5 On the history and recent studies of the 'Antrea Net Find'

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Abstract

In 1913, in connection with the draining of a wetland, a number of Stone Age objects were found in the former Finnish Municipality of Antrea in the Karelian Isthmus. During the investigations carried out in 1914, more objects were discovered, including the unique remains of a fishing net. A column of the sediment profile was taken and a phytopalaeontological analysis indicated that the context had sunk in the channel which had connected the Baltic Sea and Lake Ladoga early in the Ancylus phase. The 'Antrea Net Find' immediately triggered an animated and, at times, passionate discussion about the typology, cultural relationship and chronological position of the artefacts and the context as a whole. After more than 90 years, this discussion is still going on. However, the ethnographic reconstruction of the find presented by Sakari Pälsi right after his excavation at the find spot appears to have found continuous acceptance.

In 1998, a workgroup from the Department of Archaeology, the Department of Geology and Palaeontology and the Dating Laboratory, University of Helsinki, visited the site and took a new sample column of the sediment profile aiming at a fresh examination applying a variety of current methods not available in the early years. The results of these studies are presented elsewhere in this volume (Miettinen *et al.* 2008). This article is divided into four sections: 'On the Antrea Net Find and the work of Sakari Pälsi', 'A history of opinions and studies', 'A reassessment of the 'Antrea Net Find': environment and archaeology' and 'Concluding remarks'.

5.1 On the 'Antrea Net Find' and the work of Sakari Pälsi

5.1.1 Introduction

The 'Antrea Net Find' is one of the most important discoveries in the archaeology of Finland. It is a bog find of Stone Age objects, originally discovered by a local resident, Antti Virolainen, in the autumn of 1913, during the deepening of a drainage ditch. The following year, archaeologist Theodor Schvindt passed by when travelling in the region as an official of the Archaeological Commission (predecessor of the National Board of Antiquities). He collected the finds for the State Historical Museum of Finland (predecessor of the National Museum of Finland) and also opened a small test pit in which he discovered additional finds (Schvindt 1914). The Commission then sent archaeologist Sakari Pälsi to investigate the location. The investigation is described and the observations are documented and interpreted in field notes, drawings, maps and photographs, in addition to a completed report and a manuscript (in Finnish) for the definitive article which was published in German as many as six years later (Pälsi 1920), all kept at the National Board of Antiquities, Department of Archaeology.

According to Pälsi (1920), he spent five days investigating the find spot, 25–30 August 1914. It is more likely that he carried out the investigation during those days of July that are given in his field notes, indicated by the correction made in the catalogue of the Historical Museum and proved by the date of the newspaper story mentioned below (cf. Huurre 2003: 172 with endnote 2).

As early as on 23 August 1914, Pälsi presented the 'Antrea Net Find' and the results of his excavations at the find spot in a leading newspaper (Pälsi 1914) and on 1 October 1914, he presented the results of his investigation in front of the Finnish Antiquarian Society (Rinne 1915: 105). According to a published summary (Muukkonen 1915: 279–281) the presentation included all the main points dealt with in the above manuscript, which may have been prepared for this occasion and immediately translated into German by Alfred Hackman (archaeologist and translator of many archaeological texts into German). However, on the cover of the manuscript, he has written a demand that all corrections, additions and removals made after the translation had been completed were to be considered (i.e. translated) before sending the text for printing. The fact that the additions include both petrological determinations apparently taken from a list signed by Julius Ailio on 13 January 1920 and osteological determinations that derive from a list signed by Herluf Winge on 21 February 1920 indicates that the manuscript was revised in the year it was published.

Harald Lindberg of the Botanical Museum, University of Helsinki, carried out a phytopalaeontological study of two series of sediment blocks that Pälsi had taken at the find spot on two different occasions (1914 and 1915). He presented his results concerning the dating of the find in front of the Finnish Society of Sciences and Letters (Societas Scientiarum Fennica) on 25 October 1915 and in front of the Finnish Antiquarian Society on 4 November 1915 (Rinne 1916: 39; summary in Länsiluoto 1916: 347). In an article published the following year on the history of vegetation since the Ice Age and the first appearance of humans in Finland, he described his findings from the Korpilahti sediment blocks (Lindberg 1916). A more specific report on the topic was published in connection with Pälsi's article (Lindberg 1920).

The find immediately presented a number of methodical issues to the archaeological community, issues that are relevant still today. Although archaeology had already employed the expertise of geology and mineralogy, botany and palynology, zoology and osteology, this particular find was certainly very important for the development of the co-operation with the natural sciences – one of the best traditions of Finnish archaeological research. Accordingly, during the nine decades since the excavation took place, several studies have been devoted to the checking and reassessing of the 'Antrea Net Find'.

5.1.2 Location

The find spot is located in the Karelian Isthmus, in the part of Finnish Karelia which was ceded to the Soviet Union as a result of World War II. More precisely, the discovery was made at the farm of Ämm-Mattila (Ämmä-Mattila according to Pälsi) in the village of Korpilahti (currently uninhabited), which at the time of discovery belonged to the municipality of Antrea. After the division in 1924 of Antrea into two municipalities, Antrea and Vuoksenranta, the find spot remained

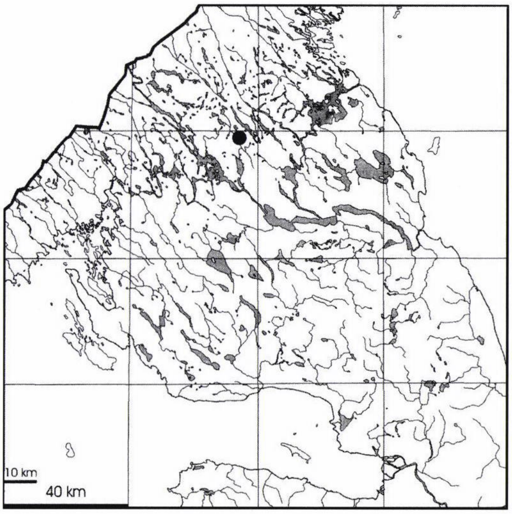


Figure 5.1 Map of the Karelian Isthmus between the Gulf of Finland and Lake Ladoga. The black dot indicates the 'Antrea Net Find'. (Map by Timo Jussila, edited by C. Carpelan 2007.)

within the latter. Today the find spot is located within the Russian Federation in the Vyborg (Fi. Viipuri) district of the Leningrad oblast'. The names of the former municipal centres of Antrea and Vuoksenranta are now Kamennogorsk and Ozërskoe, respectively. (Fig. 5.1)

According to Pälsi (1920: 3), the discovery was made c. 16 km south of the Sairala (Ru. Borodinskoe) railway station located in the former municipality of Kirvu (municipal centre now Svobodnoe). However, on the topographic map, the straight distance between the railway station and the find spot is c. 13.5 km. The distance mentioned by Pälsi appears to tally with the distance by road and, in fact, a list of expenses in his field notes includes a sum for a 16-km ride from Sairala to Korpilahti.

As indicated, the find is usually known as the 'Antrea Net Find', but in his report to the Archaeological Commission and the State Historical Museum, Pälsi for some reason named it the 'Find at Pappalampi' after a small lake located behind a rather high ridge about 300 m to the west of the find spot. Later the name of Vuoksenranta has occasionally replaced Antrea. However, the name Korpilahti has been mentioned in almost all publications.

At the time of discovery, the environment was former wetland, which the local farmers had been and still were draining in order to acquire additional field area for hay and crops. In the Soviet era, the fields were used for pasture, but apparently grazing in the area came to an end in the early 1990s. In his article, Pälsi (1920: 3) located the find spot 3/4 km (or 750 m) to the south of the farm at the eastern edge of the main drainage ditch.

On 1 June 1992, Pirjo Uino visited Korpilahti as the first Finnish archaeologist since World War II. While walking along the drainage ditch, she found a pole erected right where she had expected the find spot to be judging from published and unpublished information (Uino 1997: 352, Map 43, black dot). The pole had been erected by former Korpilahti residents who had recently visited their deserted homesteads. In 1994, members of the 'Vuoksenrannan pitäjäseura' (the society of former residents of the Vuoksenranta municipality) posted a memorial plaque with information in Finnish and Russian about the archaeological discovery (Fig. 5.2). In 1998, as described below, a work group from the Department of Archaeology, the Department of Geology and Palaeontology and the Dating Laboratory, University of Helsinki, visited the site. The plaque has since disappeared.

During the 1998 visit to the site, I estimated the distance between the cowshed of the farm and the memorial plaque to be about 400 m by counting paces on the tussocky and bushy ground. At best, this certainly was nothing more than a rough approximation. Later, in a folder containing miscellaneous Pälsi papers, a tracing of a map of the cultivated area of the Ämm-Mattila farm was found. On the tracing (made by Pälsi during his investigation), the excavation is marked at the eastern edge of the drainage ditch 420 m (but not 750 m) to the south of the location of the cowshed. It is possible to unambiguously transfer the geometry of Pälsi's tracing to the relevant sheet of the Finnish Topographic Map and position the find spot (Figs. 5.3 and 5.4).

Miikkulainen *et al.* (1981) is another source found after 1998. According to Miikkulainen *et al.* (1981: 478 and appendix page 6 no. 273) an important spring is located 90 m to the west of the cowshed of the Peko-Eskola farm, Ämm-Mattila's neighbour to the west, while the find spot is found about 450 m south of this spring. The place for the memorial plaque may have been determined on the basis of this information. A transfer of the measurements to the relevant topographic map sheet takes the find spot to the place suggested by Pälsi's tracing. The memorial plaque was probably posted at or very close to the real find spot. At a scale of 1:20 000, the dot indicating the place of the 'Antrea Net Find' well covers a slight expected uncertainty (Fig. 5.4). At present, the following values are considered valid:

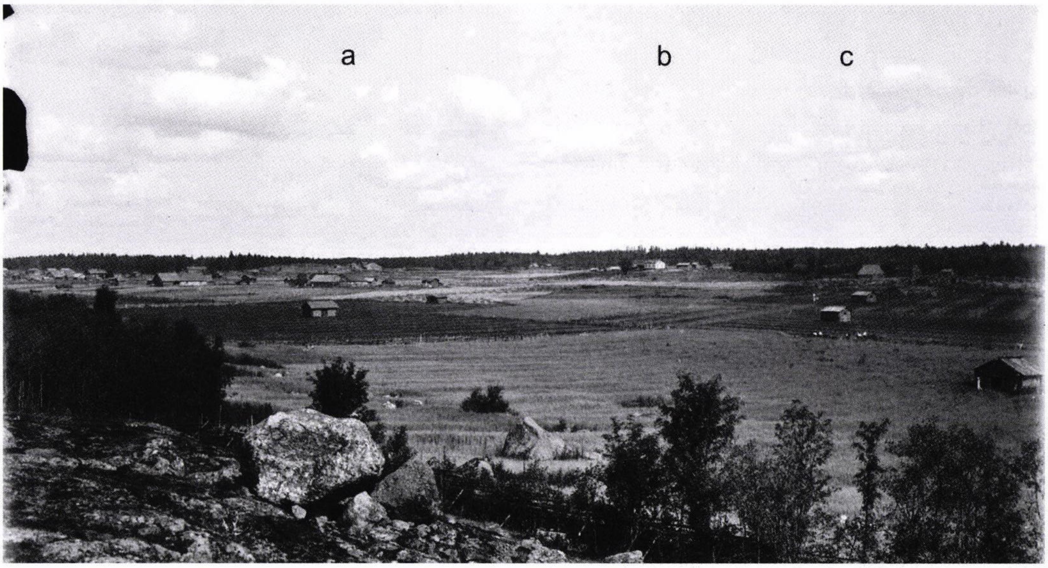
Finnish Topographic Map Sheet 4113 05 Vuoksenranta, scale 1:20 000, Helsinki 1939.
Finnish Basic Grid: x (= north) 6754 40, y (= east) 4470 64
Geographic coordinates: 60°53'N, 29°27'E

Figure 5.2 The 'Antrea Net Find'. Memorial plaque with information in Finnish and Russian about the archaeological discovery, posted in 1994 by members of the 'Vuoksenrannan pitäjäseura' (the society of former residents of the Vuoksenranta municipality). The plaque has since disappeared. (Photo: P. Uino 1998)

In addition to the horizontal coordinates of the 'Antrea Net Find', it is equally important for the reconstruction of the environment to know the location of the find spot on the vertical axis, i.e. the altitude above the present sea level. According to Pälsi (1920: 3), the altitude of the ground surface was 16.75 m asl, but he did not indicate how he arrived at this value. The field notes and excavation plans show that he levelled various features and finds, but there is no mention of a connection of a temporary fixed point to a geodetic fixed point in order to convert the levellings to altitudes asl. According to the Finnish Topographic map sheet 4113 05 'Vuoksenranta' of 1939, again, the ground surface at the find spot was located below the 15-m asl contour line. In relation to this, 14 m asl appeared to be a plausible estimate of the altitude at the find spot in 1998 (Fig. 5.4). The value presented by Pälsi must be due to a mistake.

On the other hand, I assume that the surface of the ground formed by the sedimentation of gyttja and later by the growth of wetland vegetation was at a higher level (say 16.75 m asl) until 1857 after which it started lowering as a result of drying caused by draining and ploughing. Two maps from 1698 and 1777 indicate that the altitude of the shoreline at Korpilahti approximately followed the 15-m contour line (Fig. 5.5). See sections 5.1.3 and 5.3.5 below and Miikkulainen *et al.* (1981).

