from over 60 years ago still apply to our theme: "So far, the hillforts of Finland have been studied to only a small degree in any other than purely formal terms. There has not been time to concentrate enough on their structure and the related social system. Future generations will still have to offer much time and effort to the study of the forts, most probably much more than past generations put into their construction and they must offer much more thought to revealing the plans of the forts than the actual devising of the plans required. Forts are among the crowning achievements of the culture, technology and social development of the periods concerned. Without a study of these factors forts cannot be studied in any complete way. It is thus no wonder that the study of ancient hillforts will still offer many riddles and false explanations."

APPENDIX 1

FIELD WORK AT THE KUHMOINEN HILLFORT 1983–1988

1. History of research

In the autumn of 1983 Hannu Kilpinen of Kuhmoinen informed the Section for Prehistory of the National Board of Antiquities of Finland of having found with a metal detector two spearheads at the Linnavuori hillfort at Päijälä in Kuhmoinen. He was asked to forward the finds to the antiquarian authorities. Upon their arrival they were identified as two spearheads mainly resembling type M (NM 22005:1–2). I travelled to inspect the hillfort site on October 20, 1983 together with Mr. Kilpinen and Janne Vilkuna, intendant of the Province Museum of Central Finland, Jyväskylä.

Hannu Kilpinen's finds were from the lower eastern terrace formation of the hill (Fig. 1). The locations were not re-excavated and it was decided to carry on with searches for metals in the area to the north of the finds. These investigations yielded three lead bullets, apparently from the shooting range at the foot of the hill, a two-kopeck coin from 1814 (NM 22029:3) and a tip fragment of a spearhead (NM 22029:2). The level area was investigated with a metal detector to some 30 metres north of the site of the original find. All of the above finds were recovered from immediately beneath the turf and humus layers. There was not much soil at the site, nor could any features of special interest be observed in recovering the finds.

The metal detector was used also in the crest area of the hill near a protected-monument sign placed to the northeast of the summit. When the detector was switched on, it immediately gave a signal revealing a spearhead of type M in good preservation and partly fire-patinated (NM 22029:1). Also this find came from immediately beneath the humus (Fig. 2). At the level of the find was a thin layer of soot, which often occurs at the boundary of humus and mineral soils.

As the number of recovered finds was exceptionally large for a hillfort site, it was decided to undertake surveys and more extensive field work the following season. The purpose of these investigations was to prepare a map of the site, to test the use of the metal detector in an Iron Age context and to search for remains of built structures with small excavations. The planned field work was also concerned with investigating the construction and purpose of built features visible in the area of the crest (wall and cairns). These measures were regarded as necessary, for it could be feared that news of the find would spread and the site could be overrun by irresponsible treasure-hunters.

Field work was carried out as follows:

– May 21 – 30, 1984: mapping of the site, investigation of the site with the metal detector, excavation of areas 1 and 2.
– June 24 – July 5, 1985: mapping work, metal detection, excavation of area 3 and trenches 1 and 2, recovery of samples for analysis.
– June 23 – July 10, 1986: mapping, metal detection, excavation of area 4, radiocarbon samples from cairns nos. 8, 17 and 22.
– June 22 – July 1, 1987: mapping of the site, metal detection, excavation of trench 4, thermoluminescence samples from cairns nos. 3, 11, 15,20 and 24 as well as from the wall.
– June 27–July 7, 1988: mapping of the site.

In March 1985 samples of the bottom sediments from Lakes Saaresjärvi and Linnajärvi to the east and west of the site were recovered as well as samples from the sediments of Lake Asilampi in the village of the area. The purpose of these samples was to obtain paleobotanical data on the hillfort as well as the prehistoric cemetery area of the village.

Because of lack of funds, the National Board of Antiquities is able to carry out only salvage-type excavations and surveys of sites and antiquities, and the field work at the hillfort had to be carried out by volunteers as well as with support from the Province Museum of Central Finland. The following persons took part in the field work in the above seasons: Jussi Aarnio of Rauma, Camilla Ahlström-Taavitsainen of Helsinki, Esko Ahola of Jyväskylä, Martti Aiha of Espoo, Paavo Huttunen of Vantaa, Pertti Huttunen of Turku, Auli Jämsänen of Jyväskylä, Raimo Katajamäki of Jyväskylä, Hannu Kilpinen of Kuhmoinen, Ilkka Kilpinen of Helsinki, Erkki Laitinen of Jyväskylä, Anja Leminen of Helsinki, Jouko Nummela of Rauma, Olavi Paateri of Jämsä, Risto Palttala of Jyväskylä, Vilho Partanen of Jyväskylä, Jukka Petäjä of Helsinki, Martti Porvali of Petäjävesi, Eija Puskala of Jyväskylä, Päivikki Rintala of Kemi, Seppo Rintala of Kemi, Heikki Simola of Joensuu, Pirjo Simola of Joensuu, Jules Särkijärvi of Suolahti, Kimmo Tolonen of Helsinki, Mirjami Tolonen of Helsinki, Leena Tomanterä of Helsinki, Hemmo Vesanto of Rauma, Teppo Vihola of Jyväskylä, Janne Vilkuna of Jyväskylä and Kustaa H.J. Vilkuna of Jyväskylä.

2. Mapping

The crest area of the site was mapped with a levelling machine, measuring rods, a prism and hand-held tape measures. Marked on the map were the basic grids, the edges of the precipices, the excavated area, the wall, the cairns and the finds. With the above equipment it was impossible to prepare an accurate contour map of the site. Because it was necessary, however, to obtain a map and above all an image of the form and terrain of the hillfort site, it was decided to prepare views in perspective.

The perspective views were made under the direction of Mr. Tuomo Lusa, M.Sc. (Eng.) with a computer program developed by the National Board of Survey of Finland. The material used consisted of stereographic mappings, levellings of the site and grids marked out by the surveyor Paavo Huttunen in 1988–1989, using a theodolite and a tachymeter. This material as well as the existing maps, drawings and photographs were used for reconstructing the elevation contours of the area at one-metre intervals. The contours, in numeric form, were used as the data of the program for preparing a model of the terrain and its forms. By choosing the desired perspective and elevation it was possible to print graphic perspective viewsof the terrain of the site. Fig. 10 on page 22 contains an example of these views, showing the hillfort site with its steep precipices and terraces without standing timber obstructing the view. It is obvious that it would have been impossible to take a photograph showing the same features.

3. Use of the metal detector

In recent years metal detectors have become a serious threat to the protection and conservation of antiquities. Especially abroad they have been used to cause irreparable damage to antiquities, seriously impeding opportunities for future study and field work. This new situation has led to several demands, investigations and legal measures to prohibit or limit the use of metal detectors (see

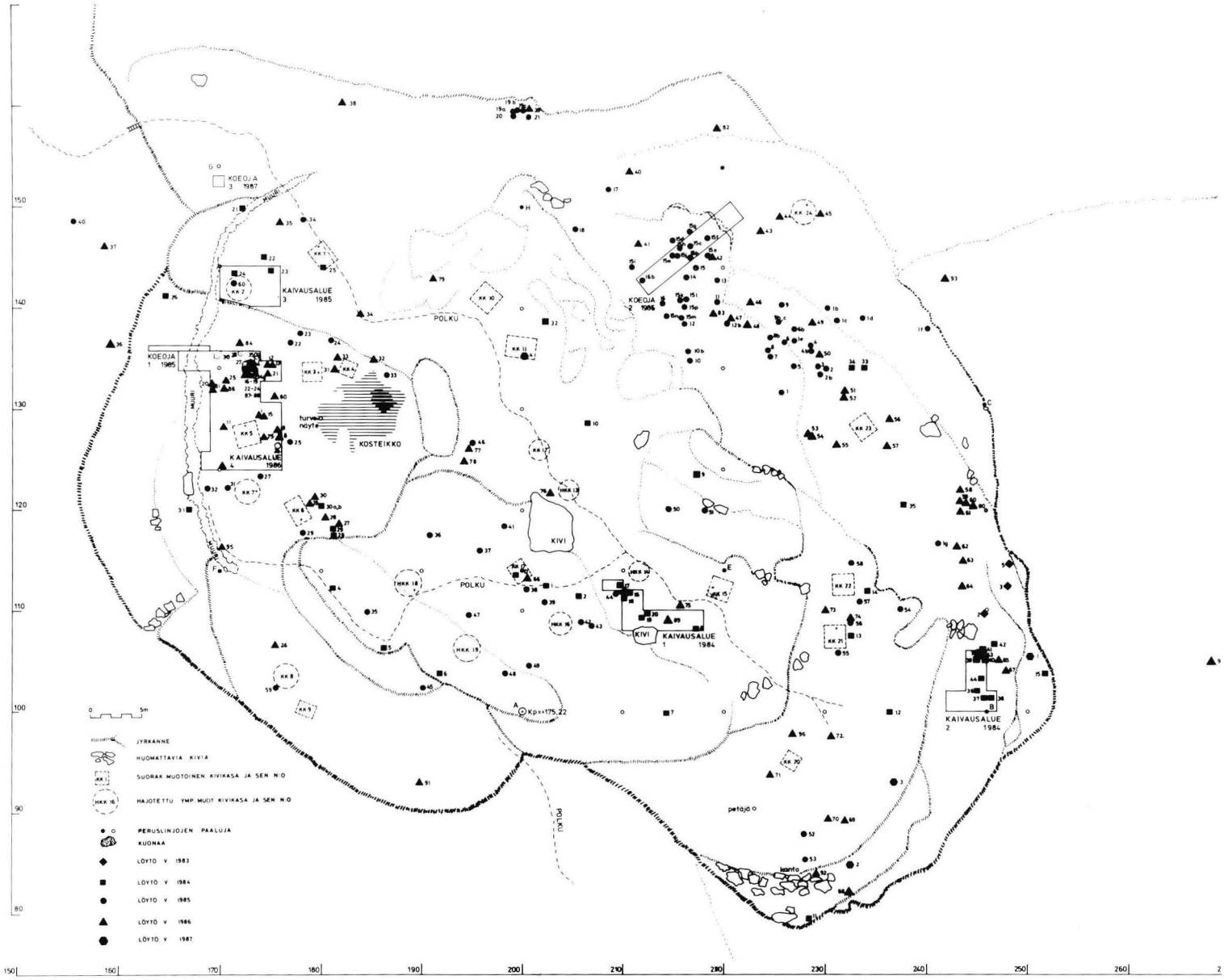


Fig. 1. Map of the Kuhmoinen hillfort showing excavated areas and finds. Translations of symbols: *jyrkänne* = precipice, *huomattavia kiviä* = stones and rocks of considerable size, *kivikasa* = pile or cairn of stones, *hajoitettu kivikasa* = disturbed pile or cairn of stones, *peruslinjan paaluja* = grid line markers, *löytö* = find.

e.g. Metal Detectors and Archaeology 1981, Metallsökare – bruk och missbruk 1983).

As the use of metal detectors has increased in Finland along with a number of negative results, it was decided to use this device at Kuhmoinen before untrained amateurs had an opportunity to invade the site. At the same time it was also possible to carry out a systematic testing of the method in connection with archaeological excavations, of which there is no previous experience in this country. Only minor tests have been carried out; for example, the University of Oulu used a metal detector in connection with excavations at the Oravisaari site in Tornio (Koivunen 1974). The metal detector was also used to improve the selection of excavated areas. As resources and funds were limited, it was necessary to select only areas of interest.

Due to the large number of these finds, it was not possible to excavate in their immediate surroundings, nor was there always reason to do so. For reasons of security, the finds were recovered and their distance from the grid lines was recorded and they were marked on the map. Markers were also left in the terrain. In the 1985 season a bottle cap or an empty cartridge was used and in 1985–1987 a copper nail. Thus the finds can be relocated and their depth measured in connection with possible future excavations at the site.

During the first season at the site in 1984 the metal detectors were used by Hannu Kilpinen and Janne Vilkuna. Kilpinen used a HK C-Scope 990 detector and Vilkuna a C-Scope VLF. TR 1220-B device. Locations of signals were marked with orange mine markers used by the Finnish Defence Forces. The results were surprising. Although the whole of the crest area could not be combed, a total of 42 find locations were nevertheless discovered. Due to lack of time part of the northeast terrace and the north slope were not investigated by metal detectors.

In 1985 Kilpinen and Vilkuna continued the use of the detectors. They were now assisted by Jouko Nummela, Jussi Aarnio and Hemmo Vesanto of the metal detection society of the Rauma region. The combing of the areas was continued and also the lower parts of the bluffs were investigated. The crest and the areas in front of the wall were cleared and the previously investigated areas were again combed with detectors. The results were again surprising, revealing 93 find locations of which 43 were in

Fig. 2. An M-type spearhead (NM 22029:1) found in the autumn of 1983 in the south part of the crest area, *in situ*.

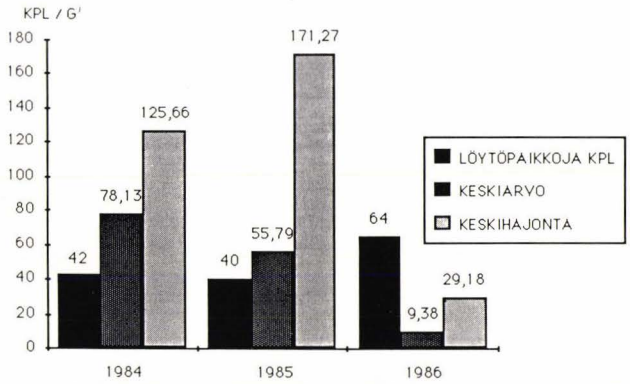


Fig. 3. Changes in the weight of metal-detected finds in the various seasons of field work at the site. Translation of symbols: *löytöpaikkoja kpl* = number of find locations, *keskiarvo* = average, *keskihajonta* = standard deviation.

the area investigated in the preceding season. At this stage Hannu Kilpinen had at his disposal a new and more effective instrument, the C-Scope Promet, which was used in areas combed by the other detector-users, e.g. the northeast terrace of the site.

In 1986 Hannu Kilpinen combed the crest area for a third time and the lower parts of the bluff for a second time. This time, 94 locations were identified[1], of which 58 were outside excavation area 4.

In the 1987 season only the terraces of the east side and the sides of the protrusions were investigated as well as the cairns selected for sampling. Only four finds were recovered.

Of special interest was the performance of the metal detectors in the excavated areas. The areas were re-combed immediately after the removal of turf and at each level of excavation. Finally, the removed soil and earth was investigated with the metal detectors. In connection with a concentration of small pieces of metal in area 4, the detector did not immediately indicate all of them, but only part after the removal of turf, even though the pieces of metal were not actually lodged beneath stones and rocks but alongside them. On the other hand, the soil at the site had many roots growing in it and the finds were mainly from the boundary of humus and soil. Accordingly, many small fragments of iron or copper were not found in excavation, despite the marking of the signal locations. The detectors also made it possible to recover lost finds from the redeposited soil. Due to the fact that this was the first time the method was applied, the number of signal locations of objects that were not found by the excavators was not recorded. If such a count had been taken, it would have been possible to assess the effect of the detectors on the total number of recovered finds.

Metal detectors are limited in many respects. For obvious reasons, they cannot indicate the presence of metal objects under stones or rocks, nor non-metal objects, which however were not found at the site. The device is not able to indicate pieces of slag of low metal content. Metal detectors should not lead to a lack of precision or a false sense of confidence in excavation work. One must also be alert when excavating areas already combed with metal detectors. Although the detector can help find objects later from the removed soil that were not recovered in the actual excavation, their original location will remain unknown.

The results of applying metal detectors in field work at the hillfort are shown in the diagram in Fig. 3, relating to three series of combings of the crest area.[2] The diagram clearly shows how the average weight of detected finds decreased in the consecutive seasons of field work. The standard deviation is not as regular. The results of 1985 were exceptional. The reason for this was an axe, weighing 1016.03 g (NM 228445:81a-b) that was found among tree roots. Excluding this find, the average weight of the recovered objects falls to 31.16 g and the standard deviation to 72.24 g.

The main reason why all of the finds were not observed in the first series of combings was most probably the thick undergrowth of the site, bushes and stones, which prevented the use of the detector in a correct position or at a suitable height from the surface. The clearing of the site and the use of a more effective detector (the C-cope Promet in 1985) permitted the recording and recovery of smaller objects. On the other hand, the properties of the new and more sensitive device were not immediately recognized. It would emit signals from stones along a path at the site and from burnt sand near the wall. For this reason, the instrument was tuned to a lower degree of sensitivity and accordingly a considerable number of the smaller fragments were found in the next season of field work. This indicates the subjective element involved in using metal detectors. It is necessary to obtain personal experience of the device in areas of numerous finds in order to distinguish reliable signals from noise.

Metal detectors have by now been used to some degree in arch-

[1] The numbers of finds of the 1984 and 1986 seasons differ from those marked in the map. The reason for this is that in both seasons a few objects were found in the excavation areas that were not indicated by the metal detectors.

[2] The diagram does not take into account the first and second series of combings of the northeast terrace and the north slope. In this connection, the areas in question were combed twice in the same season (1985) and the results of these cannot be distinguished from each other with certainty. It must also be pointed out that a more effective device was used than in the first combing of the crest area. Excavation area 4 is also excluded from the diagram. In this area objects were found also after the combing of the surface. Also in this case it is not possible to distinguish the finds from those of the previous combing of the area.

Fig. 4. An M-type spearhead (NM 22445:62, Find 30/1985) found in the stone setting at the foot of the wall. Photo Leena Tomanterä.

aeological excavations in other countries and the experiences are without exception positive. Metal detectors have shown themselves to be useful aids in research, and it is hard to imagine modern excavations of metal period sites where these instruments are not used (see e.g. Gregory & Rogerson 1984; Kyhlberg 1985; Östergren 1985).

The results from the Kuhmoinen excavations show that metal detectors are useful devices also in Finnish contexts. The detector requires some degree of experience, patience and several series of combings to achieve the best results. In locating and selecting areas for excavation the instrument is excellent. Also in excavation by layers, co-operation between the diggers and the detector will ensure the recovery of all metal objects.

Most of the finds were recovered from immediately below the humus layer or from upper part of the following layer of sand. In some places there were finds on the bedrock foundation which were covered only by a layer of moss. In places with thicker humus the finds were in slightly deeper layers. The soil cover at the site was rarely more than 30 cm. For example, a piece of iron (NM 22445:186, find 95/1986), a type M spearhead and an arrowhead (NM 22445:62–63, find 30/1985) were found at a depth of c. 30 cm among stones at the foot of the wall and a type E spearhead (NM 22445:136, find 55/1985) was found under stones next to hearth no. 21. The deeper finds were however exceptional and some of them may have been deposited or hidden. The exceptional occurrence of deeper finds is also indicated by the sensitivity of the detectors. The manual for the C-Scope Promet gives a find depth of "16" for a single coin and up to several feet for larger objects". Figs. 4–17 give an indication of the depth of the finds.

4. The test trenches and excavation areas

Test trenches and larger areas were excavated to find remains of occupation and related structures. The areas were selected on the basis of metal detector signals and features of terrain and topography.

Test trench 1. A spearhead and an arrowhead (NM 22445:62–63, find 30/1985) were found near the central part of the wall about two metres east of the visible stones of the wall beneath a number of layers of stones. In connection with this find were pieces of charcoal in soot-mixed soil. Immediately to the west of this find a test trench was dug in 1985, measuring 6 x 0.5 metres (3 m^2) and located at right angles to the wall. This location was of interest also because of the fact that in climbing the slope one is automatically led to this part of the wall with a depression be-

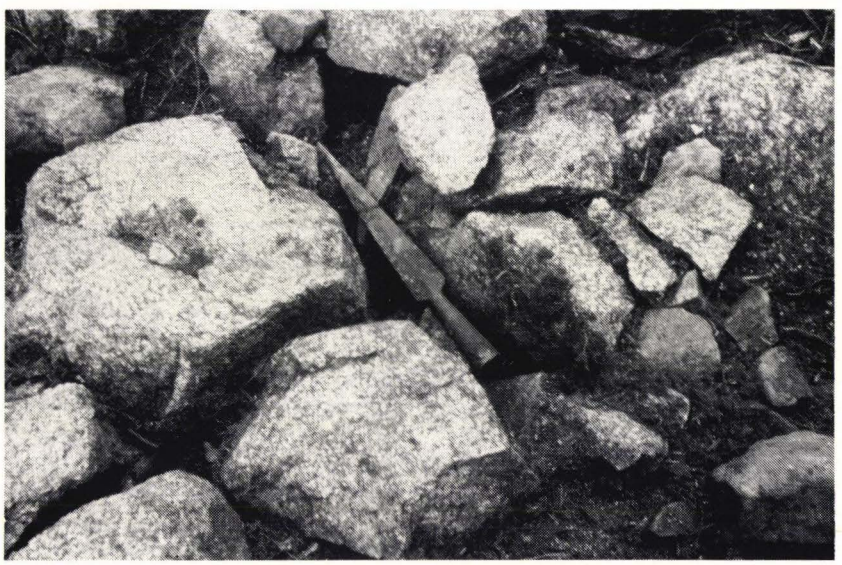


Fig. 5. A so-called East Baltic spearhead (NM 22445:21, Find 21/1984) found from beneath the turf of the stones of wall on the side of the slope.

Fig. 6. An E-type spearhead found under moss on the bedrock of the west slope (NM 22445:19, Find 26/1984).

Fig. 7. A spear-shaft ferrule from the south part of the level area behind the wall (NM 22445:190, Find 30/1986).

Fig. 8. A so-called Finnish-Russian straight-backed axe from the south part of the level area behind the wall (NM 22445:31, Find 30/1984). Photo Janne Vilkuna.

Fig. 9. A Finnish curved-backed axe from the south part of the crest area (NM 22445:81, Find 37/1985).

Fig. 10. A knife blade from the upper eastern terrace at the hillfort site (NM 22445:230, Find 74/1986).

Fig. 11. Large fragment of a copper kettle from the northeast terrace (NM 22445:93, Find 18/1985). Photo Seppo Rintala.

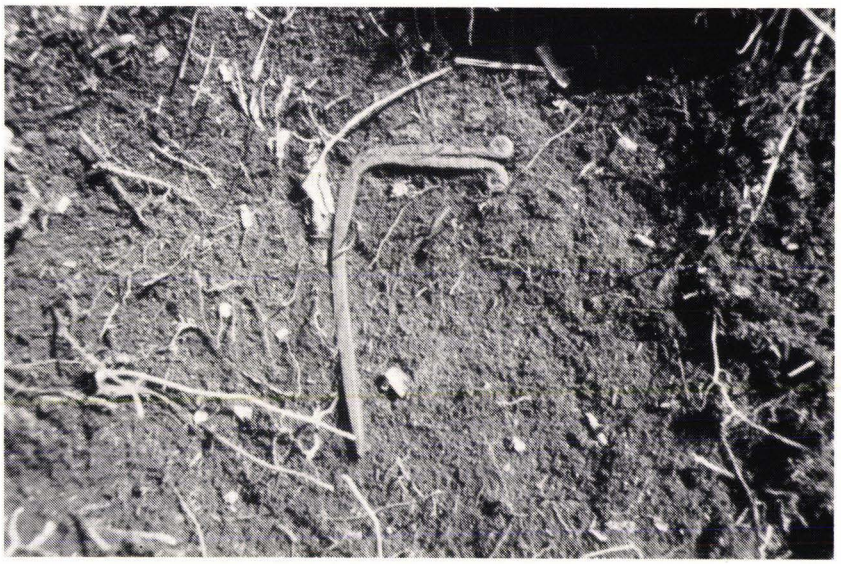


Fig. 12. A shingle-holder found on the bedrock of the south part of the crest area (NM 22445:28, Find 4/1984). Photo Janne Vilkuna.

Fig. 13. An ice-horseshoe from the north slope (NM 22445:195, Find 38/1986). Photo Seppo Rintala.

Fig. 14. A twin-spiral chain-bearer and a twin-animal brooch from the northeast terrace (NM 22445:134–135, Find 4/1985). Photo Seppo Rintala.

Fig. 15. A large penannular brooch with facetted knobs from the south part of the crest (NM 22445:89, Find 38/1985). Photo Seppo Rintala.

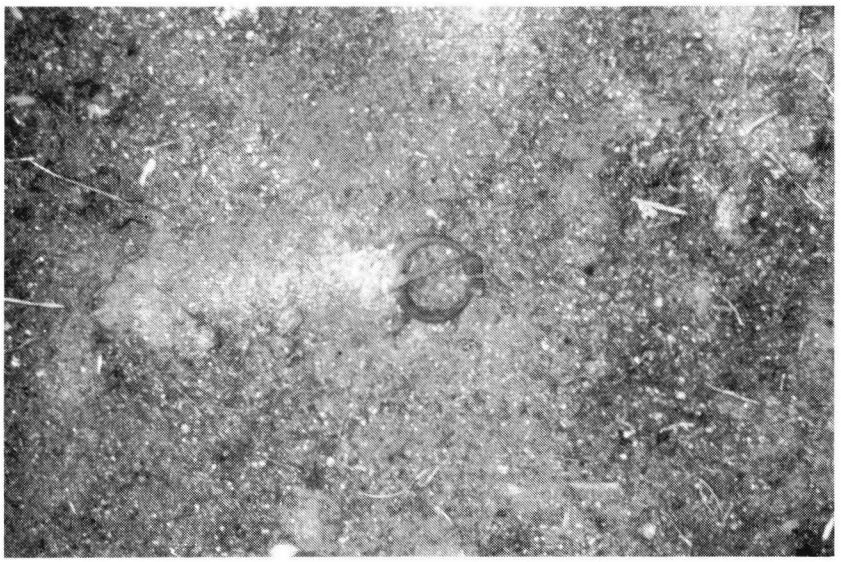


Fig. 16. A small penannular brooch from the lower eastern terrace (NM 22445:241, Find 67/1986).

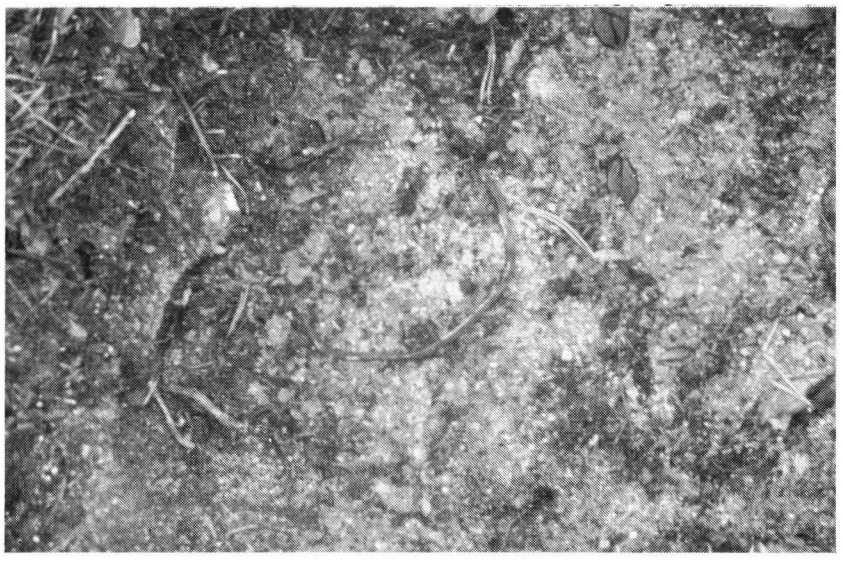


Fig. 17. A bracelet of simple form and thin section with a ridge from the north part of the crest area (NM 22445:203, Find 76/1986). Photo Seppo Rintala.

tween two piles of stones on the wall. Removal of the surface layer revealed coarse sand from burnt stones with a number of brittle stones that had been in fire. There were also pieces of charcoal a few millimetres in size. Beneath this layer was a layer of charcoal, encountered in two locations. Radiocarbon samples (Fig. 18) were taken from one of these (grid square 136/165). The samples date to 940 ± 60 BP (Su-1570).

Test trench 2. A test trench measuring 12 x 2 metres (24 m^2) was dug across the upper northeast terrace. This place was indicated by numerous signals from metal detectors and form of the terrace which appeared to be suitable for occupation and possible house remains. At the northeast end was a stone setting of indistinct form which appeared to have been man-made.

After the removal of the surface layer a layer of sandy soil, apparently sterile, was revealed with two large stones in places and a layer of soot between them. This was possibly the site of a hearth. In the middle section of the trench were stones with sooty soil among them in places. At the northeast end was a setting of burnt stones at the edge of the low terrace, from which stones appeared to have rolled down into the depression below. The form of the stone setting could not be defined as it continued to both sides of the trench.

At the boundary of humus and sand were a large number of small fragments of a copper kettle, two pieces of iron, a nail and a small penannular brooch of copper (NM 22445:54–60, finds 15b,c,f,h,j,o, 16b/1985).

As it was not possible to completely excavate the cairn laid on bedrock at the northeast end, it was dug in section to reveal its structure. The layer of stones was on top of a layer of charcoal and soot, followed by discoloured soil and bedrock. Stones from the cairn had rolled down into the depression to the northeast of the low terrace. In the latter location was a layer of charcoal and soot beneath a layer of stones and discoloured soil. Radiocarbon samples were taken from this location and from the above-mentioned charcoal layer, of which only the former was dated (840 ± 70 BP, Su-1571).

Test trench 3. Near the wall to the south of the path leading to the hillfort the metal detector reacted to burnt sand. A small test trench or pit of 2 x 2 metres was dug at the location in 1987. The humus covered a thin layer of charcoal, possibly of natural origin, followed by burnt sand. This layer was in turn followed by a streak of charcoal and soot, which in places was up to 10 cm thick. Below this layer was undisturbed red sand covering the bedrock. Radiocarbon samples were taken of the charcoal from beneath the humus and from below the burnt sand. Due to their small size, the samples have not been dated.

Excavation area 1. Several detector signals were obtained from near the location of the type M spearhead found in 1983 at the crest of the hillfort. The find signals were within a sheltered level area bounded by bedrock and with few trees, and in 1984 an area of 22 m^2 was excavated at the location (Fig. 19).

Beneath the humus was a thin and dark-coloured layer of soil with charcoal in places, which was of natural origin. This was followed by an undisturbed layer of sand of dark red colour. As there were no indications of occupation layer or remains of built structures, the excavation extended for only a few centimetres into the layer of sand. One of the squares was dug all the way to the bottom and it was observed that the c. 30 cm sand layer remained undisturbed and of dark red colour as far as the surface of the bedrock.

Despite the undisturbed appearance of the soil, seven finds were recovered in addition to the type M spearhead, found in the previous autumn (NM 22029:1, find 5/1984). The new finds were a chain divider (NM 22445:1, find 17/1984), a spearhead NM 22445:2, find 18/1984), a fragment of a hooked iron object (NM 22445:3, find 16/1984), a G-type spearhead (NM 22445:4, find 19/1984), a piece of iron (NM 22445:5, find 20/1984) and a pair of shears (NM 22445:6, find 8/ 1984). An iron clamp (NM 22445:244, find 89/1986) was later found in the removed soil.

Excavation area 2. The metal detectors indicated a number of signals on the lower terrace on the east near the site of the original finds from the autumn of 1983 (NM 22005:1–2, find 1/1983). At the excavated area the terrace was level, approximately 8 metres wide and suitable for occupation. An excavation area of 18 m^2 was laid out.

Removal of the surface layer revealed a low setting of stones at the southern end of the area. The feature measured about 3 metres in diameter. Because of numerous naturally located stones and rock it was hard to determine the actual contours of the laid stone setting. The feature contained charcoal, discoloured soil and red sand. The stones were fire-cracked with fragments among them. The feature in question was clearly a hearth.

The stone setting or small cairn contained three type E spearheads and a long knife (NM 22445: 7–10, find 36/1984, Fig. 20), placed among the stones. The artefacts were between two large stones in place, where the discoloured soil mixed with soot and charcoal appeared to be concentrated. The discoloured soil was not found under the uppermost stones, but in the layer beneath the spearheads and under the large stones. It must be pointed out that the knife and spearheads on top of the soot and charcoal layer were badly rusted and did not show any traces of patination by fire. A radiocarbon sample was taken from the layer below the finds and was dated to 770 ± 60 BP (Su-1414).

Other finds from the cairn and along its edges were a hooked fragment of an iron object (NM 22445:11, find 37/1984), a small bronze bell (NM 22445:17, find 38/1984) and a piece of iron (NM 22445:12, find 44/1984). The metal detector did not give any signal in connection with the two former objects,as they were beneath and among the stones and could not be detected.

In the northern part of excavation area 2 a spearhead, a point and a fragmentary spearhead socket (NM 22005:1–2, finds 1–2/1983) had been found previously. New finds included a fragment of a ring-headed iron object (NM 22445:15, find 39/1984), a piece of bronze plate with two holes (NM 22445:16, find 40/1984), a fragment of a spearhead socket (NM 22445:14, find 41/1984) and pieces of iron rod (NM 22445:14, finds 43/1984). All of the above finds were recovered from immediately below the humus.

In addition to the hearth and the finds there were no other finds of any significance from excavation area 2.

Excavation area 3. On the north side of the level area behind the wall is a low outcrop of bedrock with a cairn at its west end near the wall. In 1984 a melted bronze bracelet (NM 22445:22, find 24/1984) had been found close to it as well as the blade of spearhead rounded at the base resembling type G (NM 22445:26, find 23/1984). An excavation area of 24 m^2 was laid out in order to investigate the cairn and its immediate vicinity.

The stones of the cairn were fire-cracked, but removal of the stones revealed undisturbed soil which was also found in the other parts of the excavated area. The feature in question was not a hearth and it could have been a pile of missile stones collected near the wall. The stones had been broken down to suitable size with fire and water or stones from disused hearths were reused.

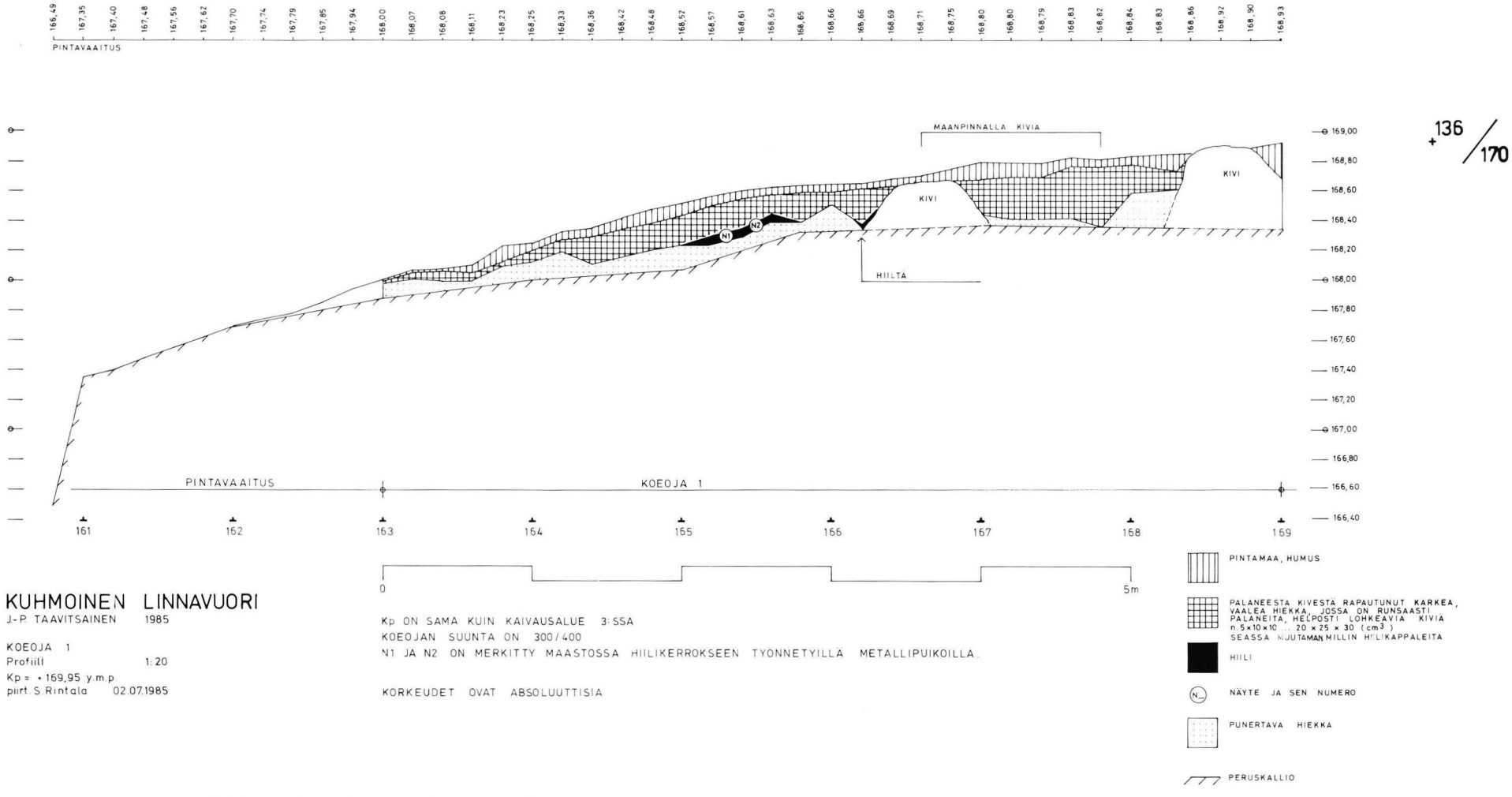
At the side of the cairn a fragment of a horseshoe nail was found (NM 22445:53, find 60/1985).

Excavation area 4. This area was immediately behind the wall in the northwest part of the site on a level piece of ground between the wall blocking the upper part of least abrupt slope and the higher parts of the site (Fig. 21). Test trench 1 was originally dug immediately to the north of this area. The level area is extensive with a thicker covering of soil than elsewhere at the site. To the east of the excavated area is a small marsh a few square metres in size.

The level area behind the wall was suited to various activities in the past, as indicated by the finds from 1984 and 1985. These include pieces of slag (NM 22445:25, find 27/1984). The test trench dug to the northwest of the spearhead and arrowhead finds (NM 22445:62–63, find 30/1985) revealed sooty soil with charcoal. After clearing and felling the thick stand of firs and aspens in the location, metal detection of the area indicated a large number of finds. It was decided to investigate in further detail the vicinity of the earlier and later finds and the nature of a protuberance in the wall. Also investigated was a stone setting to the south of the slag find, which was assumed to have been a hearth.

A total of 86 m^2 were excavated, of which 42 m^2 were dug through all the layers. Near the hearth in the south part of the area only the turf was removed and the revealed layer was mapped. The excavated area was combed with a metal detector after removal of turf and at each excavation level.

In the southern part of the area were a hearth and stone settings, of which the westernmost ones were joined to the wall. The stone setting to the southwest of the hearth was clearly man-made with selected stones laid with level surfaces facing upwards and



136 + /170

Fig. 18. Profile of test trench 1. Vertical lines indicate surface soil and humus, hatching indicates coarse sand pulverized from burnt stones and including fire-cracked and easily broken stones. Charcoal is shown in black, dots indicate reddish sand and diagonal hatching indicates bedrock. N = charcoal sample.

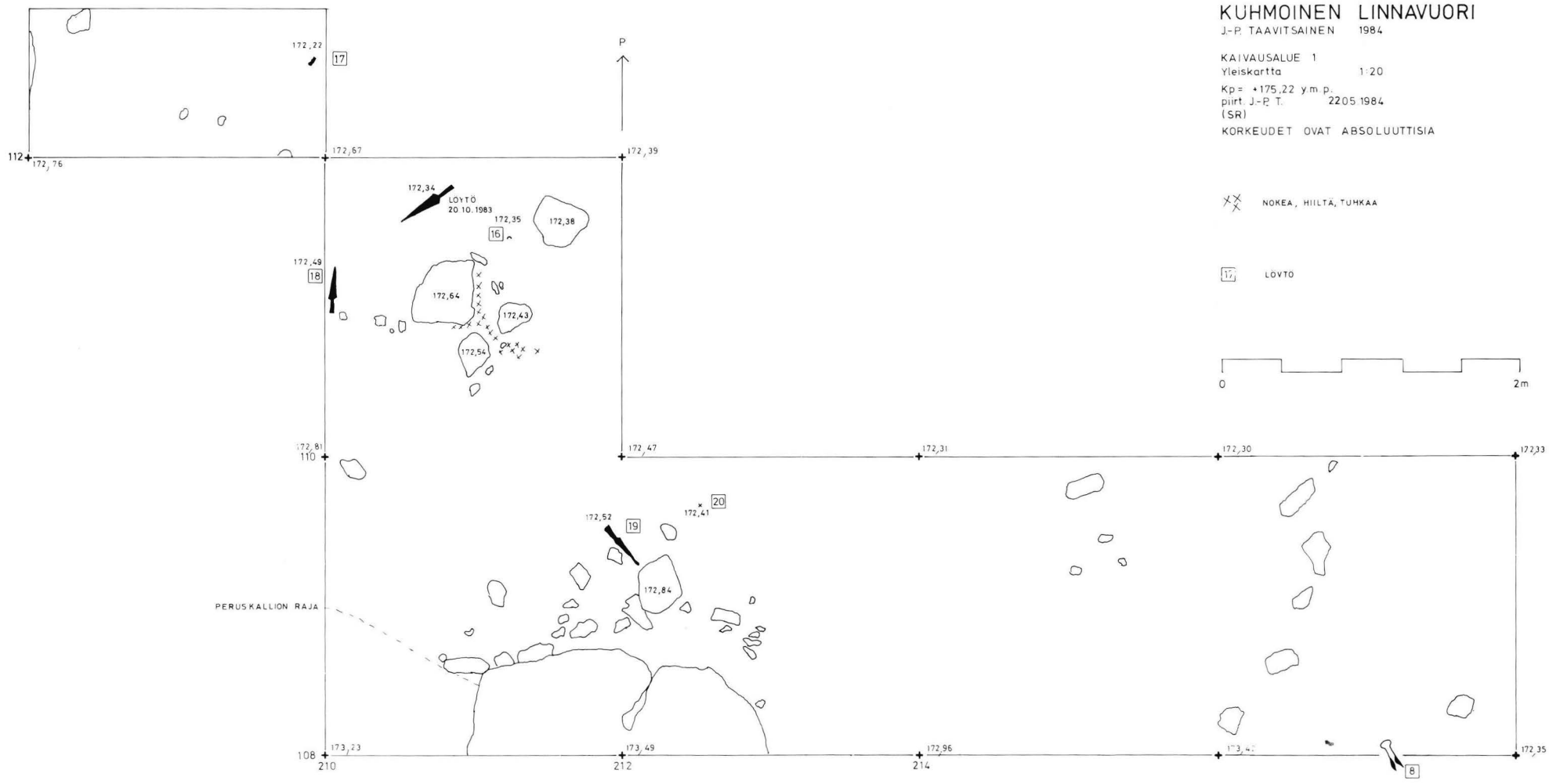


Fig. 19. Map of excavation area 1; x= soot, charcoal, ashes.

Fig. 20. A hoard or cache consisting of three E-type spearheads and a knife (NM 22445:7–10, Find 36/1984) from the stone setting of a hearth in excavation area 1. Photo Martti Aiha.

even-spaced seams (Fig. 22). The stone setting continued into the wall, but was no longer as even or clearly defined as in the vicinity of the hearth.

There was also a clearly constructed stone setting at the south end of the excavation area at a distance of about a metre from the hearth. This was a small pile of stones c. 60 cm in diameter laid on the bedrock. There were also two piles of stones of indefinite character in the north part of the area.

In the centre of the south part of the area was a well-preserved rectangular hearth measuring c. 2.2 x 2.7 metres. The framework of this feature consisted of large stones and rocks, some of which were in their original locations (Fig. 23). The southeast sector of the hearth was excavated and in the centre a thin layer of soot (< 1 cm) was found, of which a radiocarbon sample was taken. Due to the risk of contamination it was not dated.

In 1985 a section of chain (NM 22445:68, find 26/1985) had been found to the south of the area. New finds were pieces of iron and an iron object (NM 22445:154, 176, 151, find 1,8,11/1986), a fragment of a knife point (NM 22445:178, find 15/1986), a fragment of an iron point (NM 22445:176, find 9/1986), a small penannular brooch of bronze found under a stone (NM 22445:177, find 25/1986; Fig. 24) and five pieces of copper plate (NM 22445:150, find 10/1986).

In the northern part of area 4 the soil cover varied. In places bedrock was revealed immediately after removing the turf, while at the wall the soil extends to a depth of c. 40 cm. The sandy soil was of a strong red hue – as was the case elsewhere in the crest area – and in places it appeared to have been burnt, especially near the wall. There were no built structures apart from the wall. At the boundary of the two northernmost squares on grid line 172

Fig. 21. Excavation area 4 seen from the north. Photo Seppo Rintala.

Fig. 22. Stone setting in excavation area 4. Photo Seppo Rintala.

Fig. 23. Hearth in excavation area 4, view from the south. Photo Seppo Rintala.

Fig. 24. A small penannular brooch from excavation area 4 (NM 22445:177, Find 25/1986). Photo Seppo Rintala.

Fig. 25. Cairn no. 20 (upper eastern terrace). Sooty soil is marked with points and the location of the TL sample is shown with a square of dashed lines. Flat stones shown in oblique hatching.

was an oval protuberance or mound of sand c. 45 x 65 cm in area and c. 10 cm high with a few small stones and pieces of slag on the surface.

To the west of this mound were fist-sized burnt stones and in the vicinity were large amounts of slag and small fragments of metal and copper artefacts in an area c. 80 cm in diameter. A total of 350 g of slag was recovered from the northernmost square on line 172 (NM 22445:173,241, 36 g in 1984 and 314 g in 1986). Also the following finds were recovered: three pieces of copper plate (NM 22445:166, find 2/1986), a copper or bronze rod (NM 22445:167, find 3/1986), a piece of copper or bronze rod (NM 22445:168, find 4/1986), two pieces of iron (NM 22445:169–170, find 5–6/1986), a piece of copper plate (NM 22445:17, find 7/1986) and two pieces of copper plate (NM 22445:172, find 14/1986). Found among the slag was a piece of iron (NM 22445:174). Among the pieces of slag found in 1984 were also two fragments of a copper kettle (NM 22445:24, find 27/1984), of which one included a piece of the iron ear.

The excavated square to the south contained a total of 1,234 g of slag (NM 22445:164). Finds were also more numerous in this location: 4 pieces of copper plate (NM 22445:155, find 87/1986), 7 pieces of iron (NM 22445:156, find 88/1986), a fragment of an iron artefact (NM 22445:157, find 16/1986), two pieces of iron (NM 22445:158–159, finds 17–18/1986), a fragment of a knife (NM 22445:160, find 19/1986), a small piece of iron (NM 22445:161, find 22/1986) and a piece of copper plate (NM 22445:163, find

Fig. 26. Cairn no. 20 (upper eastern terrace). Photo Seppo Rintala.

24/1986). Inspection of the slag later revealed a fragment of the ear of a copper kettle (NM 22445:165).

The section of the wall was dug at the protuberance. Due to the low rise of the wall the inside was hard to determine. Test trench 1 was immediately to the north of this location between two mounds. Beneath the humus was a light-coloured layer of coarse sand which had originated from burnt stones. The layer also contained a large number of burnt and cracked stones followed by reddish sand which also appeared to have been influenced by fire. As observed in test trench 1, the section of the protuberance of the wall contained patches of soot and charcoal among burnt stones. Radiocarbon samples of some these were taken, but have not been dated. It is to be noted that the estimated foot of the wall contained large and partly thin features of soot and charcoal, which were also found elsewhere at the foot of the wall. The size and location of these features varied with depth and some extended as far as the bedrock.

A spearhead and an arrowhead had been found at the foot of the wall (NM 22445:62–63, find 30/1985). The excavations of 1986 revealed a silver penannular brooch (NM 22445:148, find 81/1986), not indicated by the metal detector.

Other finds from the northern part of area 4 – i.e. outside the slag area and the foot of the wall – were a section of bronze rod (NM 22445:152, find 85/1986) and a blade section of an adze (NM 22445:153, find 86/1986). Also found were a fragment of an iron nail (NM 22445:65, find 28/1985), two pieces of copper plate (NM 22445:180–181, finds 12–13/1986) and a piece of iron rod bent into angular form (NM 22445:179, find 21/1986).

The finds were mostly recovered from immediately beneath the humus at the first level or in the upper parts of the first excavation layer. Some objects were found at deeper locations, e.g. the adze-blade fragment (NM 22445:153, find 86/1986), was at the surface of bedrock some 30 cm below the original surface. At approximately the same depth was also the above-mentioned silver brooch (NM 22445:148, find 81/1986). The find in question may have been a hoard or cache or it may have been buried when the wall fell down.

Paleobotanical samples were also taken from the marshy area to the east of area 4, which was assumed to have been the water reservoir of the fort.

Investigations of the cairns. For the recovery of dating samples in 1986 the surface soil was removed from cairns 8, 7 and 22 which were assumed to have been hearths. In 1987 cairns 3, 11, 15, 20 (Figs. 25 & 26) and 24 were similarly investigated. In this connection it was also possible to make observations concerning the structure of the cairns.

The form of the cairns was in most cases rectangular (cairn no. 3 was of round form) and they mostly measured 2 x 2.5 metres. Large slabs placed in a circle around the centre were also a common feature. These suggest a hearth-like structure in the centre. In all of the cairns except nos. 17 and 24, there was also a large upright stone at one end of the structure.

The cairns also contained burnt stones but only a thin layer of soot. These observations, however, support the view that the structures were originally hearths.

5. Summary of excavation observations

The summary of the excavation observations of the field work at the site is brief. A total of 181 m^2 were excavated, of which 175.5 m^2 were in the elevated area of the site. This amounts to 3.3 % of the total area of the crest. In the area were large outcrops of bedrock, which were completely bare or covered only with moss, and the propotion is in reality considerably larger.

Occupation layer. Although objects and artefacts were found in all of the excavated areas as well as in other locations, occupation layer as such was found only in places in area 4, with burnt sand, patches of soot and charcoal and finds in the second excavation layer. The finds were almost without exception from the boundary of sand and humus or at a depth of a few centimetres in the sandy soil. At the foot of the wall a few objects were recovered from beneath the stone setting.It is impossible to say, whether they were originally deposited there or whether the stones had been moved in place by the action of frost.

The wall. The wall was of stone and sand-mixed construction. The sand appears to have come about from stones weathered by fire. The wall also contained features of soot and charcoal, especially at its foot. With the exception of the mounds or protuberances, the actual point where the wall begins is hard to determine, because it had been built to only a small height above the terrace or had fallen down at a later date. There are small depressions in places which can be interpreted as the foot of the wall. The outer face was built to a steeper angle forming a perpendicular wall rising from the slope.

Stone settings. At the foot of the wall were a few stone settings as well as a small pile of stones which may be related to the original structures of the wall. The function of the stone settings could not be determined on the basis of the remains.

The hearths and the pile of missile stones. With the exception of a single cairn which did not contain soot or charcoal (no. 2) the investigated cairns in the crest area proved to be hearths. The location of cairn no. 2 suggests that it may have been a pile of missile stones. In form, the hearths were mostly rectangular piles of stones. In many of them there were upright slabs or flagstones in the centre. The hearth in excavation area 2 appeared to lack any structure, although this could not be observed prior to excavation. In test trench 2 there was a hearth between two large stones in place.

The water reservoir. Although sampling from the marshy area

did not reveal any signs of a well or other structures, the fossil remains were observed to include open-water species. This may indicate the transport of water to the site and the use of the location as a reservoir (see M. Tolonen, Appendix 5).

Charcoal layers. The layers and features of soot and charcoal outside and within the wall as well as at its foot require further comment. Their locations suggest that they may be the remains of a breastwork built on top of the wall and the remains of charred structures placed between the stones. The best conditions for the formation of a charcoal layer were in the shallow depression next to the wall, where large and uniform features of soot and charcoal were observed. On the other hand, a large amount of slag was found close to this location and the charcoal may be related to it. In test trench 3, dug outside the wall, a charcoal layer covered by burnt sand indicates clearing and/or construction at some stage and may refer to repairs or re-building of the hillfort. The timber breastwork appears to have burnt down before the fort was finally abandoned. In test trench 1 the charcoal layers outside the wall are similar to those in trench 2, although it is also possible that the wall fell down. On the other hand, it seems unusual that a pure layer of burnt sand had become deposited on the charcoal in trench 3. The problem of the connection of the charcoal at the foot of the wall with features of charcoal outside it cannot be solved by excavation observations.

It must be stressed in closing that there were no indisputable observations of dwelling remains in the area of the crest, which is understandable in view of the bedrock, the thin soil cover and the lack of any need to build foundations for houses or other buildings. The stone setting near the large hearth in the excavated area may be the remains of a floor, as there was hardly any other need for a level platform which required some degree of labour. This structure or building was possibly joined to the wall.

APPENDIX 2

FINDS FROM THE KUHMOINEN HILLFORT

1. Classification

Although field observations concerning structures at the hillfort were limited and difficult to interpret, the surprisingly large number of finds present a completely different situation.

Classification of artefacts according to function entails a number of problems, especially differences between intended and actual use. Almost without exception, artefacts have many utilitarian as well as symbolic functions, any of which can be used as the basis of classification. Classification is further impaired by changes to the original function possibly caused by damage, wear and other factors.

As it is often impossible to demonstrate any other function than the primary one, the artefacts and fragments presented in this appendix are broadly classed according to their primary function, in accordance with standard practice in Finnish archaeological studies.

The classification and grouping are intended to serve a later evaluation of activities at the site. In addition to classification, the finds are dated according to available comparative material and parallels, i.e. mainly on the basis of grave finds. The artefact datings are used in chapter 3 in connection with assessments of the age of the hillfort. Also the distribution of the finds will be reviewed with respect to cultural ties and connections.

Listed in connection with each find is its catalogue number in the collections of the National Museum of Finland, the year of the find and the number used for recording in the excavations, shown in the distribution map of the finds (see Appendix 1, Fig. 1). Also listed are the grid square and area, which will help the reader to locate the finds in question (Fig. 1). The condition and special features of the finds are also mentioned, as they are of importance in assessing the activities at the site, dating and cultural ties.

2. Weapons

2.1. Spearheads

2.1.1. Spearheads of type E

1. NM 22445:19 (Find 26/1984, Plate 1:2), west slope, sq. 142/164
– 246 x 28.5 x 6 mm, weight 111.52 g
– socket damaged and in several pieces, unclear rivet-holes
– found at the foot of the wall partly pointing towards the wall and lodged under a small stone

2. NM 22445:109 (Find 14/1985, Plate 1:5), northeast terrace, sq. 142/216
– 312 x 29 x 9 mm, weight 217.04 g
– broken point, upper part of the blade bent into wavy form and bent at the sides
– socket with grooved ornamentation and a rivet-hole
– fire patina

3. NM 22445:144 (Find 54/1985, Plate 1:3), upper east terrace, sq. 110/236
– 152 x 19 x 6 mm, weight 46.48 g
– badly rusted, mouth of the socket missing

4. NM 22445:43 (Find 11/1984, Plate 1:4), upper east terrace, sq. 80/228
– 234.5 x 21 x 7 mm, weight 193.12 g
– point broken off, no rivet-holes
– hammered at the mouth of the socket

5. NM 22445:7 (Find 36/1984, Plate 1:1, 4:2), lower east terrace, excavation area 2, sq. 100/244
– 348 x 21 x 6 mm, weight 210.21 g
– damascened blade
– socket with grooved ornamentation and two rivet-holes, with an iron "stud" in one
– found from on top of the soot layer of a hearth together with the two following E-type spearheads and a long knife

6. NM 22445:8 (Find 36/1984, Plate 1:6), lower east terrace, excavation area 2, sq. 100/244
– 229 x 21 x 4 mm, weight 102.07 g
– one rivet-hole in the socket

7. NM 22445:9 (Find 36/1984, Plate 1:8) lower east terrace, excavation area 2, sq. 100/244
– 227 x 18.5 x 4 mm, weight 90.64 g
– one rivet-hole in the socket

8. NM 22445:18 (Find 42/1984, Plate 1:7), lower east terrace, sq. 106/246
– 106.5 x 17.5 x 5 mm, weight 59.06 g
– upper part of blade bent with a piece missing from the point
– piece missing from the socket, one rivet-hole in the remaining part

The E-type spearheads are of overall North European distribution. Bergljot Solberg (1984) has pointed to the grooved ornamentation and the damascened blades which he regards as the trademarks of the artisans. Furthermore, the high prevalence of technically advanced elements strongly indicates that they are derived from highly specialised workshops. Their dominant coastal distribution within Scandinavia, the many finds in the area surrounding the trading center of Birka and along the eastern trading route and their wide distribution – ranging from France to the Soviet Union – further indicate that these spear-heads originate from a central production area, probably from the Continent. Finally, the assumption of a Continental origin of these spearheads is supported by the find combinations with swords dominated by types with wide European distribution.

In Finland these spearheads have been found in all of the areas of Viking Period settlement and to some degree also in the wilderness areas.

In his classic study on the subject, Jan Petersen dated the introduction of type E to the end of the 8th century, but regards the 9th century as it main period of use (Petersen 1919 26–28). In Solberg's new typology, the spearheads of type E belong to his type-group VI and its sub-types 4A-C (Solberg 1984 58–60, 65–68; 1987). Solberg does not seem to accept the dating of subtype VI.4A or the E-type with grooved ornamentation (Petersen 1919 Fig. 13) to as early as the 8th century and places it mainly in the 9th century with further use in the 10th century. He also mentions that the type has been found in only one early 9th century connection at Birka, the rest of the Birka finds of the type have

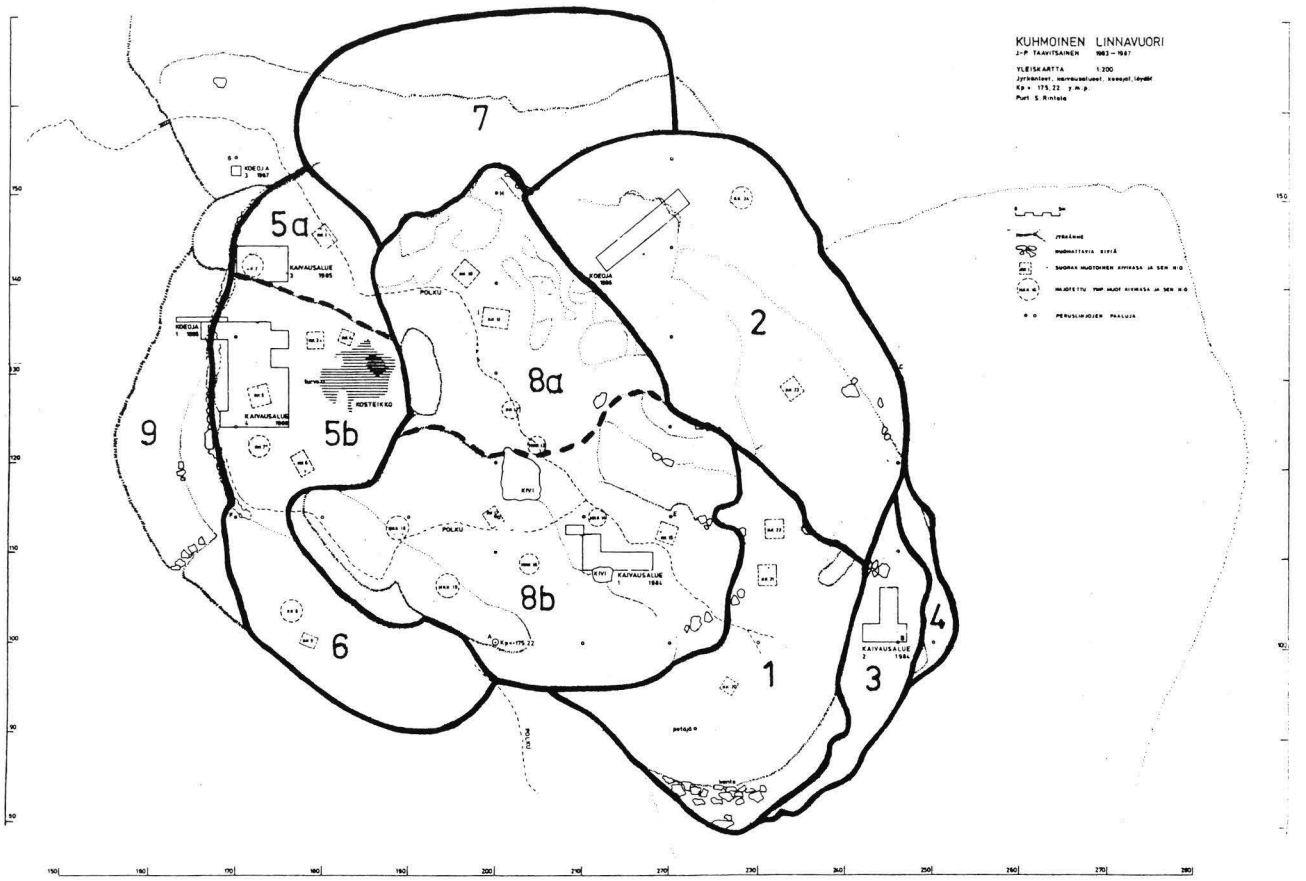


Fig. 1. Areas of finds at the Kuhmoinen hillfort. 1. Upper east terrace, 2. the northeast terrace, 3. the lower east terrace, 4. the eastern outcrops, 5a. the north part of the level area behind the wall, 5b. the south part of the level area behind the wall, 6. the southwest terrace, 7. the north slope, 8a. the north part of the crest, 8b. the south part of the crest, 9. the west slope.

been dated to 850–950 AD and they are slightly younger than their Norwegian parallels (Solberg 1984 65–67).

Sub-type VI.4B with facetted upper parts of the socket (Petersen 1919 Fig. 12) is dated by Solberg to 800–850. In the Birka finds they are also somewhat younger and one specimen may be from as late as the latter half of the 10th century (Solberg 1984 68).

Sub-type VI.4C with undecorated sockets and no facets is contemporaneous with sub-type VI.4A (Solberg 1984 68).

In Estonia spearheads of type E are dated to the 9th–11th centuries and they still occur in find contexts of the latter half of the 11th century, although most of them are from the 10th–11th centuries (Selirand 1974 110). In Russia the type is dated along similar lines. Kirpičnikov (1966 7,9–11) dates them from the 9th century to the beginning of the 11th century. Especially the bayonet-like variant is of the 12th century.

In Finland this type was the most common spearhead type of the Viking Period. According to Lehtosalo-Hilander (1985 13), there are c. 550 finds of the type amounting to 60 % of all of the Viking Period spearheads. Salmo (1938 250–251) has dated the earliest E-type spearheads to the end of the Merovingian Period. Lehtosalo-Hilander, who most recently studied the dating and distribution of the type on the basis of the finds from the Luistari cemetery in Eura, does not comment upon its introduction, but notes that smooth-socketed and decorated-socket variants were in use at the same time up to the 10th century. She regards damascening as a more important feature than decoration and dates the damascened spearheads mainly to the 9th century (Lehtosalo-Hilander 1982b 26–30, 32). Coin-datings support the dating of the type to the 9th century and the beginning of the 10th century (P. Sarvas 1972 44; Lehtosalo-Hilander 1982b 28).

2.1.2. G-type and related spearheads

1. NM 22445:4 (Find 19/84, Plate 2:1, 4:1), south part of the crest, excavation area 1, sq. 108/212
- 416 x 47 x 8 mm, weight 325.30 g
- damascened blade
- rivet-hole in the socket, with half a rivet remaining
- fire patina

2. NM 22445:21 (Find 21/1984, Plate 2:2), west slope, sq. 148/168
- 202 x 21 x 9 mm, 217.86 g
- one rivet-hole in the socket

3. NM 22445:26 (Find 23(1984, Plate 2:3, 4:4), southern part of the level area behind the wall, excavation area 2, sq. 144/174
- 203,5 x 43 x 6 mm, 118.86 g
- spearhead blade with rounded bases
- damascened blade

The hillfort finds include the typical G type (1) and two later variants, one of which is of the East Baltic variant (2) with the base of the blade at a sharper angle to the haft than in the G type proper and the other is the blade of a spearhead resembling the round-based variant of the type (3). Lehtosalo-Hilander (1985 8) refers to the former as G1 and the next-mentioned one as G2.

2.1.2.1. The typical G-type spearhead

Spearheads of type G have a wide area of distribution from Iceland to the area of the Baltic. Solberg (1984 129) has, however, pointed out that it was limited to regions where pagan burial customs survived until the 11th century. The presence of the type in

these areas and its profuse and different damascening indicates an overall European type which was probably made in several regions.

In many of the spearheads of this type the socket was silver-ornamented, which is not the case in this connection. On stylistic grounds these spearheads have usually been regarded as originating from Gotland, which is not accepted by Solberg who observes that artefacts decorated in the Ringerike and Urnes styles display such an extensive distribution in the Nordic countries that no conclusions regarding the area of manufacture can be made (Solberg 1984 129; cf. Lehtosalo-Hilander 1985 27).

Type G is the most common spearhead form of the late Viking Period in Finland. According to Lehtosalo-Hilander (1982b 15), almost 130 specimens have been found of the type and its variants. The area of distribution covers all of the regions under permanent settlement at the time and there are a few isolated finds from wilderness areas as well.

According to Petersen, the type belongs mainly to the 10th century, preferably its latter half, but is still found in 11th century connections (Petersen 1919 29). Solberg's dating does not differ from the traditional one. His type IX.1A, corresponding to type G, was in use from around 950 to the end of the Viking Period (Solberg 1984 123–126). Selirand (1974 10–11) has pointed out that the type was still in use in Estonia as late as the 13th century. Kirpičnikov classes the type among his type III, in use from the 10th to the 13th century. The actual dating of type G in the context of Kirpičnikov's group is unclear. A G-type spearhead from Bondar, presented in the illustrations of Kirpičnikov's work, is dated to the 11th century (Kirpičnikov 1966 7, 12–14, especially p. 13).

Ella Kivikoski (1939 218 & 1951 800–801) has dated the Finnish G-type spearheads to the 11th century suggesting that they remained in use until the end of the century. This is supported by coin-datings (P. Sarvas 1972 44–45; Lehtosalo-Hilander 1982b 34). A G-type spearhead was found in grave no. 12a at the Vilusenharju cemetery in Messukylä together with a Crusade Period so-called East Baltic-type spearhead (Nallinmaa-Luoto 1978 14), which may indicate the late use of the G type – or the early use of the East Baltic spearhead type. A G-type spearhead has been found at Mainiemi in Akaa with silver-spiral ornamentation of the socket (Kivikoski 1973 1181). The same ornament is also found on other spearheads (including the East Baltic type) as well as axes (Kivikoski 1973 1182, 1184, 1192). This silver-thread ornamentation is usually dated to the end of the 11th century and/or the following century, but, as pointed out by Leena Tomanterä, the oldest finds with this type of ornamentation are already from Viking Period contexts. Thus, there is no definite evidence to the 12th century dating of the type in Finland.

2.1.2.2. A spearhead of the so-called East Baltic type

As indicated by its name, this spearhead type is known only from the East Baltic region apart from Finland (Selirand 1974 112). In Finland it is of western distribution, as pointed out by Matti Huurre (1987 73). It has been found in Finland Proper, Satakunta and Häme and also from Sysmä and Iitti to the east of Lake Päijänne. In the wilderness regions it has been found in the vicinity of the water-shed at Kyyjärvi in Central Finland, Pielavesi in Northern Savo and Suomussalmi in Kainuu.

The spearhead in question appears to have been developed from type G, and is also referred to as G2 (Lehtosalo-Hilander 1985 8). Kivikoski (1973 1184) presents the type in connection with Crusade Period weapons. Nallinmaa-Luoto (1978 137, 242) dates the type to the end of the 11th century at the earliest. This is based on Estonian datings, placing the spearheads to the 13th and 14th centuries (Selirand 1974 112).

Among the Finnish finds of the type there are undamascened specimens similar to the Kuhmoinen spearhead, but the material also includes damascened spearheads and ones with false damascening, i.e. impressed with stamps imitating damascening. This group of artefacts has not been the subject of detailed study so far.

2.1.2.3. A spearhead with rounded base resembling type G

The other G-type variant from Kuhmoinen belongs to the group of rounded-base spearheads resembling type G, of which it differs with respect to the form of the socket, the blade and the junction of the blade as well as damascening. Almost identical parallels have been found in the east Baltic region where they have been dated to the 12th and 13th centuries (Anteins 1973 89, 92, 96; RA 1988 Fig. 19). The damascening of the blade of a long-socketed spearhead of the Marikkovaara find, dated to c. 1200, resembles to a considerable degree the damascening of the blade of the Kuhmoinen spearhead (A. Sarvas 1973 8; Leppäaho 1964 Tf. 59:1).

2.1.3. M-type spearheads

1. NM 22445:62 (Find 30/1985, Plate 2:5, 4:3), south part of the level area behind the wall, excavation area 4, sq. 134/168
– 431 x 46 x 9 mm, weight 420.53 g
– damascened blade
– two wide raised bands between thinner bands in the upper part of the socket; the intervening part of the socket is octagonal in section; a rivet-hole in the socket
– found under layers of stones together with an arrowhead (NM 22445:63)

2. NM 22445:68 (Find 26/1985, Plate 2:4), south part of the level area behind the wall, excavation area 4, sq. 124/174
– 47 x 26 x 13.5 mm, weight 34.9 g
– spearhead fragment consisting of the junction of the blade and the socket; raised band at the junction; the part of the socket below it appears to round
– the fragment clearly appears to have been cut into pieces and the sides of the blade in the upper part were cut symmetrically

3. NM 22029:1 (Find 4/1983, Plate 3:1), south part of the crest area, excavation area 1, sq.110/210
– 442 x 56 x 10 mm, weight 478.35 g
– two rivet-holes in the socket; the edges of one of the holes have broken off
– fire patina on the blade

4. NM 22005:1 (Find 1/1983, Plate 3:2), lower east terrace, excavation area 2, sq. 104/244
– 252 x 33 x 8 mm, weight 145.49 g
– parts of the mouth of the socket are missing
– found together with the following blade fragment

5. NM 22005:2a (Find 1/1983, Plate 3:3), lower east terrace, excavation area 2, sq. 104/244
– 59 x 35 x 6 mm, weight 54.95 g
– blade fragment with the lower part bent double on both sides by beating, the lower part has been thinned and bent
– slight traces of fire patina

Type M is one of the international spearhead types of the Viking Period with a distribution from Iceland to the shores of the Baltic (Solberg 1984 113). Silver ornamentation occurs also in the sockets of this type and Gotland has been suggested as the area of origin. On the same grounds as in connection with type G, Solberg rejects the suggested origin and maintains that because of the Ringerike-style decoration of the sockets, the type could have been made in various places in Scandinavia (Solberg 1984 111).

Approximately 100 M-type spearheads have been found in Finland and they include several variants (Lehtosalo-Hilander 1985 14). In addition to spearheads with raised or thickened parts and/or facetting there are also small undecorated specimens and narrow-bladed forms falling in between types M and K. Both of the first-mentioned have been found in Kuhmoinen. Type M occurs in both Eastern and Western Finland, and there are few finds from outside the area of permanent settlement.

Petersen (1919 35) regarded type M as the youngest of the Viking Period spearheads, dating it to the 11th century. This view has not been changed to any significant degree by later studies. Type M corresponds to Solberg's sub-types VII.3A and VII.3B (some

of the specimens with raised or thickened bands are of this type), which are dated mainly to the first half of the 11th century. Subtype VII.3B may belong to the latter half of the century or even the beginning of the 12th century (Solberg 1984 99–102). The latter dating is to a great degree based on Kivikoski's view that the variant belongs mainly to the 11th century and in Karelia even to the following century (Kivikoski 1973 865; C. A. Nordman 1924 138). Lehtosalo-Hilander (1982b 34) is of the opinion that no acceptable grounds have been presented for this claim. Three coin-datings from Western Finland support the 11th century dating and especially the beginning of the century (Lehtosalo-Hilander 1982b 34; P. Sarvas 1972 45). It is not possible to demonstrate any difference in age among the variants of the type. The Kuhmoinen hillfort finds include the typical form, the variant with a raised band and small spearheads. A spearhead of type M was found together with a G-type spearhead in grave no. 215 at the Luistari cemetery (Lehtosalo-Hilander 1982a 167).

In Estonia type M is dated to the 11th and 12th centuries (Selirand 1974 112), which is also the case in Russia (Kirpičnikov 1966 7).

2.1.4. An unclassified spearhead

1. NM 22445:2 (Find 18/1984, Plate 3:4), south part of the crest area, excavation area 1, sq. 110/210
– 368.5 x 38 x 6.5 mm, weight 202.6 g
– on one side of the socket is a fragment of raised band with crosswise grooves
– the edges of the blades have come off the seam in such a way that the original form of the blade cannot be estimated
– a large hole on one side of the socket and two rivet-holes opposite each other in the lower part of the socket

Because of the fragmentary condition of the blade, parallels cannot be identified. The artefact resembles type G to some degree (cf. e.g. Kivikoski 1973 1189). The raised band of the socket is a feature occurring in M- and H-type spearheads as well as in later Russian spearheads (Kirpičnikov 1966 passim).

2.1.5. Knife-like spearheads

1. NM 22445:90 (Find 21/1985, Plate 3:6), north slope, sq. 158/200
– 318 x 23 x 17 mm, weight 140.21 g
– barbed blade
– one rivet-hole in the socket

2. NM 22445:136 (Find 55(1985, Plate 3:5), upper east terrace, sq. 104/230
– 200 x 12 x 20 mm, weight 94.71 g
– the socket is in fragments and the blade is in an extremely poor state of preservation

2.1.5.1. Barbed knife-like spearheads

This small group of weapons (c. 20 specimens) is known from Finland Proper, Satakunta and Häme. There are also single finds from Savo, Karelia and Lapland (Kivikoski 1973 993; Lehtosalo-Hilander 1982b 36). According to Selirand (1974 115), spearheads of this type have been found in Estonia, Latvia, the Vodian-Slav region to the east of Lake Peipus and in Novgorod.

The barbed knife-like spearheads form a heterogenous group including specimens with knife-like blades, socketed or tanged ones with one or several barbs and often even specimens twisted rods (Kivikoski 1973 993, 1237). These spearheads have sometimes been mistakenly called harpoons. Socketed specimens are rare among the group, and to my knowledge there are only two finds (from Hautausmaa, Kalvola, NM 9131:2 – Kivikoski 1973 1237 and Vilusenharju in Messukylä, NM 17208:84 – Nallinmaa-Luoto 1978 t. XXV:6). Neither of these is an exact parallel to the one from the Kuhmoinen hillfort, nor can they be dated with any precision. Kivikoski has suggested a general dating to the end of pagan times (Kivikoski 1973 993). A coin-dating from the Saramäki cemetery in Maaria indicates the end of the 11th century (P. Sarvas 1972 95).

In Estonia, Selirand (1974 114–115) has dated the spearheads to the 12th–13th centuries. Kustin (1962 84) suggests the possibility that the oldest specimens are from as early as the 9th and 10th centuries.

2.1.5.2. An unbarbed knife-like spearhead

This author has no knowledge of parallels to the unbarbed knife-like spearhead. However, its similarity with the above-mentioned spearheads is so obvious that the above information on dating can also apply in this connection.

