Palynological Investigations at the Ruhtinansalmi Dwelling-site Complex in Suomussalmi.

Anthropogenic Pollen Evidence for a Hunter-gatherer Economy?

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The Ruhtinansalmi dwelling site complex near the village of Juntusranta is one of the best-known areas of prehistoric occupation in Northern Finland. Large archaeological material indicates that occupation has continued in the area for over 6000 years. The aim of the palynological investigation is to discern and to date phases of anthropogenic evidence in pollen strata. The analysis shows that human influence on vegetation was minimal and sporadic during the Stone Age and the Early Metal Age. The first continuous evidence of agriculture does not begin until the16th century AD.

Introduction

One of the largest prehistoric dwelling site complexes in Kainuu and in the whole of Northern Finland is situated in front of the village of Juntusranta, Ruhtinansalmi, in the NE side of the parish of Suomussalmi (Fig. 1). The dwelling site area comprises six separate dwelling sites: Kalmosärkkä (N and S), Mikonsärkkä, Maikonsärkkä, Nuolisärkkä and Kellolaisten tuli (Fig. 2). In addition, the dwelling site of Salmenniemi in the village of Juntusranta can also be included in the complex. All these dwelling sites are known for their large archaeological material which covers a long period of prehistoric habitation. The earliest prehistorical finds date back to the Mesolithic and the youngest prehistoric finds comprise cremation burials from the Viking Period in Mikonsärkkä (Huurre 1973). On the basis of archaeological material all periods of prehistory seem to be represented in the area. On the basis of ceramics the most intensively habited period in the Ruhtinansalmi area was the Early Metal Period.

The dwelling site complex of Ruhtinansalmi is situated close to the watershed where rivers run both east (Lake Kuittijärvi Water System) and west (River Oulujoki Water System). This makes the area interesting from the cultural-historical point of view: both eastern and western traditions may have met here during different phases of prehistory. When seeking the first signs of cultivation a special interest turns to the Early Metal Period which is also, in the light of archaeological find material, an