The find level at the surface of the basal silty clay (which rests on a bed of horizontally laminated clay) is located at a depth of about 1 m (± 0.2 m) below the surface (see section 5.3.2 below). The altitude of the find level probably equals c. 13 m asl.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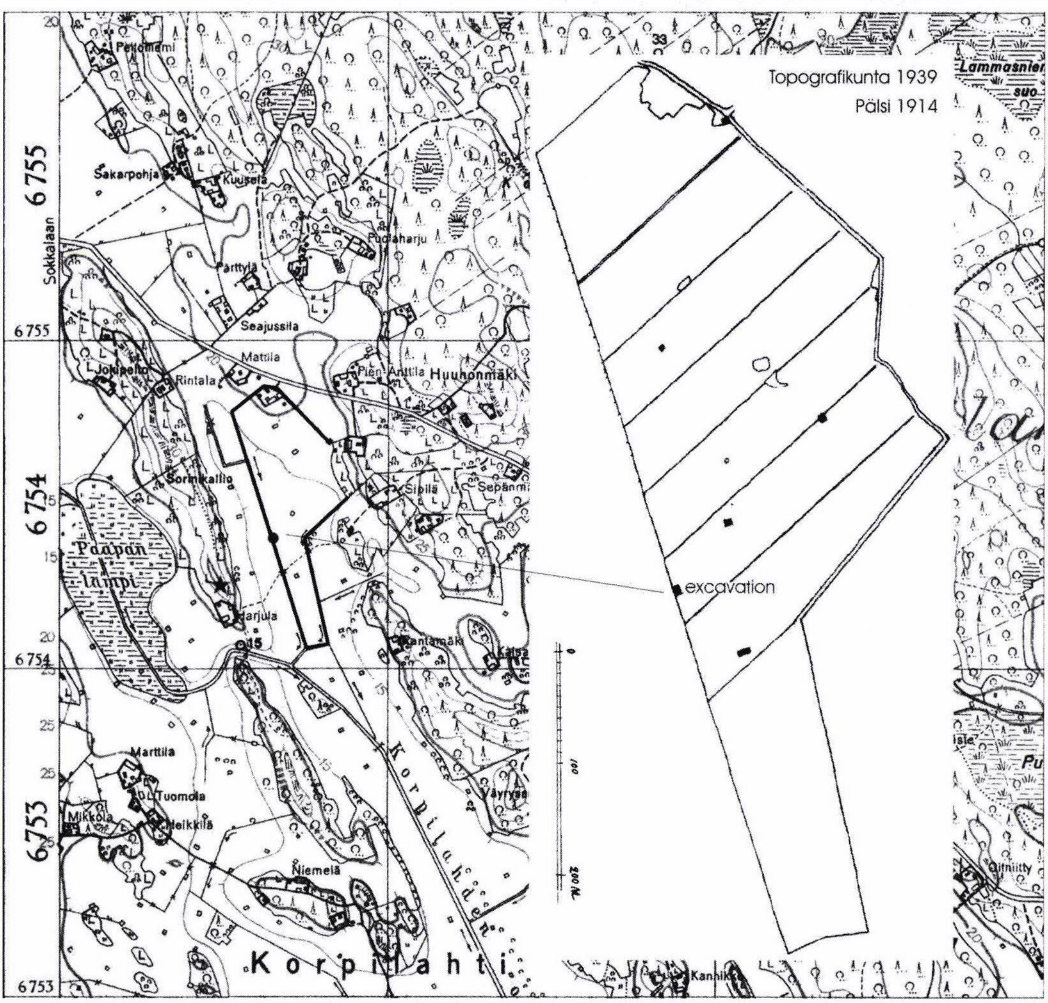
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Figure 5.3 View towards north-east of the Korpilahti valley seen from the spot indicated with an asterisk on the map, Fig. 5.4. (a) The Ämm-Mattila farm seen in the background (behind a barn); (b) the Pien-Anttila farm from where Pirjo Uino photographed the valley towards the south-east (see Fig. 1.5 in Siiriäinen *et al.* 2008, this volume); (c) Pälsi's ongoing excavation (men in white shirts in front of a barn). The photograph is taken from the altitude of the Ancylus maximum shore. (Photo: S. Pälsi 1914, National Board of Antiquities; edited by C. Carpelan)

5.1.3 The 1914 excavation

Pälsi's published data on the horizontal and vertical location of the find spot and the date of the investigation have proved to be erroneous. On the other hand, his report on how the discovery was made, the steps taken by Schvindt and how Pälsi carried out his own excavation project appears to be accurate although some details remain uncertain.

Virolainen in 1913 and Schvindt in 1914 had collected a total of 17 objects described in the catalogue of the Department of Prehistory of the State Historical Museum as items NM 6688: 1–17. Each object had been discovered lying below the 'mud' on top of the basal 'clay'. When Pälsi arrived at the site later in 1914, he noticed a depression in the edge of the drainage ditch and heaps of earth along the ditch. While the depression was the result of the 'exploratory' diggings carried out by Virolainen and Schvindt, the deepening of the ditch the previous autumn in addition to Virolainen's and Schvindt's activities had caused the heaps. As the first step of the investigation, Pälsi had the earth heaps on both sides of the depression scrutinized for possible unnoticed objects. As a result, 11 items (NM 6688: 18–28) were found. (Pälsi 1920: 4–5.)

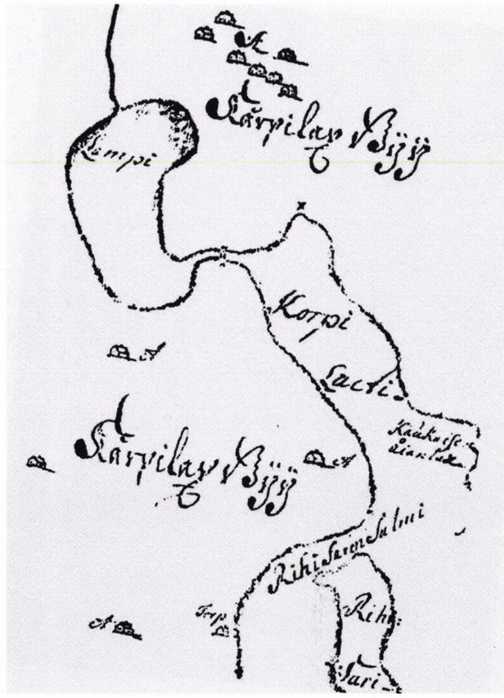


Figure 5.5 The village of Korpilahti in 1698, cropped from a larger map; orientation and scale adapted to conform with the relevant topographic map sheet (4113 05). With the exception of Paapanlampi ('Lampi' on the map) the shoreline corresponds well with the present 15-m asl contour line. Original map by E. Bergström kept at the National Land Survey of Finland. (From Miikkulainen *et al.* 1981: 21; edited by C. Carpelan)

The rest of the catalogued items (NM 6688: 29–84) came from the excavation.

The next step was to measure and open a trench of 3 by 8 m parallel to the drainage ditch and leave a 1-m strip between the trench and the ditch untouched in order to protect the trench from possible flooding. The trench was divided in 24 squares (I–III: 1–8), which were excavated in layers, higher up with spades but deeper, close to the gyttja/clay transition where Virolainen and Schvindt had collected their finds, with trowels. (Pälsi 1920: 5.)

Figure 5.4 The village of Korpilahti in 1939. Pälsi's tracing of a map of the cultivated area of the Ämm-Mattila farm with the rectangular excavation indicated superimposed on a section of the Finnish topographic map sheet 4113 05 Vuoksenranta, scale 1:20 000 (Helsinki 1939). The geometry of Pälsi's tracing can be unambiguously transferred to the relevant sheet of the Finnish Topographic Map and the find spot can be positioned. The asterisk c. 200 m south-west of the excavation indicates where Pälsi took the photograph of Fig. 5.3. (Maps: National Board of Antiquities, Military Topographic Service and National Land Survey of Finland; image compiled and edited by C. Carpelan)

Figure 5.6 The 'Antrea Net Find'. Profile of the excavation. While Pälsi (1920: Abb. 5) discerned four strata (I–IV), Miettinen *et al.* (2008) discerned five strata (in addition to one outside the picture). However, image processing reveals a wider selection of shades suggesting the presence of more horizontal strata, in addition to vertical striation indicating that a rough technique was used in cleaning the profile. (Photo: S. Pälsi 1914, National Board of Antiquities; edited by C. Carpelan)

Looking at the profile, Pälsi (1920: 5–8, Abb. 5) discerned four layers, I–IV, which he interpreted as follows: Layer I, 20 cm thick, included the sod cover and the underlying ploughed humus. Layer II consisted of untouched 'turf earth', of which the topmost part was more compact and thus probably represented what was left of the original untouched surface layer, which had transformed into the present humus of Layer I as a result of frequent burning and ploughing that had continued for 30 years, according to Pälsi's field notes (also the Russian topographic maps of 1894 and 1898 show arable field in the area). Layer III consisted of a greyish, downwards softer, finer and wetter gyttja. These layers contained scattered remains of trees and smaller plants and a random piece of 'rapakivi' granite, but no traces of human impact were seen. Layer IV consisted of light grey clay, so soft and wet that it hardly carried a standing man. The transition from Layer III to IV was sharp. (Fig. 5.6)

According to Pälsi (1920: 5–8), the transition from Layer III to IV was observed at a depth of 80–90 cm and Figure 5.6 shows a section of the profile where the depth is exactly 90 cm. However, the levellings marked on an unpublished excavation plan indicate that the depth of the surface of the basal clay varied between 75 and 85 cm with a mean value of 80 cm. Clearly Pälsi's data show some uncertainty. In fact, the question of the depth of the surface of the basal clay appears complicated as discussed in section 5.3.2.

As mentioned above, the objects discovered by Virolainen and Schvindt had been lying on top of the 'clay'. Accordingly, the finds discovered during Pälsi's excavation were found at the transition from Layer III to IV (Figs. 5.7 and 5.8). In squares I: 4–6, within a rectangular area of c 2.0 by 0.4 m, the upper surfaces of 31 natural fist-sized stones were visible above the 'clay'. North-east of the stones, in squares II–III: 3–5, also within an almost rectangular area, there were 17 oblong (c. 30 cm) pieces of shield bark of pine (*Pinus sylvestris* L.) lying on top of the 'clay'. This meant that the bark pieces were lying slightly higher than the stones, which was an important observation with respect to the interpretation of the formation of the context. Some of the bark pieces were lying with the inner and others with the outer side turned upwards. Pälsi felt that the two groups of objects, the stones and the pieces of bark, were somehow parts of the same entity. (Pälsi 1920: 8–10.)

At this point, Pälsi decided to open a section between the excavation trench and the drainage ditch in order to take a closer look at the area where Virolainen and Schvindt had carried out

Figure 5.7 The 'Antrea Net Find'. Picture of the excavation at the find level (transition between dark brown silty gyttja and silty clay gyttja, see Fig. 5.17) showing (from left to right) the traces of Antti Virolainen's and Theodor Schvindt's pits where the things were found, the sinker stones and the bark floats of the net; cf. Fig. 5.8 for explanation. View towards north-northwest. (Photo: S. Pälsi 1914, National Board of Antiquities)

diggings (Figs. 5.7 and 5.8). Including the additional squares Ia: 4–6, in addition to a zone falling between these squares and the middle of the ditch, the excavated area totalled c. 28 m^2 and not just 24 m^2 as is usually reported. It appeared that their finds had been collected from an area of 1.25 by 0.6 m. Pälsi found some objects, too, but they were lying in disturbed earth, not *in situ* (NM 6688: 29–31). He was not able to trace any functional connection between the finds from that area and those discovered in his main trench, but the same stratigraphical position was a connecting feature. (Pälsi 1920: 10.)

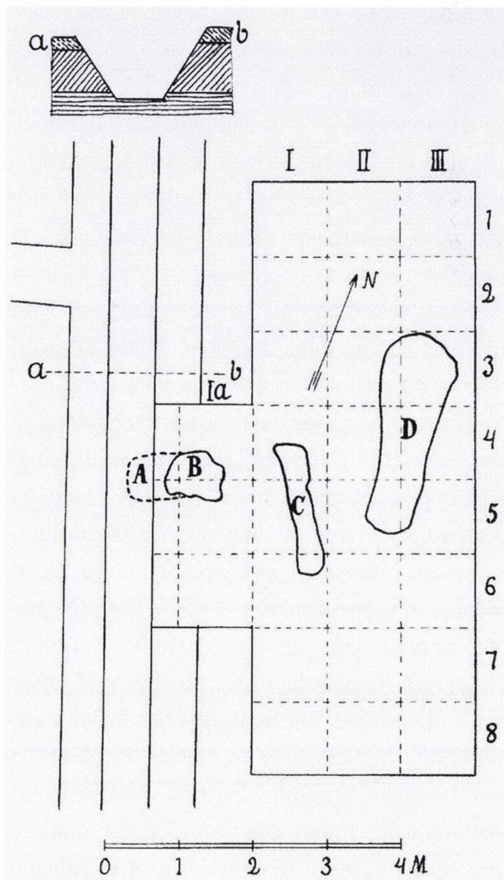


Figure 5.8 The 'Antrea Net Find'. Plan of the excavation and cross section of the drainage ditch. A = Virolainen's find spot, B = Theodor Schvindt's test pit, C = 31 sinker stones of the net, D = 18 pine shield bark floats of the net. (Drawing: S. Pälsi 1914, Unpublished Pälsi papers in the National Board of Antiquities)

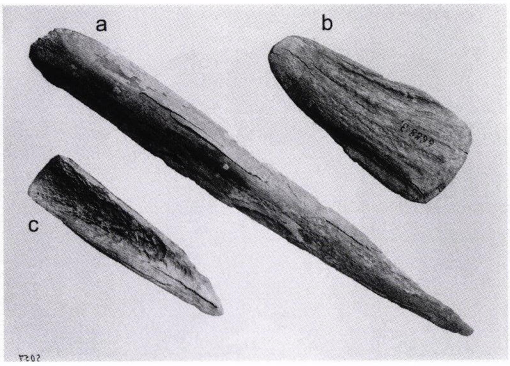


Figure 5.9 The 'Antrea Net Find'. Objects of elk bone and antler. (a) Dagger or spearhead of shinbone with a groove for inserts along one edge (NM 6688: 1). The inserts (probably quartz) were later detached and lost in addition to another similar object. (b) Axe of antler with two transverse edges (NM 6688: 3). (c) Gouge of long bone (NM 6688: 2). Not to scale (see Pälsi 1920: 11–13). (Photo: S. Pälsi, National Board of Antiquities)

While, in the main trench, the bark pieces were picked up one by one, traces of cord were discovered beneath some of the pieces. This suggested that the bark pieces, each with a small hole (some had two) in one end, were the floats of a net and that the stones discovered close by were the sinkers. Vegetal fibres were discovered in contact with many of the stones and interpreted as the remains of ties attaching the sinkers to the net. These materials were carefully collected and packed and their occurrences documented. (Pälsi 1920: 10–11; Unpublished material.)

Before closing the excavation, the basal 'clay' was checked for finds and other traces of human impact to a depth of 20 cm from its surface. No positive observations were made. In addition, a vertical column of 188 cm (divided in seven blocks) of the sediment was taken from the profile for phytopalaeontological studies, although this action is not described in the field notes, nor in the article. The sediment blocks were immediately handed over to Harald Lindberg of the Botanical Museum, University of Helsinki, for analysis. Later, the osteological material was sent to Herluf Winge of the Copenhagen Zoological Museum. (Pälsi 1920: 11, 19.) Pälsi himself studied the archaeological objects. He mentioned the osteological or petrological determination (the latter by Ailio, although he did not say this) of each described object, but did not refer to the results achieved by Lindberg.

5.1.4 Objects

The 'Antrea Net Find' included 33 items of bone and antler, 55 items of stone and 20 items of plant material, which makes a total of 108 items in addition to fragments of net cord and tinder made of tinder fungus or polypore (*Fomes fomentarius* L.) (Pälsi 1920: 11–16, Taf. I–VI. NM 6688: 1–84).

5.1.4.1 Bone, antler

Pälsi identified the functions of six of the objects of bone or antler and for two of them he pointed to typological parallels. The finds included a 'dagger' (Fig. 5.9a) of an elk's (*Alces alces* L.) shinbone, with a groove in one edge for inserts of quartz which had later become detached and lost. He compared the dagger to the slate Leaf-Shaped Points (Ailio 1909a: Fig. 34). According to Virolainen, there had been a second similar bone dagger, which unfortunately could no longer be found. According to Pälsi's interpretation, the flat axe (Fig. 5.9b) of an elk's antler had a narrow rounded cutting edge and a broad back. Similar artefacts had been found in the Baltic countries (Ebert 1913: Fig. 13: a–g). The gouge (Fig. 5.9c), two points and an awl were all made of the bones of a big mammal, probably elk.

He interpreted two of the 15 worked pieces of elk's bone as damaged objects of unknown function and the rest (with traces of splitting and sawing) as raw material for objects. The remaining 12 pieces of elk and whooper swan (*Cygnus musicus* L.) bone he interpreted as the remains of meals (some broken for marrow and some with traces of biting).