2.1.6. Unidentified spearhead fragments

1. NM 22445:149 (Find 20/1986, Plate 5:1), south part of the level area behind the wall, excavation area 4, sq. 132/169
– 18 x 18 x 6 mm, weight 4.42 g
– fragment of a socket

2. NM 22445:96 (Find 17/1985, Plate 5:10), northeast terrace, sq. 150/208
– 60 x 20.5 x 7 mm, weight 12.39 g
– point fragment

3. NM 22445:209 (Find 47/1986, Plate 5:2), northeast terrace, sq. 183/220
– 35 x 21 x 3 mm, weight 14.3 g
– socket fragment

4. NM 22445:122 (Find 9b/1986, Plate 5:7), northeast terrace, sq. 138/224
– 72 x 15 x 5 mm, weight 16.58 g
– point fragment
– blades hammered flat

5. NM 22445:128 (Find 1e/1985, Plate 5:8), northeast terrace, sq. 136/226
– 42.5 x 16.5 x 5 mm, weight 10.3 g
– point fragment slightly bent at the end
– fire patina

6. NM 22445:218 (Find 54/1986, Plate 5:3), northeast terrace, sq. 126/228
– 35 x 15 x 5 mm, weight 5.35 g
– point fragment

7. NM 22445:226 (Find 55/1986, Plate 5:4), northeast terrace, sq. 126/230
– 21 x 9 x 4.5 mm, weight 2.01 g
– point fragment
– fire patina

8. NM 22445:13 (Find 41/1984, Plate 5:13), lower east terrace, excavation area 2, sq. 104/244
– 21 x 16 x 8.5 mm, weight 2.6 g
– socket fragment
– may belong to spearhead NM 22005:1

9. NM 22005:2b (Find 2/1983, Plate 5:9), lower east terrace, sq. 108/244
– 59 x 35 x 6 mm, weight 25.73 g
– flattened lower part of socket

10. NM 22029:2 (Find 3/1983, Plate 5:6), eastern outcrops, sq. 108/244
– 86 x 20 x 5.5 mm, weight 27.14 g
– blade fragment

With the possible exception of fragment no. 8, none of the above fragments can be joined with any certainty to any of the fragmentary spearheads found in the crest area of the site.

Of interest in this connection is the fact that many of the above

fragments do not appear to have been broken in use, but were intentionally fragmented. Fragment no. 4 with its flattened blades has the appearance of a piece of iron shaped into another object.

2.1.7 Spear-shaft ferrules

1. NM 22445:190 (Find 30/1986, Plate 5:12), south part of the level area behind the wall, sq. 120/178
– 47 x 70 x 21 mm, weight 24.46 g
– affixing nail in place

2. NM 22445:48–49 (Find 14/1984, Plate 5:13), upper east terrace, sq. 110/234
– 65 x 23 x 22 mm, weight 21.95 g
– affixing nail recovered, originally in place

3. NM 22445:52 (Find 15/1984, Plate 5:11), eastern outcrops, sq. 90/252
– 51 x 27 x 15.5 mm, weight 10.59 g
– affixing nail in place

Simple, conical, hollow and sharp-pointed shaft ferrules or end bushings with a hole and a nail passing through have been used with sticks, staffs and spear-shafts. It is unnecessary to discuss the origin, function or distribution of such a simple, ageless and always necessary artefact (cf. e.g. an iron point bushing for an ice-staff, H. Vilppula 1940 52).

To my knowledge, the Finnish material contains only two prehistoric spear-shaft bushings or ferrules. One is from the Moisio cremation cemetery in Nousiainen, where it was found a few metres from a G-type spearhead (Leppäaho 1937 64). The other is from a Crusade Period find from Joensuu in Pielavesi which also includes an East Baltic spearhead and a bearded axe (NM 15870:1–3). Undated parallels have been found in Jämsä.

These artefacts have also been found in Iron Age contexts in Sweden. For example, there are several finds from Viking Period graves in Dalecarlia. As these graves also include spearheads, the objects have been interpreted as shaft bushings (Serning 1966 40, Pl. 20:9–10, 44:21, 70:4, 82:3, 84:9). The bushings or ferrules from Birka have been interpreted as having affixed to staffs (*Eispickel*) used when skating on ice (Vahlne & Arwidsson 1986 186).

2.2. Arrowheads

2.2.1. A willow-leaf-shaped arrowhead (Hiekkanen 3AIII)

1. NM 22445:63 (Find 30/1985, Plate 5:15), south part of the level area behind the wall, excavation area 4, square 134/168
– 93 x 17 x 4 mm, weight 18.29 g
– fire patina
– found from beneath an M-type spearhead (NM 22445:62) under stones at the foot of the wall.

This arrowhead type is rare in Finland, and only five specimens are known, two from Häme and Vakka-Suomi each and one from Satakunta. Outside of Finland, it has been found in Norway and Estonia (Hiekkanen 1979 71–73).

Four of the Finnish finds are from cemeteries which were in use either in the Merovingian and Viking Periods or solely in the Viking Period, one is an undated stray find (Hiekkanen 1979 71–73). The Estonian finds are dated to the 12th and 13th centuries (Selirand 1974 122) and the Norwegian specimens are of Medieval date (Farbregd 1972 29, fig. 74).

2.2.2. An unclassified arrowhead

1. NM 22445:137, (Find 2/1985, Plate 5:16), northeast terrace sq. 134/200
– 128 x 20 x 5 mm, weight 16.98 g
– fire patina

This is a twin-pointed arrowhead with the widest part of the blade below the middle. It belongs to Hiekkanen's type-group 3, but Hiekkanen's criteria of classification do not permit a more precise grouping. The unclassified arrowheads of Hiekkanen's group 3 include only one specimen (NM 17181:7) which is of similar size and shape. It was found at the Siivolanpelto cremation cemetery in Sysmä in the Päijät-Häme region. The cemetery was in use in the Viking and Crusade Periods. The type-groups (3BIV–VI) to which this arrowhead could be grouped are of the late Iron Age (Hiekkanen 1979 108–112).

There is no information on foreign parallels to this artefact.

2.2.3. A transverse-bladed arrowhead

1. NM 22445:114, (Find 13/1985, Plate 5:17), northeast terrace, sq.142/218
– 97.5 x 18 x 4 mm, weight 13.5 g
– a possibly rhomboid or triangular thickening on the tang

This arrowhead type is of eastern origin and its area of distribution covered the whole of Northern Eurasia from China to Norway. It appears to have spread into Scandinavia via Karelia and Finland. They are rare though not completely unknown in the East Baltic region (Hackman 1938 80–89; Wegraeus 1986 30–32; Hiekkanen 1979 34–35).

In Finland transverse-bladed arrowheads have been found in Finland Proper, Satakunta, Häme, Karelia and Northern Finland. The distribution of the transverse-bladed type 1X is more limited; of the 13 known specimens 12 are from five cemeteries in the Satakunta region and one from Finland Proper (Hiekkanen 1979 30–32).

The arrowhead from the Kuhmoinen hillfort can mainly be classed among Hiekkanen's type 1 X of the transverse-bladed arrowheads. Most of these are from Viking and Crusade Period cemeteries. Two are from cemeteries with both Merovingian and Viking Period finds and one is from a cemetery which was in use from the Merovingian Period to the Crusade Period (Hiekkanen 1979 30–32).

Transverse-bladed arrowheads from foreign contexts are hard to classify on the basis of illustrations alone, and only comments on dating can be presented. In Sweden this type is not older than the Viking Period (Wegraeus 1971) and it may have remained in use until the Middle Ages (Serning 1956 83). Until recent times they were part of the material culture of the Ob-Ugrians, as shown by a number of specimens in the collections of the National Museum of Finland (K. Vilkuna 1950 353–354).

2.3. A lash-ball

1. NM 22445:38 (Find 32/1984, Plate 5:14), north part of the crest, sq. 148/202
– 35 x 26.5 x 3–4 mm, 21.59 g
– two pieces fitting together

This spherical bronze artefact in two pieces with small studs is a lash-ball (Fig. 2). It was originally affixed to a rope or lash which was joined to a handle. In some cases the lash was only wound around the hand.

A lash with spiked balls was a common hand-weapon in Medieval Russia, where it is known as the *kisten*. It was used by both cavalry and infantry soldiers, but was perhaps more popular with the former.

The artefacts in question have been studied by A. N. Kirpičnikov, whose view regarding distribution and dating are cited in this connection (Kirpičnikov 1966 58–65, 134–139).

The oldest *kistens* are known from among the southeastern nomads of the Volga and the Don of the 5th–9th centuries. From them the weapon was introduced into Russia in the 10th century. A total of 127 specimens are known from the area of Old Russia and are dated to the 9th–13th centuries. Kirpičnikov divides the lash-balls into six main types. The oldest ones are of bone and are from the 10th–11th centuries. Only a few *kistens* are known from these centuries. In the following two centuries more durable, effective and smaller balls of metal came into use and they spread throughout the area of Russia, reaching their widest distribution.

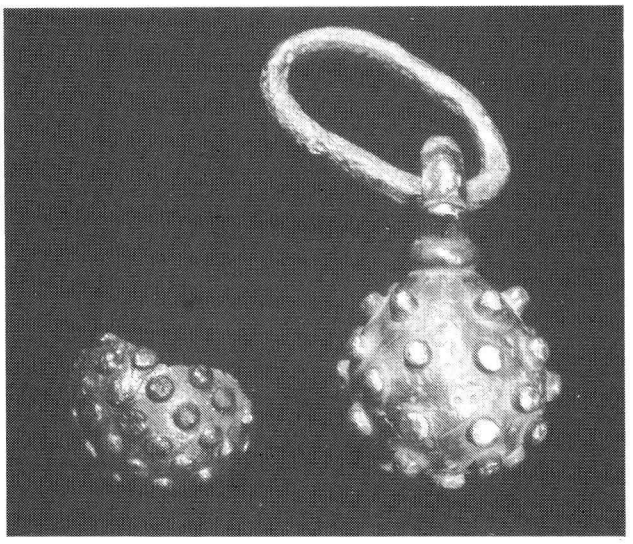


Fig. 2. Fragments of a lash-ball found at the Kuhmoinen hillfort (NM 22445:38) and a lash-ball found at Analei in Tsiviljsk, Kasan (Z. 2274). Photo Leena Tomanterä.

The distribution of a few of the types is concentrated on Southern and Northwestern Russia.

Parallels to the Kuhmoinen lash-ball can be found among the types of the 12th and 13th centuries. Kirpičnikov's type II consists of metal *kistens* of spherical or pear shape which are either smooth or fitted with studs. The round and studded variant forms type IIA, which includes identical parallels to the Kuhmoinen specimen (see e.g. *kisten* no. 69 from the Kiev *oblast*, Kirpičnikov 1966, tabl. XXXI:6). This group is dated to the 12th and 13th centuries and it is known in 22 specimens, mostly from the towns of Southern and Northwestern Russia, especially Kiev with almost half of the finds in question (Kirpičnikov 1966 64, tabl. 15). It has been suggested that the towns had the privilege of making and distribution *kistens* and many appear to have originated from the same workshop. Of the Russian find locations, Pskov is the closest one to Kuhmoinen (Fig. 3).

Type IIa, together with types IV and VI, spread outside the area of Russia to the settlements of the Bolgars on the Volga, from where Kirpičnikov lists a total of 17 *kistens*. The 13 lash-balls in the Zaoussaïlov collection of the National Museum of Finland are all from the Bolgar region, more precisely the former *gouvernement* of Kazan. The balls were originally thought to be weights (Tallgren 1918a 42, Pl. VIII: 31–32). Included are two specimens of type IIa, one from Anelei in Tsiviljsk (Zaoussaïlov 2274, Fig. 2) and one from Boltai in Tetjus (Zaoussaïlov 3397).

There are also some early written mentions of the weapon. It is depicted in an illustration of the killing of Igor Olgovitsa (1147) in the Radziwill chronicle and there are also two mentions from the 16th century. The weapon type was in use for a long period, as also indicated by oral tradition.

Although the Russian finds of lash-balls are among the oldest from Europe, the weapon was also known elsewhere in Europe and even as far as Japan (Demmin 1891 792–796). It does not appear to have been permanently adopted in the Nordic countries, for at least studies of Medieval weaponry do not mention it (see e.g. Thordeman 1943). There is, however, a Finnish find of the weapon type. A nail-studded wooden ball found in exca-

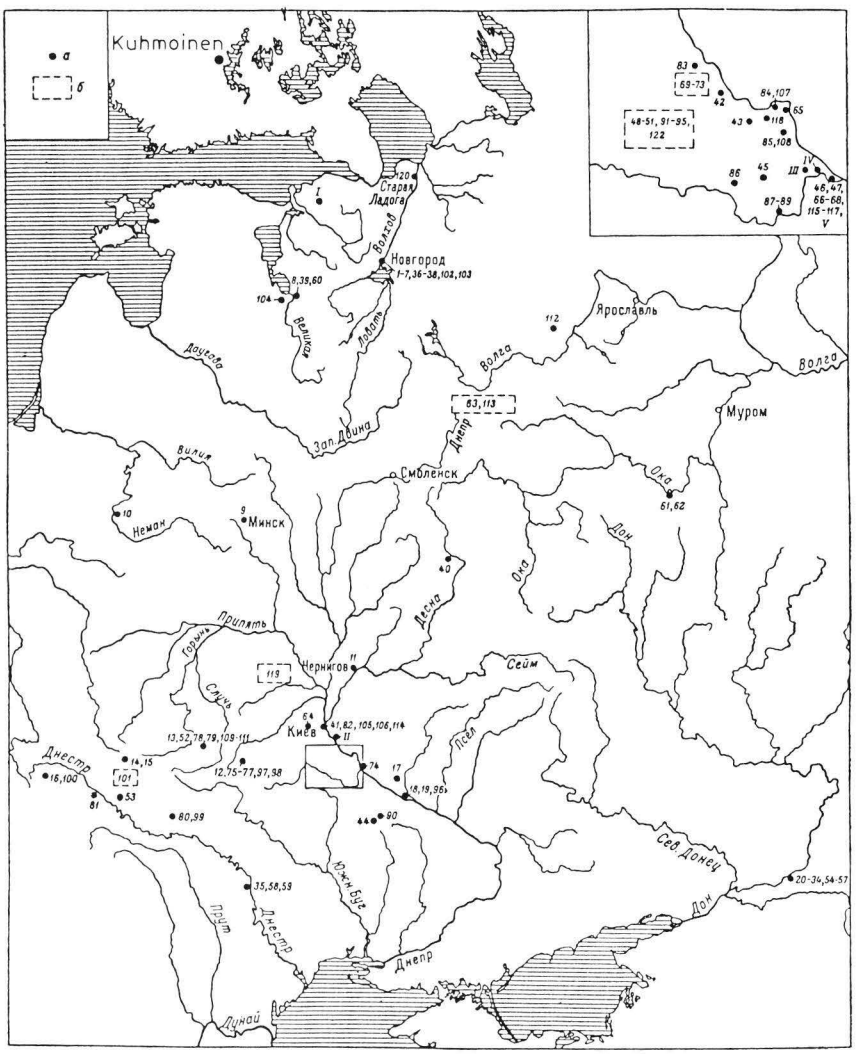


Fig. 3. Distribution of lash-balls in Russia according to A. N. Kirpičnikov (1966). The numbers of the map refer to the list of finds in Kirpičnikov's work.

vations at the Rettig lot in the town of Turku has been interpreted as belonging to a lash (Fig. 4; Historical Collections of the National Museum of Finland 4034:53; Appelgren 1902 63).

3. Tools, implements and related materials

3.1. Axes

3.1.1. A Finnish-Russian straight-backed axe

1. NM 22445:31 (Find 30/1984, Plate 6:1), south part of the level area behind the wall, sq. 120/180
– 176 x 82 x 33 mm, weight 433.09 g
– in the shaft-hole of the axe was a piece of iron (NM 22445:32) used as a wedge, weight 3.50 g
– a piece of flint (NM 22445:33) was found at the same location

In Wuolijoki's classification, the axe belongs to the straight-backed Estonian type (Wuolijoki 1972 8–9), although it is larger and heavier than most axes of this type. Wuolijoki's name for the group has not been accepted, for it gives the wrong idea of its distribution. On the basis of distribution, more appropriate terms have been suggested for Wuolijoki's straight- and curve-backed Estonian axes, such as Northern East Baltic axes or the Finnish-Russian axe, as they are known from throughout the Baltic region, but appear to be lacking from Scandinavia. In Finland their distribution covers all of the areas settled in late pagan times. There are also stray finds from uninhabited wilderness areas. The centre of distribution is, however, in Upper Satakunta and Häme (Lehtosalo-Hilander 1982b 51; Huurre 1983 375, 500; Paulsen 1956 25; Kirpičnikov 1966 38; Selirand 1974 89).

In Finland the oldest specimens of the type are dated to the end of the Merovingian Period and the beginning of the Viking Period. According to Wuolijoki, they belong to the early part of the Viking Period, but were apparently in use up to the 11th century (Wuolijoki 1972 8–9). Kirpičnikov (1966 30,37–38, ill. 6) and Paulsen (1956 25) date the axes to the 11th and 12th centuries, while Selirand (1974 89) suggests a period of use from the 9th century to the end of the 11th century.

3.1.2. A four-lugged axe

1. NM 22445:44 (Find 13/1984, Plate 6:4), upper east terrace, sq. 106/232
– 136 x 85 x 68 mm, weight 600 g
– in the shaft-hole of the axe was a piece iron (NM 22445:45, weight 13.67 g) serving as a wedge

This axe is of the four-lugged type, specimens of which Wuolijoki (1972 20–22) lists among the heterogenic Scandinavian straight-sided axes. This group does not provide any direct parallels for the Kuhmoinen specimen, but highly similar ones occur among Wuolijoki's L-axes of the late Viking Period (e.g. Tyrvää NM 6227:3) and Viking and Crusade Period groups differing from Petersen's classification (e.g. NM 8723:901) and Crusade Period groups (e.g. NM 5409:3). The centre of distribution is in Satakunta and Finland Proper and there are only few finds from Häme and Karelia. Axes of this type have also been found in wilderness areas, especially in Kainuu (Wuolijoki 1972 map 4). There are also isolated finds from Northern Scandinavia, from the southeast of Lake Ladoga and from even as far as the upper reaches of the Volga (Huurre 1983 380; 1987 73,84). Kirpičnikov (1966 29,41) dates the type to the 10th and 11th centuries.

3.1.3. A Finnish curved-backed axe

1. NM 22445:81a (Find 37/1985, Plate 6:2–3), south part of the crest, sq. 114/196
– 169 x 92 x 41 mm, weight 980 g
– in the shaft-hole were three iron rods used as a wedge (NM 22445:81b, weight 36.03 g)
– possible traces of fire patina

Fig. 4. A wooden ball with nails from the Rettig lot in Turku (NM, Hist.Coll. 4034:53). The artefact is assumed to have belonged to a whip or lash. Drawing by Tuula Piili. 1/1.

In accordance with Wuolijoki's classification, the axe belongs to the Finnish curved-backed type, dated to the Crusade Period. In connection with the type a coin-dating of 1017–1029 from grave no. 1 of the Franttilannummi cemetery in Mynämäki has been obtained (P. Sarvas 1972 45). In grave no. 2 of the Tuukkala cemetery, an axe of this type was found together with a ring brooch (Wuolijoki 1972 24).

Specimens of the type have been found in Satakunta, Häme, Savo, Ladoga Karelia and the wilderness regions of Ostrobothnia and Lapland. The centre of distribution is in Upper Satakunta and Häme. A highly similar type occurs in Russia, where it is dated to the second half of the 10th century (Kirpičnikov 1966 tabl. XIV:69). As the type is not listed by Kirpičnikov, it appears to be exceptional in the latter connection.

3.1.4. A Karelian axe

1. NM 22445:113a (Find 11/1985, Plate 6:5), northeast terrace, sq. 140/218
– 51 x 51 x 12 mm, weight 89.58 g
– butt fragment
– found together with a piece of copper plate (NM 22445:113b)

The fragment originally belonged to a long-butted axes in which the lugs and the butt had "grown together". This is a characteristic feature of Karelian axes which are both bearded and unbearded, but for obvious reasons the fragment cannot be classed into either group. They are both, however, of the same age, belonging to the Crusade Period material of Karelia (Wuolijoki 1972 31–33), apparently from the end of the period as they are often found together with ring brooches.

Karelian axes have been found only in Eastern and northern Finland, Northern Sweden and in Novgorod and the upper Volga in Russia (Huurre 1983 380; Zachrisson 1976 28, bild 29; Kolčin 1953 67:10 and 1959 fig. 10:7; Kirpičnikov 1966 tabl. XX:3).

3.2. Knives

3.2.1. Knives

1. NM 22445:147, (Find 40/1985, Plate 7:2), west slope sq. 158/154
– 54 x 24 x 4 mm, weight 20.68 g
– fragmentary with very little remaining of the blade

2. NM 22445:10 (Find 36/1984), lower east terrace, excavation area 2, sq. 100/244
– missing
– found together with three E-type spearheads (NM 22445:7–9)

The first-mentioned knife is in such a poor state of preservation that it is cannot be classified according to type. The blade was relatively wide, but with a thin butt and it cannot be regarded as an all-purpose knife. In carving the blade no doubt cut wood, but would easily be lodged in the wood and the blade was too thin for easily dislodging shaving. It may have been better suited to the cutting of meat and hides and possibly also for puncturing and shredding.

3.2.2. A shingle-cutting knife

1. NM 22445:100 (Find 16/1985, Plate 7:1), northeast terrace, sq. 140/214
– 284 x 17 x 8 mm, weight 115.01 g
– fire patina

Long knives with 20–80-centimetre blades have been classed as combat knives or sceax (Salmo 1938 127). In this thick-butted knife the blade is especially worn near the tang. Salmo has also pointed to this feature in certain sceax, observing that "das Kampfmesser hat im Bedarffalle auch alltaglichen Zwecken gedient." However, this does not appear to be a typical feature of a combat weapon and brings to mind Sakari Pälsi's (1955 57) mention of a special (old men's) shingle-cutting knife which was large and sturdy and could withstand heavy-handed use.

However, the long knife from Kuhmoinen resembles to some degree the straight-backed sceax of the Merovingian Period (Salmo 1938 132), but the blade is thinner and the butt is wider. Many of the Viking Period sceax found in graves in Satakunta and Häme had blades of this type (Salmo 1952 393–394). Examples include an approximately similar-size combat knife from Juvela, Tiihala in Kangasala (NM 5869:4) and c. 10 cm longer knives from Luistari in Eura (Lehtosalo-Hilander 1982a Pl. 70) and Ruskeenkärki in Hattula (Huurre 1976 59). In especially the last-mentioned case the considerable wear of the blade at the base of the tang shows that it was mainly used in that part. Knife-blades are worn in this manner by cutting shingles using the knife together with an axe: the long-bladed and wide-butted knife was placed on top of the section of log to be cut into shingles so that the wood was close to the handle and the blade extended past the piece to be cut, the knife-tip is tapped with an axe and at the same time the handle is pressed and slightly moved to and fro, whereby shingles can be cut. The ethnographic collections of the National Museum of Finland contain a similar shingle-cutting knife from Antrea (C 659), with use-wear of the blade in the same part. The large knife could also have been used for felling small trees and bushes.

Jan Petersen (1951 188) has defined the minimum length of the combat knife as 30 cm and the width of the blade as 3 mm. Lehtosalo-Hilander (1982b 19) has stressed that the Finnish combat knives or sceax do not correspond to Petersen's definitions. Only a few of the Viking Period knives are of sufficient length and hardly any of them have the necessary width of the blade. Lehtosalo-Hilander suggests that in Finland the form of the knives was dictated by a completely different fashion than in Western Scandinavia. A more plausible reason may be a different or several functions both in the Merovingian Period and in the Viking Period. For example, the Merovingian Period combat knives from Luistari include two knives with wear of the blade near the handle, as pointed out by Lehtosalo-Hilander (1982b 19). Many of the combat knives from Luistari and other cemeteries may originally have been tools, but tools can always be used as weapons and vice versa.

According to Salmo, thin-bladed combat knives similar to the shingle-cutting knife from the Kuhmoinen hillfort have been found in considerable numbers especially in the cemeteries of Satakunta and Häme (Salmo 1952 393–394). Lehtosalo-Hilander (1982b 19) has stressed the wide distribution of the type not only in Finland and mainland Sweden, but also in Gotland, Estonia, Latvia, Lithuania and various parts of Russia. According to her, this demonstrates the similarity of Finnish weaponry with that of Eastern Scandinavia and the whole of the Baltic region. Perhaps this similarity of knife types also indicates the common use of lighting dwellings with burning shingles.

Salmo (1952 394) dates the thin-bladed combat knives to the Viking Period and especially the 10th century. At the Luistari cemetery, coin-datings suggest a dating to the first part of the 10th century (Lehtosalo-Hilander 1982b 19). The artefact was, however, a tool which was used for a long period, as indicated by the above-mentioned example of a shingle-cutting knife from Antrea. Bladed implements completely similar to this knife from the Kuhmoinen hillfort were used as late as the Second World War for cutting shingles (Secretary of state Teemu Hiltunen, oral. comm. 1985).

3.2.3. *Puukko*-knives

1. NM 22445:185 (Find 26/1986, Plate 7:11), southwest terrace, sq. 106/174
– fragment consisting of the blade and the base of the tang
– 54.5 x 14 x 7.5 mm, weight 9.8 g

2. NM 22445:160 (Find 19/1986, Plate 7:10), south part of the level area behind the wall, excavation area 4, sq. 132/172
– fragment consisting of the blade and the base of the tang
– 40 x 13 x 5 mm, weight 8.53 g

3. NM 22445:178 (Find 15/1986, Plate 8:5), south part of the level area behind the wall, excavation area 4, sq.128/174
– point fragment
– 52 x 15 x 5 mm, weight 8.41 g

4. NM 22445:196a (Find 32/1986, Plate 8:4), south part of the level area behind the wall, sq. 134/184
– point fragment
– 18 x 10 x 5.5 mm, weight 1.78 g

5. NM 22445:75. (Find 35/1985, Plate 7:15), south part of the crest, sq. 110/184
– tang fragment
– 33 x 9.5 x 4 mm, weight 4.21 g

6. NM 22445:77 (Find 45/1985, Plate 7:9), south part of the crest, sq. 102/190
– fragment consisting of the blade and the base of the tang
– 71 x 17 x 7.5 mm, weight 17.92 g

7. NM 22445:36 (Find 6/1984, Plate 7:5), south part of the crest, sq. 102/190
– intact
– 115 x 9 x 4 mm, weight 8.39 g
– extensive wear on the blade

8. NM 22445:78 (Find 36/1985, Plate 7:7), south part of the crest, sq. 116/190
– intact
– 76 x 10 x 3 mm, weight 5.27 g

9. NM 22445:91 (Find 39/1985, Plate 8:2), south part of the crest, sq. 110/202
– point fragment
– 35 x 10 x 5 mm, weight 3.48 g

10. NM 22445:94 (Find 43/1985, Plate 7:14), south part of the crest, sq. 108/206
– tang fragment

– 46 x 17 x 5 mm, weight 13.68 g
– traces of hammering at the tip of the tang

11. NM 22445:41 (Find 7/1984), Plate 8:1), south part of the crest, sq. 108/214
– point fragment
– 40 x 11 x 4 mm, weight 4.61 g

12. NM 22445:130 (Find 2b/1985, Plate 7:12), northeast terrace, sq. 132/228
– tang fragment
– 39 x 8 x 5 mm, weight 3.65 g

13. NM 22445:131 (Find 4b/1985, Plate 7:8), northeast terrace, sq. 134/228
– intact
– 92 x 8 x 5 mm, weight 10.72 g

14. NM 22445:221 (Find 45/1986, Plate 7:6), northeast terrace, sq. 148/228
– intact
– 94 x 11 x 4 mm, weight 9.64 g

15. NM 22445:239 (Find 60/1986, Plate 8:6), northeast terrace, sq. 120/242
– blade fragment
– 30 x 14 x 5 mm, weight 4.72 g

16. NM 22445:125 (Find 53/1985, Plate 7:16), upper east terrace, sq. 84/226
– tang fragment
– 39 x 9 x 6 mm, weight 4.69 g

17. NM 22445:222 (Find 69/1986, Plate 7:13), upper east terrace, sq. 88/230
– tang fragment
– 30 x 8 x 3 mm, weight 2.55 g

18. NM 22445:230 (Find 75/1986, Plate 7:3), upper east terrace, sq. 108/232
– intact
– 126 x 18 x 6 mm, weight 27.92 g
– splinters of wood on the handle were observed in connection with the find
– fire patina

19. NM 22445:231 (Find 57/1986, Plate 8:3), northeast terrace, sq. 124/234
– point fragment
– 21 x 15 x 5 mm, weight 3.81 g

20. NM 22445:50 (Find 12/1984, Plate 7:4), upper east terrace, sq. 98/236
– intact
– 127.5 x 15 x 5 mm, weight 21.13 g

The above artefacts, both intact and fragmentary, can mainly be classed as general-purpose knives (Fi. *puukko*). They include three small knives (fi. *junki*) which are often regarded as having been used by women. Small knives were, however, needed for carving and were above all used in eating. The men wore the *junki*-knife in the same sheath as the larger knife.

Attempts have been made at classification i.a. according to the form of the back and the junction of the tang and the blade. With the exception of no. 15 (a sharp-pointed tapering knife) all of the above are straight-backed.

On the basis of the location of the tang nos. 8, 14, 15 and 19 belong to Lehtosalo-Hilander's group of "knives with the tang in the middle" (Lehtosalo-Hilander 1982b 45, 42, fig. 15:9). In nos. 7 and 21 the blade was to such a degree worn that they cannot be grouped. They may belong to the above-mentioned group or the "straight-backed knives with distinct offset" (Lehtosalo-Hilander 1982b 45, 42 fig. 15:8). Although Kivikoski (1973 67) mentions the straight-backed knife type from as early as the Early Roman Iron Age, it is usually regarded as a late type. Cleve (1943 121–122) maintains that the straight-backed general-purpose knives came into use in the 7th and 8th centuries. In the 9th century they were replaced by a type with a narrow and often short blade, with a distinct notch between the tang and the blade. This feature is present in all of the knives from the Kuhmoinen hillfort.

The feature occurs also in both of Lehtosalo-Hilander's above-mentioned groups. The last-mentioned group was in use throughout the whole period of the cemetery of Luistari (Lehtosalo-Hilander 1982b 45). Knives of the first-mentioned group were found in the youngest graves at Luistari, grave no. 404 is coindated to 1106–1111 (Lehtosalo-Hilander 1982b 45–46).

Small knives (*junki*) worn in the same sheath as the actual knife are generally regarded as being of later date. On the basis of written sources and linguistic evidence, Kustaa Vilkuna (1964b 84–90), maintains that they spread to Finland from the Medieval cultural sphere of Lower Saxony. The Finnish material does not contain any prehistoric double sheaths, not can the small knives from the Kuhmoinen hillfort be regarded as definitely belonging to such. Excavations of Medieval towns, e.g. in London, have revealed double sheaths and the oldest known specimen is from the latter half of the 13th century (Cowgill et al. 1987 130).

Knives, like tools in general, are an artefact group that is hard to date. The knives from the Kuhmoinen hillfort are of types which were in use in the Late Iron Age and up to historically documented times.

The Kuhmoinen finds include 6 intact "everyday knives" (nos. 7, 8, 14, 15, 19 and 21). Fragmentary specimens consisting of the tang and the base of the blade are three in number (nos. 1,2 ,6) and there is one blade fragment (no. 16). There are also five point fragments (nos. 5, 10, 13, 17, 18). The number of fragments is large and they do not appear to have been broken in connection with use, but are more likely to have been broken regularly or cut into three parts in a systematic manner. A whole knife can be assembled by joining together the tang, the tang and blade junction fragment and the point fragment.

3.2.4. Knife-sheath fittings

1. NM 22445:246 (Find 37/1986, Plate 8:10), west slope, sq. 146/158
– thin copper plate perforated at one end
– 37 x 6 x 1 mm, weight 0.84 g

2. NM 22445:250 (Find 22/1984, Plate 8:8), north part of the level area behind the wall, sq. 144/174
– copper fitting with band ornament and holes at both ends
– 69 x 10.5 x 0.5 mm, 1.52 g

3. NM 22445:236 (Find 61/1986, Plate 8:7), northeast terrace, sq. 118/242
– perforated acanthus-ornamented fragment of a bent copper fitting
– 34 x 11 x 0.5 mm, weight 1.69 g

4. NM 22445:229 (Find 68/1986, Plate 8:11), upper east terrace, sq. 82/232
– narrow copper plate perforated at both ends
– 21 x 7 x 0.5 mm, weight 0.37 g

5. NM 22445:250 (Find 2/1987, Plate 8:9), upper east terrace, sq. 84/232
– piece of copper plate perforated at one end
– 18.5 x 11 x 0.8 mm, weight 0.31 g

6. NM 22445:252 (Find 1/1987), eastern outcrops, sq. 104/250
– perforated fragment of copper plate
– 13.5 x 11.5 x 0.5 mm, weight 0.38 g

It is not certain whether copper plate pieces and fragments nos 1, 4–6 were originally sheath fittings. On the other hand, nos. 2 and 3 are definitely sheath fittings. The latter is from the point of the sheath and the former appears to have been a fitting strengthening the seam of the sheath. The point fitting is decorated with acanthus ornament and the seam fitting with band ornament. The finds from the Tuukkala cemetery in Mikkeli include a knife also with acanthus ornament on the sheath-point fitting and band or-

nament on the seam fitting (Heikel 1889 fig. 14, the band ornament is of better quality on the side not shown in the illustration). Both ornament styles were thus in use at the same time.

Acanthus ornament has been regarded as a characteristic of the Karelian cultural sphere. Ella Kivikoski (1966b), however, has pointed out that it was also known in Western Finland. Finds from excavations in the urban area of Turku include a Medieval acanthus-ornamented knife-sheath of leather, which however cannot be dated with any greater precision (Kivikoski 1973 1229). Kivikoski also mentions a belt fitting from the Ristimäki cemetery in Kaarina and a Karelian-style eared spoon from Anttila, Tyrväntö in Hattula. An Early Medieval silver spoon with acanthus ornament on the thickening of the stem has been found at Lammaistenkoski in Kokemäki (Räty 1986). The same ornament also occurs in the stem of a bone spoon from Osmanmäki in Eura (NM 1913:7, Aspelin 1880 1355). We may also mention a sword fragment from Rikala in Halikko with acanthus ornament on the guard (Björck 1883 62). This artefact is probably of Karelian origin. Also of eastern origin is a sword from the Mikkola cemetery in Ylöjärvi in which the pommel is decorated with the ornament type in question (Koskimies 1973).

The occurrence of these finds in Western Finland is not surprising, as the motif is an overall-European one of Romanesque origin (Karlsson 1976 74; Appelgren-Kivalo 1910). Finds of this ornament on e.g. knife sheaths are by no means uncommon in West European town excavations (e.g. Cowgill et al. 1987 118, 120). It became integrated with Nordic ornament in the early part of the 11th century (Karlsson 1976 74).

Band ornament, as indicated by the knife-sheath fittings from Tuukkala, occurs together with Romanesque ornament. The motif is a universal one and a characteristic feature of Nordic art already in the Migration and Viking Periods (Karlsson 1976 135). Niilo Valonen (1970) has published Finnish material with Viking Period and Medieval band ornament. This type of ornament is also used in the decorative art of the Lapps.

3.3. Shears

1. NM 22445:158 (Find 17/1986, Plate 8:15), south part of the level area behind the wall, excavation area 4, sq. 132/172
– fragment from the junction of the blade and the stem
– 27 x 14 x 2.5 mm, weight 2.39 g

2. NM 22445:6 (Find 8/1984, Plate 8:12), south part of the crest area, excavation area 1, sq.108/216
– intact shears
– 271.5 x 46 x 18 mm, weight 102.21 g

3. NM 22445:127 (Find 5/1985, Plate 8:14), northeast terrace, sq. 134/226
– point fragment of the blade
– 29 x 9 x 2.5 mm, weight 2.01 g

4. NM 22445:129 (Find 6b/1986, Plate 8:13), northeast terrace, sq. 136/226
– blade fragment
– 71 x 24 x 3 mm, weight 11.16 g

The shears fragments cannot be classed according to type, as this is based on the form of the curve of the upper part of the handle. According to Kivikoski (1973 976), a circular form of this detail is typical for the later group of Iron Age shears in Finland, which came into use at the end of the Merovingian Period and the beginning of the Viking Period, remaining in use throughout prehistoric times and even later. The shears type is also known from ethnographic material.

On the basis of burial finds, shears were used by both men and women. In the older and middle stages of the Iron Age they were clearly more numerous in men's rather than women's graves. The situation remained the same in the Viking Period (Hackman 1938 150–162). Also Lehtosalo-Hilander's later observations point in the same direction. According to her, double the number of shears were found in men's graves in the inhumation burial area of Satakunta than in women's graves.

The Late Iron Age shears type of Finland has also been found in Sweden and Norway (see e.g. Arwidsson 1984 195–198; Petersen 1951 318–319). A common feature is also the fact that they were found in men's graves (Hackman 1938 162), although in Scandinavia shears are more common in women's graves (Arwidsson 1984 195, Lehtosalo-Hilander 1982b 59–60). Scandinavia clearly differs from Russia and the East Baltic lands, where the same type was also in use (see e.g. Kolčin 1959 61, 58–60; Tõnisson 1974 Taf. XVI:1). In graves, however, shears are rare, with the exception of the very end of the Iron Age (Hackman 1938 162; Lehtosalo-Hilander 1982b 60).

3.4. Wood-working tools

3.4.1. Chisels

1. NM 22445:153 (Find 86/1986, Plate 9:3), south part of the level area behind the wall, excavation area 4, sq. 132/170
– blade fragment
– 14 x 9 x 4 mm, weight 0.85 g

2. NM 22445:146 (Find 1f/1986, Plate 9:6), northeast terrace, sq. 136/24
– blade fragment
– 28 x 17 x 6 mm, weight 7.7 g
– fire patina

The above fragments are from the blades of either chisels or planes. These are artefacts of wide distribution, the dating of which – even in intact condition – is difficult. These tools were known by the Romans (Gaitzsch 1980) and their basic models are still in use. The oldest fragments of chisel or plane blades in the Iron Age material of Finland have been encountered among Viking and Crusade Period finds (Salmo 1952 423–424; Lehtosalo-Hilander 1982b 60).

3.4.2. A grooving tool

1. NM 22445:106 (Find 12/1985, Plate 9:1), northeast terrace, sq. 138/216
– 118 x 32 x 22 mm, weight 35.8 g

The grooving tool is of a type with a closed blade and the tangs linked together into a clinched tang-part.

The oldest grooving and hollowing tools in the Finnish finds are from the Finskilä cemetery in Sauvo, dating back to the 4th century AD (Salmo 1957 29–30; Kivikoski 1973 181). These tools also occur in Migration and Viking Period connections at Rönni in Pälkäne, Kjuloholm in Köyliö, Kiiliä in Sääksmäki, Lapinlahti in Sakkola and Salmi in Urjala (Cleve 1943 146–148; Kivikoski 1973 622–623). There are also Viking Period finds from Luistari in Eura (Lehtosalo-Hilander 1982b 60–61). With the exception of one specimen, the tangs are not linked to each other and they appear to have been made for use with two hands or were affixed to a forked handle. The closest parallel to the grooving tool from the Kuhmoinen hillfort is from the Rönni cemetery in Pälkäne – a closed-bladed specimen with linked tangs. There are parallels to the type in ethnographic contexts (Ranta-Knuuttila 1970 157, type shown in fig. 5). It also occurs among other types of grooving and hollowing tools in Finland Proper, Häme and Ostrobothnia as well as to some degree in Karelia, Satakunta and Uusimaa (Ranta-Knuuttila 1970 160–161).

Iron Age grooving and carving tools are also known from East Prussia, Estonia, Latvia and Denmark (Cleve 1943 147) as well as from Merovingian and Viking Period men's graves in Norway (Petersen 1951 218) and Viking Period and Medieval connections in Sweden (Arwidsson & Berg 1983 35–36). Similar tools have also been found in Novgorod among finds of the 13th and 14th centuries. These include a specimen with joined tangs (Kolčin 1959 42–43, ris. 24:4,6). Like the chisels and planes, grooving tools were part of the Roman tool-kit (Gaitzsch 1980 Taf. 56:280) and in this connection Gaitzsch's views may well apply: "Between the Roman and Modern Age tools did not come into existence. Nearly all forms were either fully developed or appear for the first time in Roman archaeological contexts." (Gaitzsch 1980 256).

3.4.3 Rivets

1.–5. NM 22445:197 (Find 91/1986, Plate 9:5), southwest terrace, sq. 94/188
– five copper rivets
– 13 x 2 x 3 mm, weight 1.62 g

Five copper rivets are listed in this connection, although they could also be discussed together with vessels of metal. Copper rivets were used not only in the rims of wooden vessels (e.g. Suotniemi, Käkisalmi NM 2487:101) but also for repairing copper vessels (see p. 203, copper pieces 80–81). An example of the former is a piece of copper plate riveted to the rim of a wooden vessel (NM 2487:101) from the Suotniemi cemetery.

3.5. A smithing tool and work debris

3.5.1. A punch

1. NM 22445:115 (Find 15e/1985, Plate 9:2), northeast terrace, sq. 144/218
– 97 x 22 x 21 mm, weight 180.28 g

This iron punch, a blacksmith's tool, is of almost rectangular section, slightly tapering downwards with a narrowing slightly above the middle part. The edge of the wider upper part has been widened through beating.

Blacksmiths' burials are not known in the Finnish material, unlike elsewhere in the Nordic countries. Smithy tools are also few in number in prehistoric contexts. Grave no. 2 of the Kekomäki cemetery in Kaukola contained a number of blacksmith's tools, including a hammer, a punch-like iron tool or stamp, forceps, three whetstones and a piece of bronze rod, which was originally raw material (Schwindt 1893 32–34). Schwindt (1893 172) has interpreted the grave-goods as belonging to a copper- and silversmith. Schwindt also refers to a casting scoop from the Suotniemi cemetery (grave no. 3) in Käkisalmi (Schwindt 1893 173). Finds from Huvilaniemi in Nokia include files (NM 11282:47–48). Small possibly blacksmith's tools of iron are a hammer from Ristenkömppä in Laitila, augers, wedges, punches and dies from Värilä in Pälkäne (NM 6096:2, 66), Saramäki in Maaria (Kivikoski 1973 980), Makasiininmäki in Janakkala and Vilusenharju in Tampere (Nallinmaa-Luoto 1978 218–219). Finds from the Hovinsaari smithy in Räisälä, assumed to be of Crusade Period date, and the Lieto hillfort, still used in Medieval times, include blacksmith's tools (Leppäaho 1951; Luoto 1984a 92). These have also been found at ancient hillforts in Karelia (Kočkurkina 1981 passim). Stamp-like iron tools have also been found at the Hovinsaari smithy and among the stray finds of the Suotniemi cemetery (Schwindt 1893 165). None of them, however, provide direct parallels to the find from the Kuhmoinen hillfort.

On the other hand, several parallels can be found in ethnographic material. Highly similar chisels were used for cutting iron (see e.g. Tobiassen 1981 39–40). These, as well as spiked punches, are still used by the master-blacksmith Oiva Rännilä. Rännilä's cutting tools also show how the artefact was hafted with a withe of willow at its narrowest part (Fig. 5, see also Tobiassen 1981 43–44).

In Scandinavia punches and chisels are known not only from Viking Period graves but also from the well-known Mästermyra coffin find in Gotland (e.g. Arwidsson & Berg 1983 Pl.8; Thålin-Bergman 1983 198; Blindheim 1963 34; Petersen 1951 93, 95–98; Grieg 1922 58–60; Müller-Wille 1977 156; 1983 251). The considerable age of chisels and also punches is demonstrated by Roman and Provincal Roman finds (Olhaver 1939; Gaitzsch 1980).

3.5.2. Slag

1.–5. NM 22445:184 (Find 84/1986), south part of the level area behind the wall, sq. 136/172
– 5 pieces, total weight 207 g

6.–100. NM 22445:164, south part of the level area behind the wall, excavation area 4, sq. 132/172
– 95 pieces, total weight 1,234 g

Fig. 5. Cutting irons from the smithy of Oiva Rännilä of Kuhmoinen. Willow withes are affixed to the irons. Photo Seppo Rintala 1985.

101.–103. NM 22445:24 (Find 27/1984), south part of the level area behind the wall, excavation area 4, sq. 134/172
– 3 pieces, total weight 36 g
– found together with two fragments of kettle ears (NM 22445:23)

104.–125. NM 22445:173, south part of the level area behind the wall, excavation area 4, sq. 134/172
– 22 pieces, total weight 314 g

Although slag cannot be classed as artefacts or tools and is residue and debris from the work of blacksmiths, it will be presented for practical reasons in connection with the blacksmith's tools.

At the Kuhmoinen hillfort slag was found in the excavated areas of the level area behind the wall from grid squares 132/172 and 134/174. From the latter 1,234 g were recovered (NM 22445:164) and from the latter 350 g (NM 22445:24, 173). Slag was also found in square 136/170 (207 g – NM 22445:184) to the north of area 4. The total weight of slag finds is 1,791 g. In the excavated area the slag was recovered from a clearly limited area (see p. 134) and the find location north of the excavated area was at a distance of only one metre. All of the pieces of slag were found immediately below the humus layer.

All of the slag is mainly of the same colour – sandy brown. The sizes of the pieces varied: the largest one measured 90 x 48 x 34 mm and the smallest ones were the size of the tip of one's little finger. The weight of the pieces varied from a few grams to over 100 grams. Some of the pieces are of uneven surface with sand or stones affixed to them, while in some cases one side was smooth and glazed. There are also small drop-like pieces with smooth surfaces.

Slag comes about in two ways: in the preparation of iron and in connection with smithing. In recent years this material category has become a subject of interest. Most of the studies concern smelting slag, but also smithing slag has been discussed (e.g. Sperl 1980; Bachmann 1982). Bachmann (1982 31) states that "as known to everyone working in this field, distinction between the two types is difficult. The presence of ore and/or tap slag at a particular site is evidence of iron smelting. The occasional stray find, particularly in or near settlements, may indicate smelting." Some conclusions have been presented on the basis of the appearance of the pieces of slag. For example, according to Serning (1979 93; see also Serning et al. 1981 3), "small, calotte-shaped pieces with fairly smooth, convex lower sides were probably formed in smithing. Small, irregular, heavily roasted and magnetic pieces seem usually to be smithing slag; they occur in smithing and reheating pits and elsewhere on iron producing sites." Markku Mäkivuoti (1988) refers to drop-shaped smithy slag and smelting slag. In the latter material, typical features of the distinct pieces are the affixing of clay to the pieces from the walls of the smelting structure and the cake-like form of slag which had collected at the bottom of the kettle-like smelting pit.

With reference to the form of the pieces of slag, Tove Nyholm (1988) has even tried to identify the beating process in question with a division of smithy slag into three types. Type I consists of calotte-shaped slag, further divided into thick (Ia) and thin (Ib) slag. Type II includes forge fragments and type III consists of pieces of irregular shape (for further criteria, see Nyholm 1988 97–99).

It is also possible to distinguish slag types through the analysis of chemical content. This, however, is problematic, for metallurgical studies indicate that both of the main types are of the same composition. The reason for this is a chemical reaction produced by the smelting oven and the forge, which in both cases is of the same character (Bachmann 1982). Unfortunately it was not possible to carry out analyses in this connection. In addition to the material from the hillfort, a chemical study would also have required the acquisition and analysis of comparative material from elsewhere in Finland. Thus, the pieces of slag from the Kuhmoinen hillfort must be reviewed in relation to various finds of slag presented below.

Iron smelting spread at the same time into Southern and Northern Finland. In Southern Finland it was introduced from the west and the south and in Northern Finland the technique was adopted from the east. Iron smelting pits dating back to the last centuries BC have been found in Northern Finland (Neitilä 4 in Kemijärvi and Äkälänniemi in Kajaani). Indications of iron smelting have also been observed at the Rakanmäki site in Tornio which is mainly dated to the middle stages of the Iron Age. A smelting oven has been found at Kainuunkylä in Ylitornio, which has been dated to the 11th and 12th centuries. A number of iron smelting locations of Medieval and 16th century date have also been found at Ylikylä in Rovaniemi. Material from Kainuu includes iron smelting finds of peasant character and indefinite date. In cases where the actual smelting location could be observed, it consisted on a stone-lined pit with several dozen kilograms of slag (Mäkivuoti 1987 & 1988; Schulz 1986; Purhonen 1982; Kehusmaa 1972 80–88).

There are, however, relatively few finds of smelting locations. The lack of smelting ovens and forges among Finnish antiquities is a phenomenon which has not yet been explained, as pointed out by Jorma Leppäaho who suggested that ovens were deliberately destroyed (Leppäaho 1949 49). He has also observed that iron was smelted mainly in the vicinity of bog ore sites, often in isolated areas far from settlement and the disturbance of the soil even today.

A number of smithy sites are also known. In connection with the blacksmith's tools the Tontinmäki, Hovinsaari smithy and smelting site in Räisälä was mentioned. This site, possibly of Crusade Period date, included a forge pit with a stone-laid floor. Another smithy of possibly the same age has been found at Kuuppala in Kurkijoki (Leppäaho 1949 49). Blacksmithing is also indicated by cairn no. 2 at Hylli, Epaala in Pälkäne with its finds of Viking Period casting mould fragments and slag (Edgren 1968). A forge site has also been found at the Paaso hillfort in Sortavala (Kočkurkina 1982 77).

In addition to iron smelting sites and forges slag has also been found in cemeteries. It is a common feature of Iron Age cremation burials, sometimes occurring in large amounts. Part of this is apparently smelting slag and part is smithy slag. The oldest finds of slag in cemeteries date from the Late Roman Iron Age and slag occurs in this context throughout the period of cremation burial. Especially in the burial cairns of the Middle Iron Age, slag is commonly found (Leppäaho 1951 201; see also Hackman 1938 58–59).

Leppäaho (1951 201–20) suggests that the presence of slag in cremation cemeteries is a religious phenomenon, regarded as natural in the period of cremation burial, as "the glowing coals smelted the iron and separated the slag" it was a suitable part of the magic elements of cremation rituals.

As there are no metallurgical analyses available, data on slag and its occurrence must be used to resolve whether the slag from the Kuhmoinen hillfort is smelting or smithy slag. The appearance of the material does not permit any final conclusions in this respect, although drop-shaped pieces and large cake-like pieces with clay are not present. This may indicate smithy slag. The appearance of the material resembles Nyholm's slag types Ib and III. According to Nyholm (1988 105), type Ib can be related to so-called general smithy processes, especially forge welding, which produces more slag than other techniques; a further possibility is that all of the calotte-shaped pieces represent the same process, viz. the refining of iron and that the group of irregular slag pieces (only those with iron) represents general smithy work.

The possible presence of smithy slag is further supported by the fact that there are no observations at the site of a pit, nor are there several dozen kilograms of slag, as in the above-mentioned smelting contexts. It must also be pointed out that the excavation squares with slag also revealed a total of 32 small fragments of copper kettles, a piece of copper and copper rod, pieces and fragments of iron, a horseshoe nail and a fragment of a cut knife. These objects were found mixed with the slag. The objects are of small size and their mean weight is only 3.61 g. There are no references to finds of this type in connection with smelting pits.

Although lake ore occurs in Kuhmoinen (Aarnio 1917 9) it seems improbable that lake ore was transported to the top of the hill in a time-consuming and laborious process. It was much easier to smelt the ore where it was first gathered. The known finds of smelting ovens are on lake shores. According to Oiva Rännilä (born 1907), a master blacksmith from Kuhmoinen, who visited the site and inspected the pieces of slag, the material was clearly smithy debris.

The limited area of slag finds immediately below the humus is suited to the assumption of a smithy, although there were no finds of a smithy building or structure with stone-laid floors or forge pits. However, a smithy operating under field conditions did not necessarily require a separate building. Oiva Rännilä, mentioned above, regarded the place as suitable for a field smithy, e.g. of the kind used in the Second World War. Such a smithy does not require any permanent structures and a roof is needed only for long-term use. A field smithy is built by constructing a wooden platform, raised on legs to working height or approximately to the waist, upon which is placed a 10–15 cm layer of sand and a lining of stones. Bellows are also required. A forge of this type can be constructed in a few hours. According to Rännilä, slag is thrown when working where the blacksmith stands. At the Kuhmoinen hillfort slag was found within a small area.

On the basis of the above, the slag from the level area behind the wall can be interpreted as evidence of a field smithy. Shown in Fig. 6 is a field smithy, built in the 1930s and still in use. It consists of a pedalled fan and above it a forge covered with a small roof. It has a wheel resembling that of a sewing-machine which is worked by a pedal. The wheel is linked by a belt to a fan which provides air for the forge. This is a highly simple device, which after being removed from its place of use, e.g. by a field, would leave no other archaeologically observable traces than a few pieces of slag.

3.6. Fragment of a sickle or scythe blade

1. NM 22445:196b (Find 34/1986, Plate 9:4), north part of the level area behind the wall, sq. 138/184
– 155 x 22 x 4.5 mm, weight 47.55 g
– at the base of the fragment are clear indications of re-sheping.

Fig. 6. A field smithy belonging to Heikki Etelämäki (86) of Jokivarsi in Alavus. Photo Juha Aho-Pynttäri 1987.

The base is bent upon the blade and beaten together with it and the rest of the base is bent into trough-like form. The doubly-bent base part was flattened and made thinner by hammering both in the top part and in the actual blade part.

Sickles and scythes, which are often difficult to distinguish from each other, are known from periods of Finland's prehistory and from all of the settled area (Kivikoski 1973 62, 63). Because of the fragmentary condition of this find, it is uncertain whether it is a sickle or a scythe blade and to which type it possibly belongs to.

According to Hackman, scythes are from men's graves while sickles occur evenly in both men's and women's graves (Hackman 1938 172–173). The situation is different, however, at the Luistari cemetery in Eura where sickles are clearly women's tools (Lehtosalo-Hilander 1982b 54–55).

3.7. Fire-making implements

3.7.1. A strike-a-light

1. NM 22445:67 (Find 59/1985, Plate 9:9), southwest terrace, sq. 104/176
– 72.5 x 30 x 3 mm, weight 11.62 g
– fire patina

The fire-striking iron or strike-a-light in question belongs to a type of closed form which is referred to as the oval and angular strike-a-light. This type came into use in the Merovingian Period, but became common only in the Viking Period and its use spread in the later stages of the Iron Age (Kivikoski 1973 642, 1007, 1247, 1249). Sirelius (1921 7) has pointed out that the types of the Late Iron Age remained in use until the present. The type is question is known from throughout the area of Iron Age settlement in Finland as well as in Scandinavia (La Cour 1961 191) and Novgorod (Kolčin 1959 103).

The finds from the Luistari cemetery in Eura support the earlier view concerning the age of the oval and angular strike-a-lights. On the basis of the Luistari material it appears that this was a men's artefact type (Lehtosalo-Hilander 1982b 72–73).

The strike-a-light from the Kuhmoinen hillfort is not a completely typical "oval and rectangular" specimen. The inside is actually oval and not beveled in shape. This particular model is also present in other archaeological contexts, e.g. Merovingian Period graves in Luistari (Lehtosalo-Hilander 1982b 489) and in a Crusade Period context from Suotniemi in Käkisalmi (Schwindt 1893 t. 12: 87).

3.7.2. A striking flint

1. NM 22445:33 (Find 30/1984), south part of the level area behind the wall, sq. 120/180
– flake of striking flint
– size 22 x 10 mm, weight 0.71 g
– found together with axe NM 22445:31

3.8. Weights

1. NM 22445:145 (Find 1g/1985, Plate 9:7), northeast terrace, sq. 116/240
– on the top side of the cylindrical piece of lead are three rectangular stamped impressions in a row and on the sides are four irregular-shaped impressions of different size.
– 18 x 17 x 11 mm, weight 23.22 g

2. NM 22445:251 (Find 3/1987, Plate 9:8), upper east terrace, sq. 92/236
– a piece of lead flattened on four sides with a line marked on one side.
– 7,3 x 7 x 7 mm, weight 2.22 g

The three dots marked on one side of find 1 bring to mind stamped weights. The impressions on the sides may be signs of "adjusting" the weight. The form also resembles to some degree the most common spherical weights with even sides. These were made of iron or bronze. The iron weights were overlaid with bronze.

The number of weights in the Finnish material has been estimated at over 350 (Lehtosalo-Hilander 1982b 66,71). They have been found in Finland Proper, Satakunta, Häme, Uusimaa and in hoard contexts in Lapland. There are no finds from Savo or Karelia. The weights and scales are common in Northern Europe (Kivikoski 1973 823).

The oldest weight find, dated to the Merovingian Period, is from Gulldynt in Vöyri. This disc-shaped object is also the only one from this period. There are a few dated weight finds of the 10th century, but most of them are from the 11th century. The youngest coin-dating for a weight is 1135–1158 (P. Sarvas 1964; 1972 99; Kampman 1928 55).

On the basis of form the Finnish weight finds are divided into spherical, cubic, discoid, ball-shaped, irregular-shaped and temporary groups (P. Sarvas 1964). Direct parallels to weight no. 1 from the Kuhmoinen hillfort are hard to find in this material, especially as lead weights are exceptional. To my knowledge, there are only two other lead weights – a disc-shaped specimen from Rusko and one from the Kalomäki cemetery in Hauho (NM 18468:2259). The latter is both cylindrical and round-shaped and serves as an indirect parallel to the Kuhmoinen find. Closer parallels in terms of shape have been found in Sweden, at Helgö and Birka, but also at Sigtuna, Lund and other Medieval sites. The youngest of the dated specimens are from the latter half of the 12th century (Kyhlberg 1980 239–240; Molander 1976 187).

Find no. 2 resembles a small lead shot, but its shape, resembling a cube, and the line marked on one side are features better suited to weights. The above-mentioned weight from Kalomäki is a fairly close parallel, although it is larger (9.1 g). Kalomäki was a cremation cemetery in use from the Merovingian Period to the Crusade Period. There are also three Late Iron Age inhumation graves at the site.

According to Kampman, the Finnish finds of weights indicate the use of the so-called mark system, which also in use in Scandinavia and the Baltic lands. The units of the system varied considerably. The unit of weight was the *aurtua* (Fi. *äyrityinen*), the weight of which varies from 7 to 9 g in the Finnish finds. The present weight of the three-dotted weight from the Kuhmoinen hillfort (23.22 g) is in Kampman's system equivalent to one *äyri*, i.e. three *aurtuas* (21–27 g).

4. Buildings and furnishings

4.1. Nails and clamps

1. NM 22445:176 (Find 9/1986), south part of the level area behind the wall, excavation area 4, sq. 126/174
– point fragment
– 26 x 5 mm, weight 0.61 g

2. NM 22445:179 (Find 21/1986), south part of the level area behind the wall, excavation area 4, sq. 132/174
– point fragment, bent or clinched
– 42 x 5 mm, weight 8.86 g

3. NM 22445:80 (Find 46/1985), north part of the crest, sq. 126/194
– point fragment
– 47 x 9 x 8 mm, weight 5.87 g

4. NM 22445:201 (Find 66/1986), southern part of the crest area, sq. 114/200
– point fragment
– 35 x 7 mm, weight 5.69 g

5. NM 22445:244 (Find 89/1986), southern part of the crest area, from the fill of excavation area 1
– U-bent nail-like iron object, possibly a clamp
– 52 x 53 x 4 mm, weight 9.32 g

6. NM 22445:54 (Find 16b/1985), northeast terrace, test trench 2, sq. 142/212
– point fragment of a nail
– 35 x 6 mm, weight 2.90 g

7. NM 22445:111 (Find 15g/1985), northeast terrace, sq. 146/216
– point fragment
– 50.8 x 8 x 7.5 mm, weight 3.86 g

8.–9. NM 22445:120 (Find 6/1985, Plate 10:3), northeast terrace, sq. 136/224
– fragment of a rivet nail together with a possibly similar fragment
– former: 35 x 14 x 11.5 mm, weight 7.81 g; latter: 35 x 6 mm, weight 6.71 g

10. NM 22445:217 (Find 53/1986), northeast terrace, sq. 126/228
– point fragment
– 25 x 4 mm, weight 1.52 g

11. NM 22445:219 (Find 50/1986), northeast terrace, sq. 134/228
– point fragment
– 68 x 5 mm, weight 5.99 g

12. NM 22445:227 (Find 51/1986, Plate 10:1), northeast terrace, sq. 130/230
– round-based nail
– 62 x 4 mm, base 16.5 mm, weight 7.75 g

13. NM 22445:139 (Find 1c/1985), northeast terrace, sq. 138/230
– point fragment, bent or clinched at the middle part
– 51 x 5 mm, weight 3.78 g

14. NM 22445:234 (Find 63/1986, Plate 10:2), northeast terrace, sq. 114/242
– fragment of a round-and convex-based nail
– 48 x 5 mm, base 17 mm, weight 7.01 g

The finds of nails and nail fragments do not include large nails used in building. This is not surprising, as log construction did not require nails. The nails may, however, be from buildings, at least the clamp (no. 5) suggests the presence of locks and bolts. Nails and clasps could have been used with locks and bolts, but also in chests, cabinets etc. inside the houses and buildings. A somewhat more special object is the rivet-nail (no. 8) which could also have been used in boats.

The above objects belong to a material category, of which more detailed conclusions regarding age or distribution cannot be presented.

4.2. Shingle-holders

1. NM 22445:28 (Find 4/1984, Plate 10:5), south part of the crest, sq. 112/180
– 126 x 67 x 8.5 mm, weight 60.11 g
– fire patina

2. NM 22445:27 (Find 3/1984, Plate 10:6), southern part of the crest area , sq. 112/198
– 103.5 x 22 x 11 mm, weight 30.63 g

3. NM 22445:42 (Find 9/1984, Plate 10:4), southern part of the crest area , sq. 122/216
– 107 x 47 x 10 mm, weight 24.12 g
– clamp partly rusted and missing

These finds are all of the same holder type, consisting of a single piece of iron. The forked clamp part, "rolled" at the ends is bent to a right angle in relation to the tang which was originally placed in a crack in the wall or the oven.

Shingle-holders are an unusual item in the archaeological material. This author knows of only three other find locations, all of them in Karelia. Cairn no. 2 at the Hämeenlahti hillfort in Kurkijoki contained a shingle-holder together with an arrowhead of Hiekkanen's type 3FIX, dated to the Crusade Period and the Middle Ages (Appelgren 1891 128, 141, fig. 102; NM 2613:12). Finds from recent excavations at the Paaso hillfort in Sortavala include two shingle-holders (Kočkurkina 1981 81,141, t. 12:1,4). Scrap metal from the Hovinsaari smithy in Räisälä, which is possibly of Crusade Period date, included a bent shingle-holder (Schwindt 1893 70, 147, k. 424). None of these, however, are direct parallels to the Kuhmoinen finds. Nor are there any exact parallels in the ethnographic material. Shingle-holders with rolled ends occur, however, in ethnographic contexts (Salmo 1931; M. Vilppula 1937; G. Grotenfelt 1921), as well as in the Medieval finds of Novgorod and Latvia (Kolčin 1959 100; Atgasis 1983).

Shingle-holders without pedestals were common throughout the Nordic countries and they were in use as far as the West Carpathians (Salomies 1942 84–86). This appears to be a timeless artefact type of the coniferous region and the area of log construction.

4.3. A key

1. NM 22445:76 (Find 33/1985, Plate 10:7), south part of the level area behind the wall, sq.132/186
– the key has a partly rusted loop and the stem is two-pronged in the lower part with a notched and perforated plate joined to it at a right angle
– 118 x 30 x 8 mm, weight 36.06 g

The key belonged to the tubular locks, commonly used in the Nordic countries in the Viking and Crusade Periods (Homman 1961 66). Tubular locks, their keys and parts are also known from contemporary Finnish finds from all of the areas which were permanently settled at the end of the Iron Age (Kivikoski 1973 960–961).

A particular feature of the Kuhmoinen find is the forked stem, joined to the centre of a metal plate affixed to it at a right angle. Five similar artefacts have been found at the Vanhalinna hillfort in Lieto. These are both two- and three-pronged (Rinne 1914 114, k. 90; Luoto 1984a 210:IBA-BE). There is also a find from excavations in the town of Turku (Appelgren 1902 63, fig. 15). Jukka Luoto (1984a 88) has dated these keys and locks, which refers to as group H, to the latter half of the 13th century and later, mainly with reference to Scandinavian parallels. This dating is also in agreement with the find from Turku, which cannot be older than the first half of the 13th century.

However, Luoto has also referred to a lock of his types F and G from the Viking Period cremation cemetery of Franttilannummi in Mynämäki, which would indicate a considerably older date for the locks. As the find is not a closed one, Luoto is unwilling to suggest an earlier date (Luoto 1984a 89). If, however, this lock is from the actual cemetery context, the difference in age could be somewhat less on the basis of the period of use of the cemetery. This cemetery was in use up to the Crusade Period (Kivikoski 1973 13). Blomqvist (1941 95, 98, bild 15) dates the introduction of the type to as early as the Viking Period. In this connection, he presents a key with a three-pronged stem, which can be dated on the basis of its find context to the earliest period of the Middle Ages, i.e. earlier than the 13th century and mainly to the 11th century. One of the finds is from the 14th century and the rest are without any precise date. Excavations in Lund have later revealed more keys of this group which have been dated to the 13th century (Andrén & Nilsson 1976 401).

Blomqvist refers to a Norwegian find of a two-pronged key resembling the shape of a churn stem, which is dated to the Viking Period (Grieg 1933 80; Rygh 1885 456). Also to be mentioned in this connection are keys in which the two-pronged stem changes into a curved round disc which is not symmetrically in the middle part of the stem (Luoto's type C). This type is dated to as early as the 11th century (Luoto 1984a 87). It seems hard to imagine that there was such a great chronological gap between these key types and the tubular locks which employed a highly similar principle. In summary, it can be said that there are finds which indicate a dating older than the 1250s.

5. Kitchen utensils

5.1. Fragments of metal vessels

1. NM 22445:182 (Find 37/1986), west slope, sq. 146/158
– piece of copper plate
– 21 x 9 x 0.9 mm, weight 0.7 g
– found together with a possible knife-sheath fitting (NM 22445:246)

2. NM 22445:20 (Find 31/1984, Plate 11:4), west slope, sq. 120/166
– large piece of copper plate
– 107 x 71.5 x 1 mm, weight 27.25 g
– the piece is perforated and torn, and the narrowest edge is bent

3.–7. NM 22445:150 (Find 10/1986, Plate 12:4), south part of the level area behind the wall, excavation area 4, sq. 124/170
– 5 pieces of copper plate
– largest piece: 48 x 37 x 1 mm, total weight 23.99 g
– there is a hole in one of the pieces

8.–11. NM 22445:155 (Find 87/1986, Plate 12:6), south part of the level area behind the wall, excavation area 4, sq. 132/172
– 4 pieces of copper plate
– the largest piece, which was badly bent, measures 21 x 23 x 1 mm, total weight 6.6 g

12. NM 22445:163 (Find 24/1986), south part of the level area behind the wall, excavation area 4, sq. 132/172
– small fragment of copper plate
– 13 x 8 x 1 mm, weight 0.25 g

13. NM 22445:165 (among pieces of slag), southern part of the level area behind the wall, excavation area 4, sq. 132/172
– piece of copper plate
– 19 x 15 x 12 mm, weight 4.70 g
– iron rivet

14.–16. NM 22445:166 (Find 2/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– 3 pieces of copper plate
– largest piece: 29 x 13 x 1 mm, total weight 1.51 g
– one of the pieces may be from the rim of a vessel

17. NM 22445:171 (Find 7/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– piece of copper plate
– 27 x 11 x 0.5 mm, weight 0.51 g
– this piece may be from the rim of a scales cup

18.–19. NM 22445:172 (Find 14/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– 2 pieces of copper plate
– larger piece: 28 x 24 x 1 mm, total weight 4.61 g
– the larger piece has clearly been cut, the smaller piece may be from the rim of a vessel

20.–21. NM 22445:23 (Find 27/1984), south part of the level area behind the wall, excavation area 4, sq. 134/172
– 2 fragments of kettle ears or lugs
– larger piece: 40.5 x 29.5 x 12 mm, total weight 28.93 g
– part of the copper kettle is affixed to the larger fragment

22. NM 22445:180 (Find 12/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– piece of copper plate
– 14 x 9 x 2 mm, weight 1.03 g

23. NM 22445:181 (Find 13/1986), south part of the level area behind the wall, excavation area 4, sq. 134/174
– piece of copper plate
– 11 x 9 x 0.5 mm, weight 0.24 g

24. NM 22445:71 (Find 29/1986), south part of the level area behind the wall, sq. 116/178
– piece of copper plate
– 39 x 36.5 x 1 mm, weight 4.58 g
– seam

25.–28. NM 22445:29 (Find 28/1984), south part of the level area behind the wall, sq. 116/118
– 4 pieces of copper plate
– largest: 38 x 26 x 0.5 mm, total weight 2.93 g
– narrow hole in one piece

29.–37. NM 22445:30 (Find 29/1984), south part of the level area behind the wall, sq. 118/180
– 9 pieces of copper plate
– largest piece: 37.5 x 28.5 x 0.5 mm, total weight 2,77 g
– round holes in three of the pieces and a copper rivet in the largest piece

38.–39. NM 22445:191 (Find 27/1986, Plate 11:9), south part of the level area behind the wall, sq. 118/180
– piece and fragment of copper plate
– larger piece: 38 x 20 x 1 mm, total weight 3.36 g
– the larger piece is from the rim of a vessel

40. NM 22445:188 (Find 35/1986, Plate 11:2), north part of the level area behind the wall, sq. 148/174
– piece of copper plate
– 57 x 16 x 1.5 mm, weight 3.59 g
– the edge is bent double

41. NM 22445:34 (Find 25/1984, Plate 11:6), north part of the level area behind the wall, sq. 144/180
– piece of copper plate
– 33 x 15 x 9 mm, weight 2.19 g
– wound into spiral form

42.–43. NM 22445:84a (Find 19a/1985, Plate 11:7), north slope, sq. 158/198
– 2 pieces of copper plate
– larger piece: 10 x 31 x 1 mm, total weight 26.46 g
– affixed to the larger piece with two rivets is a copper lug, the smaller fragment is from a seam

44.–45. NM 22445:86 (Find 19b/1985, Plate 12:1), north slope, sq. 158/198
– 2 pieces of copper plate
– larger piece: 92.5 x 42 x 1.3 mm, total weight 22.95 g
– a round hole in the larger piece, which may be from a rim

46.–47. NM 22445:87 (Find 19c/1985), north slope, sq. 158/198
– 2 pieces of copper plate
– larger piece: 154 x 11 x 2 mm, total weight 16.83 g
– the pieces were bent double

48. NM 22445:35 (Find 5/1984), south part of the crest, sq. 106/188
– piece of copper plate
– 30.5 x 17 x 0.5 mm, weight 1.00 g

49. NM 22445:109 (Find 77/1986, Plate 12:5), north part of the crest, sq. 124/194
– piece of copper plate
– 34 x 10 x 0.8 mm, weight 1.15 g
– two small round holes in one end and a dotted line ornament on one side

50. NM 22445:98 (Find 50/1985), north part of the crest, sq. 120/214
– fragment of a lug of iron
– 47 x 17.5 x 4 mm, weight 7.95 g

51.–59. NM 22445:93 (Find 18/1985, Plate 11:1), northeast terrace, sq. 146/204
– 9 pieces of copper plate
– largest piece: 230 x 130 x 1 mm, total weight 136.79 g
– 3 seam fragments

60.–61. NM 22445:97 (Find 15i/1985), northeast terrace, sq. 144/210
– 2 pieces of copper plate
– larger piece: 42.5 x 20 x 1 mm, total weight 3.43 g
– both from seams

62. NM 22445:99 (Find 15n/1985), northeast terrace, sq. 138/214
– piece of copper plate
– 31.5 x 16 x 1 mm, weight 1.77 g
– seam fragment

63. NM 22445:101 (Find 15m/1985), northeast terrace, sq. 138/214
– piece of copper plate
– 16 x 9 x 0.5 mm, weight 0.24 g

64. NM 22445:102 (Find 15k/1985), northeast terrace, sq. 140/214
– piece of copper plate
– 18.5 x 13 x 1 mm, weight 0.39 g

65. NM 22445:55 (Find 15o/1985, Plate 11:5), northeast terrace, excavation area 2, sq. 146/214
– piece of copper plate
– 18.5 x 13 x 1 mm, weight 1.03 g
– seam fragment

66. NM 22445:57 (Find 15h/1985), northeast terrace, excavation area 2, sq. 146/214
– piece of copper plate
– 48 x 20 x 1 mm, weight 2.44 g

67. NM 22445:103 (Find 15d/1985), northeast terrace, sq. 146/214
– piece of copper plate
– 55 x 19 x 1 mm, weight 4.54 g

68.–69. NM 22445:105 (Find 10/1985), northeast terrace, sq. 134/216
– fragment of an iron lug and a piece of copper plate
– former: 76 x 27 x 10 mm, latter: 30 x 13 x 1 mm, total weight 37.79 g

70. NM 22445:104 (Find 10b/1985), northeast terrace, sq. 134/216
– piece of copper plate
– 25 x 23 x 1 mm, weight 1.06 g

71.–72. NM 22445:107 (Find 15p/1985, Plate 12:3), northeast terrace, sq. 138/216
– 2 pieces of copper plate
– larger piece: 26 x 11 x 6 mm, total weight 0.99 g

73. NM 22445:108 (Find 15l/1985), northeast terrace, sq. 140/216
– piece of copper plate
– 11 x 9 x 0.5 mm, weight 0.31 g

74. NM 22445:59 (Find 15c/1985), northeast terrace, test trench 2, sq. 146/216
– piece of copper plate
– 35.5 x 18 x 1 mm, weight 1.43 g

75. NM 22445:113b (Find 11/1985), northeast terrace, sq. 140/218
– piece of copper plate
– 31 x 22 x 1 mm, weight 2.21 g

76.–77. NM 22445:208 (Find 42/1986), northeast terrace, sq. 144/218
– 2 pieces of copper plate
– 44 x 32 x 1 mm, total weight 8.71 g
– seam fragments

78. NM 22445:211 (Find 46/1986), northeast terrace, sq. 140/222

– piece of copper plate
– 29 x 19 x 1 mm, weight 0.98 g

79. NM 22445:212 (Find 43/1986), northeast terrace, sq. 146/222
– piece of copper plate
– 47 x 22 x 1 mm, weight 4.80 g

80.–81. NM 22445:117 (Find 1/1985, Plate 11:10), northeast terrace, sq. 130/224
– 2 pieces of copper plate
– larger piece: 47 x 42.5 x 1 mm, total weight 8.29 g
– 3 rivets in one of the pieces and one rivet in the other

82.–83. NM 22445:118 (Find 8/1985, Plate 12:2), northeast terrace, sq. 134/224
– 2 fragments of iron lugs
– larger fragment: 24 x 18 x 4 mm, total weight 7.24 g
– rivet remaining in one of the fragments

84.–85. NM 22445:214 (Find 44/1986, Plate 12:8), northeast terrace, sq. 148/224
– 2 pieces of copper plate
– larger piece: 38 x 19 x 1 mm, total weight 1.61 g

86.–87. NM 22445:132 (Find 3/1985), northeast terrace, sq. 134/228
– 2 pieces of copper plate
– larger piece: 50 x 49 x 11 mm, total weight 30.7 g
– pieces of iron riveted to the larger piece

88. NM 22445:220 (Find 49/1986), northeast terrace, sq. 134/232
– piece of copper plate
– 43 x 40 x 1.74 mm, weight 8.00 g
– copper rivet in one corner

89.–90. NM 22445:46 (Find 33/1984), northeast terrace, sq. 134/232
– 2 pieces of copper plate
– larger piece: 78.5 x 60.5 x 0.5 mm, total weight 18.99 g
– two rivets and a rivet hole in the larger piece which is from a rim

91. NM 22445:51 (Find 35/1984, Plate 11:8), northeast terrace, sq. 120/236
– piece of copper plate
– 37 x 34 x 0.5 mm, weight 4.17 g
– bent double with four, possibly five, larger holes and 2 smaller ones

92.–94. NM 22445:232 (Find 56/1986), northeast terrace, sq. 128/236
– 3 pieces of copper plate
– larger piece: 22 x 14 x 1 mm, total weight 2.59 g
– seam fragments with a rivet in one piece

95. NM 22445:233 (Find 64/1986), northeast terrace, sq. 110/242
– piece of copper plate
– 11 x 6 x 1 mm, weight 0.34 g

96. NM 22445:247 (Find 93/1986), slope below the northeast terrace, sq. 142/240
– piece of copper plate
– 15 x 13 x 1 mm, weight 1 g

97. NM 22445:213 (Find 71/1986, Plate 11:9), upper east terrace, sq. 120/242
– piece of copper plate, possibly from a scales cup
– 41 x 31 x 0.3 mm, weight 1 g

98.–103. 22445:237 (Find 58/1986), upper east terrace, sq. 120/242
– 6 fragments of copper plate
– largest fragment: 28 x 8 x 1 mm, total weight 1.92 g

104. NM 22445:216 (Find 92/1986), upper east terrace, sq. 84/226
– piece of copper plate
– 11 x 13 x 0.5 mm, weight 0.5 g

105. NM 22445:16 (Find 40/1984, Plate 11:3), lower east terrace, excavation area 2, sq. 104/244
– rectangular piece of copper plate
– 43 x 13 x 0.5 mm, weight 2.59 g
– two round holes

The most numerous category of finds consists of pieces of copper plate.[1] These include a few pieces with traces of seams, originally from kettles made of several pieces of plate. Traces of seams were also observed in small pieces. A clear indication of kettles are the fragments of lugs or ears, many of which include remains of the actual copper vessel. With a single exception (no. 43) the lugs were beaten into an oval leaf-like shape.