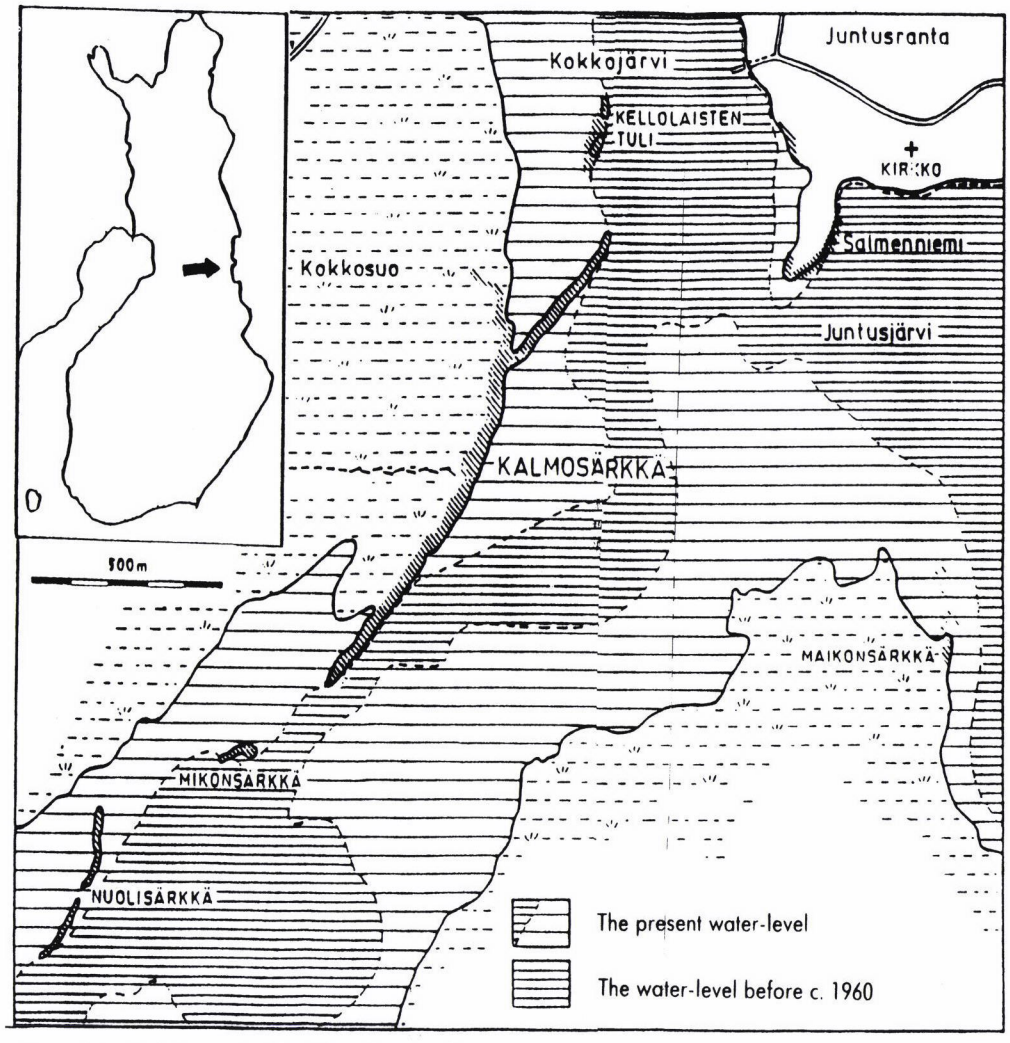


Fig. 1. The Ruhtinansalmi dwelling site complex.

unusually actively habited phase in the prehistory of Kainuu. Contacts were maintained deep into the east, in the Upper and the Middle Volga areas (Chalikov 1986; Huurre 1986a). A large majority of all casting moulds known in Finland have been found in Suomussalmi, which is also an indication of activity in the area. Bronze implements, moulds, crucibles and even the raw material itself were transported and exchanged in the large area. Therefore it is natural to assume also that the know-how of early cultivation may have spread into Northern Finland through these contacts.

It seems that the beginning of the Early Metal Period indicates a discontinuity in the culture with new types of ceramics (ST or Textile ceramics), bronze casting and an increase in the amount of material. Therefore it seems reasonable to assume that also slash-and-burn cultivation may have begun in the Suomussalmi area during this period between 2000-1000 calBC.

The palynological studies carried out in Kainuu in the 1980's and the 1990's suggest early reflections of human impact on vegetation in Vaala, Nimisjärvi and Puolanka, Kotila. These rather unexpected results make it possible to postulate that agriculture, in the form of slash-and-burn technique, may have begun in Northern Ostrobothnia as early as during the Early Neolithic (Reynaud &

Fig. 2. Pollen sampling at Maikonsärkkä in Suomussalmi.

Hjelmroos 1980) or during the Late Neolithic at the latest (Vuorela & Kukkonen 1992).

Kainuu, together with the whole geographical area of Peräpohjola, is probably the northernmost area suitable for agriculture in the prevailing climatic conditions and therefore it is surprising that very early remains of agriculture have been found there. Further, the archaeological material evidence gathered from the dwelling sites represents in general the artifacts characteristic for the hunter-gatherers living in bands of no larger than some tens of individuals. Even though villages of Neolithic dwelling pits were built in the coastal area, in the former estuary of the River Kemijoki (Kotivuori 1993) and along large inland water systems like Lake Saimaa (Karjalainen 1996), no dwelling pit systems are known in Kainuu. It is probable that they existed there also, but for one reason or another they have not been found so far. This refers to a mobile or temporal type of habitation where a sedentary life did not play as an important a role as in Ostrobothnia and in the Saimaa area. It is possible that agriculture was not as important here as in the areas where material remains suggest a sedentary way of life.

In this paper our primary purpose - together with the analysis of the pollen profile of Maikonsärkkä - is to investigate whether slash-and-burn cultivation was practiced in the Ruhtinansalmi area during the Late Neolithic and the Early Metal Period. It was assumed that the remains of human influence are sparse and difficult to discern. However, it is possible to detect them, even in such areas which archaeologically seem to be far less intensively habited than the Ruhtinansalmi area (Vuorela & Kukkonen 1992). The main emphasis here is in the palynological analysis; more detailed archaeological discussions will be presented in another context.

Research history

The prehistoric finds of Kalmosärkkä first became known in the mid-1950's, only two years before the large water regulation project in Lake Kiantajärvi was completed (Huurre 1984). The Archaeological Commission organized a survey on the shores of Lake Kiantajärvi in order to locate and excavate prehistoric dwelling sites before the water rose above the former elevation.