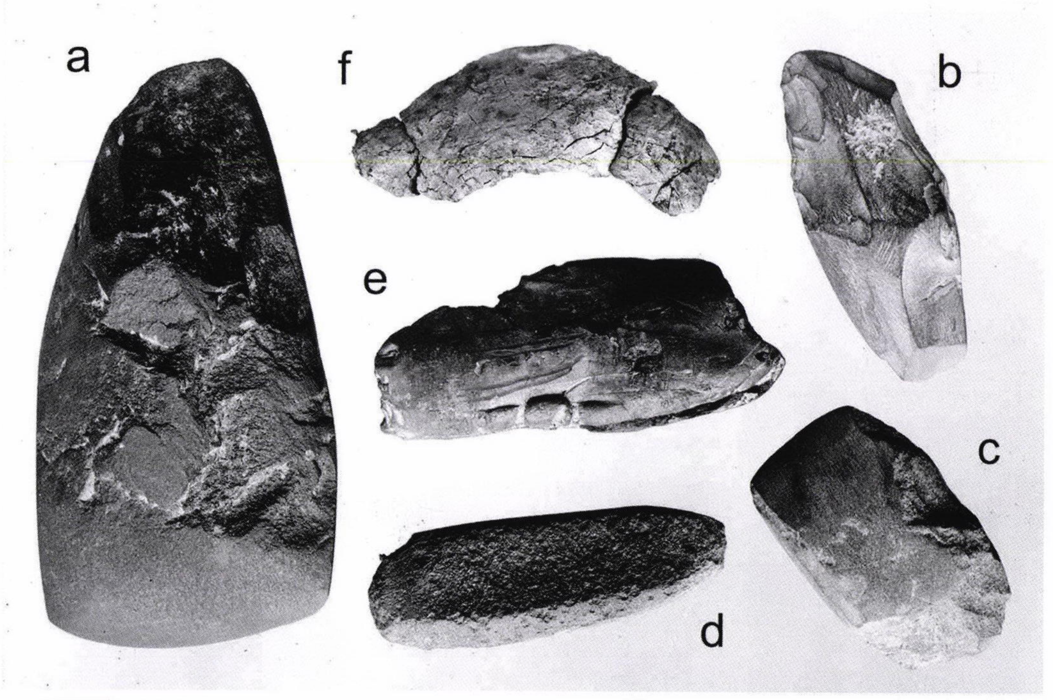


Figure 5.10 The 'Antrea Net Find'. Objects of stone and organic material. (a) Transverse axe of black rock resembling diabase (NM 6688: 7). (b) Small adze of Onega green slate, possibly reshaped from a gouge with curved back (NM 6688: 19). (c) Small adze of fine grained olivine diabase (NM 6688: 18). (d) Object of unknown function (NM 6688: 20). (e) Tinder of *Fomes fomentarius* L. (6688: 23). (f) Wood (6688: 24). Not to scale (see Pälsi 1920: 14–15). (Photo: S. Pälsi, National Board of Antiquities)

5.1.4.2 Stone

Pälsi identified the functions of almost all of the 55 stone objects, but pointed to typological parallels for only two of them. He compared the axe (Fig. 5.10a) of diabase-like stone with a broad cutting edge and a narrow back and showing a rather superficial grinding with similar axes from the Laperla cluster of settlement sites in the municipality of Suomusjärvi, southwest Finland (Ailio 1909b: 221), i.e. the 'Primitive' or Suomusjärvi Axe. The fragmentary adze (Fig. 5.10b) again appeared to him as made of what originally had been a Gouge with Curved Back (Ailio 1909a: Fig. 21). In addition, the collection included a small adze of fine-grained olivine diabase (Fig. 5.10c) and a preform of another.

Furthermore there were six whetstones (Fig. 5.11b–d), a stone interpreted as a hammer stone (Fig. 5.10d) and one which he considered as a fire stone (Fig. 5.11e). Seven smooth and almost round natural stones the size of a pigeon's egg (Fig. 5.11a) were similar to those found at excavations at the Stone Age settlement sites in the municipality of Kaukola (without explicit reference). The 31 fist-sized natural stones were interpreted as the sinkers of a net (Figs. 5.7 and 5.14). Finally, the collection included five worked pieces of quartz.

5.1.4.3 Vegetal material

Pälsi interpreted the 17 pieces of shield bark of pine as the floats of a net (Figs. 5.7 and 5.12), the remains of cord as parts of the net itself (Fig. 5.13a), thought to be of linden (*Tilia cordata* L.) bast or fibres of nettle (*Urtica urens* L.), as also the remains of the bindings of the sinkers (Fig. 5.14). In addition, the collection includes a piece of wood (Fig. 5.10f), small pieces of birch bark and two pieces of tinder fungus (*Fomes fo-*

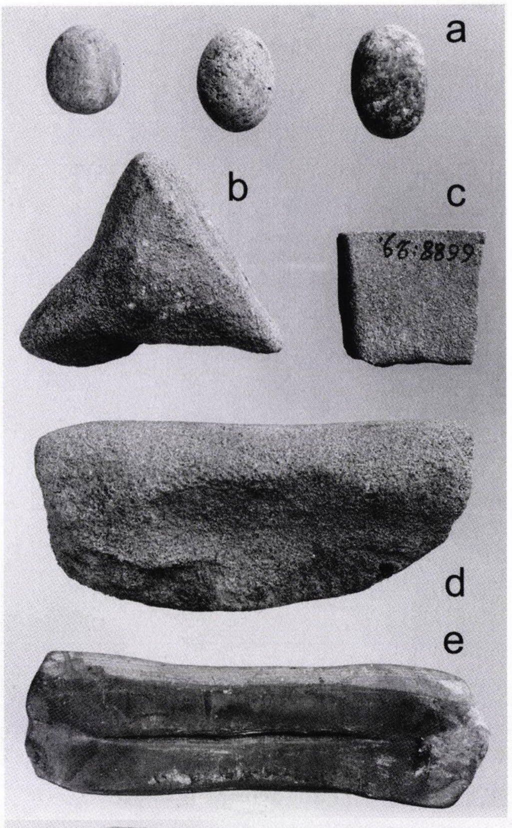


Figure 5.11 The 'Antrea Net Find'. Objects of stone. (a) Small natural egg-shaped stones (6688: 25). (b) Polyangular whetstone (NM 6688: 12). Piece of flat whetstone (NM 6688: 29). (c) Flat whetstone (6688: 11). (e) Flat whetstone with furrow (NM 6688: 9). Not to scale (see Pälsi 1920: 14–15). (Photo: S. Pälsi, National Board of Antiquities)

Figure 5.12 The 'Antrea Net Find'. Pieces of shield bark of *Pinus sylvestris* L. with holes for fastening. Floats for a net. Not to scale (see Pälsi 1920: 16–17). (Photo: S. Pälsi, National Board of Antiquities)

mentarius L.; Fig. 5.10e) interpreted as belonging to the fire utensils.

5.1.5 Date

It is very interesting to note that Pälsi never expressed an opinion of the chronological position of the 'Antrea Net Find'. Of course, in his archaeological writing, Pälsi, on the whole, did not plunge into specific chronological considerations. However, Fig. 2 in Pälsi's (1920) article and the fact that he did not refer to the results achieved by Lindberg (1916: 19–23; 1920) may hint at additional intricate reasons. His Fig. 2 (cf. Fig. 5.15 here) is a simplified tracing of the Russian topographic map sheets XIII: 52 and XIV: 52 (completed in 1894 and 1898 respectively at the scale of 1:42 000), which only includes the River Otamonjoki and Lake Paapanlampi, the 21-m (actually 10 sažen' or 21.34 m) asl contour line and the find spot. According to Ailio (1915), the 21-m asl contour line represented the shoreline of the Lake Ladoga transgression, which he dated to the Neolithic and to which he connected the net find. Ailio aggressively opposed Lindberg's dating of the stratum where the objects had been found to the early Ancylus phase of the Baltic. It is difficult to judge to what extent Ailio, who was Pälsi's superior at the Archaeological Commission, influenced the preparation of the article.

5.1.6 Interpretation of the find

In his field notes, Pälsi pondered the meaning of the pieces of bark and the stones. His mind turned towards thoughts of lake dwellings, about which he began to speculate. Soon, however, he caught the drift and realised that his findings really told a different story. Twenty-four days after his return from Korpilahti, a popular article on the 'Antrea Net Find' was published, in which he presented all his main points of interest that he then repeated in front of the Finnish Antiquarian Society in October of the same year and again six years later in his definitive article (Muukkonen 1915; Pälsi 1914; 1920).

What kinds of conditions led to the formation of the context in question? Clearly the artefacts had sunk in water, possibly because of an accident. They might have fallen from a capsized boat or they might have been the load of a wanderer who had broken through the ice. The fact that the artefacts were found within a limited area favoured the latter alternative. The artefacts had been packed in a container like a knapsack, possibly made of birch bark. The sack had landed on the bottom immediately, as had the sinker stones, but it had taken some time for the net cord and the floats to soak and sink.

Pälsi considered that the artefacts were the belongings of a man and that the context showed that the man had been well equipped. With axes, adzes, preforms and raw materials in his load he had been, in fact, 'over-equipped' for an ordinary fishing trip. Perhaps the man had been moving from one settlement site to another when he met with an accident.

For Pälsi, the net was a most interesting object of study. Based on the number and location of the floats and sinkers in relation to each other and the weight of the latter (c. 15 kg), as well as comparison with ethnographic parallels, he concluded that the length of the net had been c. 27 m and the height 1.3 m or more. The net was made of a two-threaded cord, the width of the meshes had been c. 6 cm and the knots were of a type which, according to him, appeared in the imprint of a net found on the bottom of a Neolithic pot from Kiukainen, south-western Finland (Hackman 1914: 127, Fig. 3), and which was still used in the production of fishing nets in Finland (Fig. 5.13). Pälsi assumed that the net had been intended for bream (*Abramis brama* L.) or salmon (*Salmo salar* L.).

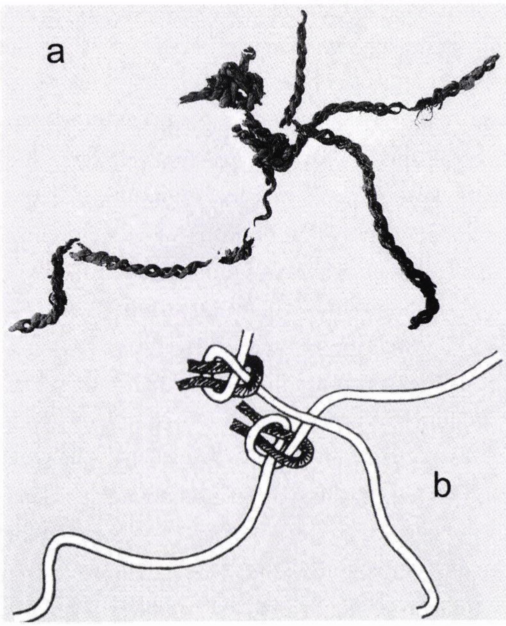


Figure 5.13 The 'Antrea Net Find'. (a) Fragments of net cord with knots of willow bast. (b) Reconstruction of the knots. About natural size (see Pälsi 1920: 16). (Photo and drawing: S. Pälsi, National Board of Antiquities; image compiled and edited by C. Carpelan)

Figure 5.14 The 'Antrea Net Find'. Cubes of silty clay gyttja taken from beneath sinker stones with remains of bindings made of shavings of willow stem. Not to scale. (Photo: S. Pälsi, National Board of Antiquities)

5.2 A history of opinions and studies

5.2.1 Problems, questions

In Finland, archaeological objects had been discovered in wetlands and collected for museums and scientific excavations had also been carried out at wetland find spots as early as the 19th century (see Taavitsainen 2001). However, in 1914, wetland excavation was no more a routine action for Finnish archaeologists than it is today. Pälsi was not sent to Korpilahti as an expert in wetland archaeology, but as a practical person and a Stone Age archaeologist who had worked in the Karelian Isthmus for many seasons. He had worked, though, under the direction of Ailio, who was the leading Stone Age expert and representative of the geo-scientific aspect of archaeology. Obviously Pälsi succeeded in developing a satisfactory working technique.

In the article on the 'Antrea Net Find', Pälsi (1920) concentrated the presentation on the method of excavation, the description of the archaeological objects, the analysis and interpretation of the observations connected to the remains of what he thought to be a net for fishing and on the reconstruction of the conditions which led to the formation of the context in question. Archaeology as ethnography was Pälsi's forte.

He did not go into comparative classification and typology of the artefacts, nor into dating and chronology, and he did not discuss the cultural context and connections of the collected material. Neither did he use the results of the archaeological, phytopalaeontological and osteological investigations to compile a review of the environmental conditions in which the society represented by the find subsisted.

However, these questions and all theoretical and methodical problems related to them remained. During the 93 years since the first presentations of the archaeological find and its phytopalaeontological dating, many researchers have taken up the themes dropped by Pälsi. Five phases in the history of opinions and studies of the 'Antrea Net Find' can be distinguished.

5.2.2 Phase 1 (1914–1929)

On 23 August 1914, Pälsi published a popular article on the 'Antrea Net Find' in a leading newspaper and on 1 October, he presented the find in front of the Finnish Antiquarian Society.

As early as the spring of the following year, Ailio (1915: 85–86), in his extensive study of the Postglacial development of Lake Ladoga (Fi. Laatokka, Ru. Ladožskoe ozero) and its correlation with the Stone Age settlement, briefly described the Antrea find and the find spot. He thought that the find context had probably fallen in the water of a transgressing Lake Ladoga and been covered by sediments shortly before the transgression maximum. Thus, the Antrea find was almost simultaneous with the finds from the Ladoga canal close to the River Sjas (Ailio 1915: 86; Inostrancev" 1882), which had been covered by the beginning transgression. On the one hand, Ailio (1915: 152–155) found that the settlement in the Karelian Isthmus and the Ladoga canal represented by Combed Ware (Style 2, according to Europaeus-Äyräpää 1930) narrowly predated the transgression maximum. On the other hand, based on typological considerations, he found that the beginning of the Combed Ware context narrowly predated the transition between the Neolithic periods II and III (as defined by Oscar Montelius 1891). The conclusion was that the initial colonisation of the Ladoga region had begun slightly before the transgression began around 2500 BC and that the transgression maximum had occurred somewhat later. This locked the chronological position of the Antrea find. Referring to suggestions that part of the finds from the Ladoga canal and from neighbouring regions would date from very early periods, Ailio (1915: 157) stated that there were no finds from the Ladoga region and other parts of Finland nor from the neighbouring regions in Russia datable to the Ancylus period (cf. Sarauw 1904: 181–314).

Lindberg presented his results concerning the dating of the find in late autumn 1915. In addition to the Antrea find, he dated the 'Kirkkonummi Ice Pick' (Europaeus 1915) to the Ancylus period, radically earlier than generally expected. Referring to Ailio (1915), he asked why archaeologists tended to date the initial colonisation of the Ladoga region to an advanced part of the Neolithic, while phytopalaeontology offered evidence that this region had provided a favourable environment for a hunting and fishing population well before the beginning of the Litorina and the climatic optimum. He pointed out that during the Glacial period, hunting societies had dwelled in environments with arctic animals. He concluded that finds from the early

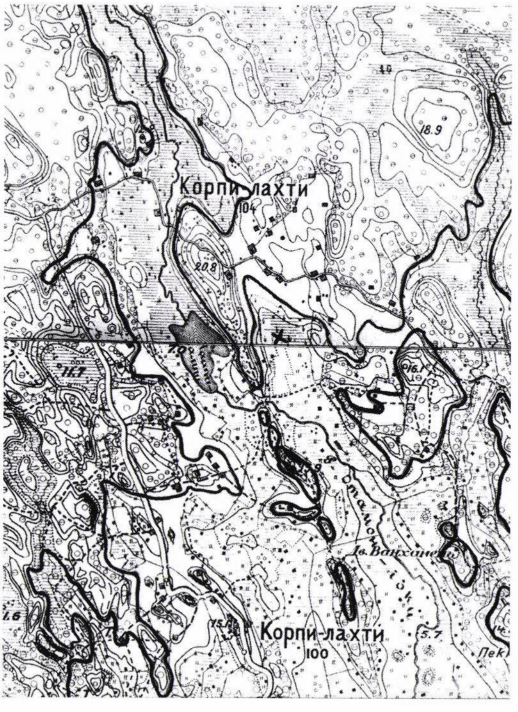


Figure 5.15 Map of Korpilahti (two connected sections of the Russian topographic map sheets XIII: 52 and XIV: 52 printed in 1894 and 1899 to scale 1:42 000) with the 10 sažen' contour line (corresponding to 21.34 m) highlighted by Sakari Pälsi. A simplified version of the map is published in Pälsi (1920: Fig. 2). The altitude of c. 21 m asl represents the Lake Ladoga transgression after the forming of the River Vuoksi c. 5000 BP / 3800 calBC. In spite of a general conformity, a comparison with the 20-m contour line in Fig. 5.4 reveals some important differences. A cross indicates the 'Antrea Net Find'. (Photo: S. Pälsi, National Board of Antiquities)

part of the Ancylus should not surprise anyone (Lindberg 1916: 28). However, on the latter occasion, Ailio had raised objections against Lindberg's dating, which he simply had found too early (Länsiluoto 1916: 347).