It is not certain whether all of the seamless pieces were originally from kettles, although the pieces of copper plate appear to homogeneous. Possible exceptions are finds 8 and 97 which may be parts of scales cups. No. 23 with perforation and line ornament can hardly be assumed to be from a kettle and its precise origin remains unknown.

Most of the pieces of copper plate were cut, bent or broken. Some of them appear to have been deliberately shaped or resemble pieces left over from cutting. The material includes various perforated, riveted and double-bent pieces of plate, which may have been used in repairing kettles (see e.g. Schwindt 1893 t. 13:96 and Taavitsainen 1986 31–33). In affixing the pieces bronze or copper rivets were used as well as thin strips of copper (e.g. no. 18). The latter are of the same width as the holes in the pieces of copper plate.

Pieces of copper plate were also used for strengthening the rims of wooden vessels and copper or bronze rivets, similar to those used for repairing kettles, were used. It is possible that some of the pieces were from wooden vessels or intended for strengthening them. Pieces of copper plate could also have been used as fittings of various kinds.

The oldest Finnish copper kettles date back to the Merovingian Period. In these kettles the material is thinner and their form and technique differ from the later kettles. The pieces of copper plate from the Kuhmoinen hillfort include a piece of thin plate of this kind (no. 52), which – along with a number of other alternatives – may be from one of the earlier kettles.

As shown by the seam pieces, the majority of the copper plate material is from kettles made of several pieces of plate. Distinctive features in this respect are denticular protrusions cut into the edges. In Western Finland vessels of this kind have been found in cremation cemeteries in Satakunta with datings to the Merovingian and Viking Periods or to the latter period only (Salmo 1952 417–418, 488–489). There are only a few finds of kettles or their fragments from inhumation graves. These have been found at Osmanmäki and Luistari in Eura, Vilusenharju in Messukylä, Savolainen in Konginkangas and Lautamäki in Teuva (Taavitsainen 1986 32). The inhumation burials in question date to the Viking and Crusade Periods. In the Crusade Period kettles were common in Karelian men's graves (Saksa 1985 43). Also in Western Finland intact kettles have been found in men's graves (Luistari and Vilusenharju) in cases where the grave has not been destroyed. The small vessel fragment from Teuva is from a grave which probably contained a male corpse together with several women.

Fragments and pieces of kettles have been found not only in cemeteries but also at the Vanhalinna hillfort in Lieto (Luoto 1984a 94), at several Karelian hillforts and at Lapp sites in Kainuu and Lapland – including Swedish Lapland (Zachrisson 1976 47–50). The long use of the kettle type is indicated by kettle offerings by the Lapps of Savo in the 16th century and late ethnographic examples (Taavitsainen 1986).

It has been suggested that the kettle type in question originated

[1] Pieces of kettles and metal plate were submitted for metallurgical analysis. The final results were not available at the time of writing, but preliminary results indicate that the kettles were of pure copper and the other pieces of metal plate are bronze or brass. On the basis of metal content, numbers 49, 91, 97 are not kettle fragments.

from the Orient. It is of wide distribution and the origin of the pieces from the Kuhmoinen hillfort remains unsolved. In Sweden the use of kettles pieced together from denticulated pieces (Trotzig's type D) can be observed to have begun in both men's and women's graves of the 10th century, continuing until the present day. These kettles also have the above-mentioned lug type (Trotzig 1978; 1984) and they include a Viking Period parallel to the exceptionally-shaped lug from the Kuhmoinen hillfort (Serning 1966). Leaf-like lugs are also known from Medieval contexts in the Nordic countries and in Novgorod (Kivikoski 1934 48, 50–51; Th. Nilsson 1976 234–235; Kolčin 1959 104–106).

5.2. Parts and fragments of kettle-hangers

1. NM 22445:74 (Find 24/1985, Plate 13:3), south part of the level area behind the wall, sq. 136/180
– piece of a suspension hook
– 48 x 19.5 x 11.5 mm, weight 11.7 g
– fire patina

2. NM 22445:95 (Find 44/1985), south part of the crest, sq. 110/208
– fragmentary length of chain slightly flattened in the middle
– 85 x 19 x 6 mm, weight 13.48 g

3. NM 22445:112 (Find 51/1985, Plate 13:2), south part of the crest, sq. 120/218
– fragmentary length of chain slightly flattened in the middle
– 52 x 22 x 7 mm, weight 10.39 g
– fire patina

4. NM 22445:207 (Find 83/1986), northeast terrace, sq. 138/218
– half of a chain length, flattened in the middle
– 63 x 4 mm, weight 3.83 g
– fire patina

5. NM 22445:124 (Find 9/1985, Plate 13:6), northeast terrace, sq. 140/224
– fragmentary ring
– 52 x 49.5 x 4 mm, weight 14.80 g
– fire patina

6.–10. NM 22445:133 (Find 4/1985, Plate 13:4), northeast terrace, sq. 136/228
– a chain-length piece of iron with looped ends at a 90-degree angle and four other pieces of iron, one of which appears to be from a similar length of chain and three from a ring
– largest piece: 73 x 20 x 8 mm, total weight 30.44 g

11. NM 22445:228 (Find 52/1986), northeast terrace, sq. 130/230
– fragment of an iron ring
– 37 x 18 x 8 mm, total weight 8.58 g
– fire patina

12. NM 22445:138 (Find 1b/1985, Plate 13:9), northeast terrace, sq. 138/230
– chain length slightly flattened in the middle
– 91 x 18 x 4 mm, weight 10.54 g

13.–20. NM 22445:47 (Find 34/1984, Plate 13:1), northeast terrace, sq. 134/232
– suspension hook and seven fragments of chain
– largest piece: 117.5 x 17 x 17 mm, total weight 33.85 g

21. NM 22445:143 (Find 1d/1985, Plate 13:5), northeast terrace, sq. 136/228
– loop-ended chain length with ends at a 90-degree angle
– 54.5 x 16 x 4 mm, weight 6.54 g
– fire patina

22. NM 22445:15 (Find 39/1984, Plate 13:7), lower east terrace, excavation area 2, sq. 104/244
– loop-ended piece of iron with one end broken off
– 66 x 24 x 6.5 mm, weight 13.41 g
– possible traces of fire patina

23. NM 22445:242 (Find 65/1986, Plate 13:8), lower east terrace, sq. 104/246
– fragmentary and bent length of chain
– 81 x 26 x 4 mm, weight 8.57 g
– fire patina

Kettle-hangers are rare in Finnish Iron Age finds. This author knows of only two cemeteries with finds of this type: Lempoinen in Lempäälä and Vilusenharju in Messukylä. At Vilusenharju four more or less intact sets of kettle-hangers were found as well as two hooks and a piece of chain possibly belonging to a kettle-hanger. One of the intact sets is from grave 12a, dated to the 12th century. The dating of these artefacts is, however, somewhat problematic as they were found together with other material collected from the cremation cemetery and deposited in the grave. The other intact sets are from a location to the east of the pit of grave no. 43, dated to the end of the 11th century. The rest are from chronologically even more uncertain connections (Nallinmaa-Luoto 1978 199). The kettle-hangers from Lempoinen in Lempäälä (NM 7221:1) have been dated to the Viking Period (Salmo 1952 418). In connection with this find, Salmo also presents a set of kettle-hangers of uncertain date from the Kalmaanmäki cemetery in Nokia (NM 3429) and Huhti in Perniö (NM 3444:4). Because these artefacts require the presence of kettles, they may be assigned the same datings as kettles.

Kettle-hangers are known from Scandinavia. In Sweden they have been found in cemeteries of the Migration and Viking Periods. According to Salmo, the Viking Period specimens differ from the Finnish ones, while the older ones are similar (Salmo 1952 418). Nallinmaa-Luoto (1978 199) mentions finds of kettle-hangers in Viking Period graves along the southeastern shore of Lake Ladoga. Because these graves also contain Scandinavian artefacts, she assumes that the similar kettle-hangers from Vilusenharju are also of Scandinavian origin.

Comparing the above-mentioned kettle-hangers from the Kuhmoinen hillfort with corresponding Finnish finds, one can observe that the hooks, the chain lengths flattened in the middle and the rings are highly similar to the corresponding parts of intact sets of kettle-hangers. Similar artefacts also occur in ethnographic contexts in Finland.

6. Horse-gear

6.1. Bits

6.1.1. A ring bit

1. NM 22445:61 (Find 32/1985, Plate 14:1), south part of the level area behind the wall, sq. 122/168
– twin-jointed ring bit, with rings of rhomboid section, four protrusions at the joints in each with sharp edges, suspended from the rings are halter fittings in the shape of the figure eight
– length: 184 mm, diameter of ring: 39 mm, weight 85.91 g
– possible fire patina on the fittings of the halter

Ring bits are known from all of the lands bordering on the Baltic. The oldest Finnish specimens are from the Merovingian Period, while the two-jointed bits come into use in the Merovingian Period, remaining in use until the end of the Iron Age – as indicated by grave finds (Taavitsainen 1976 42). This type is still in use.

The ring-bit find from the Kuhmoinen hillfort belongs to a small group with wide mouth irons with extensions. These are known from cemetery finds from Kurkijoki, Makasiininmäki in Janakkala, Mäeksmäki in Masku and in two specimens from Tulonen in Karkku (Taavitsainen 1976 15 and map 7; Kivikoski 1973 1000). The closest parallels, including the fittings of the halter, is one of the bits from Tulonen in Karkku (NM 5203:89) and a bit from Mäeksmäki in Masku (NM 13399:7). Both of these, as well as the find from Makasiininmäki in Janakkala, are from cremation cemeteries which were used in the Merovingian and Viking Periods.

There are also parallels to the Kuhmoinen bit from Late Iron Age contexts in Estonia (Tallgren 1925 133, Taf. 1:7) and the Livonian area of Latvia (Riga Katalog 1896 Taf. 28:18). Swedish parallels from the cemeteries of Valsgärde and Bengtsarvet in Söllerö are dated to the first half of the 11th century (Fridell 1930 fig. 30; Serning 1966 53, Pl. 64:1). After this period furnished burials came to an end in Sweden. In the Swedish and Danish finds there are fittings with extensions also in bar bits (Montelius 1906 280, Abb. 448; Müller 1888–1895 Taf. XXXVII:586).

In most case bits have been found in men's graves, although they are not completely unknown from women's graves (Taavitsainen 1976). In Finland the distribution of the type covers Finland Proper, Satakunta, Häme and Karelia. It is also known from the whole of the Baltic region in the Late Iron Age. Because of the mouth iron parts, the bit from the Kuhmoinen hillfort must be regarded as a "hard" bit, in which the sharp extensions would cut into the horse's palate when necessary. This permitted the rider to force the mount into sharp turns and fast movements. The bit was not intended for a work-horse.

It is also possible that the pieces of kettle-hangers include parts of bits.

6.1.2. A bar bit

1. NM 22445:69 (Find 25/1985, Plate 14:2), south part of the level area behind the wall, sq. 126/176
– curved and looped bit bar
– 134 x 25 x 13 mm, weight 29.47 g

Because the mouth irons are not preserved, their possible relation to the mouth iron with extensions of the ring bit remains unknown.

Bar bits have been found sporadically in Finland in the areas which were permanently settled at the end of pagan times. There are no direct parallels to the Kuhmoinen specimen in the Finnish material. The oldest known bar bit is from the Merovingian Period and their use continued through the Viking Period to the Crusade Period. Finds from the latter period are known only from Karelia. Bar bits for mounted steeds also occur in Late Iron Age contexts around the Baltic (Taavitsainen 1976 24–25). Like the ring bits, they are still in use.

6.2. Horseshoes

6.2.1. An ice-shoe

1. NM 22445:195 (Find 38/1986, Plate 14:4), north slope, sq. 160/180
– 45 x 22 x 40 mm, weight 22.94 g

The oldest Finnish find of horseshoes for use on ice is from the end of the Migration Period, subsequent to which they occur in rare numbers in the grave finds of the Finnish mainland throughout the Late Iron Age. They are especially common in the Åland Isles (Kivikoski 1973 389, 996, 1246). There are also a few finds from late prehistoric and/or Early Medieval hillfort contexts at the Vanhalinna hillfort in Lieto, Paaso in Sortavala and Tiuri in Räisälä (Luoto 1984a 82, 206; Kočkurkina 1981 77,79, ris. 22:18, 21,22; 84, 139, t. 10:20–22 Kočkurkina 1981 54,133, t. 7:4; Appelgren 1891 103, fig. 45). The prehistoric and ethnographic collections of the National Museum of Finland contain dozens of ice-shoes of uncertain date. Some of these may be very young, as this artefact remained in use in the same form until it was replaced by modern horseshoes.

The wide distribution of this practical artefact for similar conditions is indicated by Swedish and Norwegian finds of ice-shoes from Merovingian and Viking Period graves (Kivikoski 1973; Petersen 1951 62–64). In the Åland Isles these objects have been found in both men's and women's graves (Kivikoski 1963 113), which is also the case e.g. in Norway (Petersen 1951 63).

6.2.2. A horseshoe and horseshoe nails

1. NM 22445:245 (Find 36/1986, Plate 14:5), west slope, sq. 136/158
– horseshoe nail
– 24 x 16 x 7 mm, weight 4.83 g

2. NM 22445:53 (Find 60/1985, Plate 14:6), north part of the level area behind the wall, excavation area 3, sq. 142/170
– horseshoe nail
– 28 x 13 x 8 mm, weight 4.50 g

3. NM 22445:65 (Find 28/1985, Plate 14:7), south part of the level area behind the wall, excavation area 4, sq. 134/172
– horseshoe nail
– 28 x 15.5 x 8 mm, weight 5.02 g

4. NM 22445:88 (Find 49/1985, Plate 14:3), south part of the crest area, sq. 104/200
– a curved and badly rusted fragment of an iron artefact with a hole in the outer side and a caulk in the unbroken end together with three pieces of iron broken from a single piece
– 60 x 18.5 x 4 mm, weight 14.2 g

Prior to the 7th century horseshoes were unknown in the Europe. In the Nordic countries they came into use only by the end of the 11th century (Engwall 1937 89; Liestøl 1961 545). There are no certain prehistoric finds of horseshoes from Finland. Horseshoes and horseshoe nails have been recovered as undated stray finds from cemeteries. Horseshoe nails have also been found at the Vanhalinna hillfort in Lieto (Luoto 1984a 84).

The curved iron object in question cannot be definitely identified as a horseshoe. Even if it were a horseshoe, it is in such poor condition that its type cannot be identified and dating is impossible.

There have been attempts at dating horseshoe nails, but the indefinite and insufficient criteria involved make conclusions uncertain (Luoto 1984a 84).

6.3. A whip handle

1. NM 22445:119 (Find 7/1985, Plate 14:8), northeast terrace, sq. 134/244
– weight 103 g

The function of this artefact type has been a subject of considerable debate. In Finland objects of this kind have usually been regarded as whip handles or -sockets, or even as personal adornments of some kind, the use of which was limited to privileged persons (see e.g. Hackman 1938 127–131; K. Vilkuna 1953 11; Forsåker 1986 135). It has also been suggested that they were parts of carriages or sledges (Lund 1975). The find context at the Kuhmoinen hillfort does not give any indication of the function of the artefact, but because of its connections with horse-gear – despite many other alternatives – it will be discussed in connection with them.

Alfred Hackman (1925) grouped the Finnish whip handles into various types. The Kuhmoinen specimen is of Hackman's type C ("Gerät vom nordschwedischen Typus Abb. 4c"). This type does not have a socket or a tang, but fittings, riveted to the handle.

There is only one other find of this type from Finland, from Naskalinmäki at Lapinlahti in Sakkola (NM 7901). On the basis of its distribution, Hackman regards type C as Swedish. This is also maintained by Serning, who lists 28 finds of the type from Sweden (Serning 1966 61). There is a single find from Norway (Hackman 1925 14). Hackman (1938 126) suggests that the Naskalinmäki specimen came to Karelia from Sweden or the Varangian colonies of Russia. Forsåker (1986 135) has pointed out that – with the exception of the above-mentioned Norwegian find – whip handles are found only in Birka and elsewhere in Eastern Sweden. This, in turn, suggests an eastern origin. The Russian material includes whip handles, but of the material published by Kirpičnikov I have been able to find only one example of type C and even this is not a close parallel to the majority of the Swedish C-type whip handles (Kirpičnikov 1973).

On the other hand, grave no. 151 at Birka contained an almost identical parallel to the Naskalinmäki find (Arbman 1940 Taf. 27:3; Forsåker 1986 135). The Kuhmoinen specimen could thus be of Swedish origin.

The Naskalinmäki find from Sakkola is dated to around the year 800 AD (Hackman 1938 124). In Sweden type C was in use in the Viking Period, mainly in the 10th century, but its period of use also extends past the beginning of the 11th century. The youngest finds are from the first half of the 11th century (Serning 1966 62). Burials with grave goods cease around this time and the further history of the artefact type is difficult to follow.

7. Personal ornaments

7.1. Brooches

7.1.1. Round brooches

7.1.1.1. A twin-animal brooch

1. NM 22445:135 (Find 4/1985, Plate 15:1), northeast terrace, sq. 136/228
– 56 x 54 x 4.5 mm, weight 52.53 g
– traces of fire on the artefact
– found next to a twin-spiral chain bearer (NM 22445:134)

There are some 50 finds of twin-animal brooches in the Finnish material. These are women's brooches and their area of distribution covers Finland Proper, Satakunta and Häme. There is only one find from the region of Häme east of Lake Päijänne, from Jaala. There is also a single find from Alavus in Ostrobothnia (Kivikoski 1973 662) and two from the Åland Islands. One of the latter is an atypical specimen with knobs (Kivikoski 1980 22).

Different views have presented concerning the dating of the brooch type by Appelgren (1897 12) and Kivikoski (1939 134). Appelgren linked the type to types C and D of the four-animal brooches. Salmo (1952 315) dates them to the first half of the 11th century and Cleve (1978 91–92) suggests the period from 800 to 1000. Arwidsson (1940 121–128 and 1942 57–59) maintains a connection with the Vendel D style and dates their introduction to the end of the 8th century or to around the year 800. Lehtosalo-Hilander (1982b 98–100) dates the whole group to 800 (825) – 950 on the basis of the Luistari finds, other cemetery finds and the above-mentioned views.

7.1.2. Penannular brooches

7.1.2.1. A penannular brooch of bronze with rolled ends (Salmo's group 4)

1. NM 22445:141 (Find 57/1985, Plate 15:3), upper east terrace, sq. 110/232
– the undecorated rod is of round section; pin missing
– 50 x 59 x 5 mm, weight 19.64 g

Penannular brooches with rolled ends are known from all of the areas where penannular brooches were used. In Finland they have been found in all of the areas settled in the Iron Age (Salmo 1956 25,202–102; Kivikoski 1951b 49).

The oldest brooches of this type are from the end of the Merovingian Period (8th century) and they remained in use up to the end of the Iron Age when they began to be used to a lesser extent and became smaller in size. Most of them must, however, be dated to the Viking Period (Salmo 1956 21–27; Kivikoski 1951b 49,50; Kivikoski 1973 433,690,1034; Cleve 1978 99–100; Lehtosalo-Hilander 1982b 100–101). According to Salmo the corresponding datings for the Baltic lands are approximately the same (Salmo 1956 25). The Kuhmoinen specimen corresponds to Carlsson's type RUL:SM*run of the Gotland brooches and is dated to the older stage of his period D (1000–1100; A. Carlsson 1988 73). In Russia the penannular brooches with rolled ends are dated to the 10th–13th centuries (Malm 1967 152; Sedova 1981 86).

Grave finds from Luistari in Eura show that this type was generally used in men's cloaks, but was also present in women's graves (Lehtosalo-Hilander 1982b 100). According to A. Carlsson penannular brooches mainly belonged to men's apparel in Gotland.

7.1.2.2. A large penannular brooch with facetted knobs (Salmo's group 7)

1. NM 22445:89 (Find 38/1985, Plate 15:2), south part of the crest, sq. 112/200
– 79 x 72 x 13.5 mm, weight 125.79 g
– possible traces of fire on the right-hand knob

This brooch type is of wide distribution, covering the whole of the Baltic region. It is also common in the Finnish finds, and a total of c. 130 specimens (Lehtosalo-Hilander 1982b 102) are known Finland Proper, Satakunta and Häme. There are also isolated finds from Western Uusimaa and Ostrobothnia as well as two stray finds to the east of Lake Päijänne from Suonenjoki in Savo and Iisalmi. The type is not known from Karelia, although it is common in the regions to the east and south of Lake Ladoga (Salmo 1956 35,102; Kivikoski 1951b 50–52: Kivikoski 1973 694; Malm 1967 159–161; Sedova 1981 86).

In Finland and Scandinavia the type has been dated to the Viking Period (Salmo 1956 35; Kivikoski 1951b 51–52; Kivikoski 1973 694). In Gotland it is dated to Carlsson's period B/C (800 – 1000; Carlsson's type FAC:US*sex:a; A. Carlsson 1988 69). Salmo (1956 35), on the basis of a single atypical specimen suggests, with reservations, that the type remained in use up to the 11th century, which, however, is not confirmed by later observations or coin datings. The related coin dating by Pekka Sarvas are from the 9th century, and he stresses that brooches of this type were not present in any of the coin-dated 11th century finds of his material (P. Sarvas 1972 21). According to Lehtosalo-Hilander (1982b 102), the specimens of the type from Luistari are probably from the 9th century with the exception of one find with a coin dating to 913–942.

The datings for the Russian finds of the type are somewhat different. Malm (1967 161, 181–182) dates them to the period from the mid-10th century to the first half of the 11th century. At Novgorod they are dated to 900–1150 and there is even one specimen from the mid-14th century (Sedova 1981 86).

According to Salmo and Malm the large brooches were from men's graves, while the smaller ones were from women's graves (Salmo 1956 36; Malm 1967 159). All of the Luistari specimens were, however, from men's graves and a smaller brooch was recovered from the grave of a boy (Lehtosalo-Hilander 1982b 102). Available information suggests, therefore, that it was a men's brooch.

7.1.2.3. Small penannular brooches of rhomboid section with even or beveled knobs (Salmo's group 13)

1. NM 22445:177 (Find 25/1986, Plate 15:4), south part of the level area behind the wall, excavation area 4, sq. 126/174
– no signs of decoration on the rod, mainly oval section with almost conical knobs, pin missing
– 39 x 34 x 3 mm, weight 3.93 g

2. NM 22445:56 (Find 15j/1985, Plate 15:5), northeast terrace, test trench 2, sq. 144/214
– undecorated rod, one knob is angular while the other is mainly conical in shape, pin missing
– 36 x 33 x 4.5 mm, weight 5 g

3. NM 22445:126 (Find 52/1985, Plate 15:9), upper east terrace, sq. 88/226
– front side of the rod decorated with triangular stamp impressions, beveled knobs with rounded edges
– 53 x 51 x 4 mm, weight 20.81 g
– possible traces of fire

4. NM 22445:140 (Find 56/1985, Plate 15:14), upper east terrace, sq. 108/232
– undecorated rod, knobs of upwardly widening form mainly of conical shape
– 43 x 37 x 4 mm, weight 7.57 g

In reviewing the brooches of Salmo's group 13 it can clearly be seen that Salmo did not literally apply his own criteria of classification in all cases. The brooches include specimens with conical and flat knobs, ones with differing types of knobs and also specimens in which the rod is not completely rhomboid in section. The Kuhmoinen brooches are also classified in this inconsistent manner (cf. e.g. 1 and 3).

Salmo's group 13 is of wide distribution with finds from Norway, Gotland, Northern Sweden, Estonia, Latvia, Ingria and Novgorod (Salmo 1956 104; Kivikoski 1951b 53–55; Selirand 1974 157; Malm 1967 185–186; Sedova 1981 88). Gotland has been suggested as the area of origin of the Finnish brooches. According to Salmo, decoration among other details points in this direction. However, he also points out that most of the brooches were made in Finland. This author is familiar with a total of 173 finds of the type from Finland Proper, Satakunta, Häme, Savo and Karelia. There are also a few finds from Kainuu and Ostrobothnia. In spite of finds from Ingria and Novgorod, their occurrence in Savo and Karelia is sporadic with only two brooches from each of the latter areas (Salmo 1956 104).

Salmo (1956 59–63) dates the group mainly to the Crusade Period – although he points out that some of the Gotland specimens are from the end of the Viking Period. The oldest Finnish brooches of the type are from the beginning of the 11th century, but most of the material is from the end of the 11th century and the 12th century (see also Kivikoski 1951b 54).

Pekka Sarvas has discussed the dating of the brooches on the basis of coin-finds. In this connection Salmo's groups 13, 15 and 16 are grouped together as they were in use at the same time. Sarvas refers to their being found together in grave no. 6 at Moisio, Myllymäki in Nousiainen. There are also other examples of contemporaneous use: a grave at Lautamäki in Teuva with brooches of groups 13, 14 and 16 and a grave at Kiiliä in Sääksmäki with brooches of groups 13 and 16.

On the basis of coin datings, Sarvas suggests that the brooches of group 13 came into wider use during the first quarter of the 11th century – there are only four earlier datings and in three of these cases the brooches occur singly. They were later worn in pairs at the shoulders. This is the same period when the round concave-convex brooches also worn in pairs went out of use (see also P. Sarvas 1971 59). From this stage onwards Sarvas maintains that the penannular brooches were used *at least* until the end of prehistoric times. In another connection Sarvas has presented absolute dates for the end of use, which was in the first half of the 13th century. This view is indirectly supported by the fact that penannular brooches have not been found in the oldest strata of the town excavations in Turku.

More recent coin datings concerning the type are available from Luistari in Eura, but they do not alter Sarvas's view of the dating of the group. The youngest date from Luistari (grave 404) is 1106–1111 (Lehtosalo-Hilander 1982a 308; 1982b 105). The youngest date given by Sarvas is from Rikala in Halikko, 1158–1165 (P. Sarvas 1972 23–25).

Sarvas does not mention in this connection grave II of the Rukoushuone cemetery at Narva in Vesilahti (P. Sarvas 1972 124, find 62) with its unknobbed penannular brooch. Although this artefact is in poor condition, the rhomboid section of the rod can still be observed. On the basis of this detail it can mainly be classed to Salmo's group 13. The grave in question is coin-dated to 1173–1190 (P. Sarvas 1972 25).

Brooches of Salmo's group 13 have also been found at the Vanhalinna hillfort in Lieto. In his discussion of these finds Jukka Luoto (1984a 68–69) criticizes Sarvas's views concerning the introduction of these brooches. His criticism is somewhat difficult to follow and his final conclusions are more or less the same as Sarvas's (see also Cleve 1978 102).

In the Ingrian finds the small penannular brooches of rhomboid section (Malm's group VIII) are dated to the period from the 11th century to the 13th century (Malm 1967 166–167, 185–186). At Novgorod they are dated from the end of the 11th century to the mid-13th century (Sedova 1981 88). In Estonia the corresponding datings encompass the 12th and 13th centuries (Selirand 1974 157).

The Kuhmoinen brooches cannot be directly fitted into Carlsson's typology for the brooches from Gotland. On the other hand, Salmo's group 13 finds a direct parallel in Carlsson's type FAC:S*rom:a, which is the only of Carlsson's period E (1100–1150) (A. Carlsson 1988 76). The dating is younger than that suggested by Salmo for the Gotland brooches.

The brooches in question have been found in both men's and women's graves (see e.g. Lehtosalo-Hilander 1982b 105).

7.1.2.4. A low-knobbed penannular brooch of flat section (Salmo's group 16).

1. NM 22445:241 (Find 67/1986, Plate 15:8), upper east terrace, sq. 102/246
– in the middle of the rod is a part decorated with four crossing dots and outlined by embossed pairs of lines; the rest of the rod is decorated with embossed triangles and rhomboids; the flat knobs are decorated with four lines and a dot at their intersection
– 33 x 34 x 2 mm, weight 5.87 g

As in the case of the previous group, also the low-knobbed penannular brooches of flat section pose a number of problems for classification. The decoration of the knobs is the same as in many of Salmo's brooches with floral-ornamented knobs (Salmo's group 14 – "die Hufeisenfibel mit blumenformigen Knöpfen"). The form of the knobs and the rod link it to Salmo's group 16 ("die platte Hufeisenfibel mit dünnen Knöpfen") and in this connection it is classed into this group.

According to Salmo, this group was a parallel to the later penannular brooches with raised-band ornament (group 15 – "die Hufeisenfibel mit Buckelring"). These parallel groups appear to have become mixed at times, and Salmo lists in his group 16 a number of brooches where the middle part of the rod, i.e. the raised part, is separated with crossing lines like in the Kuhmoinen specimen. Despite this, these have often been included in group 15 (e.g. NM 4464:3 from the Turku region).

Salmo regards this unassuming low-knobbed and flat-sectioned brooch type as Finnish in origin with finds from Finland Proper, Satakunta, Savo, Karelia and Ostrobothnia. Of the 32 finds only two are from Savo – the Tuukkala cemetery in Mikkeli – and one is from Karelia – Lapinlahti in Sakkola (Salmo 1956 71–72,105; see also Kivikoski 1951b 53,55).

Mentioned above was grave no. 6 of the Myllymäki cemetery at Moisio in Nousiainen which contained brooches of groups 16, 13 and 15. This grave indicates the joint use of the later penannular brooch types. Salmo, however, regards, the low-knobbed and flat-sectioned variant as the youngest group, found in all of the larger Crusade Period cemeteries. He dates them mainly to the 12th and 13th centuries (Salmo 1956 71–72). A later combination was found in grave 25 at the Myllymäki cemetery in Nousiainen containing a brooch of group 16 and a small ring brooch. A similar combination was also found in grave 10 of the Luistari cemetery in Eura with the floral-knobbed brooches, which on the basis of the section of the rod and the form of the knobs can be placed in the same group as the brooch from the Kuhmoinen hillfort. According to Lehtosalo-Hilander, this grave is dated to the final period of the cemetery, 1070–1130 (Lehtosalo-Hilander 1982a 53–55, 363; 1982b 188). A similar penannular brooch was also found in grave 404 of the cemetery with a coin dating to 1106–1111 (Lehtosalo-Hilander 1982a 280–283; 1982b 106). The coin datings by Sarvas, five in all, are of earlier date, from the end of the 10th century or the beginning of the 11th century (P. Sarvas 1972 23).

Salmo mentions only a single parallel from outside of Finland – from Ingria. Malm (1967 165, fig. 24:4,5, 167, 186–187) mentions a few specimens and dates the brooches to the 11th–12th centuries and partly to the 13th century.

The Finnish grave finds show that the brooch type was worn by both men and women.

7.1.2.5. A Karelian convex penannular brooch (Salmo's group 26)

1. NM 22445:148 (Find 81/1986, Plate 15:10), south part of the level area behind the wall, excavation area 4, sq. 132/168
– the partly poorly visible decoration of this silver brooch is divided into three fields. The part in the middle of the arc is decorated with angular band-wreaths and what appears to be a fragment of a plant motif. On both sides of this part the decoration continues in palmette ornaments and the knobs display signs of rhomboid designs with crossing lines. The wide base of the pin is bounded by lines in pairs within which are traces of band ornament.
– 50 x 45 x 2.5 mm, weight 8.05 g
– found at the foot of the wall under a few layers of stones

This brooch belongs to Salmo's group 26 ("die gewölbte karelische Hufeisenfibel"), of which 20 specimens are known from Karelia, but none from the region of Savo. The specimens are mostly silver, but there are also bronze brooches of the type. In addition to those mentioned by Salmo (1956 106) there is also a find from Hämeenlahti in Kurkijoki. This material does not include any exact parallels to the brooch from the Kuhmoinen hillfort. A fairly similar specimen in terms of size and decoration is a silver brooch without knobs from the Rantue hoard in Sortavala (8121:3; C. A. Nordman 1924 85, fig. 62). According to A. Saksa, a highly similar find of a piece of brooch rod without knobs was recovered from the Lapinlahti dwelling site in Sakkola (present-day Olhavka). Among the parallels we may also mention a bronze penannular brooch with indistinct ornament from Säkinmäki in Kurkijoki (NM 2053:3).

There are also a few finds of the type from Ingria (Tallgren 1928 163–164; Tallgren 1938 103). A penannular brooch mainly of this type has also been found at Khatnizhitsa on the Ougra River about 100 kilometres east of Smolensk (Strandberg 1938 176).

Salmo sees the prototypes of this group in the penannular brooches with "thick raised bands" (Hufeisenfibel mit Buckelring). An intermediary form is a brooch from Muolaa, NM 2744:6 (C. A. Nordman 1924 152, Abb. 129). Salmo also suggests that the Karelian brooches with raised bands are the oldest ones and the youngest ones are those where the location of the raised band is marked only with transverse lines (Salmo 1956 94–95). However, the available material does not permit any chronological evaluation of differences between these typologically defined older and later types. Specimens both with and without the raised band are dated according to the period of use of the type, which according to Salmo is 1100–1250 (Salmo 1956 94, 91–92). A later trait is their occurrence together with the ring brooches (Kekomäki, Kaukola – graves 2 and 3; Schwindt 1893), which may suggest a somewhat later date. Kočkurkina (1982 101) dates these brooches to the 12th–14th centuries.

The Karelian penannular brooches have been regarded as the personal ornaments of women, especially used with cloaks (see e.g. C. A. Nordman 1945 228). This is based on views presented by Schwindt (1893 120, 137), according to which only one of the brooches from the women's graves was of penannular form – a convex Karelian penannular brooch from grave 1 at Kekomäki in Kaukola. However, in the same cemetery graves 2 and 3, defined by Schwindt as male burials, contained convex brooches belonging to men. The brooch type was thus used by both men and women and smaller and larger specimens occur in both groups.

7.1.3. A ring brooch

1. NM 22445:37 (Find 1/1984, Plate 15:11), south part of the crest, sq. 112/202
– a ring brooch of silver with a flat ring part
– 26.5 x 25.5 x 2.5 mm, weight 4.02 g

This was a brooch form common throughout Northern Europe (see e.g. Kivikoski 1973 1047–1052; P. Sarvas 1971 59; Appelgren 1902 62,65; Kivikoski 1939 148; Blomqvist 1948 132; Sedova 1981 89–92; London Museum 1967 275). Not only of wide distribution, this simple everyday brooch was also of an almost timeless type, used by men and women to affix the cloak or at the neck-opening of the shirt or dress (Blomqvist 1948 122–123). In Western Finland they have been found in late prehistoric/Early Medieval cemeteries and in Medieval churches and in Eastern Finland in pagan cemeteries. In both areas brooches of this type have also been found at hillforts and in castles. The prehistoric, historical and ethnographic collections of the National Museum of Finland also include a number of stray finds of uncertain date.

In connection with the brooch finds from the excavations in the town of Lund, Ragnar Blomqvist observes that when the penannular brooches went out of fashion in the 11th century or slightly later, they were replaced by ring brooches. All of the specimens of the type which have been recovered from dated contexts point, however, to the 13th and 14th centuries. Blomqvist maintains that in Northern Europe the ring brooches are usually dated to the 13th and 14th centuries (Blomqvist 1948 132–138). This dating has also been assigned to later finds from Lund (Stenholm 1976 297, 299), which also applies to excavation finds from London (London Museum 1967 275). The closest parallels to the Kuhmoinen find are from Lund, albeit without precise dates (Blomqvist 1948 bild 15:3–4).

The datings for the Finnish finds are similar. Nordman dates the ring brooches of Savo and Karelia to the 13th and 14th centuries, but also suggests that some of them may be of even younger date. The dating is based i.a. on grave no. 9 of the Tuukkala cemetery in Mikkeli. Included in this grave was a ring brooch together with a pair of oval tortoise brooches and a silver plate brooch, according to which C. A. Nordman (1924 9–10, 148, 177–178) dated the burial to the 13th century. Brooches of this type have been found in Karelia together with large Karelian penannular brooches of silver, e.g. in graves 2 and 3 of the Kekomäki cemetery in Kaukola. The latter grave is contemporaneous with the Tuukkala find (C. A. Nordman 1924 57).

Pekka Sarvas, who has studied this group of artefacts in detail, dates the ring brooches according to European datings to the 13th and 14th centuries (P. Sarvas 1971 59). He has especially addressed the question of the transition from the bronze penannular brooches to the ring brooch type, which in his terms signified in Western Finland a transition from the Crusade Period to the "Hansa period". On the basis of its distribution, Sarvas regards the type as a symbol of the Hanseatic trade and the power of the Hanseatic League.

With the exception of the above-mentioned grave no. 25 at Myllymäki in Nousiainen the transition can be observed in Western Finland solely in Christian contexts. This grave contained a small ring brooch and a penannular brooch of Salmo's group 16 (NM 10146:104–107). The Kirk'ailanmäki cemetery in Hollola included graves furnished solely with ring brooches in addition to ones with oval tortoise brooches and penannular brooches. Grave no. 4 of this cemetery offers a concrete possibility for dating the brooch type. It contained a bracteate struck by King Valdemar (1250–1275) in Götaland (P. Sarvas 1971 61). There is also a cemetery with finds of penannular and ring brooches – Saramäki in Maaria with a number of cremation pits and inhumation graves (Kivikoski 1939 14–17). Ring brooches have also been found in the Medieval church of Lempäälä (Hiekkanen 1986). Hiekkanen points out, however, that in connection with the various stages of construction of the church, objects from other contexts may have become deposited under the floor.

Indirect evidence for dating the transition to the first half of the 13th century is provided by finds from Turku and Koroinen. Excavations at Koroinen as well as in the oldest 13th and 14th century layers in Turku have not revealed any penannular brooches thus far (Appelgren 1902; Valonen 1958). The seat of the local diocese was moved to Koroinen in 1221 (Gardberg 1979 50) and the town of Turku appears to have been established at its present site in the mid-13th century. The fact that penannular brooches are missing from these finds supports Sarvas's view that they went out of use and were replaced during the first half of the 13th century.

The ring brooches in turn went out of use at a much later date. In Finnish and Estonian ethnographic contexts they have remained in use almost up to the present (Sirelius 1915 253–261; Kirme 1986 145,147). It may even have been in wider and longer use also elsewhere.

There is reason to discuss one of the ring brooch groups in further detail. Serning (1956 30) has distinguished as separate from

the 13th and 14th century brooches of the type an 11th and 12th century group of smaller ring brooches with transversely decorated arcs. The dating of this group is of interest, as the abovementioned Myllymäki grave contained one of these.[2] According to Sarvas, it is the only West Finnish find indicating the transition from the Crusade Period to the so-called Hansa Period.

In later years the available material has increased. The combination of brooches from grave 10 of the Luistari cemetery includes a ring brooch of the latter type[3] as well as two floral-knobbed brooches (Lehtosalo-Hilander 1982a 53–55, 363). One of the knobbed brooches belongs to Salmo's group 16. The grave is from the final period of use of the Luistari cemetery (1070–1130).

A similar brooch has also been found in grave 44 of the C cemetery in Köyliö (NM 8723:476) together with beads, a pendant brooch, a ring, jointed chain, pieces of bronze chain and small bronze spirals (Cleve 1978 51–52). Cleve dates the grave to the 12th century – the same age as the Myllymäki grave. The latest find of the type is from grave 1 of the Mahittula cemetery in Raisio (19000:25). This grave also contained bead fragments, small pieces of bronze spirals, half of a simple-formed and narrow bracelet and a perforated pendant coin of Adelheid I (999–1044) struck in Quedlinburg. The excavation finds from the church of Lempäälä also include a similar brooch of uncertain date (Hiekkanen 1986 99).

Serning (1956 30, footnotes 4 and 5) presents a number of Swedish and Norwegian parallels, which, however, are from chronologically problematic connections or were removed from their original context. A more reliable find, however, is the Tingby hoard in Dörby, coin-dated to the end of the 12th century (Hildebrand & Hildebrand 1878 PL:c; Tuukka Talvio, oral comm.).

Inger Zachrisson (1984 30) has studied the ring brooches with grooved arcs in the finds from Swedish Lapland. She refers to Serning, but also mentions an article on the Skar hoard in Nordland by Munch. This hoard also contained a similar brooch. The other material of the find consisted of Viking Period – 13th century objects. Munch refers to Serning's (1956) dating, but also mentions a Norwegian grave of the 10th century which included a brooch of the type in question. As there is no further reference it is not possible to check this find. Zachrisson presents the conclusion that the brooch type can be dated to c. 1200, although there are also indications of its use in the late 13th century (Zachrisson 1984 34).

It is also interesting to compare the above views on chronology with finds of ring brooches from Novgorod where the available datings are based on controlled dendrochronological contexts. As a separate group Sedova mentions ring brooches with grooved arcs, nine of which have been found from contexts from the end of the 12th century to the mid-14th century. Unfortunately it is not mentioned how many of these are from the latter half of the 12th century. Sedova also suggests the same date from the disc-shaped ring brooches. The total number of these brooches is 17, two of which are from the latter half of the 12th century (Sedova 1981 89–92). With reference to the Novgorod datings, Luoto (1984a 70) has dated the introduction of the Finnish ring brooches to the second half of the 12th century.[4]

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[2] The brooch is now missing, but the catalogue of the National Museum of Finland contains a photograph of it, which shows that the object is a cast brooch.

[3] Lehtosalo-Hilander (1982b 54, 106–107) classes the object among the penannular brooches, but suggests that the ring may have been originally intact, as indicated by the break in the arc.

[4] The dating of the ring brooches is also of importance for the absolute age of the final period (c. 1070–1130) of the Luistari cemetery in Eura. If the above dating for the group is correct, it would imply a younger date for the cemetery. Although the cemetery has not been totally excavated, there are features of discoloured soil in the shape of graves, some of which could be interpreted as unfurnished graves of the Christian period. Several maps have been presented concerning the graves of different age at the Luistari cemetery (Lehtosalo-Hilander 1982bc), but unfortunately there are no maps of unfurnished graves or ones with few objects. The lack of such a map prevents any further review of spatial and chronological factors. It appears, however, that the so-called final period of the cemetery does not indicate the actual end of its use. P. Sarvas (1971) has demonstrated that the transition to unfurnished burials occurred gradually and that burials with grave goods still occurred in the end of the 12th century and the beginning of the 13th century. The Luistari grave with a ring brooch and the unfurnished burials may indicate that the transition was equally gradual also in this case.

7.1.4. A brooch pin

1. NM 22445:206 (Find 75/1986, Plate 15:6), south part of the crest, sq. 110/214
– narrow-based brooch pin of bronze
– 40 x 2 mm, weight 1.14 g
– possible traces of fire

In most cases it is impossible to define the type of brooch on the basis of the pin. In spite of this, it may be noted that a similar but shorter pin was also found at the Kuhmoinen hillfort in a low-knobbed and flat-sectioned penannular brooch (NM 22445:241).

7.2. Parts of chain-sets

7.2.1. An eastern (?) chain joint

– NM 22445:206 (Find 75/1986, Plate 16:1), south part of the crest, excavation area 1, sq. 112/208
– bronze chain joint or length with loops at the ends; one of the loops is broken (?); the middle part is perforated and decorated with a stamped impression
– 51.5 x 10.5 x 2.5 mm, weight 3.94 g

There are no direct parallels to this chain joint or length. The Gråträsk hoard find from Swedish Lapland contained two broadly similar lengths of chain in which the middle part consists of two perforated ovals (Serning 1956 42, Pl. 41:1–2). The chain lengths are regarded as being of eastern origin. The Gråträsk find contains elements from various parts dating from the 8th to the 14th centuries (Zachrisson 1984 68).

7.2.2. A twin-spiral chain-bearer

1. NM 22445:134 (Find 4/1985, Plate 16:2), northeast terrace, sq. 136/228
– 47 x 35.5 x 4 mm, weight 14.46 g
– possible traces of fire
– found together with a twin-animal brooch (NM 22445:135)

Twin-spiral chain-bearers are common in all of the areas of Finland settled in late prehistoric times and they have been regarded as a specifically Finnish artefact form (Kivikoski 1973 767, 768, 1110). The Scandinavian finds of the type consist of a single find from Gotland and one from Norway. There are two finds from Saarenmaa (Ösel) in Estonia. The type is also known from eastern finds in Ingria, the province of Kostroma and Novgorod (Kivikoski 1939 151; Schauman 1971 32; Sedova 1981 33).

Kivikoski (1939 150–151) dates the oldest specimens of this type to the 11th century and the youngest ones to the Crusade Period. This is supported by P. Sarvas's coin datings (P. Sarvas 1972 30). Referring to a grave with C-type brooches in the Osmanmäki cemetery in Eura, Schauman (1971 4–5, 29–32) dates the oldest chain-bearers of this type to as early as the first half of the 10th century. A twin-spiral chain-bearers suspended from a narrow-rimmed D-type brooch, found in Tornio, is dated to the latter half of the 10th century (Huurre 1983 355, 358).

Later finds of the type include a chain-bearer found in a grave adjacent to grave I of the Rukoushuone cemetery in Vesilahti, which was coin-dated to the end of the 12th century. There is a later dating for the type from Novgorod, according to which the artefact type was still in use in the 13th century (Sedova 1981 35,33, ris. 10:4).

7.2.3. A rhomboid pendant made from an ear spoon

1. NM 22445:85 (Find 20/1985, Plate 16:3), north slope, sq. 158/198
– a rhomboid bronze pendant made from an ear spoon with acanthus ornament on one side
– 48 x 14 x 2.5 mm, weight 7.3 g

The ear spoon is an artefact of wide distribution with a long historical background. The oldest finds from Denmark and Sweden are from the Roman Iron Age to the Vendel Period. Ear spoons have also been found in the women's graves of Birka and elsewhere in Sweden as well as in Medieval town excavations. In Sweden they remained in use in ethnographic contexts until the 19th century (Gräslund 1984b 177–182). They are also known from the settlements east of Lake Ladoga, where they are assumed to have spread along with the Varangians (Salmo 1952 353; Raudonikas 1930 107–108).

The oldest Finnish finds of ear spoons are from Viking Period contexts in Satakunta. These are two bronze specimens from Tulonen in Karkku (Kivikoski 1973 945, 946) and a bronze ear spoon found in grave 2 of the Vilusenharju cemetery in Messukylä (Kivikoski 1973 946). The latter grave also contained a small penannular brooch mainly resembling Salmo's group 13. As the brooch was found singly, it may be dated to the 11th century (Nallinmaa-Luoto 1978 108) and especially its first part, i.e. in the Viking Period. Of uncertain date are an ear spoon of bone and two fragments of bone ear spoons from the Hiukkainvainionmäki cremation cemetery in Huittinen, dated to the Merovingian and Viking Periods (Kivikoski 1973 947).

The Viking Period ear spoons do not, however, include parallels to the relatively few Crusade Period ear spoons of Western Finland. These have been found in grave 3 of the Yliskylä cemetery in Perniö (Appelgen-Kivalo 1907b Tf. IX:2; coin dating 1106–1125, P. Sarvas 1972 117), the Pahnainmäki grave find in Kalvola (first half of the 12th century or c. 1150; C. A. Nordman 1924 80–82,143–146) and as a stray find from Anttila in Tyrväntö (NM 6503:21). The first-mentioned find is undecorated while the second one is decorated with clumsily-executed band ornament. The last-mentioned find is the closest parallel to the Kuhmoinen find. It is also decorated with engraved acanthus ornament, although the rim with circles between two rows of lines is different. Also the specimen from Anttila in Tyrväntö was later made into a pendant.

Ear spoons have been found in greatest numbers in Eastern Finland. To my knowledge there are 41 finds from the regions of Savo and Karelia and one from Riga, Latvia (Caune 1990). These include both bronze and iron parallels to the undecorated spoon from Perniö (Patja, Sakkola NM 10710:7,NM 10817:8; Suotniemi, Käkisalmi NM 2487:52; Kekomäki,Kaukola NM 2595:39; Hovinsaari, Räisälä NM 2592:110). In two specimens (Laukkanen, Räisälä NM 3118:10; Virolainen, Lapinlahti, Sakkola NM 9415:13) there is also band ornament, but the material from Savo and Karelia does not include direct parallels to the Pahnainmäki spoon. Nor are there any direct parallels to the Kuhmoinen specimen, but its ornament, the acanthus motif (and the casting technique), display clear links with the Savo-Karelian ear spoons, which – with the above-mentioned exceptions – also display the same type of ornament or palmette motifs. However, engraved decoration has been found only in Karelia in addition to the two finds from Häme.

The Savo-Karelian ear spoons are dated to the period of the Karelian culture. Grave 21 at Patja in Sakkola was coin-dated to 1210/20 – 1260/70 (Kivikoski 1942 85–87; P. Sarvas 1972 4, footnote 1). Kočkurkina (1982 115–116) dates the ear spoons from the Karelian cemeteries to a period ranging from the 12th to the 13th century. Ear spoons have been found in women's graves and they belonged to the set of chain ornament worn by women. In Finland it also belonged to folk costume (T. Vuorela 1979 192).

7.3. Bracelets

7.3.1. A bracelet of simple form and thin section with a ridge

1. NM 22445:203 (Find 76/1986, Plate 16:6), north part of the crest, sq. 120/202
– an undecorated bracelet of triangular section
– 88 x 43 x 2.5 mm, weight 8.06 g
– the bracelet is bent and shows signs of fire

This author has not found any parallels to the bracelet. Because of their simple form, bracelets of this kind may have remained unnoticed by archaeologists, especially in cases where they have been found in fragmentary condition among cremation finds.

This find resembles undecorated or sparsely decorated Early Iron Age bracelets of simple form. They are often of segment-shaped section, but to my knowledge there are no bracelets of triangular section. On the other hand, in 89% of known cases the spiral bracelets are of triangular section (Korkeakoski-Väisänen 1981 39). The oldest spiral bracelets – an East Baltic artefact form – date back to the Roman Iron Age. During the following periods it appears to have gone out of use and it reappears in the archaeological record in the late Merovingian Period, although it is relatively rare. It is common in the Viking Period, but again there are no spiral bracelets from Crusade Period contexts (Korkeakoski-Väisänen 1981 49,78,85; Kivikoski 1973 456,744; Lehtosalo-Hilander 1982b 121).

There are four coin datings relating to this artefact type: 913–932, 913–942, 1014–1024 and the end of the 10th century – the beginning of the 11th century (P. Sarvas 1972 28; Lehtosalo-Hilander 1982b 121). Their distribution covers the whole of the area settled in the Iron Age (Korkeakoski-Väisänen 1981 map 10).

However, the Kuhmoinen find is not a fragment of a spiral bracelet, but an intact specimen. Despite this, it was easy to fashion simple bracelets from the rod of spiral bracelets, and their dating finds a number of references in that of the spiral bracelets. The question of a more precise dating must remain open.

7.3.2. A simple bracelet with tapering ends

1. NM 22445:116 (Find 12b/1985, Plate 16:4), northeast terrace, sq. 138/220
– 41 x 8.5 x 4 mm, weight 5.67 g
– this fragment of an undecorated bracelet with tapering ends is slightly flattened at the ends, and it appears that the ridge part was beaten flat to some degree
– signs of fire

Because of the damaged and deformed condition of this object, direct parallels cannot be demonstrated. The closest possible parallels are the bracelets of simple form with tapering ends from Viking Period contexts. These form a heterogeneous group (Kivikoski 1973 738; Korkeakoski-Väisänen 1981 37–38).

According to Korkeakoski-Väisänen, the artefact group in question (type II 3a) is of exclusively West Finnish distribution, covering Finland Proper and Häme. There are no finds from Satakunta (Korkeakoski-Väisänen 1981 84–85, map 9). This author has studied the specimens mentioned by Korkeakoski-Väisänen and the closest parallels to the Kuhmoinen find are the bracelets from Ihalempi in Hattula (NM 2895:12) and Mustamäki in Halikko (NM 5512:43).

The artefact group appears to be of southern origin with parallels in Estonia, Latvia and the Vladimir region of Russia. There are also parallels in hoard finds from Norway and Gotland (Korkeakoski-Väisänen 1981 77).

The dating of the bracelets is highly uncertain, as all of the known specimens are either stray finds or from undated contexts. Hackman (1940 78; Korkeakoski-Väisänen 1981 38) dates the bracelets to the beginning of the Viking Period. In Norway they are dated to the beginning of the 9th century (Petersen 1928 153–154) and in Estonia to the 9th–12th centuries (Selirand 1974 165). It must be kept in mind, however, that the bracelets of simple form with tapering ends were common in Finland already in the Early Iron Age and the possibility remains that the Kuhmoinen find may be older than the Viking Period.

7.3.3. A bracelet of massive form with widened ends

1. NM 22445:22 (Find 24/1984, Plate 16:7), north part of the level area behind the wall, excavation area 2, sq. 142/170
– 92 x 23 x 8 mm, weight 82.88 g
– a burnt bracelet bent double; one end melted
– the ends are decorated with transverse bead motifs and part of the outer surface is covered with D-shaped depressions placed in a wavy band

This is the most common bracelet type of the Viking Period. Korkeakoski-Väisänen (1981 3–12,73,82–83) refers to 101 whole and 103 fragmentary specimens with D-ornaments, forming her type I1.a. The area of distribution covers Finland Proper, Satakunta and Häme. There is also a find from Hanko in Uusimaa (Korkeakoski-Väisänen 1981 82; Kivikoski 1939 179–181).

Kivikoski (1973 734) dates the bracelet type to the Viking Period. Precise dating is impaired by the large number of cremation cemetery finds. It has also been suggested that the oldest bracelets of the type are from the 9th century (Korkeakoski-Väisänen 1981 10).

The bracelets can be divided into two groups of wide and narrow shape. The width of the ends varies from 15.5 to 48 mm. In the find from the Kuhmoinen hillfort the unmelted end is 22 mm wide and the bracelet is of the narrow variant. It has been suggested that the narrow variant is older and the change to the wider form occurred in the mid-10th century. Thus, the wider specimens would be from the end of the 10th century and the 11th century (Korkeakoski-Väisänen 1981 10–12; Lehtosalo-Hilander 1982b 120; Kivikoski 1939 179–181). Four coin datings are available in this connection, of which the oldest is 876–884 and the youngest is 979–999. The oldest coin-dated grave contained a narrow-shaped bracelet and the youngest one a wide bracelet. The material is too small, however, to date the transition from one variant to the other (P. Sarvas 1972 28–29).

7.3.4. A wide bracelet with tapering ends

1. NM 22445:189 (Find 29/1986, Plate 16:5), south part of the level area behind the wall, sq. 120/178
– main fragment of a bronze silver-plated bracelet; along the edges are twin rows of dots
– 18 x 6 x 1 mm, weight 1.46 g
– the object has clearly been cut

This fragment is of a wide type of bracelet with tapering ends and varying decoration which were made of silver-plated copper or silver plate and often of tin-coated copper plate. Korkeakoski-Väisänen (1981 48–56; see also Kivikoski 1973 750, 1086) does not classify the bracelets according to material, but groups them according to section into concave-convex ones (type V1a1) and straight-sectioned specimens (type V1a2). It is difficult to apply this grouping, for the straight types clearly include concave-convex ones (e.g. NM 9750:6 from Franttilannummi in Mynämäki and two bracelets,NM 14349:60, from Ristimäki II in Kaarina). Furthermore, many of the bracelets listed as straight in section are slightly convex or concave-convex ones have straight or flat ends (or vice-versa), which raises obvious problems of classification. The straight-sectioned ones include specimens in which the middle part is recessed. Thus, the section is wavy in shape and in sense doubly concave-convex (e.g. NM 12549:62 from Rikala in Halikko). As only a few of the bracelets are clearly straight or concave-convex in section, Korkeakoski-Väisänen's groups will be discussed as a single group, as in Christina Bäcksbacka's study (1975 95).

The decoration of the bracelets varies to a great degree and there are no exact parallels to the find discussed in this connection. For example, there is a similar dotted line ornament in a bracelet from Rikala in Halikko (NM 12690:12) which is overlaid with tin. Other bracelets coated with tin are from Kalvomäki in Kokemäki (2 bracelets; NM 1763:14), Yliskylä in Perniö (NM 2912:86–87) and Kirk'ailanmäki in Hollola (four bracelets; NM 20450: 1,2,18,45).

In Finland this type of bracelet has a clearly western centre of distribution, with finds from Finland Proper, Satakunta, Häme and Lapland (Korkeakoski-Väisänen 1981 map 12).

The Finnish finds are dated to the 11th and 12th centuries (Hirviluoto 1986 40–42; Korkeakoski-Väisänen 1981 55; Kivikoski 1973 750). The oldest specimens are from the Viking Period and the majority of the finds are dated to the following period. Four coin datings are available in this connection: 1009–1017, 1023–1029, 1054–56, 1158–1165 (P. Sarvas 1972 28).

To the south and east of Finland bracelets of this type have been found in Estonia, Latvia, Ingria and Novgorod. The Latvian bracelets of the type are dated to the 11th – 13th centuries (Tõnisson 1974 128–129; Kivikoski 1940 41). The Estonian bracelets are dated on the basis of hoard finds to the 12th and 13th centuries (Selirand 1974 169). The finds from Novgorod are from the 12th to the 14th centuries (Sedova 1981 103–110, ris. 39–40).

7.4. Belt parts and fittings

7.4.1. A perforated end-fitting of a belt

1. 22445:70 (Find 22/1985, Plate 16:8) south part of the level area behind the wall, sq. 136/176
– a perforated belt end-fitting with looped ends
– 51.5 x 11 x 6.5 mm, weight 7.58 g

A close parallel to this object has been found in the Hulkkunanmäki cemetery in Lieto (NM 9695:20; Kivikoski 1939 193, Abb. 32; Kivikoski 1973 899). The only difference is that the latter is not perforated nor does it have looped ends. Other similar end-fittings have been found in the following Viking and Crusade Period cemeteries: Vilusenharju, Messukylä (NM 18856:653, Nallinmaa-Luoto 1978 153, t. XXVII:17); Mikkola, Ylöjärvi, grave 3 (NM14622:88) and Taskula in Maaria, grave 10 (NM 11275:24–25; coin dating 1036–39).

The two last-mentioned finds belong to the so-called belts of Gotland type, which include animal-shaped fittings and three-part rings. Apparently the Kuhmoinen specimen must also be placed in this connection.

In Finland belt fittings, belt rings and buckles of the Gotland type have been found in Finland Proper, Satakunta and Häme and in smaller numbers in Savo and Karelia. Inhumation burials indicate that they belonged to the attire of men. As indicated by the name, the form originated in Gotland, but the large number of "degenerated" specimens indicates local manufacture (Kivikoski 1973 893). In Finland the belt parts and fittings of Gotland type are usually dated to the 11th and 12th centuries (Kivikoski 1973 893), which is supported by coin datings (P. Sarvas 1972 38–39). In Sweden these objects are dated to the 11th century, but it must be pointed out that around the middle of the 11th century the practice of furnished burials ceased in Sweden (Nerman 1929 128–129). Later use was of course not out of the question. The Estonian specimens are from finds of the 11th century (Selirand 1974 131).

7.4.2. A belt fitting

1. NM 22445:200 (Find 78/1986, Plate 16:9), north part of the crest, sq. 124/194
– fragment of a bronze object with a plate-like part including a rivet and decorated with bull's eye motifs and dotted lines joined to a flat hook-like part with bull's eye decoration
– 52 x 29 x 1 mm, weight 2.79 g

The width of the fragment and rivet show that it had originally been affixed to a narrow strap of leather. However, it is not absolutely certain that the object in question is a belt fitting. Nor are there any direct parallels in the available material. Highly similar fittings have been found at the Storsvedberget cemetery at Västanby in Karjaa (NM 8896:34,43). The cemetery was in use in the Late Roman Iron Age and the Merovingian Period.

7.5. A metal application for clothing

7.5.1. A bronze spiral

1. 22445:123 (Find 9c/1986, Plate 16:10), northeast terrace, sq. 138/224
– fragment of a bronze spiral
– 22 x 6 mm, weight 2.53 g
– possible traces of fire

Bronze spiral ornament is a characteristic feature of Viking and Crusade Period costume (see e.g. Lehtosalo-Hilander 1984a). The fragment from the Kuhmoinen hillfort is from Western Finland (Leena Tomanterä, oral. comm.). Spiral ornaments were used in men's clothing, especially on belts, leggings and cloaks, but they were more common in women's attire.

7.5.2. A bell pendant

1. NM 22445:17 (Find 38/1984, Plate 16:11), upper east terrace, excavation area 2, sq. 100/246
– a cast bell pendant of bronze with a loop resembling a flattened sphere; along the crossing openings are parallel lines and three bull's eye motifs
– 30.5 x 26 x 24 mm, weight 16.88 g
– possible traces of fire patina

In Finland bell pendants have been found in the cemeteries of Satakunta and Häme. They are rare in Finland Proper and this author does not know of any specimens from the Karelian finds (Cleve 1978 123–124; Lehtosalo-Hilander 1982b 116; Schauman 1971 48–49, Kivikoski 1939 157 & 1973 810,1139, 1210).

So far there are no exact parallels to the bell pendant from the Kuhmoinen hillfort. It differs from other cast specimens in its form and the shape of the suspension loop. Highly similar ones are included among the round and cast pendants dated by Cleve to the 10th century and the beginning of the 11th century (Cleve 1978 123–124). Related to these objects are four coin datings from the Kjuloholm cemetery in Köyliö and one from Luistari in Eura. The oldest dating is 971–974 and the youngest one is 1018–1024 (P. Sarvas 1972; Lehtosalo-Hilander 1982b 90, 306). The coin datings clearly emphasize the latter half of the 10th century and the beginning of the 11th century. In this respect, a bell belonging to the Kernaala hoard in Janakkala, dated to c. 800, appears to be exceptionally old. The problems related to the dating of hoard finds must also be borne in mind in this connection.

Bells or bell pendants have been found in all parts of the East Baltic region in contexts from the 11th to the 13th century (Selirand 1974 153). The Northwest Russian finds are from the 10th–11th centuries (Malm & Fehner 1967 133–141). They have also been found in the west – albeit rarely – in the children's graves at Birka. The dating in this connection is the "jüngere Birkastufe" (Gräslund 1984a 119–123). Gräslund also refers to Frisian finds of pear-shaped bell pendants from graves of the 8th century and the beginning of the 9th century (Schmid 1970 50, Abb. 4).

The bells served a variety of uses. They were used as ornaments in various kinds of men's and women's clothing and they were also hung on horse reins.[5] They may also have been used as rattles by children and they may have been affixed to cribs (Cleve 1978 123–124; Lehtosalo-Hilander 1982b 116; Pälsi 1928 77, fig. 4; Gräslund 1984a 122). In this study they are listed among personal ornaments, although the above uses suggest other possibilities as well.

8. Unidentified fragments of artefacts

8.1. Fragments of bronze and copper artefacts

1. NM 22445:152 (85/1986, Plate 17:2), south part of the level area behind the wall, excavation area 4, sq. 132/170
– piece of bronze rod of trapezoid section
– 17 x 6.5 x 3 mm, weight 1.18 g
– possible traces of fire

2. NM 22445:167 (Find 3/1986, Plate 17:1), south part of the level area behind the wall, excavation area 4, sq. 134/172
– a thin piece of bronze or copper rod of low trapezoid section; one end of the piece is sharp and the other is flat; the piece appears to have been cut
– 77 x 57 x 1 mm, weight 2.15 g
– possible traces of fire

3. NM 22445:168 (Find 4/1986, Plate 17:3), south part of the level area behind the wall, excavation area 4, sq. 134/172
– a rod of copper or bronze, apparently "cold-beaten" from copper plate
– 55 x 4 x 2.5 mm, weight 3.63 g

4. NM 22445:73 (Find 34/1985, Plate 17:5), north part of the level area behind the wall, sq. 148/178
– fragment of a perforated bronze artefact
– 33 x 28 x 8.5 mm, weight 11.6 g
– partly melted

5. NM 22445:224 (Find 72/1986, Plate 17:4), upper east terrace, sq. 96/230
– piece of copper or bronze rod of mainly round section
– 54 x 19 x 4 mm, weight 8.68 g

The width, length and section of find no. 1 suggest a straightened spiral ring. The somewhat flattened section may have been caused by straightening the object by beating.

Finds nos. 2 and 4 are possibly rods of raw material (copper or bronze), which may have the use of find no. 1 as well.

Nothing can be said of the origin of no. 3. It is similar in appearance to melted fragments of bronze objects from cremation cemeteries.

8.2. Fragments of iron artefacts

1. 22445:186 (Find 95/1986), south part of the level area behind the wall, sq. 116/170
– piece of iron
– 22 x 12 x 4 mm, weight 1.9 g

2. NM 22445:151 (Find 11/1986), south part of the level area behind the wall, excavation area 4, sq. 128/170
– fragment of an iron artefact
– 23 x 19 x 6.5 mm, weight 4.65 g

3. 22445:154 (Find 1/1986), south part of the level area behind the wall, excavation area 4, sq. 128/172
– fragment of an iron artefact
– 77 x 38 x 3 mm, weight 14.7 g

4.–10. NM 22445:156 (Find 88/1986), south part of the level area behind the wall, excavation area 4, sq. 132/172
– 7 pieces of iron
– largest piece: 38 x 10 x 12 mm, total weight 17.5 g

11. NM 22445:157 (Find 16/1986), south part of the level area behind the wall, excavation area 4, sq. 132/172
– fragment of an iron artefact
– 37 x 12 x 3 mm, weight 2.54 g

12. NM 22445:159 (Find 18/1986), south part of the level area behind the wall, excavation area 4, sq. 132/172
– piece of iron
– 23 x 9 x 4 mm, weight 1.69 g

13. NM 22445:161 (Find 22/1986), south part of the level area behind the wall, excavation area 4, sq. 132/172
– small fragment of iron
– 12 x 7 mm, weight 1.00 g

[5] In the table 16 this bell pendant is erraneously placed among horse-gear.

14. NM 22445:162 (Find 23/1963), south part of the level area behind the wall, excavation area 4, sq. 132/172
– piece of iron rod with a flat, widened and bent end
– 34 x 7 x 6 mm, weight 5.19 g

15. NM 22445:169 (Find 5/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– piece of iron
– 33 x 4 mm, weight 2.86 g

16. NM 22445:170 (Find 6/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– piece of iron rod
– 23 x 6 mm, weight 2.68 g

17. NM 22445:174 (among pieces of slag), south part of the level area behind the wall, excavation area 4, sq. 134/172
– fragment of an iron artefact
– 42 x 19 x 8 mm, weight 12.56 g

18. NM 22445:175 (Find 8/1986), south part of the level area behind the wall, excavation area 4, sq. 134/172
– piece of iron rod
– 25 x 6 mm, weight 2.08 g

19. NM 22445:64 (Find 31/1985), south part of the level area behind the wall, sq. 122/170
– piece of iron rod bent into U-shape
– 24 x 18 x 7.5 g, weight 3.88 g

20. NM 22445:66 (Find 27/1985), south part of the level area behind the wall, sq. 122/174
– piece of iron rod bent into U-shape
– 20 x 7 mm, weight 6.51 g
– fire patina

21. NM 22445:187 (Find 80/1986), south part of the level area behind the wall, sq. 130/174
– piece of iron rod
– 23 x 5 x 3 mm, weight 1.65 g

22. 22445:72 (Find 23/1985), south part of the level area behind the wall, sq. 136/178
– bent piece of iron rod
– 57 x 27 x 8 mm, weight 15.05 g
– possible traces of fire patina

23. NM 22445:192 (Find 28/1986), south part of the level area behind the wall, sq. 118/180
– piece of iron
– 32 x 11 mm, weight 4.11 g

24.–30. NM 22445:193 (Find 31/1986), south part of the level area behind the wall, sq. 132/180
– 7 small fragments of iron
– total weight 5.8 g

31. NM 22445:194 (Find 33/1986), south part of the level area behind the wall, sq. 134/180
– piece of iron rod
– 47 x 6 mm, weight 4.75 g

32. NM 22445:84b (from next to Find 19a/1986), north slope, sq. 158/198
– piece of iron rod bent into spiral shape
– 25 x 18 mm, weight 2.96 g

33. NM 22445:202 (Find 39/1986), north slope, sq. 158/200
– piece of iron
– 18 x 6 mm, weight 1.8 g

34. NM 22445:243 (Find 82/1986), north slope, sq. 156/218
– small fragment of iron
– 13 x 16 x 3 mm, weight 0.7 g

35. NM 22445:198 (Find 79/1986), north part of the crest, sq. 142/190
– fragment of a small iron ring (?)
– 16 x 3,5 mm, weight 0.89 g
– fire patina

36. NM 22445:249 (Find 4/1987, Plate 17:3), north part of the crest area, sq. 134/200, cairn no. 11,
– a round and perforated piece of iron plate flat on one side and concave on the other
– 31 x 26 x 5.5 mm, weight 10.55 g

37.–41. NM 22445:40 (Find 10/1984), north part of the crest, sq. 128/206
– 5 pieces and small fragments of iron
– largest piece: 29 x 15 x 4 mm, weight 4.26 g

42. NM 22445:79 (Find 47/1985), south part of the crest sq. 108/194
– piece of iron rod
– 27 x 15.5 x 12 mm, weight 6.26 g

43. NM 22445:83 (Find 41/1986), south part of the crest, sq. 118/198
– piece of iron rod with both ends bent into hooks
– 56 x 5 x 4 mm, weight 4.11 g

44.–45. NM 22445:82 (Find 48/1986, Plate 17:8), south part of the crest, sq. 102/198
– piece of iron rod and a piece of a triangular iron plate
– former: 37 x 4 x 5.5 mm, weight 2.05 g, latter: 41.5 x 22 x 6 mm, weight 7.1 g
– traces of handling in the latter

46. NM 22445:92 (Find 42/1985, Plate 17:6), south part of the crest, sq. 108/204
– fragment of an iron artefact
– 42 x 15.5 x 9 mm, weight 15.41 g

47. NM 22445:39 (Find 2/1984), south part of the crest, sq. 110/204
– 2 pieces of iron
– larger piece: 22.5 x 8 x 5 mm, total weight 1.71 g
– fire patina

48.–51. NM 22445:3 (Find 16/1984), south part of the crest, excavation area 1, sq. 110/210
– 4 pieces of hook-like iron objects
– largest piece: 27 x 19.5 x 5 mm, weight 4.52 g

52. NM 22445:5 (Find 20/1984, Plate 17:7), south part of the crest, excavation area 1, sq. 108/212
– piece of iron
– 34 x 16 x 6.5 mm, weight 5.96 g

53. NM 22445:204 (Find 41/1986), northeast terrace, sq. 152/210
– piece of iron
– 12 x 11 x 4 mm, weight 2 g

54.–55. NM 22445:205 (Find 40/9186), northeast terrace, sq. 152/210
– 2 pieces of iron rod
– larger piece: 43 x 9 x 4 mm, total weight 6.05 g
– hammered end; not broken

56. NM 22445:110 (Find 15/1985), northeast terrace, sq. 142/216
– piece of iron
– 18.5 x 17 x 4.5 mm, weight 2.85 g

57. NM 22445:58 (Find 15b/1985), northeast terrace, test trench 2, sq. 144/216
– fragment of an iron artefact
– 31 x 22 x 6.5 mm, weight 7.36 g

58. NM 22445:60 (Find 15f/1985), northeast terrace, test trench 2, sq. 146/218

– hooked piece of iron
– 35.5 x 9 x 3.5 mm, weight 5.11 g
– fire patina

59. NM 22445:210 (Find 48/1986), northeast terrace, sq. 138/222
– piece of iron rod
– 23 x 6 mm, weight 3.79 g

60. NM 22445:121 (Find 8b/1985), northeast terrace, sq. 116/242
– piece of iron rod bent at one end
– 67 x 17 x 7 mm, weight 9.07 g

61. NM 22445:235 (Find 62/1986), northeast terrace, sq. 116/242
– fragment of an iron artefact with a looped end
– 24 x 11 x 7 mm, weight 4.18 g

62. NM 22445:238 (Find 59/1986), northeast terrace, sq. 120/242
– fragment of an iron rod
– 16 x 6 x 4 mm, weight 1.45 g
– hammered at one end

63. NM 22445:215 (Find 96/1986), upper east terrace, sq. 96/226
– fragment of an iron object with a rivet
– 32 x 17 x 6 mm, weight 3.00 g

64. NM 22445:223 (Find 70/1986), upper east terrace, sq. 88/230
– piece of iron plate bent at the edge
– 39 x 24 x 4.5 mm, weight 7.74 g

65. NM 22445:225 (Find 73/1986, Plate 17:11), upper east terrace, sq. 108/230
– piece of iron rod
– 91 x 10 x 6 mm, weight 31.3 g

66. NM 22445:142 (Find 58/1985, Plate 17:10), upper east terrace, sq. 138/232
– piece of iron rod
– 40 x 7.5 x 7 mm, weight 4.99 g

67. NM 22445:14 (Find 43/1984), upper east terrace, excavation area 2, sq. 104/244
– pieces of iron rod
– largest piece 33 x 8 x 7 mm, weight 4.63 g

68. NM 22445:12 (Find 44/1984, Plate 17:12), upper east terrace, excavation area 2, sq. 102/244
– piece of iron rod
– 22 x 9.5 x 8 mm, weight 3.99 g

69. NM 22445:11 (Find 37/1987, Plate 17:9), upper east terrace, excavation area 2, sq. 100/244
– piece of iron rod bent at one end
– 59 x 8 x 5 mm, weight 7.23 g

70. NM 22445:248 (Find 94/1986, Plate 17:14), from the east of the hillfort outside the crest area, sq. 112/268
– fragment of an iron artefact; one end broken off; three-pronged; one end of chisel-like form (key?)
– 143 x 17 x 5 mm, weight 27.2 g

It is not possible to classify the above finds, as many of the pieces of iron are completely unidentifiable small fragments or pieces of rod that can be from almost kind of object at all. Probably alternatives are, however, nails and the chain-lengths of kettle-hangers. There is also a fragment (no. 2) which may contain enough features for identification, but despite efforts it has not been possible to find any parallels.

A total of 70 iron fragments were found in 49 different locations. Four or five of these show traces of fire patina and nos. 14, 45, 55 and 62 show signs of hammering and handling.

9. Finds of later date

1. NM 22029:3 (Find 5/1985), eastern outcrops, sq. 114/248
– a 2 kopeck copper coin from 1814
– weight 13.15 g

2. NM 22445:240 (Find 90/1986), northeast terrace, sq. 120/244
– a bronze button
– 7.5 x 5 mm, weight 0.78 g

It is of course possible that among the listed finds are also other later objects than the two mentioned above. It was, however, impossible to separate any possible finds of this kind from the rest of the material. For example, the horseshoe nails could well have originated from forestry work carried out at the site in later times. Large areas of timber are known to have been felled at the Kuhmoinen hillfort at least in the 1930s. Related to this may be a factory-made horseshoe found in the crest area which was not recovered.

Other later finds include bullets, cartridges, bottle caps, tin foil and a factory-made nail.

APPENDIX 3

PREHISTORIC FINDS AND SITES IN KUHMOINEN

Briefly listed in the following are the locations of prehistoric finds and sites in Kuhmoinen, the types of finds and their dating. Also discussed are the distribution of the finds and the burial practices involved. The precise locations of the finds are given in Fig. 1.

1. Iron Age stray finds

1. Kuntala (formerly Hokkala), Anttula, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6828 83, y = 562 82, z = c. 92.5 m
Socketed axe, NM 15675
Dating: Early Roman Iron Age – Merovingian Period, possibly also Viking Period (Kivikoski 1973 59).
Distribution: Few finds of socketed axes in Eastern Europe; common in Scandinavia and the East Baltic region, from where they are assumed to have spread to Finland (Kivikoski 1973 59).