The first archaeological objects at Kalmosärkkä were found by a local school teacher, Martti Manner, in the 1950's. The first archaeological survey was conducted at Ruhtinansalmi in 1957 and it uncovered several remains of prehistoric habitation in several places in the area. On the basis of the survey results Matti Huurre carried out excavations at the most threatened and archaeologically rich parts of the Ruhtinansalmi dwelling sites in 1958 and 1959 (Huurre 1959; 1986a; 1986b; 1992). The excavations uncovered remains of continuous habitation from the Late Mesolithic to the Early Iron Age. All dwelling sites were situated on narrow, curved ridges. The main excavations covered over 1000 m^2 at Kalmosärkkä S and N and Kellolaisten tuli (Fig. 1).

In the beginning of the 1970's metal artifacts and their fragments were found in the ridge at Mikonsärkkä. The site was inspected soon after this by Matti Huurre and it was interpreted to be a cremation burial from the beginning of the 900's AD (Huurre 1973). A considerable number of prehistoric finds was also found during early spring, before the water level rose to its normal elevation (Huurre 1983). It is also important to note that the National Board of Antiquities organized large excavations in Suomussalmi from the beginning of the 1980's to the middle of the 1990's. Between 1992-1994 three excavations were carried out in the Ruhtinansalmi area: at Kalmosärkkä, Mikonsärkkä and Salmenniemi.

The material at Kalmosärkkä clearly shows that the amount of ceramics in finds increases significantly during the Early Metal Period. Above all textile ceramics and Anttila ceramics seem to represent a change in the intensity of habitation. Figure 3 illustrates the different ceramic types as a function of time. The most prominent peak in the numbers of ceramics dates roughly at 1000 BC but during the first centuries AD the manufacture of ceramics ceased. This is well in accordance with the development documented in both Eastern and Northern Finland. Only some stray finds witness some sort of continuity in habitation in these regions (Carpelan 1997).

Geomorphology

Topography is a conspicuous connecting link between the dwelling sites of Ruhtinansalmi. All six sites, Kalmosärkkä N and S, Kellolaisten tuli, Nuolisärkkä, Mikonsärkkä and Maikonsärkkä, are situated on narrow, crescent-shaped sandy ridges. The soil at every site is fine-grained, dry sand, which is favourable for short-term, temporary habitation. The ridges themselves are unsuitable for cultivation, because of their dryness and small surface area.

For topographical reasons dwelling sites were small in size. No dwelling depressions were made on the sites but some hunting pits existed there instead. Conditions were probably most favourable during spring. Shallow water, favourable for spawning pike and a large wetland for nesting birds during the early summer probably played an important role in the seasonal economy. One should not forget the location of the area, a probable transition camp on the route between east and west, either (Huurre 1983).

Water regulation has influenced the archaeological studies both negatively and positively. It has changed the environment by washing and destroying dwelling sites and by making sites and finds clearly visible also. Erosion has irrevocably destroyed large parts

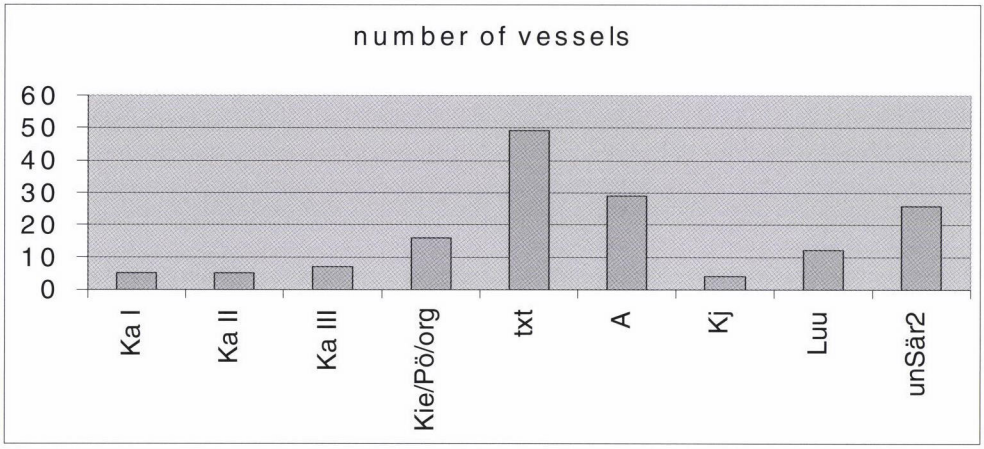


Fig. 3. The number of ceramic vessels in the Ruhtinansalmi area. Legent: Ka I – Early Combed Ware, Ka II – Typical Combed Ware, Ka III – Late Combed Ware, Kie/Pö/org – Kierikki/Pöljä/organic-tempered Ware, txt – Textile ceramics, A- Anttila ceramis, Kj – Kjelmøy ceramics, Luu – Luukonsaari ceramics, unSär2 – undefined Säräisniemi 2 ceramics.