In his review of new Stone Age finds discovered in 1914, Aarne Europaeus (1916: 43–44) briefly describes the discovery of a net and other artefacts from a wetland in Antrea. He also mentions the sensational phytopalaeontological dating to the Ancylus. Because a special publication was expected soon, he did not go into details.

Six years after the investigation, as Lindberg's (1916) article had been published but Pälsi's had not, Europaeus (1920: 53–54), in a study of the oldest stone axes found in Finland, examined the axe from Antrea (Fig. 5.10a). Although the surface was more carefully and completely ground, its shape was identical to the preceramic Suomusjärvi type of axes. A dating to the Ancylus appeared too early, but he admitted that datings of early archaeological phenomena achieved by archaeological methods were not unshakeable and therefore the use of geological and phytopalaeontological methods was a welcome contribution. As for the dating of the Antrea find, one had to patiently wait and see. He referred to the finds from Kunda, northern Estonia, which included bone objects similar to those from Antrea and their suggested dating to the Ancylus, although the mainstream dating was to the Neolithic. The Swedish archaeologist Knut Stjerna (1911: 13, 14), again, had presented arguments in favour of a contemporaneity of Kunda with the early Ertebølle culture of Denmark and thus a date to the early part of the Litorina phase.

Finally, the Antrea article was published (Pälsi 1920), accompanied by Lindberg's (1920) second and more specific article on the phytopalaeontological dating. As mentioned, Pälsi did not touch the dating and chronological position of the find. The same year, Ailio (1920) published a popular essay in which he repeated the essence of what he had stated earlier (Ailio 1915), but now he estimated the typological date of the find to be almost 3000 BC (or the age to c. 5000 years).

In a study of the Stone Age in Russia, Ailio (1922: 7–8) commented on the dating of both Antrea and Kunda in a somewhat aggressive manner. According to him, the phytopalaeontological dating of the former to the beginning of the Ancylus was methodically unsatisfactory, although he did not explain how. He claimed that from a geological viewpoint it was clear that the stratum in question was only slightly older than the Ladoga transgression maximum. From an archaeological viewpoint, again, it was typologically impossible to chronologically parallel technically advanced well-ground stone tools, such as those of the Antrea find, with Azilian-type implements. Typologically, the tools from Antrea could not predate the Period I to II transition of the younger Stone Age. The Kunda–Ertebølle parallel was also fallacious, as had been pointed out earlier by Max Ebert (1913: 507).

In an important study published the same year, 'Fornfynd från Kyrkslätt och Esbo socknar', Europaeus (1922: 86, 150, 178) paralleled Antrea, Kunda, Ertebølle and the early Litorina. An article in Ebert's 'Reallexikon' (Europaeus 1924) presented his arguments to an international audience. The carefully ground surface was a trait that did not fit with an early dating to the Ancylus. Having mentioned Ailio's arguments (1922), he presented his own, which were the following: the stone objects corresponded to those of the Suomusjärvi culture and the bone objects to the Kunda and Pärnu finds, although they were probably slightly younger than the oldest of these Estonian finds. This meant a dating to Period I of the younger Stone Age and to early Litorina – all in good correspondence with the arguments and the chronological table presented in Europaeus (1922).

It is important to note that from the beginning, the chronological position of the Antrea find had been found to depend on the dating of similar finds in the Baltic countries, primarily the Kunda finds of Estonia. Antrea could not be older than Kunda, which, as mentioned above, was first considered Neolithic (Grewingk 1882; 1884), but later also paralleled on the one hand with the Maglemose culture and the Ancylus and on the other hand with the Ertebølle culture and the early Litorina period. Although the Ancylus alternative had been criticised by Ebert (1913) and Ailio (1922) and in general was not accepted, A. M. Tallgren (1922: 35–40) ventured to argue in favour of such a date. Ailio (1923) promptly attacked him for this.

However, also C. A. Nordman (1922: 30–31), in a review of the history of settlement in the Baltic Sea region, accepted that the Maglemose culture (also called Mullerup) dated from the Ancylus period and argued that Kunda and related finds in the Baltic states derived typologically from Mullerup. The 'Antrea Net Find' and the 'Kirkkonummi Ice Pick' and part of the Ladoga canal finds belonged to the Kunda section of the Mullerup entity. Together they constituted the first period of the Mesolithic in the region. Nordman thus took a stand on the chronological issue, but he did not refer to the ongoing dispute.

It appears that the most intensive debate on the date of the 'Antrea Net Find' and related sites took place in 1922. Later Ebert (1926) still argued in favour of a date to the Litorina and Europaeus (1929), in an article on the Suomusjärvi culture in the 'Reallexikon', conformed with his view expressed in 1922 and 1924. Geologist Matti Sauramo (1928: 204), however, in his textbook on the quaternary geology of Finland, simply stated that based on geological and palynological criteria, the Antrea find, along with Kunda and Maglemose, dated from the Ancylus.

In the meantime, geologist P. W. Thomson had started his stratigraphical and palynological studies of the history of forests (and the vegetation in general) in Estonia. He also became interested, among other things, in the dating of the finds which had been collected in the layers of the ancient Lake Kunda. He argued that the minimum age of the finds was defined by the stratum which represented the catastrophic draining of the lake. He showed that this had happened at the transition from the Boreal to the Atlantic climatic period (corresponding approximately to the Ancylus–Litorina transition). This proved that the Kunda culture was contemporary with the Maglemose culture of Denmark and the Ancylus. (Thomson 1929; 1930.) This was an important achievement for the study of the Estonian Mesolithic, but did these fresh results have any influence on the views on the chronological position of the 'Antrea Net Find'?

5.2.3 Phase 2 (1930–1939)

One year after the Suomusjärvi article in the 'Reallexikon', Europaeus-Äyräpää (1930: 170) returned to the Antrea find in the introductory section of his classical study of the typology and chronology of the Stone Age ceramics in Finland. He recalled that the find had been dated to the Ancylus according to phytopalaeontological criteria and that this dating had been considered too radical. Apparently Thomson's articles had not reached Finland yet (and the first note on this early date was not published in an archaeological context in Estonia until 1932 by Harri Moora), but having obtained some personal information from geologist Lennart von Post (Sweden) and archaeologist Rikhard Indreko (Estonia) on recent studies carried out at Kunda and the dating to the Ancylus of the Kunda finds, Europaeus-Äyräpää found it easier and more natural to accept the dating of the Antrea find to this early stage. This statement opened the second phase in the history of study related to the 'Antrea Net Find'.

As a logical step, Pälsi and Äyräpää took the initiative to have the Antrea sediment column, kept at the National Museum in Helsinki, re-examined as the methods of quantitative pollen analysis had "improved considerably" during the 15-odd years since Lindberg's study. The task was given to quaternary geologist Esa Hyyppä, who had carried out research projects in the Karelian Isthmus and thus was well prepared for the work. He also promptly published his results (Hyyppä 1934).

As the result of a pollen analysis, Hyyppä concluded that the stratum including the finds had formed in the *beginning* of the Ancylus period, thus confirming the result achieved by Lindberg (1916; 1920). A comparison with Thomson's (1929) results indicated that Antrea would slightly predate Kunda. Referring to the environmental history, Hyyppä found it only natural to discover traces of human presence in the Karelian Isthmus in the beginning of the Ancylus period. He even claimed that the conditions had been favourable for human presence as early as the preceding Yoldia period (cf. Lindberg 1916).

Clearly, Hyyppä's study provided a breakthrough in the Antrea issue and at the same time it brought about a change of attitude within Mesolithic research in Finland (although archaeologists still stuck to a more conservative line than geologists). In the mid- and late 1930s, Äyräpää (1934; 1936a & b; 1939) published several articles in which he pointed out that the dating of the Kunda finds to the Ancylus period on the basis of stratigraphy and pollen analysis had made it possible to rethink the dating of the Antrea find. He now stated that while Kunda had been dated to mid-Ancylus, the earliest traces of human presence in southern Finland dated from the late (!) Ancylus. He did not venture to adopt Hyyppä's well-grounded dating and claim that this dating really implied that still older finds were to be discovered in Estonia in the future (as realised in the 1970s, see Jaanits & Jaanits 1975; 1978).

Grahame Clark of Cambridge was the only foreign researcher who showed a real interest in the Antrea find. In 'Mesolithic Settlement of Northern Europe' (Clark 1936: 108–109, 241), he provided a brief description of the find in general and a more detailed description of the net made from a two-thread cord of bast, but according to him "it was not possible to elucidate the type of knot or mesh employed from the fragments that remained". Having mentioned the phytopalaeontological date to the Ancylus and the debate it had caused (e.g. Ailio 1922), he refers to Nordman, who in a letter had told him about recent research that had confirmed the early chronological position (i.e. Hyyppä 1934). Like Nordman earlier, Clark included Antrea, Kirkkonummi, Kunda, Pärnu etc. in the Maglemose culture, which represented his Mesolithic Period II, corresponding with the Boreal period.

5.2.4 Phase 3 (1945–1967)

World War II interrupted much of the archaeological activity both in the field and at the desk in Finland and as a result of the war, the region of the 'Antrea Net Find' was incorporated into the Soviet Union and so transferred out of the reach of Finnish archaeologists. However, the interest in the Antrea find lived on at least in Äyräpää's thoughts, as well as those of geologist Matti Sauramo. However, their focus was now on solving the whole question of the initial colonisation of Finland with the help of geological and palynological studies at sites of the Suomusjärvi culture in western Finland on the one hand and a second re-examination of the Antrea find on the other.

Sediment studies in combination with shore displacement studies connected to a number of sites in the Suomusjärvi environment allowed them to presume that the sites in question had been abandoned during the Ancylus period and thus were chronologically close to the Antrea find. Together they presented their fresh results in front of the Finnish Academy of Sciences and Letters in 1947 (Äyräpää & Sauramo 1948; see Luho 1967: 114 with refs. and Abb. 22.).

In 1947, they proceeded to the re-examination of the Antrea find, including the sediment column, but the results were published later. The re-examination of the Antrea sediment column was directed by Matti Sauramo and the main idea was to analyse samples taken at 1-cm intervals from the critical portions of the stratigraphy (analysis by T. Suomalainen). Sauramo (1951: 96–97) concluded that the net was significantly older than the Ancylus transgression, as Hyyppä's analysis had already indicated, and the archaeological correspondence of Antrea with Kunda was supported by a comparison with Thomson's (1935) diagram which indicated a corresponding chronological position. People lived in the Karelian Isthmus as early as during the transition from the cool Preboreal climatic phase when birch forests dominated the environment to the more favourable Boreal phase when pine forests dominated.

Until now, the net cord and the bindings of the weights of the Antrea find had been considered to have been made of nettle or bast of linden (Pälsi 1920: 17; repeated e.g. by Äyräpää 1936a & b and Luho 1948), but apparently this was an unconfirmed supposition. At Äyräpää's request, the botanist Viljo Kujala analysed a section of the preserved cord and came to the conclusion that it was made of the bast of a willow species (possibly *Salix cinerea* L.) (Kujala 1948). This fitted better than linden with the dating of the net to the early Ancylus. He also stated that the bindings of the weights were made of the stem of some aquatic plant not yet identified. Later he identified the bindings as shavings of wood from beneath the bast of a willow (Sauramo 1951: 87).

Äyräpää himself, in a review of the earliest archaeological finds of Finland, recalled the reluctance archaeologists had earlier shown towards the early datings of Antrea, Kunda and even Maglemose. However, the two re-examinations of the Antrea sediment column had shown that Lindberg was right. The find dated from the early Ancylus at the latest (!) and the corresponding dates of Kunda and Maglemose had been confirmed too. Now Finnish prehistorians were expecting discoveries of even earlier finds. (Äyräpää 1951.)

Äyräpää (1951: 4–5) referred to the Komsa culture of northernmost Norway, which had been discovered around 1920 and 'officially' described and interpreted in the 1930s (Nummedal 1920; Bøe & Nummedal 1936). Äyräpää accepted the interpretation that the population in question had moved from the East European plain to the arctic coast of Norway along the corridor that had formed between the White Sea in the east and the remaining Scandinavian ice sheet in the west as early as the Yoldia stage, which had preceded the Ancylus in the development of the Baltic basin. He found it not impossible that this migration had left traces within Finland, too.

As for the Antrea find, Äyräpää concluded that it, together with the 'Kirkkonummi Ice Pick', indicated that people representing the Kunda culture were moving about in Finland and that the latter indicated that they had been present in the winter, too. This meant that they had permanently settled down in the region in the early Ancylus. The 'Heinola Sledge Runner' again would rather represent the influence of the Komsa migration. In the cultural sequence, the Kunda culture represented an initial phase out of which the Suomusjärvi culture developed in western Finland, while another variant (with Ilomantsi axes) developed in eastern Finland

and Karelia. Again, it is clear that Äyräpää owed a lot to the extensive study of the Mesolithic in Estonia recently published by Indreko (1948). In the latter study, the examination of the Kunda finds and their comparison with early Mesolithic finds in other countries played a central role, The Antrea find was mentioned twice, in connection with the stone axes and with the net (Indreko 1948: 152, 328). Interestingly, he does not mention the type of dagger represented by the one from Korpilahti, with inlaid microliths.

After 17 years, Clark (1952: 44–45, 226–227) returned to the 'Antrea Net Find' in his study on the economic basis of the European prehistoric societies. He stressed the importance of the net for the economy of food collecting societies and therefore underlined the importance of the Antrea find. This find included "part of a seine net used by Maglemosian fishermen in the waters of the Ancylus lake; it was made from a two-thread cord, almost certainly of willow bast, and it was knotted." He mentioned the phytopalaeontological date to the Ancylus and the debate it had caused (e.g. Ailio 1922).

Äyräpää had suggested that traces of settlers predating the Antrea find were probably to be found in Finland. Five years later, Ville Luho, a disciple of Äyräpää, presented a number of finds assumed to be older than Antrea (Luho 1956) in his doctoral dissertation. They represented what he called the Askola culture, which, according to him, was closely related to the Komsa culture, not Kunda. He also claimed that the Suomusjärvi culture had developed out of the Askola culture, not Kunda. The traits which resembled those of Kunda had been adopted as a result of cultural contacts. (Luho 1956: 150–162.)