2. Pussi, Valkiala, Kuhmoinen

Basic survey map 2144 07 Karklampi
x = 6830, y = 562 (estimate)
Type C axe, NM 2089:26
Dating: Merovingian Period – early Viking Period (Wuolijoki 1972 6).
Distribution: A western axe type, found in all of the provinces of Finland. Largest concentration in Northern Finland, to where it may have spread from Norway (Wuolijoki 1972 7, Map 1).

3. Kuhmoinen

Straight-backed Finnish axe, Häme Museum 1091:29
Dating: Viking Period (Wuolijoki 1972 23)
Distribution: Finds from Finland Proper, Satakunta (especially Upper Satakunta) and Häme. Few finds from Eastern Finland (Wuolijoki 1972 22–23, Map 5).

4. Papinsaari, Tapiala, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6828 02, y = 563 10, z = c. 95 m
Penannular brooch with knob ornaments, NM 16864
Dating: Viking Period, especially the 10th century (Kivikoski 1963 80; Salmo 1956 41; Lehtosalo-Hilander 1982b 102).
Distribution: This brooch type occurring in men's graves is known in Finland from the Åland Islands, Finland Proper, Satakunta, Häme, Savo-Karelia and Northern Finland. Few finds from Eastern Finland. Although relatively rare outside of Finland, the type is known from Sweden, Norway and the southeastern shore of Lake Ladoga (Kivikoski 1973 696; Lehtosalo-Hilander 1982b 103).

5. Marttila, Anttula, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
Round convex brooch of type F, Kuhmoinen Museum
Sources: A-L Hirviluoto, inspection report 1962 (1963)
Dating: 10th and 11th centuries (P. Sarvas 1972 19–20; Kivikoski 1973 661).
Distribution: This brooch occurring in women's graves is known from Upper Satakunta and Häme. Single specimens have been found in Savo and Uusimaa (Kivikoski 1973 661).

6. Lahnalahti, Puukoinen, Kuhmoinen

Basic survey map 2144 08 Harjunsalmi
x = 6843, y = 565 (estimate)
Type E spearhead, NM 10312
Dating: 9th and 10th centuries (e.g. Lehtosalo-Hilander 1982b 30).
Distribution: A Scandinavian type, found in large numbers throughout the areas bordering on the Baltic as well as in Russia. Also known from Central and Southern European finds. In Finland spearhead of this type have been found in wilderness areas as well as in the areas of Iron Age settlement (Kivikoski 1973 852–853; Solberg 1984 65–68; on the dating and distribution, see Appendix 2, p. 187–188).

7. Jousimatka, Lummene, Kuhmoinen

Basic survey map 2143 06 Lummene
x = 6821, y = 550
Two type E spearheads, NM 1253
Dating and distribution: see stray find no. 6.

8. Kuhmoinen

Type E spearhead, type M axe, NM 5,6
Dating: On the type E spearhead, see stray find no. 6. The axes of type M are dated from c. 1000 A.D to the Middle Ages (Wuolijoki 1972 27) and belong to a body of material in use both in the Viking and Crusade Periods, sometimes referred to as the artefacts of the 11th century.
Distribution: On the type E spearhead, see stray find no. 6. Type M axes are a Scandinavian weapon type that spread throughout the whole Baltic region and to regions to the east. In Finland it is found in all of the areas settled in late prehistoric times as well as in Northern Finland (Wuolijoki 1972 Map 6).

The find in question is from the year 1830 and the artefacts were recovered from a field. Also included in the find was sword, which was not found in connection with cataloguing. It is not certain whether the objects belong together.

9. Kotivainio, Tikka, Tapiala, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6827 42, y = 564 70, z = c. 100 m
Two spearheads mainly resembling type K, NM 6305, Hämeenlinna museum 635

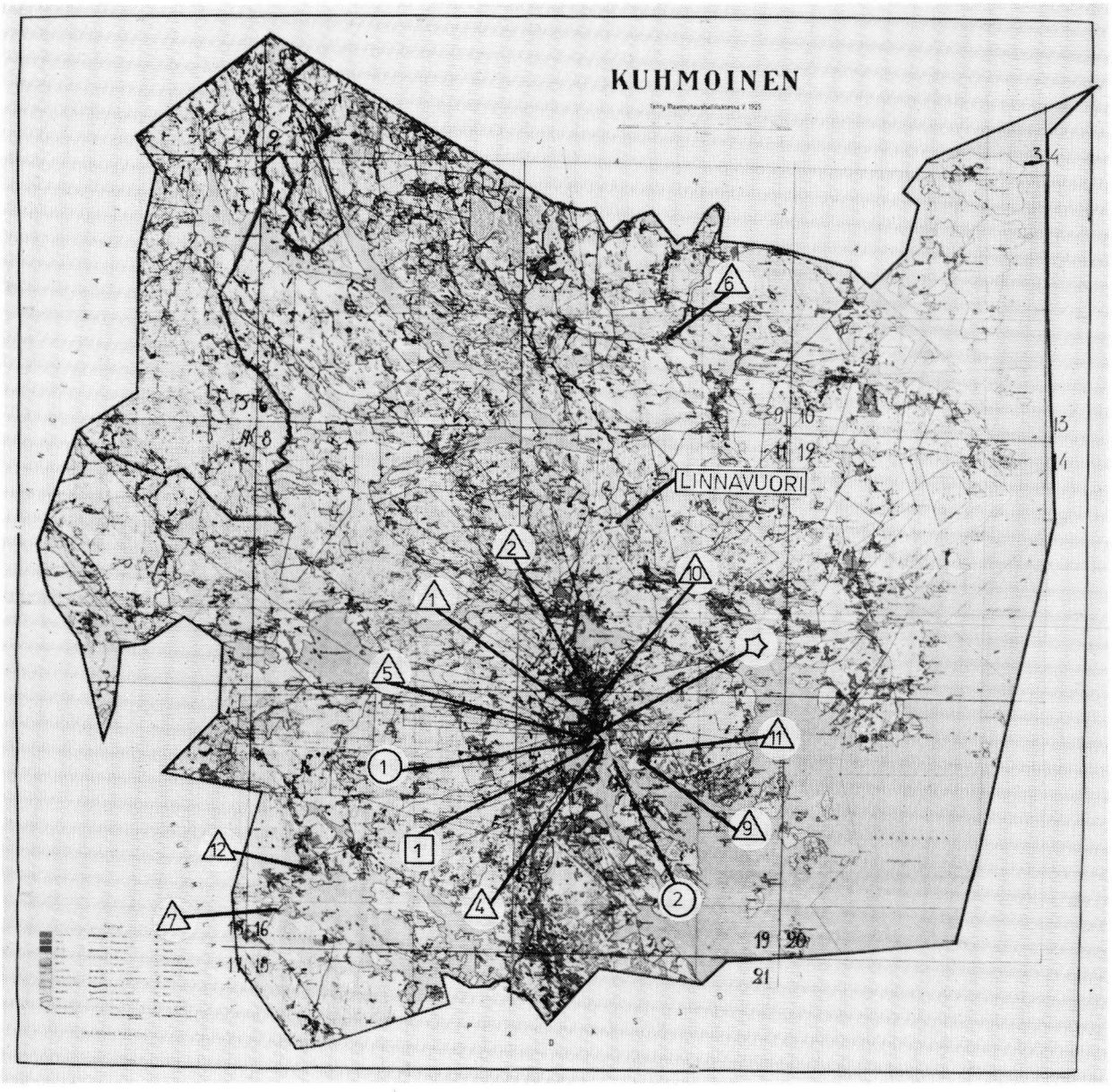

Fig. 1. Iron Age and Medieval finds from Kuhmoinen. △ = stray find, □ = hoard find, ○ = cemetery find, ⬠ = Early Medieval grave find. Numbers refer to list of sites and locations in Appendix 3.

Sources: A. Hackman, map and photograph 1918.
Dating: 10th century with variants of the type were still in use in the early 11th century (Lehtosalo-Hilander 1982b 32, Solberg 1984 86).
Distribution: The type has a wide distribution with finds from Iceland, Norway, Sweden, Estonia, Finland, Russia and England (Solberg 1984 102; Kirpičnikov 1966 7; Kivikoski 1973 862–863).

10. Hovila, Kaukola, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6829, y = 562 or 563 (estimate)
Curved-backed Finnish axe, Hämeenlinna museum 663
Dating: Crusade Period (Wuolijoki 1972 23).
Distribution: Satakunta (especially Upper Satakunta), Häme, Savo-Karelia and Northern Finland (Wuolijoki 1972 23, Map 5; on the dating and distribution, see Appendix 2, p. 193).

11. Myysylä, Tapiala, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6827, y = 564 (estimate)
Curved-backed Finnish axe, NM 2089:25
Dating and distribution: see stray find no. 10.

12. Harju, Lummene, Kuhmoinen

Basic survey map 2143 06 Lummene
A small penannular brooch of bronze with faceted knobs (Salmo's group 13), 2089:27
Dating: Crusade Period (Salmo 1956 59–63).
Distribution: Finland Proper, Satakunta and Häme. Brooches of this type have been found in both men's and women's graves. Exceptional in Savo-Karelia; stray finds from Northern Finland (Salmo 1956 59–63; on the dating and distribution see Appendix 2, p. 207).

2. Iron Age hoard finds

1. Papinsaari, Tapiala, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6828 18, y = 563 20, z = c. 85 m
NM 7854:1–16.
Sources: A. Europaeus, report 1921.
Inspections of the site: The hoard was found in connection with grave-digging. It includes a breast-chain set and a shorter length of chain with various pendants as well as two neck-rings, three bracelets, three round perforated brooches, a comb pendant, two bells, a triangular-headed pin and two spirals (Kivikoski 1955a 75–77). A. Europaeus conducted a trial excavation at the site. As there were no finds of bones or charcoal, he concluded that "it is most probable that the find is a hoard, although an inhumation grave similar to one at Käräjämäki in Eura is possible. One must also keep in mind an unidentified bone fragment found in the trial excavation."
Dating of the finds: The deposition of hoard finds is usually dated according to the youngest component. The brooches of the Papinsaari hoard are from the Merovingian Period or the early Viking Period, according to which the find has been dated to around the year 800 (Kivikoski 1955a 75; C.A. Nordman 1924 113). Seger (1979 68) dates the hoard to the 9th century on the basis of the comb and bird pendants (see also Lehtosalo-Hilander 1982b 108).
Distribution: The artefacts of the Papinsaari hoard display contacts over large areas. Although domestic types are included the collection bears a strong East-Baltic character (round brooches; triangular-headed pin). No exact parallels are known to the chain ornaments, which generally have been found only in Häme. Parallels to the pendants have been found outside the area of Häme in the Aurajoki River valley and in the Vakka-Suomi region of SW Finland. The find also includes features indicating the Permian regions of Russia (bell pendants and possibly also the neck-rings). There are also Scandinavian artefacts among the pendants, which of course may originate from the east as well. (See Kivikoski 1955a 75–77, 98–99, 100–105, 116, 123; Kivikoski 1973 430, 449, 457,469,482,484).

3. Iron Age cemeteries

1. Rautsaarenkärki, Tapiala, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6827 40, y = 563 60, z = 85 m
NM 22365
Sources: J.-P. Taavitsainen, inspection report 1987.
Inspections of the site: During the excavations at the Kuhmoinen hillfort in 1984, Hannu Kilpinen – the discoverer of the hillfort finds – reported two cairns at a site known as Rautsaarenkärki. These were inspected in connection with the excavations of the hillfort.

Rautsaarenkärki is a promontory located in the village of Tapiala to the southeast of Papinsaari along the water route leading to the main village of Kuhmoinen. At present it is the northernmost promontory of the island of Uotilansaari (Vasikkasalo), which is still isolated at times of high water. To the south of the point of the promontory are two cairns, of which the one to the south is rectangular in form, appearing to be demarcated by large stones or boulders at the corners. The cairn measures c. 3 x 4.5 metres. The cairn to the north is of indistinct form with a diameter of about 6 metres.

Later in the same summer Kilpinen also found a sword fragment, a melted piece of bronze plate and a knife on the northern slope of the point. Kilpinen also discovered a belt-buckle and a hinge iron of late appearance in the elevated area near the cairns.

The sword was excavated, in which connection a piece of iron and a fragment of a sickle were found next to it and partly beneath it. A quartz flake was also found. The immediate area was inspected with a metal detector and a small even-armed brooch in good condition was found.

The trial excavations were continued in 1987 in connection with the mapping of the site and two trial pits were dug on the high area of the point. A trial pit dug between two large fixed stones in the vicinity of a navigation cairn in the highest part of the area contained soil which appeared to be disturbed. The pit also contained a fragment of a bronze bracelet (?) in addition to later bottle sherds, caps and pieces of wire.

In trial pit no. 2, excavated between cairns 1 and 2 the soil appeared to be undisturbed. At the boundary of humus and sand was a fragment of an iron hook and a piece of burnt bone. The north slope of the site was again inspected with a metal detector with new results. New finds were discovered immediately next to the former ones. Next to the location of the sword were more of its fragments and a type E spearhead in soil-mixed sand, beneath which was an undisturbed layer. Fragments of burnt bone were also found next to the artefacts. Other finds from the slope include a piece of melted bronze plate, a pair of chain joints of iron covered with bronze wire, a double-spiral chain-bearer and a large piece of an iron tang. Finds of later date include an iron artefact of unknown function, a horseshoe nail, a piece of iron rod and an auger.

The large number of late finds is not surprising for the navigation cairn is still kept and maintained. The point is also a popular site for excursions. Among the papers of H.A. Reinholm is a letter of March 17,1864 from Albert Lindbohm, an assistant clergyman from Kuhmoinen. The letter mentions the Kuhmoinen hillfort as well as other prehistoric finds in the region (Reinholm 12 145–148). Also mentioned is the Rautaniemi promontory, referred to as a site of scenic beauty on the island of Uotilansaari where, according to local tradition, the Russians had built storehouses. According to Lindbohm the local tales are verified by the levelled ground at the site and the man-made arrangements of stones. Lindbohm mentions the site, as it offers one of the most beautiful views of Lake Päijänne. It was to this site that Lindbohm took foreign guests and friends, all of whom agreed with the sentiments of the poet Kallio (Samuli Kustaa Bergh):

"Huoleti kiitelköot muut Alppein seutuja kauniiks',
Kauniimpi, kalliimpi on mulla – mun syntymä maa."
(Oma Maa, 1832)
"Let others freely praise the beauty of the Alps,
Something far more beautiful and dear have I
– the land of my birth."

Dating and distribution of the finds: Datable artefacts are a type V sword of the 10th century (Petersen 1919 156; Kivikoski 1951c 777), an even-armed brooch of the Viking Period without exact parallels, a type E spearhead of the 9th–10th centuries, a 10th century – Viking Period double-spiral chain-bearer (Schauman 1971 29–32) and chain joints attributed to the latter half of the 10th century and around the year 1000 on the basis of coin datings (Schauman 1971 26–27). The finds are mainly of types common in Western Finland and the Baltic regions. Chain joints have been found in Satakunta, Finland Proper and the Päijät-Häme region. The Kinnula chain find has similar joints (Schauman 1971 26; Luho 1966). It is not certain whether the finds all derive from the same burial. The most probable dating is the 10th century.
Form of burial: Burnt bones together with melted and damaged objects resemble the conditions of West Finnish cremation cemeteries, but the steep slope of the site does not seem to be a suitable location for a cemetery. The lowermost finds were recovered from only c. 20 cm above water level.[1] In his inspection report concerning Kuhmoinen, Aarne Europaeus (1921) mentions how the surface of Lake Päijänne had sunk 1.2 metres in 1832–38 when the Kalkkinen rapids were cleared [According to Olli Ristaniemi (pers. comm.), the water level sank 1.5 metres]. The finds do not, however, shows signs of having been in water, and they can hardly have been in their original locations.

It is surprising that on the most favourable location of the point there is no cairn similar to the ones in the south part. At present, there is a navigation cairn in this location surrounded by stony terrain. It is possible that a cairn of the latter type may also have been situated here and could have been converted into a navigation cairn, in which connection the subsequently found artefacts were discarded and thrown downhill. This may be the most plausible explanation for the uncommon locations of the finds.

The burial cairns resemble so-called Lapp cairns in their appearance, structure and location.

[1] According to the nearest water-marks (Jyväskylä, Kalkkinen) the level of Lake Päijänne was c. 50 cm higher than the mean when the site was mapped.

2. Ala-Rantala, Anttula, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6828 16, y = 562 82, z = 80–85 m
NM 1232:1–9, NM 1266:1–2, NM 1558
Sources: Hj. Appelgren-Kivalo, report 1907; A. Europaeus, report 1921.
Published sources: Aspelin 1880 300–301; Appelgren-Kivalo 1907, Tf. IV.
Inspections of the site: The Ala-Rantala cemetery is in the village of Anttula about a kilometre south of the church of Kuhmoinen in a shore location facing the island of Papinsaari. According to Europaeus the site was originally an island. The artefacts were found in 1851 and 1853 in excavating a cellar and were forwarded to the predecessor of the National Museum of Finland in 1872 and 1874. The site has been inspected by Hj. Appelgren-Kivalo in 1907 and A. Europaeus in 1921. No excavations have been conducted.
Dating and distribution of the finds: The cemetery contains both Viking and Crusade Period material. The only definitely Viking Period artefact is a round convex brooch of type E (NM 1232:9) found in Häme and Upper Satakunta, dated by Kivikoski (1973 660) to the 11th century. Artefact types which were in use in both periods are a double-spiral chain-bearer (NM 1232:2–3), two axes of type M (NM 1232:6–7), a spearhead of type G (NM 1232:8) and an Estonian curved-backed bearded axe (NM 1558). Crusade Period artefact types are a small West-Finnish penannular brooch of bronze (Salmo's group 13, NM 1266:1), a palmette-decorated silver plate pendant of Karelian distribution (NM 1232:4; Kivikoski 1973 1130) and a so-called Hanseatic bowl (NM 1232:1). Hanseatic bowls have been found in various parts of Europe and the Kuhmoinen specimen belongs to group IIIc according to the classification by the Polish archaeologist T. Poklewski and is dated to the late 12th and 13th centuries (Poklewski 1961 49).

The cemetery finds include West-Finnish and Karelian artefact types as well as types distributed throughout the Baltic region.

Form of burial: The Ala-Rantala cemetery contained inhumation burials. Throughout the first millennium cremation was the predominant practice throughout Finland with the exception of the Eura-Köyliö region of Satakunta. It was only in the 11th century that inhumation burial began to spread elsewhere in Finland (see e.g. Kivikoski 1955b 22–23).

4. Early Medieval burial finds

1. Lindén, Lästilä, Kuhmoinen

Basic survey map 2143 09 Kuhmoinen
x = 6828 48, y = 563 01, z = 80–85 m
Archive sources: A. Europaeus, report 1921.
Inspections of the site: In 1917 an inhumation grave without objects or artefacts was discovered next to the cottage of Fabian Lindén to the north of the bridge leading to the island of Papinsaari. The remains of this grave were investigated by A. Europaeus in 1921. The fill of the grave was mixed with charcoal and the grave pit was laid SW–NW with the head of the corpse pointing to the southwest. Large stones had been placed on the head and side of the deceased.
Dating: In his report Europaeus suggests that despite the lack of finds it is probable that the burial dates from the end of prehistoric times or at any rate from not much later. This view was based on the occurrence of charcoal and the similar site at Ala-Rantala in the near vicinity.

The orientation of the grave is the same is in many of the cemeteries of Häme of the late prehistoric period and early historically documented times. Pälsi (1938 30–31) suggested that the SW–NE orientation in fact meant the same as the Christian

Fig. 2. Field-clearing cairn at Sysiömehaka on the Saksa holding at Lästilä, 3–4 km NE of the local church. Photo National Board of Antiquities/Alfred Hackman 1918.

Fig. 3. Excavation of an old hearth possibly belonging to a cabin at Notkonmäki, Kauko, c. 4 km north of the local church. Photo National Board of Antiquities/Alfred Hackman 1918.

W–E orientation, as in ancient times the points of the compass were not known with any precision and were rotated towards the west by an eighth of a circle. For example the Toppolanmäki cemetery at Sääksmäki contains graves of similar orientation. A common feature is also the occurrence of stone settings in some of the graves, which were laid on both graves with artefacts as well as on graves without grave-goods. Similar stone settings of corresponding orientation have also been found in the Christian and Medieval cemeteries of Kyrkosund in Hiittinen and Liikistö in Ulvila (Pälsi 1938; Kronqvist 1938c; C.O. Nordman 1940).

5. Cairns of indefinite date

According to maps prepared by Fabian Lindén, larger and smaller groups of cairns are located in Kuhmoinen, often at some distance from present farms and fields. There are also considerable numbers of these cairns in the neighbouring parishes. As these cairns are outside the actual area of cairn burials in an area with otherwise few finds, the antiquarian authorities decided that they should be investigated. This task was given to Alfred Hackman in 1918.

Hackman excavated four cairns in three different locations [Sysiömehaka, Saksa, Lästilä – 2 cairns of a group of four (Fig.2), Lepsinkagas, Saksa, Hästilä – 1 cairn of a group of 24 and Notkonmäki, Kaukola, Kaukola – a single cairn]. Hackman also photographed similar sites. The cairns contained burnt stones and charcoal, but no artefacts. With the exception of the cairn at Notkonmäki, Hackman, as well as his excavators, interpreted the cairns as having come about in the clearing of burned-over land. The Notkonmäki cairn (Fig. 3) was regarded by the excavators as an old oven. Hackman's excavation report states the following: "According to my workmen the cairn had not come about through the piling of stones from a burn-cleared plot, but had to be a primitive hearth, situated in a forest cabin for the use of hunters or those involved in burn-clearing. In order to demonstrate the nature of such an oven they took the stones from the cairn and built such an oven in a few minutes. It was mainly of the same appearance as the sketch below, which shows the opening of the oven (Fig. 4). In my opinion, this assumption of my crew appears to be highly probable. I refer in this connection to primitive oven from Loppi ("Lopen asunnot", fig. 8 and 9) described by Ailio and the descriptions and illustrations by Sirelius in "Die primitiven Wohnungen der finnischen und obugrischen Völker", fig. 234,235. The soil among the stones can be thought to have fallen down from the roof of the cabin when it fell down. Of course, the age of the hearth cannot even be estimated. With all probability it is however from historically documented times."

After Hackman's field work the problem of the cairns was studied in 1968 when Timo Miettinen excavated at Terrijärvi in Anttula a number of low cairns of indefinite character, inspected the previous year by Anna-Liisa Hirviluoto. Miettinen concluded that the cairns had come about from stones torn up by the roots of storm-felled trees.

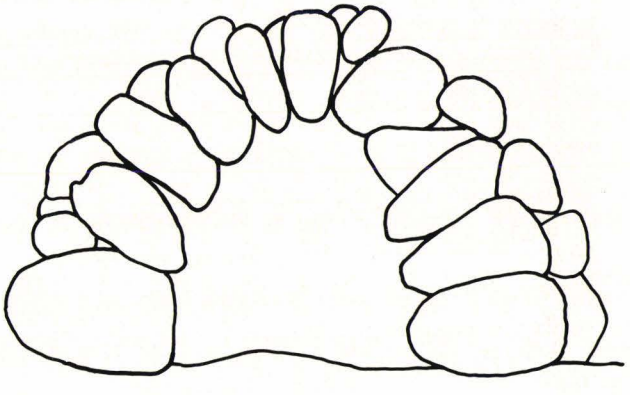

Fig. 4. Alfred Hackman's sketch of the hearth or oven at Notkonmäki.

APPENDIX 4

ANCIENT HILLFORTS AND FORTIFICATIONS IN SATAKUNTA, HÄME, SAVO AND KARELIA AND MEDIEVAL CASTLES IN HÄME

1. History of research

The list of hillforts is preceded by a brief review of the history of related research, based mainly on Jouko Voionmaa's review of the subject (J. Voionmaa 1935–1936 14–18).

Interest in ancient forts and fortifications is almost as old as antiquarian studies. When the clergy of the Swedish realm was ordered to gather information on antiquities, hillforts were mentioned in the first reports submitted. Johannes Velinus, vicar of the parish of Janakkala from 1670 to 1680, lists among the antiquities of his parish the Unikkolinna and Hakoinen hillforts (Bomansson 1858 124–125). In the 18th century hillforts are already mentioned in printed sources, but these early brief reports and mentions are of little aid to present studies. In the 19th century C.A. Gottlund and especially H.A. Reinholm collected folklore related to hillforts.

When archaeological research proper and the surveys of administrative districts came under way in the 1870s, hillforts also became a subject of interest. Within a few years they were the subject of specialist studies. Hjalmar Appelgren, basing his work partly on information from Reinholm, carried out field work at hillforts in 1885, 1886, 1888 and 1889. These involved inspections as well as mapping and excavations. The results of this work were published by Appelgren in his dissertation in 1891. Preparing such an overview of the subject almost a hundred years ago was truly a pioneering effort. J. Voionmaa stresses that prior to this a study of the ancient fortifications of a whole country had been published only in Norway. In the rest of Scandinavia and in the Baltic countries the ancient fortifications still awaited study.

In 1914 Juhani Rinne published "Suomen keskiaikaiset mäkilinnat I" (Medieval hillforts of Finland I) based on field work at the Vanhalinna hillfort in Lieto and Hakoinen in Janakkala. The work also discusses prehistoric hillforts.

Julius Ailio was also active in the study of hillforts. His work was apparently inspired by his history of the Castle of Häme (Ailio 1917). Ailio published a number of article relating to hillforts (Ailio 1915; 1921b; 1924; 1925; 1928).

Jouko Voionmaa began the study of hillforts in 1934 and 1935 with a survey of hillforts in the southern regions of the province of Häme (J. Voionmaa 1935–1936) and continued the study of hillforts especially in Häme and Satakunta with mapping work and excavations until the early 1960s. The results have not been published.

From the 1950s to the 1970s several scholars carried out new excavations at the Vanhalinna hillfort in Lieto. Jukka Luoto published the results of field work in 1984. He has also carried out field work at several hillfort sites in the province of Finland Proper (Luoto 1984a). In the 1970s a graduate thesis concerning hillforts was presented at the University of Helsinki (Pohjakallio 1973).

Hillforts have always been a subject of interest in surveys and local history studies. Many archaeologists have carried out inspections and small excavations at such sites. Here it will suffice to mention briefly only the main scholars and studies concerned.

In the areas of Karelia ceded to the Soviet Union after the Second World War, archaeologists from Petrozavodsk and Leningrad have continued the studies and field work begun by the Finns (Kirpičnikov & Petrenko 1974; Kočkurkina 1981; Spiridonov 1987).

2. Problems of definition

Defining a hillfort has always been problematic. Hj. Appelgren (1891 XLI) describes them as follows: "the fortifications, discussed here, differ from Medieval ones insofar as brick was never used in them, nor mortar, nor do they ever have moats." He goes on to classify hillforts according to form and location into three main groups. The first group consists of "walls mainly of stone on high and steeply-faced hills with an irregular perimeter and accommodated into the natural forms of the site." Appelgren's second group consists of "special fort-like forms in various parts of our country such as unfortified hills, caves mentioned as forts, walled towns etc." The third group "consists of fortifications mainly of stone on low-lying ground forming a regular, square or oblong perimeter and locally known as forts." These structures which are of smaller size than the hillforts and called *jätinkirkot* (giants' churches) in Finnish have later been demonstrated to be stone perimeters laid in naturally-formed fields of stones and Stone Age artefacts have been found in them (Europaeus 1913; Ailio 1922a; Forss 1981). Despite the uncertain function of the latter structures, later studies have not linked them in any way to ancient fortifications.

A problematic group consists of Appelgren's "special fort-like forms". The use of the name fort or castle (Fi. linna) is not a sufficient criterion for an ancient fortification (see e.g. Europaeus 1928 1491). Many hills have come to be popularly known as "forts" due to their imposing appearance. A further problem is the etymology of the word "linna". In its oldest known meaning this original Baltic-Finnic word refers specifically to a fortification, but it may have previously meant only a mount, hill or rise (Hakulinen 1949; cf. Karsten 1949). In some cases the word may be the actual original place-name of the site.

Appelgren's wall-criterion is also an uncertain basis for definition. The archaeologist and geologist Julius Ailio regarded many of the walls regarded as certain evidence of hillforts by Appelgren as natural phenomena (see e.g. Ailio 1924), above all as rows of boulders and stones that formed on ancient shorelines (see e.g. Aartolahti 1971).

There are also other explanations for the stone formations of hillforts than geological factors relating to shores. Some of the hillforts (e.g. the Kuhmoinen hillfort) are in the supra-aquatic region located at a higher elevation than the ancient shore formations. Occurring in these regions are frost formations, of which for the subject at hand are of significance solifluction soil and patterned ground caused by freezing and especially terraces and spits of solifluction soil. This can form a thick layer with patterned ground in its upper parts. Solifluction formations often consist of moraine and in many cases moraine layers have over the course of a long period of time after the retreat of the glacier slowly moved downhill due to the effect of long-term frost. As a result of this, solifluction soil layers have formed (J. Donner 1976 111–113; Embleton & King 1975 96–125; Aartolahti 1982). It is possible that among the walls of the hillforts are rows of stones and wall-like formations produced by solifluction. The moraine of supra-aquatic hills can to a certain degree be compared to drumlins. These usually have a core of bedrock around which the

moraine has gathered. Thus far, no studies have been carried out in Finland concerning the effects of high hills and mounts on the origin of moraine formations. Thus, it is hard to say, how solifluction formations may possibly be identified from man-made walls or walls worked by man. In the case of shore formations of known elevation the situation is somewhat different.

In 1930 Julius Ailio asked the geologist Matti Sauramo to inspect the hillforts of the environs of Hämeenlinna. Most of these Ailio regarded as "forts of fable". Sauramo's and Ailio's views differed, however, and Sauramo agreed with Appelgren's original views. He reclassified the hillforts of Mantere and Linnanpää in Vanaja and Unikkolinna in Janakkala, which Ailio had regarded as natural formations, as man-made hillforts. The grounds for this included the lack of a constant elevation, which is required of shore formations, structure differing from that of the latter and the locations of the walls in places protected from shore action (Sauramo 1934).

Even archaeologists have disagreed with respect to the walls of hillforts, for example the wall of the Linnankallio site at Vesilahti. Ailio regarded it as a natural formation, while Jouko Voionmaa maintained that it was man-made.

In addition to single forts there are also problematic "clusters of forts". Especially the hillforts of Tuulos and Pälkäne have led to varied interpretations.

Of the five hillforts listed by Appelgren in Tuulos, Ailio (1924) accepts only one – the Laurinkallio site, while J. Voionmaa (1935–1936 63–67) lists two. They agreed on the "natural character" of the majority, i.e. three forts, but disagreed regarding the Linnankallio hillfort site in Tuulos. The list of hillforts in the prehistory of Häme mentions only one site in Tuulos. According to Ella Kivikoski the list was drawn up according to information from Voionmaa (Kivikoski 1955a 70,170). Voionmaa, apparently on the basis of later studies, changed his views regarding the character of the Linnankallio site.

Matti Huurre disagrees with both Ailio and Voionmaa (1935–1936 137), who regarded the Kirvunlinna site at Pälkäne as a natural formation, and he maintains that the walls of the hillfort are man-made (Huurre 1972 67–68). The Huntila hillfort in Pälkäne is regarded by both Huurre (1972 67) and J. Voionmaa (1935–1936 136) as man-made. However, none of the above sites at Pälkäne are mentioned in the above list of hillforts in the prehistory of Häme (Kivikoski 1955a 70,170). This may also mean that Voionmaa changed his views. Huurre also mentions another possible hillfort site in Pälkäne – Linnamäki at Uutana – which was not known to Voionmaa or Ailio.

Because of the large amount of conflicting data, the hillfort sites of Pälkäne and Tuulos should have been inspected. As there were no opportunities for this, the list mentions only one hillfort at Tuulos and none in Pälkäne.[1]

The above examples may serve to demonstrate the problems of defining hillforts and a comprehensive list would require field surveys and inspections of all known sites with the place-name *linna* (castle, fort, fortress), preferably with the aid of a trained geologist, and would involve mapping and measurements in many uncertain locations. In the case of hillfort sites without structures even this would not suffice. As some of these locations have revealed finds indicating their use as fortifications, it appears that they were also built as forts. Confirming hillfort sites without walls would require excavations. It is also possible that there are still hitherto unknown ancient fortifications whose names do not give any indication of the function of the sites concerned, although their discovery is naturally haphazard. In connection with this study it was not possible to undertake the necessary fieldwork involving inspections, mapping, levelling and excavations. As it can be assumed that future studies in more detail will add to the number of known hillfort sites, the list presented here cannot be regarded as final.[2] It is also possible that a complete list of these sites will never be accomplished. We may also refer to problematic cases where a natural wall formation could have been utilized in the building of walls – which is only natural considering the time and labour involved (cf. e.g. Gotland; Philip 1985 166) – cannot be proven to have been a fortification, even if in fact it had been one.

Jukka Luoto (1984a 154) has pointed to the use of the place-name alone and wall structures as criteria of definition, both of which he regards as unreliable. Luoto goes on to complain of how the actual concept of an ancient hillfort-type fortification has never been satisfactorily defined. Luoto limits his own study to sites known as ancient fortifications, from which prehistoric or early historical artefacts have been found. Excluded from his material are remains of fortifications of brick or greystone or ones that can be defined as the forts of manors.[3]

Nor does the author of this study presume to present a comprehensive definition of a hillfort site. The selection of material implies a different type of definition, combining Appelgren's and Luoto's criteria. In this connection the term hillfort will apply to all mounts, hills and small islands with steep slopes, referred to as forts in folklore or according to their place-name, which have "produced" prehistoric and early historical finds and which have walls of stone and/or earth. Also included are cliffs and hills without obvious structures that have been traditionally regarded as forts with prehistoric and/or early historical finds of artefacts from their crest or foot areas.

Excluded from the material are forts with primary finds of brick and/or mortar or sites regarded as Medieval manor forts. Exceptions are, however, made in the case of "brick and mortar forts" with prehistoric finds. These early finds are assumed to signify a prehistoric stage of occupation preceding the brick structures. In the case of Hakoinen in Janakkala (mentioned in the appended list) there are no such finds, but it is nevertheless presented briefly, for a comparison of the age of "anonymous" hillforts with this site, regarded as having been built by a Medieval invader, is not without interest for the theme of this study.

Also excluded are hill and island sites where the earthworks or walls appear, on the basis of subjective and visual inspection, to have been natural phenomena, later barriers for cattle, the result of clearing rocks from rapids etc. It must be stressed, however, that subjective criteria of selection of the material of this study are also applied.

Within the present borders of Finland there are 72[4] hillforts

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[1] The Liekolankatu site in Vammala (Tyrvää) is often mentioned in connection with hillforts. As this small area is enclosed by walls or structures regarded as natural formations, it is not included in the material (Vormisto 1980 13; see also Luoto 1984a 157; Salmo 1952 80). A similar site, also in Vammala, is often mentioned in lists of hillforts, viz. Hiukkasaari in Tyrvää. Appelgren (1891 13) explains the walls and slag finds of the site as the result of clearing rocks and debris from the nearby rapids. Salmo (1952 87–88) disagrees with this, while Luoto (1984a 157) prefers to leave the question open. Due to conflicting information, the site is not discussed in this study.

[2] After this manuscript was completed, trial excavations were carried out at the Kiianlinna hillfort in Janakkala, which due to its lack of structures and previous finds was excluded from the material. The excavations revealed finds of ceramics and slag from the terraces of the ridge of the site. There were no finds from the crest of the hill.

[3] Luoto, however, does not apply his own criteria in this connection. His comparisons of material include a number of ancient fortification with finds of brick and/or mortar (e.g. Linnamäki in Porvoo, Sibbesborg in Sipoo, Junkarsborg in Karjaa, Hakostaro in Uskela etc.) Brick and mortar may be a late and/or secondary phenomenon. In the case of the above sites this question was not, however, discussed. There are also finds of brick from the Vanhalinna hillfort in Lieto, the subject of Luoto's study, where it was not found in secondary contexts (Luoto 1984a 128). If the criteria of selection of the comparative material were applied to the main subject of study, the Vanhalinna site would have to be excluded.

[4] Information on the numbers of hillforts is mainly based on the list of sites compiled by Lauri Pohjakallio (1973).

Åland Islands: Borgö, Hammarland; Borgberget, Prästgården, Hammarland; Borgberget, Dalkarby, Jomala; Borgdalsberget, Näs, Saltvik; Borgboda, Saltvik; Brändbolstad, Sund (Dreijer 1948).

Finland Proper: Lautkankare, Sauvo; Linnamäki, Pertteli; Linnamäki, Muurla; Linnamäki, Rikala, Halikko; Linnavuori, Pyölä, Halikko; Linnamäki, Rekottila, Paimio; Muurimäki, Paimio; Nakolinna, Paimio; Linnavuori, Huttala, Piikkiö; Linnamäki,

corresponding to the above loose definition as well as 25 in the areas of Karelia ceded to the Soviet Union. Of these the appended detailed list of sites comprises the Lake Päijänne region of Häme and for purposes of comparison the province of Satakunta and the Lake Vanaja region of Häme (the latter and the Päijänne regions of Häme are jointly listed under the heading of Häme) as well as Savo and Karelia. The list describes each hillfort and possible excavations and related observations, finds and their dating. Also the relationship of hillforts with Iron Age sites, permanent settlement of the 1560s and routes of communication are briefly presented.

Included in the listed descriptions are also evaluations of the area and extent of the hillforts concerned. In measuring the area of the crests of the hills various kinds of cartographic material has had to be used, in some cases even basic survey maps, and the areas mentioned must be regarded as only rough assessments. Where possible, the areas excavated have been measured and their relation to the overall area of the crest of the site. This data is not, however, of a highly informative character in all cases. Especially at rocky sites there is not much to excavate. For example the Arasalo hillfort at Ikaalinen must be regarded as totally excavated, although Ailio's excavations – of all possible locations – covered only 8 % of the total area. Due to the lack of sufficient information it is not possible to assess the ration of excavated area with the total area available for excavation.

The hillforts of Karelia pose a separate set of problems. The material includes hills and hilly sites, where Appelgren claimed walls could be found.[5] These are not described in any detail, as Appelgren did not map many of the sites and there have not been many inspections of them since. In the case of these hillforts a detailed investigation of the relationship of Iron Age occupation and historically documented settlement was not feasible. They are included mainly for chronological reasons and for this reason hillforts with finds are discussed in more detail.

3. Ancient hillforts and fortifications of Satakunta

3.1. Linnaluoto, Harola, Kokemäki

Basic survey map 1134 12 Kokemäki
x= 6797 30, y = 574 45, z = c. 43 m
Reports: Hj. Appelgren, notes 1886 and appended maps; E. Sarasmo, survey report 1946, p. 37; A. Nissinaho excavation reports 1981–82.
Finds: NM 2501:7–24; Häme Museum 1179:20; Satakunta Museum (SatM) 17362:1, SatM 17580, SatM 17993:1–3; Department of Archaeology of the University of Turku (TYA) 166: 1–8, TYA 198:1–141, TYA 215:1–376.
Published sources: Appelgren 1891 9–12; Rinne 1944 24–25; Salmo 1952 68–69; Luoto 1984a 157; Nissinaho 1985; Luoto 1988 61–63.

The Linnaluoto (Fort Island) site is in the former location of the Harolankoski rapids located between the villages of Harola and Heinoo approximately 2.8 kilometres northeast of the church of Kokemäki.

According to Appelgren, the island is of irregular four-sided form. The level higher part extends 150 x 125 paces at its largest extent. The sandy banks of the island are roughly 5 – 8 metres high and almost perpendicular with the exception of the northwest side where there is a slight depression. Crossing this depression is a row of stones c. 3 metres wide which may be a wall. Due to the low elevation of the site Appelgren was not convinced of its prehistoric date, pointing out that the stones and rocks could have been from a burn-clearing field at the site. On the north side of the island Appelgren observed a cairn 9–11 metres in diameter and another island of less distinct form on the east side.

The island has changed form considerably since Appelgren's inspection. Originally, it measured some 90 x 100 metres. The current has eroded the island and it now runs north-south measuring c. 90 metres x 25–38 metres. The southern end rises 3–4 metres from the surface of the Kokemäenjoki River, while the north end is lower in elevation. The present area of the island is approximately 2400 m^2.

In 1886 Appelgren excavated an area of c. fourteen square metres. At the site of the excavation a fragment of an M-type spearhead had been found from the bank (NM 2501:7). There were no finds of charcoal or bone at the site. However a number of artefacts were recovered: fragments of clay discs, pot sherds, pieces of iron, a piece of glass, quartz flakes, slag and horse's teeth (NM 2501:8–16). Appelgren also excavated most of the cairn on the north side. There were only a few fragments of bone. Other finds included pot sherds, slag, a fragment of a primitive ploughshare, a fragment of a grinding stone, a fragment of a clay disc and an iron fibula with a curved rod (NM 2501:17–24).

The next excavations to be carried out on the island were in 1981 and 1982 almost a hundred years later, under the direction of Aino Nissinaho. An area totalling 170 m^2 was uncovered in the south part of the island. In this connection, a cairn of earth and stones, interpreted as a hearth, was excavated as well as an adjacent smaller setting of stones measuring 2 x 1 metres and stone setting 28 metres long, 0.5–1.0 metres wide and 0.2–0.3 metres thick. Of the latter feature there were no traces visible on the surface. The long stone setting is partly located in a shallow ditch, which the land-owner regarded as a former field drainage ditch. According to Nissinaho it is however possible that the structure is of prehistoric date, as the finds from its immediate vicinity correspond to those from the rest of the occupation layer at the site, On the other hand, cultivation at the site may have led to a similar composition of finds also in this area, as the occupation layer consisted of a soil layer c. 25–30 cm thick, which was also observed by Appelgren.

The finds from the 1981 and 1982 excavations (TYA 198: 1–141, 215:1–376) are similar to those recovered by Appelgren. A total area of 234 square metres has been excavated, comprising some 9.75 % of the present area of the island.

The finds from the Linnaluoto site are as follows: an oval striking-stone (SatM 17580), an iron fibula with a curved rod (NM 2501:17), a penannular brooch of iron with rolled ends (HM 1179:20), an even-armed brooch that appears to have been melted by fire (SatM 17362:1), a fragment of an M-type spearhead (NM 2501:7), a brooch ? (SatM 17580), a glass bead (TYA 215:1), a bronze belt buckle (TYA 215:2), a bronze button (TYA 198:101), a fragment of a bronze chain (SatM 17993:1), three knives (TYA 166:2; 198:1, 101), an iron key (TYA 198:104), three nails (TYA 198:105–107), 19 iron artefacts and fragments of iron (NM 2501: 15,20; TYA 166:1; TYA 198:2, 103, 108–111; TYA 215:3–8), a sherd of glass (NM 2501:12), three fragments of grinding stones (NM 2501:18; TYA 166:6; TYA 215:10), 66 fragments of clay discs (NM 2501:8,9; TYA 166:8; 198:3–10; 215:11–35), 64 pot sherds and 3.369 kg of ceramics (NM 2501:9–10, 19,21; TYA 166:4–5; TYA 198:11–42, 112–130; TYA 215:36–189; SatM 17993:3)[6], a fragment of a red-ware vessel (TYA 166:3), 5.238 kg of burnt clay and/or daub (NM 2501:10, 20; TYA 198:43–56; TYA 215:190–273), 151 g of burnt and unburnt bone (NM 2501:

Kaskela, Lieto; Linnamäki, Viikka, Lieto; Vanhalinna, Lieto; Bornholm, Nauvo; Kajamonvuori, Masku; Linnavuori, Koljola, Nousiainen; Linnavuori, Repola, Nousiainen; Linnavuori, Vehmaa; Hautvuori, Laitila; Kirkkeenlinna, Laitila; Linnavuori, Seppälä, Laitila; Linnavuori (west), Matinmaa, Laitila; Linnavuori (east), Matinmaa, Laitila.

Uusimaa: Slottsbacken, Botby, Helsinki; Skällberget, Siuntio; Uusipyöli, Karjalahoja; Linnamäki, Pöykäri, Karjalohja; Haverå-kersberget, Karjaa; Slottsberget, Karjaa; Bocklint, Karjaa; Sutarkulla, Karjaa; Bonäs, Tenhola.

[5] Appelgren presents information of apparently obscure character in connection with the walls Linnasaari or Lapinlinna fortification site at Tervu in Kurkijoki and the Linnamäki site at Korpisaari site also in Kurkijoki. A. Saksa of the Leningrad Branch of the Institute of Archaeology of the Academy of Sciences of the USSR who has inspected the sites did not observe any remains of walls or earthworks. These sites are not included in the study.

[6] Lacking from the figures are sherds in the collections of the Satakunta Museum (SatM 17993:3).

10,12,24; TYA 198: 14,79–100; TYA 215:343–376)[7] and 2.388 kg of slag (NM 2501:10,16,22–23; TYA 198: 57–69, 132; TYA 215:274–328)[8]. The finds also include 34 flakes of quartz and lithic material as well as fragments of stone artefacts (NM 2501:10, 14; TYA 166:7; TYA 198:70–74, 133–140; TYA 215: 329–342) and a parallel-bladed stone adze (TYA 215:9).

The finds display a marked chronological range (Luoto 1988 62). The oldest artefacts are of Stone Age date (even-bladed adze, fragments of stone artefacts and what appear to be flakes of quartz and lithic material). The oval striking-stone dates from the Early Roman Iron Age to the Merovingian Period. The iron fibula with a curved rod is from the late Merovingian Period, i.e. 750–800 A.D. (Lehtosalo-Hilander's type 2, Lehtosalo-Hilander 1982b 89–91). The penannular brooch is usually dated to the 8th century, but may have remained in use still in the 10th century (Salmo 3A; see Salmo 1956 18; Lehtosalo-Hilander 1982b 100). The even-armed brooch of the overall Scandinavian Ljønes type (Kivikoski's group 4) was mainly in use in the 9th century (Petersen 1928 76; Kivikoski 1939 15–17) and the M-type spearhead is of the 11th century (see Appendix 2 page 190).

Due to its long period of manufacture and use the ceramic material is problematic in terms of dating. Nissinaho (1985 79) has classified the finds of ceramics according to temper and wall form into two groups: 1) coarsely made ware with quartz temper, reddish and/or black-hued paste, a wall thickness of c. 8 mm and in most cases with even rims, although profiled rims also occur, and 2) ware made of dense paste and/or sand temper of brown and reddish hue with a wall thickness of c. 0.5 mm and an even or profiled rim. The pottery is decorated with wavy lines and cord impressions. The publication does not mention, to which group the decorated sherds belong. It is assumedly a feature of group 2. Luoto (1988 62) dates the ceramic finds to the Iron Age on the basis of their decoration.

Sherds resembling the above-mentioned coarsely-made ware are usually dated to the Early Iron Age. Similar ceramics have been found at the Vemmellahti site in Pieksämäki, among other locations. Two thermoluminescence datings have been made of two sherds from Vemmellahti which are assumedly from the same vessel : 1030 AD ± 100 (R-851306) and 1340 ± 70 (Hel-TL). Similar coarse ware has also been found in Medieval contexts from the Linnaluoto site at Forsby in Kokemäki, the Liinmaa hillfort at Eurajoki, in Ulvila and possibly also in Turku (Luoto 1988 74). Available examples suggest that this type of pottery was in use throughout the Iron Age and well into the Middle Ages. Accordingly, one of the Iron Age ceramic groups from the Linnaluoto site in Harola may be of late date. The remainder of the finds does not provide precise datings.

A radiocarbon dating has also been obtained from the Linnaluoto site. Hearth charcoal excavated by Nissinaho provided a dating of 1130 ± 110 BP (Hel-1906, Nissinaho 1985 80), calibrated to one sigma cal AD 780 (894) 1010 (Stuiver & Pearson 1986). It is not known from what part of the burnt timber the sample derives.

After his excavation Hjalmar Appelgren observed that "the excavations and finds do not shed any light on the use of the island as a fortification": The same also applies to Nissinaho's excavation results. Helmer Salmo (1952 68) regarded the island as fortified on the basis of the section of wall in the depression. Appelgren was skeptical of this and regarded it as being possibly of later date. On the other hand, Salmo regarded the cairn as a Merovingian Period grave. Juhani Rinne (1944 24) did not believe that there had been any fortifications on the island, but suggested that it may have served as a place of refuge. According to Luoto (1984a 157, 159), no remains of defensive structures have been found on the island and on these grounds he maintains that its fortificatory function is uncertain. The Iron Age finds may be originally from a cemetery at the site. Luoto suggests that the island was a sanctuary, where also the dead could have been buried. A. Nissinaho, who excavated at the site, does not mention the section of wall in the northwest part. This feature may have been eroded by the river and accordingly there were no opportunities for studying it in further detail. According to Nissinaho (1985 80), the stone structures of problematic function, the find material and its context suggest that Linnaluoto was a dwelling site, where iron was made and possibly also cloths and/or thread. In connection with the site burials were also carried out, as indicated by the stray finds, interpreted as cemetery material, and the iron fibula with a curved rod found in the cairn. There were no opportunities for stratigraphic observations regarding the duration of use of the site or its possibly temporary nature. The special function of the site may also be indicated to by its inaccessible location in the rapids, whereby – and also due to its small size – it was impractical for a settlement unit subsiding on agriculture. Nissinaho goes on the present Luoto's views regarding the sanctuary nature of the site without any arguments to the contrary.

It is highly difficult to say anything certain of the dating and nature of the Linnaluoto site. The finds include material from the Stone Age, Iron Age and modern times. Furthermore, the island was burn-cleared and there are also signs of field cultivation. It was without doubt also a pasture and due to its favourable location it must have been used for salmon fishing. There may also have been a salmon weir in the rapids, examples of which are numerous along the Kokemäenjoki River. It is impossible to combine the various structures, dated artefacts and the radiocarbon-dated hearth with the various activities of the site. The most certain conclusion appears to be that no signs of a fortification were observed there.

Linnaluoto is located in the middle of an area of Iron Age, Medieval and 1560s settlement (Salo 1972; Suvanto 1973a 52; SAK 1973). It is also on a major route of communication.

The oldest known written reference to Linnaluoto island is according to Seppo Suvanto from the assizes of 1607 where Martti Simonpoika of the Harola village claimed the island from the vicar of Kokemäki. In this connection, the "whole parish" testified that the island had belonged to the vicarage "of old and since time immemorial". According to Suvanto, this was the Linnaluoto site which is locally known as an ancient fortification. The vicarage belonged to the local Ylistaro group of holdings, to which the Harola village did not belong, and accordingly ownership of the island must have been based on some other reason than a later redistribution or claiming of lands. A plausible possibility is that in the Early Middle Ages the Catholic parish took over the role of owner of the Iron Age parish-type organisation (Suvanto 1973a 42). This system of ownership and the Papal Bull of 1229 securing the rights of the church to own the sacred groves of the pagans should be kept in mind in assessing Luoto's views of the site as a sanctuary.

3.2. Linnavuori, Kauttua, Eura

Basic survey map 1134 07 Kauttua
x = 6777 95, y = 526 52, z = 57.5 m
Reports: Hj. Appelgren, survey and excavation maps; S. Pälsi, inspection report 1943; J. Voionmaa, excavation report 1946; J. Voionmaa, Euran Kauttuan Linnamäki – topografiaa ja havaintoja (Linnamäki, Kauttua, Eura – topography and observations); A-L Hirviluoto, survey report 1959, 69; P-L Lehtosalo-Hilander, excavation report 1975.
Finds: NM 2501: 1–6, NM 11638: 1–17, NM 19878: 1–3.
Published sources: Appelgren 1891 38–41; Salmo 1952 47–48; Luoto 1984a 156.

The Linnavuori hillfort is in the village of Kauttua on land owned by the Kauttua pulp and paper mill approximately 0.7 kilometres west of the Eurajoki rapids. The highest point of the hill rises some 12 metres above the surface of Lake Pyhäjärvi. The crest of the hill, measuring 30 x 40 metres is bounded to the north and the east by a steep precipice of rock. To the south and the west the slope is more gentle with six sections of a stone wall of different length joined to each other. The wall is over a metre high and two metres thick and its total length is roughly 63 metres. In front of the wall is an outside earthwork structure or wall running parallel to it which is possibly of earth. The fort area enclosed by the precipices and the wall comprises only 1200 m^2. Linnavuori in Kauttua is one of Finland's smallest hill sites with enclosing walls.

[7] Not included in the sum are bone fragments NM 2501:12,24; TYA 198:14.

[8] Not counted are slag fragments NM 2501:22–23.

According to J. Voionmaa, a land-reparcelling map from 1782 in the archives of the National Board of Survey of Finland marks the Linnavuori site with a roughly sketched outcrop of bedrock without a reference number for further explanation. However, the Moisio holding on low-lying ground to the northeast of the hill includes the text "*linnan umbiaita*" ("closed fence of the fort"; Archives of the National Board of Survey, Eura 7 11. 2/10–12.).

The Linnavuori site has been mapped and excavated by Hj. Appelgren in 1886 (c. 100 m^2), J. Voionmaa in 1946 (c. 95 m^2) and P-L Lehtosalo-Hilander in 1975 (3 m^2). A total of some 16.5 % of the area of the crest has thus been excavated.

In the excavations it was observed that the parts of the wall laid on the bare bedrock were solely of stone. In places with gravel (the gravel layer varied in thickness from a few centimetres to 25 cm) the wall was made of both gravel and stones. Gravel was shoveled into the walls from the crest, where a depression can be observed alongside the structure. On the outside the wall was perpendicular and its top sloped towards the crest of the hill. The placing of stones within the walls as well as various remains of charcoal, soot and other debris do not, however, permit any conclusions regarding the structures on the walls. On the basis of the structure of the walls Voionmaa classifies the site as a combination of the bedrock and gravel-ridge types of hillforts.

Excavations in 1946 revealed in the inside south corner of the wall a feature of stones 9–20 cm thick and 1 x 3 metres in area. This consisted of fist-sized and slightly larger stones in a single layer and in places in two layers. The stone setting adjoined the inside of the wall where it could be clearly seen as differing from the uneven bedrock. Voionmaa suggests that the stone setting was laid on a spot that was trampled more than others with the intention of raising the ground level. It would thus have been some kind of passageway inside the fort. It may also have been the floor of a roof or some other structure joined to the wall.

All of the excavations revealed a number of artefacts. A total of 123 pot sherds have been recovered, falling into two groups: dark-hued, coarse-tempered ware with thick walls (NM 2501:3, NM 11638:1, NM 19878:1) and thin-walled ware of lighter hue and finer paste (NM 2501:3). Also included are a number of sherds decorated with triple wavy lines (Appelgren 1891 40, fig. 20). The finds of ceramics include two fragments of clay discs (NM 2501:1, NM 11639:1). A large amount of iron slag was also found – 3.9 kg from Appelgren's excavations (NM 2501:5,6), 8 kg from Voionmaa's area no. 1 in 1946 (NM 11638:4) and 5.3 kg from area no. 2 in 1946 (NM 11638:6). Also Lehtosalo-Hilander found a piece of slag in a trial pit (no. 2; NM 19878:3). The slag is in pieces of various size, the largest one weighing 2.5 kg. A total of 17.2 kg of slag has been recovered.[9] According to Voionmaa there are no finds indicating the manufacture of iron at the site and he suggests that slag was brought to the fort to be used as missiles. This, however, does not explain why the slag material includes small pieces that could not have broken off from larger clumps. Voionmaa also assumes that a fragment of a clay disc (NM 2501:1) from Appelgren's excavation was brought to the hill along with the slag.

Other finds consist of a clenched iron nail and a piece of a flat iron rail (NM 2501:2) and the under-stone of a large flour-grinding quern (NM 11638:3). Also found were 35 fragments (3.5 g)[10] of burnt bone (NM 2501:5, NM 11638:2, NM 19878:2).

Of most interest among the finds is a fragmentary straight-backed sceax (NM 11638:5) from Voionmaa's excavation area no. 2 in 1946. The point and the tang were broken off. The same location, which was of small size, also contained slag, bone fragments and pot sherds. The straight-backed sceax type is mainly regarded as a weapon of the 8th century (Salmo 1938 137) and in some cases it was also used in the Viking Period (Kivikoski 1939 124). Voionmaa dated the decorated pot sherds to the Viking Period and of slightly later date than the sceax, with reference to a vessel of similar decoration from the Osmanmäki cemetery in Eura (NM 6:27:14), among other parallels. Also Luoto (1984a 156) suggests a Viking Period dating for the ceramics. The material also includes a few sherds of coarse ware. This simple type of ceramics is usually dated to the Early Iron Age, but it was in use until the Middle Ages (on the dating, see p. 223).

The location of the Linnavuori hillfort was well chosen in relation to the Eurajoki rapids. It is between the old roads of the area with easy access from the Iron Age centre of settlement in the Eurajoki River valley, and was the most favourable fortification site in their vicinity. The Luistari cemetery is some 900 metres northwest of the hillfort. Less than two kilometres to the southeast are the sites of a number of Iron Age finds (Suvanto 1973a 28; Salmo 1952 48; Lehtosalo-Hilander 1982c 58). In the map of settled areas of the 1560s the region is a permanently settled farming district (SAK 1973).

3.3. Räätikäsvuori, Sampu, Huittinen

Basic survey map 2112 06 Keikyä
x = 6791 25, y = 430 10, z = c. 82.5 m
Reports: J.-P. Taavitsainen, inspection report 1988.

The Räätikäsvuori site is in the village of Sampu in Huittinen, c. 4.6 km north of the church of Huittinen. The crest of the hill rises to approximately 40 metres above the level of the adjacent Kokemäenjoki River c. 900 metres to the west.

Räätikäsvuori is an extensive rocky hill with several domes located between the old and new highways leading to Tampere. The hillfort was on the innermost crest where the slopes are steep especially on the northeast and west sides as well as to the southeast. On the less abrupt slope to the south is a c. 35 metre section of broken wall, in places unclearly defined, which is some two metres wide and a few dozen centimetres high. A narrow depression to the southwest also appears to have been crossed by a stone wall. The gently sloping northwest and north sides were also enclosed by a built section of wall measuring c. 25 m.

Most of the crest of the hillfort is bare bedrock with a thin soil layer in places. Apart from the wall there were no other signs of human action in the area of the crest.

The area enclosed by the precipices and the walls measures c. 50 x 70 metres (c. 2500 m^2).

The nearest Iron Age cemeteries (Kappelinmäki, Virkonmäki and Hiukkavainio in Huittinen) are some 2.5 to 3.2 kilometres to the south of the site (Salo 1972). The hill is in an area permanently settled in the 1560s (SAK 1973) and close to the Kokemäenjoki River, a main route of communication, as well as the highway linking the provinces of Satakunta and Häme (Wallin 1893, appendix I).

3.4. Linnavuori, Kojola, Vammala (Karkku)

Basic survey map 2121 10 Lantula
x = 6809 12, y = 453 40, z = 112.5 m
Reports: H.A. Reinholm, no. 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), p. 71–77; Hj. Appelgren, map.
Finds: NM 2501:29–30
Published sources: Appelgren 1891 13–15, Salmo 1952 94–95.

The Linnavuori site is to the south of Lake Kulovesi on the Pentti holding of the Kojola village approximately 600 metres from the lakeshore and opposite to the Salonsaari island in the lake. The crest of the hill measures c. 60 x 75 metres (c. 4150 m^2) and its highest point is some 55 metres above the level of the lake and 112.5 metres above sea level. The southern side of the hill rises gently in a succession of terraces while the north and west sides are steeper and do not provide access. There is a separate bluff of bedrock in the southeast corner where the north and west sides are joined by a section of wall. The wall to the southwest, which was originally unbroken, curves upwards and is c. 30 metres long, 3 metres wide and one metre high. The wall to the east, measuring 16 metres, curves inwards and is slightly lower than the other wall. In the middle part of this wall was a gateway c. 3 metres wide. Inside the enclosed area are four fields or settings of stones of different size, the sides of which are from 3 to 9 metres in length. Two similar stone settings were also located in the de-

[9] Not included is a piece of slag (NM 19878:3) that has been lost.

[10] Not included are bone fragments NM 2501:1 (1 fragment) and NM 19878:2 (2 fragments) that have been subsequently lost.

pressions of bedrock on the west side (Appelgren 1891 13–15; Salmo 1952 94–95).

In 1886 Hjalmar Appelgren carried out excavations along the inside of the southwest and west walls as well as in the central stone setting. The excavations covered an area of c. 94 m^2 and did not reveal any finds (Appelgren 1891 15; the catalogued finds NM 2501:29–30 consist of a naturally formed stone and a soil sample). Some 2.3 % of the area of the crest has been excavated.

According to Tallgren (1918c 90) an oval striking-stone was found at the Pentti fort, but this cannot be verified.

The nearest remains of Iron Age settlement are over 2.5 kilometres to the north and 3.4 km to the west. The closest settled farms of the Middle Ages were c. 1.2 km north-northwest of the hillfort and c. 1.5 km northwest by west on the opposite shore of the lake. In the 1560s the vicinity was permanently settled with a large number of farms and holdings. In the Middle Ages a road passed by the hillfort (Suvanto 1973a 35; SAK 1973).

3.5. Arasalo, Isoröyhiö, Ikaalinen

Basic survey map 2122 12 Ikaalinen
x = 6851 76, y = 457 50, z = > 105 m
Reports: Hj. Appelgren, excavation map; J. Ailio, excavation report 1903.
Finds: NM 2501:31–33.
Published sources: Appelgren 1891 17–19; Salmo 1952 134.

The Arasalo hillfort is in the vicinity of the Isoröyhiö village at the northwest end of a promontory of the same name – formerly an island – extending into Lake Kyrösjärvi. The hill rises some 20 metres above the level of the lake. On the opposite shore is an island called Linnasaari (Fort Island) and the report mentions the location as Linnasalmi (Fort Strait). Cartographic sources refer to the hill as Pirunvuori.

The rocky hill is accessible only from the southeast, where a wall was built. According to Ailio, only a short section of it was laid of stones, followed by a row of large boulders continuing to the north. The total length of the wall is some 20 metres. The gateway to the fort was originally widened to permit the transport of logs from its east side. The preserved west part of the gateway indicates that both of the corresponding parts were extended to the inside. The crest covers an area of c. 40 x 70 metres (c. 2300 m^2).

In 1886 Hj. Appelgren excavated part of the wall (approximately 25 m^2) and the central area (c. 15 m^2). Found in this connection were two quartz flakes and a scraper (NM 2501:33). An object regarded by Appelgren as a scraper (NM 2501:32, see Appelgren 1891 fig. 13) is of natural provenance, but its point shows signs of having been ground. Appelgren also reports having observed stone settings on the crest similar to those at the Pentti hillfort in Karkku, which together with the Stone Age finds brought Julius Ailio to investigate the site in 1903. Ailio excavated in all locations that were to some degree level and suitable for occupation, including parts of the fort previously excavated by Appelgren. Ailio's excavations covered an area of c. 180 m^2 (approximately 8 % of the area of the crest). The excavations revealed gravel mixed with stones, but no features indicating human action nor any stone settings. On the crest Ailio uncovered two locations resembling hearths with small deposits of charcoal or sooty soil. On the basis of his observations Ailio concluded that the hillfort had been occupied for only a very brief and temporary period.

There are no Iron Age finds from the vicinity of the hillfort. Approximately one kilometre to the north on the Ylioja holding also in the Isoröyhiö village are a number of unexcavated cairns, which have been tentatively described as Iron Age remains. The rest of the cairn groups of Ikaalinen are of similarly uncertain and obscure character. The next-closest group (Lahti, Ikaalinen) is c. 3.5 kilometres southwest of the hillfort (PEK 1983 15, no. 65).

Quartz flakes (NM 19949) have been found in a field to the southeast of the hillfort and this location has been regarded as a Stone Age dwelling site (PEK 1983 15, no. 28). The map of permanent settlement of the 1560s indicates fixed occupation of the Isoröyhiö village and its environs (SAK 1973).

The hillfort is well situated for purposes of communication in Lake Kyrösjärvi at the parting of water routes from the south to the northeast and northwest.

3.6. Linnavuori, Siuro, Nokia

Basic survey maps 2123 02 Siuro and 2123 03 Mahnala
x = 6820 06, y = 465 24, y = 117 m
Reports: H.A. Reinholm, No. 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), p. 86–98; Hj. Appelgren, excavation map; S. Pälsi, excavation report 1944; J. Voionmaa, draft of an excavation report, map sketches and photographs.
Published sources: W. Carlsson 1869 21–22; Heikel 1882 44–47; Appelgren 1891 15–17; Kaukovalta 1934 46–48; K. Jaakkola 1934 11–13; Salmo 1952 103.

The Linnavuori hillfort is in the Penttilä village next to the Valmet aircraft factory on the east shore of Lake Jokisjärvi. The hillfort is at an elevation of 56 metres above the level of the lake and 117 metres above sea level according to Voionmaa. The crest of the hill measures c. 105 x 140 metres (c. 15,000 m^2). To the north of the hill is a field known as Sotaniitty ("Battle meadow"). At the site of the fort bedrock is visible in places and part of the area is covered by gravel. On the northeast, east and southwest sides the ridge has steep precipices. In the south part of the southeast side there is an isthmus 6 metres lower than the crest leading to the adjacent Sivakkavuori hill. Easiest access to the hillfort is from this location. The west and northwest sides as well as the north corner end in abrupt precipices of bedrock and on this side the crest is bare bedrock higher than the surrounding parts. The crest is bounded by broken sections of wall in all places except the latter. The walls are 2.5 to 4 metres wide and slightly over a metre high. According to Voionmaa, there were two gateways in the wall, one in the south corner and one on the southeast side. The sides of the latter gateway were extended to the inside, thus forming a passageway. The map drawn up by Pälsi also shows a gateway opening in the north section of the wall. The original length of the ramparts can be estimated at c. 130 metres.

Earlier sources mention that the surveyor Daniel Hall had seen ramparts and walls at the hillfort in 1776. The earliest available map of the site was by Messrs. Gottlund and Godenhjelm, which was published by A.O. Heikel (1882 45). Also Appelgren mapped the hillfort as well as excavated the inside of the walls at the location of the gateway (c. 50 m^2) and the foundation of the east gate ("Pirunpihanportti" – "Gate to the Devil's yard"). The latter excavation also covered some 50 square metres and both locations were without finds. A third mapping of the hillfort was carried out by Sakari Pälsi together with surveyors in 1944. In comparing Appelgren's and Pälsi's maps it can be seen that part of the walls had disappeared, especially on the southeast side. Also the width and height of these features had clearly decreased. Jouko Voionmaa excavated an area of approximately 15 m^2 in the area of the gateways. There were no finds of artefacts. A total of c. 115 m^2 of the crest of the site has been excavated (c. 1 %).

Among Voionmaa's papers and other material is a letter from V. Iisalo of the Valmet aircraft factory, containing a list of prehistoric finds from Siuro. According to this letter, artefacts had also been found at the hillfort. These consisted of a musket, spearheads and arrowheads from the crest and blacksmith's tools from the crest and the shore area. In 1943–1944 a stone axe was found at the hillfort, which was forwarded to the National Museum of Finland. This may be an artefact of uncertain date (NM 13372), resembling an arrowhead and found 500 to 600 metres north of the hillfort in the Linnavuori residential area at the waterline of the lake.

No Iron Age cemeteries are known for the immediate vicinity. The nearest ones are c. 2.5 kilometres to the south and 3 kilometres to the southeast (PEK 1983 77). The map of settlement of the 1560s shows villages to the south of the Linnavuori hillfort and on the opposite shore of the lake (SAK 1973 map 2).

The Linnavuori hillfort is in a central location controlling communication from Lake Kulovesi in the west and Lake Pyhäjärvi in the east to Lake Kyrösjärvi in the north.

3.7. Pirunlinna, Kuivaspää, Lempäälä

Basic survey map 2123 10 Lastustenkulma
x = 6808 14, y = 491 22, z = c. 135 m
Reports: H.A. Reinholm, No. 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), p. 160–180; N. Cleve, excavation report 1929; J. Voionmaa 1935–1936 131–132; V. Luho, survey report 1940, p. 35–36; J. Voionmaa, draft of an excavation report and photographs.
Finds: NM 8962: 1–2, NM 9013: 1–6.
Published sources: Heikel 1882 10; Appelgren 1891 20–21; Kaukovalta 1934 50–51; Salmo 1952 129–130; Taavitsainen 1982 34.

The Pirunlinna ("Devil's Fort") site is in the area of the Kuivaspää village c. 9 km north of the church of Lempäälä. The hillfort rises to an elevation of some 30 metres above the level of the adjacent Lake Linnajärvi.

The site is strewn with rocks and natural formations are hard to distinguish from man-made walls. According to Voionmaa's draft map the crest of the hill is enclosed by stone walls from the northeast and east ends to the south and west parts up to the northwest part where there are no walls. There are three gateways in the stone wall. Of these the sides of the gates to the south and the northwest were located downhill. According to the above-mentioned map, the length of the ramparts is c. 100 metres. The crest enclosed by the walls and the precipices measures some 50 x 90 metres (c. 3400 m^2).

The first known description of the site is from the 1750s and was drawn up by Erik Ehdner, vicar of the parish of Lempäälä (Kaukovalta 1934 50). The oldest map, apparently from 1872, was by the surveyor I.J. Ingberg (Heikel 1882 10; Appelgren 1891 20). Jouko Voionmaa mapped the crest of the hillfort in 1947 and 1948. No excavations have been carried out at the site.

However, the floor of a cave known as Pirunkirkko ("Devil's Church") on the north slope has been excavated. Two flint arrowheads found in 1926 and 1927 (NM 8962:1–2) led Nils Cleve to carry out excavations in 1929 and an additional five arrowheads were found (NM 9013:1–6). According to Cleve the cave was not an actual dwelling site and the finds were of a temporary nature. The arrowheads are of the period of Typical Comb Ware (Taavitsainen 1982 34).

The Linnavuori hillfort is located in unpopulated forested terrain among low-lying land and bogs. The nearest Iron Age cemetery is some 7 kilometres to the southwest. In the 1560s permanent settlement was located somewhat closer to the site, i.e. 3 km west-northwest of the hillfort (SAK 1973).

The hillfort is not in connection with any water routes or roads on ridges. A road leading north to Lakes Pyhäjärvi and Näsijärvi is, however, at a short distance from the hillfort (Niitemaa 1955 231).

3.8. Linnankallio, Kaakila, Vesilahti

Basic survey map 2123 07 Lempäälä
x = 6801 98, y = 480 12, z = c. 107.5 m
Reports: Y. Hovi, draft for a map; J. Ailio, inspection report 1924; J. Voionmaa 1935–1936 129; v. Maajoki, survey report 1939, p. 32; J. Voionmaa, report draft, map draft and photographs 1946.

The Linnankallio site is in the village of Kaakila approximately 1.7 km north-northeast of the church of Vesilahti. The hillfort is at the shore of the Kaakilanniemi promontory extending into Lake Pyhäjärvi at the site of a stretch of open water known as Toukosenselkä. The highest elevation of the site rises to c. 30 metres above the level of the lake.

The northeast side of the hillfort, running parallel with the shore, forms a steep precipice and the southeast end is a steep slope with bluffs and difficult access to the crest. From this part the gradient becomes less abrupt towards the southwest side. Also the northwest part is one gentle slope. The bare and rocky crest part measures c. 190–200 metres by 20 metres, except for the southeast end which is c. 20–35 metres wide. The total area of the crest is approximately 4000 m^2.

Along the southwest side is a stone wall almost 90 metres long which follows the edge of the precipice and is broken in places. Included in the wall are large boulders over a metre in height and width. The sections built of smaller stones have fallen down and are at present c. 50 cm high and 1–1.5 metres wide. There is no wall in the northwest part.

In 1924 the site was inspected by Julius Ailio who regarded the walls as naturally formed phenomena, similar to corresponding structures of stones and boulders at other hillfort sites in Häme. Ailio pointed to the lack of ramparts in the gently sloping northwest part, which in his opinion showed the lack of any plan for fortifying the site. Ailio's report appears to have led to the exclusion of this site from lists of surveyed antiquities. It is not mentioned in Salmo's work on the Iron Age of Satakunta (Salmo 1952) nor in the list of protected sites drawn up by the zoning authorities of the Pirkanmaa region (PEK 1983).

Despite Ailio's views regarding the site, Jouko Voionmaa's survey report mentions it as a definite hillfort. In 1946 Voionmaa also mapped the site and described the walls in his report draft. This document, however, contains a number of cautionary remarks regarding the fortificatory purpose of the site. However, the walls must be regarded as man-made (Joakim Donner, oral communication).

The hillfort is on a promontory jutting into the lake in a location well suited to purposes of communication and adjacent to sites of Iron Age settlement in the region. The nearest Iron Age cemetery is Kirmukarmu in Vesilahti, some 2 kilometres to the south (PEK 1983 54, 95). The promontory was permanently settled in the 1560s (SAK 1973).

3.9. Linnamäki, Valkkinen, Vesilahti

Basic survey map 2114 06 Narva
x = 6792 05, y = 477 05, z = c. 127.5 m
Reports: J. Voionmaa 1935–1936 128–129; V. Maajoki, survey report 1939, p. 31; J. Voionmaa, map drafts and photograph; untitled draft manuscript on hillforts in the archives of the National Board of Antiquities.
Finds: NM 12992: 1–17.
Published sources: J. Voionmaa 1937; Salmo 1952 121–122; Luoto 1984a 157.

The Linnamäki site is in a forested area of the village of Valkkinen approximately 9 km west-southwest of the church of Vesilahti. About 500 metres north-northeast is Lake Hirvijärvi. The hillfort rises to an elevation of some 30 metres above the level of the lake.

The WSW and NE sides of the hill as well as the SE end are steep rocky bluffs, which did not require man-made fortifications or ramparts. The northwest side slopes gently with terraces in places. In this location there is a double series of ramparts. The lower section of wall with two gateways was originally c. 120 metres long and is of unusual form. In the middle of its course the wall turns sharply uphill and after some distance turns sharply downhill again. In the upper parts of the slope a natural rocky terrace was utilized with two sections of wall measuring some ten metres in length. From this location the foreground and the area of the gates could be controlled. At the southern end of the hillfort area are two 15-metre lengths of wall located parallel. All of the stone walls measure 1 – 1.5 metres in width with a height of 0.5 to 0.75 metres. In addition to the walls other man-made features include 30 cairns. The area enclosed by the walls and the bluffs is approximately 70 x 95 metres (c. 5200 m^2).

J. Voionmaa discovered the site on the basis of its place-name in 1935 or 1936 in connection with his survey of hillforts and ancient fortifications in Häme. In this connection, a preliminary mapping of the site was also carried out (J. Voionmaa 1935–1936 128–129; J. Voionmaa 1937). In 1951 the hillfort was again mapped and excavations were carried out on the crest. According to available photographs, turf and soil were also removed from the walls. A comparison of the original and later maps shows that Voionmaa's conception of the walls had changed considerably.

The description of the crest area is based on Voionmaa's map from 1951.

An area of c. 125 m^2 was excavated, within which were three cairns (c.. 2.4 % of the area of the crest). As Voionmaa's papers include only a draft for a map, it is difficult to describe the actual observations. The untitled manuscript on hillforts, however, contains an interesting reference to the discovery of building remains in this connection. These are mentioned as having been built "with only small stones along their walls, used to fill the space between the lower timbers and the bare bedrock and with walls made level in uneven parts with a filling of small stones and earth." It is, however, difficult to verify these observations. Voionmaa's excavation maps show two rectangular areas demarcated within a stone and rock-strewn area. These areas may possibly depict houses. According to the texts of the photographs there was at least one hearth within the area covered by house-floor no. 2. This feature, however, can be observed outside the demarcated rectangular area, where by the actual meaning of these plots is hard to explain. In any case, they do not serve to verify Voionmaa's description of house remains. No other house-floors can be observed in the other parts of the excavated area.

Voionmaa's photographs indicate that another hearth was also discovered in the excavated area and outside this area at least cairn no. 9 was excavated, possibly also cairns nos. 1 and 7. Unfortunately all of the cairns cannot be identified, because they were not all numbered. In his manuscript draft Voionmaa mentions that the hearths were laid in a natural depression of the bedrock which was of triangular form or by making the base and sides of the hearth of flagstones. Voionmaa assumes that the hearths were used for a long period and fire-cracked stones, charcoal, soot and other debris were deposited next to them. In this way cairns had formed, the largest of which are up to 2–3 metres in diameter and half a metre high. There is no information regarding the number of hearths that were investigated to suggest such an idea.