depth in cm	peat type	humification degree
0-20	Carex-Sphagnum peat	H 1-2
20-30	Carex-Sphagnum peat	H3
30-40	Carex-Sphagnum peat	H4
40-125	Carex-Sphagnum peat	H5
125-150	Carex-Sphagnum peat	H4
150-165	Carex-Sphagnum peat (Narrow charred bands at - 155 and 162 cm)	H5
165-169	Carex-Sphagnum peat	H6

Table 1. Peat stratigraphy of the sampling site, cored on the lawn level.

of ridges although archaeologically the most important shores are today sheltered by stone walls. The dwelling site of Kellolaisten tuli is almost totally washed away and Nuolisärkkä and Mikonsärkkä are on their way to be complete destroy. Erosion has uncovered large parts of dwelling sites which has obliged archaeologist to conduct large salvage excavations at the area. A considerable number of stray finds have been picked up from the washed shores.

On the basis of this one can see that the ridges are not suitable places for cultivation, although they have been used for living during several thousands of years. Still, several potential slash-and-burn areas exist inside a circle of one km from Maikonsärkkä.

Research site and methods

Maikonsärkkä, which is situated on the SE side of Lake Juntusjärvi opposite Kalmosärkkä, is a narrow esker surrounded mainly by peatlands protruding into Lake Juntusjärvi, about 65°12' N, 29°29' E (by national grid 723665:361590), 200 m a.s.l. Pollen analysis sampling was performed using a "toe breaker corer" (80 x 800 mm) and a swing corer (50 x 500 mm) from a mire deep enough ca 30 m east of the Maikonsärkkä esker. The mire site type at the core site is an oligotrophic Sphagnum flark fen on moderately humified sedge-white moss peat(Table 1).

50 subsamples were treated by the conventional KOH-method (Faegri & Iversen 1989) for pollen analysis. Pollen percentages were calculated from the basic sum of terrestrial pollen (TLP) and the proportions for other groups (n) were based on TLP + n. The sum of the total terrestrial land pollen varied between 239 at the surface and about 1600 grains per spectrum at a lower level. Pollen concentrations were calculated on the basis of the known sum of exotic particles. Charcoal particles were counted in two size classes: <40 µ and >40 µ.

Pollen results are presented in groups based on life-form, systematic position, habitat and on indication value in relation to man. The last mentioned grouping must not be understood *sensu stricto* because this division as such is more precise than in Nature.

The large plant family Poaceae (Gramineae) contains both wild and cultivated genera, which produce large pollen grains (Cerealia-

Table 2. Radiocarbon dates of the Maikonsärkkä peat profile with T½ of 5568 years. Calibration is based on Stuiver & Reimer (1993).

Lab. ref. No.	Depth. cm	δ13	Conv. BP	Cal. Age
Hel-4143	28-32	-27.8	420±80	1450 AD
Hel-4144	88-92	-27.9	4640±90	3370 BC
Hel-4145	103-107	-26.4	5240±90	4020 BC
Hel-4146	165-169	-28.4	8230±100	7260 BC