Luho postponed the discussion of the Antrea, Kirkkonummi and Heinola finds to a later occasion, namely his study of the Suomusjärvi culture (Luho 1967). He gave a detailed account of each and found no chronological problems. As for their cultural background, the 'Heinola Sledge Runner' presumably represented the Askola culture, a branch of the Komsa culture, while the 'Kirkkonummi Ice Pick' was a typical Kunda object. The cultural background of the 'Antrea Net Find' was more difficult to determine. The typological traits of the bone and antler objects resembled but were not identical with corresponding Kunda objects. He pointed out that corresponding finds from the east (i.e. the Central Russian lowland) were unknown. He seemed to dislike the idea of identifying the Antrea find as a representative of the Kunda culture. (Luho 1967: 24–29.)

Meanwhile Nina N. Gurina (1961: 30, 40–41), in her study of the "Ancient history of the North-West of the European part of the USSR", paid some attention to the Antrea find context. She presented the main features and listed the finds according to Pälsi (1920), paying special attention to the net. She also mentioned the disagreement concerning the chronological position of the context. According to her several scholars (Lindberg, Hyyppä, Zemljakov and Clark) took it to the Boreal and the Ancylus, while others (Ailio and Ravdonikas), on the basis of artefact typology, paralleled the find with the Neolithic Pit-Combed Ware. However, she concluded that recent results achieved by Finnish scholars proved that the find context dates from the Mesolithic and was somehow connected to the Suomusjärvi culture.

5.2.5 Phase 4 (1968–1991)

A new phase in the chronological studies of the Stone Age in Finland began in 1968. On the one hand, the Radiocarbon Dating Laboratory at the University of Helsinki had begun to operate in 1968, headed by Högne Jungner (1979: 1). On the other hand, Ari Siiriäinen (1969) published his first article on the use of the distance diagram as a method in correlating coastal settlement sites with shore displacement. The two methods were fruitfully combined by Siiriäinen (1972) when he presented "A Gradient/Time Curve for Dating Stone Age Shorelines in Finland" and later in a summarising article (Siiriäinen 1974). This provided a simple graphic method that made it possible to process the whole Stone Age sequence in a coherent and consistent manner.

As a result of Siiriäinen's (1969; 1974; 1981) chronological studies in combination with comparative archaeological research, Luho's Askola culture turned out to be a mistake. This meant a return to Äyräpää's (1951) scenario where the 'Kirkkonummi Ice Pick' and the 'Antrea Net Find' were explained within a regional context in which the Kunda culture had an important role, while the 'Heinola Sledge Runner' possibly pointed to an eastern connection.

Again, 39 years after his first reference to the 'Antrea Net Find', Clark (1975: 221–227) returned to the scene in his study of the 'Earlier Stone Age settlement of Scandinavia'. He described the geographical setting of Finland in general and the Karelian Isthmus in particular from the viewpoint of the history of settlement. He also described the Antrea find in detail and discussed its context in the settlement of the East Baltic.

In 1972 and 1979, two of the bark floats from the 'Antrea Net' had been radiocarbon dated to 9230±210 BP (Hel-269) and 9310±140 BP (Hel-1303) respectively (Jungner 1979: 44; Jungner & Sonninen 1983: 95; Matiskainen 1989b: 71; Siiriäinen 1974: 7, 11). This fitted well enough with available dates for the Preboreal–Boreal transition and the culmination of the Ancylus transgression. From this point on, the 'Antrea Net' was referred to as the world's oldest fishing net.

The 'Kirkkonummi Ice Pick' had first been dated to the early Ancylus based on an examination of the diatoms found in the clay sticking to the object (Lindberg 1916: 18–19). However, according to a reinterpretation done in the late 1980s, the list of species points to the Ancylus–Atlantic overlap, i.e. later than 8500 BP (Pentti Alhonen, personal information to Matiskainen 1989b: 71; Edgren 1992: 27). Also the 'Heinola Sledge Runner' had been thought to date from the Preboreal–Boreal transition on the basis of pollen analysis and was thus dated to c. 9200 BP (Aario 1935; 1936; Matiskainen 1989b: 71). The radiocarbon date, however, gave it a somewhat younger age: 8840±90 BP (Su-1710; Edgren 1992: 27).

Meanwhile, musicologist Cajsa Lund (1981: 259; cf. Rainio 2001: 20), in search of prehistoric musical instruments, suggested that the two wing bones of whooper swan among the Antrea finds, which Luho (1967: 29) had earlier identified as some kind of gouges (and Pälsi as rests of meals), actually were the remains of primitive flutes.

In 1981 the society of former residents of the Vuoksenranta municipality, 'Vuoksenrannan pitäjäseura', published a historical and descriptive volume on the municipality (Miikkulainen *et al.* 1981). The principal editor, Antti Miikkulainen, presented sections on the geology and archaeology of the region. Among other things, he described the 'Antrea Net Find' (according to Pälsi 1920) and also gave some information that would have been helpful during the 1998 expedition, as indicated above.

5.2.6 Phase 5 (1992–2006)

In 1992, Pirjo Uino visited Korpilahti as the first Finnish archaeologist since World War II and was able to approximately locate the spot of the 'Antrea Net Find' on the Finnish topographic map as described above (Uino 1997: 352 map 43). This opened the fifth phase in the history of study related to the 'Antrea Net Find'.

In June 1995, J.-P. Taavitsainen had the opportunity to visit Korpilahti and the find spot (Saarnisto *et al.* 1999: Fig. 10). The same year he published an article on the find in a memorial book on the former municipality of Antrea (Taavitsainen 1995). The article included a short description of the find and the excavation. His main point, however, was the net itself and, in particular, the knots used in making the net. Because of the knots, the net provided a mathematical and more precisely a topological issue.

During her stay in Helsinki in 1978, Professor Joan S. Birnbaum of Columbia University, New York, had visited the National Museum and seen the exhibited remains of the 'Antrea Net' and Pälsi's reconstruction of the knots (Fig. 5.13). Later, she had turned to the National Board of Antiquities asking for more detailed information on the find and the net. The Board had provided the information and subsequently Birnbaum had stated that she accepted Pälsi's reconstruction and that she would use the name of Antrea when referring to this type of knot in the future. (Taavitsainen 1995: 460–462.)

For a long time, the 'Antrea Net' was the oldest dated net find at least in Europe. Taavitsainen (1995: 462–463) was able to refer to recent bog finds from Friesack, northern Germany, which include the remains of nets, some of which have preserved knots. The date of the latter corresponds to that of the 'Antrea Net' (see Gramsch 1987; 1992).

In 1995, at a conference on 'Archaeology in Eastern Finland – Human occupation in Boreal Forests' held in Savonlinna, Pavel M. Doluhanov of the University of Newcastle upon Tyne, Great Britain, examined the Holocene environment and prehistoric settlement in the north-eastern Baltic area. He found that the 'Antrea Net Find' indicated the arrival of the initial settlement in the Karelian Isthmus. He had inspected the locality of the find as early as 1970–1971 and found that "the site was located in a small bay of a strait which connected Ladoga with the sea" and that "the samples of the clay which had filled the bay contained typical Boreal pollen spectra". (Dolukhanov 1995: 26.) Two years later he found reason to return to Korpilahti (see below).

In 1998, at the Department of Archaeology, University of Helsinki, a working group headed by Professor Ari Siiriäinen started to plan an archaeological fieldwork project in the Karelian Isthmus as a continuation of the Saimaa project carried out earlier on the Finnish side of the border (see Lavento 2008a & b, this volume). To begin with, a reconnaissance trip to the area was made in the autumn 1998, as described elsewhere in this volume (Siiriäinen *et al.* 2008).

The reconnaissance trip included a visit to the site of the 'Antrea Net Find'. There the aims were to define the location of the find spot (as described above) and collect a new sediment profile in order to enable continuing the research into the date of the find and the palaeoenvironment of the surroundings. Resampling was necessary because the sample column taken by Pälsi in 1915 (Lindberg 1916: 20; 1920), which was still available when Luho (1967: 33) worked on his Suomusjärvi study, could no longer be found in 1998. (See section 5.3.2 below and Miettinen *et al.* 2008, this volume)

From the beginning, the future project was planned to be carried out in co-operation with the Institute for the History of Material Culture, Russian Academy of Sciences, St. Petersburg, represented during this trip by Vladimir I. Timofeev. He informed the Helsinki group that in 1997, in connection with a Saima-Ladoga project (!), he and Doluhanov had carried out fieldwork aiming at the "identification of the Mesolithic site of Antrea–Korpilahti and the sampling of archaeological deposits there with a view to establishing the radiometric age and main characteristics of the palaeoenvironment"

(Dolukhanov & Timofeyev 1998: 5–7).

Information given in Dolukhanov & Timofeyev (1998: 7), in addition to personal information and documentation handed over by Timofeev (11 January 1999), located their two sampling spots (close to each other) at c. 1.1 km south-southeast of the actual find spot discussed above. According to the same sources, the profiles also differed in structure from the original profile as described by Lindberg (1916; 1920), Hyyppä (1934) and Sauramo (1951), as well as from the 1998 profile (Miettinen *et al.* 2008, this volume).

The 'Antrea Net Find' attracted more and more interest and was mentioned in studies of the chronology of the Early Mesolithic peopling of the northern areas and in connection with the study and management of wetland sites (Burov 2001; Carpelan 1999; Taavitsainen 2001; Timofeev *et al.* 2004; 2005). In a prehistory of the former Finnish Province of Viipuri, Matti Huurre (2003) presented a short review of the 'Antrea Net Find'.

Fieldwork was also carried out. In 2000, a working group headed by Timo Jussila searched the close surroundings of the find spot for settlement sites. The result was negative. The zone close to the 30-m asl contour line turned out to be mostly unsuitable for settlement. In 2000, 2001 and 2003, Jussila's group proceeded westwards and discovered Mesolithic sites at c. 30 m and c. 25 m asl about 7 km west of the find spot. In 2004, a working group headed by Hannu Takala carried out test pit excavation and levelling at the sites. (Jussila 2000; Jussila & Matiskainen 2003; Takala 2004.)

In a recent study of an Early Mesolithic site at Ristola in Lahti, southern Finland, Takala (2004) briefly reviewed the earliest Mesolithic sites in Finland and the Karelian Isthmus, including the 'Antrea Net Find'. In this study, the radiocarbon dates of the net cord and of two sediment samples taken from the 1998 cores were first published in print.

5.3 A reassessment of the 'Antrea Net Find': environment and archaeology

5.3.1 Background

In 1998, a workgroup from the Department of Archaeology, the Department of Geology and Palaeontology and the Dating Laboratory, all University of Helsinki, visited the site and took a new sample column of the sediment profile aiming at a fresh examination applying a variety of current methods not available in the early years. The results of these studies are presented elsewhere in this volume (Miettinen *et al.* 2008).

This chapter looks at the results wishing to understand the environmental settings from the point of view of an archaeologist and with reference to Pälsi's study. The place of the 'Antrea Net Find' within the frame of the Early Mesolithic of Finland, East Baltic and Northwest Russia will not be examined here.

5.3.2 The sediment profile

The 1998 sampling was done under the direction of Professor Matti Eronen of the Division of Geology and Palaeontology, Department of Geology, University of Helsinki, c. 10–20 m south-east of the memorial plaque mentioned above (section 5.1.2) in order not to hit Pälsi's excavation. A pit of 1 m^2 was dug with a spade to the depth of c. 103 cm below the surface and a vertical sequence of eight (8) blocks was cut from the profile. Next to the pit, five (5) cores were taken with a 'Russian peat sampler' from between the depths of 80 and 190 cm below the surface. Thus the stratigraphy was secured down to the depth of 190 cm below the surface and the contact between silty gyttja and silty clay gyttja, i.e. the find level, was found at a depth of 118 cm below the surface. (Fig. 5.16)

The question of the length of the original sample column and the depth of the find level is interesting, because five authors have given a number of different values that do not agree with Pälsi's levellings. One of Pälsi's unpublished excavation plans indicates that according to levelling, the depth of the surface of the basal 'clay' varied between 75 and 85 cm with a mean of 80 cm (Fig. 5.16). However, in his article, Pälsi (1920: 8) stated that the basal 'clay' began to appear somewhere between 80 and 90 cm and published a photograph showing a depth of 90 cm (Fig. 5.6). According to Lindberg (1916: 20–21) the length of the sample column provided by Pälsi divided in seven blocks was 170 cm and the depth of the contact between silty gyttja and silty clay gyttja (i.e. the find level) occurred at 109 cm below the surface. Later Lindberg (1920) stated that the length of the sample column was 188 cm and the depth of the find level 104 cm. (Fig. 5.16)

Fourteen years later Hyyppä (1934: 9–10, Fig. 1) assumed that the column had shrunk about 10 cm because of drying, but stated that this did not hamper the examination and interpretation because the surface of the basal 'silt' was easy to distinguish. According to his diagram, the length of the column was 176 cm and the depth of the surface of the basal 'silt' 107 cm. According to the diagram published by Sauramo (1951: Fig. 3), the depth of the surface of the basal 'silt' was 109 cm. He did not mention the length of the surviving column. Finally, according to Luho's (1967: 33) measurement, the length of the sample column was 165 cm and the depth of the actual find level at 99 cm. By then, the column had probably begun to crumble as a result of 50 years of storage in variable conditions. (Fig. 5.16)

It is difficult to see the reason for Pälsi's variable depths of the surface of the basal 'clay' (the find level). However, one of his photographs (Fig. 5.6) provides proof in favour of a 90 cm level at one point of the excavation. On the other hand Lindberg's, Hyyppä's and Sauramo's depths measured from one and the same column taken by Pälsi from the profile of his excavation cluster closely around a mean of 107 cm. The difference could be due to the fact that according to Pälsi's levellings the surface of the basal 'clay' was not even; in addition, the thickness of the covering sediment may have been variable. This probably would explain the depth of 118 cm of the corresponding level in the 1998 column which was taken 10–20 m off Pälsi's excavation, as discussed above.

However, because the contact between silty gyttja and silty clay gyttja (the find level) is considered unambiguous by each author, it is possible to make acceptable comparisons between the different studies based on the original sediment column on the one hand and between them and the 1998 profile on the other. Evidence of this is provided by the fact that the contact between silty gyttja and silty clay gyttja formed during the climax phase of the Holocene Pine maximum (Hyyppä 1934; Miettinen *et al.* 2008, this volume; Sauramo 1951).