A large number of finds were recovered in the excavation. The weapon finds consist of an even-pointed arrowhead (Hiekkanen's type-group 1) and an unclassified fragment of an arrowhead (NM 12992:11,2). Tools and implements include a fragment of a knife (NM 12992:13). Also found were c. 942 pot sherds (NM 12992: 3,5–7, 9, 12, 14, 16) and roughly 345 g (1775 fragments) of burnt bone (NM 12992: 4, 10, 15, 17) and a piece of slag weighing 470 g (NM 12992:8).

In terms of dating the most interesting find is a half of an Abbasid coin (NM 12992:1), minted between 786 and 809 AD (Granberg 1966 185). According to Talvio (pers. comm.) the *post quem* date is 804 AD. It must be pointed out, however, that these coins were struck in large numbers and they were long in circulation, as indicated by their occurrence in later hoard finds. For example, the coin fragments of the Kapatuosia find from Hollola, which is dated to the late 11th century, include a fragment of an Abbasid coin struck between 786 and 809 AD (Talvio 1982). The Tiuri silver hoard of the 12th century (C.A. Nordman 1924 134) contains two Cufic coins, of which the older one is dated to 904/905 AD (Granberg 1967 214).

Both of the arrowheads are of the Late Iron Age. The oldest even-pointed arrowheads of Hiekkanen's type-group 1 are from the Migration Period, but they have mainly been found in Viking and Crusade Period connection (see Appendix 2, page ***).

The pot sherds include fragments of vessels of smooth surface, fine-grained paste and mainly thin walls, part of which are decorated with triple wavy lines (e.g. NM 12992:6 cf. Kauttua, Eura) or "broken line ornaments" (e.g. NM 12992:9). A considerable part of the sherds are of undecorated coarse ware in use from the Early Iron Age to the Middle Ages. The inside and outside surfaces of these sherds have thin lines, apparently caused by smoothing with a spatula-like tool (e.g. rim sherd NM 12992:4; on the dating of the ceramics see p. 223).

Due to its isolated location, the Linnamäki site has been regarded as a place of refuge (J. Voionmaa 1937 49; Suvanto 1973a 67–68). The nearest known Iron Age remains are at a distance of 8–10 km and the assumed route used by enemies, the main water route of Lake Vanaja is also at this distance (J. Voionmaa 1937 49–50; PEK 1983 95). It has been underlined, however, that from the highest point of this site the Pirunlinna hillfort of Lempäälä can be seen (J. Voionmaa 1937 50). From the latter there are routes of communication both upstream and downstream along the Kokemäenjoki River (Salmo 1952 122). In the map of permanent settlement of the 1560s a village is marked 2.5 km north-northeast of the Linnamäki hillfort (SAK 1973).

4. Ancient hillforts and fortifications and Medieval castles of Häme

4.1. Linnosaari, Valkeakoski (Sääksmäki)

Basic survey map 2132 03 Valkeakoski
x = 6795 70, y = 502 41, z = > 87.5 m
Reports: H. A. Reinholm, No. 8, Finlands fornborgar, Kymmene vattensystem (Ancient forts of Finland, Kymijoki River water system), 213–222; Hj. Appelgren, notes and map; J. Ailio, inspection report 1923; E. Sarasmo, survey report 1942; E. Sarasmo, inspection report 1971; E. Sarasmo, excavation report 1971 (1972); E. Sarasmo, preliminary report of excavations carried out in 1972; E. Sarasmo, summary of excavations in 1971–72 and 1977–78.
Finds: Häme Museum 3088.
Published sources: Vuorinen 1972 33.

At the head of the Valkeakoski rapids, approximately one kilometre to the northeast of the actual rapids is the Linnosaari island located in the Apianvirta river, flowing from Lake Mallasvesi to Lake Vanaja. The island is c. 80 x 140 metres in area and rises to 5 metres above the level of the lake. There are two moats joining at a right angle in the side of the plateau of the island facing Valkeakoski. The intersection has not been dug and it forms an isthmus crossing the moats. In addition to these excavated features there are also cairns on the island. It also appears that the sides of the elevated part were reinforced with stones. The area enclosed by the ditches and the sides of the elevated part comprises some 1150 m^2.

Pastor Reinholm's notes on ancient fortifications refer to the island and it is also mentioned in J. V. Hirsjärvi's survey of the antiquities of the district of Tampere from 1882–1883. Hirsjärvi, who visited the site, was of the opinion that it was a fortification. Hj. Appelgren concurred with this view and carried out excavations in two locations on the island in 1886. The first excavation (30 m^2) was in the corner of the adjoining moats and did not reveal any finds, only stones and soot. Appelgren's second excavation area (14 m^2) was at the north edge of the elevated area. Found in this location were layers of charcoal, of which the uppermost one showed traces of burn-clearing at the site. The charcoal layers contained bones and Appelgren was of the opinion that one of the layers resembled a charred floor of timber.

In 1923 Julius Ailio inspected the site and in his report he suggests that the features dated from the time of the so-called Great Wrath (1714–21) and that these "batteries" accounted for the local name for the island. Ailio observed at least six low cairns in the elevated area, which he maintained resembled those of the Migration Period. Some of the cairns had been disturbed and in them Ailio observed traces of occupation layer.

In 1971–1972 and 1977–1978 Esko Sarasmo conducted extensive excavations on the island. The following brief summary is based on the excavation reports and information provided by Sarasmo.

In the field work charred timbers and pieces of logs were found at the edges of the elevated part which measured c. 25 x 40 metres. According to Sarasmo, this part had been enclosed by a rectangular structure of logs, which had burnt down at some stage. The fortification was of relatively large logs, 30 to 35 cm in diameter, and employed blockwork or corner-joining technique. Its original height is estimated at c. 2.5 metres.

Two stages of construction were observed, with the charred remains of the timber ramparts belonging to the first one. These were covered with earth from the moats. In other parts around the edges of the island these were not covered over – contrary to information from Vuorinen (1972 33) – nor were they cleared. This author has also observed at the site how the charred features were covered by only a thin layer of turf. These observations sug-

gest that a re-fortification of the site was for some reason interrupted. It is also possible that the moat was dug at a much later stage and was in no way a continuation of the first stage of construction. If the latter were the case, there would be a soil feature in the turf layer observable in the profile section of the ditch above the charcoal. Such a feature cannot be seen in the drawn section. Later construction should have destroyed or in any case disturbed the remains of the timber structures, which appear to have been preserved in their original state after having fallen down.

Sarasmo also excavated the cairns and observed that they were not graves. Three low cairns inside the moat at the southwest end on the highest location of the island contained burnt and unburnt bones, fire-cracked stones, but hardly any burnt soil or soot. According to Sarasmo, the westernmost cairn also contained a hearth. In the immediate vicinity of this cairn as well as the one adjoining it charred pieces of timber and logs were found. It appears that there had been a timber construction around the cairns.

The excavation finds consist mainly of burnt and unburnt bone. Also found were a few nails, small fragments of whetstones, an iron clamp and a piece of flint for striking fire. Artefacts providing datings are a die-cube of bone, a tanged spearhead, two armour-piercing arrowheads and a pot sherd. The latter is of Epineolithic date, belonging to the Sarsa-Tomitsa type of c. 1300 B.C. – 300 A.D.. (cf. Meinander 1954, Tf. 28:h, 29:h, concerning the dating see Carpelan 1979 11). The small die-cube is similar to those generally found in Medieval castles (see e.g. Taavitsainen 1980 47). A Medieval dating is also suggested by the armour-piercing arrowheads, which, however, were still in use around the advent of Modern Times (Alm 1956 236). These artefacts came into use in the Nordic countries in the 13th century. According to Luoto (1984a 81), they changed in the following century from long narrow-necked types to short, blunt-tipped forms with thick neck parts. According to Sarasmo, these finds are connected to the first stage of construction, but unfortunately they provide a highly broad chronological range.

In 1987 radiocarbon samples were taken of pieces of timber left in the uncovered excavation areas, which had by now become grown over with moss. A log sample from the north edge of the elevated part of the island provided a dating of 820 ± 40 BP Su-1711), cal AD 1180 (1225) 1260 (relative area under probability distribution 1.00 1187–1257; Stuiver & Pearson 1986). The butt-end of the log was undecayed and the dating was not of this part, but of the charcoal. Even if we take into account the wearing of the surface of the log due to human action, it is probable that the age of the tree itself does not have much effect on the result.

The radiocarbon dating finds an interesting perspective with reference to information concerning the island from the historian Jalmari Jaakkola (1926 23, footnote 2): "Linnasaari, in the narrow-west part of the Lake Längelmävesi water route at Valkeakoski, provides a certain type of reference, though only probable, to role of the Lake Vanaja route as a boundary against the east. Already in early taxation records this island is mentioned as belonging to the Castle of Häme and border outposts of this kind were taken into use also elsewhere by the castles."

The above quotation from Jaakkola refers to the central location of Linnosaari Island vis-à-vis routes of communication. On the other hand, there are no definite observations of prehistoric remains or monuments in its vicinity and there are only two stray finds from Valkeakoski (a bearded axe NM 8208:1 and a spearhead NM 11517). Linnosaari Island in located in the midst of an area permanently settled in the 1560s (SAK 1973).

4.2. Rapola, Valkeakoski (Sääksmäki)

Basic survey map 2132 02 Sääksmäki
x = 6788 66, y = 507 18, z = > 145 m
Reports: H. A. Reinholm, No. 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system); A. O. Heikel, map; Hj. Appelgren, map; J. Ailio, excavation reports 1918 and 1920; S. Pälsi, excavation report 1942; E. Sarasmo, survey report 1945, p. 2; J. Voionmaa, map draft and photographs; A-L Hirviluoto, excavation report 1964 (1965).
Finds: NM 2501:35, NM 12045:1–2.
Published sources: Appelgren 1891 22–24; Ailio 1921; Luoto 1984a 158; Hirviluoto 1987.

The Rapola hillfort is at the southeast end of the Rapolanharju ridge, about a kilometre northwest of the church of Sääksmäki and approximately the same distance from Lake Rauttuselkä. The ridge rises at this location to over 65 metres above the level of Lake Rauttuselkä and over 145 metres above sea level.

Rapola is Finland's largest ancient fortification site. The fortified area, bounded by a wall which is obscure in places, measures c. 380 metres in length and its greatest width is 200 metres (the area of the crest part is c. 52,000 m^2). The perimeter of the wall has been measured to be approximately one kilometre. This extensive area contains two large depressions in the ridge.

According to H. A. Reinholm the oldest known reference to Rapola is from an old map of 1647 with the following text "At this place a castle had been built and even today the walls can be seen to some degree." (Reinholm 236, no. 8; Appelgren 1891 23, footnote 1).

The surveyor I. J. Ingberg is known to have carried out the earliest field work, the mapping of the hillfort, probably in the 1870s. In 1886 Hj. Appelgren excavated the mound of the northwest corner of the wall as well as the mounds in the north part of the ridge on the east side. The results of these excavations were negligible (Appelgren 1891 24).

In 1918 and 1920 Julius Ailio carried out excavations and mapping surveys of the site (Ailio 1921). According to his observations, the slopes had been artificially steepened in places. The walls were of earth and stones. In the lower and less abrupt locations the walls were almost completely of stones, especially in the northwest end, where the slope was strewn with rocks. The outer face of the wall is steeper than the inside and in places there are transverse depressions at short and relatively regular intervals. The base of one of these features was excavated, revealing stones laid to form a foundation corresponding to the thickness of a log. There were two definite gate locations, at the mouth of the small wall ditch and at the entrance of the larger wall ditch, where the thick wall forms a longish gateway.

Ailio was of the opinion that outside fortifications were to be found in two locations: a c. 15-metre long ditch one metre deep outside the southeast opening of the large wall and a terraced feature in the northwest part.

Within the perimeter of the wall are shallow depressions, longiform or round features approximately two metres across and larger ones, usually half a metre deep. These were in groups and in some case in rows in all parts of the fort. Ailio's maps shows 69 of these features within the walls and 4 outside the perimeter. He suggests that they were house-floors or hearths. Two of these features were excavated. One contained a disturbed hearth at the bottom with a small kettle pit. The other one was round with soot and a small kettle pit at the bottom. Around the hearth pit was an irregular and even field of stones. Ailio suggests that shelters with ridged roofs originally stood at both locations.

Also in the fort area are 13 oven-type hearths of stone, open from above. Some of these are surrounded by round settings of small stones, while others lack such features. Two of the hearths were excavated, revealing hearth structures laid of stones. In one of these was a large flat stone raised at the far end of the hearth. Ailio suggests that the hearths were used for heating stones to melt snow and to boil water in wooden containers. Near a gazebo to the west of the fort are 5 small cairns of low height containing fist-sized stones.

Two large pits at the bottom of the wall ditch have been interpreted as wolf-hunting pits. They were excavated in order to find out whether they had originally been wells. The results did not offer any definite solution. On the basis of finds of bone Ailio regarded them as hunting pits.

In 1942 Sakari Pälsi carried out the levelling of seven sections of the wall as well as removing moss from a 9-metre section of wall and preparing for photography three of the stone piles to the north of the gazebo.

Pälsi observed that the sections of the wall parts of earth were steeper on the outside and less abrupt on the inside. Earth fill was transported to the inside even in sections of wall that were of stone and steep on the outside. The earth was excavated from inside the perimeter. This created pits in all locations behind the

wall and apparently also at some distance from the wall. Pälsi points out that all of the pits can hardly be regarded as house-floors. According to Pälsi, the fact that the wall was interrupted in places may indicate that the Rapola fort was never completed.

Three of the cairns near the gazebo were also excavated. They consisted of mostly fist-sized stones which appeared to have been chosen for the purpose. There were no signs of fire on the stones and Pälsi interpreted the cairns as piles of throwing-stones. There were nine of these cairns along a section measuring 60 metres.

In 1949 Jouko Voionmaa is known to have excavated the structure of the earthworks and possibly other features as well. The available material from Voionmaa's excavations consists of drafts of two profile sections. Observed in the excavated sections were soot-mixed streaks and patches of charcoal. Finds consist of a section of an iron rod and two pot sherds (NM 12405:1–2).

In 1964 A-L Hirviluoto mapped and restored the east gateway which had been damaged in forest-felling at the site.

Since 1988 the Rapola hillfort has been under investigation in connection with a special research project concerning local settlement history.

The excavated areas are hard to estimate. There is no information on the extent of Appelgren's excavations and the hearth features studied by Ailio entailed an area of roughly 50 m^2. As no maps are available, the area excavated by Pälsi remains unknown. Also the extent of Voionmaa's excavations is unknown. On the basis of a preserved draft for a map it appears that he uncovered an area of at least 40 m^2. All in all, the excavated area of the hillfort is clearly less than one per cent of its total extent.

The piece of iron rod (NM 12405:1) is of octagonal section, broken at one end and hammered at the other with traces of fire patination, and has been interpreted as the shaft of an angon with a corresponding dating to the Merovingian Period (e.g. Luoto 1984a 158).

The undecorated pot sherds (NM 12405:2) are of simple household ware, resembling to some degree the ceramics found at the Kauttua hillfort in Eura and the Valkkinen hillfort in Vesilahti, which were in use for a long period (see p. 223). The paste of the Rapola sherds is, however, less coarse than in the latter finds.

4.3. Linnamäki, Tenhola, Hattula

Basic survey map 2132 04 Leteensuo
x = 6776 43, y = 529 58, z = 142 m
Reports: A. Heikel, map; J. Ailio inspection report 1921; J. Voionmaa 1935–1936 43–45; S. Ojala, survey report 1939, p. 17; J. Voionmaa, drafts for an excavation report, maps, photographs and manuscript drafts; A. Erä-Esko, report on restoration work at the site, 1969.
Finds: NM 11639: 1–2, NM 11824: 1–36, NM 11968: 1–90.
Published sources: Heikel 1878 47–48; Appelgren 1891 32–33; Huurre 1976 61–63; Luoto 1984a 158.

The Linnamäki hillfort at Tenhola in Hattula is located on the Tenhola estate in the village of the same name 6.2 km northwest of the local church and about a kilometre from the east shore of Lake Vanaja. The highest point on the ridge of the site is 142 metres above sea level and approximately 65 metres above the level of the adjacent lake.

At its widest the ridge measures 21 metres and its length is over 100 metres. The gradient of the ridge is steep (c. 30 degrees) and the highest part forms a plateau. The crest is slightly curved in form and its north part, measuring some 75 metres runs N-S. The remaining part (c. 25 metres) runs NNW-SSE. The highest point of the hillfort is at the "bend", from where the plateau sinks c. 3.5–4 metres both to the south and the north. This slope is less marked to the south and more abrupt to the north.

Observable fortification features are high walls of gravel on both sides of the gateway and in the west part a section of wall beginning some 20 metres before the west gate, leading to the bluff on the east side of the south part of the fort. Both of the gates have sides opening outwards. The downhill section between the sides measures c. 12 metres at the west gate and c. 4 metres at the south gate.

Preliminary mapping of the site was carried out by A. Heikel in the 1870s and J. Ailio in 1921. Jouko Voionmaa carried out extensive excavations of the crest part in 1946–1949. The total area excavated measures approximately 1520 m^2. The area enclosed by the earthworks totals 1700 m^2, of which 1050 m^2 (c. 62 %) have been excavated. In 1969 sections of timber breastworks were rebuilt on both sides of the SW gate of the west side under the inspection of Aarni Erä-Esko.

The main observations and results of the excavations will be presented below, based on the above report drafts by Jouko Voionmaa.

Although the walls do not enclose the whole of the crest area a fortification structure of some kind had originally bounded the highest part of the site on all sides. In the areas without sections of wall excavations revealed settings of stones along the sides of the crest as well as stone settings outside the perimeter intended to keep earth and stones in place. The latter features were also observed in connection with the actual walls. No regular features were observed on the surface of the wall sections, but within the walls were stones wedged upright. There were no remains of possible timber structures.

Voionmaa has also suggested that there were house-floors also at the hillfort and that buildings of some kind had been located in connection with the walls. Accordingly in such a case the corner joint of the assumed breast work had also served as the wall of a building. The building could also have been used for defensive purposes. In front of some of these building remains was a small semicircular setting of stones to prevent the ground from softening. For the same reason the actual house-floors were also laid with stones, unless they were of timber.

At the site were also buildings situated close to the walls, but apart from them with walls of different orientation than the breastworks. According to Voionmaa these buildings did not have hearths, although the latter have also been found at the hillfort. One of the hearths was under a shelter.

Voionmaa's observations concerning building remains are hard to verify.

Small settings of stones were found near both of the gates. These have been interpreted as parts of buildings, weights for the timbers of the breastwork or also as piles of throwing stones.

In the final stages of his field work Voionmaa made an interesting observation. In 1948 in connection with the excavation of profile sections in the NE corner of the site, a second layer of building remains was observed at a depth of 0.4–2 metres below ground level and below the one already studied. The profile section shows a streak of burnt layer before the original ground level. In excavating the lower layer a section of fallen and burnt log wall was found with birchbark chinking and charred fragments of the foundation of the breastwork. The excavated section was at the corner of the breastwork. Uniform lengths of timber were found, but they partly disintegrated immediately upon contact with air. A foundation of stones of various size was made for the timbers of the breastwork at the edge of the slope.

The first stage of construction was also excavated at two other parts of the site – on the west side towards the curve of the crest and to the south of the SW gate. Profile sections shedding light on this first stage of construction were also excavated at various other locations and it was observed that the lower layer of building remains was not so deep as in the NE corner and that its depth varied considerably depending on the section of "tactical terrain" facing the location in question. The form of the crest of the site appears to have originally been similar to other ridges in the vicinity, which have a top part only a few metres wide with a terrace-like plateau on both sides from where the slope begins to descend uniformly to the gulleys between the hills. The first breastwork appears to have been erected on such a terrace. At a later stage the crest part was made level and its present profile does not correspond to its original state.

The excavations revealed a large number of artefacts. All of the finds were immediately beneath the surface layer with untouched soil following. The occupation layer was generally very thin.

Ceramics constituted the main category of finds, totalling 2094 sherds. A total of 579 g of burnt and unburnt bone were recovered (NM 11824: 2, 8, 14, 16, 2326; NM 11968: 1, 12, 14, 21, 23, 33, 40, 57, 62, 64, 70, 74, 76, 81, 88). Other finds include three pieces of burnt clay (NM 11968:3), a fragment of a clay whorl (NM 11639:1), three whetstones (NM 11968:18, 32, 72), a grinding stone (NM 1968: 66), a stone adze (NM 11968:94), two frag-

ments of glass beads (NM 11968:86), a piece of iron slag weighing 382 g (NM 11968:10), a section of an iron tang (NM 11968:21), half of an arrowhead (?) (NM 11824: 21), a fragment of an iron artefact with a tang (NM 11968:89), a scythe with a broken tip (NM 11968:79), an iron ball or piece of shot (NM 11968: 90), four fragments of a neck-ring (NM 11824:6, 11968:2–4) and a blade fragment of a broken sword (NM 11824:20).

Of the above only a few artefacts can be dated with any accuracy. One problematic artefact must, however, be mentioned: a small stone adze (NM 11968:84) of slightly irregular form, which may be of Stone Age date. A more precise dating is provided by the fire-patinated blade fragment of a sword (NM 11824:20) which is of interesting structure. According to Leena Tomanterä the sword had separate blades and the core of the blade part consists of two rods running parallel and joined with wound damascening technique. This is a four-part blade dated to mainly the beginning or middle of the Merovingian Period (see e.g. Voss 1976, 281).

The four fragments of a neck-ring (NM 11824:6, NM 11968:2–4) were found together with the piece of slag in the area excavated at the gate of the north side in a location measuring a few m^2 in area. The neck-ring is of a Finnish-East Baltic type, generally dated to the Viking Period. Some of the specimens of this type found in cremation cemeteries have been assumed to date from the preceding period. From this period are also the oldest East Baltic finds while the youngest Estonian finds are from around the year 1200 (Kivikoski 1973 727).

A fragment of a bronze spiral is dated to the Viking Period or later (NM 11824:30; Lehtosalo-Hilander 1984).

The ceramic finds are mainly of coarse-tempered undecorated thick-walled ware which remained in use for a long period (see p. 223). Also represented are sherd of thin-walled ware with wavy-line decorations (NM 11968:39 as well as sherds with line decorations (NM 11968:13). The same combination of ceramic types is also known from the hillforts of Kauttua in Eura and Valkkinen in Vesilahti, while only coarse ware was found at Rapola in Sääksmäki. An iron ball (NM 11968:90), found eight metres from the south gate, measures 4.8 cm in diameter and is completely similar to a cannon ball. According to Tapani Ahvenisto (pers. comm.) it may be from a 16th-century *falcon*, due to its weight of just under a pound, but an earlier dating is also possible.

In the 14th century firearms came into use in Europe. In the middle of the century a tubular type of cannon with a shaft was used, with a caliber of 30–40 mm. At first these were used to fire arrows, but lead and iron shot (of which the oldest mention is from 1345) soon replaced arrows. It has been assumed that firearms were introduced into the Nordic countries immediately after they had become common in the towns of the Hanseatic League in the mid-14th century (Alm 1958 563–577). They spread to Russia around 1380 (Kirpičnikov 1976). The oldest documented source on firearms in Finland is from as late as 1434, when the commander of the Castle of Raasepori (Sw. Raseborg) wrote to the town council of Tallinn ordering three chamber-loading guns, as well as a cannon-master capable of using them (Hausen 1921 2102).

The location of the find suits the assumption of its having been a cannon ball. The above possibilities for dating are however disputable. The caliber is slightly larger than in the oldest known firearms and the find may be of a later date. In the near vicinity are several manors and estates, whose owners may have kept firearms. The find may also be related to the winter war of 1496, when the Russians are known to have invaded deep into the regions of Häme and burned the images and crucifix of the church of Hattula (Suvanto 1952 235).

Two radiocarbon datings were carried out in 1981 of material from the hillfort. Published sources mention the two stages of construction (J. Voionmaa 1959 513) and on the basis of this information it was assumed that the charcoal samples (NM 11824:5) would be related to the first stage and that the finds of unburnt bone (NM 11968:5) to the later history of the fort. Later, when the drafts of the excavation report and maps were found, it became clear that this was not the case.

The first stage of construction came to light in the later phases of the 1948 excavations, which were continued the following year. The pieces of charcoal were however found in the previous summer. Nor is the location of the charcoal finds suited to the above assumption; they can be identified as having come from a point to the west of the basic grid line of the northernmost area excavated, while the remains of the first stage of construction came to light to the east of the line.

In the grid square from where the charcoal was found there is an area hatched in pencil, which may indicate charcoal, but there were no finds of hearth remains in this square (−4+2/0−2W). In the square immediately to the south of the above the map draft contains a marking indicating pot sherds and bone (NM 11968: 13–14) as well as a small circle marked hearth. There is, however, no uniform charcoal layer extending to the grid square on the north side. Thus, the radiocarbon-dated charcoal is not related to the hearth or any other structure and appears to consist of separate pieces found under the turf layer.

A find of bone (NM 11968:5) from the 1948 excavation also came from the north area, but to its east. Some 50 cm from the square to the south of the bone finds were a fragment of a neck-ring (NM 11824:6) and from the square on the east side three fragments of a neck-ring (NM 11968:3–4). The slag (NM 11968:10) was from the square to the southwest. The earlier stage of construction came to light at this excavated area.

The charcoal sample is dated to 1600 ± 130 BP (SU-960), calibrated AD 261 (429) 600. Within this range the 96 % probability of dating falls between the years 330 and 600 (Stuiver & Pearson 1986). The age of the bone is almost 1000 years younger, 630 ± 130 BP (Su-961), with a calibrated dating of AD 1260 (1300,1365, 1374) 1420; with a 100 % probability of falling between the years 1260–1430 (Stuiver & Pearson 1986).

The hillfort is in a location somewhat apart from settlement in the vicinity. The nearest Iron Age cemetery is at Pirnes in Hattula slightly less than a kilometre to the northwest. The Suontaka and Hinnonmäki cemeteries in Tyrväntö are 2 – 2.5 kilometres from the hillfort. South-southeast from the fort at a distance of 4.5–5 km to the north of Lake Lehijärvi are the Raimaanmäki and Kirkkomäki cemeteries in Hattula. The hillfort remains within the area of Iron Age and 1560s settlement in a barren and narrow ridge area between the Vanajanselkä stretch of open water in Lake Vanaja and the narrows of the lake (Huurre 1976 67 & 1978 7; SAK 1973). The location of the hillfort is advantageous, as the adjacent water route is well visible from it. There is no data on any significant roads having passed by the hillfort.

4.4. Aulanko, Hämeenlinna

Basic survey map 2130 09 Hämeenlinna
x = 6768 22, y = 525 56, z = > 150 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system); A. Heikel, map; J. Ailio, inspection report 1921; J. Voionmaa 1935–1936 38–39; E. Sarasmo, survey report 1939, p. 10–11; J. Voionmaa, report draft with maps and photographs, "Linnavuorista" (On hillforts) manuscript; J. Voionmaa, inspection report 1952, J. Saukkonen, survey report 1984 (1987), p. 123–124.
Published sources: Heikel 1878 49–50; Appelgren 1891 34–35; Sauramo 1934 212.

The hillfort of Aulanko is in the town of Hämeenlinna on the southwest shore of Lake Aulanko at an elevation of c. 70 metres above the latter and over 71 metres above the level of Lake Vanaja (over 150 metres above sea level). Towards Lake Aulanko and the north the hill is steeply sloped without access. To the northwest, west and south the hill forms terraces hanging into gently sloping terrain at a distance. If the hill had been intended to serve as a fortification, breastworks would have been required along the whole of the terrace, extending some 80 metres. Estimating the course of the wall and the original extent of the site is made difficult by the fact that this well-known scenic location has come to be built with roads and buildings, in which connection sections of wall have also been destroyed. The best-preserved section of wall is along the terrace of the west part with stones and earth forming a low mound extending to the edge of the bluff and broken by roads. According to Ailio's map draft the extent of the crest area is estimated at c. 6500 m^2.

The hillfort was mapped by A. Heikel and Hj. Appelgren. Julius Ailio visited the site in connection with his studies of the

hillforts of Häme in 1921. Ailio's report takes a skeptical view of the walls. Sauramo (1934 212) regarded the walls as man-made and mentions that Ailio agreed with him.

In 1949 and 1950 Jouko Voionmaa carried out excavations at the site. Two areas were opened as well as profile sections of the walls. Roughly 300 m^2 were excavated, of which 275 m^2 were in the crest area. Thus, some 4.2 % of the latter area has been excavated. The first area was in the sector between the main road and a road to the north and the second area was to the south of the main road. On the basis of his excavations Voionmaa observed that the terrace on the slope, previously assumed to have been a shore formation, had come about in connection with the construction of the hillfort. Voionmaa also mentions that a hearth, fragments of burnt bone and possibly the foundations of a building were found in the second area.

In the manuscript on hillforts the following observation is made: "when a fort was re-built, as in the case of Aulanko and the hillfort of Tenhola, some remains of this were recovered in the lower layer." In some of the sketches of profile sections charcoal occurs at a depth of c. 80 cm. It is possible that Voionmaa interpreted these traces of fire as an earlier stage of construction. An untitled manuscript draft mentions that Aulanko is an intermediary type between forts on rocky hills and those built on ridges. At Aulanko there are outcrops of bedrock in the crest part. Voionmaa observes that the first stage of construction was on the bedrock foundation, but a thick layer of gravel was brought to the site, upon which the structures were erected when the fort was re-built.

The Aulanko site is to the north of the rich area of cemeteries in Hämeenlinna c. 1.7 km east and 2.2 km north of the nearest cemeteries and between villages marked in the map of settlement in the 1560s (Huurre 1978 7; Keskitalo 1976 75; SAK 1973).

4.5. Häme Castle, Hämeenlinna

Basic survey map 2131 09 Hämeenlinna
x = 6766 13, y = 525 05
Reports: Reinholm, N:o 8, Finlands fornborgar, Kymmene vattensystem (Ancient forts of Finland, Kymijoki River water system), p. 289–320; E. Härö, excavation report concerning the terrace to the northwest of the Kukkotorni tower in the southwest wing of the courtyard of the forecastle (1961); E. Härö, report on the excavations of the terrace to the southwest of the church tower in the courtyard of the forecastle (1962); E. Härö, report on the excavations of the terrace to the southeast of the church tower on the courtyard of the forecastle (1963); E. Härö, report on excavations of the terrace to the northwest of the church tower in the southwest wing of the courtyard of the forecastle (1962).
Finds: National Museum of Finland, Coin Cabinet 77038.
Published sources: Ailio 1917; Drake 1967 & 1968.

Häme Castle is located in the present town of Hämeenlinna in the heart of the region of Häme. It is situated by the narrows of the main water route of the province in the midst of an area of intensive Iron Age settlement (Kanerva 1984 79).

The considerable find material from the castle, which has not yet been analysed in any detail, contains only two prehistoric artefacts. In the terrace to the southwest of the church tower a Merovingian Period pin with a ring was found about 75 cm from the wall of the tower immediately above the bottom gravel layer (NM 16560; cf. Kivikoski 1973 447). In this location was a thin feature of occupation layer consisting of black soil with burnt stones. A Frisian coin (Deventer, Bishop Bernold 1027–1054) was found in the northeast courtyard of the castle. There were no observations in connection with finds suggesting a possible prehistoric use of the castle site. Knut Drake (pers. comm.) has suggested in a later connection that there may have been a prehistoric dwelling site at the location of the pin find.

Various views have been presented concerning the date of construction of the castle (see Drake 1968 16–19). Juhani Rinne was of the opinion that it was built in the early 14th century, mainly because of the fact that the fortress of Hakoinen can be connected with the Vanai Castle of the chronicle of Novgorod (Rinne 1914 289). Ailio (1917 214) maintained that the castle was founded by the Earl Birger, which is also the view taken by Olsson (1944 240). Tuulse (1947 26), in turn, dates the earliest history of the castle to around 1300. Drake (1968 40), who headed restoration work on the castle dates the oldest stage of construction to the period from 1260 to 1290 on architectural grounds. Drake (1967) also suggests that the fortress of Vanai of the chronicle source may have referred to the Castle of Häme.

The coin finds from the castle have been analysed. Pekka Sarvas, head of the Coin Cabinet of the National Museum of Finland, has identified and classified all of the coin finds from the castle. The oldest coins are from the period of Magnus Eriksson (1319–1363). These are two-faced *pennings*, struck in the 1320s or 1330s (Pekka Sarvas, pers. comm.). Beginning with these specimens is a series of coin finds extending to modern times. It must be pointed out, however, that a more thorough analysis has not yet been carried out taking into account the representativeness of the finds and their locations.

4.6. Mantereenlinna, Mäskälä, Hämeenlinna (Vanaja)

Basic survey map 2131 09 Hämeenlinna
x = 6763 67, y = 528 80, z = 131.6 m
Reports: H.A. Reinholm N:o 8, Finlands fornborgar, Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), p. 336–339; A. Heikel, map; J. Ailio, survey report 1921; J. Voionmaa 1935–1936 34–37; E. Sarasmo, survey report 1939, p. 11; J. Voionmaa, report and map drafts and photographs; J. Saukkonen, survey report 1984 (1987), p. 188–189.
Published sources: Appelgren 1891 35; Sauramo 1934 213–214; Keskitalo 1976 102–103.

The Mantereenlinna hillfort is in the village of Mäskälä in Vanaja, about 1.5 km east-northeast of the church of Vanaja. The site is on the west shore of Lake Katumajärvi at an elevation of some 50 metres above the lake (131.6 metres above sea level). The north corner of the fort site and the east and south sides fall abruptly into the waters of the lake. On the south side are steep terraces which are hard to climb. On the other hand, the west side facing the mainland was originally a gentle slope which had to be fortified as far as three outcrops of bedrock at the site with two low gullies in between. Only a small section of wall remains in the central part of the central outcrop. At the north end in a gully between outcrops of bedrock is a structure of large stones. In the middle part of this structure is a gateway with sides turned inwards measuring c. 12 metres. There is another gate structure in the south gully with sides measuring c. 7 metres. The area of the crest measures 30 – 80 metres and its length is c. 215 metres (c. 11,000 m^2).

The site has been mapped by A. Heikel, Hj. Appelgren and J. Ailio. In his report Ailio regarded the walls as natural formations and suggested that gateways had come about when a route was opened to the crest. Sauramo (1934 213–214) demonstrated later that the walls cannot be regarded as geological formations.

In 1951 Jouko Voionmaa mapped the site with its gate structures, pointing out that the possible stone settings observed by Appelgren in the crest area must be regarded as natural formations.

According to Voionmaa, there may have been a small structure serving a water reservoir at the site. This feature, piled of stones, measured 0.5 x 1.0 metres and was 0.5 metres deep.

The Mantereenlinna site is at the southeast boundary of the area of Iron Age cemeteries which was permanently settled in the 1560s (Huurre 1978 7; Keskitalo 1976 75, SAK 1973).

4.7. Linnanpää (Hakovuori), Kankaantaka, Hämeenlinna (Vanaja)

Basic survey map 2131 09 Hämeenlinna
x = 6762 42, y = 528 80, z = 125 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), p. 327–334; A. Heikel, map; J. Ailio, inspection report 1921; J. Voionmaa 1935–1936 31–34; E. Sarasmo, survey report 1939, p. 12; J. Voionmaa, report and map drafts, photographs; J. Saukkonen, survey report 1984 (1987), p. 232–234.

Published sources: Heikel 1878 50–52; Appelgren 1891 35–36; Sauramo 1934 213; Keskitalo 1976 103.

The Linnanpää (Hakovuori) site is in the village of Kankaantaka in Hämeenlinna (Vanaja) on the west shore of Lake Vanaja approximately 1.5 km southwest of the church of Vanaja. The crest of the hill rises some 25 metres above the surface of the lake (125 metres above sea level).

Linnanpää is a ridge running parallel with the adjacent Hattelmala ridge area. The northeast and east ends fall steeply into the lake as well as the west side. The northwest, south and north sides provide easy access. The crest area is c. 230 metres long and its width is difficult to estimate due to the lack of walls. Also the extent of this area is difficult to estimate. According to Voionmaa's map draft it appears to be c. 15,000 m^2.

In the central part of the fort is a depression between two mounds, making the area uneven.

The northwest and north ends are bounded by two sections of wall, joined by a third rising uphill. In the outer wall is a gate and at the lower part of the joining wall another gate, or possibly two.

Along the south slope are also two parallel sections of wall, which have undergone changes in connection with the building of houses and roads in the area. In this connection foundations of the fortification were destroyed.

A. Heikel, Hj. Appelgren and J. Ailio mapped the site. Ailio took a critical view of the walls, regarding them as shore formations. Matti Sauramo (1934 212–213) could not relate these features to any known shore elevations and did not find any geological explanation for the joining wall. According to Sauramo, the walls could not be natural formations. According to Jyri Saukkonen, who surveyed the site, the lower section of wall at the north end does not appear to be man-made. It is also unsuitable as he foundation of a timber breastwork. The upper wall, however, was regarded by Saukkonen as man-made.

In 1949 Jouko Voionmaa mapped the site and excavated five profile sections (total area 16 m^2, of which 11 m^2 in the crest area). Two sections each were excavated upper and lower walls of the south end. Voionmaa's map draft shows a depression on the inside and outside of the wall indicating the filling of the wall with earth. According to the profile sections the walls were partly built of large stones and rocks, although the main material used was gravel. In some locations there were remains of charcoal and reddish, possibly burnt, soil. The places where the sections of wall end are difficult to determine.

The visible parts of the walls of the north part are strewn with rocks. The only available section of this part shows that the wall was mixed with gravel, but built of stones throughout. The length of the lower wall is c. 30 metres and the upper section measures approximately 20 metres. The section of wall joining them is 4.5 metres long. Also in this location the exact places where the walls end are hard to determine, except at their northeast end.

At the northwest corner of the upper wall soil was removed from a small area. As the soil appeared untouched, further excavations were not undertaken. Behind the wall are five cairns. A profile section was excavated in the largest one in the centre of the group. This was a setting consisting of small and middle-sized stones.

The excavations did not reveal any finds. However, only a negligible part of the crest area – less than 1 % – has been excavated.

The Linnanpää hillfort is to the west of Lake Vanaja and to the southwest of a rich cemetery area. It is also in an area permanently settled in the 1560s (Huurre 1978 7; SAK 1973).

4.8. Unikkolinna, Kernaala, Janakkala

Basic survey map 2131 07 Kaloinen
x = 6949 71, y = 529 58, z = c. 110 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), 378–382; Hj. Appelgren, map; J. Ailio, inspection report 1921; J. Voionmaa 1935–1936 23–24; B. Boström, survey report 1942, 20; J. Saukkonen, survey report 1984, 66–67.
Published sources: Bomansson 1858 125; Heikel 1878 52–55; Appelgren 1891 36–37; M. Kerkkonen 1931 22–26; Sauramo 1934 214.

The Unikkolinna hillfort is in the village of Kernaala in Janakkala to the east of the old road from Janakkala to Loppi. The site is on the boundary of the villages of Kernaala and Hyvikkälä approximately 5.1 km south-southwest of the local church. The highest point of the hill is 29 metres above the lake (110 metres above sea level).

The hillfort with its rocky terrain is in a marshy and forested area. The hill is slightly less than 100 metres long and approximately 50 metres wide (c. 5000 m^2). Both sides are steep, while the ends slope gently. The northwest end is more abrupt than the southeast end. At the south corner is a ravine extending midway to the crest area. Reports generally mention fortification structures at the ends and in the ravine. In the central part of the northwest end a c. 20-metre section of wall, 1–1.5 metres wide and 0.5 – 0.75 metres high has been preserved. At the southeast end there is a section of wall c. 21 metres long, but even in this part it does enclose the whole of area behind it. At the mouth of the ravine is a section of similar wall, but it is also too short and apparently stones from it have rolled downhill.

The oldest mention of the Unikkolinna hillfort is from 1674 by Johannes Velinus, vicar of Janakkala (Bomansson 1858 125).

The hillfort has been mapped by Hj. Appelgren, J. Ailio and J. Voionmaa. True to his critical attitude, Ailio in his inspection report discusses the nature of the site and is prone to regard it as a fortress of tale and fable alone. Matti Sauramo (1934 214), however, regarded the walls as man-made. On the basis of my own inspection of the site, I regard only the walls of the northwest end as definitely man-made.

The hillfort site is in the midst of rocky and marshy terrain, mainly unsuitable for farming. The Hakoinen hillfort is almost 3.5 kilometres distant and the nearest known Iron Age cemeteries are also at this distance. Two stray finds are known from within a two kilometre radius of the site. In the 1560 the hillfort was surrounded by small villages. The nearest settlement is 1.5 kilometres from the site (SAK 1973).

4.9. Teponlinna, Lautsia, Hauho

Basic survey map 2132 09 Ilmoila
x = 6792 76, y = 524 64, z = 105 m
Reports: J. Voionmaa 1935–1936 59–61; J. Voionmaa, map draft; J. Saukkonen, survey report 1983 179–180.
Published sources: Keskitalo 1985 212–213.

The Teponlinna hillfort site is on the Myllymäki holding of the Lautsia village of Hauho c. 9.4 km north-northwest of the church of Hauho and 1.1 km east of Lake Ilmoilanselkä. The hillfort is at an elevation of c. 20 metres above the northeast end of the adjacent Lake Vähänjärvi (105 metres above sea level). The hill is bounded by steep faces of bedrock with exception of the more gently sloping south and southeast faces. The crest area is c. 40 metres long and c. 25 metres wide at its south part and 15 metres wide at its north part (c. 600 m^2).

The 15-metre section of wall at the site is on the slope with easy access to the crest. At the gateway the wall is 5 metres wide, but narrows towards both ends. The nature of the possible sides of the gateway part cannot be estimated, as the wall which was built of small rocks and boulders had filled almost all of the gateway when it fell down.

In the summer of 1935 Jouko Voionmaa inspected and mapped the site on the basis of local reports. Further mapping was carried out in 1950, and possibly at other times as well.

The site is at a distance from settled areas. The nearest Iron Age cemeteries are some 4 kilometres to the west on the opposite shore of Lake Ilmoilanselkä. In the 1560s there was no settlement in this area on the east shore of the lake (Huurre 1978 7; Keskitalo 1985 173; SAK 1973).

4.10. Laurinkallio (Ristinaronkallio), Juttila, Tuulos

Basic survey map 2134 02 Tuulos
x = 6783 78, y = 541 18, z = 125 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water

system), 441–456; A. Heikel, map; J. Ailio, inspection report 1920; J. Voionmaa, 1935–1936 63–65; J. Voionmaa, report and map drafts; J. Saukkonen, survey report 1983, 39–41.
Published sources: Heikel 1978 45; Appelgren 1891 27–28; Ailio 1924 36–37, Keskitalo 1985 213–215.

The Laurinkallio hillfort is in the village of Juttila in Tuulos on the Lauri holding c. 2.5 km northwest of the church of Tuulos. The site is at the shore of Rovinlahti Bay at the southeast end of Lake Pyhäjärvi. The highest point of the hill is over 40 metres above the level of the lake (125 metres a.s.l.). With the exception of the northwest end adjacent to the shore, the hill is steep and the crest area measures c. 50 x 160 metres (c. 7500 m^2). In the gently sloping part is a wall built of stones, which begins on the south side of the hill, makes a right angle and curves along the north side. Near the corner in the curved part is a gateway, where the fallen-down wall on both sides is wider than elsewhere. Over 50 metres of wall have been preserved.

In connection with the site Appelgren mentions outer earthworks, but both Ailio and Voionmaa were skeptical of the existence of an outer wall.

Along the inside of the wall are piles of stones approximately a metre long and half a metre wide, which Ailio regarded as having served as a weight for the lower parts of the breastwork, preventing it from falling or being torn down (Ailio 1924 37). In addition to Ailio the hillfort was previously mapped by A. Heikel and Hj. Appelgren and after him by J. Voionmaa in 1947 and 1948.

Iron Age finds are known from the vicinity of the Laurinkallio hillfort. Immediately to the south Iron Age artefacts have been found and the cemetery of Haaksivalkama is located c. 300 metres southwest of the site. The hillfort is on a water route leading southeast to Lammi, which has been in relatively active use. In the 1560s a number of large villages were located to the south of the hillfort (SAK 1973).

4.11. Linnamäki, Kirkonkylä, Lammi

Basic survey map 2134 04 Lammi
x = 6775 10, y = 554 98, z = c. 150 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar Kumo vattensystem (Ancient forts of Finland, Kokemäenjoki River water system), 457; J. Voionmaa 1935–1936 68–69; J. Voionmaa, report and map drafts, photographs, manuscript "Muutamia rakennuksenpohjia muinaislinnoilla" (House-floors at ancient fortification sites), untitled manuscript draft, J. Saukkonen, survey report 1983 50–51.
Finds: NM 12404.
Published sources: Appelgren 1891 31; Wallin 1894 187

The Linnamäki hillfort in the centre of Lammi is located some 400 metres to the north of the Medieval stone church of the parish. The site is by an open field on a hill forming part of a ridge extending to the southeast from the northeast shore of Lake Ormajärvi. Its elevation is 51 metres above the adjacent lake and 148 metres above sea level. The ridge of the site is 113 metres long, of which the actual hillfort occupies 111 metres, and 10–20 metres wide (total area c. 1300 m^2).

The slopes of the hill provide difficult access. Not much of the wall structures are visible. At a later stage gravel has been excavated from the southeast end of the hillfort. In the Civil War of 1918 fortifications were built partly on top of the prehistoric structures and by removing earth from the crest area. The crest of the ridge has been a traditional site of local festivities with a flag-pole. It is possible that the surrounding terrain has been levelled.

Relatively few remains of early fortification structures or earthworks are visible above ground. These consist of stones and boulders in the south part of the east side of the crest, a few mound-like features of wall and an artificial steepening of the bluff carried out in connection with the construction of the earthworks. The length of the wall is difficult to estimate. In his survey of the site in 1983 J. Saukkonen did not observe any sections of wall.

In 1435 in connection with the marking of the boundaries of the vicarage of Lammi, one of the fixed points mentioned in the records is the site of the highest point of the Linnamäki hillfort (Hausen 1921 2163; Suvanto 1972 95). This is most probably the same site as discussed here.

Jouko Voionmaa excavated and mapped the hillfort between 1947 and 1949, opening four sections of the sides and the crest as well as four separate areas. A total of 178 m^2 were uncovered (of which 130 m^2 were in the area of the crest). The excavations were difficult to carry out due to the thick growth of hazelnut bushes on the hill.

With one exception, the excavation areas were at the sides of the hill. These as well as the profile sections showed that the crest area had been levelled and the earth removed to the sides, forming a clearly visible bluff. This terrace was then supported with stones. A stone-setting mainly of rectangular form uncovered in area 2 was interpreted as a house-floor. In his untitled draft manuscript Voionmaa presents the following information concerning the building remains: " An example of a building joined to the wall of an ancient fortification can be observed at the Linnamäki hillfort in Lammi with its house-floor measuring 3 x 3 metres. There were no remains of the blockwork joints, but excavations revealed corner foundations of small fist-sized stones. In the centre of the house-floor was a sunken storage pit with large stones. Large stones were also found along the slope." The building did not appear to have been heated.

The excavation area opened in the middle part of the crest revealed two hearths and possible house-floor remains in connection with them. There were no finds of occupation layer.

In his report Voionmaa especially mentions a find of charcoal from a considerable depth, which he assumes to have derived from a fire at the site or from an earlier stage of construction.

The only artefact find from the site is a Viking Period fragment of the rod of a fibula (NM 12404) from the edge of the storage pit. As there are no knobs on the artefact the dating is based on its decoration and cross-section. The fragment may have been in fire and it was also bent and shows signs of having been cut.

The Linnamäki hillfort is in an area lying between Lakes Pääjärvi and Ormajärvi with numerous cup-marked sacrificial stones indicating Iron Age settlement and a few cemeteries. The area was also settled in the 1560s (SAK 1973).

4.12. Kapatuosia, Kirkonkylä, Hollola

Basic survey map 2134 10 Hollola
x = 6772 64, y = 577 48, z = 137.3 m
Reports: J. Voionmaa 1935–1936 75–76; J. Voionmaa, map drafts; P-L Lehtosalo-Hilander, survey report 1962 28.
Finds: NM 20467: 1–78; National Museum of Finland, Coin and Medal Cabinet 62075
Published sources: Taavitsainen 1982; Talvio 1982.

A gravel ridge known locally as Kapatuosia is located to the north of the church of Hollola. The ridge, running almost N-S, rises to an elevation of c. 56 above the level of Lake Vesijärvi on the east side (137.3 metres a.s.l.). The slopes of the hill are very steep and hard to climb. The steep slopes rise to an even crest area, c. 60 metres long and 30 metres at its widest (area c. 1400 m^2).

J. Voionmaa (1935–1936) mentions the site in his study grant report, regarding it as a possible ancient fortification due to its exceptionally level crest part and requiring further study. Voionmaa had the opportunity of carrying out these studies in 1962, 1963 and 1965. A total of 360 m^2 were uncovered in three locations in various parts of the hill and along its slopes, amounting to some 46 % of the total area. A profile section was also dug along the southeast slope.

The excavations brought to light a number of artefacts. Newspaper clippings in the archives of National Board of Antiquities contain interesting information on various excavation results, such as a house-floor with a storage pit, a timber breastwork along the sides of the crest area with a gate and at least one hearth (Eteläsuomen Sanomat 16.6. & 19.6.1962; Pitäjänsanomat 13.7.1965). It is however impossible to verify these results from the drafts of the excavation maps.

The most interesting find category consists of over 335 small fragments of silver coins, with a total weight of 34.31 g. The fragments were found in an area of a few m^2 in area I around a path

leading to the site from the site. This location is where Voionmaa, according to his statements to the press, assumed that the gate of the breastwork was located. Also found in this area was silver thread wound into a spiral. Probable finds from the near vicinity include another piece of silver thread, a small piece of silver plate, seven small fragments of silver from among the coins and a small piece of melted silver.

Talvio (1982 36) has interpreted the broken and cut fragments as cut silver, collected over a long period of time.

According to Talvio, most Viking Period hoard finds contain cut silver along with coins. However, there have not been any previous finds consisting solely of cut silver. The fact that in Finnish finds coin fragments normally occur together with whole coins supports the assumption that the Kapatuosia fragments were the remains of a hoard, most of which was recovered at some earlier date. Talvio also suggests that the silver was deliberately collected to be melted. Included in the finds is a small melted fragment of silver. Talvio has identified 94 fragments of coins (Talvio 1982 38–39), of which 13 are of Oriental origin or Oriental type. The oldest coin dates back to 786–809. There are also four Danish coins and the remaining 60 are of German origin. With the exception of the German coins the remaining fragments appear to be of unstruck dies as well as a number of completely unidentifiable fragments. The find material is thus dominated by German material.

A distinct group consists of Frisian coins, totalling 53 specimens. Of these, 16 fragments of coins of Count Egbert II (1068–1090) appear to be of latest date. Assuming that the fragments were interred at the same time, the date of deposition is *post* 1068.

The Frisian coins, and especially those of Egbert II, are of special interest, as the youngest Frisian coins are completely lacking in other finds from the present area of Finland. In Karelia, on the other hand, Frisian coins are especially numerous.

Finds from near the gate structure in area I – apparently from the same excavation squares – include small broken pieces of rings, chains and a spiral of bronze as well as a piece of bronze plate. Also found was a piece of wound silver thread. There is no information available on the precise location of this material, but all of the artefacts with markings indicating the find squares are from area I. The material thus appears to include not only cut silver but also cut bronze. It is difficult to date debris-like material of this kind, but the Late Iron Age seems probable in this connection.

Among the debris is a fragment of a Scandinavian oval convex-concave brooch (NM 20467:66; Taavitsainen 1982 30, fig. 3:4). Due to its fragmentariness it cannot be dated with any precision to other than the Viking Period. It mainly brings to mind type JP 51 and the 10th century (Petersen 1928 67). In Finland brooches of this type have been found only in the Åland Islands (Kivikoski 1973 713). They are also known from finds along the rivers of Russia.

Found in the same grid square in area I along with 19 bronze fragments was a bracelet of bronze (NM 20467:53). The artefact, which is not of iron as mentioned by Taavitsainen (1982 28), is broken at one end, slightly bent and shows possible signs of fire. There are also signs of cutting or carving. The intact end is decorated with raised lines. The artefact belongs to a type of flat-ended bracelets of round rod section, of which five are known. Four of these are from Lower Satakunta and one from Leväluhta in Isokyrö, Ostrobothnia. These bracelets are dated to the Merovingian Period (Kivikoski 1973 458; Salmo 1952 234, fig. 145).

The find of a chain fragment (NM 20467:5) is of Schauman's type 101, which was in use from the Late Roman Iron Age onwards. It became common, however, only in the Merovingian Period, 650 – ±800 (Cleve 1943 83; Schauman 1971 22). The type was in use in the East Baltic region from the Roman Iron Age onwards. In Scandinavia it is known from the Merovingian Period, 600–800 (Cleve 1943 83; Schauman 1971 22).

Possible finds of the Crusade Period is a bronze tube with three protrusions and a piece of metal thread belonging to it (NM 20467:65). The tube resembles ear ornaments of the Karelian brooch material of the Crusade Period (Taavitsainen 1982 28; fig. 3:7). The technique of manufacture is eastern.

A spiked spur of iron, cut into two pieces (NM 20467:34), was found in area III. This artefact falls into the transition from prehistoric to historically documented times and is dated mainly to the late 12th and 13th centuries (Zschille & Forrer 1891; Norberg 1971 532).

There are also numerous finds from historically documented times from the hill. This is understandable as the site, due to its central location in the parish, was used as a local place of gathering since time immemorial. At present there is a lookout tower on the hill and previously an open-air dance floor. Of the later finds, coins provide the most precise datings. These are a *blaffert* of Christian III (1553–1559) and a Swedish silver *öre* from 1637. Other coins were also found in the excavations in the 1960s, but were not collected. Finds of uncertain date include pieces of brick, sherds of a red ware vessel, a pipe ferrule, cuff-links etc. Various nails, pieces and flakes of flint, fragments of burnt bone and a simple bronze ring may be from either prehistoric or historically documented times.

Furthermore, 177 quartz flakes, a small retouched quartz and three scrapers have been found at the site (Taavitsainen 1982 32–33). According to available information these were concentrated in area III. Areas I and II revealed only a single flake each. Also the majority of the several hundred fragments of burnt bone (total weight 570 g) were from area III. Of these fragments only one has been identified with certainty – a bone of beaver (NM 20467:74). The osteological material also includes three possible bones of elk. These finds as well as the lack of bones of domesticated animals (cf. finds of bovine and horse bones from the Linnamäki hillfort in Tenhola) point to the Stone Age rather than the Iron Age or the Middle Ages. The same also applies to the quartz flakes.

Prehistoric finds are known from within a radius of one kilometre to the north, west and southeast of the Kapatuosia site. To the north is an uncertain burial cairn, to the west the Mömmölä silver hoard of the 11th century and southeast of the site a Karelian oval tortoise brooch has been found (NM 13955; Taavitsainen 1982 27). The old church indicates the existence of a Medieval centre of settlement and permanent settlement is also indicated by data on the 1560s (SAK 1973).

Suvanto (1986 56–57) has discussed the singular name of the site, maintaining that it refers to region of origin of St. George of Cappadocia. St. George was a popular and revered saint of both the eastern and western church. The early veneration of St. George was however of such a marked degree in the eastern church that Suvanto suggests that place-name is of eastern origin. Kapatuosia is favourably located between the headwaters of the Porvoonjoki River and Lake Vesijärvi. Also a road to the coast led from the site. Lake Vesijärvi in turn provided access to Lake Päijänne.

4.13. Linnamäki, Hankaa, Hollola

Basic survey map 2133 11 Herrala
x = 6757 84, y = 580 60, z = > 137.5 m
Reports: J. Voionmaa 1935–1936 77–78; J. Voionmaa, report draft; P-L Lehtosalo-Hilander, survey report 1962 26–27.
Published sources: Wallin 1894 186; Kuusi 1935 31–32.

The Linnavuori hillfort at Hankaa in Hollola is to the south of the Salpausselkä ridges about 14.5 km east-southeast of the church of Hollola and c. 3 km north-northeast of the Herrala railway station. The site is approximately 800 metres to the east of the highway between Lahti and Herrala in terrain of bedrock and growths of pine forest. The hillfort consist of a large outcrop of bedrock running NE-SE, with an uneven crest part c. 230 metres long and 15–90 metres wide (total area 15,000 m^2). The elevation of the site is slightly less than 50 metres above the level of the adjacent Lake Huhmajärvi (137.5 metres a.s.l.). The northwest end of the hill and a ravine in its east bend are the only places providing unobstructed access. The other sides of the hill are steep cliff faces. According to Voionmaa, there were remains of a breastwork foundation in both of the above-mentioned location. This consisted of broken sections of stone wall running c. 40 metres in the northwest end and some 12 metres at the upper end of the ravine.

Sakari Kuusi (1935 32) was skeptical of the wall structure in the northwest end, but observed a stone wall extending midway

across the ravine at the southeast end. Lehtosalo-Hilander maintained that at least part of the wall at the northwest end was a natural formation. This author inspected the site in the summer of 1988 and observed the same as Kuusi. There was only a section of wall partly obstructing the ravine, on the basis of which the site is classified as a hillfort.

The oldest known mention of the site is in a map of the Hankaa village from 1813, where it is referred to as *Linnoinmäki* (MHA, H19 Hollola 3/1 Hangasby 1813).

There have been no excavations at the site. J. Voionmaa conducted mapping work there on at least two occasions.

Linnamäki is in a wilderness area at some distance from settlement. A so-called Lapp cairn is known from c. 5 km to the southeast and the nearest dated Iron Age cemeteries are some 6 km north-northwest of the site. The hillfort is also peripherally located with respect to settlement of the 1560s. The nearest village is 2.5 km to the southwest and the following one c. 3.5 km northwest of the hillfort.

The hillfort is however closer to routes of communication. In the near vicinity are a number of small rivers and streams belonging to the headwaters of the Porvoonjoki River. About two hundred metres from the site is the ancient winter road from Hollola to Porvoo (Kuusi 1935 32; Wallin 1893 84).

4.14. Linnamäki, Linnasaari, Virmaila, Padasjoki

Basic survey map 2143 11 Virmaila
x = 6836 50, y = 563 60, z = > 107 m
Reports: H.A. Reinholm, N:o 12, Finlands fornborgar Kymmene vattensystem (Ancient forts of Finland, Kymijoki River water system), 147–153; A. Europaeus, notes of an interview with A. Th. Böök 1927; J. Voionmaa 1935–1936 141; H. Salmo, inspection report 1961; J.-P. Taavitsainen, inspection report 1986.
Published sources: Appelgren 1891 92; J. Voionmaa 1964.

Linnasaari Island at Padasjoki is adjacent to Virmailansaari Island on the Tehinselkä stretch of open water on Lake Päijänne. The site is located 13.2 km northeast of the church of Padasjoki. In the north end of the island are three small promontories jutting to the north. The tip of the one to the east curves west. Between this promontory and the middle one is a sheltered lagoon-like bay.

The hillfort is on the curved east promontory. It rises to an elevation of slightly less than 30 metres above the level of the lake (over 107.5 metres a.s.l.). The hill of bedrock runs mainly E-W and the north and south slopes are steep while the west and east ends are less abrupt. At a lower elevation in the west part of the hill is a bedrock terrace which may have been the site of an outer fortification. Slightly higher up is a stone wall extending from one end of the hill to another. The crest area measures c. 35 x 85 metres (c. 3200 m^2).

At a lower level part of the west end is a low cairn on bare bedrock, which may have been the base of a so-called Lapp cairn.

There are no archive reports concerning excavations or mappings of the site. In 1985 divers investigated the east shore area of the bay to the west of the hillfort for remains of boats. These investigations did not provide any results. In this connection a major part of the crest area of the hillfort was investigated with a metal detector, bringing to light a 19th-century knife (Eero Naskali, pers. comm.) and an iron marking post with a brass knob of a type used by archaeologists, indicating archaeological field work at the site.

There are no remains of permanent settlement at Linnasaari Island or on the adjacent Virmailansaari Island. There is, however, an Iron Age stray find from the latter island. The nearest Iron Age cemeteries – albeit without any precise dating – are at Padasjoki. On the opposite shore in Sysmä are number of Iron Age cemeteries. In the 1560s there were two villages on Virmailansaari (SAK 1973).

The island of Linnasaari is in a central location with respect to routes of communication. It is in the central part of Lake Päijänne at the confluence of several water routes. To the east is the region of Sysmä with its significant water route leading east to Lake Saimaa.

4.15. Linnavuori, Päijälä, Kuhmoinen

4.16. Linnavuori (Pukinvuori), Moiskala, Jämsä

Basic survey map 2233 07 Jämsä
x = 6863 15, y = 563 52, z = 122 m
Reports: V. Voionmaa, notes among J. Voionmaa's papers; J. Voionmaa, map draft; J.-P. Taavitsainen, inspection report 1988.
Finds: NM 24262.

The Linnavuori or Pukinvuori hillfort is located approximately 1.2 km southeast of the church of Jämsä in the villages of Vitikkala and Moiskala. The steep hill is on an outcrop of rapakivi granite to the south of the nearby Ohasvuori and Hartusvuori hills. The highest point of the site rises to an elevation of c. 80 metres above the Jämsänjoki River and measures c. 30 x 50 metres (area c. 1200 m^2). There are no visible remains of walls. In the northeast part at the edge of the cliff is a feature of stone setting, which may be the foundation of a wall. Excavations are needed to determine the precise nature of the site.

Jouko Voionmaa mapped the hillfort in the late 1940s. There is no information on any possible excavations at the site.

Adjacent to the hill is an old path or track running from the southeast to the northwest. In 1985 Kari Koskinen, using a metal detector, discovered a bronze sword pommel (NM 24262) at a depth of c. 10 cm next to the path. The location of the find is roughly 25 metres east-southeast of the highest point of the hill in a depression between outcrops of rapakivi granite. From this location the path continues across a terrace-like formation resembling outworks of the fortification. In the summer of 1988 the depression and the terrace were investigated with a metal detector along an area extending a few metres on both sides of the path. In the depression were found two rusted pieces of iron (NM 24262) and on the terrace a perforated piece of copper plate (NM 24262).

The crest area of the hill was also investigated with a metal detector. Previously Kari Koskinen had found a horseshoe on the west side and now the metal detector revealed cartridges, metal caps as well as various iron objects and fragments of recent date. Recovered were three fragments of an iron kettle (NM 24262).

No parallels are known to the sword pommel. It resembles to some degree pommels of the Merovingian Period and those of the late Viking Period and the Crusade Period. According to Jüri Selirand (letter to the present author, dated December 10, 1988), the artefact belongs to a group of Curonian five-part sword pommels of bronze, although he is not familiar with any exact parallels to the find in question. The five-part sword pommels occur in Estonian finds of the second half of the 12th century and the beginning of the 13th century. Due to the lack of suitable parallels a more precise dating is not available. The *terminus post quem* of the copper kettle is the 10th century (Trotzig 1978).

The hillfort is in a central location with respect to Iron Age and 1560s settlement in the region.

4.17. Linnasenmäki, Jämsänkoski

Basic survey map 2233 07 Jämsä
x = 6868 05, y = 561 62, z = 136 m
Reports: H.A. Reinholm, N:o 12, Finlands fornborgar Kymmene vattensystem (Ancient forts of Finland, Kymijoki River water system) 182–187; J. Voionmaa 1935–1936 150–151; J. Voionmaa, report draft, maps and photographs; K.Itkonen, survey report 1962 2–3; K. Itkonen, excavation report 1962–1965; P. Honkanen, excavation report 1981.
Finds: NM 2267: 2, NM 15689: 1–4, NM 16097: 1–20, NM 21164: 1–5.
Published sources: Appelgren 1891 93–94; K. Itkonen 1968; Keskitalo 1954 84–86; Suvanto 1954 95–96; Taavitsainen 1982 33.

The Linnasenmäki hillfort is located next to the industrial facilities at Jämsänkoski on the east bank of the Jämsänjoki River approximately 800 metres south of the local church. The site rises to an elevation of c. 40 metres above the river (136 metres a.s.l). It

is on a rocky hill running southwest-northeast with a crest area measuring c. 50–70 x 140 metres (c. 9000 m^2). The southeast part ends in a steep cliff and access is difficult also on the west, north and northeast sides. There are also ravines providing easy access in these parts. The east and southeast sides slope gently and the foundations of a uniform section of wall (length c. 125 metres) are at these locations.

The wall foundations were partly built of middle-sized stones and rocks as well as larger rocks and were lodged among boulders in place. This was observed for example immediately to the northeast of the gate. The gate on the east-southeast side had one side with a large boulder of rapakivi granite facing it. The map of the area shows two sides of the gate lengthened outwards.

In the northwest corner is a short c. 6 metre section of wall. There is no information on wall structures in the north end.

The site has been mapped and excavated by Jouko Voionmaa in 1950, A.-L. Hirviluoto in 1962, Kerttu Itkonen in 1962–1965 and Pekka Honkanen in 1981. Roughly 1300 m^2 of the crest and sides of the hillfort have been excavated (450 m^2 of crest – c. 5 % of the total area). Jouko Voionmaa mapped the site and excavated in three locations as well as investigating the structure of the wall. There were no finds. Towards the crest area by the gate Voionmaa observed a pile of missile stones and in one of the excavation areas on the crest a pile of stones 1 metre in diameter was found. This feature consisted of gravel mixed with stones 15–20 cm in diameter.

The profile sections of the walls show that Voionmaa observed burn-marked reddish soil and charcoal beneath the stone setting. Charcoal was also observed in the surface level among the stones.

Hirviluoto's and Itkonen's excavations were begun by studying features on the southwest and west slopes that suggested the presence of a cemetery, which, however, was not the case. The excavations were concentrated on stone settings and cairns on the west slope (at elevations between 104 and 109 metres a.s.l.), which Itkonen interpreted as the remains of some kind of outer fortification. This area revealed sooty soil and charcoal as well as 25 flakes of quarts (NM 16097:1,4–9, 11,13–19). In Itkonen's final season at the site the walls and their immediate vicinity were excavated, including a cairn. Some 120 metres of trenches were excavated in the crest area in places of suitable terrain. There were no observations of special features with the exception of camp-fire remains noted by Itkonen in connection with the wall.

There were no finds from Pekka Honkanen's excavations along the south slope of the hill.

The quartz material is difficult to date with any precision and it may be described as being of Stone Age type. A stone adze has been found on the north slope (Jämsänkoski local heritage museum cat. n:o 2267:2).

The site is to the north of areas of Iron Age settlement in Jämsä. The nearest cemeteries are almost 7 km south-southeast of the hillfort and the nearest stray finds are from the same direction c. 4.4 km from the site. In the 1560s local settlement followed the same pattern as in the Iron Age and the environs of the hillfort were not settled (Keskitalo 1954 & 1956 56; SAK 1973).

The Linnasenmäki hillfort is in an interesting location with respect to water routes leading from Multia and Petäjävesi via the Jämsänjoki River to Lake Päijänne. There was a waterfall in the river at the location of the hillfort.

4.18. Linnankallio, Kalkkila, Nastola

Basic survey map 3111 09 Nastola
x = 6766 68, y = 444 34, z = > 100 m
Published sources: A. Sarvas 1979 40–41.

The Linnankallio hillfort is to the east of Lake Salajärvi in the village of Kalkkila approximately 6.6 km north-northeast of the church of Nastola. The highest point of the hill rises slightly less than 15 metres above the surface of Lake Salajärvi (over 100 metres above seal level). In the north end of the steep rocky hill is a 15–18 metre section of wall and remains of wall can be observed along the east and south sides. The crest area measures c. 45 x 70 metres (2560 m^2). There is a water-spring about 100 metres to the northeast.

In 1951 the hillfort was mapped by J. Voionmaa.

The Linnankallio hillfort is in the midst of an area of Iron Age finds. There are nearby find locations to the north-northeast, east and south of the site. To the north-northeast at a distance of 4.2 km is the Skinnari Lapp cairn, possibly of Viking Age date and at a distance of 5.6 km the village of Ruuhijärvi with numerous finds. At a distance of 2.6 km to the east is the site of the Viking Period coin hoard of Immilä and 4.5 km to the south the Vehkosilta hoard (see A.Sarvas 1979 20,45). The villages of Ruuhijärvi and Immilä were inhabited in the 1560s (SAK 1973).

The hilllfort is close to Lake Salajärvi, forming a water route to the east. A few kilometres to the south are the Salpausselkä ridges and a road originally leading to Viipuri.

4.19. Linnavuori, Hakoinen, Janakkala

Basic survey map 2131 11 Janakkala
x = 6752 15, y = 532 08, z = 141.4 m
Reports: H.A. Reinholm, N:o 8, Finlands fornborgar Kymmene vattensystem (Ancient forts of Finland, Kymijoki River water system), 340–374; B. Boström, survey report 1942, 22–25; J. Saukkonen, survey report 1984 222–224.
Finds: NM, Hist.Coll. 2671:1–24, 4922:5, 5455:1–105.
Published sources: Bomansson 1858 125; Heikel 1878 91–102; Rinne 1914.

The hillfort of Hakoinen is in Janakkala at the northwest end of Lake Kernaalanjärvi approximately 1.8 km south-southwest of the local church. The site is on a rocky hill rising over 62 metres above the level of the adjacent lake (141.4 metres a.s.l.). In the crest area fortification remains of brick have been found which differ from local building traditions.

The location of the site by Lake Kernaalanjärvi is of interest. This region was the southernmost point of the Iron Age settlement of the Lake Vanaja region. The headwaters of Lake Vanaja flow into Lake Kernaalanjärvi from different directions. Flowing from the northwest are the waters from Kalvola, from the west those from Loppi and from the east the waters from Lammi (Rinne 1914 129–130). Hakoinen thus had good links with the main settled areas of Häme.

The oldest written source clearly referring to the site is in Johannes Velinus's description of ancient monuments of Janakkala from 1674 (Rinne 1914 140). An earlier, indirect reference is from 1625. In the latter the Hakoinen manor, at the foot of the hill, is referred to as the old castle of Häme. Local folklore also mentions Hakoinen as the predecessor of the present Castle of Hämeenlinna (Heikel 1878 96–98; Ailio 1917 83).

The hillfort has been excavated and mapped by Hj. Appelgren, J. Ailio and J. Rinne. These studies revealed in the crest area an encircling wall of stone and brick and a two-roomed dwelling with a chimneyed fireplace in the northeast corner. In the west corner were the remains of a building of brick situated apart from the encircling wall. To the south of the hillfort was a relatively extensive outer fortification consisting of an encircling wall of stone, a dry moat and a wall. In this area were a well or water reservoir and a wooden building.

Many scholars (e.g. Ailio 1925 90; Europaeus 1928 1500; J. Voionmaa 1959 514) have been of the opinion that Hakoinen was originally a prehistoric hillfort that was later rebuilt into a Medieval castle. Although this suggestion is plausible, there is no actual evidence to support it.

The various views regarding the date of origin of the Medieval castle are based on comparisons of structures, finds and historical sources. Juhani Rinne (1914; see Jokipii 1965) linked to site to a castle built by the Earl Birger in connection with his expedition into Häme and accordingly described it as a border outpost. Rinne's parallel to the site was the castle of Lilleborg in Bornholm, whose date of destruction – 1259 – was the *terminus ante quem* of Hakoinen. The possible similarities between Lilleborg and Hakoinen can, however, be interpreted in various ways. With reference to the same Danish castle, Julius Ailio (1917 102–103) suggested that the castle of Hakoinen was built before the middle of the 13th century by Bishop Thomas. In addition to Ailio, Martin Olsson (1944 232–233) and Armin Tuulse (1952 90) have regarded Hakoinen as older than the period of Earl Birger. Knut Drake (1967 33) has suggested – also with reference to

Lilleborg – that the castle may have been built in the late 12th and the beginning of the 13th century, at a time when Danish interests were marked in the coastal regions of Uusimaa to the south (Ruuth 1911; Rinne 1923; G. Kerkkonen 1952; Nielsen 1972).

The find material from the site is problematic in terms of dating, consisting of objects and artefacts of an overall Medieval character, which, however, are hardly older than the 13th century. Among the finds is a silver coin of Birger Magnusson (1290–1318; Hist.Coll. 2671:1), which is a possible indication of use at the end of the 13th and the beginning of the 14th century. Drake (1967 33) has pointed to the chimneyed fireplace, which, even in central locations such as Visby, came into use only around the year 1300. Thus, he suggests that the castle was still inhabited in the 14th century and perhaps in the following century as well.

Rinne (1914 280) has suggested that the castle was still in use in 1311 when the Novgorodians laid siege upon it. Rinne links the mention of the first chronicle of Novgorod regarding the castle or fort of Vanai with Hakoinen, where the fortifications on the crest of the hill and the outer structures at a lower elevation correspond well to the description of the chronicle. Rinne also maintained that the coin of King Birger supported this view and pointed out that in connection with the castle the chronicle refers to the "nyemets" and not the Jem. Ailio (1915 87–88) also accepted the connection of the chronicle with Hakoinen.

5. Ancient hillforts and fortifications of Savo

5.1. Linnavuori, Vatila, Haahkala, rural commune of Mikkeli

Basic survey map 3142 04 Porrassalmi
x = 6835 10, y = 510 35, z = > 120 m
Reports: E. Sarasmo, survey report 4–5.
Finds: NM 23179: 1–3.
Published sources: Paasonen 1889 104; Lehtosalo-Hilander 1988 188–189.

The Linnavuori hillfort at Vatila is on a high and steep hill approximately two hundred metres long and 40 metres wide (c. 6500 m^2) on the east shore of Lake Linnajärvi about 8 km south-southwest of the town of Mikkeli. The crest of the hill rises to slightly less than 30 metres above the adjacent lake. There are no remains of walls or ramparts, but the terrain of the site is in other respects suitable for an ancient fortification.

In 1986 ore prospectors found an axe (NM 23179:1) in the northernmost depression or ravine of the north end of the site. Close to this location a strike-a-light (NM 23179:2) was found. In the crest area near the highest point of the hill a bent knife tang (NM 23179:3) was found. The axe belongs to a Finnish type of curved-backed axes, dated to the Crusade Period (Wuolijoki 1972 24). Lehtosalo-Hilander (1988 189) describes the artefact as a straight-backed Finnish axe of the Viking Period. The artefact shows signs of fire patina. Preserved in the socket are two iron wedges and wood, whereby the patina must have been the result of hardening.

There are also previous finds from the site. Paasonen (1889 104) mentions that "rare plants grew on the cleared area of the hill and finds of iron slag show that a blacksmith had lived here at some time." Esko Sarasmo's survey report mentions the following: "Towards the mainland about 50 metres from the site is another steep hill of approximately the same size and shape. Between these hills is a sheltered depression which has been under cultivation. In the part of this area closer to the hillfort site slag has been found and the area grows wild hops. The old owner of the nearby Masko holding told that in time of war refugees had lived at the site and that they had had a smithy there." Unfortunately the pieces of slag were not collected and Paasonen's claims cannot be verified.

The hillfort is not far from remains of Iron Age settlement in the area. The Tuukkala cemetery is some 5 km to the northeast. The site is also within an area settled in the 1560s (SAK 1973).

5.2. Linnavuori, Sairila, rural commune of Mikkeli

Basic survey map 3142 05 Mikkeli
x = 6841 74, y = 519 08, z = 119.6 m
Reports: Hj. Appelgren, maps; E. Sarasmo, survey report 1933 3.
Published sources: Paasonen 1889 104; Appelgren 1891 113–114, Rinne 1947 100–101.

The Linnavuori hillfort at Sairila is approximately 4.8 km east of the centre of Mikkeli. The crest of the site, measuring 70 x 115 metres (c. 8800 m^2) rises to over 40 metres above the adjacent Sairilanlahti Bay. The west and north sides end in bluffs of bedrock and access to the site was via the depressions at the northeast and northwest corners. Remains of a possible wall have been found, however, only at the former location at the mouth of the ravine or depression. The south part of the site, covered with a sandy ridge, was set off by a wall. The feature in question is a 50-metre long wall structure of sandy soil with a steep outside face, upon which earth was piled from the inside and outside. The wall is along the precipice of the ridge and follows in a curve the natural edge of the upper level of the hill. On the south side is a gateway opening approximately two metres wide, which was supported with stones.