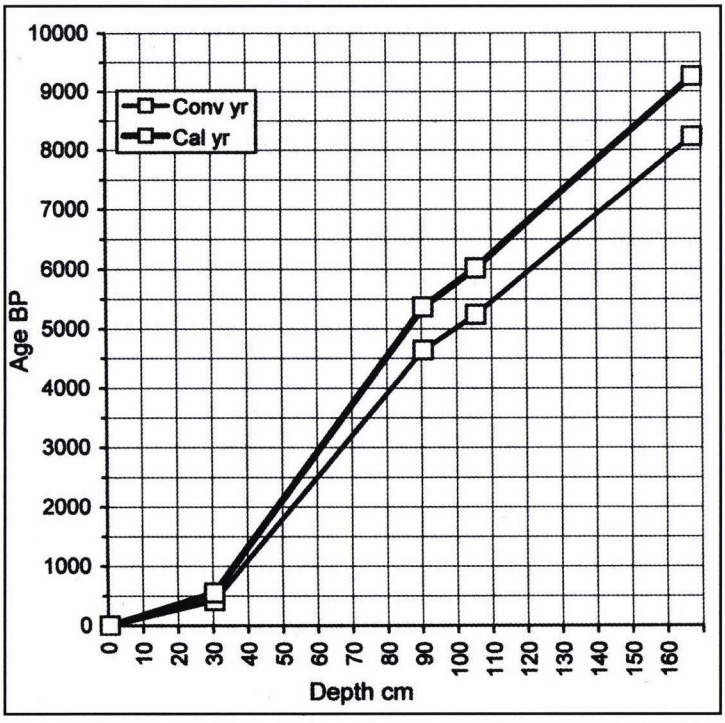


Fig. 4. Sedimentation curves of the mire near the dwelling site of Maikonsärkkä.

type). Of these natural grasses, *Leymus* (earlier *Elymus)* and *Elymus*, the former have been utilised also by ancient man. Identification to genus level was based on characteristics of pollen surface sculpturing and measurements of pore dimensions.

Results

Radiocarbon datings were made on four samples (Fig. 4). A sedimentation rate curve was drawn in ratio to uncalibrated (uncal., uncorr., conv.) and calibrated (cal., corr.) radiocarbon ages. The curve shows that the accumulation of the sediment at the site has been quite even in spite of the loose and unhumified surface peat. The mean value for the accumulation in the whole column is only 0.18 mm/cal ^{14}C year.

Based mainly on changes in the forest tree composition, the set of pollen diagrams (Fig. 5, a-d) were divided into more or less homogenous local assemblage zones. MS1-paz (8200-5200 ^{14}C yr uncal. BP) shows that *Pinus* and *Alnus* dominated the vegetation communities, characterized also by increasing high *Betula* values and quite high proportions of Cyperaceae and Polypodiaceae. The high charcoal peak, which is visible also with the naked eye, is probably a reflection of a local or a subregional natural fire. This zone seems to lack any human traces.

MS2-paz (about 5200-4600 ^{14}C yr uncal. BP) is characterized by an *Alnus* peak and by herbs such as Chenopodiaceae, *Plantago major/media* and Cruciferae, which possibly reflect a slight human influence.

MS3-paz (about 4600-420 ^{14}C yr uncal. BP) is characterized by the dominance of *Picea* and *Pinus*, also peaks of *Scheuchzeria* and to some extent also of *Sphagnum.* Human impact could be indicated by e.g. Chenopodiaceae, Cruciferae, *Prunella*, *Sagina*, *Solidago, Trifolium*, Caryophyllaceae, Scrophulariaceae and *Triticum.* Unfortunately the Cerealia-type grain found at 89 cm was so crumpled that identification was possible only to the level of cf. *Triticum.*

MS4-paz (about 420 ^{14}C yr uncal. BP to present) is characterized by a low total pollen concentration (Fig. 5d) and by a rapid increase of dwarf shrubs, a slight increase in charcoal

particles, *Rumex acetosa, Hordeum*, Centaurea-type, *Achillea, Plantago lanceolata* and Cichoriaceae. Together with these indicators of human activities, there is a typical feature for slash-and-burn cultivation, i.e. a decrease in *Picea*. The increase of an entomophilous *Rubus chamaemorus*, following *Scheuchzeria* in the previous zone, reflects a local vegetation succession *in situ* when an already poor wet flark site develops into a dry hummock phase.

Discussion

Ordination analyses for summarising trends in palynological data were not utilised here because they are good mainly for detecting a history of intense cultivation but restricted when dealing with material from earlier hunter-gatherer people (see Huttunen et al., in press).

The succession of forest vegetation reflected in the pollen sequence in the study area started in the early Holocene ca 8200 BP. The general succession of forest vegetation follows rather well the general pattern presented earlier for Kainuu (e.g. Vuorela & Kankainen 1991). Concerning species-dependent pollen production the forests in the region during the first half of the Holocene were *Pinus*-dominated mixed forests with a considerable share of *Betula* and *Alnus* at edaphically better sites.

Up to the middle of the Holocene (i.e. MS1-phase) there are few indicators of weak disturbance e.g. erosio- or nitrophilous plants *(Urtica, Epilobium,* Chenopodiaceae), which, together with increased charcoal, can be linked also to human interference. Anyhow, there is no definite proof for the existence of stone-age man here.