The 1998 profile was analysed by a graduate student, Kirsi Ylikoski (2004), for lithology, loss-on-ignition, pollen, spores and diatoms under the supervision of Professor Matti Eronen and later Dr. Arto Miettinen at the Division of Geology and Palaeontology, Department of Geology, University of Helsinki. For this study, the results have been revised and reinterpreted by Miettinen (diatoms) and Docent Kaarina Sarmaja-Korjonen (pollen, spores). In addition, Dr. Eloni Sonninen analysed a section of the column for ^{13}C isotopes and Professor Högne Jungner had a piece of net cord and two sediment samples radiocarbon dated with the AMS method at the Dating Laboratory, University of

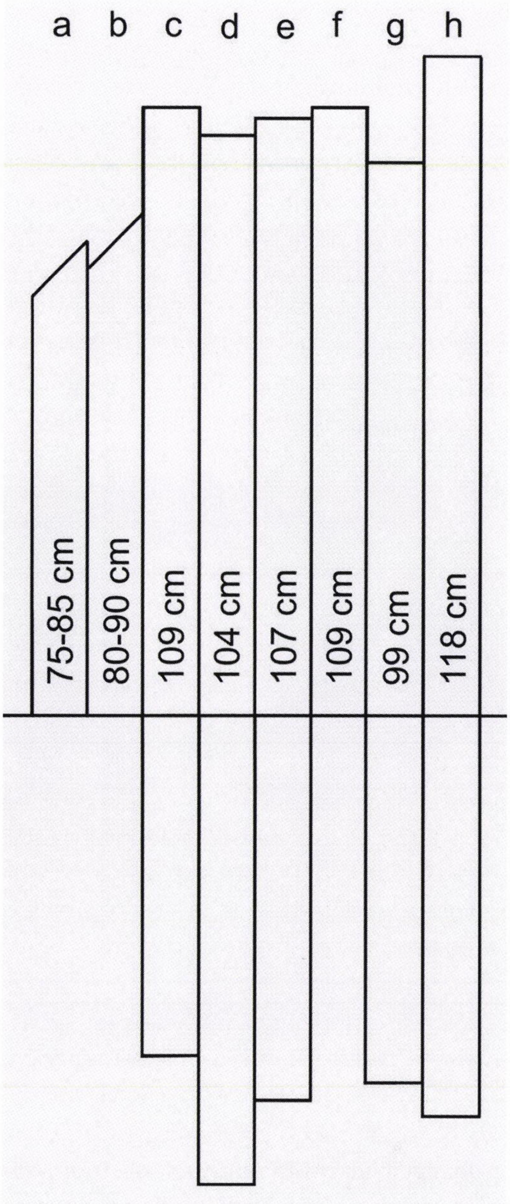


Figure 5.16 The 'Antrea Net Find'. Graph showing eight different depths of the find level, i.e. the surface of the basal 'clay' and several different lengths of the same sample column. (a) Pälsi according to unpublished excavation plan. (b) According to Pälsi (1920: 7). (c) According to Lindberg (1916). (d) According to Lindberg (1920). (e) According to Hyyppä (1934). (f) According to Sauramo (1951). (g) According to Luho (1967). (h) The 1998 sample column according to Miettinen *et al.* (2008, this volume). (Illustration: C. Carpelan)

Helsinki. The net cord was examined by Docent Terttu Lempiäinen at the Herbarium, Department of Biology, University of Turku. A report of these studies is published elsewhere in this volume (Miettinen *et al.* 2008)[1].

5.3.3 The dating

As mentioned above (section 5.2.5), two floats made of shield bark of pine (*Pinus silvestris* L.) had earlier been used for radiocarbon dating with the following results: 9230±210 BP (Hel-269) and 9310±140 BP (Hel-1303). As the dates fall close enough to each other, the wide age uncertainties overlap almost completely. *T*-test and *Xi*-square prove that the samples are statistically the same and therefore it is justified to use their pooled mean, 9285±115 BP, to represent the age of the floats. This date calibrates to 8650–8300 calBC[2].

The shield bark of a pine needs 100–150 years to develop. Therefore shield bark corresponds to "charcoal from wood species with a long life span" ($\delta > 100$ years), which means that a certain "age before human use" must be allowed for (cf. Waterbolk 1971; 1983). In the case of the net cord of willow bast, again, the age before human use certainly "is so small as to be negligible" ($\delta < 20$ years). Therefore a piece of net cord was sacrificed for an AMS analysis, which gave the following date: 9140±135 BP (Hela-404), which calibrates to 8560–8240 calBC (Miettinen *et al.* 2008, this volume). As expected, the date of the bast is younger than that of the bark, but as the age uncertainty is wide enough to overlap with those of the floats, the ages BP of the three samples are statistically the same at the 95% level. (However, there is a difference of 140 years between the calibrated central values).[3]

The net must have been made and then lost in the water within a negligible period of time well covered by the age uncertainty. As for the certainty of association of the net with the rest

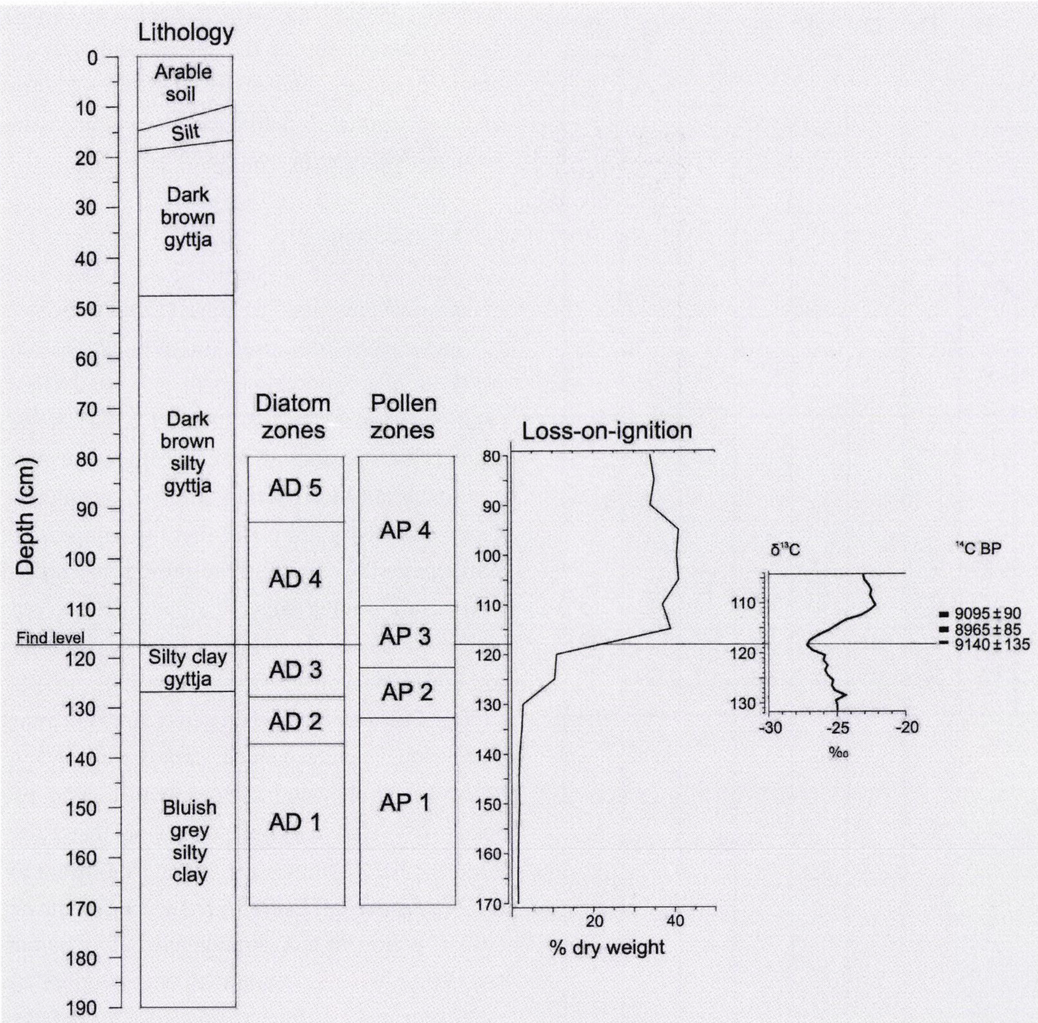


Figure 5.17 The 'Antrea Net Find'. Graph showing basic information of the 1998 sample column. (Drawing compiled and edited by C. Carpelan according to Miettinen *et al.* 2008, this volume)

of the objects of the find, the published stratigraphic observations are precise enough to satisfy class B, "high probability". It is possible to continue chronological considerations relating to the whole find context with confidence. As mentioned (section 5.1.3), the remains of the net were discovered on top of the silty clay gyttja. In the 1998 profile, the corresponding layer is found at a depth of 118–119 cm and the AMS analysis of the net cord (Hela-404) is assumed to date this level.

In addition, AMS analyses of two sediment samples of the 1998 profile representing silty gyttja from the depths of 115–116 cm and 112–113 cm respectively were carried out, resulting in 8965±85 BP (Hela-417) for the former and 9095±90 BP (Hela-416) for the latter one. As expected, these two dates are slightly younger than that of the net cord representing the surface level of the silty clay gyttja. However, the material of the 112–113 cm sample is older than that of the 115–116 cm sample. The reason for this contradiction is not known; possibly there was disorder in the sedimentation. But again, because of wide limits of age uncertainty, the ages BP of Hela-404, Hela-416 and Hela-417 are statistically the same at the 95% level.

5.3.4 Diatoms and water level

As a result of the examination of the 1998 profile between the depths of 170 and 80 cm, a sequence of five diatom assemblage zones (AD1–AD5) was distinguished (Miettinen *et al.* 2008, this volume). The diatom assemblage of AD1 (170–145 cm) probably represents the Yoldia Sea stage of the Baltic, while the assemblage of AD2 (145–130 cm) points to the Yoldia–Ancylus transition. The transition is dated to c. 9500 BP (Saarnisto & Grönlund 1996: 206; c. 8800 calBC).

The zones AD3 (130–115 cm) and AD4 (115–95 cm) comprise the most interesting section of the profile. This section includes, at the depth of 119–118 cm, the find level dated by a sample of net cord (Hela-404) and the transition from silty clay gyttja to silty gyttja at 118 cm. In addition, there are two dates of samples of silty gyttja from the depths of 116–115 cm (Hela-417) and 113–112 cm (Hela-416). (Fig. 5.17)

The diatom assemblage of AD3 represents the actual Ancylus Lake stage of the Baltic. The change from silty clay gyttja into silty gyttja at 118 cm and the change in the diatom assemblage at 115 cm (transition to AD4) probably indicate a drop in the water level which occurred immediately after the Ancylus transgression had reached its maximum and turned to regression. This reversed the shoreline displacement from negative to positive and this positive shoreline displacement was accelerated by the isostatic land rise, which at that time was considerably faster than today. (Fig. 5.17)

A total of 46 samples of one cm were taken from sediment cores 1, 3 and 4 for the analysis of $\delta^{13}C$ at depths between 104 cm and 132 cm. The sample size and frequency give a better time resolution than that which can be obtained from the diatom and pollen records. The resulting record shows an interesting sequence. A rising trend takes the $\delta^{13}C$ value -25.0 ‰ at the depth of 132 cm to the value -22.8 ‰ at 118 cm. There a sharp bend turns the direction to a drop of c. 5 ‰ to the value -27.7 ‰ at 112 cm. The sudden turn from a rising to a falling trend in the $\delta^{13}C$ values reflects a rapid change in the conditions in the basin. (Fig. 5.17; Miettinen *et al.* 2008, this volume.)

The significant changes observed in the lithostratigraphy and the $\delta^{13}C$ values at the depth of 118 cm close to the upper boundary of AD3 representing an Ancylus type of diatom assemblage most probably reflect the maximum point of the Ancylus transgression of the Baltic. This is supported by the date of the net cord to 9140±135 BP (Hela-404), which fits well with the present opinion that the Ancylus culmination occurred at some point between 9200 and 9100 BP (Björck 1995). Naturally, these estimations have statistical uncertainties that cover the wide uncertainty of Hela-404.

There is another bend in the isotope curve at the depth of 112 cm. The $\delta^{13}C$ value of -27.7 ‰ rises to -26.9 ‰ at the depth of 104 cm where the sample series ends. Logically, also this bend should reflect a change in the conditions prevailing in the basin. In the known history of the Baltic basin and that of Lake Ladoga, the following significant event was the emergence of the Heinjoki threshold from the regressive Ancylus. As a consequence of this, Lake Ladoga was isolated and became an independent basin, which possibly changed the conditions to an extent that would affect the $\delta^{13}C$ values.

However, the interpretation of the diatom assemblage of AD4 (115–95 cm) may not support an assumption that the bend in the $\delta^{13}C$

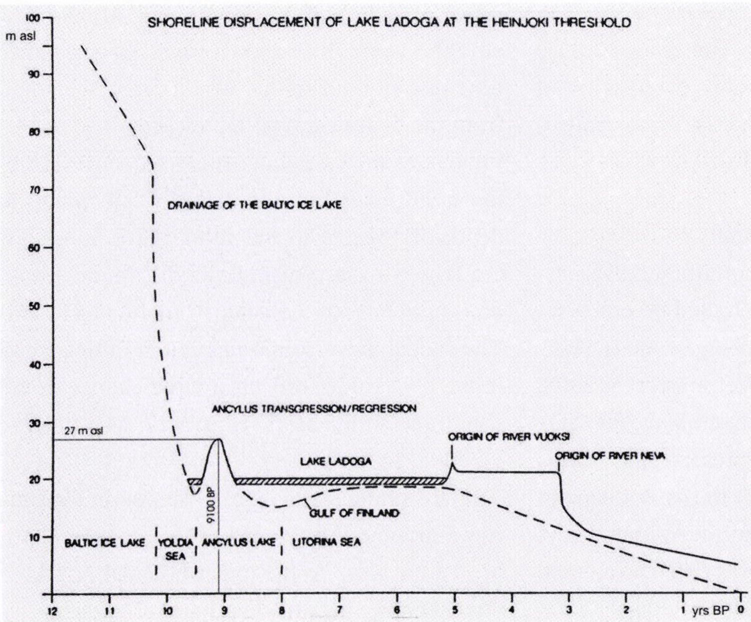


Figure 5.18 Diagram of shore displacement at the Heinjoki threshold according to Saarnisto & Grönlund (1996). Altitudes (m) on the ordinate and radiocarbon time scale BP on the abscissa. (Edited by C. Carpelan)

sequence at the 112 cm level would reflect the isolation of Lake Ladoga. Instead, the diatom assemblage of AD5 (95–(80) cm) would indicate that Korpilahti, as part of Lake Ladoga, had become isolated from the Baltic "some time around 8800 BP" (Miettinen *et al.* 2008, this volume; Saarnisto & Grönlund 1996: 206, Fig. 2; c. 7900 calBC).

If this is correct, the bend in the $\delta^{13}C$ sequence at the 112 cm level reflects a currently unknown event in the history of the Ancylus regression in the Karelian Isthmus, whatever this might be. But then again, recent studies have revealed "deposits related to the drainage and lowering of the Ancylus Lake through the Storebælt, into the southern Kattegat. Instead of being a several hundred-year-long event, which has been implied earlier, this lowering seems to have occurred over a very short time. In a later and more long-lasting phase, the normal background discharge from the Baltic area dominated the flow style ..." (Novak & Björck 1998.) This would support the assumption that the bend in the isotope curve at 112 cm really corresponds to the isolation of Lake Ladoga immediately after 9000 BP or 8200 calBC, during an initial rapid lowering of the Ancylus.

The palaeoenvironmental reconstruction summarised above suggests that the net and the other artefacts were submerged at the time of the maximum of the Ancylus transgression, when Korpilahti was part of the channel that connected the Ladoga basin with the Baltic Sea.

5.3.5 Islands and the mainland

Figure 5.18 is a shoreline displacement curve presented by Saarnisto & Grönlund (1996). The curve shows water level changes in the Lake Ladoga basin at the Heinjoki threshold isobase. For comparison, a shoreline displacement curve for the Gulf of Finland at the same isobase is given (cf. Saarnisto 2003: 58). According to the curve, the water level of the channel that connected the basin of Lake Ladoga with the Baltic Sea had lowered to c. 20 m above the present sea level by the Yoldia–Ancylus transition. Subsequently, the Ancylus transgression reached a maximum altitude of 27 m asl. As a result of the following regression, the level again lowered to c. 20 m asl.

The find spot of the 'Antrea Net Find' at Korpilahti is located at a slightly higher isobase north-west of the Heinjoki threshold isobase. Consequently, at Korpilahti, the corresponding values are slightly higher. This is supported by the observation of a stretch of an eroded shoreline below the 30-m asl contour line (Jussila 2000; section 5.3.8).