In 1888 the site was mapped and excavated by Hj. Appelgren. He excavated two cairns inside the wall (approximately 60 m^2 or c. 0.7 % of the total area of the crest). These cairns were interpreted as piles of missile stones.

The nearest remains of Iron Age settlement, the cemetery of Visulahti, are approximately 2 km north-northwest of the site (Westerholm 1929 35). At a closer distance are villages settled in the 1560s (SAK 1973). The hillfort is at the end of a bay along a water route leading almost as far as Mikkeli.

5.3. Linnavuori, Otrala (Ohrala), Laitiala, rural commune of Mikkeli

Basic survey map 3142 04 Porrassalmi
x = 6832 76, y = 516 80, z = 115.8 m
Reports: J. Leppäaho, inspection report 1937–1938 (1939); E. Sarasmo, survey report 1938 3–4; J. Leppäaho, report on the reconstruction of the walls of the site 1955 (1957).
Published sources: Paasonen 1889 105–106; Appelgren 1891 114–117; Rinne 1947 98–100.

The Linnavuori hillfort at Ohrala is on a promontory known as Linnaniemi, approximately 10 km south-southeast of the centre of Mikkeli. The site may originally have been an island. The area of the crest, measuring c. 40 x 110 metres (c. 4800 m^2), rises to an elevation of c. 40 metres above the adjacent lake. The west side of the hill is steep and on the east side the slope is so steep that natural formations provided adequate protection. In front of the south end of the hill is a low terrace which had to be protected by a wall. The wall raises the outer edge of the terrace and blocks the depressions leading to it. The stone wall is broken in places and according to the available map of the site it is preserved in two sections of foundations with a total length of c. 14 metres.

At the north end of the rocky hill is a terrace, raised by a section of wall c. 20 metres long. This section of wall was built of long-shaped stones laid carefully, part of which may have been split for the purpose. At this, the most vulnerable location of the fort, is the gate. The wall and the rock face rising behind it delimit the terrace into a kind of outer fortification.

In 1888 the site was mapped and excavated in two locations by Hj. Appelgren. The first excavation area was on the level area behind the south walls where shallow depressions were investigated (approximately 4 m^2). The excavations revealed untouched soil. The larger depression revealed pieces of quartz, which were not collected and cannot be evaluated. Appelgren also excavated the bottom of a depression in the centre of the crest part (roughly 6 m^2), revealing the remains of a hearth. In the depression an object resembling a whetstone was found, but was not collected. Only some 0.2 % of the total area of the crest has been excavated.

The hillfort is located on a water route leading to Mikkeli. The nearest Iron Age cemetery, Kyyhkylä in Mikkeli, is slightly over

3 km north-northwest of the site. The hillfort is at the edge of an area settled in the 1560s (SAK 1973).

5.4. Linnavuori, Ruusin Turasalo, Kirkonkylä, Taipalsaari

Basic survey map 3134 04 Rutola
x = 6779 80, y = 557 20, z = > 100 m
Reports: T. Miettinen, survey report 1975 (1977), 30.

The Linnavuori hillfort at Turasalo is located on a hill of bedrock rising approximately 25 metres above the surface of Lake Saimaa on the southwest shore of a stretch of water known as Ruusin Turasalo. The site is approximately 4.5 km south of the church of Taipalsaari. The hill forms a small promontory. Its northeast side is steep, while the other sides have a less abrupt gradient. At the northwest end of the southwest edge is a depression between two outcrops of bedrock that provides easy access. A stone wall, approximately 30 metres long and 5 metres wide runs across this depression. At the southeast end of the hill is another location with easier access to the crest. At this location there are large boulders at the foot of the slope, and it is possible that there was also a wall there. This author visited the site in the mid-1970s in connection with the inspection of a local rock painting and observed stone settings also in the crest area. The latter are not mentioned in the above-mentioned survey report. The survey report does not indicate the length of the wall or the area of the crest. According to the basic survey map it is approximately 5000 m^2.

Viking Period finds are known from the area. The cemetery of Mammonniemi is roughly 6 km northwest of the site and a number of stray finds are known from within a 15-kilometre radius. Approximately 3.3 km southeast of Turasalo is the hillfort of Kuivaketvele. The nearest village inhabited in the 1560s is some 4 km to the north and there are a number of settled villages further to the north.

The hillfort of Turasalo is centrally located with respect to local water routes. It is only a short distance from portage sites leading to Lake Päijänne and Lake Kivijärvi of the Kymijoki River system with access as far as the sea (Taavitsainen 1988 222).

5.5. Linnavuori, Kuivaketvele, Taipale, Taipalsaari

Basic survey map 3134 07 Lappeenranta
x = 6778 38, y = 560 26, z = 116.8 m
Reports: A. Erä-Esko, inspection report 1960; T. Miettinen, survey report 1975 (1977), 31.

The hillfort is on the northeast shore of the island of Kuivaketvele to the east of the local road leading to Taipalsaari, approximately 6 km west of the centre of Lappeenranta. With the exception of the southeast side the bedrock hill has exceptionally steep faces. The site rises to an elevation of over 40 metres above Lake Saimaa. The only observed remains of wall are in the southeast part. The section of wall of stones of various size runs c. 40 metres NE-SW on the centre of the crest area on the bare bedrock. The wall has deteriorated considerably and at present in 10–50 cm high. The wall and the precipices enclosed and area of c. 150 x 240 metres (c. 31,000 m^2) and it appears that the wall was never finished.

In the near vicinity are a number of burial and stray find sites (see chapter 5.4.). The hillfort of Turasalo is 3.3 km to the northwest. The hillfort is in a central location with respect to routes of communication (see chapter 5.4.). The name of the local village refers to an old portage site.

5.6. Linnavuori, Ihantsalo, Puumala (Juva)

Basic survey map 3143 06 Rokonsalo
x = 6828 00, y = 550 52, z = > 110 m

Reports: C.A. Gottlund, Antiqvariska Anteckningar (Antiquarian notes) III 336; E. Sarasmo, survey report 1938, 6, 9–11.
Published sources: Appelgren 1891 117; Rinne 1947 101–102.

The Linnavuori hillfort on the island of Ihantsalo in Puumala (formerly Juva) is some 12 km west-northwest of the church of Puumala. In 1938 the site was mapped by Esko Sarasmo. The sides facing the shore and to the west rise in steep precipices to an elevation of over 30 metres above the adjacent lake. This western part of the site forms the main fortification, measuring 40 x 80 metres. Precipices on the north and east sides of this area separate it from an adjacent terrace area some 15 metres lower. In the south part, the latter area which is mainly bounded by steep precipices, extends only to the edge of a ravine adjoining the southeast corner of the main fortification. The ravine provides the only route of access the main fort. At the northwest end the side of the terrace slopes gently and this location is bounded by a 17-metre section of stone wall approximately 2 metres wide. In the middle part of this section of wall is the damaged main entrance to the terrace area. According to Rinne, this area served as the first point of defence forming an outer fortification 30 x 70 metres in area. The area of the crest is c. 4740 m^2.

The southeast corner provides the only route of access to the main fort. It does not have a terrace forming a natural boundary and the ravine is blocked by a section of wall. Of the wall c. 18 metres remain, rising from the shore to the actual fort.In this part of the site the wall is at a distance of only a couple of metres from the 5-metre high rock face and forms a narrow pass leading to the terrace. According to Rinne, a mound of earth in this location indicates the course of the rest of the wall. The wall was carefully built of overlapping stones and perpendicular surfaces at the sides.

The Ihantsalo hillfort is at a considerable distance from Iron Age cemeteries and even the nearest stray find site is 26 km from the hillfort. In the 1560s the region was sparsely settled and there are no houses or farms on the island. However 4 km to the northeast are two villages of a single holding each (SAK 1973; Taavitsainen 1988 222).

The site is in an interesting location in relation to routes of communication. Pekka Lappalainen (1970 35–39, 40,49) has stressed the strategic location of the hillfort at the mouth of the water route leading from Lake Lietvesi to Lake Luonteri.

5.7. Linnavuori, Pisamalahti, Sulkava

Basic survey map 3144 09 Kyrsyänjärvi
x = 6850 26, y = 569 86, y > 130 m
Reports: H.A. Reinholm, N:o 13, Finlands fornborgar Karelen (Ancient forts of Finland, Karelia), p 306–309; Hj. Appelgren, map; A. Europaeus, inspection report 1927; S. Pälsi, inspection report 1934; A.-L. Hirviluoto, inspection report 1960; M. Bergström, report on a photographic expedition expedition to the site 1983 (1984).
Published sources: Tuneld 1795 509; Appelgren 1891 117–119; Rinne 1947 102–105.

The Linnavuori hillfort on Pisamalahti Bay is approximately 5 km southwest of the church of Sulkava and rises to an elevation of c. 55 metres above the adjacent lake at Linnasalmi. The impressive site is mainly bounded by inaccessible precipices of bedrock and fortification structures were required only along the east side, where the crest area is enclosed by a wall carefully built of overlapping stones, over 2.7 metres high in places and between 2.3 and 3.3 metres wide. The gate was apparently in the south part of the east section of the wall. The total length of the wall is approximately 120 metres. The upper area of the hill bounded by the wall and the precipices is c. 100 x 120 metres (c. 8300 m^2). Within the wall are small low mounds of stones, interpreted as piles of missile stones.

According to the oldest taxation records of the Sulkava region from 1561 Linnaniemi (the hillfort site) was the first area of land mentioned as having belonged to Hannu and Heikki Kontiainen of the Iitlahti tax-division area (Pirinen 1988 385, 405–406). The hillfort is also mentioned in Tuneld's and Porthan's geography of Finland from 1795 (Tuneld 1795).

The hillfort was mapped by Appelgren possibly in 1888.

There are no Iron Age cemeteries in the immediate vicinity and the nearest stray find – of the Early Iron Age – is from a distance of 4 km. Pekka Lappalainen has stressed the strategic lo-

cation of also this site: Pisamalahti Bay is at the confluence of water routes leading from the east from Lakes Lepistönvesi and Tuohivesi and from the south from Lake Enonvesi.

6. Ancient hillforts and fortifications of Karelia

6.1. Linnamäki, Koverila, Kaukola

Published sources: Appelgren 1891 97–98.

6.2. Linnasaari, Tiuri, Räisälä

Reports: Hj. Appelgren, map; Hj. Appelgren-Kivalo, inspection report 1921; J. Ailio, unfinished report of the mapping of the site; S. Pälsi, inspection report 1944.
Finds: NM 502; 2591:1–10, 2672:1–11, 2740: 1–20, 2788:1–18, 6699:1–22.
Published sources: Appelgren 1891 98–10; Schwindt 1893 85–90; Kirpičnikov & Petrenko 1974; Kočkurkina 1976 & 1981 30–62; Kirpičnikov 1983 & 1984 144–149; Luoto 1984a 158.

Approximately 10 km south of the former church of Räisälä in the Tiuri rapids at the narrowest reach of the River Vuoksi was originally a long and narrow island of moraine, known locally as Linnasaari (Fort Island). According to Appelgren, the highest elevation of the site was 7 metres above the level of the river. The site ceased to be an island after the level of the river was lowered. The sides of the island are encircled by a wall of moraine rocks with the outer face built perpendicular. In various places along the inside of the wall are small room-like depressions measuring 2 x 3 metres. The area within the perimeter is c. 60 x 240 metres (c. 11,000 m^2). Within the walls are remains of building floors, including recent remains, such as a smithy used in clearing the rapids.

A sword pommel (NM 502) was recovered as a stray find from the site. In 1888 Th. Schwindt opened a trench in the southeast part behind the wall as well as excavating a cairn in the centre of the island. The latter did not contain any finds, while the trench revealed pot sherds, four fragments of whetstones, a horseshoe for use on ice, a bead, pieces of iron and copper plate, slag and two nails (NM 2591:1–10).

Field work was continued by Hj. Appelgren the following summer with total excavations of two house-floors and partial excavations with trenches of two others. The totally excavated house-floors did not contain any finds or hearth structures. One of the partially excavated house-floors contained a hearth as well as pot sherds and a piece of iron rail (NM 2672:1–3). The other house-floor joined the wall along its north and east sides. This location revealed a knife-point, part of an oval tortoise brooch that had been hammered flat, a fragment of a grinding stone, pot sherds, burnt clay, slag, three iron nails, bone fragments, teeth, glazed ware and clay mortar (NM 2672: 4–11).

In 1890 a silver hoard (NM 2740:1–20) was found on the island which is dated to the 12th century (C.A. Nordman 1924 45–46, 134). Schwindt (1893 88) mentions that the hoard was found in connection with the excavation of an ice-cellar from the bottom of the cellar pit. As there is no further information on the actual conditions of the find, it cannot be applied to the dating of the wall structures. The following year Schvindt excavated at the site of the hoard, finding a armour-piercing arrowhead, a fragment of an encolpion bracelet, the socket of a spearhead of angular section, two pieces of iron rod, a knife-point, an iron object, six whetstones and fragments of whetstones, a flake of flint, 305 pot sherds, iron slag, burnt clay and bone fragments (NM 2788: 1–18).

Schvindt continued field work in 1914 with an excavation of the embankment to the south of the adjacent road. These excavations produced a large number of finds: a fragment of a brooch with rolled ends, a fragment of a bronze spiral, a piece of copper or bronze plate, two knives, part of a lock, a fragment of an iron artefact with an eyelet, two nails with rounded heads, two horseshoe nails, three fragments of nails, a piece of iron, an iron tube, two whetstones, ten flakes of flint, melted glass and a fragment of glass, burnt bone, hundreds of pot sherds, burnt clay, iron slag and half of a horseshoe (NM 6699:1–22).

The finds from the site presently in the collections of the National Museum of Finland are as follows: a sword pommel, a spearhead, a fragment of a spearhead, an armor-piercing arrowhead, two knives, two fragments of knife-points, 16 fragments of whetstones, 1530 g of slag, a spindle whorl, 11 flakes of fire-striking flint, four nails, seven fragments of nails, a part of a lock, 1314 pot sherds (mainly wheel-turned, with the exception of sherds NM 2672:1), two pieces of a copper kettle, half of a horseshoe with rolled ends, half of band-ornamented brooch that was hammered flat, a bead, a fragment of a bracelet, a fragment of a bronze spiral, a horseshoe for use on ice, a horseshoe nail, the abovementioend silver hoard, 352 g of burnt clay, 1539 g of burnt and unburnt bone, 11 unidentified fragments of iron objects and artefacts, a piece of glass and three sherds of red ware.

The bronze penannular brooch with rolled ends (NM 6699:1) was in use from the 8th century to the end of heathen times (Salmo 1956 25), the bronze spiral (NM 6699:2) is dated to the Viking and Crusade Periods (Lehtosalo-Hilander 1984a 60), the encolpion bracelet (NM 2788:2) is of the Viking Period or the 11th century (Kivikoski 1951c 695), the barbed and knife-like spearhead (NM 2672:9) is of the late Viking Period and the Crusade Period (Kivikoski 1973 993). Artefacts of the Crusade Period are the sword pommel (NM 502; Kivikoski 1973 1169,1170) and the fragmentary half of a band-ornamented oval tortoise brooch (NM 2672:5; Linturi 1982). The silver hoard (NM 2740:1–18) is dated to the 12th century (C.A. Nordman 1924 45–46, 134; Talvio 1979 14–15). The armour-piercing arrowhead (NM 2788:1), used with a cross-bow, came into general use around the year 1200 (Luoto 1984a 80). The socket of a spearhead of octagonal section (NM 2788:3) is of a type dated to the 13th and 14th centuries (Kirpičnikov 1966 7). The ceramic material from the site consists mainly of later wheel-turned ware.

Field work at the site has been continued by Soviet archaeologists. In 1971 A. N. Kirpičnikov excavated nine trial pits (total area 80 m^2) in various parts of the site. Between 1971 and 1974 S.I. Kočkurkina excavated a total area of 1620 m^2. It is difficult to estimate the areas excavated by Finnish archaeologists, but it can be assumed that at least 100 m^2 were excavated. By the 1970s at least 15.5 % of the total area of the fort site had been excavated.

Excavations of the past decades have revealed a rich and varied collection of materials: brooches, weapons, various tools, including blacksmith's tools (e.g. a crucible, a hammer, a cutting iron etc.), carpentry tools, spindle whorls and needles as well as various artefacts related to building and the interiors of dwellings. Also found in Kočkurkina's excavations were 61 fragments of bone, of which only three could be identified. These were of bovines (Vereščagin 1982 208). Also 14 house-floors with hearths were excavated. The occupation layer varied from a few centimetres to half a metre and in places it was up to 88 cm thick.

The finds from the site in Finnish collections include early artefacts, more of which were found by soviet archaeologists: fragments of an encolpion bracelet and a bracelet with vertical zig-zag line ornament and narrowed ends, dated to the 10th and early 11th centuries (C.A. Nordman 1924 120), a Magdeburgian coin of the 11th century, etc. Of note is the fragmentary nature of the older artefacts. This material was the basis for the dating of the site to as early as the 10th century and around the year 1000 by Finnish scholars (Ailio 1925 89; Hackman 1911 83). Rinne (1932 265), however, dated the site to the 12th century.

Kočkurkina (1981 60) has pointed to the earlier material from the site. In addition to the various metal artefacts she also mentions the coarse hand-modelled ceramics, which is regarded as being of earlier date. This material resembles the dark-hued coarse ware found at hillforts and fortifications in Western Finland (see p. 223). In Russia sherds of this type are dated to the 10th and 11th centuries. Sherds of hand-modelled pottery were found in the same locations as the older metal artefacts as well as at various other locations on the island. Kočkurkina regards the distribution of the sherds at the site as an indication of land use and on the basis of the ceramics she suggests that the island was a dwelling site before becoming a fortification. She also stresses the favourable location of the island, suggesting that it was occupied

already at the end of the first millennium and in the beginning of the second millennium. The older finds are connected with this stage of settlement.

The fort is dated by Kočkurkina to the period between the founding of the castle of Viipuri and the treaty of Schlüsselburg (1323). This view is based on the fact that the treaty forbade the building of forts in the vicinity of the border. The artefacts of the silver hoard from the wall, which was dated by Finnish archaeologists to the 12th century, are regarded by Kočkurkina as types of the 12th and 13th centuries and the finds of bit-silver rods as dating to the 13th–15th centuries. According to N. Bauer (1929 & 1931) the Novgorodian bit-silver rods fall into two groups of long and short form. The formal distinction between these groups is debatable. The longer rods are from the 13th century and the shorter ones date back to the 14th–15th centuries. The specimens from Tiuri are mainly of the shorter group. According to Kočkurkina, the hoard cannot be older than the wall structure.

A. N. Kirpičnikov does not discuss the older finds at all, only noting that the views of Finnish archaeologists regarding the early founding of the fort are debatable. Kirpičnikov maintains that there is no evidence suggesting a founding date earlier than the 14th century. Chronicle sources mention that the Swedes destroyed the fort in 1411, after which, according to Kirpičnikov, it was not rebuilt. Most of the finds are of this stage and this assumption is also supported by the finds of ceramics.

Kirpičnikov's position on the date of founding differs from Kočkurkina's views. As the fort is not mentioned in a source from 1333 listing the forts of Karelia, Kirpičnikov suggests that it was founded in the late 1330s, connecting it to Valittu, the commander of the castle of fort of Käkisalmi, who is known to have built forts of stone. Kirpičnikov also suggests the possibility that the fort was built at a later date.

In his studies Kirpičnikov notes the wall of moraine rocks, which, according to him, is not a typical feature of the 14th century and more likely an indication of the participation of the local populace in the building of the fort. The construction of the walls is regarded by him as an example of Finnish-Karelian building skills.

Both Finnish and Soviet scholars have regarded the Linnasaari site at Tiuri as a military and craft centre, as also indicated by historical sources. The site has been linked with the town of Tiversk, mentioned in a source from 1404 among the smaller towns ceded by Novgorod to Prince Juri of Smolensk.

Of interest in this connection is the opinion of A. M. Spiridonov of Petrozavodsk (pers. comm.) that Soviet finds of pot sherds from Tiuri may include material similar to Early Metal Period Luukonsaari Ware. There are also sherds, of possible Early Metal Period date, in the collections of the National Museum of Finland (NM 2672:1) which are hand-modelled of porous paste and decorated with comb-stamp inpressions. Comb-stamp decoration is not a rare feature in Early Metal Period pottery (see e.g. Meinander 1954). The sherds from Tiuri resemble a sherd from the Vanhalinna hillfort in Lieto, which Luoto (1984a 109,226) describes as Typical Comb Ware. The sherds from Tiuri and Lieto resemble Early Metal Period ceramics with comb-stamp decoration from the environs of Tallinn.

6.3. Linnavuori, Kaukola, Antrea

Published sources: Appelgren 1891 107

6.4. Viipuri Castle, Viipuri

Published sources: Hackman 1944; Tjulenev 1980; 1981; 1982a; 1982b; 1983; 1984.

The castle of Viipuri is on a sandy islet with a few outcrops of bedrock in the strait connecting Viipuri Bay with Suomenvedenpohja Bay. The site is central to routes of communication.

V. A. Tjulenev's excavations over the past few years have revealed indications of a Karelian fortress pre-dating the castle built by the Swedes in 1293. An overall description of the site is difficult as the occupation layers have become mixed in the various stages of construction. The following account regarding the Karelian fortress is based on discussions with Tjulenev and his article in part I of the history of Viipuri, published in Finnish (Tjulenev 1982a).

The oldest layers of occupation have been discovered thus far in the area of the castle known as the Smith's Courtyard (see Tjulenev 1981). In this area was a man-made breastwork of sand with timber posts, three metres wide and 0.8 metres high. Also found in the area were charred remains of buildings, some which were linked to the breastwork. Tjulenev suggests that the Karelian fortress also had a small wooden tower.

Finds from the earliest stage of construction include a Karelian knife, a plaited bronze ring, a spearhead in two fragments, two armour-piercing arrowheads, a tanged arrowhead, two locks, a fragment of a crayfish brooch, a damaged animal-ornament brooch of later date, a disc pommel of a sword, a bronze bell-pendant, a round perforated pendant, a bronze bead with spiral ornament, two fragments of axes and nails. The finds also include a Cicelin or Etcelin sword without a handle, which was bent double and had been in fire. Tjulenev (1984) dates the sword to the period between 1130 and 1200. There are also numerous finds of slag, a number of pieces of bronze relating to the working of bronze and pieces of copper plate. There are no finds of ceramics from the Karelian fort. The material is similar to finds from Karelian cemeteries and, according to Tjulenev, dates to the 1100s and the early 13th century.

Karelian artefacts have also been found in the later layer of the Swedish period, e.g. the pin of an oval tortoise brooch. Tjulenev regards this find as an indication of the mixing of the occupation layers in connection with later stages of construction at the site.

Soviet archaeologists have thus far excavated approximately 2000 m^2 of the castle area, of which some 700 m^2 belongs to the Karelian fortress.

6.5. The old castle of Käkisalmi

Finds: NM 2790:1–47

Published sources: Schvindt 1898; Komonen 1931; Rinne 1932 266–268; K. Grotenfelt 1932 274–276; Kolčin & Černyh 1977 60–63, 113–114; Kirpičnikov 1979; 1983 72–73 & 1984 119–114; Kuujo 1958 & 1984.

Käkisalmi is on the River Vuoksi two kilometres upstream from where the waters of the river system flowed into Lake Ladoga prior to the opening of the Suvanto water route in 1857. The location was a favourable one at the east end of a water route leading from Suomenvedenpohja Bay on the Gulf of Finland to Lake Ladoga.

The early stages of the castle or fort are mentioned in conflicting chronicle sources. Having built the castle of Viipuri at the west terminus of the water route, the Swedes aimed at extending their power to the Lake Ladoga end of the route. According to the Chronicle of Erik, the Swedes conquered Käkisalmi and made Sigge Loke commander of the fort. This source suggests that there was an earlier fort at the site which could have belonged only to the local Karelians. A Novgorodian chronicle on the same events mentions that the Swedes, under the command of Sigge, built a small fort or castle in Karelia in 1295, which was soon conquered by the Russians. "Since then the Russians have had the island, which they took with great strength..." According to chronicle sources the Novgorodians built a new fort in 1310 at the rapids of the River Vuoksi, after having destroyed the earlier one.

The location of the first castle or fort has been debated, especially whether it was at the same site as the old fort or elsewhere. Subsequently, the castle has been the scene of numerous conflicts and battles, but these will not be discussed in this connection.

Th. Schvindt (1898 1) and Julius Ailio (1928 62) were of the opinion – albeit without presenting any grounds for their views – that oldest Karelian fort was at Kalliosaari Island upstream from the present site. Antti Komonen (1931 3–4) and Juhani Rinne (1932 266) have suggested the present site as that of the Karelian fort. Rinne observes that "there does not appear to be evidence for the assumption that the castle in question was only a minor fortification, located on a rocky island upstream at the head of the rapids." Komonen, in turn, refers to finds of the 11th–13th cen-

turies from the castle area, which are also mentioned by Rinne (1932 267). Erkki Kuujo and Kirpičnikov, with reference to the former, suggest that the original location of the fort was Holmansaari (Kalasaari) Island at the mouth of the river (Kuujo 1984 57). Sources refer to a mill at the mouth of the river near a "gorodishche".

There are, however, no prehistoric finds from the island in question, whereas prehistoric material has been found in the area of the old castle. In 1891 Schvindt excavated a mound in the middle of the courtyard, which was the site of an 18th-century guards house. Beneath the remains of the building was a layer of fill over 2 metres thick containing artefacts and objects of different periods – "the lowermost ones being of forms common to Karelia in heathen times" (Schvindt 1898 119). Among the finds are pot sherds (NM 2790: 1,45) similar to those from Karelian hillforts. Other finds common to hillforts are two spindle whorls (NM 2790:10, 11), a piece of copper plate NM 2790:17), two molten pieces of bronze (NM 2790:18), a punch (NM 2790:7), two whetstones and a fragment of a whetstone (NM 2790:12–13, 25), nine pieces of iron slag (NM 2790:24), a fragment of the tip of a harpoon and a hollowing tool (NM 2790:21). The finds also include a spearhead (NM 2790:2), a bronze shaft of a Karelian knife (NM 2790:3), 14 fragments of iron artefacts (NM 2790:4,6), a bronze ring and a fragment of a bronze ring (NM 2790:4,6), a belt-buckle of bronze (NM 2790:16), a small bronze cup (NM 2790:5), a ring-stone (NM 2790:19), a flint chip (NM 2790:26) as well as 14 fragments of burnt and unburnt bone and teeth (NM 2790: 27–28).

The spearhead can be classified as belonging to type F on the basis of its dimensions, the transverse grooves of the socket and the flat shape of the blade. The spearhead shows traces of having been in fire, but there is some wood left in the socket.[11] Petersen (1919 29) dates the introduction of F-type spearheads to the middle of the 9th century. According to Solberg (1984 92), the introduction of the type falls into the first half of the century (Solberg's type VII 1A), with the main period of use between 850 and 930. Of his other spearhead types closely resembling type F Solberg dates type VII 1B to 850–950 and VII 1C mainly to the 10th century (Solberg 1984 93–94). The latter group with rounded butts provides the closest parallels to the Käkisalmi find. In Russia type F belongs mainly to Kirpičnikov's type III of the spearheads of the 9th–13th centuries (Kirpičnikov 1966 72).

As there are no available excavation reports, the depth of the finds and their relationship cannot be verified. According to the main catalogue of the National Museum, finds NM 2790:1–15 and half of the material of NM 2790:45 were from beneath the foundations of the building remains. These finds include a bronze knife shaft of Karelian type, which in addition to the pot sherds, would suggest a dating to the Crusade Period.

A pit excavated in 1926 next to the gate leading to the courtyard revealed a fragment of bone (now missing), two whetstones and a Crusade Period bronze penannular brooch of rhomboid section with faceted knobs (Salmo's group 13).

Juhani Rinne appears to have had at least oral information on excavation carried out at the site. Rinne describes the site as follows (Rinne 1932 267): " The breastwork consisted at first of an unmortared wall of stone similar to the one at Tiuri. It was built on the shore terraces and left the level central area of the island free for urban-type settlement. Here, as at Tiuri, the small dwellings, storehouses and shops of the burghers, built without order, filled the crowded area within the walls with a mass of constructions. Excavations of the courtyard of the castle revealed remains of these buildings as well as finds of weapons, tools etc, of which the oldest ones date back to the period of the finds from Tiuri." There are references to other prehistoric finds as well. In a history of Priozersk (Fi. Käkisalmi) published in 1960, there is a reference to N.N. Gurina's finds of 10th century material from the castle area. These, however, are not mentioned in the 1976 edition of the same work (Kuujo 1984 57). Kirpičnikov (1979 53) observes that according to Gurina 10th century pottery was not found in the 1984 excavations at the site.

The castle area was excavated by A. N. Kirpičnikov in 1972–1973 and 1975–1976. So far excavations of the oldest construction stages of the castle and fort have been carried out in the northeast part. These revealed remains of log houses. Kirpičnikov divides his finds into two chronological horizons: 1310–1360 and 1360–1380. The older stage is in agreement with chronicle sources, according to which a new fort was built by the Novgorodians in 1310. Kirpičnikov's chronology is based on dendrochronological results. On the basis of log material Kolčin and Černyh (1977 113–114) refer to two stages of construction of the old fort. The oldest stage is dated on dendrochronological grounds to the first quarter of the 14th century. The upper layer of building remains is dated on the same grounds to the 1360s, when the burnt fort was rebuilt. Kirpičnikov also mentions a small log framework found beneath the 1310–1360 horizon, which he dates to the very beginning of the 14th century. There are, however, no dendrochronological datings of this material. On the basis of the lower layer of building remains, the area appears to have had houses and buildings before 1310 when work was begun by the Novgorodians.

The total area of the island is roughly 6,000 m^2. The oldest remains of buildings have so far been found only in the southeast part of the castle in an excavated area of c. 216 m^2. Referring to excavation results and observations, Kirpičnikov suggests that the fort was built in 1310 on the basis of an overall plan of construction. There may have been a pier or the foundation of a timber breastwork at the shore. The remains of log houses have not yet revealed any traces of stone ovens. Kirpičnikov suggests that these may have been torn down, but underlines that only a small area of the site has been investigated. One of the buildings had a floor area of 50 m^2, which, according to Kirpičnikov, indicates that there were some 100–110 houses, 300–330 inhabitants and 100 soldiers at the fort.

The excavation finds are linked to the 1310–1360 and 1360–1380 construction stages and Kirpičnikov maintains that all of the finds fall within these periods. According to Kirpičnikov's text and illustrations (1979) the older stage of construction is represented by pot sherds (total 344) and remains of leather footwear. Iron artefacts include an armour-piercing arrowhead, a horseshoe and the socket of a spearhead. Bone material includes an arrowhead fragment, spindle whorls a needle and bone handles. Also found were glass paste and glass beads, four even-armed brooches, the knob of a Karelian penannular brooch, an oval tortoise brooch of types F1 and C2, a crucifix of amber and bronze, fragments of a bronze bracelet and a belt-buckle, two rings, a crucible with a "bronze core", an icon lamp and net weights. Large amounts of dung were also found between the building remains.

The finds from the 1970s as well as those by Finnish archaeologists contain a number of artefacts, which according to corresponding cemetery datings, are of considerable age. As the available data is incomplete it is impossible to determine to which of Kirpičnikov's chronological horizons the Finnish finds belong.

The oldest find presented by Kirpičnikov is a small even-armed brooch of the Merovingian Period (Kirpičnikov 1979 64, Fig. 4:5). The majority of finds of this type are dated to the 7th and 8th centuries (Cleve 1943 75). The finds also include a West-Finnish even-armed brooch of the Viking Period, belonging to Kivikoski's group 6 of the 9th and 10th centuries (Kirpičnikov 1974 63 Fig. 3:5, 64 Fig. 4:2; Kivikoski 1938 20). Crusade Period artefact types include a small penannular brooch of Salmo's group 13 (Kirpičnikov 1979 64, Fig. 64:3), oval tortoise brooches of types F1 and C2 (Kirpičnikov 1979 62, Fig. 3:4 and 63, Fig. 3:3), a knob of a Karelian penannular brooch (Kirpičnikov 1979 62, Fig. 3:11–12) and a tubular eared ornament (Kirpičnikov 1979 63, Fig. 3:9).

The condition of the artefacts is of interest. According to the published illustrations they are all in poor condition and fragmentary. Many of the objects also show signs of melting. In the same layer were also finds of a smithy (Kirpičnikov 1979 63, Fig. 3:7).

There were finds indicating blacksmithing also in the upper layer of building remains. This horizon also includes Karelian artefact types of the Crusade Period: fragmentary knife handles

[11] Not listed among the finds are objects and artefact fragments of modern appearance, found in the layer of lime-mixed mortar. This does not mean that the above-mentioned finds do not include later objects. Artefacts of a probable later date are the ring-stone and the bronze cup which may have been used to hold sulphur.

of bronze and a broken tubular eared ornament (Kirpičnikov 1979 63). The finds of the later stage of construction also include an even-armed brooch of Kivikoski's group 7, which was fragmentary and showed signs of fire. This type is dated to the latter half of the 10th century and the beginning of the 11th century (Kivikoski 1938 23). The location of this find is, however, dated dendrochronologically to the year 1389.[12]

Kirpičnikov (1979 67) mentions the contradiction between the dating of the castle and the dating of the material of Finnish origin. He does not comment upon the Merovingian Period brooch, as he regards it as a tubular eared ornament. On the other hand, the Karelian material of the Crusade Period is not necessarily in conflict with Kirpičnikov's dating, as it may also be from the 14th century. Of the problematic Viking Period material of West-Finnish origin, Kirpičnikov observes that it may have become mixed with later finds or that these artefact types remained in use longer in the area and/or came into fashion again after an interval. According to Kirpičnikov, Käkisalmi was the site of extensive manufacture and distribution of Karelian bronze brooches and ornaments for the nearby rural areas. It was thus a fortified military camp and trading site, in the same way as the Tiuri fort in Räisälä. Juhani Rinne (1932 266) especially compared the old fort of Käkisalmi to the Linnasaari site at Tiuri. The original location of the Karelian fort is still open. In comparing the Käkisalmi region with Sortavala and its numerous hillforts and fortified islands, the possibility arises that there were several fortified islands at Käkisalmi. However, problems remain concerning the log framework beneath the older layer of construction and only further study will show whether the 1310–1360 horizon was preceded by an even earlier fort. These remains may have been part of a Karelian fort conquered by the Swedes or a later fort built by the Swedes or even a fishing shed built at the site. At present, however, the nature of the early remains cannot be defined. Kirpičnikov does not discuss the significance of the earliest layer and suggests that island of Holmansaari was the site of the older fort. The first ^{14}C datings from recent excavations suggest that there was a fort at the site in the 13th century (Saksa et al. 1990).

6.6. Rantalinnanmäki, Korpisaari, Kurkijoki

Published sources: Appelgren 1891 122–124

The Rantalinnanmäki hillfort is on the Kurkijoki River to the west of the island of Korpisaari at an elevation of 24 metres above the river. The steep north, northeast and west slopes are bounded by water. The slope to the southeast adjoining the mainland is less abrupt and with partly moss-grown wall of stones and earth with a gate entrance. There is a bend in the wall at the gate. The section continuing south-southwest is 45 metres long while the section extending northeast measures 13 metres. At its base the wall feature is 5.5–6.3 metres wide with the crest of the wall forming a ridge. The inside height is one metre and the outside height is 3 metres. The high area or crest of the site is almost triangular in form, measuring almost 60 x 75 metres (c. 3500 m^2). At a lower elevation on the slope is a row of stones, possibly the remains of a wall originally connecting the fort to a nearby hill.

In 1986 Aleksanteri Saksa, working with a metal detector, found a pan at the site. According to Saksa (pers. comm.), the pan dates to c. 1050–1100.

6.7. Riuhtun Suurmäki, Riekkala, Kurkijoki

Published sources: Appelgren 1891 124–125

6.8. Linnavuori, Hämeenlahti, Kurkijoki

Reports: Hj. Appelgren, map; Hj. Appelgren-Kivalo, inspection report 1921; J. Ailio, inspection report 1921 & 1932.
Finds: NM 2613:1–49, 2673: 1–68.
Published sources: Appelgren 1891 125–136; C.A. Nordman 1924 154; Kočkurkina 1981 68–72; Luoto 1984a 158–159.

The Linnavuori hillfort is located to the south of Hämeenlahti Bay at Kurkijoki. The site is mainly a steeply sloped and baredomed hill of bedrock, rising to an elevation of 42 metres above Lake Ladoga (47 metres a.s.l.). On the south slope, with the least incline, are two concentric sections of stone wall. There is a short section of wall at the northwest side of the crest area blocking a narrow pass or ravine and a short length of wall on a terrace on the east side. The crest area measures c. 60 x 100 metres (c. 5600 m^2). At the south part of the crest Appelgren reports to have found a house-floor. According to Appelgren there were at least 60 small cairns in the crest area, described as "piles of charcoal and soot covered over with stones". In 1888 and 1889 nine of these cairns were excavated. Appelgren also investigated the areas between the cairns. He made finds from both the cairns and the thin soil layer around them. The exact area of the 19th century excavations is hard to determine. On the basis of the general and detail maps at least 90 m^2 were excavated in the crest area.

The site yielded a considerable number of finds. In the following, the finds from the cairns and other excavated areas are not classified (for a detailed description, see Appelgren 1891 128–136). Finds of weapons include three arrowheads. Tools included a partially preserved axe, nine knives, one of which was fire patinated, a fragment of a knife blade, shears, 20 fragments of whetstones, 44.9 g of slag, four spindle whorls, 19 pieces of tinder flint and two halves of harpoons. Finds related to house remains include five nails and fragments of nails (in one of the four fragments fire patina can be observed), a riveting nail, a kindling chip holder in two pieces, four locks, lock parts and keys, 752 pot sherds (including a sherd of stoneware), 24 fragments of a copper kettle, two fragments of pot holders and a bell clapper. Brooches and ornaments included a penannular brooch with rolled ends, a silver Karelian penannular brooch and pin, the frame-part of a frame brooch, two brooch pins, of which one was damaged by fire, a pendant brooch and the fragment of a similar object, a length of bronze chain, nine beads and one bead fragment, three rings and two belt-buckles. Also found were five coins and coin fragments, 1708.23 g of burnt clay, 1278.14 g of burnt and unburnt bone, 24 unidentified iron artefacts and pieces of iron, a melted piece of bronze, a fragment of a clay artefact, a piece of quartz and four pieces of glass.

The coins provide the most precise datings in the material. Cairn no. 8 contained a fragment of an Arabian coin (NM 2673:41), dated to 911/912 (Granberg 1966 216). Cairn no. 9 contained two Frisian coins, one of which is of the 11th century and the other was struck by Egbert II (1068–1090; Salmo 1948 35; Talvio 1979 14). The terminus post quem dating of the copper kettle is the 10th century (Trotzig 1978).

The iron brooch with rolled ends (NM 2673:27) is of Salmo's group 7A which is a type known from the 8th to the 10th centuries (Salmo 1956 17; Lehtosalo-Hilander 1982b 100). The tubular lock and its keys (NM 2613: 21, 38; NM 2673:34) possibly came into use already in the Viking Period, but were common in the Crusade Period and the Middle Ages (see e.g. Homman 1966 61). The arrowheads are of Hiekkanen's types 3BIX (NM 2673: 52, 2 specimens) and 3FIX (NM 2613:9), the silver Karelian penannular brooch and pin (NM 2613:26,29), a bronze ring with grooved decoration (NM 2673:43), a butt fragment of a Karelian axe (NM 2673:53), and the frame brooch (NM 2673:64) are all of the Crusade Period. The pottery from the site, which appears to have been turned on a wheel is similar to material from Crusade Period and/or Medieval contexts elsewhere in Karelia. The sherd of stoneware (NM 2613:43) is dated to the 12th century at the earliest, when this type of pottery began to be imported into the Nordic countries (Cederlund 1963 385).

The hillfort has also been excavated by Soviet archaeologists. In 1987 A. Saksa excavated at two locations at the site and opened a number of trial pits below the precipice on the east side. An excavation area of 52 m^2 at the gate of the wall revealed three

[12] This dating is in contradiction with the overall dating of the later construction stage (1360–1380). It is possible that Kirpičnikov implies that the latter stage lasted throughout the 1380s.

pot sherds from beneath the stone setting as well as five pieces of slag and an iron ingot (A. Saksa, pers. comm.). An axe-blade fragment was found at the surface of the stone setting. The area was enlarged to the inside of the wall by removing topsoil and revealing a stone setting occupying 12 square metres. There were no other finds. An area of 16 m^2 excavated at the western edge of the crest revealed 26 pot sherds. According to Saksa the pottery from the crest area is of the 14th century, while sherds from beneath the wall are of the 12th century or the end of the 12th century (A. Saksa, pers. comm.). Saksa interprets his observations as indicating two stages of construction at the site. Trial pits below the precipice on the east side contained pieces of charred timber, which according to Saksa, were not the remains of forest fires, but had fallen down from the log breastwork of the fort.

An area of at least 170 m^2 (3 %) of the crest of the hillfort has been investigated.

6.9. Jäämäki, Kuuppala, Kurkijoki

Reports: Hj. Appelgren, map; J. Ailio, inspection report 1932.
Published sources: Appelgren 1891 136, 144–145.

The site was inspected by Aleksanteri Saksa, using a metal detector. There were no finds.

6.10. Linnavuori, Lopotti, Kurkijoki

Reports: Hj. Appelgren, maps; K. Soikkeli, inspection report; Hj. Appelgren-Kivalo, inspection report 1921; J. Ailio, inspection report 1921.
Finds: NM 2612: 27–40, NM 2645: 1–12.
Published sources: Appelgren 1891 145–159; Kočkurkina 1975 & 1981 66–68; Luoto 1984a 159.

The hillfort at Lopotti in Kurkijoki is to the south of the Raholanjoki River. The highest part of the bedrock hill measures c. 100 x 200 metres (total area of the crest is c. 11,000 m^2). The slopes are not steeply inclined, but in many places – especially on the north and west sides – they are difficult to climb. The remains of a stone wall are located at the boundary of the crest area and the sides in places where the incline begins to level. There are five locations of this kind – three on the west side and two on the east side. On the crest are mounds of earth and pits. At the foot of the hill is a site interpreted as a Viking Period cremation cemetery.

In the summer of 1888 Hj. Appelgren excavated mounds nos. 2 and 3 and pits nos. 4 and 5 on the crest of the hill. The following summer Th. Schvindt excavated a small area on the north side of the crest. Mound no. 3 contained the remains of a four-sided wooden framework. The extent of the excavations is difficult to determine.

The following finds were recovered: an arrowhead, a fragment of a whetstone, 37.28 g of slag, a riveting nail, 47 pot sherds, including a sherd of stone are, two fragments of a copper kettle, a fragment of a penannular brooch with rolled ends, two lengths of bronze chain, four beads, all of which had been in fire and of which two were fragmentary, 16 bracelet fragments (with traces of fire), three fragments of bronze spirals, an unidentified fragment of a so-called Permian brooch, 55.49 g of burnt clay, 191.7 g of burnt and unburnt bone, a brick fragment and two sherds of red ware.

The finds include a few datable artefacts. The spiral bracelet (NM 2645: 2,3) is of a type in use in the Early Roman Iron Age as well as in the Merovingian and Viking periods (Korkeakoski-Väisänen 1981 41–42). The iron penannular brooch with spiralled ends (NM 2645:5) was in use from the Merovingian Period until the end of heathen times (Salmo 1956 17–18). The lengths of bronze chain (NM 2645:1) are mainly of a Viking Period type. The bronze spirals are of the Viking and Crusade Periods (Lehtosalo-Hilander 1984a). The fragments of the copper kettle are of the 10th century and later date (Trotzig 1978). The encolpion bracelets (NM 2612:39, NM 2645:4) are of the Viking Period and the 11th century (Kivikoski 1951c 695). The arrowhead of Hiekkanen's type 3BIX (NM 2612:29) is of the Viking Period and the Middle Ages (Hiekkanen 1979 99). On the basis of rim sherds the pottery from the site appears to have been wheel-turned. Among the finds is a sherd of stoneware, which was introduced in the Nordic countries in the 12th century (Cederlund 1963 385).

In 1971 the northern part of the hillfort was excavated by S.I. Kočkurkina to an extent of 444 m^2. These excavations revealed four house-floors with hearths and a large number of artefacts, mainly fragmentary. The finds include a spear-shaft iron, a blacksmith's tool resembling a punch and an even-tipped arrowhead of the Viking and Crusade Periods (mainly resembling Hiekkanen's type 1IV) which was the only datable artefact. The material also includes a number of later artefacts which may derive from a trading site next to the fort. According to Kočkurkina, most of the artefact material is from the latter stages of the fort, i.e. the 14th and 15th centuries. The dating is mainly based on finds of pottery.

Kočkurkina's finds also include a number of Stone Age artefacts: 17 quartz flakes, three quartz scrapers and a stone adze.

In 1987 Aleksanteri Saksa carried out trial excavations in two areas on the crest of the hill. Test pit no. 1 (12 m^2) contained 16 sherds of 13th–14th century pottery and trial pit no. 2 (6 m^2) contained 17 sherds of the 15th and 16th centuries (A. Saksa, pers. comm.).

The wall was built of uncut natural boulders, which has given grounds to assume that the fort was built by West Finns (Rinne 1947b 103).

An area of at least 462 square metres of the crest has been excavated (over 4.2 % of the total area).

6.11. Linnavuori, Osippala, Harvia, Jaakkima

Reports: Hj. Appelgren, map; U.T.Sirelius, inspection report 1918.
Published sources: Appelgren 1891 160–161.

6.12. Linnamäki, Suur-Mikli, Jaakkima

Reports: Hj. Appelgren inspection report 1921.
Finds:NM 2614:1–4.
Published sources: Appelgren 1891 162–164; Spiridonov 1987.

The crest of the Linnamäki hillfort of Suur-Mikli in Jaakkima measures 40 x 90 metres (2,300 m^2). There are remains of wall on the northeast, east, southeast, south and southwest slopes. There are also low mounds within the walls, eight of which were excavated by Appelgren in 1988 (approximately 55 m^2). Nearly all of the mounds were covered over with a layer of transported sand, beneath which were a charcoal layer and soot. Found in the mounds were a total of eight pot sherds, a piece of flint and a piece of quartz as well as iron fragments (NM 2614:1–4; the latter finds are missing). The sherds are of wheel-turned ware, of a type commonly found in Crusade Period contexts in Karelia.

A. M. Spiridonov excavated a total area of 56 m^2 in the crest part and on the southeast slope outside the walls. Excavation area no. I on the crest (c. 32 m^2) revealed two pieces of tinder flint and the area on the slope 10 sherds of glazed pottery of later date. There were also mounds in area no. I which Spiridonov (1987) interpreted as having come about in connection with farming at a later date.

Approximately 4 % of the crest area has been excavated.

6.13. Linnavuori, Rautalahti, Sortavala

Published sources: Appelgren 1891 166.

6.14. Linnamäki, Otsoinen, Sortavala

Published sources: Appelgren 1891 164–166.

6.15. Paasonvuori, Helylä, Sortavala

Reports: Hj. Appelgren, map; A. Europaeus, inspection report 1929.
Published sources: Appelgren 1891 166–168; Rinne 1914 62; Kočkurkina 1981 73–87.

The Paasonvuori hillfort is located between the town of Sortavala and the village of Helylä, approximately 1 km south of the confluence of the Tohmajoki and Helylänjoki Rivers. The oval-shaped hill, extending NE–SW, rises to an elevation of 73.5 metres above the adjacent Lake Liikala (79.2 metres a.s.l.). The slopes are steeply inclined in all places except on the south side, where the slope is blocked by a wall of earth and stones with a gate. The first section of wall measures 38 metres x 3 metres and the second section 23.5 metres x 2.5 metres. The height of the wall varies between 1 and 1.6 metres. According to a map published by S. I. Kočkurkina (1981 73), the crest area of the hill measures c. 70 x 100 metres with an available area of 4,700 m^2.

Parts of the hillfort were excavated by Kočkurkina in 1978–1980. A total of 730 m^2 of the crest area were investigated, amounting to some 15.5 % of the overall area. In practice, this percentage was somewhat greater, because the site also includes bare outcrops of bedrock, with nothing to excavate. The excavations revealed a large number of artefacts (total 1,263) and provided observations of various structures. The occupation layer varied from 0.1 to 0.8 cm in thickness. In the crest area seven house-floors of stone were uncovered with areas varying from 40 to 48 m^2. These were built in a closed "chessboard" order, as if they formed a line of defence. The hearths were located in the centre of the houses, in some cases closer to the north or south wall. Outside the houses at a higher elevation on the crest was a depression with the remains of a blacksmith's furnace. A fragment of a casting mould suggests the working other materials than iron. Also revealed in the crest area was a structure interpreted as a potter's kiln. A few trial pits were excavated at the foot of the hill, but with no results.

A total of 15 finds of weapons were recovered:[13] various types of arrowheads, a spear shaft iron and a spearhead fragment. A total of 170 tools and fragments of tools were found. These include general-purpose tools such as knives, razors, axes, scissors (?) and whetstones. Also included are fire-making implements, strike-a-lights and pieces of tinder flint, weaving tools, spindle whorls, spindle needles and a needle. The blacksmith's tools include a crucible, a wire-pulling iron, a hammer, a punch and a cutting iron. A total of 741 pieces of slag were also found. A balance cup and weights are included in the finds. Farming implements consist of sickle fragments, a hoe, a cow-bell possibly also pitch spoons. Fishing is represented by a fish-hook.

Of the finds, 76 are related in various ways to buildings and household activities. These include nails, rivets, chip-holders, locks and keys as well as hinges and door fittings, and fragments of copper kettle and a pot-holder chain. Finds of pot sherds are 927 in number. The material also includes 151 iron nails which appear to be of late date.

Horse-gear and related objects are few in number – 17 finds in all. These consist of bits, a horseshoe for use on ice, horseshoe nails and hoof-spikes intended to prevent horses from moving. On the other hand the material contains a large number of brooches and personal ornaments. Among the 101 finds of ornaments are even-armed brooches, various types of penannular brooches (especially ones rolled ends), oval tortoise brooches and frame brooches. Common among the finds are chain-hung pendants and pendant fragments as well as beads. The bracelets include a fragment of a spiral bracelet of bronze and parts of an encolpion bracelet. There is one possible fragment of a ring. Artefacts related to attire and costume are the fragments of a bronze spiral and belt-buckles.

[13] The total number of finds given by Kočkurkina and the number given in the above description do not match. The reason for this may be the author's incomplete notes, but also the fact that we do not know how Kočkurkina recorded, for example, her finds of pot sherds and slag. The figures, however, give a reliable indication of the various activities reflected by the artefacts and the proportions of the various artefact groups.

The finds also include 199 fragments of unidentified objects, especially pieces of iron, iron rings, melted pieces of bronze, as well as pieces of bronze or copper rod, two coins of later date etc. A total of 1604 fragments of burnt and unburnt bone were recovered, of 121 have been identified. These include 90 fragments of bovine bones, 7 of sheep or goat, 7 bird bones, 6 of beaver, 4 of pig, 3 of dog, one of fox, one of sheep, one of marten and one of a perch (Vereščagin 1982 208).

Most of the datable finds are artefacts typical of the Karelian culture, which are dated by Kočkurkina to the 12th and 13th centuries. The material, however, includes two small penannular brooches (Salmo's groups 13 and 16), which can be regarded as being of West-Finnish character. There are also a few artefacts of the Viking Period and the 11th century. These include even-armed brooches of Kivikoski's group 7, fragments of spiral and encolpion braceletes, a Livonian needle-holder (Kivikoski 1973 784), a belt-fitting of so-called Gotland type, bronze spiral ornaments and possibly some of the penannular brooches with rolled ends which were in use over a long period. A noteworthy feature is the fact that the bracelet fragments, the needle-holder, the belt-fitting and some of the penannular brooches and bronze spirals had been in fire and were partly melted, which again was not characteristic of the later brooches and personal ornaments. The older brooches and ornaments resemble to a great degree finds from cremation cemeteries. On the basis of these finds Kočkurkina suggests that there was a cemetery at the site in the 10th–11th centuries. The fortified hill in turn is from the 12th–13th centuries, according to Kočkurkina, who maintains that the cemetery was destroyed when the fort was built. If there had been a cemetery at the site, it is strange that no human bones have been identified in the osteological material. It must also be pointed out that older material was found in various parts of the crest and in the same locations as slag.

To the southwest of the hillfort is the cemetery of Helylä. In his inspection report Aarne Europaeus observes that the historical taxation records of the so-called Vatya Fifth region mentions villages under and by the fort of Liikala and that the latter term without doubt refers to the Paasonvuori hillfort. There is also information according to which a Greek-Orthodox church was located on the site in the 17th century. The first Lutheran church of Sortavala was opposite the fort on the far shore of the Liikalanjoki River. According to Europaeus this indicates that the region of the fort was one of the centres of the region during the period of Karelian settlement.

6.16. Linnavuori, Läskelän-Joensuu, Sortavala

Published sources: Appelgren 1891 168–169.

6.17. Linnavuori, Tokkarlahti, Sortavala

Reports: Hj. Appelgren, map.
Published sources: Appelgren 1891 169–170.

6.18. Linnasaari, Tokkarlahti, Sortavala

Reports: Hj. Appelgren, map.
Finds: NM 2648:1–2.
Published sources: Appelgren 1891 171–173.

The island of Linnasaari ("Fort Island") is in the middle of Tokkarlahti Bay approximately half a kilometre southeast of the above-mentioned hillfort. On the island is a hill rising 25 metres above water level. The hill is divided by a pass running in the middle into two halves. This geographical feature is blocked with sections of wall at both ends. There are also lengths of wall on he west and southeast sides of the fort as well as in a ravine extending from the pass or gulley to the east part of the crest area of the hill. The area enclosed by the sections of wall and the precipices measures c. 80 x 100 metres (c. 4,950 m^2). In 1889 Th. Schvindt carried out excavations the eastern terrace finding two artefact: a piece of copper plate and a whetstone (NM 2648:1–2).

6.19. Hiiretsaari, Tulolansalmi, Sortavala

Published sources: Appelgren 1891 173–174.

6.20. Lieritsaari, Tulolansalmi, Sortavala

Published sources: Appelgren 1891 174.

6.21. Anttilanniemi, Tulolansaari, Sortavala

Published sources: Appelgren 1891 174–176.

6.22. Hulkonvuori, Tulolansaari, Sortavala

Reports: Hj. Appelgren, map.
Published sources:Appelgren 1891 176–178.

6.23. Linnavuori, Mäkisalo, Impilahti (Sortavala)

Reports: Hj. Appelgren, map; Hj. Appelgren-Kivalo, inspection report 1921; J. Voionmaa, mapping report 1938.
Published sources: Appelgren 1891 178–179; Spiridonov 1987.

The Linnavuori hillfort is on Mäkisalo, the easternmost island of the archipelago of Sortavala in Impilahti (Sortavala). The hillfort is on the shore of Vuorenlahti Bay. According to Appelgren, the hillfort rises to an elevation of 62 metres above Lake Ladoga. The slopes of the site are abrupt on all sides, except the northwest, where the hill is traversed by a straight stone wall with two gates, running WSW–ENE. The wall and the bluffs limit the fort into an area measuring 40 x 70 metres (c. 2,700 m^2).

The protrusions of the gates are an interesting feature of the wall. On the west side of the western gate the sides have been extended inwards by some 23 metres and there is also a small enlargement on the outside. According to Appelgren, there were small enlargements or protrusions on both sides of the east gate.

In 1938 the crest of the hill was mapped by J.Voionmaa. A. M. Spiridonov has excavated three trial trenches of 2 x 6 metres (total area 36 m^2; Spiridonov 1987). Approximately 1.9 % of the crest area has been investigated.

6.24. Lapinsaari, Mäkisalo, Sortavala

Published sources: Appelgren 1891 179–180.

6.25. Havukkakallio, Parppeila, Ilomantsi

Basic survey map 4243 03 Maukkula
x = 6949 12, y = 548 05, z = > 190 metres
Reports: V. Luho, inspection report 1955; A. Sarvas, survey report 1970, p. 32–33.
Finds: NM, Hist.Coll. 62074.
Published sources: Tirronen 1885.

The Havukkakallio hillfort is in the village of Parppeila about 4 km SSE of the Lutheran church of Ilomantsi. At the site is a hill of rock with steep sites and a crest area of c. 5,000 m^2, rising to an elevation of 32 metres above the small Haukkalampi Lake to the south. The southeast slope is less steep and is traversed by two walls. These appear to be of earth, although the inner wall is partly laid with stones. Other clearly observable signs of construction are four cairns on the crest of the hill.

In 1961–1962 Jouko Voionmaa conducted excvations at the site. According to newspaper articles (Uusi Suomi 28.7. and 1.8.1962) the excavations had revealed a bear-hunting spear in 1961 and a harpoon the following year. (A spearhead is also mentioned as having come to light as early as 1915.) Both of the artefacts are of types that retained their forms unchanged for centuries. The newspaper articles also mention that a total of 13 house-floors were also excavated. In several of them charcoal and remains of hearths were found. The harpoon was found in a house-floor. There were also finds of iron slag from the site. In the crest area a total of 40 different locations were excavated. It is impossible to estimate the extent of the excavated area, as there are no preserved maps.

Differing from the above newspaper reports, Anja Sarvas's survey, with reference to a personal communication by Jouko Voionmaa, mentions that a knife of indefinite date was found at the hillfort. However, the only preserved find from the site is a harpoon consisting of two three-pronged parts (NM. Hist. Coll. 62074). Sarvas also mentions that the cairns or piles of stones within the walls were interpreted as house-floors by Voionmaa.

The hillfort is favourably located in a watershed region with access to Lakes Ladoga and Onega, on the one hand and the inland regions of Finland on the other.

APPENDIX 5

POLLEN-ANALYTICAL EVIDENCE OF ANCIENT HUMAN ACTION IN THE HILLFORT AREA OF KUHMOINEN, CENTRAL FINLAND

Mirjami Tolonen

Abstract

This paper describes biostratigraphical evidence of changing vegetation and disturbance effects on the natural landscape in the late Holocene as inferred from a comparative analysis of radiocarbon-dated soil pollen, peat pollen and sediment pollen records. Emphasis is placed on the value of combining palaeoecological evidence derived from a close network of study sites. The paludified soil site is located in a distinctive hilly habitat of the Lake Päijänne region. General prehistoric and historic human disturbance is monitored, but special attention is paid to late Iron-Age – early Medieval times (A.D. 1000–1300). Through dendroecological investigations of a pine stump, establishing a local fire chronology for the past 3 centuries, it is possible to trace and date several fires. The sedimentary charcoal data help to explain changes in accompanying fossil pollen records.

The timing and scale of local vegetation changes within the main reference area of the village of the locality are shown to deviate from that established for the hillfort area. Pollen analysis reveals the beginning of continuous human activity during the early Iron Age, and by Medieval times permanent cultivation and pasturage had created an open landscape with fields concentrated around the main village in the former area, while the latter remained more or less forested wilderness until the early 1700s.

The limnological changes in lakes adjoining the hillfort and *in situ* burnings of the close peat layers, dated to the late Iron Age – Medieval times and historic periods (A.D. 1000–1800), may be associated with numerous fires in the area. Changes in water-level caused peat growth to increase, which correlates with the oldest historical records from the mid-1600s to the 1800s, in turn revealing the regressive climatic period of the Little Ice Age.

1. Introduction

Reconstruction of past vegetational development depends upon precise comparisons of stratigraphic and microfossil compositions through time and space. Many of the available fossil records represent specific case studies at different temporal and spatial scales. Being a time-consuming method, pollen analysis is usually investigated for one site only. Comparisons of several stratigraphic cores analysed at close intervals, however, are needed to reconstruct past environments more accurately and completely.

The continuous impact of man on vegetation has continued for approximately the last two millennia in South Finland. The modern vegetation and landscape from a mosaic resulting from both anthropogenic and natural influences. Many parts of the landscape which appear "natural" today may in fact have totally changed as a consequence of traditional land-use activities, long forgotten today.

This paper reports evidence of prehistoric and postglacial vegetation changes and is based on a comparative analysis of lake pollen, soil pollen and peat pollen records, complemented with other biostratigraphical analyses, such as charred particle analyses and ^{14}C-datings. The study was undertaken to supplement archaeological and historical studies conducted from 1984 to 1988 by Mr. J.-P. Taavitsainen, lic. phil., of the hillfort area at Kuhmoinen, situated on the mid-western coast of Lake Päijänne in the South Finnish Lake District.

Palaeoecological analysis aims at assessing the effects of land use and attempts to distinguish consequences due to other events leading to erosion-inducing disturbances. Therefore, specific problems have prompted this stratigraphic study. The first was to distinguish between natural and cultural vegetational changes in the palynologic record. The second aim was to pursue additional sources of data, i.e. *in situ* charcoal deposits and microscopic soot particle countings, to provide a picture of local fire disturbances on vegetation at and around the archaeological site. To further this aim, fire scars on a pine tree stump were studied to provide a detailed chronology of the recent fire history for correlation with the youngest peat sections within the study site, otherwise not datable by other techniques.

The second principal problem was to determine any possible differences between the main or church village area where fields and most settlements are concentrated today and the forested environment of the hillfort area at the edge of intensively cultivated land. These two areas are situated within c. 8 km of each other.

2. Investigation area, study sites

2.1. The area and sites studied

The study sites are located in two areas within the commune of Kuhmoinen in the province of Central Finland, 61°38'N, 25°12'E. Their location in relation to the archaeological study area is given in Fig. 1.

The physiography of the study area is quite varied with hills and domes of granite, rising 70–130 m above the surface of nearby Lake Päijänne. The whole area is well drained with numerous streams and rivers. The hillfort of Kuhmoinen (175.2 m a.s.l.) lies in an upland area (mean altitude 130 m, maximum elevation 205 m a.s.l.) west of Lake Päijänne, north of Lake Lummene and southwest of Lake Isojärvi on the major N-S directed drainage divide. The bedrock of the area is predominantly granite, mica, veined gneiss and phyllite; the area is bisected by a number of NW-SE orientated fracture lines (Fig. 1). The major topographical features are rock massifs and short esker chains, which are subdivided into individual esker hills and hillocks.

In addition to silty and sandy till and bare bedrock, numerous scattered peatlands are situated in bedrock valleys and other topographic depressions. Large deposits of sand are found adjacent to eskers. Clay deposits, although not common, are concentrated along the shores of lake Päijänne.

Fields surround the church village, with coniferous forests more distant. Spruce (*Picea abies*) predominates on the moraines, while Scots pine (*Pinus sylvestris*) grows on the eskers. In places the vegetation clearly has a eutrophic character in shady groves on slopes and valleys of moraine hills, and along small streams and the shores of lakes. They support mixed deciduous forest with herb-rich forests of *Tilia cordata, Corylus avellana, Acer platanoides* and even scattered stands of *Ulmus glabra* (Koskinen 1969).

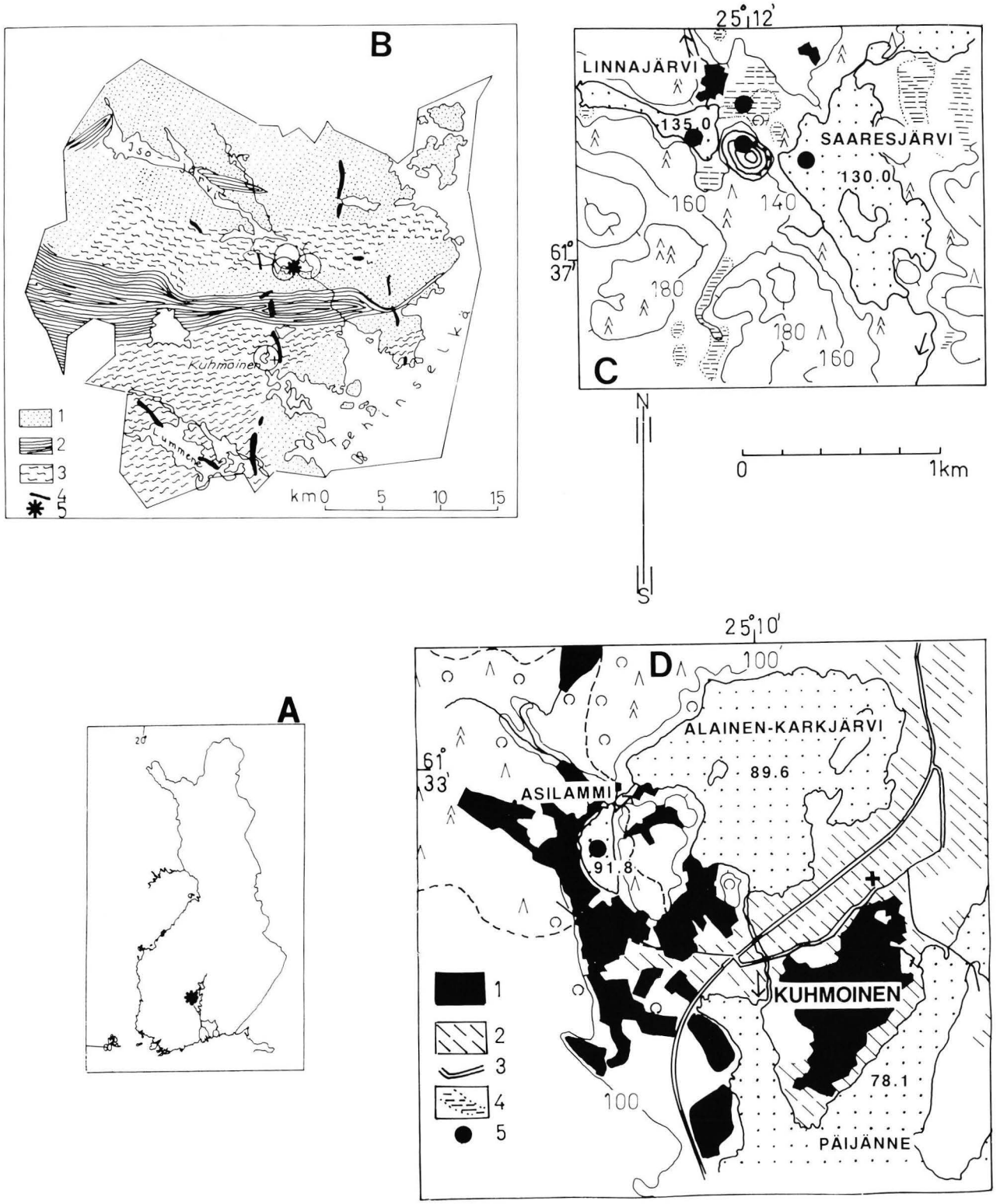

Fig. 1. The Kuhmoinen area. A: Location of study area on the western shore of Lake Päijänne. B: Bedrock geology of the study area (1 = granites, 2 = phyllites, 3 = mica and veined gneiss) and regional distribution of eskers (4); 5 = the hillfort. The coring sites are shown with circles. C and D: The sites mentioned in text (1 = cultivated fields, 2 = densely populated areas, 3 = road, 4 = peatlands, 5 = coring sites.

2.1.1. The Linnavuori (hillfort) massif and the Linnavuori soil site

The hillfort lies on the drainage divide bordered on both sides by water: Lake Linnajärvi to the west and Lake Saaresjärvi to the east, with a surface elevation of about 135 m and 130 m, respectively. The southeast-facing slopes of the hill are steep and bare (33–43 m high) forming bedrock cliffs. The northwest-facing side is more gentle, covered by mixed spruce-pine forest. The top of the hill is some 80–100 m in radius forming some level terraces. The top of the hill has a very thin layer of soil, and where the strongly exposed sites are not treeless *Pinus sylvestris, Juniperus communis, Sorbus aucuparia, Calluna vulgaris, Empetrum nigrum* and grasses grow.

The Linnavuori Soil site occupies a rock depression with a bedrock cliff wall on one side. The site (c. 10 m in diam.) is over-

grown with *Calluna vulgaris* and *Vaccinium myrtillus* dwarf shrubs and *Sphagnum* mosses. The peat consists of woody *Sphagnum* in the upper part while at depth it is mixed with wood fragments and charcoal layers. Below the peat sequence at the base, mor represents a supra-aquatic mineral soil. Archaeological excavations revealed a wall of timbers and stones on the terrace immediately adjacent to the depression, which had subsequently burnt (see Taavitsainen 1990).

2.1.2. Lake Linnajärvi and Saaresjärvi; Linnasuo bog

In addition to the Linnavuori hill-top site, three nearby sites were studied for fossil pollen to contribute to an understanding of environment during the Viking and Crusade periods, and during early historic times.

Two lakes within a radius of c. 300 m from the hillfort sites were cored. The ombrotrophic Linnasuo bog lies between the lakes, on the northeastern shoulder of Lake Linnajärvi, which is separated from the hillfort by moraine ground some 200 m wide. The threshold between Linnasuo (136.5 m a.s.l.) and Lake Saaresjärvi is only a few metres. The area of the bog is about 2.5 ha. Maximum depth is 3.5 m, and less than 0.5 m in a relatively broad margin of the bog.

Saaresjärvi forms part of the Päijänne lake chain. The lake area is 39 hectares. The watershed is relatively large (c. 620 ha) receiving waters from several small ponds and bogs north of Saaresjärvi. The lake is surrounded mostly by rocky cliffs and outcrops of bedrock. Coring was conducted in the westernmost bay of the lake in close proximity to the hillfort (Fig. 1).

Hilly terrain, with silty moraine soils predominating, surrounds Lake Linnajärvi (area 9 ha, drainage basin 237 ha). A late-glacial or early post-glacial supra-aquatic layer covers the upland soils in this area. Therefore, much of the area has been fertile enough to be exploited by slash-and-burn agriculture. This is indicated by some place-names as Ohramäki ("Barley-hill"), by a floristic excursion on the field, and by old field cairns, i.e., piles of stones accumulated for forest clearance in the past.

2.1.3. Lake Asilammi

Another site about 8 km SW of the hillfort near the Kuhmoinen church village was investigated to establish regional vegetational trends for correlation. Lake Asilammi (91.2 m a.s.l.) is located on a chain-lake on the western shore of Päijänne (Fig. 1). Its surface area is 7 hectares and the watershed area includes some 188 hectares. The maximum depth of the lake is 7.5 m. The lake is bordered on the eastern side by an esker running in a N-S direction. The western shore is gently sloping terrain where fields dominate. The lake has an outlet in its NE part. In the light of the relief and the natural history of ancient Lake Päijänne, it is probable that the ancient outlet of the lake in its SE part flowed directly into Lake Päijänne.

3. Material and methods

3.1. Sediment and peat cores

The bottom sediments of Lakes Asilammi and Linnajärvi were sampled through the ice in March 1985 from the deepest part of the basin using a Russian peat sampler (100×10 cm) to a depth of 250 cm and 360 cm respectively. Lake Saaresjärvi was too deep for our coring instruments (over 18 m water) at its deepest point. Therefore, coring was performed where the water was 9.5 m deep; the topmost 38 cm was obtained with a Züllig sampler, and the Russian peat sampler was used to sample the remainder of the sediment profile from 30 to 160 cm.

In July 1986, an open vertical pit was excavated and a monolith 60 cm in length was cut from a fresh exposure in the paludified depression of the Linnavuori soil site.

Similarly, the cores for stratigraphical analyses in Linnasuo were sampled in July 1987 from an open peat face with a spade and knife from the surface to a depth of 115 cm, and the lower section to 305 cm depth with a Russian peat sampler (50×10 cm).

In the laboratory, sub-samples were dried at 105°C and precentage loss on ignition was determined by combustion at 550°C for four hours to provide an estimate of organic content. The monolith from the soil site and the upper core from Saaresjärvi (0–38 cm) were cut into 1 cm-thick segments, and the subsamples represent contiguous sampling. The remaining lake sediment and peat cores were sampled at 10 cm intervals for pollen and other microfossils; close-interval analyses were performed (at 1, 2.5, or 5 cm intervals) at selected levels with "anthropogenic signals". Pollen processing followed standard methods (Berglund 1986), and pollen concentrations were determined by the tablet method of Stockmarr (1971).

All sediment samples used for pollen analysis were subjected to the same chemical treatments; from the peat sections samples were subjected to acetolysis only, and the soil samples from Linnavuori were boiled for 5 minutes in 5 % NaOH, then sieved to remove coarse material, after which the fine fraction was treated with KOH, acetolysis and HF (Fægri & Iversen 1975).

For each sample, a basic count of 500 to 600 tree pollen grains (AP) were identified in addition to non-arboreal pollen and spores (NAP).

Up to 1000–1300 grains were counted from "cultural phases" at each analysed level. Microscopic charred particles were counted on the pollen slides following the method described by M. Tolonen (1978). The 22 radiocarbon datings were made at the Geological Survey of Finland. The datings were made on the total organic fraction of the samples.

3.2. Calculation of fire ages

A detailed dendrochronological study was made of fire-scarred pine tree stump located on the topmost terrace of the hillfort. This tree was cut down in 1935, and a stump c. 75 cm tall and c. 180 cm in basal measurement remains standing. Whole cross sections of the trunk were obtained and tree rings were counted in the laboratory. The surface of the section was sanded smooth and the ranges were counted with a magnifying glass (6–25x). Fire scars were dated on several wedges.

4. Results

4.1. Evaluation of the radiocarbon dates

The 22 radiocarbon dates obtained here for the purpose of tracing the occupation history of the hillfort are presented in Table 1. The results show that all of the dates are stratigraphically consistent.

Three dates were obtained to date the arrival of spruce: Pc° in Asilammi 4820±120 yr B.P. (Su-1508), and Linnajärvi 4870±120 yr B.P. (Su-1472), as well as Pc^{+} for Linnasuo 4460±50 yr B.P. (Su-1769). These imply that the event took place about 3500–3700 calendar years ago. The advance of spruce in Finland is discussed in several studies (Huttunen 1980, Donner et al. 1978, K. Tolonen 1987). According to these studies the establishment of spruce forest took place in the Lahti – Lammi area about 4400–4500 yr B.P. At about 5000 yr B.P., spruce reached the lake region of Saimaa. It seems that the spread of spruce from the lake district of Saimaa to Päijänne was fast, taking only a few centuries.

In the peat profile of Linnasuo Bog (at the depth of 150 cm), the *Picea* and *Pinus* frequencies are low, which might be due to a local factor affecting the pollen deposition (Fig. 7). Both charcoal analyses and numerous charred horizons in the core support the conclusion that fire frequency was high during the period of spruce migration, as is generally the case for all of southern Finland (Tolonen 1978, 1987, Huttunen 1980).

On the basis of the radiocarbon ages for the bog series, a curve for the rate of sedimentation can be drawn (Fig. 9). The average rate is about 0.2–0.3 mm/yr between the lowest dated level (Pc^{+}) and the modern surface. The rate was slightly low at 59–60 cm and again near the surface. If the curve is compared with the development of the bog it can be concluded that sedimentation dur-

Table 1. The radiocarbon dates obtained for Linnasuo Bog, Linnavuori soil site, Lake Linnajärvi and Lake Asilammi, Kuhmoinen, Lake District. The dates were prepared at the Geological Survey of Finland, Espoo (Su-). The calibrated dates are based on the calibration curve by Stuiver and Pearson (1986) and Pearson and Stuiver (1986), and the computer program is by Stuiver and Reimer (1986). The time span of moving average (yr) for each sample is by Mook (1983).