Figure 5.19 is a simplified overall map that covers the Baltic basin showing the channel that connected the basin of Ladoga with the Baltic Sea during the Ancylus culmination. The map (Fig. 5.20) covers an area of 27 by 20 km and gives an approximation of the Ancylus maximum shoreline represented by the 30-m contour line in the northern and central part and the 25-m contour line in the southern part of the map. Land is white, water is grey and present water bodies are black; find spots are indicated (section 5.3.8).

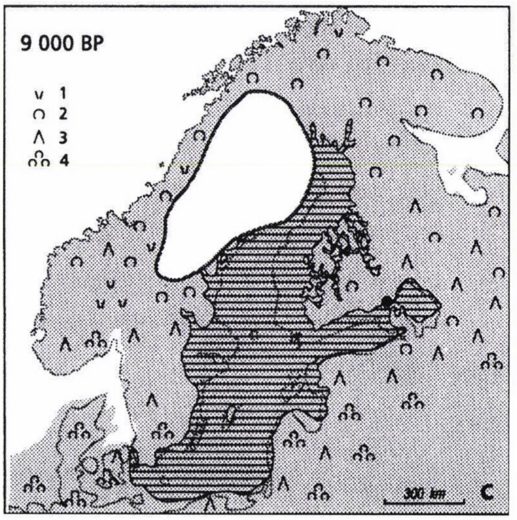


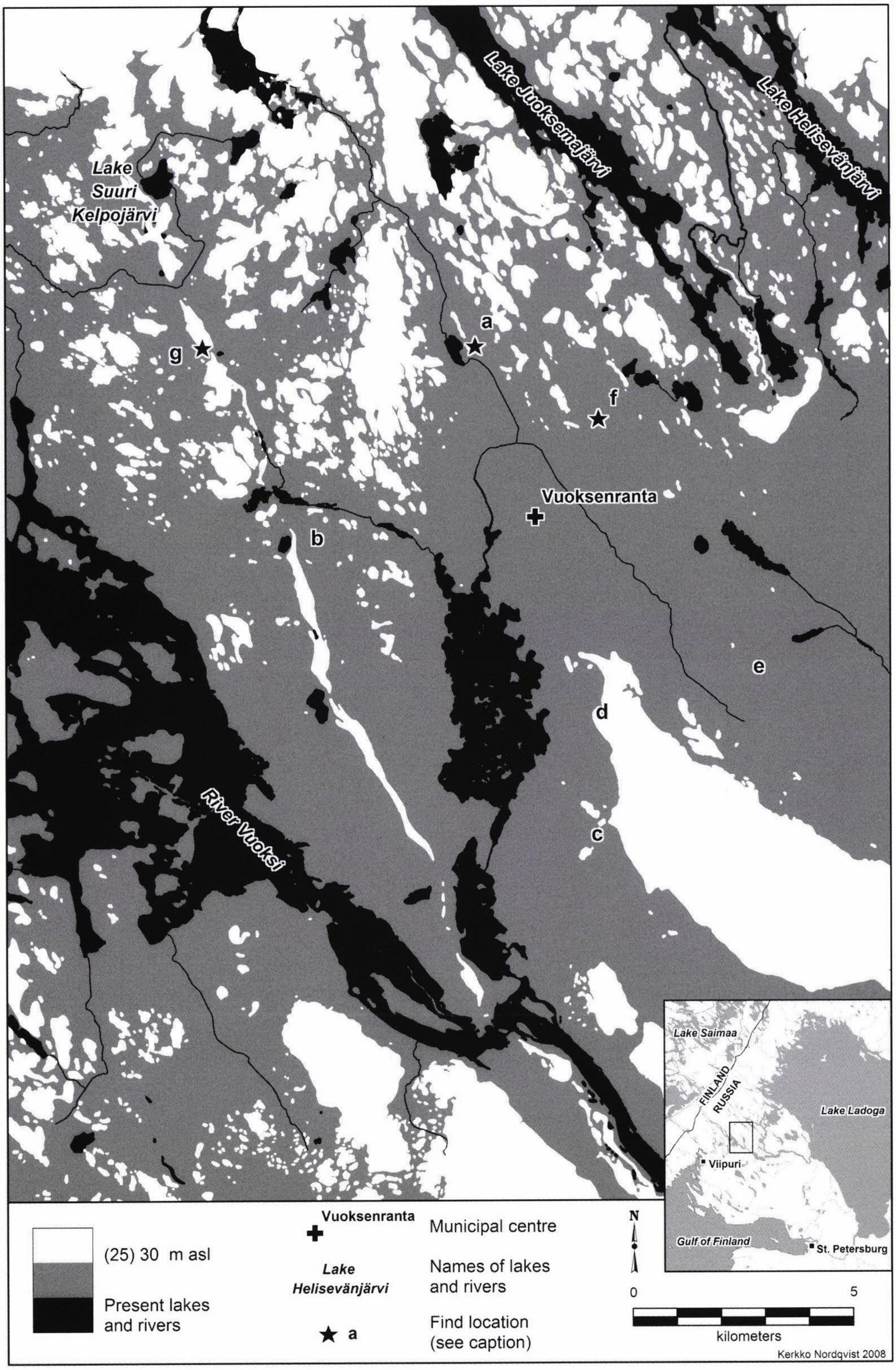
Figure 5.19 Reconstruction of the environment in North-West Europe around the Baltic basin during the culmination of the Ancylus Lake (horizontal hatching) when a diminishing cap of Glacial ice still covered a large area in the North of the Scandinavian peninsula (white patch). According to the reconstruction, the Ancylus Lake drains through the Öresund instead of the Storebælt as proposed in the present article. 1 = treeless tundra; 2 = birch; 3 = pine; 4 = broad-leaved trees of the temperate zone. The black spot indicates the 'Antrea Net Find'. (From Hyvärinen 2002; edited by C. Carpelan)

The tracing suggests that the 'Antrea Net Find' was submerged in an archipelago almost on the verge of the open waters of the Lake Ladoga–Baltic Sea channel. The artefacts landed on the bottom c. 15 m below the surface c. 250 m south-east of the southern tip of a small island directed south-southeast – north-northwest (the topmost part of a narrow ridge). This ridge is located in the middle of the Korpilahti valley, which during the Ancylus maximum was a bay-like body of open water. In the west, this 'bay' bordered on a large island (c. 5 by 1 km) and was directed south–north. In the east, the border was formed by a series of smaller oblong islands in a south-east – north-west direction. The bottom of this funnel-shaped 'bay', at the same time the nearest point of the mainland was c. 3.5 km north-northwest of the find spot.

On the other hand, the open sea began immediately south-southeast of the find spot. However, c. 7.5 km south of the find spot there was a large, more or less oval island (c. 9 by 5 km) surrounded by a number of small islands especially on its western side. South of this palaeo-island and the present River Vuoksi (Ru. reka Vuoksa) the open sea bordered on the archipelago of the southern side of the Lake Ladoga–Baltic Sea channel. There the 25-m contour line probably gives a better approximation of the Ancylus maximum shoreline.

During the Ancylus culmination, a ridge in a north-northwest – south-southeast direction which passes the find spot at a distance of c. 5.5 km west-southwest appeared as a series of long and narrow islands. This almost 30 km long line that bridged the Lake Ladoga–Baltic Sea channel certainly provides an interesting and important feature.

The situation changed as a result of the Ancylus regression. This led to the emergence of


Lake Juoksemajärvi
Lake Helisevänjärvi
Lake Suuri Kelpojärvi
a
g
f
Vuoksenranta
b
e
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c
River Vuoksi
Lake Saimaa
FINLAND
RUSSIA
Lake Ladoga
Viipuri
Gulf of Finland
St. Petersburg
(25) 30 m asl
Present lakes and rivers
Vuoksenranta
Municipal centre
Lake Helisevänjärvi
Names of lakes and rivers
a
Find location (see caption)
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Kerkko Nordqvist 2008

Figure 5.20 Reconstruction of the surroundings of the 'Antrea Net Find' during the Ancylus maximum when the objects became submerged. The shoreline of the time is represented by the 30-m asl contour line in the northern and central part and the 25-m contour line in the southern part of the map. Land is white, water is grey and present water bodies are black; a cross indicates the Vuoksenranta municipal centre. (a) The 'Antrea Net Find' and two Mesolithic stone objects in the immediate vicinity. (b) A globular mace head (stray find). (c) Seven Mesolithic stone objects (stray finds) from the village of Kaskiselkä. (d) One Mesolithic stone object (stray find) from the village of Karkeala. (e) At least four Mesolithic stone objects from the eastern part of Vuoksenranta. (f) The find spot of four Mesolithic stone objects found during digging at Koskisenharju in addition to observations of cultural remains made at the occasion. Probably an Early Mesolithic dwelling site. (g) Early Mesolithic dwelling site named Sokkala-Pajusuo 1 in the former municipality of Antrea. (Map: K. Nordqvist)

the Heinjoki threshold and hence the isolation of the Ladoga basin, including the channel in question, and to the formation of a shoreline, which along the Heinjoki isobase stabilised at c. 20 m asl (i.e. approximately the same altitude as during the Yoldia–Ancylus transition). The map in Figure 5.21 indicates that the Korpilahti valley was now a relatively narrow inlet penetrating the mainland. This situation remained stable until c. 5000 BP (c. 3800 calBC) when the formation of the River Vuoksi pushed water into Lake Ladoga, after which the shoreline stabilised at c. 21 m asl. This new situation remained stable until c. 3100 BP (c. 1400 calBC), when the formation of the River Neva (Ru. reka Neva) drained Lake Ladoga and the water level sank c. 12 m. (Fig. 5.18; Saarnisto & Grönlund 1996; Saarnisto 2003: 66.)

As a consequence of this, the water level in the channel lowered 3 m to correspond with the altitude, c. 17 m asl, of the newly emerged threshold at Tiurinkoski. This resulted in the formation of a complicated lake system within the former channel. The water level lowered slowly to c. 15 m asl as this threshold eroded. This situation remained the same until AD 1857, when the dredging and opening of a new direction for the River Vuoksi drained the lake system in the interior and started the latest phase in the history of the water bodies in the Karelian Isthmus. (Saarnisto 2003: 75–77.)[4]

5.3.6 Vegetation

As a result of the examination of the 1998 profile between 170 and 80 cm below the surface, a sequence of four pollen assemblage zones (AP1–AP4) was distinguished (Miettinen *et al.* 2008, this volume). When judging the pollen assemblages, one must not forget that the sample series was taken in the middle of an area that, at some point, used to be a large body of open water in an outer archipelago bordering on the open sea. This means that the pollen assemblage of the zone AP3 in particular has a regional character, not a local one. Note that the depths of the pollen zones are compared with the depths of the diatom zones for the sake of synchronisation with the phases of the history of the water bodies and the variable shore line displacement (sections 5.3.4 and 5.3.5). (Figs. 5.17, 5.20 and 5.21.)

AP1 (170–147.5 cm) formed during the Yoldia stage, when the region under study was an archipelago in flux: the water level was lowering and the islands were growing. Pollen grains were scarce and part of the pollen was secondary, deriving from pre-Holocene deposits and probably also from long-distance transport. In addition, it is not known to what extent the east–west channel through the Karelian Isthmus provided an obstacle for the northward spread of the early Holocene vegetation. Hence, it is not possible to assess the real composition of the vegetation in the area. However, with reference to results from the southern part of the Karelian Isthmus, Miettinen *et al.* (2008, this volume) assume that birch and pine appeared in the region of interest and that also spruce (*Picea*) and perhaps also alder (*Alnus*) occurred in small percentages.

The lower part of AP2 (147.5–130 cm) formed during the Yoldia–Ancylus transition period, when the water level stabilised for a while at 20 m asl and the whole archipelago was dry land with the exception of some lakes and the Korpilahti valley (Fig. 5.21). The former straits and open waters were now ravines, valleys and lowlands between the former islands, which provided sheltered environments for an open and light forest with an ample ground floor vegetation. Pine was common but birch was the dominant tree. Spruce and alder persisted in marginal percentages and hazel (*Corylus*) entered the region.

The upper part of AP2 (130–122.5 cm) again coincides with the early part of the Ancylus transgression, when the water level began to rise and the hills became islands again, now diminishing. The rising water killed and felled trees. Timber, branches and patches of turf from newly formed bogs were floating about. However, the type of forest on untouched land did not change. (Fig. 5.21)

The pollen zone AP3 (122.5–110 cm) includes the later part of the Ancylus transgression, the transgression maximum and the early part, if not the whole of the regression (see section 5.3.4, Fig. 5.17). Now pine reached its postglacial maximum and became the dominant tree of the boreal forests, which were denser and more closed than before. Spruce and alder practically disappeared, but elm (*Ulmus*) appeared right at the bottom of the zone. One must not forget that AP3 represents the phase when the region had the character of an outer archipelago bordering on the open sea and the area of land was limited. However, as mentioned in section 5.3.5, c. 1.5 km west of the Korpilahti sampling spot there was a large island (5 by 1.5 km) and further away other rather big islands, which probably were covered by dense boreal forest (Fig. 5.20).

In the upper part of AP3, after the Ancylus maximum, birch began to increase again at the cost of pine. Around the AP3–AP4 transition at 110 cm, the shoreline was established at c. 20 m asl, which meant that the Korpilahti valley once again was an inlet which penetrated the mainland (Fig. 5.21). In AP4, the forests were dominated by birch and pine and mixed with elm and hazel and, soon again, alder.

Because of various sources of error, the early Holocene succession of the vegetation as interpreted from pollen spectra cannot be taken to represent the climate or temperatures i.a. in the region around Lake Onega (Fi. Ääninen, Ru. Onežskoe ozero), Lake Ladoga and the Gulf of Finland. Greenland ice core data indicate that the warming of the climate immediately after the transition from Pleistocene to Holocene was significant and rapid in the North Atlantic region, where it continued to c. 8000 ice core years BP (c. 6000 BC). Based on various arguments, it has been suggested that the early Holocene was comparatively warm and humid in the Karelian Isthmus and southern Finland. However, a comparatively cool period (perhaps several) apparently interrupted the favourable development of the climate, but unfortunately the dating of the cooling is uncertain. If, again, the spread of elm is taken to indicate a warming climate, this occurred at the AP2–AP3 transition slightly before the pine maximum and the episode with the 'Antrea Net Find' at 9140±135 BP (c. 8300 calBC).

5.3.7 Remains of plants and animals

Birch was probably the first tree species to spread to the area in the early Holocene and has since been a common tree, even though the pollen spectra indicate fluctuations in the frequency (Miettinen *et al.* 2008, this volume). Thus the presence of birch bark in the 'Antrea Net Find' perfectly meets the expectations, as does the presence of tinder fungus (*Fomes fomentarius* L.). These particular bracket fungi typically grow on the stems of birches.