Lab.No	Depth below sediment surface (cm)	Moving av.	Radiocarbon age (yrs B.P.)	Most probable date(s) cal. A.D./B.C.	68 % probab. range cal. A.D./B.C.	δC^{13} ‰	Point dated
Linnasuo Bog							
Su-1761	52 −55	100	1390±50	A.D. 642	A.D. 615−668	−27.2±0	Fire layers, fluctuations in *Picea*
Su-1762	55 −57	80	1510±50	A.D. 558	A.D. 503−603	−28.4±0	Slash-and-burn cultivation
Su-1763	58 −59	40	1590±40	A.D. 438	A.D. 409−523	−28.6±0	Control for the above
Su-1764	59 −61	80	1760±40	A.D. 245	A.D. 213−323	−28.9±0	Fire layers
Su-1765	80 −82.5	100	2820±60	980 B.C.	1050−912 B.C.	−28.8±0	Decrease in QM
Su-1766	82.5−85	100	2840±50	1009 B.C.	1066−939 B.C.	−28.4±0	First occasional anthropogenic pollen
Su-1768	95 −97.5	100	3490±50	1815 B.C.	1904−1750 B.C.	−28.5±0	A fire layer, "middle subboreal"
Su-1767	97.5−100	100	3600±50	1962 B.C.	2036−1909 B.C.	−28.4±0	Control for the above one
Su-1769	120 −125	160	4460±50	3111 B.C.	3192−3030 B.C.	−28.4±0	After the spread of *Picea*
Lake Linnajärvi							
Su-1469	48 −53	100	2650±120	825 B.C.	920−780 B.C.	−27 ±2 est.	Above the decrease, in QM, below $Cer.^0$
Su-1470	58 −63	100	2720±130	864 B.C.	1020−800 B.C.	−27 ±2 ,,	First occasional anthropogenic pollen
Su-1471	78 −83	100	3290±130	1563 B.C.	1730−1440 B.C.	−27 ±2 ,,	Below the decrease in QM
Su-1472	163 −168	100	4870±120	3673 B.C.	3790−3530 B.C.	−27 ±2 ,,	Rise in *Picea*
Linnavuori soil site							
Su-1463	17 −19	40	>Modern			−27 ±2 est.	A fire layer
Su-1464	26 −27	40	100±60	A.D. 1876, 1889	A.D. 1681−1737, 1788−1933	−25 ±2 ,,	Basal part of peat
Su-1465	36 −37	40	1290±80	A.D. 700	A.D. 652−804	−25 ±2 ,,	Contact between humic mor and basal silt
Lake Asilammi							
Su-1466	48 −53	100	1670±100	A.D. 381	A.D. 240−490	−27 ±2 est.	Intensification of cultivation
Su-1467	60 −65	100	2180±110	218 B.C.	390−100 B.C.	−27 ±2 ,,	Beginning of cultivation
Su-1468	83 −88	100	3070±90	1369 B.C.	1443−1245 B.C.	−27 ±2 ,,	Beginning of clearance
Su-1510	116 −121	100	4100±90	2630 B.C.	2831−2519 B.C.	−30 ±2 ,,	Control for the one below
Su-1509	123 −128	100	4200±80	2884 B.C.	2913−2663 B.C.	−30.8±0.1	Sporadic human influence
Su-1508	158 −163	100	4820±90	3643 B.C.	3706−3521 B.C.	−30 ±2 est.	Rise in *Picea*

ing the earlier ombrotrophic phase was roughly constant. In the upper part of the core smaller pauses and possible hiatuses are obvious, caused by numerous fires intermittently with accelerated peat growth at several horizons (most clearly between the levels of 20 cm and 40 cm). The slight decrease towards the surface may also be due to recent drainage of the bog. It seems that the dates in the peat profile are probably "correct".

All the dates are stratigraphically consistent in the lake series (both Asilammi and Linnajärvi). There is no direct evidence for assessing the validity of the dates. Most of the dates above Pc^+ ("agricultural periods") deviate from expected ages and are older. The rate of sedimentation curves (Figs. 4 and 15) show high values for the 1500 years after Pc^+, (r = approx. 0.5−0.7 mm/yr). After the general decrease in the frequencies of the broad-leaved trees in the pollen diagrams, the rate of sedimentation slowed to some 0.25−0.3 mm/yr.

It has been recognized that radiocarbon dates of lacustrine sediments can be affected by older carbon material. With respect to "cultural sequences", the ages may be some 600−800 years too old (M. Tolonen 1978, K. Tolonen 1980). Thus, it is highly probable that the uppermost dates in the profile are "too old". An increase of change in discharge from the catchment could have contributed to textural change in the sediment in the Asilammi core, being most important in the upper 130 cm. The sediment is unevenly varved with a high content of clay and silt. It is also possible that some of the pollen (most clearly at 65−80 cm) is likely to be secondarily derived from older sediments and soils. Clearance within the catchment is likely to be the reason. It is not possible to differentiate if land use changes accompany hydrological changes. Increased ash content in the sediment, largely due to inflow of mineral particles from the watershed, charred soot particles, indicative of fires, and changes in the phytoplankton populations, indicate high trophic conditions. Together, this information suggests disturbances on the watershed area. A comparison of pollen data with inferred land clearances which are datable by interpolation from the age/depth curves, are more or less synchronous. It is assumed that accelerating soil erosion due to land use resulted in an abundant supply of allochthonous organic matter that affected the two uppermost samples, dated Su-1466 and Su-1467, to be possibly at least 200 to 400 yr too old.

In the Linnajärvi core, the uppermost sample for radiocarbon dating (48−53 cm) was taken from the "precultural" sequence. The ash content of the sediment in the layers between 40 to 70 cm (Fig. 2) is regular, but higher than in previous levels, which in turn suggests allochthonous input from the catchment area. There are numerous fluctuations in the *Picea* curve, with the earliest cereal pollen being found at the 42.5 cm level. Between the uppermost and lowermost dated levels, the rate of sedimentation is relatively high (0.5 mm/yr), decreasing towards the surface (0.3 mm/yr). As noted earlier (e.g. K. Tolonen 1980), an independent calibration is needed to establish the chronology. A suitable method here is the pollen analytical dating of Cer^0 (the absolute limit for Cerealia) calibrated by the dates from the adjoining Linnasuo bog. Thus, it may be postulated that the two uppermost radiocarbon ages in the Linnajärvi series (Su-1469 and Su-1470) are some 600 years too old.

Two of the three radiocarbon dates obtained for the Linnavuori soil site are "modern", indicating contamination from living eric-

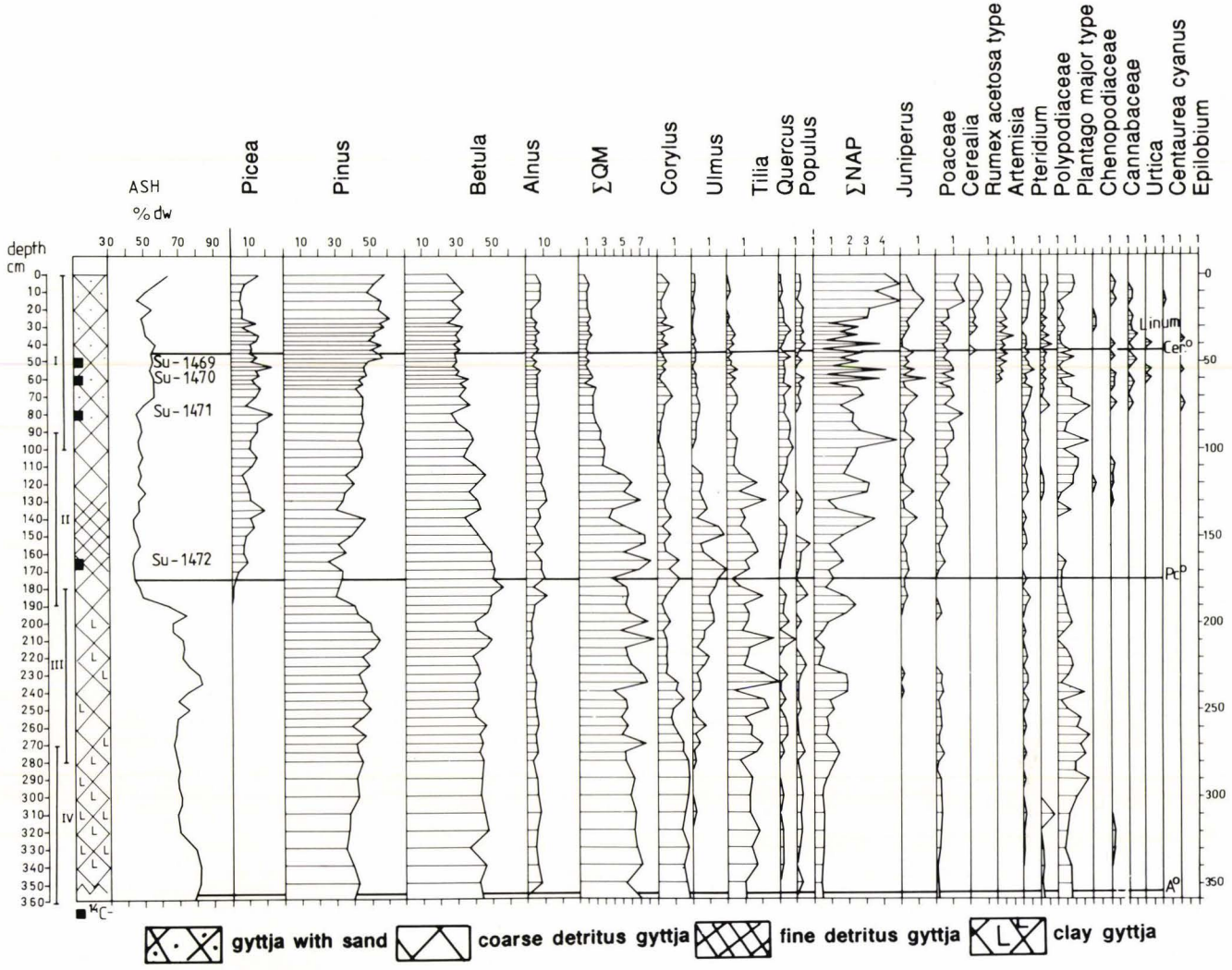

Fig. 2. Lake Linnajärvi. Stratigraphy, loss on ignition and percentage pollen diagram for selected pollen taxa for Linnajärvi. The percentage based was Σ AP for trees and Σ P for others.

aceous roots which penetrated at depth to the dated levels. It is apparent that even after removing all visible roots prior to dating, finer roots still remained to affect the results (Olsson 1986). The material in one of the "modern" samples (100±60, Su-1464) was deposited after cal. A.D. 1680 at 68 % confidence level (Table 1). When the local fire chronology (discussed below) is used for an independent correlation of the fire layers in the peat section of the core, an age of c. A.D. 1730 is extrapolated for the fire layer immediately below the radiocarbon-dated level.

The lowermost date is of a sample of humus-rich mor. Dating the soil matrix in which the pollen grains are found is known to be difficult, and often gives unreliable ages (e.g. Aaby 1983). It is highly probable that the lowermost date in the present profile is "too young" owing to the mobility of the humus. If the age of 1290±80 yr B.P. (calibrated date c. A.D. 700) is considered a minimum age for the 36–37 cm sequence and similarly an age of A.D. 1730 for the 27–28 cm level, approximate dates for the stratigraphical changes between 28 cm and 36 cm seen on the core may be obtained by interpolation. The main period of interest in the present paper (c. A.D. 1050–1300) falls within that section of the core composed of consolidated and compact blackish brown greasy humus layer.

4.2. Pollen-diagrams

4.2.1. Linnajärvi

Pollen analysis of the core reveals the typical long-term features of forest history during the post-glacial period in South-Central Finland (Fig. 2).

The spread of lime (*Tilia cordata*) and spruce (*Picea abies*) in the region has been dated to c. 6200 yr B.P. (e.g. Tolonen et al. 1976) and 4800 yr B.P. (Ristaniemi 1987), with their initial pollen rises occurring at 280 and 165–170 cm levels, respectively. In the upper part of the diagram a general decline of deciduous trees (QM⁻) and a corresponding spread of conifers, are seen. These occurrences are considered natural changes in the vegetation caused by gradual climatic and pedogenic deterioration. The main emphasis of the present work is on the history of agriculture. In the Linnajärvi diagram, there is a slight concentration of Chenopodiaceae, *Plantago major* and Poaceae pollen at 110–135 cm (phase L-1), indicating open habitats with possible forest fire, as there is a coincident decline in the spruce curve associated with charcoal peaks (2200–2700 B.C.) (Fig. 3). There is a renewed decline of spruce at 75–80 cm (3290±130 yr B.P., Cal. 1730–1440 B.C.) after a brief abundance, followed by occurrences of *Humulus/Cannabis* and Chenopodiaceae (phase L-2). *Urtica* and Caryophyllaceae pollen become more frequent at the 65–60 cm level, and a continuous curve for *Rumex acetosa – acetosella* begins, showing general signs of open habitat and pasturing (Cal. from 1730–1440 to 750–800 B.C.).

The first single cereal pollen grain occurs at 42.5 cm (Cer⁰, absolute limit), or slightly after numerous irregularities in the spruce curve, and slightly before the increase in the ignition residue curve, reflecting increase in soil erosion (L-3). In the same levels, pollen grains (especially conifer pollen), were broken and degraded. No absolute dating for the level is available, but an age

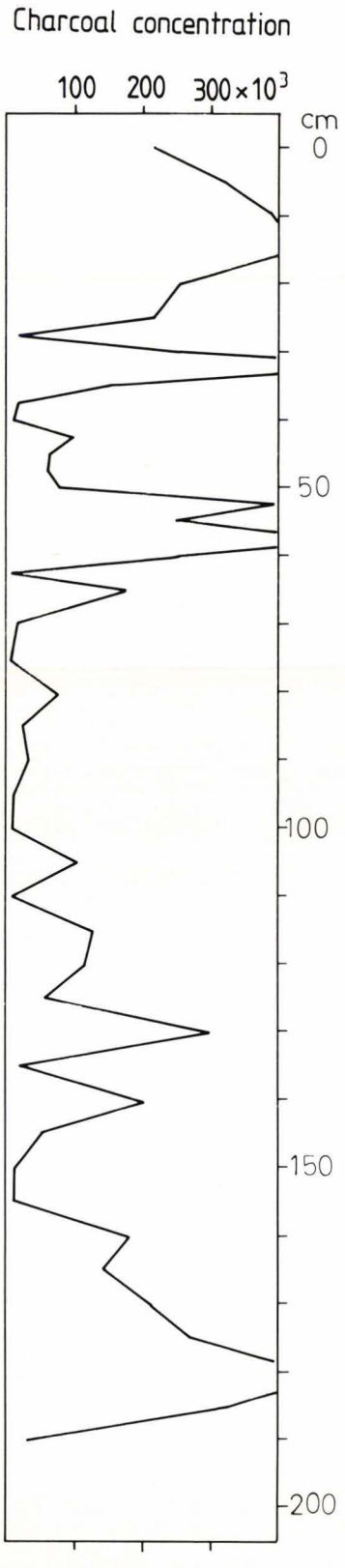

Fig. 3. Microscopic charcoal concentration in the sediment of Linnajärvi.

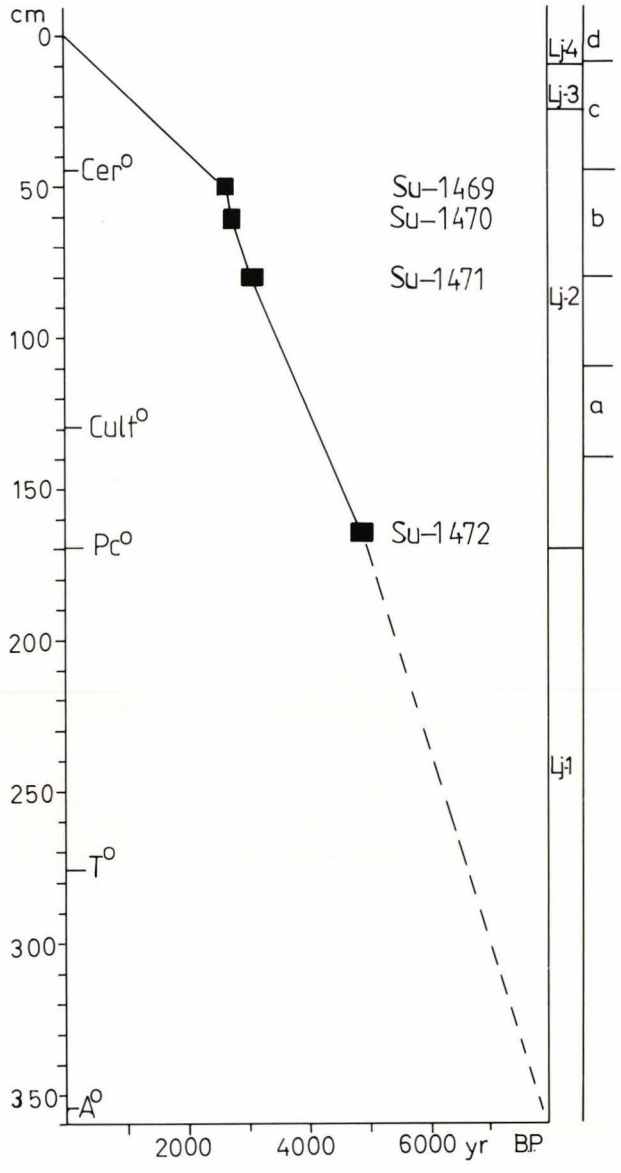

Fig. 4. The conventional radiocarbon ages from Lake Linnajärvi plotted against sediment depth. Local pollen assemblages zones (Lj: 1–4) and local cultural phases (a–d) are shown in the right margin.

of c. 2000–2200 B.P. is estimated from the age/depth curve (Fig. 4). From this level upwards, the general signs of slash-and-burning and pasturing become frequent: at 32.5 cm (L-4) level the Cerealia curve, also including *Secale*, becomes continuous (Cer^+, Sec^+, empiric limit). Simultaneously, there is a relative increase of NAP, and an indication of possible retting, by a pollen grain of *Linum usitatissimum* (L-4). At the 25 cm level (c. A.D. 600–1000) upwards, the permanent decline of spruce (Pc^-) is apparent as a consequence of extensive slash-and-burning of forests. This change can be detected in most pollen diagrams from Southern and Central Finland (Huttunen 1980, Tolonen & Huttunen 1979, Vuorela 1978, 1981). In the topmost 15 cm of the diagram, the fall in the *Cerealia*, *Juniperus* and *Rumex* curves, and the rise in *Picea* shows a change from predominantly slash-and-burn culture to more intensive arable farming. The occurrences of *Centaurea cyanus* at 10–15 cm (estimated A.D. 1700 – recent) suggest cultivation close to the lake basin.

4.2.2. Saaresjärvi

The pollen diagrams (A and B) from Saaresjärvi show a typical Finnish forest history post-dating the invasion of spruce c. 4800 yr B.P. (Figs. 5 and 6). The lower half of the Saaresjärvi A diagram is similar to the Saaresjärvi B diagram, but is more complete in having the recent sequence with a continuous record of anthropogenic indicators. In profile B, there is a possible hiatus in the topmost detritus gyttja, because of movement and redeposition of sediment to other parts of the lake. It seems that according to pollen stratigraphy versus thickness of the sediment, a continu-

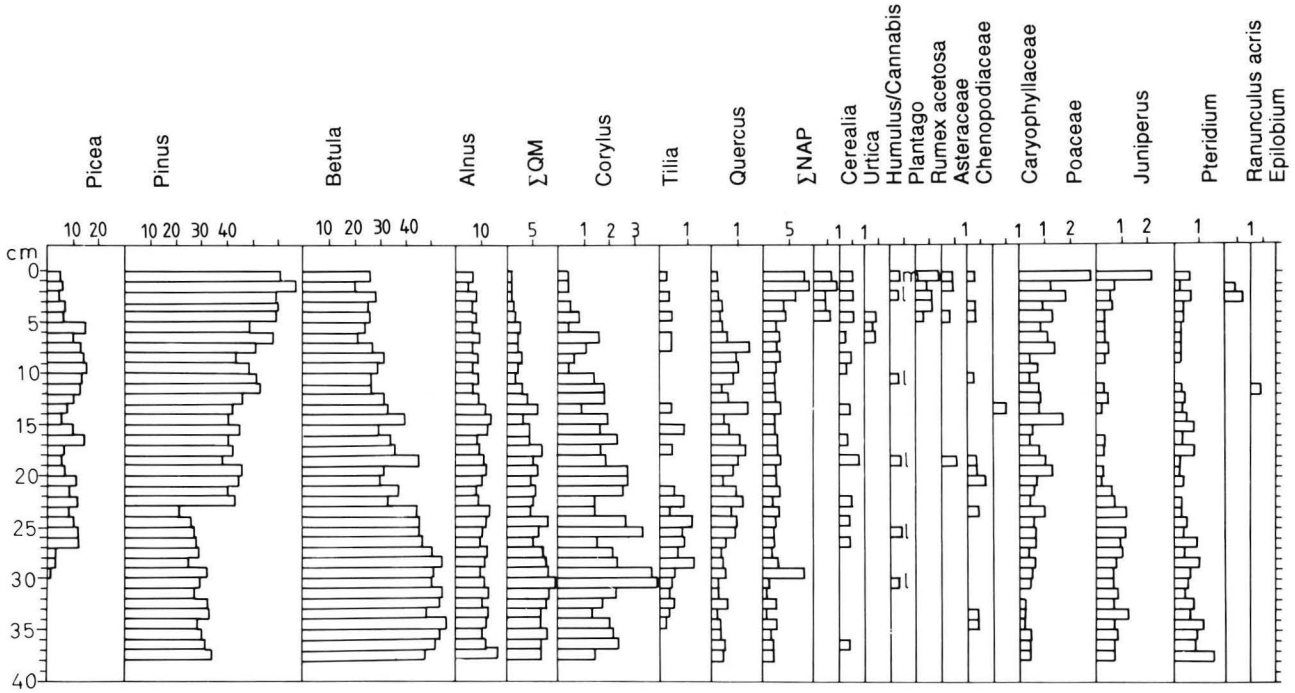

Fig. 5. Relative pollen diagram from core A at Lake Saaresjärvi showing percentages of main pollen types of consecutively counted sections. The percentage base used was Σ AP for trees and Σ P for others.

ously low net sedimentation took place in profile A. Peat stratigraphy at the Linnasuo bog basin (Fig. 7) indicates hydrological changes in the last two millenia. Correspondingly, at this study site, which obviously lies close to the limit between sediment transportation and the accumulation bottom (Håkanson et al. 1983), one can infer the effect of water level decreases as causing a standstill of accumulation. The pollen types do not show to what extent resuspension together with sorting and differential movement occurred in the basin. In fact when compared with the Linnajärvi diagram, the trends in the main pollen components are almost identical.

The present profiles were constructed to investigate the impact of man on the local environment for comparison with the other diagrams. It seems obvious that, since the morphometry of the basin in the study area caused fluctuations in the net sedimentation, no absolute dating is relevant in terms of the resolution available and it is impossible to make firm conclusions regarding synchronism of deposits due to the lack of absolute dating. How-

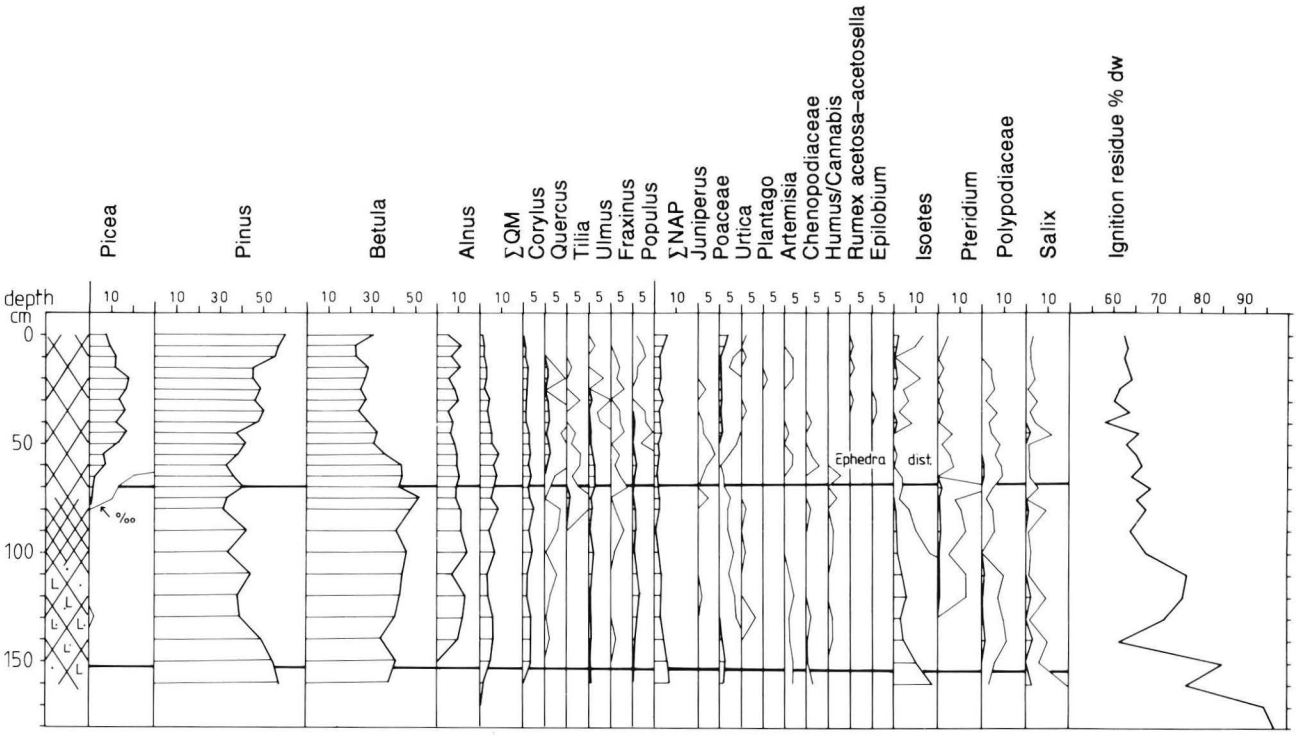

Fig. 6. Relative pollen diagram for main pollen types and loss on ignition for core B at Lake Saaresjärvi. Symbols of stratigraphy: see Fig. 2.

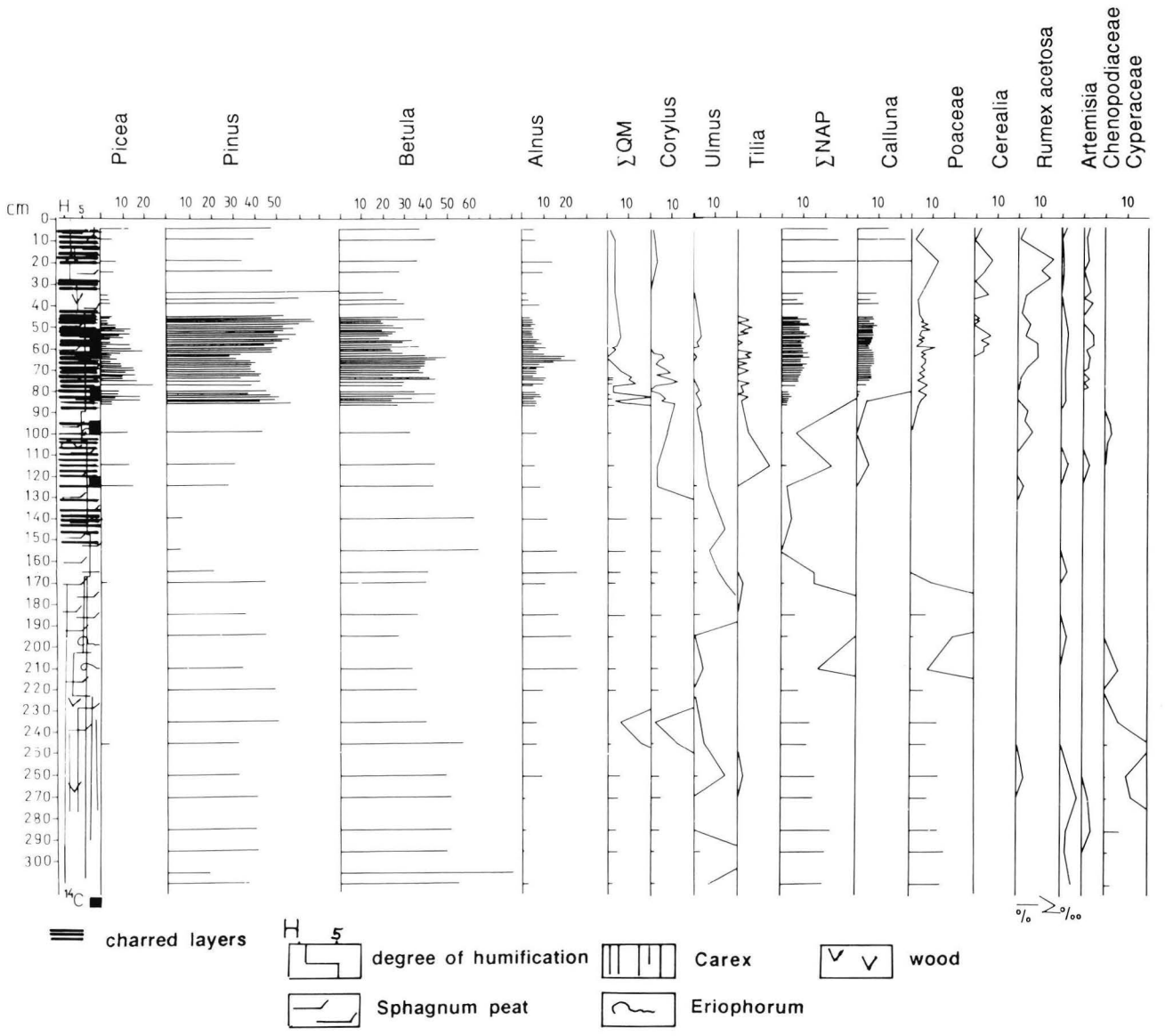

Fig. 7. Linnasuo Bog. Relative pollen diagram for selected pollen taxa. Forest fires are indicated by horizontal lines in the stratigraphy column.

ever, the pollen assemblages in general, and anthropogenic indicator pollen in particular, make the levels at 17.5–20 cm and 10 cm in the A diagram interesting, for these provide evidence of conditions existing during the onset of frequent forest fires, and the fall of the broad-leaved deciduous trees interrelated with appearances of anthropogenic pollen types. The episodes recorded probably relate to the period between c. 500–1000 B.C. and to the turn of the first and second millenium A.D., respectively. In addition to Poaceae, *Plantago lanceolata* and *Humulus/Cannabis*, pollen such as *Artemisia*, Chenopodiaceae and *Urtica* are found more frequently than in the preceding levels. The evaluation for the origin of these pollen types is not straightforward. Apart from being anthropogenic indicators, wind-dispersed taxa such as *Plantago lanceolata*, *Artemisia* and Chenopodiaceae are probably "background noise". *Pteridium* and *Juniperus* frequencies decrease at these intervals where the pollen slides contain abundant charcoal particles. Two disturbance phases are evident at the 50 and 20 cm depths in diagram B. It is tempting to speculate that these phases are the same as in those Linnajärvi and Linnasuo diagrams which indicate "the first appearance of occasional anthropogenic pollen" and "first slash-and-burn cultivation". They are dated at around 800–1000 B.C. and A.D. 400–500 respectively. From the mineral particles in the sediment, and from the pollen record of *Ephedra* in diagram B after the time of *Picea* migration, it appears that erosion took place in the area surrounding the basin.

The coring site is sheltered from the prevailing westerly winds while the Linnavuori Hill is an exposed site. The herbaceous taxa throughout the sequences include numerous types normally associated with open and disturbed mineral ground. The upper half of the Saaresjärvi B diagram shows synchronous features indicating unstabilized post-fire environs such as pollen grains of *Epilobium angustifolium*, fireweed, in several samples. The decrease in *Isoetes* spores (including the disappearance of *Isoetes echinospora*) at around 2500 B.P. possibly points to a rising water level in the lake. *Isoetes* is well represented in the upper part of diagram A in association with a lowered water level, and with the more silty sediment. The continuous and increasing indications of settlement and farming activity in Medieval and modern times (5–0 cm in diagram A) coincide with the foregoing discussion.

The most interesting aspect here is the negative record of pollen of cereal types below the 5 cm level in monolith A. Assuming that sediment accumultion has been continuous, it may be inferred that no more than c. 500 years are represented in the topmost 5 centimetres. The rate of accumulation would in that case be only 0.1 mm/yr. The erosional flush, however, combined with the

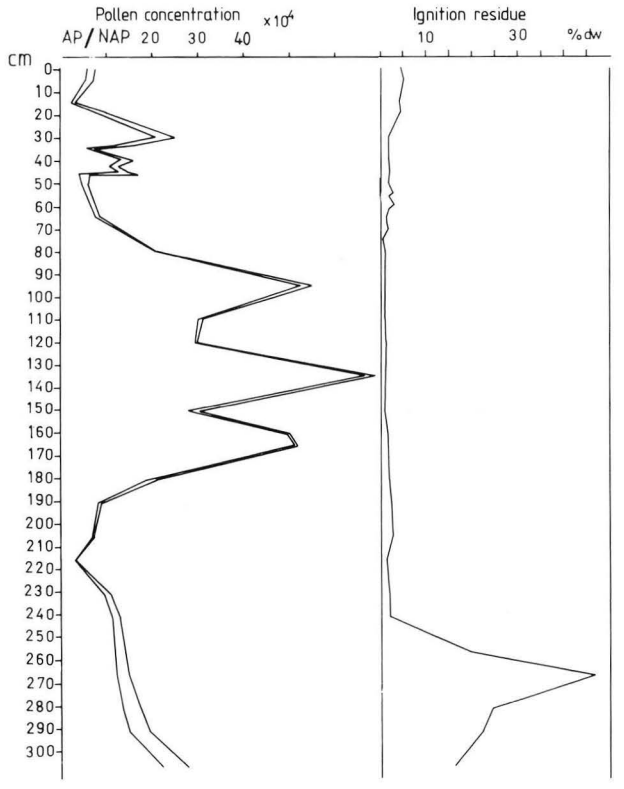

Fig. 8. Linnasuo Bog. Total pollen concentrations x10^4 pollen/ cm^3 and ignition residue of sediment as % of dwt.

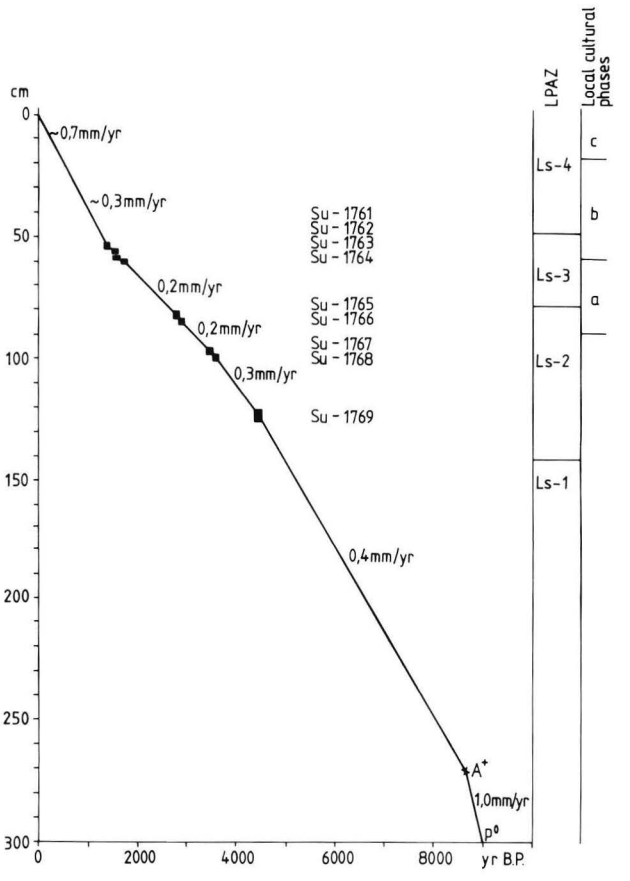

Fig. 9. Growth curve for the Linnasuo Bog profile based on nine conventional radiocarbon ages. Local pollen assemblage zones (Ls: 1–4) and local cultural phases (a–c) are shown in the right margin.

lake's productivity, suggests that they increased the rate of deposition, so that a given layer of sediment is more probable for only 200-300 years.

4.2.3. Linnasuo

Fig. 7 is a pollen diagram from Linnasuo Bog which resembles those presented for lake sites in this study. The lowermost samples in the diagram contain a high proportion of non-arboreals including pollen of aquatic plants. Sediment deposition took place in shallow water slightly before development into peatland in the outermost bay of lake through a carr stage with deciduous trees and shrubs (Fig. 8). The high values for pine and *Hippophae* of the primary stage (290 cm) suggest a poorly forested, competition-free phase preceding the final spread of *Alnus* (e.g. Tolonen & Ruuhijärvi 1976). The dominant NAP species are representative of a local shore vegetation: *Carex*, Poaceae, Chenopodiaceae, *Humulus*, etc.

Though the spread of *Picea* is a discernible feature in the diagram. Pc^+ as such is difficult to locate. The 30-cm sequence at 130–160 cm, below the rise for the *Picea* curve in the profile (^{14}C-date 4460±50 at 120–125 cm) occurs with a horizon representing numerous forest fires. Local succession is postulated, as evidenced by a fall in *Pinus* associated with a rise in *Alnus*, and subsequently followed by *Betula* and QM. The frequencies of *Picea* pollen do not allow any discussion on the timing of the *Picea* invasion into the area. The further decreasing trend in the deciduous trees may reflect a general opening of forests around the study site and the change from marschy herb-rich hardwood swamp to ombrotrophic *Sphagnum* pine bog (at 150–100 cm). In all, 14 fire layers we recognized in the sequence, the number of single fires may actually be larger. Based on the radiocarbon dates, the average accumulation of peat was c. 0.3 mm/yr (Fig. 9).

The invasion of bog species after the carr stage into the basin is seen by the distinct appearance of further increase of *Calluna* from the c. 100 cm level. The final decline of QM at 70–75 cm is of regional significance. The first indication of anthropogenic influence, pollen grains of *Artemisia*, Chenopodiaceae and *Plantago major*, were encountered at 80–85 cm. From this level upwards in the profile, the general signs of "human impact" in the form of fires (i.e. *Rumex acetosa*) are evident. The first cereal pollen occur at 57 cm (c. A.D. 400–500) ($Cer.^0$, absolute limit). Frequent irregularities in the spruce curve, reflecting temporary successional dominance of deciduous trees over spruce, dominate to the 45 cm level. From this level upwards, the decline of spruce (Pc^-) may be synchronous with regional trends in most South and Central Finnish pollen diagrams, dated to c. A.D. 600-1000 (e.g. K. Tolonen 1987).

There is a period of rapid peat accumulation at 42–33 cm with fire marks. At the 33–29 cm sequence (around A.D. 1000) again there are disturbances with 3 fire layers. In spite of various NAP-pollen no definite "cultural pollen" (*Cerealia* pollen) was found. The 29–20 cm sequence of peat is weakly decomposed, suggesting rapid regrowth of *Sphagnum*, after which, at the 20–15 cm level, the peat becomes highly humified. This suggests a change in the ground water table or flooding of the bog. Between 0 and 15 cm of the topmost peat (c. 0–250 B.P.) six fire layers were distinguished (Fig. 7, see later p. 260) simultaneously with the rise of diverse cultural pollen ($Cer.^+$, empiric limit).

4.2.4. Linnavuori

Fig. 10 is from the paludified centre of the basin, where the deposit is 10 cm of stratified mor humus over the basal 13 cm of sand and gravel and 27 cm of organic deposits at the surface. This developmental sequence is strictly local.

Paludification of the old land surface by peat implies waterlogged conditions. The development of surface waterlogging, although not a simple process, was largely controlled by fires. Charcoal fragments are common throughout the profile. The lithology of the bottom strata shows that they are of supra-aquatic origin.

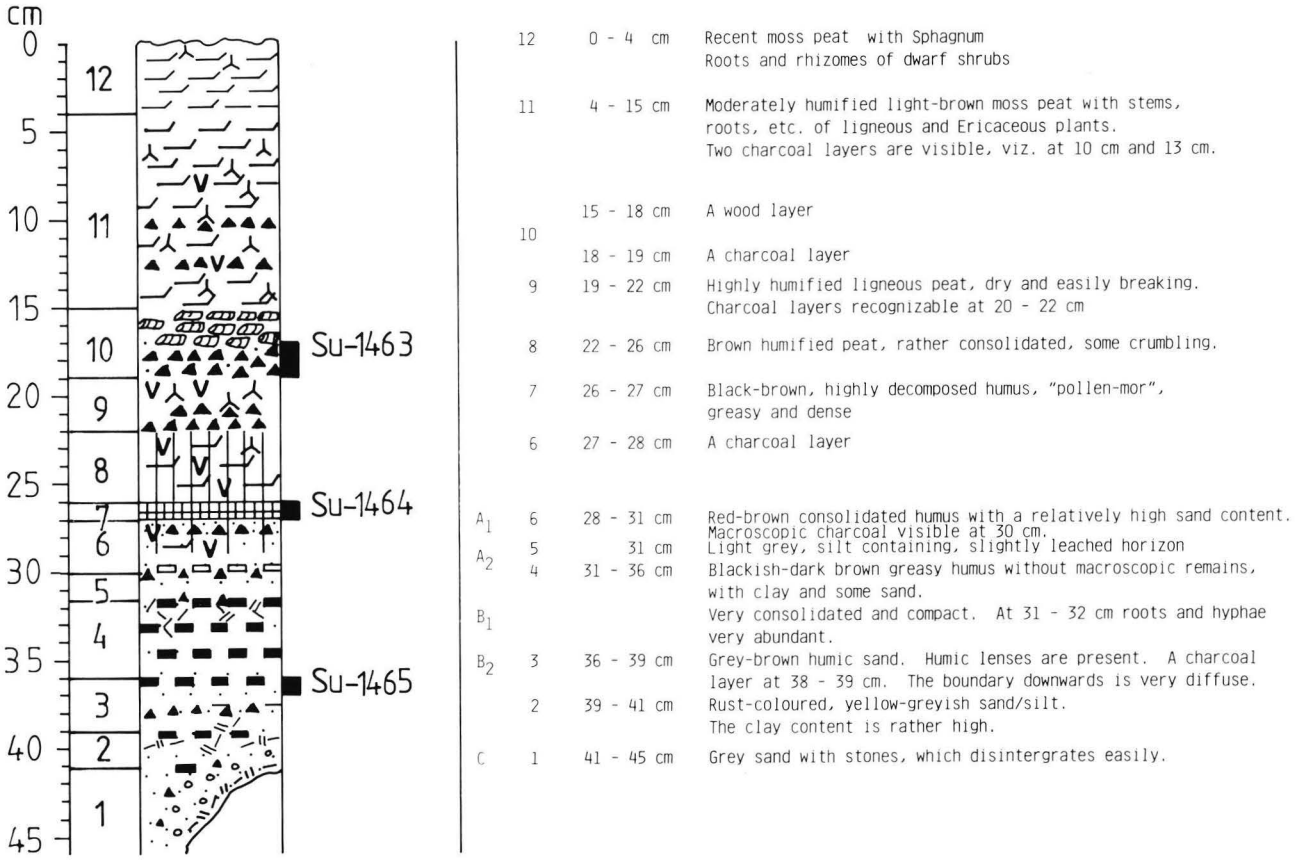

Fig. 10. Descriptions of lithology for the Linnavuori (hillfort) soil profile.

At 41–36 cm tissues of *Calluna vulgaris* and *Carex rostrata* characterizes wet conditions. Fragments of coniferous wood and the high relative abundance of *Picea* and *Pinus* pollen in the lowermost sample point to forests on the hill-top. At the fire horizon of 37-36 cm, NAP increases and *Artemisia* and *Salix* are frequent. The 36–31 cm sequence represents period of renewed pine heath forest first with Poaceae, Asteraceae and *Calluna*, and later with *Filipendula* and Cyperaceae. Numerous fungal remains (fruit bodies, conidia or chlamydospores and ascospores; see van Geel 1976) are present on host ericaceous roots and leaves. Pronounced changes in the groundwater table took place, as deduced from sharp fluctuations of various algal remains, a.o. diatom frustules and Chrysophycean cysts at 32 cm.

Diatom taxa may be divided into three groups, plankton, periphyton (and plankton-periphyton) plus "facultatively terrestrial" diatoms (see Rehnberg 1976). The last form occurs in moist and aquatic biotopes in a terrestrial environment (as among mosses). The former diatoms live either freely or are associated in some way with a water body. Certain littoral forms, e.g. *Pinnularia divergens* W. Smith, and epiphytic genera *Navicula* spp., *Nitzschia* spp. and *Cymbella gracilis* (Rabenh.) Cleve in the samples point to a greater water body than a moss polster (see e.g. Wolf 1982). Other common taxa found were e.g.: *Pinnularia hemiptera* (Kütz.) Cleve, *P. viridis* (Nitzsch.) Ehr., *P. subcapitata* var *hilseana* (Janiseh.) O. Müller, *P.* cf. *borealis, Gomphonema acuminatum* Ehr., *G. parvulum* (Kütz.) Grun., *Stauroneis aceps* f. *gracilis* Raabenh., *Eunotia lunaris* (Ehr.) Grun., *E. exiqua* (Brébb.) Rabenh. and *E. praerupta* Ehr..

At 33–32 cm brown fungal hyphae are especially frequent, and the measuring of hyphal fragments in samples prepared for pollen analysis showed them to be typical for raw humus in podzol forest soil (Huikari 1951, Andersen 1979, Aaby 1983).

Macroscopic remains indicate a fire at 31 cm, followed by a rise of the water table later. The sediment of 30–29 cm (slightly leached humus and sand layer) contains many diatom frustules and abundant Chrysophycean cysts. Pollen analysis reveals that *Salix* stands become established.

It seems reasonable to conclude that during the water phase at 32 cm, humus particles, fixed in aggregates, were transported downwards by percolating water (Munaut 1967). Similarly, well aerated conditions prevailed during the water-phase, since the pollen concentration was relatively low and the pollen preservation poor at this horizon. The blackish "pollen-mor" sequence below 32 cm shows a depositional stage with low biological activity.

At 29–27 cm a charcoal layer characterizes a new fire event. Paludification followed, since *Sphagnum* growth took place over the highly humified and consolidated (muddy) ligneous peat layer. In view of the number and magnitude of the disturbance in question, it is most plausible that between the top of the mor accumulation and the lower organic section there might well be one or more hiatuses.

Changes in the rate of sedimentation are evident at several phases. Obvious time gaps for these levels might be of significance and vary from the average time/depth curve. The pollen chronology does not reveal evidence for this in the curves because of insufficient resolution (Fig. 11).

At 26–22 cm in the *Sphagnum* peat, there are remains of *Betula, Salix, Populus, Calluna* and Cyperaceae suggestive of deciduous trees and shrubs covering the basin. The high peak of pollen grains of *Sorbus aucuparia* and Ericaceae also preceded the next fire event at 22–21 cm.

The high pollen concentration value (Fig. 12) between the depths of 22 and 26 cm shows high decomposition of the sediment, and to a lesser extent opening of the surrounding forest. The low pollen concentration with a high NAP/AP ratio from 21 cm upwards suggests a herb-rich succession stage of secondary forests that lasted about five decades (see below). After the fire at 18–17 cm the hill-top changed to more *Pinus-Calluna* growing locally, and a regeneration of forests at the cost of decreasing NAP frequency took place at the adjacent hillfort.

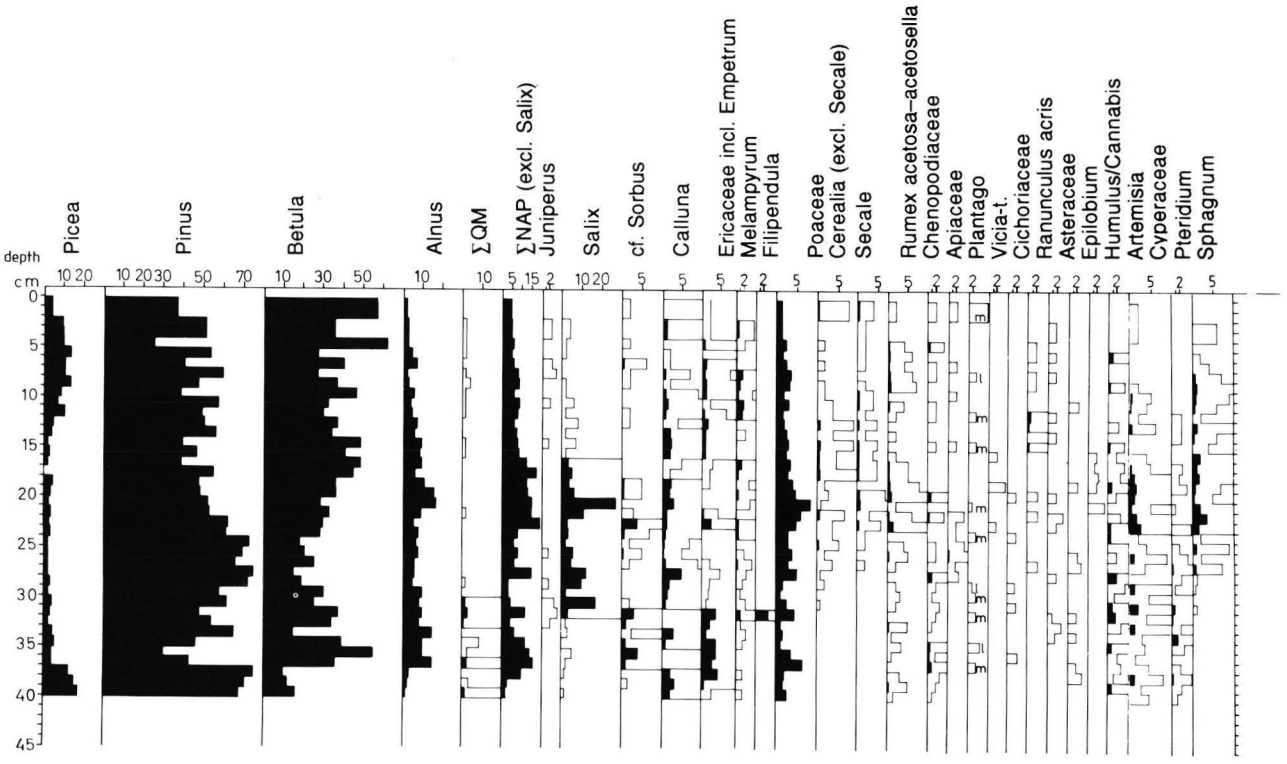

Fig. 11. Linnavuori Soil site: the relative pollen diagram for selected pollen taxa of consequtively analyzed core. The percentage base used was Σ AP for trees and Σ P for others.

4.2.5. Asilammi

There is evidence in the lowermost basal clay-gyttja which indicates the spread of lime (*Tilia cordata*), along with a relatively high proportion of other broad-leaved deciduous trees. The rise in spruce pollen (^{14}C-age 4820±90 yr B.P.) at the c. 160-cm level is not significant. It has become apparent in recent studies that forest fires were common at the time of the spruce invasion, as indicated by charcoal peaks (Figs. 13 and 14). The sediment is rich in silt and clay, and at 180 cm the ignition residue is 85 % of dry weight. The sediment laminations with light and dark clayey bands of varying thickness appear in the core at 160–220 cm.

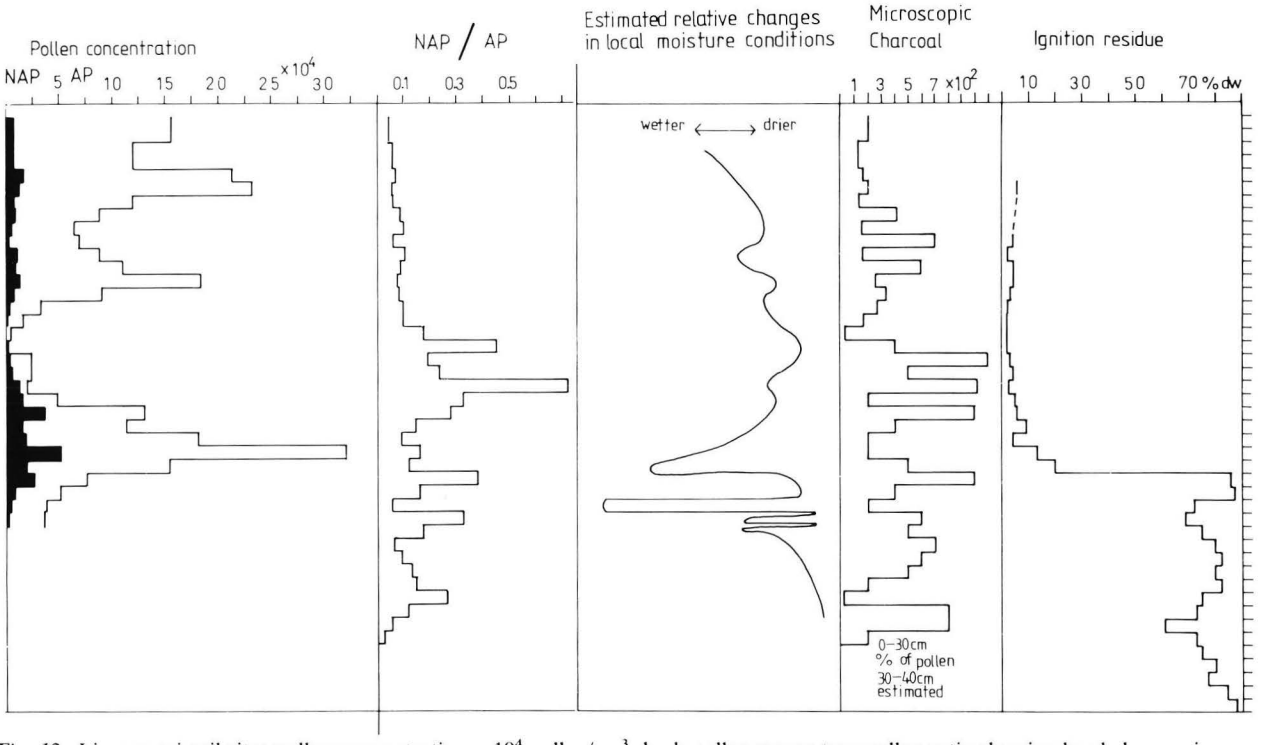

Fig. 12. Linnavuori soil site: pollen concentrations x10^4 pollen/cm^3; herb pollen versus tree pollen ratio showing local changes in vegetation: approximate changes in local moisture conditions inferred from different bioindicators in the stratigraphic sequence; abundancce of microscopic charcoal counted as numbers of fragments in pollen slides, dots mark fires occurring *in situ* as concluded from comparisons with the macroscopic charred layers in the core (Fig. 10); and ignition residue of the core.

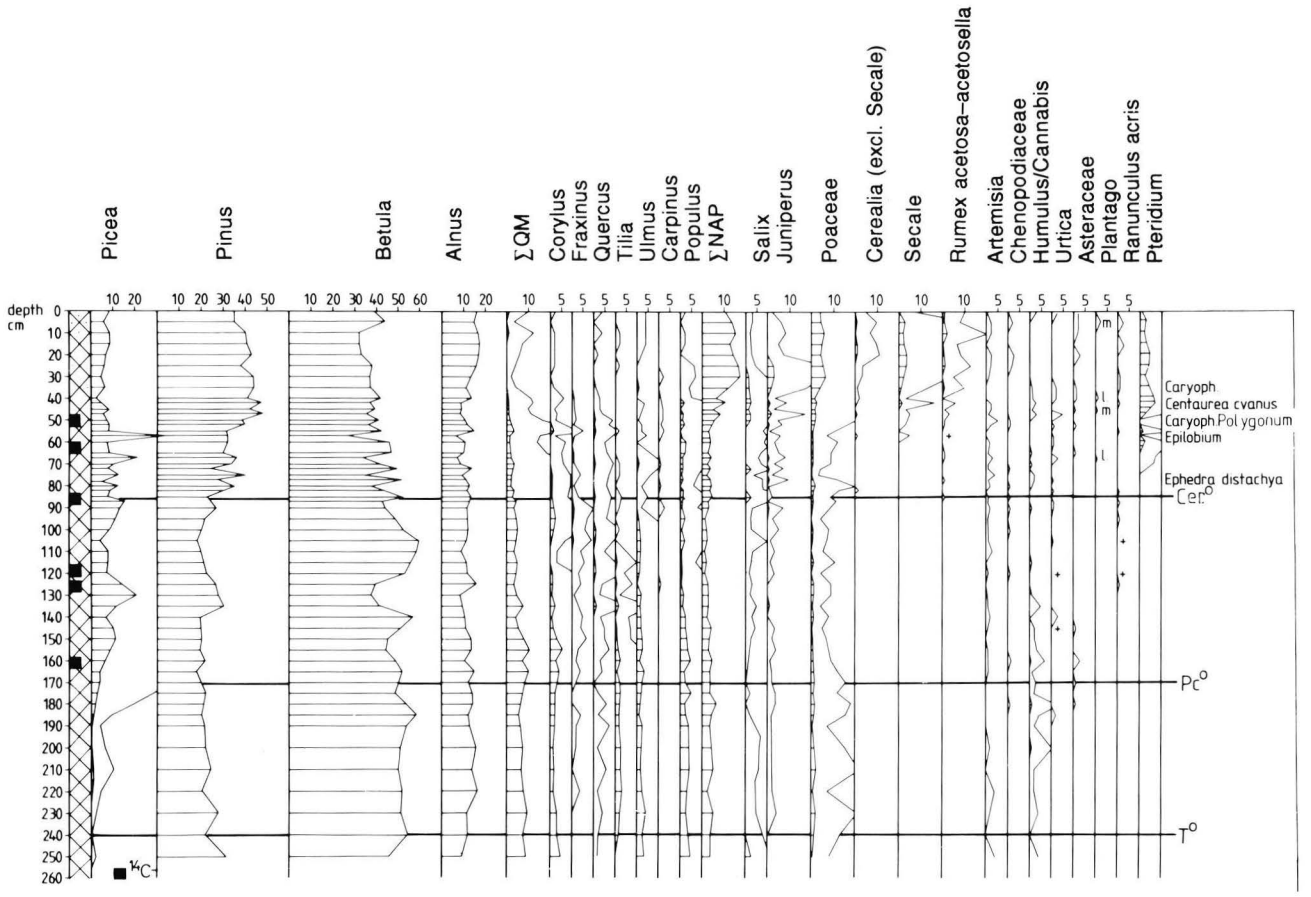

Fig. 13. Lake Asilammi: relative pollen diagram of main pollen types. The percentage base used was Σ AP for trees and Σ P for others.

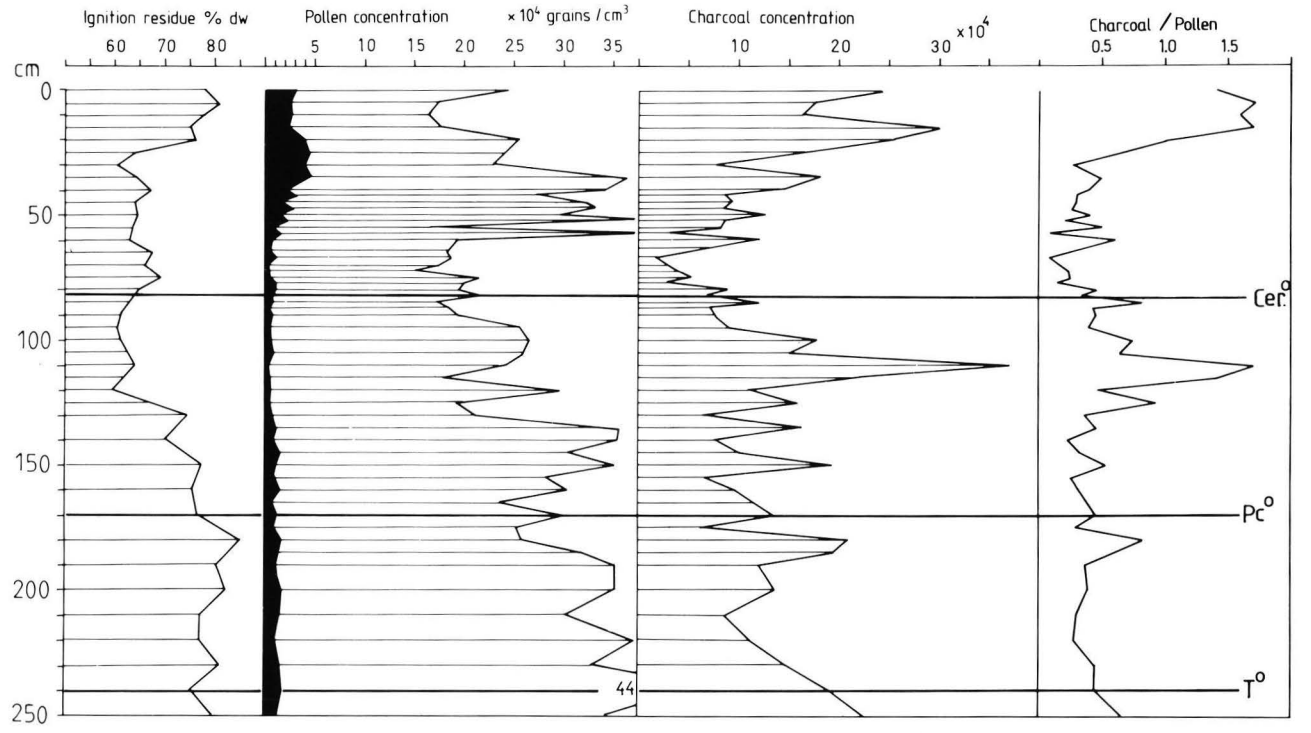

Fig. 14. Lake Asilammi: ignition residue of the sediment, pollen and charcoal concentrations x10^4 pollen/cm^3 and charcoal/pollen ratio.

These are indications of a period of disturbances and water level changes which accelerated soil erosions in the catchment. The sediment accumulation in the basin was high. The Ancient Lake Päijänne level originated around 6000 yr B.P. as a result of a transgression (Saarnisto 1971). The altitude of this shore level is c. 95 m a.s.l. in Kuhmoinen (Ristaniemi 1987). According to the lithology, the homogenous coarse detritus gyttja at 160–125 cm is explained by deposition of sediment in an isolated kettle hole.

From the level of 160 cm upwards to 125–130 cm (phase A-1), a further gradual increase of spruce and a decrease in QM occurs. The homogenous character of the sediment suggests a more or less peaceful phase of sedimentation. However, the sediment accumulation rate was relatively high (0.7 mm/yr average), if calculations with the radiocarbon ages and the relative pollen stratigraphy are used. The curve for ignition residue shows a slight declining trend, but the sedimentation data indicate no inwash of allochthonous material. The lake increased in productivity, but the relatively high ash content is due to increased silica originating from autochthonous biogenic input. A dramatic shift in the stratigraphy occurs at 125–130 cm. The falling trend in the ash curve suggests a long-term change in the trophic status of the lake. Sediment accumulation rate is an average c. 0.3 mm yr^{-1}.

Mineral erosion in the catchment area is seen at levels between 110 and 80 cm (A-2). Interrelated fluctuations in the *Picea* frequencies associated with high charcoal peaks (Fig. 14) dominate this sequence, following the period after c. 4200 yr B.P. (c. Cal. 2800 B.C.). The sediment is laminated. The thickness of the white, black or grey bands vary considerably, but visual inspection could not confirm their formation as annual varves. The light-grey clayey horizons indicating erosion serve as marker levels of forest disturbances within the watershed. Most of the horizons have a clear correlation with decreases in the *Picea* curve.

Pollen analysis of the core reveals the beginning of human interference at 82.5 cm, where the first cereal pollen was found (Cer.^{0}, absolute limit). Sporadic pollen grains of *Rumex acetosa* and *Ranunculus acris* were found below that level to the onset of disturbances at 130 cm. Slightly after the first cereal pollen (A-3, c. 1350–1200 B.C.) cultural pollen increase and become more diverse. Although the single occurrence of Cerealia pollen may indicate that it originates either from local cultivation or equally from longdistance transport, as has been interpreted in comparable pollen diagrams from S. Finland (e.g. Vuorela 1986), in view of the combined microfossil evidence, however, the flushes from environmental disturbances can hardly have been carried to the lake basin outside the watershed area.

A series of cyclic fluctuations in percentages of *Picea* and *Betula* pollen, indicate local interferences. Along with *Picea* and *Betula*, the QM vanishes and non-arboreal increase. A pollen grain of *Ephedra distachya* is present at 77 cm. Many of the *Ephedra* pollen found from South Finnish post-glacial sediments are thought to originate from late-glacial or early post-glacial deposits, moraine ridges or eskers adjacent to the basin for pollen profile (Glückert 1979, and references therein). Redeposition of older material is evident (e.g. at 75 and 65 cm), making it impossible to date or to calculate annual pollen deposition rates for this period. Water-level fluctuations in post-fire environments with consequent inwashing of mineral soils from open ground could be of natural causes, but repeated cycles with cultural indicator pollen appear as a positive indication of human activity.

The forest clearance for cereal production is indisputable from 57.5 cm (about A.D. 200–400), where *Secale* pollen is present (Cer.$^{+}$, Sec.$^{+}$, empiric limit). *Populus*, *Betula* and *Picea* decrease as a consequence of slash-and-burning. An increase in non-arboreal, *Juniperus* and *Alnus* pollen show the secondary succession in post deforestated circumstances. Coincidently with the onset of the Cerealia curve, the spruce decline (Pc^{-}) is a permanent feature (55 cm). The pollen concentration values show a marked increase, which can be partly due to increased productivity of the forests around clearings or to better pollen dispersal of the non-local component. The rise in NAP clearly indicates slash-and-burn cultivation with species, such as *Epilobium* (cf. *Chamaenerion*), *Melampyrum* and *Pteridium* prefering high ash-content in soils. Later stages of succession on burnt-over land gradually developed into secondary forest e.g. *Salix*, *Juniperus* and *Corylus*.

At 40 cm level (A-4; c. A.D. 800–1000), *Secale* and non-arboreals such as *Rumex*, Poaceae and *Ranunculus acris* become most

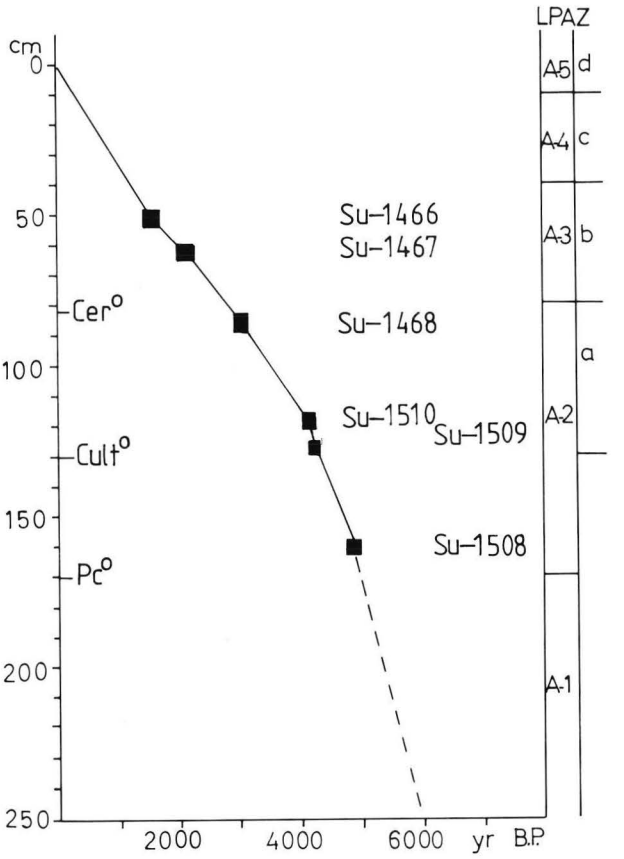

Fig. 15. The conventional radiocarbon ages from Lake Asilammi plotted against sediment depth. Local pollen assemblage zones (A: 1–5) and local cultural phases (a–d) shown in the right margin.

frequent and subsequently slightly later at 30 cm the ignition residue curve rises, due to "field erosion" (Tolonen et al. 1975) (Cer.$^{++}$, rational limit). Intensive land-use within the watershed increased the nutrient input into and the primary production of the lake; this organic load led to the formation of dark clay-gyttja with a high sulphide content in the 30–12.5 cm sequence of the core. In the topmost 12.5 cm of the diagram (about A.D. 1700-recent) the decline in the *Secale* curve and non-arboreals shows the change to advanced agriculture, which is also shown by the grey clay-gyttja of the sediment. The proportion of organic material in the sediment decreases to c. 20 % as a consequence of heavy load of clay from the surrounding fields (Fig. 14).

5. Role of fire on the hillfort and the surrounding forest

5.1. Fire scars and fire frequency

The studied Scots pine stump reached an age of 305 years on the hill terrace before it was cut in 1935. The evidence from the rings and fire scars shows that the tree survived at least six fires, the first one in 1730 and subsequent ones in 1766, 1783, 1813, 1858 and 1897. The fire of 1813 was the most severe, as it burned through the bark and cambium, destroying approximately 30 % of the tree's circumference. The tree had begun to form a buttress after the 1783 fire in response to previous fire damage and its location alongside a stone. Buttress growth was fast and enough to support the tree to keep it upright, while on the opposite side growth was extremely slow during the later years (Fig. 16). The fires occurred at intervals of 36, 17, 30, 45 and 39 years, respectively from the oldest to the youngest, after the first fire when the tree was 100 years old.

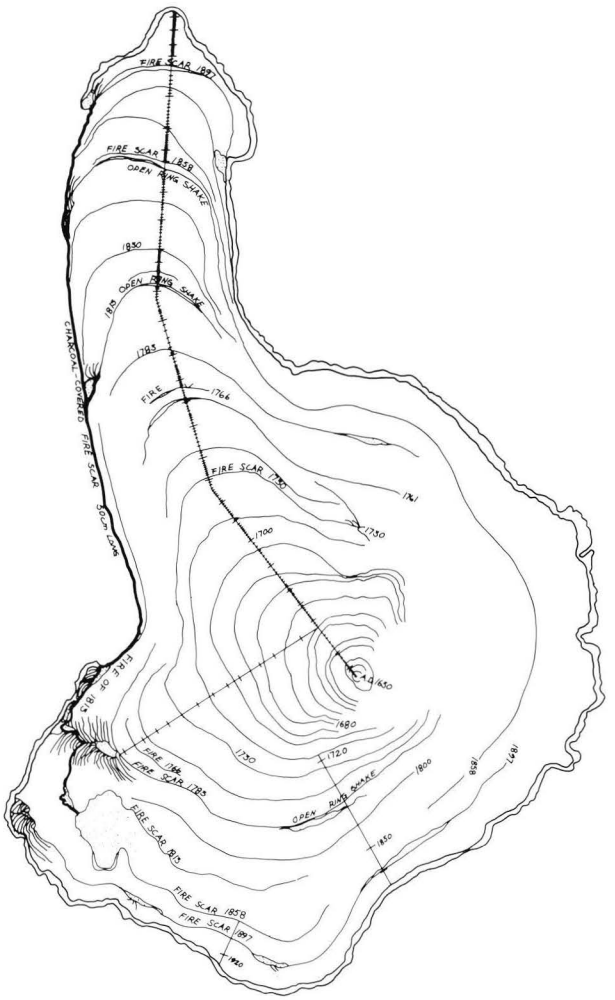

Fig. 16. Cross-section of the Scots pine stump (*Pinus sylvestris*) showing the main events in its history. The tree grew from A.D. 1630 to 1935.

5.2. Coincidence of fires with fire horizons in the soil profile

Several *in situ* fires on the Linnavuori soil site are recognized as layers of charred particles, visible to the naked eye as a band in the core. There are 7–8 distinct horizons with macroscopic charcoal fragments in the open peat and soil face (Fig. 10). Subsequently, the number of 8 fires in all was inferred form countings of microscopic charcoal fragments in pollen preparations.

In the peat section, (between 0 and 27 cm) some horizons are clearly defined, e.g. the two uppermost ones viz. at 10 cm and 13 cm, one quite distinct and thin at the 18–19 cm level, and a woody layer (pine) lies above a relatively thick charcoal horizon. At the 20–22 cm level, the charcoal horizon is more diffuse making identification difficult. By comparing the stratigraphy with the microscopic charcoal data (Fig. 12), it is concluded that there were two separate fires during this period. Another diffuse charcoal horizon was formed on the mineral soil surface (30–35 cm), and it is not possible to distinguish separately single fires in this sequence. Although it is possible that there were several fire events in all, the charcoal sequence is associated with bioturbation and downwash in the raw humus stage, as well as low accumulation rates of organic matter during the time of burning. The lowermost distinct layer of charcoal was found at 38–39 cm in humic sand. The lower boundary is very diffuse suggesting movement of particles into the basal clayey silt. The number of fires must be considered a minimum estimate for the core.

Considering the local phytogeographical and climatic characteristics, it is quite evident that on top of the rocky hill, having a very thin organic soil layer and sparse vegetation cover, fires easily swept over the whole area. The distance of the soil site from the pine stump is some 70 metres (at different terraces). It can be stated that the charcoal layers distinguished in the soil site are contemporaneous with the fire scars on the pine stump, and fire events in the soil core can be cross-dated with confidence. The 1813 fire, which burnt most of the pine trees, seems to have been very severe in the hollow.

Between the levels of 10 cm and 28 cm all six fires are recognized, viz. 1897, 1858, 1813, 1783, 1766 and 1730. A date of 100±60 yr B.P. (Su-1464) when calibrated (Stuiver & Pearson 1986) suggests that deposition accumulated "later than A.D. 1680". Based on the average growth rate of the sediment profile (see p. 260) the underlying fire date of 1730, and the whole chronology seems fairly reliable. Based on the ^{14}C-date Su-1465 at 36–37 cm, the fire layer below was formed c. A.D. 600–700. It can be concluded that the sequence of 28-36 cm spans a period of a thousand years, and in archaeological terms the late Merovingian, Viking and Crusade periods as well as Medieval times.

The shallow basin is saturated by rainwater only. It has been claimed that during the "active period of the hillfort" there was a "well" to collect excess water from the site (Appelgren, National Board of Antiquities, Topographic Archives). The stratification of the core is visually undisturbed. As the whole hollow was not excavated during the field work or cleared from the present vegetation, no signs of a "reservoir" proper were found. It thus remained a possibility that the main spot of a former depot of water lies next to the sampling site.

The formation of peat itself implied water-logged conditions. Analyses of macroscopic plant remains and microfossil studies show that the bare mineral soil, being nutrient-poor, acidic gravelic till in upland environs, lead to the invasion of heather, cotton grass and sedges. After becoming buried beneath bog mosses (*Sphagnum*), podzolization of the soil continued. The fire at the 26–27 cm level was followed by a rising water level, and highly consolidated muddy peat was deposited. Fires and fallen trees obviously impeded drainage and led to final soil waterlogging. Deciduous shrubs, consisting of alder, birch and willow, were growing at the site before the fire of 1730.

In the sample of 29–30 cm, c. 2 cm below the contact of mineral soil and organic deposits (cf. ignition residue curve in Fig. 12), an open-water phase is postulated.

5.3. Fire disturbance on the Linnasuo bog

The abundance of charcoal (Figs. 10 and 12) both macroscopic fragments visible in the core, and microscopic soot particles visible on the pollen slides from the long profile spanning about the last 9000 years, indicates a period of low fire frequency when birch, alder and other deciduous trees were the dominant forest trees around the site (between 7000 and 5000 yr B.P.). After the spruce migrated between 4800 years B.P. to c. 3500 yr B.P. (Cal. 3000–1700 B.C.) 14 burned layers were recognized in the core. From around 3500 yr B.P. (cal. 2000–1700 B.C.) to c. 1700 B.P. (A.D. 200–300) 12 peaks in charcoal abundance and drastic fluctuations in *Picea* pollen frequencies indicate recurrent periods of distrubance. High charcoal concentrations, denoting frequent fires at c. A.D. 200–300 to A.D. 500–750 (51–63 cm in the profile), may be of man-made origin, too, since appearances and increases in pollen types indicating cultivation and forest clearance are found.