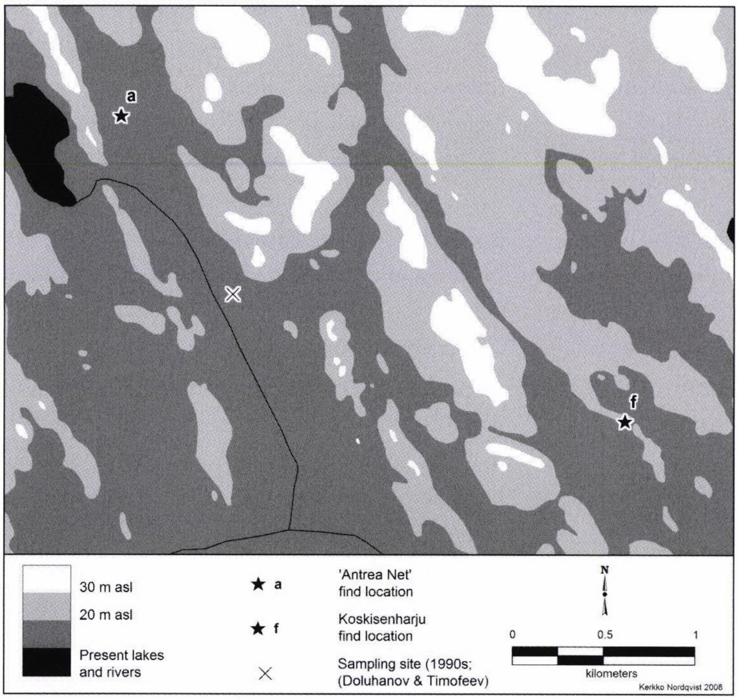

Figure 5.21 Reconstruction of the surroundings of the 'Antrea Net Find' where the shoreline is represented by the 20-m asl contour line. This was the case during the Yoldia–Ancylus transition and again when the Ancylus regression lowered to the altitude of the Heinjoki threshold immediately after 9000 BP. (Map: K. Nordqvist)

Furthermore, the find includes 17 pieces of the shield bark of pine. The pollen analysis indicates that pines had grown in the area for several centuries before the episode with the net at the Holocene Pine Maximum, which occurred simultaneously with the Ancylus maximum. This means that pines with shield bark were certainly found on the islands in the vicinity.

The net cord was made of the bast of some willow species and the bindings of the sinker stones were made of shavings of wood from beneath the bast of a willow. In the pollen spectrum, willow was present in small percentages throughout the profile. This means that willow was available in the vicinity when the net was made.

The vegetal raw materials discussed here were most probably available on the islands in the vicinity of the find spot at the time when the artefacts in question were made and soon landed on the bottom of the Ancylus. However, this does not prove that the raw materials were really collected right there. It is equally probable that the materials were collected somewhere else within the region controlled by the local society.

The 'Antrea Net Find' context includes a number of utensils, worked pieces and refuse of bone and antler. The collection represents only two species, namely the elk and the whooper swan. Both species have certainly occurred in the Korpilahti area during the Ancylus maximum when the objects were submerged. As strong swimmers, elks probably have proceeded as far as the large island west of the find spot where the boreal 'taiga' certainly provided suitable pasture for these animals. Similarly, there were environments in the vicinity suitable for whooper swans resting before continuing their spring or autumn migration. But, of course, there were suitable environments for both (and for swans even better) closer to and on the mainland.

Naturally, the coastal environment abounded with mammals, birds and fish, which were exploited by the society that controlled the region.

An overview of the fauna exploited by Stone Age societies in the Karelian Isthmus is given by Sanna Seitsonen (2008) elsewhere in this volume.

5.3.8 Archaeological interpretation of the 'Antrea Net Find'

The palaeoenvironmental reconstruction summarised above indicates that the net and the other objects landed at a depth of c. 15 m on the bottom of the channel which connected the Ladoga basin with the Baltic Sea when the Ancylus transgression was culminating.

What is the character of the 'Antrea Net Find'? The fact that the items were found very close together suggests that they were packed in some kind of container or tied together when they ended up in the water. Any floating material not attached to the load of objects or the net would certainly have spread out and disappeared. Could it be an offering? Pälsi's idea of an accident appears more plausible.

According to Pälsi, the objects belonged to a man who had been 'over-equipped' for an ordinary fishing trip and was therefore probably a member of a group moving from one settlement to another following a local transhumant pattern. But of course the owner of the things could have been a single man on the move. He might have been a craftsman or trader who was on tour marketing products. The original owner of the 'Antrea Net Find' possessed at least one object made of foreign raw material, namely Onega green slate (Fig. 5.10b), although he might have specialised in working bone and antler (originally the find included two daggers).

The artefacts might have fallen from a boat capsizing in a heavy swell if the person or the travelling party had underestimated the power of the waves and set out. Alternatively, the artefacts might have been the load of a wanderer who had broken through the ice in winter. One has to keep in mind that the episode occurred during the time of the culminating Ancylus when the water level was first rising and then falling at an unusual rate. The continuous movement might have hampered the formation of durable ice in the winter. Currents changing from one year to another may have weakened the ice cover at unexpected places. Accidents may not have been unusual in the winter under such conditions. Moving on the ice would have been even more risky for strangers.

As a matter of fact, the date of the net cord appears to correspond perfectly with the estimated date of the Ancylus culmination and the beginning of the Ancylus regression (which resulted from the Storebælt breakthrough). I prefer to think that the episode with the 'Antrea Net Find' took place one winter when the effects of this breakthrough suddenly affected the water level and consequently weakened and even broke the ice when the owner of the objects was crossing the wide bay which then covered the present Korpilahti valley. I believe that in the iceless season, the effects of a lowering water level and associated currents would not have seriously harmed a boat in the open waters.

At any rate, the 'Antrea Net Find' proves that Early Mesolithic people moved about in the outer archipelago of the Lake Ladoga–Baltic Sea channel. This differs drastically from Pälsi's (or rather Ailio's?) interpretation, which was based on the assumption that the find dated from the Neolithic, when the shoreline was at 21 m asl and the artefacts were submerged in a smallish bay that penetrated the mainland.

While suggesting transhumant movements Pälsi, however, did not discuss the position of the 'Antrea Net Find' in relation to the archaeological material known from the region. By 1914, the material from the territory of the future municipality of Vuoksenranta available at museums consisted of 29 stray found stone tools. By 1945 the corresponding number was

47. Of these, 21 objects may be classified as representing Mesolithic (adzes, axes and gouges in addition to one mace head), 24 as Neolithic and 2 as Bronze Age types.

In addition to the 'Net Find' (Fig. 5.20a), a Mesolithic stone adze was later found in the same former wetland and a Mesolithic stone axe was found in the ground close to the Ämm-Mattila farm apparently connected to the 20-m asl contour line. Even though both objects could have been dropped in the water during the Ancylus transgression the latter alternatively could derive from a Late Mesolithic dwelling site postdating the emergence of the Heinjoki threshold (cf. sections 5.3.4 and 5.3.5).

A solitary globular mace head with funnel shaped shaft hole found while taking sand c. 6 km southwest of the 'Net Find' close to the 20-m asl contour line (Fig. 5.20b) had probably been dropped in the water at or slightly after the Ancylus culmination (for the dating of the type see Matiskainen 1989a). Later the flooding caused by the formation of the River Vuoksi probably covered the object with a c. 20 cm layer of sand. The find spot is located c. 0.5 km east of the north-northwest – south-southeast esker mentioned above (section 5.3.5).

An interesting collection of Mesolithic finds, eight Mesolithic stone objects, comes from the series of small islands on the western side of the large oval island and 11–12 km to the south of the 'Net find' (section 5.3.5, Fig. 5.20c–d). The available information suggests that some of them are probably found at altitudes corresponding to the Ancylus maximum. Most probably Early Mesolithic dwelling sites are to be found there.

At least four Mesolithic stone objects have been found scattered within a radius of c. 10 km east to south-east of the 'Net Find'. In addition, at a distance of c. 3 km south-east of the 'Net Find', an interesting context of four Mesolithic stone tools (three adzes and a gouge) was discovered in 1936 during the deepening of a drainage ditch at the Koskisenharju ridge close to the former farm of Pelkkala (Figs. 5.20f and 5.21b). The things were found covered by gravel at a depth of 80 cm together with burnt stones, charcoal and ashes. According to the topographic map sheet (4113 05 Vuoksenranta) the altitude of the find spot is c. 20 m asl. (Figs. 5.20 and 5.21)

Accepting that it was the action of rising water that had torn down and spread the gravel covering the objects and the fire places one has to choose between two possible occasions: the Ancylus transgression on the one hand and the flooding caused by the formation of the River Vuoksi on the other. The considerable amount of covering gravel appears to point to the action of the Ancylus transgression rather than to any later and weaker flooding. If so, this find would indicate that pioneers were moving about in the Karelian isthmus no later than during the Yoldia–Ancylus transition c. 9500 BP / c. 8800 calBC (cf. Fig. 5.18).

Such an early date is supported by the fact that logically comparable dates of charcoal have been acquired from the dwelling site at Veret'e 1 in the Kargopol' Region, northern Russia (Le-1469 9600±80 BP / c. 9000 calBC) and Pulli in south-western Estonia (9600±120 BP / c. 9000 calBC) on the one hand and of burnt bone samples from the dwelling site of Myllykoski in Orimattila, southern Finland, (Hela-552 9480±90 BP / c. 8750 calBC) and Rahakangas in Eno, south-eastern Finland, (Hela-882 9405±80 BP / c. 8650 calBC) on the other hand (Carpelan 1999; Takala 2004: 150, 161; Pesonen 2005).

Although the observations made at Koskisenharju have not yet been verified professionally other finds from the region provide evidence of settling activities obviously predating the Ancylus culmination. At present, early dwelling sites are known as a result of search activities carried out under the direction of Jussila and Takala in the period 2000–2004.

The Mesolithic dwelling site at Tarhojenranta in the former municipality of Heinjoki (centre now Veščevo) close to the Heinjoki threshold in the Karelian Isthmus, excavated by Takala in 2003 and 2004, has something in common with the Pelkkala site. According to a published summary (Takala 2004: 156, Fig. 154) the Mesolithic layer with a flint material that can be linked to the whole sphere of Post-Swiderian technique was covered by a layer with ceramics and a charcoal sample dated to 5815±50 BP / c. 4700 calBC. Unfortunately this upper layer was disturbed by ploughing. At an altitude of c. 20 m asl, the site had been by the shoreline both before and after the Ancylus transgression. The site must have been flooded in connection with the formation of the River Vuoksi c. 3800 calBC. It is possible to assume that the layer covering the Mesolithic site had formed earlier as a result of the Ancylus transgression and afterwards served as a bed for a Neolithic dwelling site. At present, however, it is not possible to present proof for this; Takala on the other hand does not present challenging arguments.

At Vuoksenranta, Jussila and his workgroup found no settlement sites in the immediate surroundings of the find spot at Korpilahti. The zone between 25 and 30 m asl was found less suitable for settlement. Instead, Jussila's group discovered five Mesolithic sites in the former municipality of Antrea c. 7 km west of the 'Net Find' and c. 2–3.5 km south of the small lake Suuri Kelpojärvi (Ru. ozero Borovskoe), on the north-northwest – south-southeast esker mentioned above (section 5.3.5). When Takala's group carried out testing and levelling at these sites, four of the sites clustered close to the 25-m asl contour line while one of them, named Antrea 6 Sokkala-Pajusuo 1 after the adjacent bog, was located approximately at 30 m asl (Fig. 5.20g)[5]. A piece of burnt bone collected at this site was dated to 9275±120 BP (Hela-931; 8630–8320 calBC). (Jussila 2000; Jussila & Matiskainen 2003; Takala 2004: 152.)

The altitude of c. 28 m asl probably corresponds to the Ancylus maximum. The date, on the other hand, points to a chronological position that predates both this event and the 'Antrea Net Find'. But because of wide limits of age uncertainty, this date (9275±120 BP) and that of the Korpilahti net cord (9140±135 BP) are statistically the same at the 95% level. However, the overlap does not prove that the two samples were formed simultaneously and so the bone from Sokkala-Pajusuo 1 may well be up to 135 radiocarbon years or 250 calendar years (i.e. the age difference of the calibrated central values) older than the net cord from Korpilahti. Hence Sokkala-Pajusuo 1 would date from some point around the middle of the rising of the Ancylus transgression. Because of topographic reasons (steep slope) it was probably practical to place the settlement on the plateau on top of the esker some metres above the actual shoreline which, in addition, probably was often affected by heavy wave action.

5.4 Concluding remarks

By chance, Antti Virolainen discovered things while digging in a wetland at Korpilahti in 1913. By chance Theodor Schvindt passed by in 1914 and obtained the things for the National Museum where the staff understood that the find was unique and important. Sakari Pälsi was sent to excavate which he got done succesfully and even took a sediment column for scientific scrutiny. While archaeologist Pälsi studied the archaeological material as an ethnographer, botanist Harald Lindberg studied the sediment column for diatoms and (to a lesser degree) pollen.

In 1915 Lindberg stated that the archaeological context was very old, dating from the early Ancylus. Archaeologists rose in revolt and run riot because of the result which they found outrageous: no archaeologist had ever had the guts to suggest such an unlikely date for any archaeological context in the Baltic Sea region. In Finland, Julius Ailio was the most ardent opponent.

Yet, Lindberg was right. To my knowledge no justified arguments were presented against his method and work. The history of opinions and studies concerning the 'Antrea Net Find' and related issues tells more about a conservative and stubborn attitude than about innovative thinking among the archaeologists. Let us imagine where an immediate acceptance of Lindberg's result would have taken Stone Age archaeology in the Baltic Sea region!

In 1998 a new sample column of the Korpilahti sediment profile was taken. The aim was to carry out a fresh examination applying methods not available for the earlier investigators. Various reasons postponed the work and the preparation of the papers (Miettinen *et al.* 2008, in addition to this). However, almost ten years after the fieldwork it is possible to publish this article. While the first and second section turn towards history the third section deals with the fresh investigation. What about the results?

Hopefully, the location of the 'Antrea Net Find' is now refixed and the inconsistencies in Pälsi's reporting clarified. Pälsi never expressed an opinion in the dating issue and he did not go into the history and reconstruction of the environment. In this study, both are considered as of fundamental importance as well as the question of the relation of the find to the Mesolithic archaeological material known from the region.

The Karelian Isthmus provided a corridor through which both Butovo people of Central Russia and Kunda people of the Baltic countries pushed towards the North. Positive indications are found suggesting that pioneers moved about in the region as early as the Yoldia–Ancylus transition c. 9500 BP / c. 8800 calBC. and that by the time of the Ancylus maximum and the 'Net Find' c. 9140 BP / c. 8300 calBC the region supported a permanent Early Mesolithic settlement. The Mesolithic archaeological material in addition to the information on environmental history now available, everything encourage the launching of directed research projects in the former municipality of Vuoksenranta and elsewhere in the Karelian Isthmus.

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Endnotes

1 Because of misunderstanding, the sample blocks and cores were removed in connection with the move of the department of Geology to a new address. Hence, rechecking and follow-up examination have not been possible.

2 The calibration of radiocarbon dates BP to correspond with the calendar time scale is carried out with the calibration software OxCal 3.10, applying the IntCal04 calibration data set (Bronk Ramsey 2005), if not otherwise indicated. The calibrated values are given at the 1 σ (68.2%) probability level.

3 Before Hela-404 we got another sample of the net cord for an AMS analysis which gave the date 5515±70 BP (Hela-365). Later it turned out from laboratory documentation that in the past this part of the net had been treated with some substance.

4 Numerous place names and oral tradition recorded for instance in the Korpilahti area bear witness to the former existence of a lake system in the interior of the Karelian Isthmus. In the Korpilahti valley, the shoreline of this water body appears to have stabilised at c. 15 m asl, as inferred from the maps of 1698 and 1777. These maps indicate that the surface of the wetland covering the 'Antrea Net Find' and in the strip south of

the small lake Paapanlampi (both areas lie lower than the 15-m contour line according to the topographic map of 1939) must have remained at a somewhat higher level (Fig. 5.5). The lowering probably began soon after 1857, when the sudden drop of the water level caused natural drying to begin. Artificial draining of the wetland, followed by ploughing beginning in the 1880s, completed the lowering. (Miikkulainen *et al.* 1981: 14–16, 21, 25, 42, 46; cf. Miettinen *et al.* 2008, this volume; Saarnisto 2003: 74–77. See sections 5.1.2 and 5.1.3 above.)

5 Takala uses the name Suuri Kelpojärvi.