Distinct charcoal layers in the stratigraphy presumably reflect the proximity of the fires. That five clearly defined fire layers at the 42–47 cm sequence were found, indicates *in situ* pulse events on the bog appear to be differentiable. The spruce pollen percentages show that this tree was especially vulnerable to fire and was slow to recover. At the 34–42-cm level the weakly decomposed peat suggests a progressive increase in peat growth. Equally, there is no sign of burning (a period of some 250–300 years). At 30, 31 and 33-cm levels distinct fire horizons were found. The intervening sequence from 31 to 33 cm, again, is composed of weakly humified peat and shows a period of recovery. Estimated from the age/depth curve, the 30-cm level can be dated to c. 700–800 years B.P. (Fig. 9).

In the top 5–15 cm of the peat core there are six distinct fire horizons. The intervening sequence from 30 to 20 cm is of rather

weakly decomposed ericaceous peat and the 15–20-cm section of highly humified peat. Data from pollen analysis illustrate a record of cultivation and clearances from the 15-cm level upwards. The impact of land clearance and continuous human activity is estimated from the age/depth curve beginning about 250 years ago. This is in accordance with historical documents (unpubl. manuscript by Lindén, National Board of Antiquities, Section for prehistory, Topographic Archives) that report modern settlement in the region to have begun in the early 1700's and 1800's.

On this basis, a correlation of the fire scars of the pine stump dated back to A.D. 1730, with the fire events in the peat core at 6, 8, 10, 13, 14 and 15 cm, illustrates a record of disturbances that are considered synchronous in the area.

5.4. Relationship of the lake sedimentary record to the fire chronology

Charcoal concentrations were calculated for the upper core section for Lake Linnajärvi, representing the last 5000 years. Data indicate that the record, by its main trends, is similar to the regional pattern of fire frequency in South Finnish lake sediments. The sediment type does not allow any fine resolution analyses (K. Tolonen 1986). Charcoal concentrations are high for periods roughly representing Pc^0, Qm^-, Cer^0 and Cer^+ in the pollen stratigraphy. The charcoal in the top 15 cm of the Linnajärvi sediment is the combined sedimentary record of several fires during the last past centuries.

At the 42-cm level, there is a single charcoal peak followed by an increase in the ash content of the sediment, at 40 cm. Many pollen grains (especially those of coniferous trees) were broken or degraded in the same horizon as well. The abundance of charcoal is associated with the first appearance of Cerealia pollen (*Hordeum*-type, absolute limit, c. 200 B.C.–A.D. 0). In the light of the evidence, it seems probable that an increase in soil erosion from local human activity took place within the watershed of the lake.

A peak in charcoal concentration (Fig.3) associated with pollen of *Cerealia* (including *Secale*) and *Linum* at the 32 cm (c. A.D. 250–450)-level, suggests that local slash-and-burn clearance took place. The composition of the sediment below the 20-cm level shows no increase in erosion of organic soils in the catchment. No exact dating for the event can be given, but an estimate can be made with the aid of the spruce decline at the 20-cm level (Fig. 2). The spruce decline in southern Finland generally is dated to the Late Iron Age. The decline is thought to have been caused by intensive forest clearances (e.g. Huttunen 1980). In the pollen diagram from the Linnasuo Bog, which is situated in the same catchment area as Lake Linnajärvi the decline of spruce is detected at 45 cm. In both cases the age/depth curve gives a rough age of A.D. 700–800.

It appears from this study that the ecological interpretation of sedimentary charcoal, and thus fire history, and its reflection of fire frequency for a region, is impossible from a single lacustrine site. I conclude from the pollen evidence that intensive cultivation and land use took place in the area during the time represented in the top 15 cm of the Linnajärvi core. Also charcoal concentrations show maximum values. Because of the relatively limited resolution of the matrix, the high charcoal concentration is an accumulated record.

It its main trends, the sedimentary charcoal in the Lake Asilammi core coincides with the foregoing interpretation. During the pre-agricultural period, between Pc^0 and Cer^0, several peaks in charcoal abundance indicate periods of high fire activity, with maximum values found in sediment deposited at 110 cm (3750–4000 B.P.). The final increasing trend from c. 60 cm (Cer^+, $Secale^0$), 2250 years B.P. precedes the *Picea* decline. Single charcoal peaks may be considered as single pulse events that occurred outside the lake basin. At 85, 60 and 40 cm, minor peaks may be associated with the Cerealia pollen findings in the pollen diagram. Taking into account several processes in the lake basin, such as bioturbation, erosion, redeposition and sediment focusing (Davis & Ford 1982), the charcoal record may be attenuated significantly. There are several explanations for the major increase in the top 20 cm including the following: 1) fires were frequent or regionalized, 2) charcoal is derived from accidental domestic fires, as those burning the church village e.g. in 1753 and in 1783 (Suvanto 1965), from intentional clearances as well as from wild fires, but those cannot be differentiated from each other, and 3) charcoal from fires was widely dispersed.

The correspondence of the data from the two lakes, provide information on the background pattern of fire disturbance on a regional scale.

6. Discussion

The chronological and ecological context of the peat-covered hollow on the top terrace of the hillfort in relation to the prehistoric and historic "active period" of the site is to be discussed in relation to the stratigraphy and microfossils. The episode corresponding to the "active period" with stone and earth movement for the building of defensive walls relates to the end of Iron Age and Medieval times (Taavitsainen 1990). As discussed in the foregoing paper the site was used as a position of defence against invading enemies. The theory is proposed that human activity resulted in the destruction of local forest.

The present data shows that at around 1500 years ago, mineral soils at this terrace were well drained, with accumulation of mor humus following a fire. Deep mor layers, as well as the humus – iron pan, may prevent vertical drainage, and thus, accelerate the growth of the mor (Iversen 1964). A *Calluna* maximum which is distinctive at the base of the mineral soil profile, and the subsequent mass presence of dark-coloured fungal hyphae in the humus layer, illustrates well an old soil. The fungal hyphae and pollen assemblage became buried in the mineral soil quickly, as pigmented hyphae (living hyphae) develop in the litter layer and large fragments remain undecomposed if decomposition is retarded, as in the present case (Andersen 1984).

The microscopic study revealed two phases of open water (at least for part of the year). The latter was subsequently succeeded by paludification, which within the coarse limits of the radiocarbon chronology, took place after A.D. 1680. Charcoal fragments are common within the mor sequence, thus proving that fires gradually accelerated peat growth by waterlogging of the ground. Several microfossils, such as algal and fungal remains, are valuable indicators for two local open-water phases.

Round silica cysts of Chrysophyceae and diatom frustules occurring in the sediment layers, are often regarded as typical oligotrophic algae. In most studies dealing with the ecology or taxonomy of fossil statospores of Chrysophyceae, they are preserved in lake sediments only. Many of the diatom taxa are indisputable terrestrial species of small moist hollows, wells and mosses, while some of them are "free water" periphyton species. The general topography and basin morphometry suggests that there was human disturbance. Since no mixing of sediments revealed by core stratigraphy or by the pollen chronology in the small open face of the dwarf-shrub and tree-covered hollow could be demonstrated, the small pool was probably situated aside the coring-site proper.

The lower open-water sequence in the mineral soil section of the study core reflects the lateral penetration of moisture (overflow). Chrysophyceae responded to changes in wetness by encysting rather than migrating, hence retaining their position in the stratigraphic sequence. No precise statement about earlier conditions, in the water body can be made as the biological affinites and ecological demands of most cysts are unknown or poorly described (see e.g. Gronberg 1985, 1986).

The pollen data of the Linnavuori mor-humus stage relating to human influence on the vegetation is interpreted as reflecting trampling and grazing on disturbed habitats that encouraged the spread of weeds and ruderals. Although the Poaceae account for the greater part of the NAP, the diagram shows a diagnostic local flora of successional stages including weeds and sprouters on cleared mineral soil. The degree of vertical mixing of sediment and pollen cannot be deduced. The hill-top has been periodically treeless or cleared, as implied by the fairly high frequency of open ground herbs in the core.

No specific sedimentary hiatus can be identified, but it is evident that fires slowed down or stopped sediment accumulation. Although there is no apparent mixing of pollen assemblages, the possibility of vertical transport of pollen within the mineral section must be considered (Havinga 1963), however. Transport did

not affect the overall pollen assemblages and pollen zones. The presence of single cereal-type pollen grains throughout the analyzed levels makes it questionable to be used as a chronological marker pollen. As the occupation area of the hillfort is on an elevated, rocky and limited location, the cereal pollen can be largely of regional or long-distance origin apart from the local pollen components. Alternatively, during periods of deforested lowlands around the hillfort, effective pollen dispersal through upslope winds occurred. Thus, high numbers of secondary pollen of weeds originating from cleared mineral soils, was combined with regional pollen.

On the basis of the complex pollen dispersal mechanism for the Linnavuori soil site no conclusions can be drawn on local cultivation practices either in space or time. In view of combined pollen-analytical evidence (Lakes Linnajärvi and Saaresjärvi) for the laying out of slash-and-burn clearances in the vicinity of the hillfort, there seem to have been non-agricultural periods in the late Iron Age – early Medieval times.

The open-water phase in the Linnavuori soil core was followed by intense washing in of organic material. This change, together with alterations in some herbaceous pollen components suggests destabilized soils. The above-lying sediment is rich in wood charcoal fragments indicating that the reforested hollow area had been severely disturbed by fire leading to additional water influx to the hollow when the vegetation was destroyed. The beginning of peat formation was dated to the early 1700's. The fire that preceded the high water stage, and final *Sphagnum* growth, took place in 1730 based on the fire scars. Dating is possible only because of the peculiar topographic feature of the study area. The stratigraphy suggests that the forest succession has been interrupted later by five fire disturbances leading to reforestation in the early 1800's.

The absence of cereal-type pollen records in the Linnasuo bog profile at levels dated to around the Viking and Crusade Periods is noteworthy, and thus evidence of farming over a period of the "active phase" on the hillfort is lacking. As with the adjoining Lake Linnajärvi, three major instances of erosion occurred in the catchment of the basin, i.e. at the onset of the first slash-and-burn clearance (around the 4th century A.D.), and cultivation (about 250–200 years ago). The middle one, dating approximately to the early Middle Ages (estimated from the age/depth curve) indicates that the forest was burned. Culture indicating pollen, including a few Cerealia pollen, was found in the analyzed horizons. Generally it can be concluded that although the local forest pollen zones are synchronous and show the same developmental pattern, it is possible to demonstrate that due to different depositional processes in the basin, there are considerable differences between the assemblages of the lake Linnajärvi and Linnasuo bog diagrams in the horizons deposited during the Medieval times. Concerns relate to the temporal and spatial variation of pollen frequencies. The peat profile is seen to provide a more sharply defined picture of the response of both AP and NAP absolute and relative values and hydrological changes than the lake sediment profile. The rather regular tree pollen curves in the lake profile in the long run likely are smoothened, and pollen and charcoal evidence of disturbance of vegetation around the shores of Lake Linnajärvi – likely to be associated with accelerated fires and logging – suggest suspension and mixing of pollen in the water normally present in lakes. Consequently, Cerealia pollen from regional pollen rain may be present in small frequencies and no definite conclusions can be made if the surrounding areas were cultivated.

The high *Pinus* frequencies at 30 cm (roughly dated to around A.D. 1000) is seen to be over-representated from increased pollen source area in post-fire environments. Again, the highest pollen numbers of Cerealia (*Secale*) reflect high cultivation activity in the Asilammi profile in the horizons deposited at the same period. The data are sufficiently characteristic to serve as evidence of rapidly increasing cultivated land around the church village. Given the inherent inaccuracies in the dating techniques, the contemporaneity of this with the phase of activity in the hillfort cannot be precisely determined.

In view of the Asilammi pollen diagram, it is evident that there were extensive clearances and obviously the regular field systems by the 10–12th centuries A.D. The Asilammi diagram shows that the surrounding forests were severely exploited two centuries earlier, and the spruce extinction (Pc^-) signifies development well. An evaluation of any set-back or break in Medieval agrarian development is not possible, due to the low resolution of the matrix.

A crucial problem with the interpretation of the post-settlement vegetation succession, is differentiation of the relative influences of climatic, edaphic and anthoropogenic factors on the ecological changes inferred from palynological records. Commencement of accelerated peat formation at the Linnavuori soil site in the early 1700's as a consequence of a fire, is accompanied by evidence for slash-and-burning practices in the adjoining area. The rate of peat accumulation in Linnasuo varied greatly preceding the fire A.D. 1730. Similarly, the lake sediments of the adjoining Saaresjärvi revealed considerable changes in the water level, the date being estimated to about the turn of the Middle Ages to Modern times. The increased peat growth and rises in water level may partly be explained by strong forest clearances caused by reduction in the over all transpiration.

Reference has been made to the climatic fluctuations of the last 1000 years in Nordic countries (e.g. Karlen 1984). The "Medieval Warm period" occurred between 900 and 1300 A.D., reaching its culmination around A.D. 1100–1200. Signs of climatic deterioration appeared later and cooling resulted in the so-called Little Ice Age climatic episode of the past centuries. The climatically unfavourable phase with many oscillations ended in the 19th century (Lamb 1982). There are written reports of the climatic characteristics of the 17th–18th century in Kuhmoinen documenting the numerous cold and rainy decades (e.g. 1601–1607, 1708–1711, 1741–1756, 1779, 1791), that lead to hardships in the form of failures of crops, famine, epidemics (1630, 1695–1697, 1712, 1780–1783 etc.), and affected life in many ways (Jutikkala 1962). During the earlier part, i.e. A.D. 1200–1600 numerous wars and enemy occupations are known to have taken place in the area (Suvanto 1965). Thus, provided the explanation of changes of climate is applicable on a broader scale, they combined with human disturbance in the background rates causing an increased runoff from the slopes of the hillfort which obviously also became devoid of forests.

There were 21 farms in the early 1500's, and in about 200 years, up to the mid 1700's, the number had doubled in the church village. The increase of the population in those unstable centuries was not simple, however, as many farms became abandoned periodically; in 1607 over 30 % of the existing farmsteads are reported as being unable to pay their taxes. There were mostly from one to three houses in each of the other 11 villages of the parish. A widespread expansion of population began in that area towards the end of the 18th century. Written documents record that the Linnavuori area became settled about 200-100 years ago, which means that cultivation and grazing opened patches of forests. Thus, the palaeoecological evaluation of cultural pollen record from the 18th century on, is coincident with the historically known establishment of agriculture in the area.

The synchronous occurrence of numerous fires makes one speculate an association with the clearings. It is known that in 1753 and 1783, there were several fires in the church village, the former burning one fourth of the houses (Suvanto 1965). The latter fire was recorded also in this study by fire scars on a Scots pine stump reaching an age of 305 years in all. The other five fire scars were dated to A.D. 1897, 1858, 1813, 1766 and 1730. From the viewpoint of the local vegetation history on the hillfort terrace and at the adjoining lowland, the fire events are of importance. Therefore, at this given geological situation paludification is held to be a consequence of a surplus of water becoming in waterlogged post-fire environs. There is no relationship between the pine tree-ring record and climatic factors, as this single tree represents growing circumstances in unusual environs.

7. Conclusions

Three main conclusions can be drawn from this study:

1) There are considerable differences both in space and time that indicate the impact of human activity on the landscape around the main village of Kuhmoinen compared to the wilderness landscape of the parish around the hillfort. The first sporadic occurrence of Cerealia in the Asilammi profile, dating back to the Bronze Age, typically shows the earliest evidence of slash-and-burn cultivation. The earliest signs of slash-and-burn cultivation

of Pälkäne, Tavastia (Häme), date to the same period (M. Tolonen 1981). Discussion have centered on the statistical uncertainty for detecting local or regional pollen sources, much less the indicator value of certain taxa to identify anthropogenic pollen (e.g. Vuorela 1986). Starting in the early Iron Age, and becoming relatively continuous at c. A.D. 300–500, woodland clearance and cultivation resulted in open agrarian landscape in the church village by the end of Iron Age (c. A.D. 1000–1100). In light of the evidence presented here, the first signs of agricultural clearance in the forests around the hillfort started by A.D. 400–500, but ceased by c. A.D. 900–1000. Cultivation only started again in the 18th century at a scale to bring about permanent changes in both vegetation and soils. In the diagrams of the hillfort area, the occurrence of abundant charred particles, cyclic fluctuations in the AP curve, and the low pollen frequencies of arable field weeds point to a late time for the practice of clearing forests by burning; it was only more than some hundred years ago that a change took place to permanent fields.

2) Fires have been an important part of the hillfort ecosystem for at least the past 4500 years. The regional pattern of fire activity shows that in the precultural sequence, the fire rotation was about one fire in every 100 to 150 years. The number of fire scars on a pine stump at intervals of 100, 36, 17, 30, 45 and 39 years within historical time, makes the recent fire rotation for the area significantly shorter than that generally estimated for regions of boreal forests.

3) This case study illustrates that by choosing several basins in close proximity to one another in conjunction with known regional and local vegetation changes, patterns in aerial pollen fallout due to varying air masses over the terrain, can be demonstrated with a high degree of accuracy.

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Abbreviations

ESA	=	Eurasia Septentrionalis Antiqua
FA	=	Fennoscandia archaeologica
FM	=	Finskt Museum
HAik	=	Historiallinen Aikauskirja
HTF	=	Historisk Tidskrift för Finland
HyalM	=	Helsingin yliopiston arkeologian laitos Moniste
KLNM	=	Kulturhistoriskt lexikon för nordisk medeltid
KSIA	=	Kratkie soobščenija IA AN SSSR
KSV	=	Kalevalaseuran vuosikirja
MIA	=	Materialy i issledovanija po arheologii SSSR
SM	=	Suomen Museo
SMYA	=	Suomen Muinaismuistoyhdistyksen Aikauskirja

PLATES

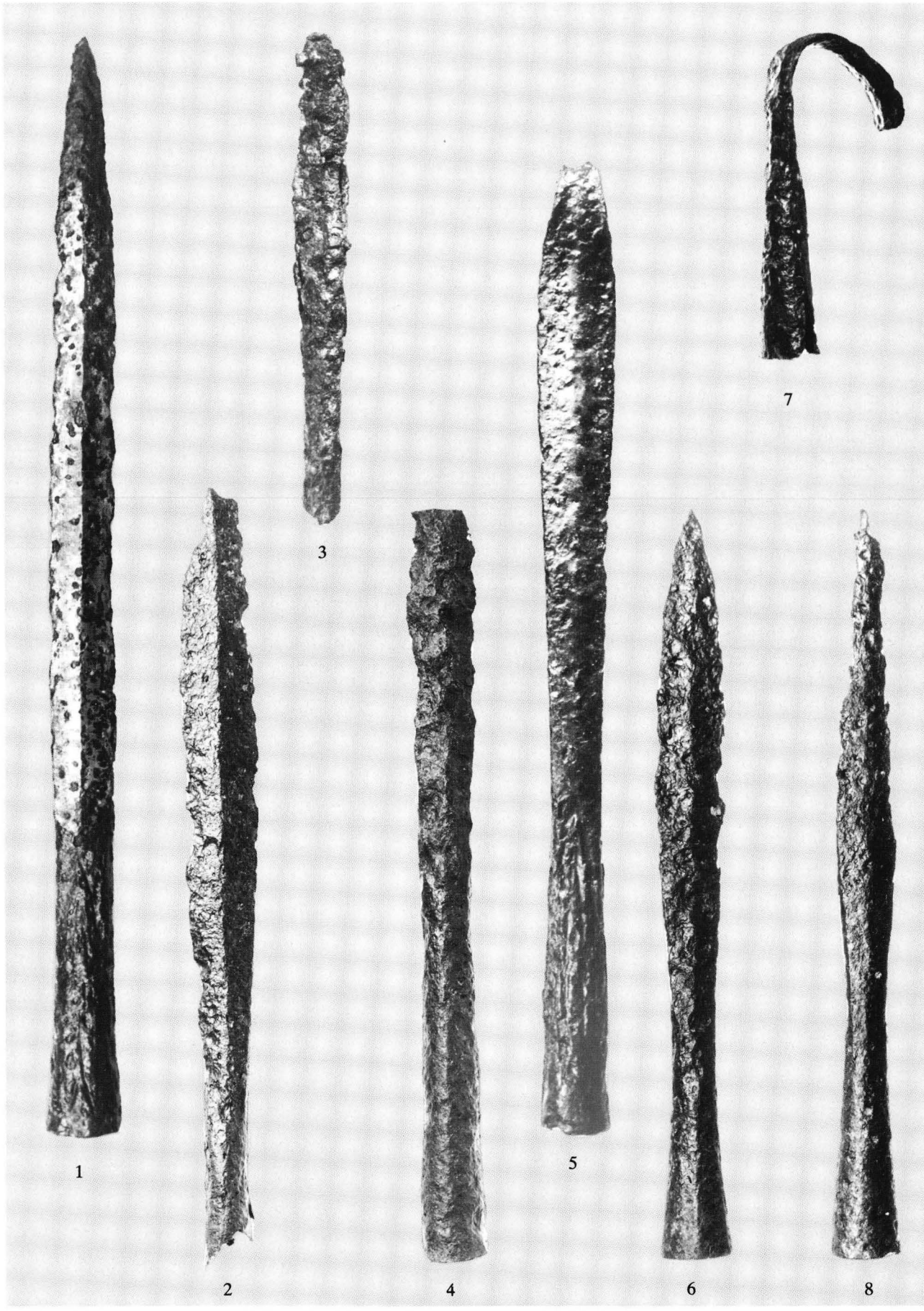

Plate 1. Spearheads: 1 – NM 22445:7, 2 – NM 22445:19, 3 – NM 22445:144, 4 – NM 22445:43, 5 – NM 22445:109, 6 – NM 22445:8, 7 – NM 22445:18, 8 – 22445:9. Scale 3:5.

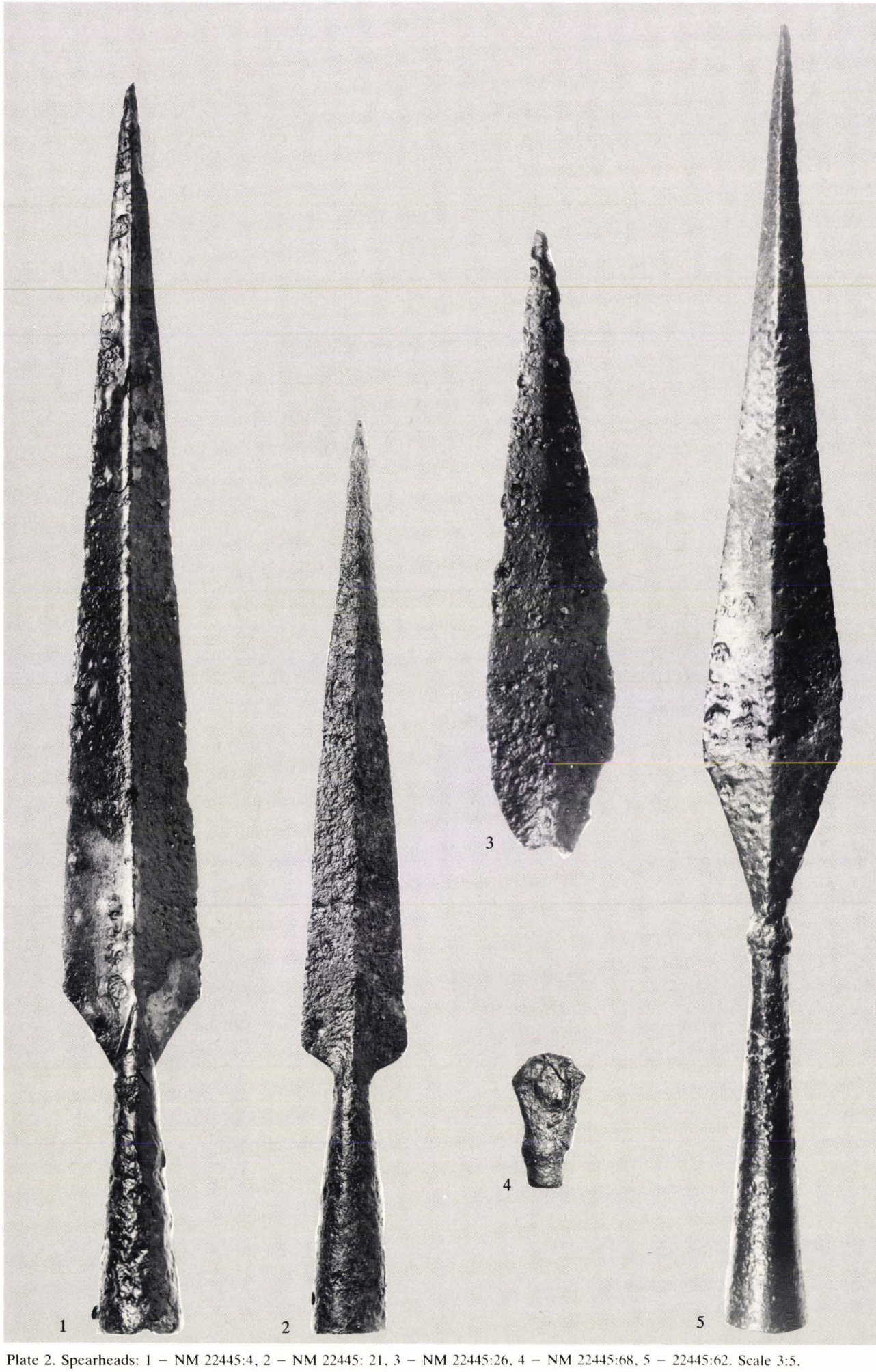

Plate 2. Spearheads: 1 – NM 22445:4, 2 – NM 22445: 21, 3 – NM 22445:26, 4 – NM 22445:68, 5 – 22445:62. Scale 3:5.

Plate 3. Spearheads: 1 – NM 22029:1, 2 – NM 22005:1, 3 – NM 22005:2a, 4 – NM 22445:2, 5 – NM 22445:136, 6 – NM 22445:90. Scale 3:5.

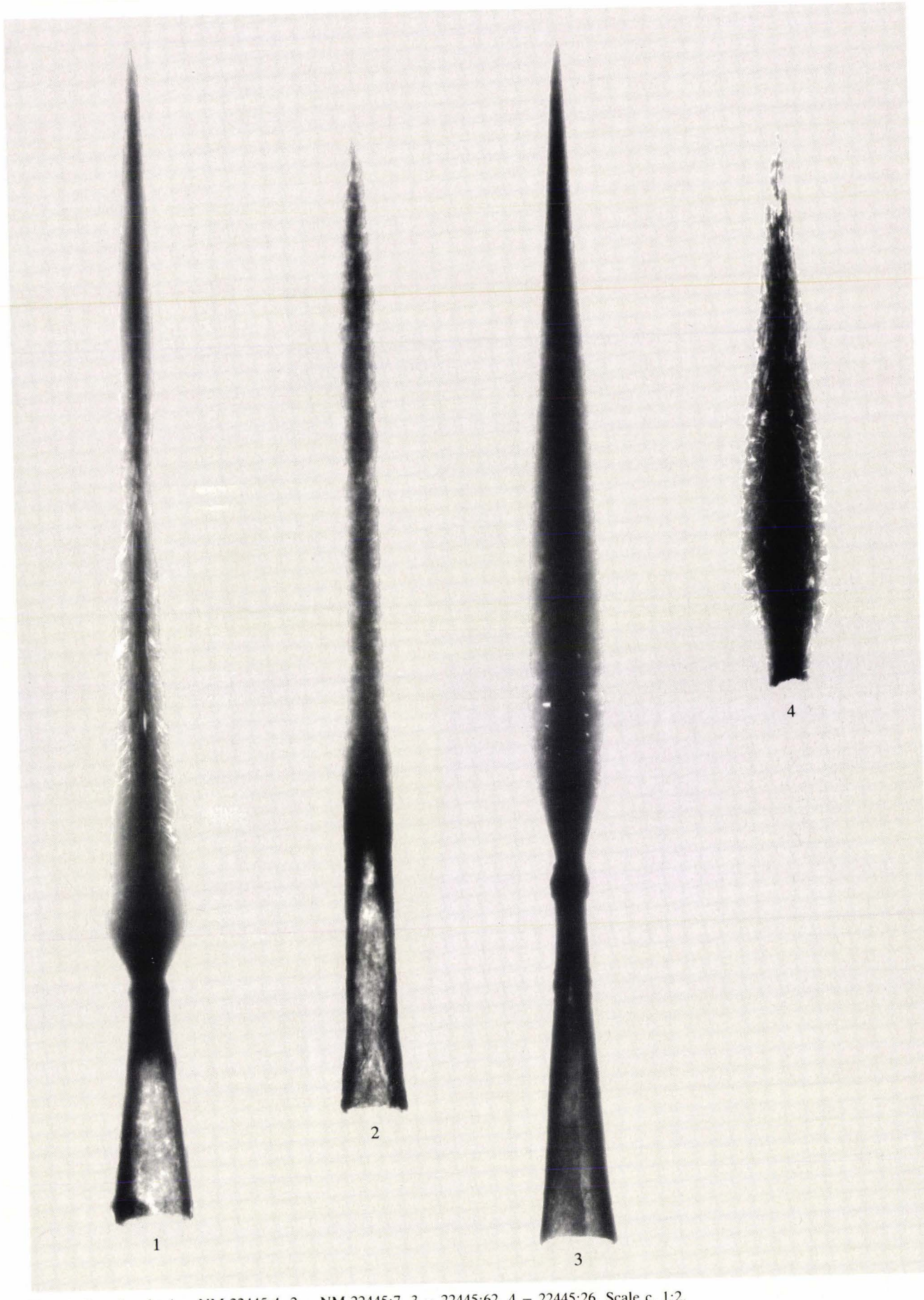

Plate 4. Spearheads: 1 – NM 22445:4, 2 – NM 22445:7, 3 – 22445:62, 4 – 22445:26. Scale c. 1:2.

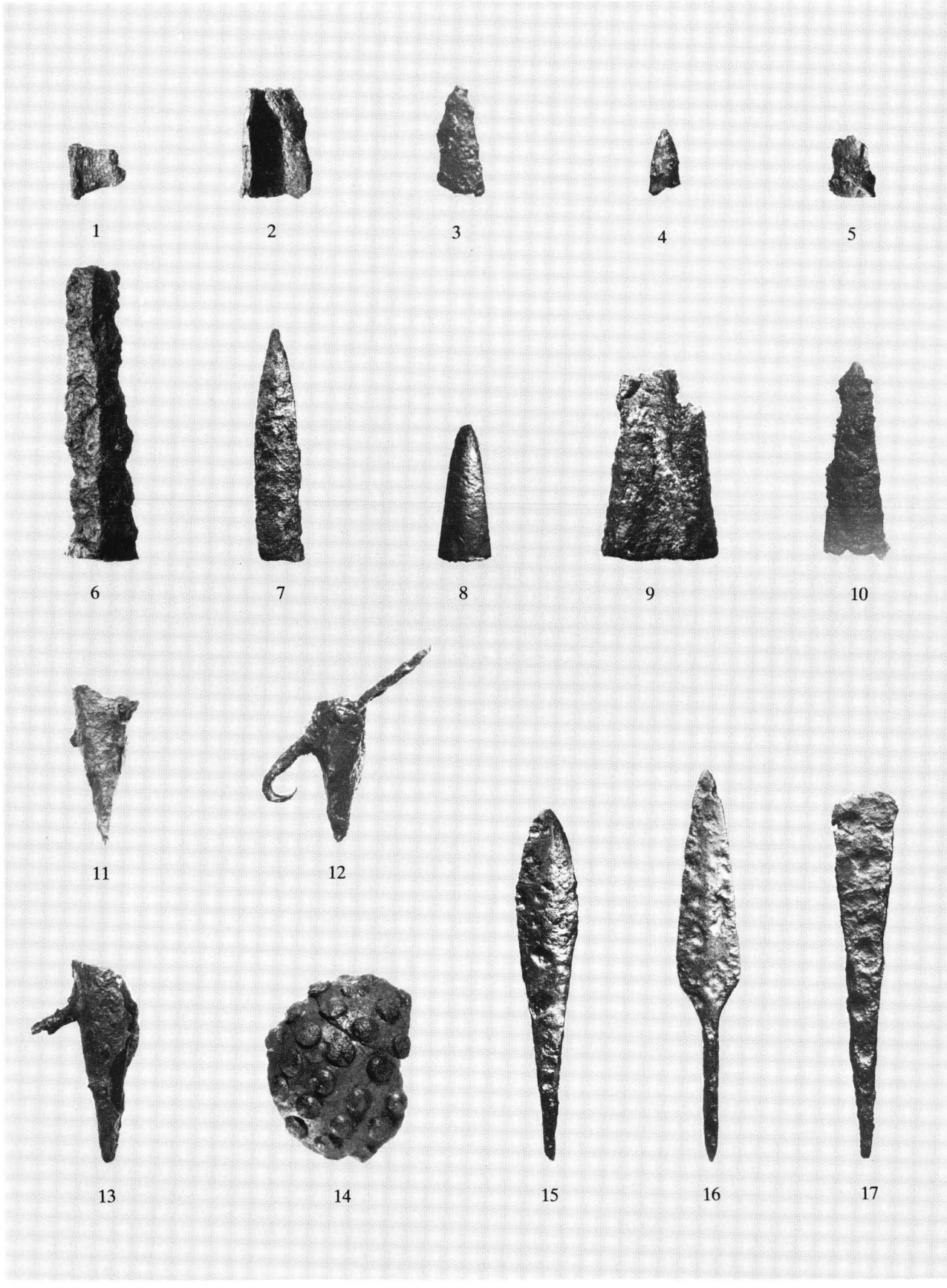

Plate 5. Unidentified spearhead fragments: 1 – NM 22445:149, 2 – NM 22445:209, 3 – NM 22445:218, 4 – NM 22445:226, 5 – NM 22445:13, 6 – NM 22029:2, 7 – NM 22445:122, 8 – NM 22445:128, 9 – NM 22005 :2b, 10 – 22445:96. Spear-shaft ferrules: 11 – NM 22445:52, 12 – NM 22445:190, 13 – 22445:48–49. Lash-ball: 14 – NM 22445:38. Arrowheads: 15 – NM 22445:63, 16 – NM 22445:137, 17 – NM 22445:114. Scale 1–13,15 3:5, 14 1:1.

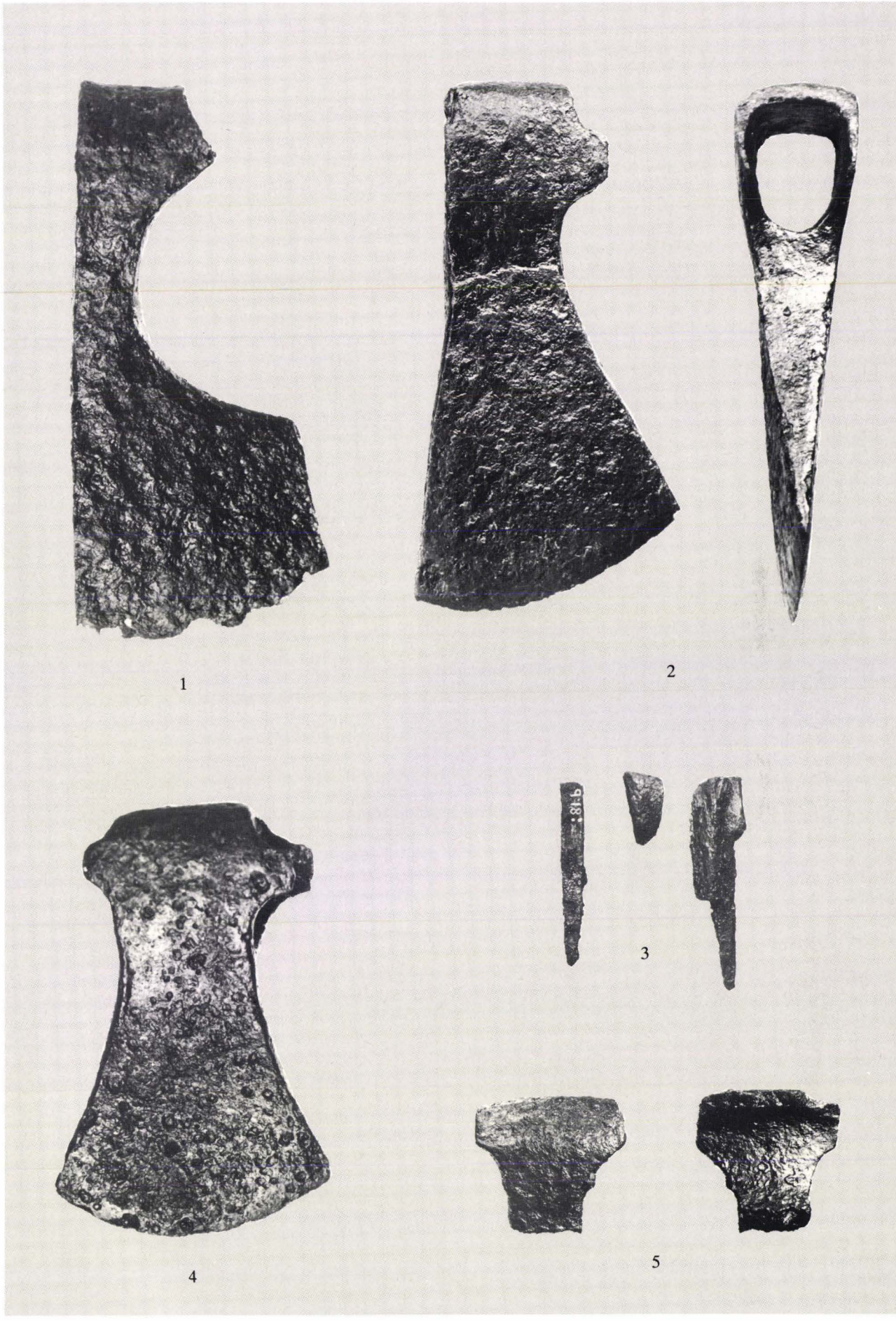

Plate 6. Axes: 1 – NM 22445:31, 2 – NM 22445:81a, 3 – NM 22445:81b, 4 – NM 22445:44, 5 – NM 22445:113a. Scale 3:5.

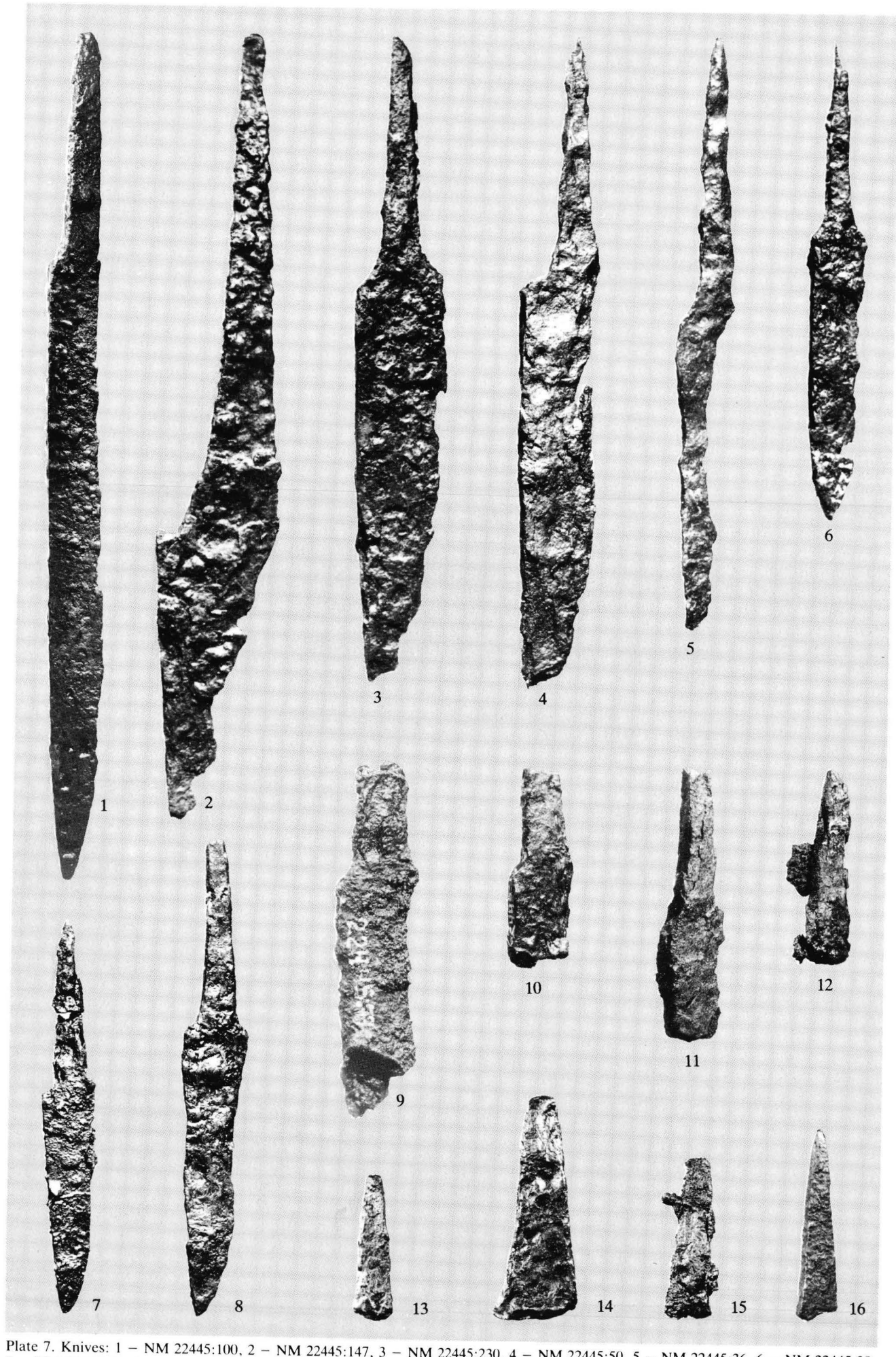

Plate 7. Knives: 1 – NM 22445:100, 2 – NM 22445:147, 3 – NM 22445:230, 4 – NM 22445:50, 5 – NM 22445:36, 6 – NM 22445:28, 7 – NM 22445:78, 8 – NM 22445:131, 9 – NM 22445:77, 10 – NM 22445:160, 11 – NM 22445:185, 12 – NM 22445:130, 13 – NM 22445:222, 14 – NM 22445:94, 15 – NM 22445:75, 16 – NM 22445:125. Scale 1 3:5, 2–16 1:1.

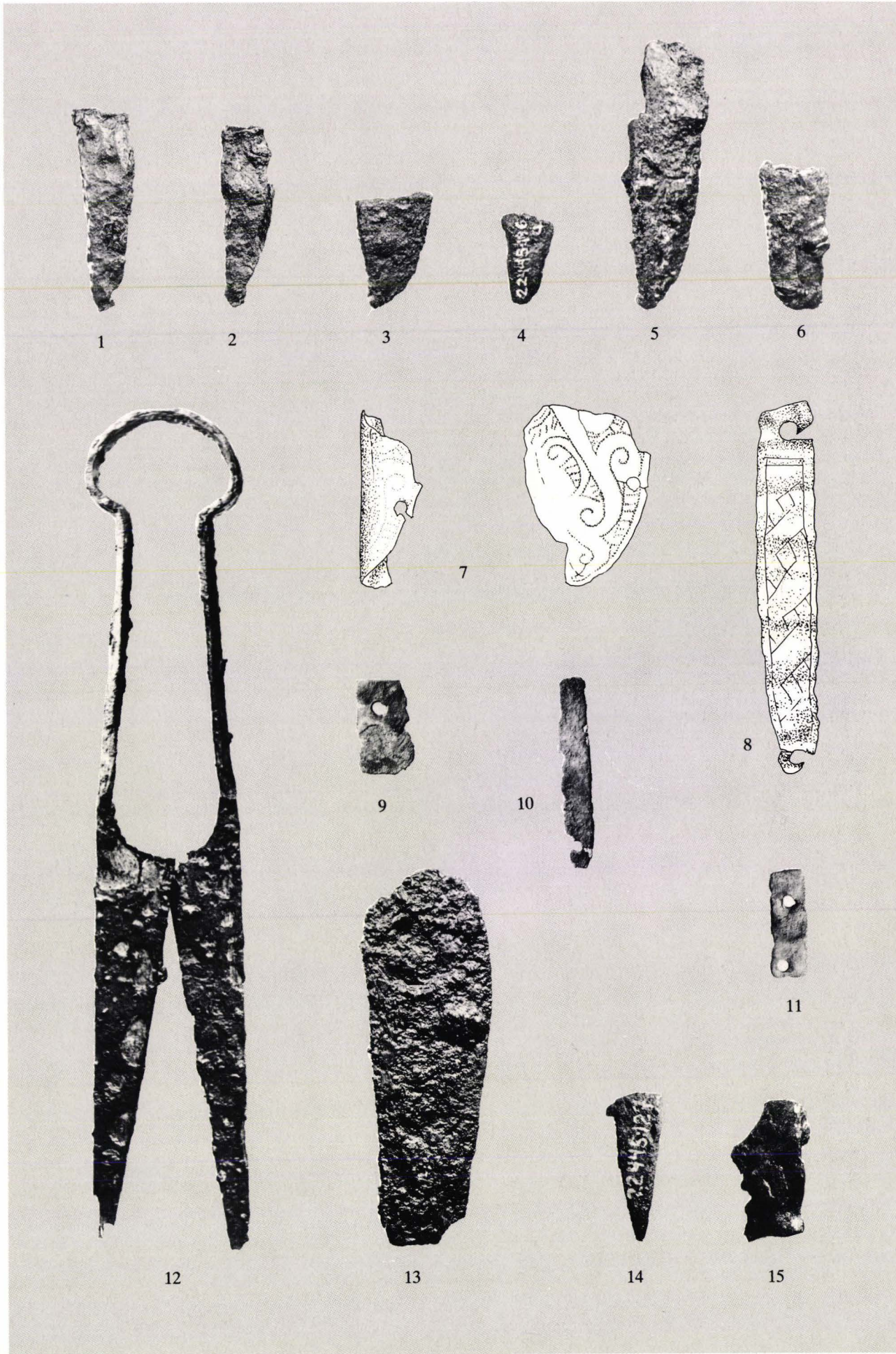

Plate 8. Knife fragments and knife-sheath fittings: 1 – NM 22445:41, 2 – NM 22445:91, 3 – NM 22445:231, 4 – NM 22445:196a, 5 – NM 22445:178, 6 – NM 22445:239, 7 – NM 22445:236, 8 – NM 22445:25, 9 – NM 22445:250, 10 – NM 22445:246, 11 – NM 22445:229. Shears: 12 – NM 22445:6, 13 – NM 22445:129, 14 – NM 22445:127, 15 – NM 22445:158. Drawings Tuula Piili. Scale 1–8, 10–12 1:1, 9 3:5.

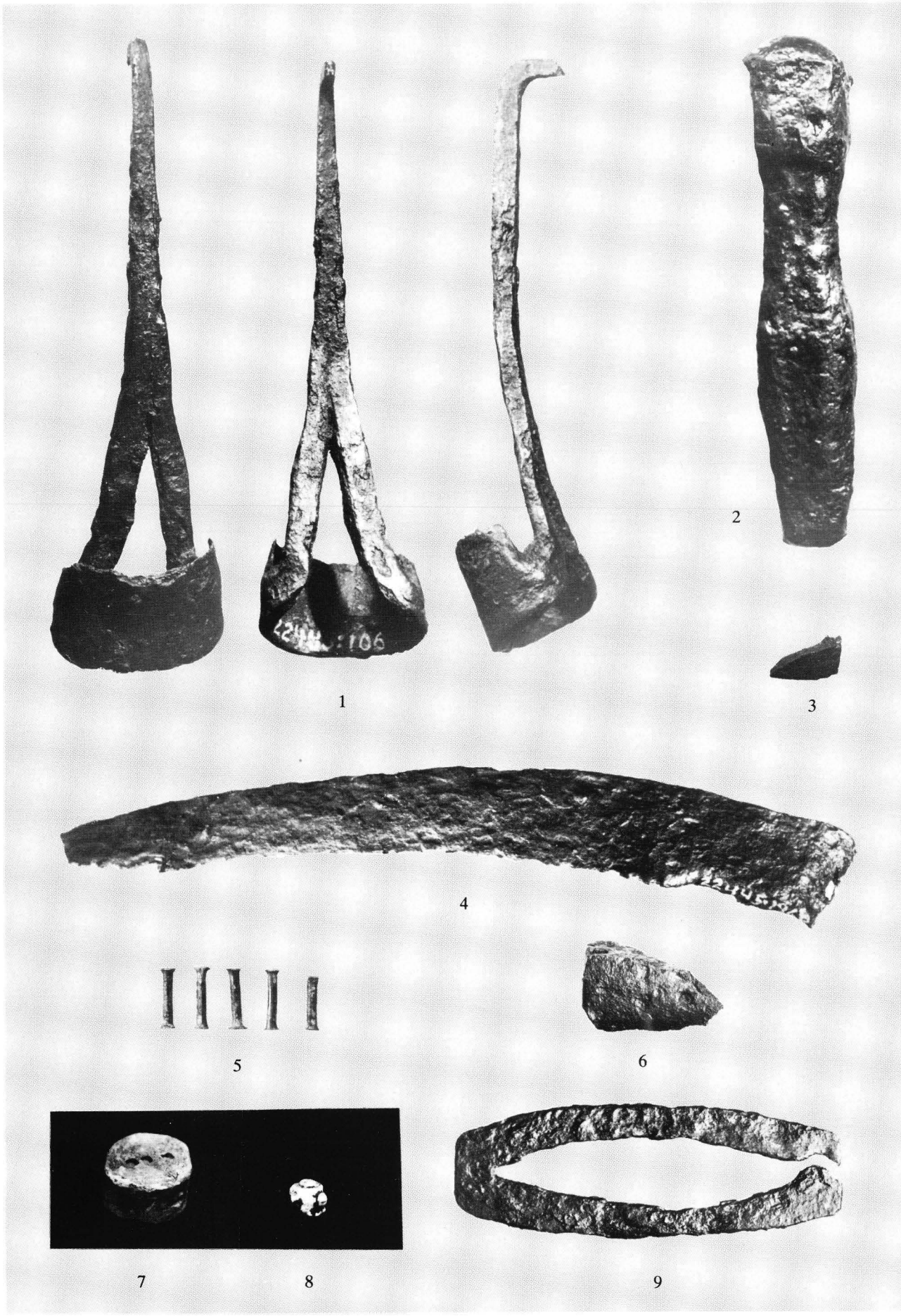

Plate 9. Grooving tool: 1 – NM 22445:106. Punch: 2 – NM 22445: 115. Chisel fragments: 3 – NM 22445:153, 6 – NM 22445:146. Fragment of a sickle or scythe blade: 4 – NM 22445:196b. Rivets: 5 – NM 22445:197. Weights: 7 – NM 22445:145, 8 – NM 22445:251. Strike-a-light: 9 – NM 22445:67. Scale 1:1.

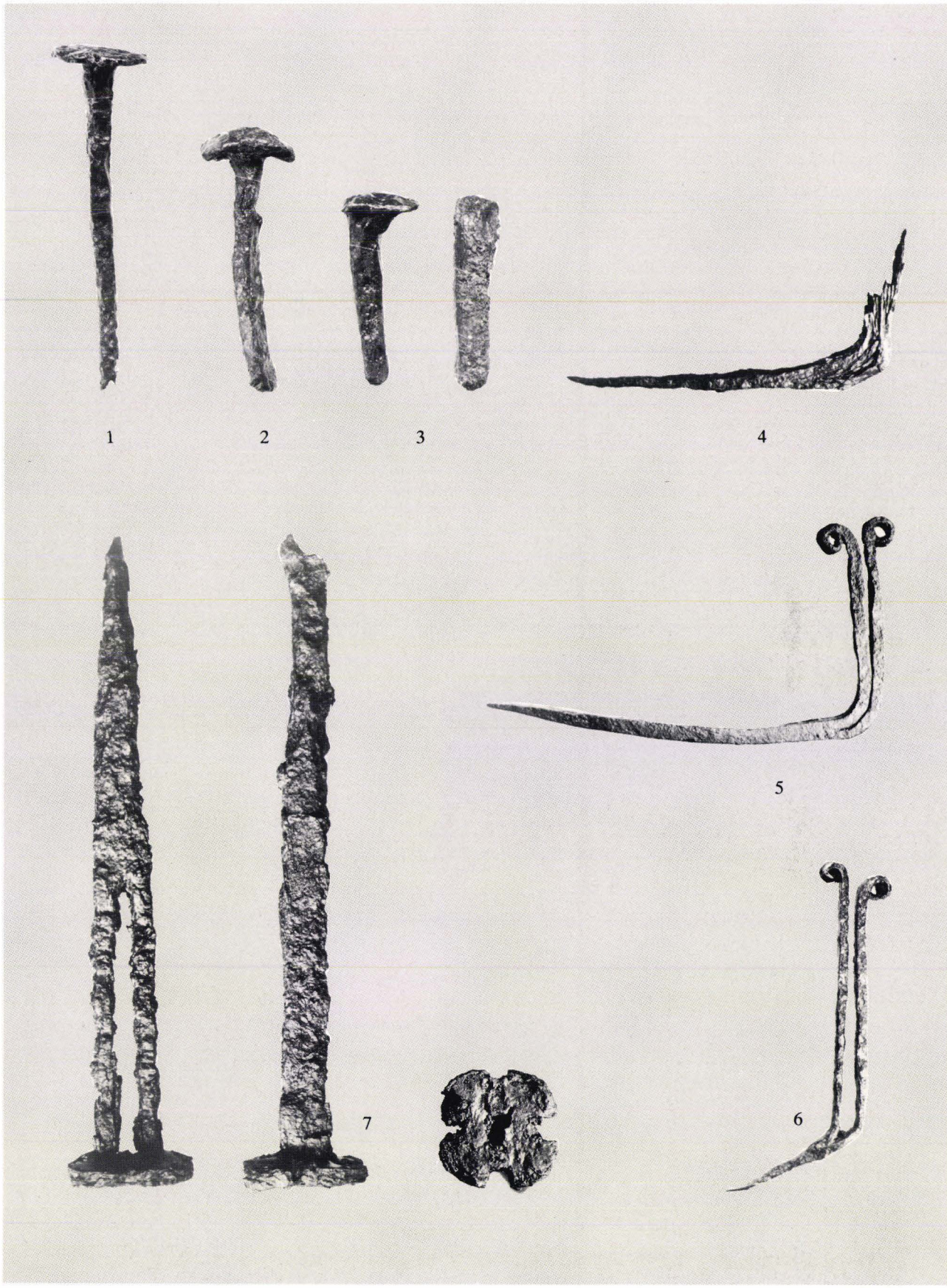

Plate 10. Nails: 1 – NM 22445:227, 2 – NM 22445:234, 3 – NM 22445:120. Shingle-holders: 4 – NM 22445:42, 5 – NM 22445:28, 6 – NM 22445:27. Key: 7 – NM 22445:76. Scale 1–3,7 1:1, 4–6 3:5.

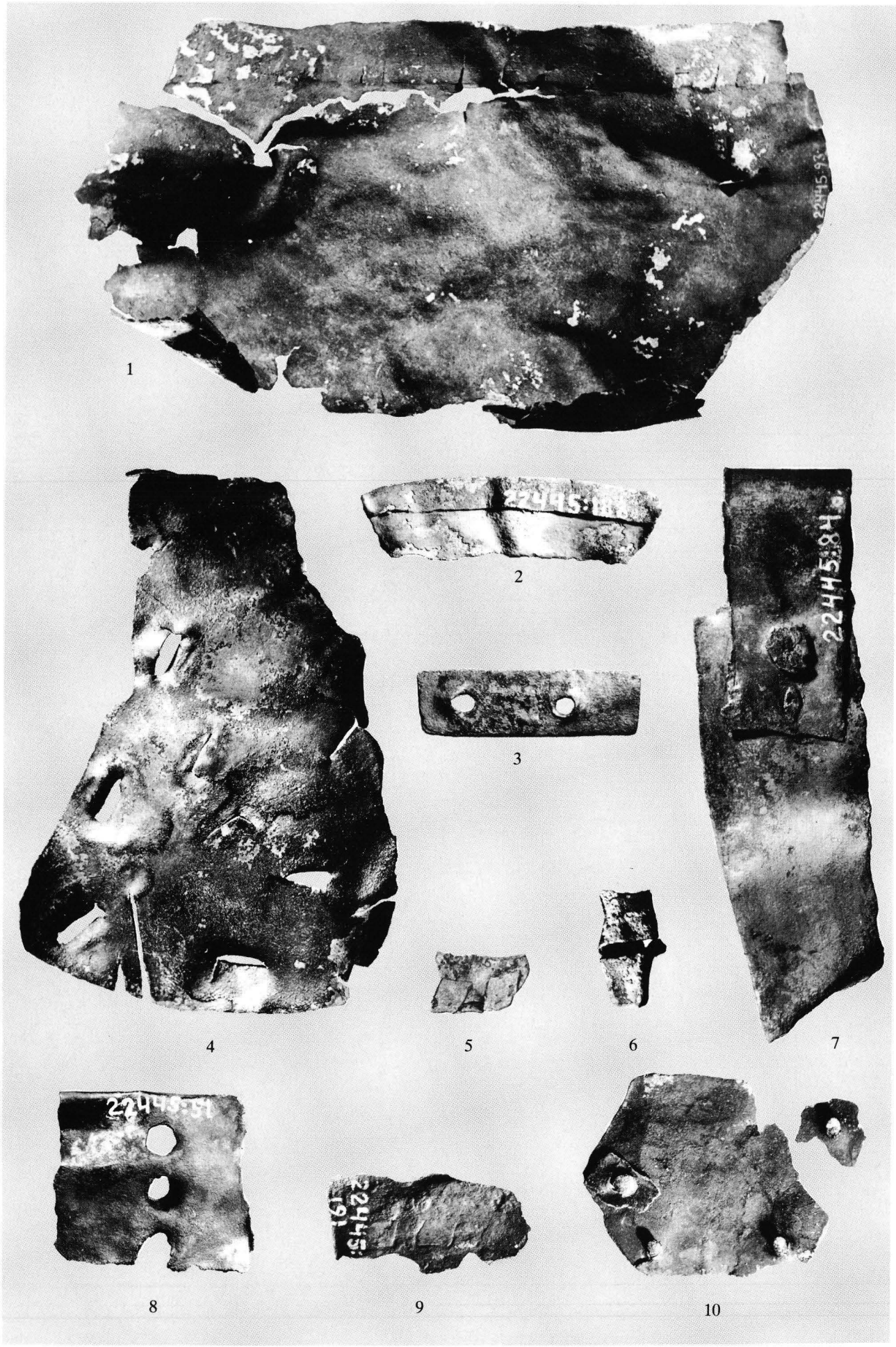

Plate 11. Fragments of metal vessels: 1 – NM 22445:93, 2 – NM 22445:188, 3 – NM 22445:16, 4 – NM 22445:20, 5 – NM 22445:55, 6 – NM 22445:34, 7 – NM 22445:84a, 8 – NM 22445:51, 9 – NM 22445:191, 10 – NM 22445:117. Scale 1 3:5, 2–10 1:1.

Plate 12. Fragments of metal vessels: 1 – NM 22445:86, 2 – NM 22445:118, 3 – NM 22445:107, 4 – NM 22445:150, 5 – NM 22445:199, 6 – NM 22445:155, 7 – NM 22445:132, 8 – NM 22445:214, 9 – NM 22445:213. Scale 1:1.

Plate 13. Parts and fragments of kettle-hangers: 1 – NM 22445:47, 2 – NM 22445:112, 3 – NM 22445:74, 4 – NM 22445:133, 5 – NM 22445:143, 6 – NM 22445:124, 7 – NM 22445:15, 8 – NM 22445:242, 9 – NM 22445:138. Scale 1:1.

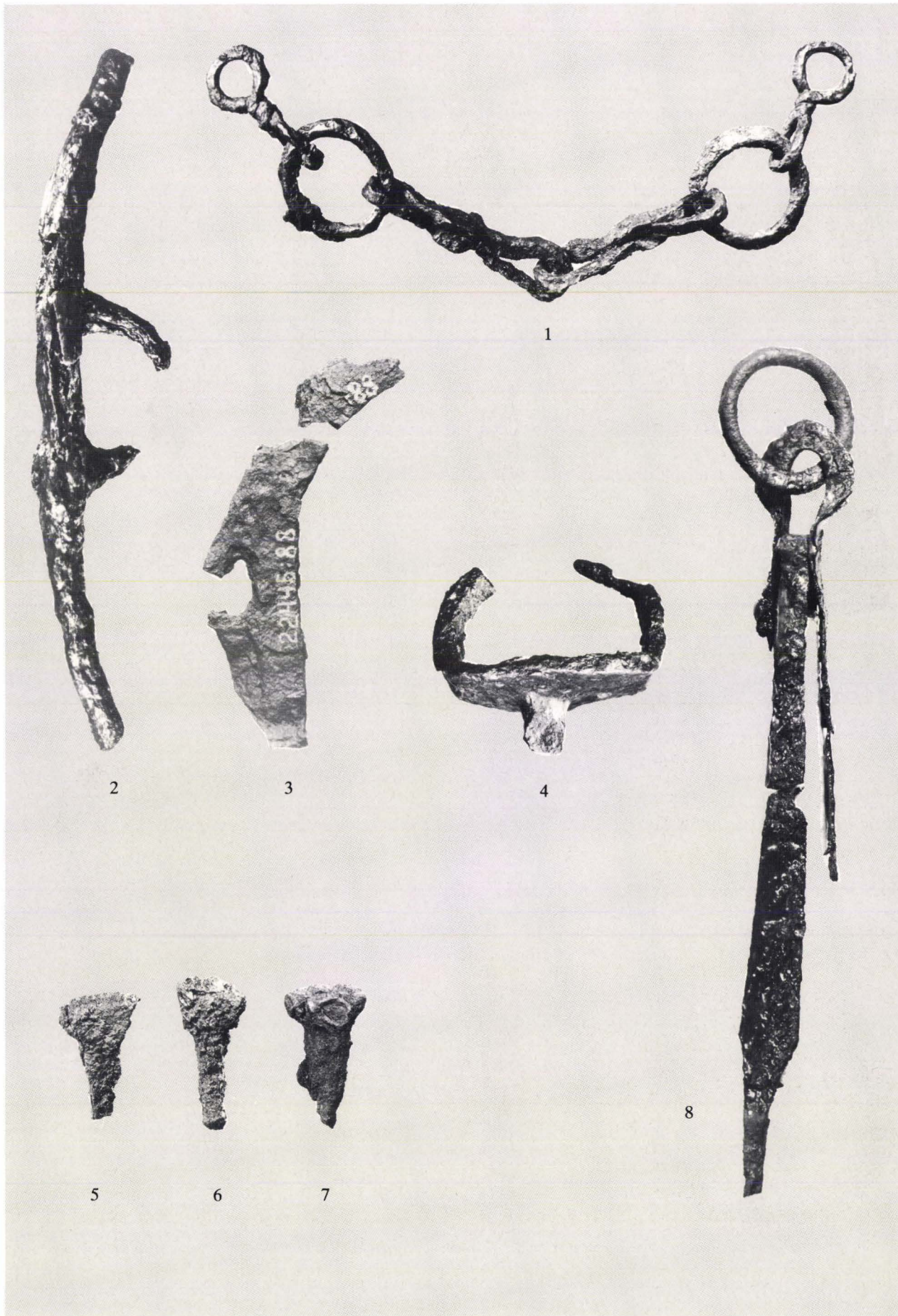

Plate 14. Bits: 1 – NM 22445:61, 2 – NM 22445:69. Horseshoe and horseshoe nails: 3 – NM 22445:88, 5 – NM 22445:36, 6 – NM 22445:53, 7 – NM 22445:65. Ice-shoe: 4 – NM 22445:195. Whipstock: 8 – NM 22445:19. Scale 1,8 3:5; 2–7 1:1.

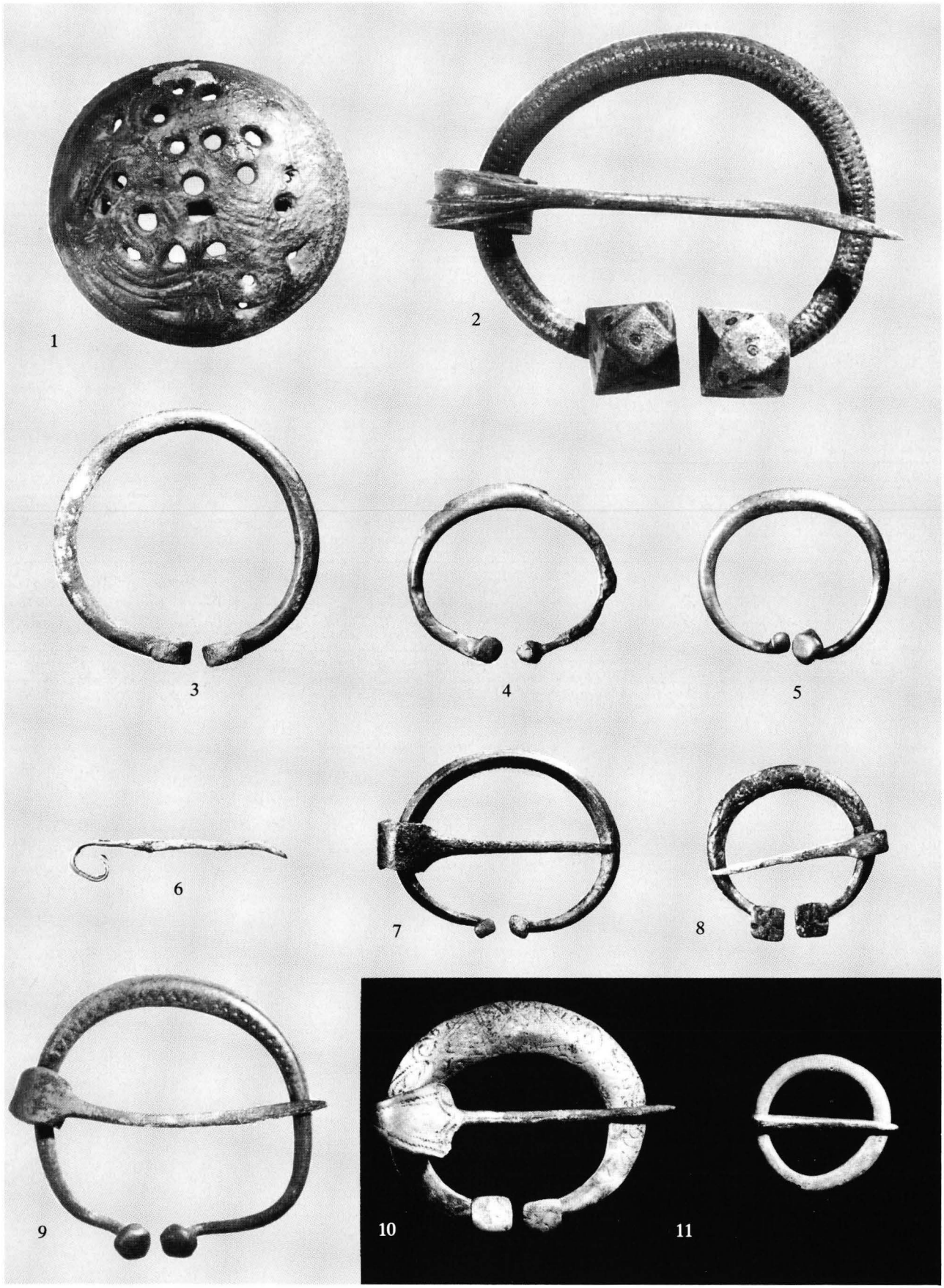

Plate 15. Brooches: 1 – NM 22445:135, 2 – NM 22445:89, 3 – NM 22445:141, 4 – NM 22445:177, 5 – NM 22445:56, 6 – NM 22445:206, 7 – NM 22445:140, 8 – NM 22445:241, 9 – NM 22445:126, 10 – NM 22445:148, 11 – NM 22445:37. Scale 1:1.

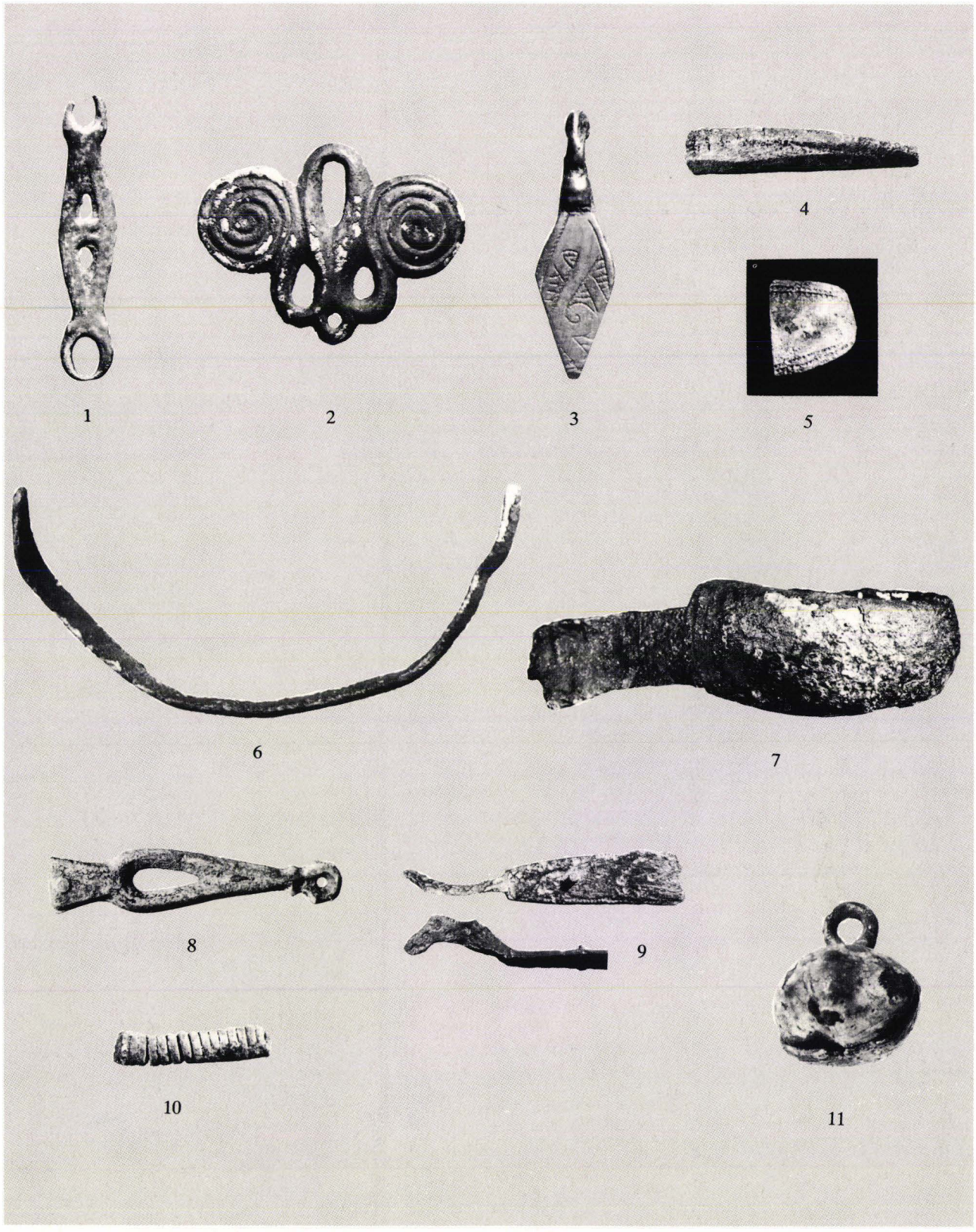

Plate 16. Parts of chain-sets: 1 – NM 22445:1, 2 – NM 22445:134, 3 – NM 22445:85. Bracelets: 4 – NM 22445:116, 5 – NM 22445:189, 6 – NM 22445:203, 7 – NM 22445:22. Belt parts and fittings: 8 – NM 22445:70, 9 – NM 22445:200. Metal application for clothing: 10 – NM 22445:123, 11 – NM 22445:17. Scale 1:1.

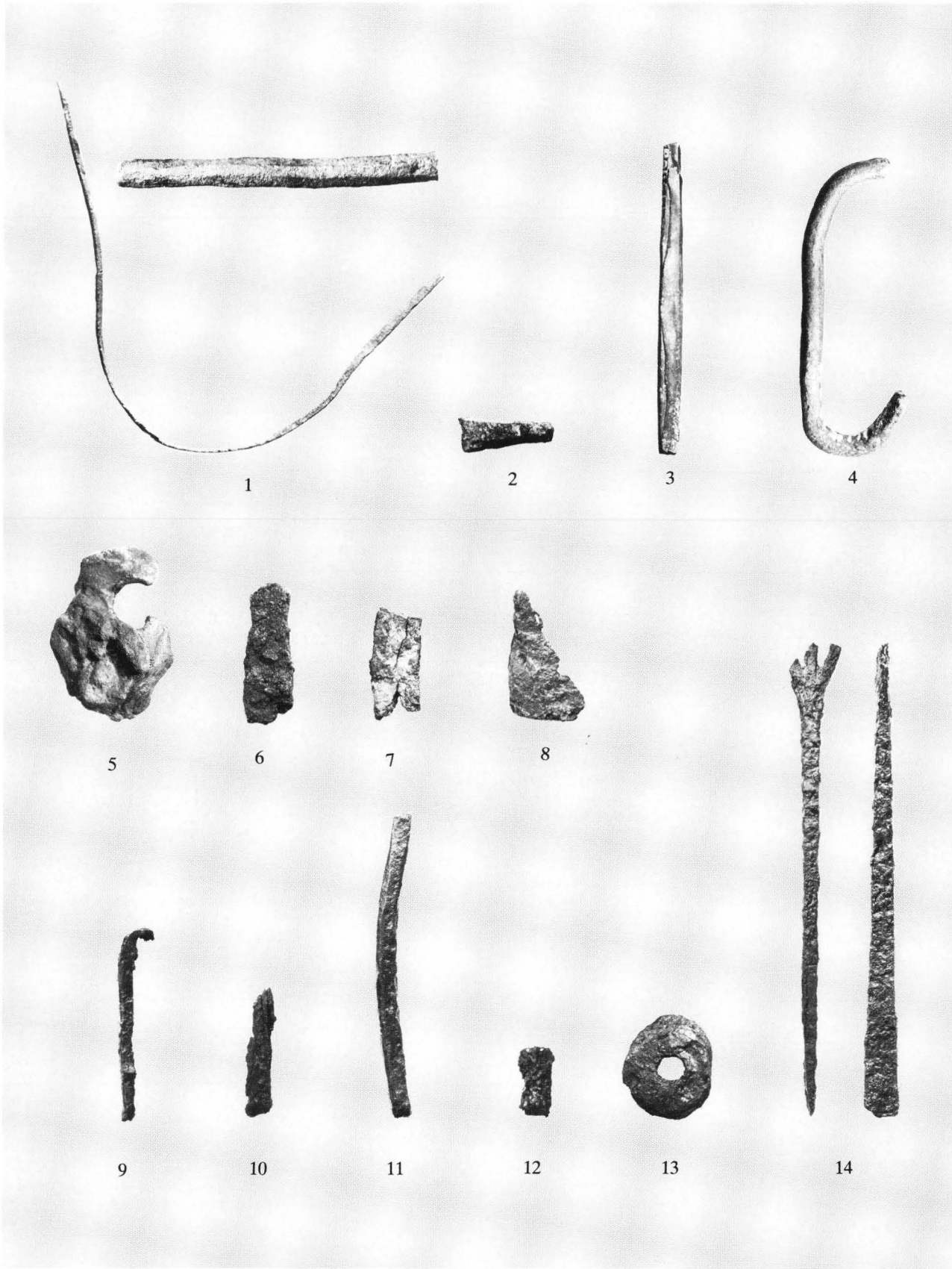

Plate 17. Unidentified fragments of bronze, copper and iron artefacts: 1 – NM 22445:167, 2 – NM 22445:152, 3 – NM 22445:168, 4 – NM 22445:224, 5 – NM 22445:73, 6 – NM 22445:92, 7 – NM 22445:5, 8 – NM 22445:82, 9 – NM 22445:11, 10 – NM 22445:142, 11 – NM 22445:225, 12 – NM 22445:12, 13 – NM 22445:249, 14 – NM 22445:248. Scale 1–5 1:1, 6–14 3:5.