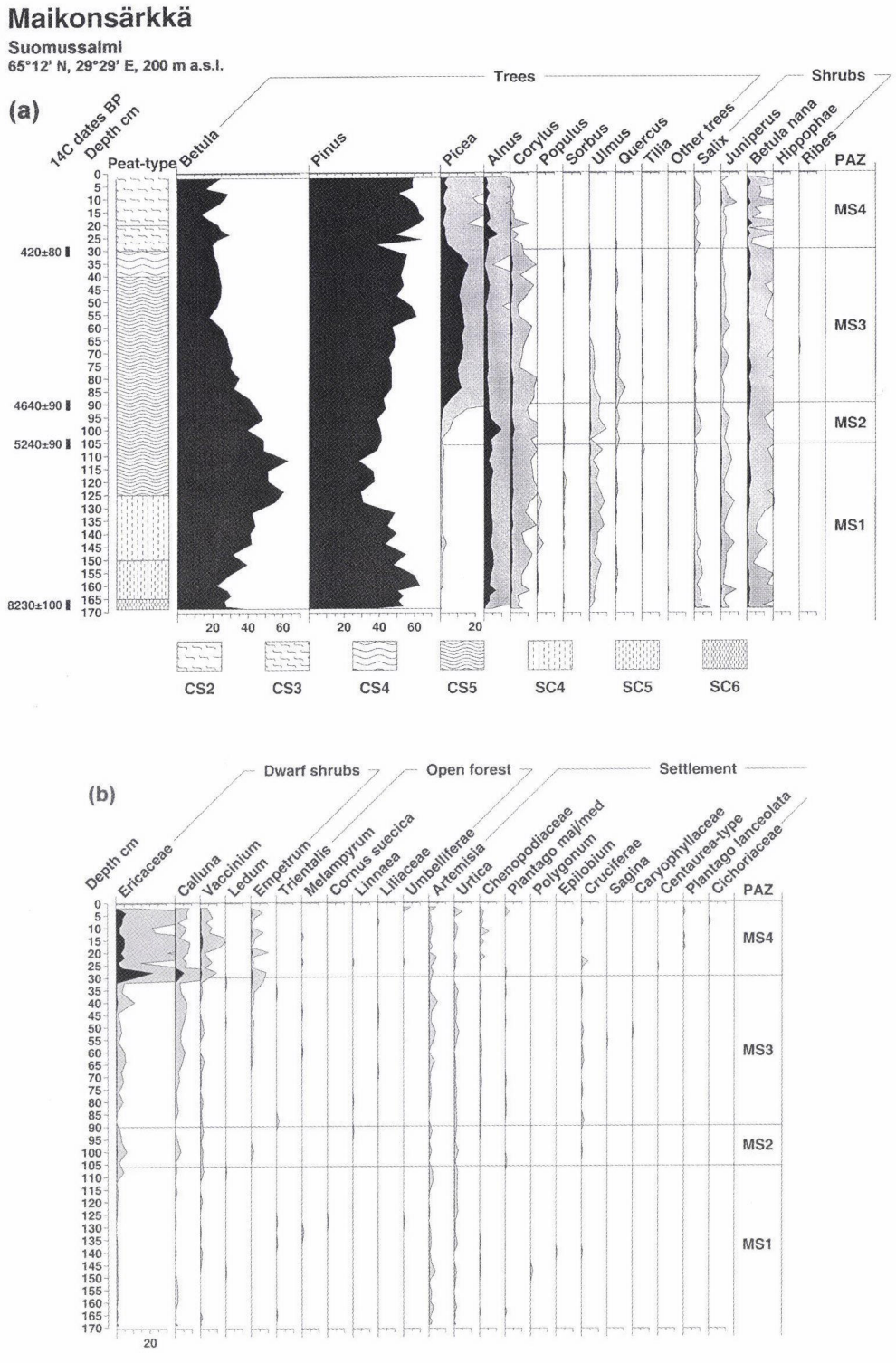
The establishment time of *Picea*-stands (ca 5200-4600 BP) with a single peak of *Alnus,* together with settlement species such as Chenopodiaceae, *Plantago major/media* and Cruciferae, shows probable, although weak, signs of human occupation. The sampling interval was so sparse that there is no preceding rise in the charcoal curve which could be connected with the *Alnus* peak. Such a peak can, of course, also reflect vegetation succession on the former Lake Juntusjärvi. So far, as Vuorela (1992) nicely stated: "...when dealing with indications from this period you sometimes have the strong feeling of trying to make something out of nothing."

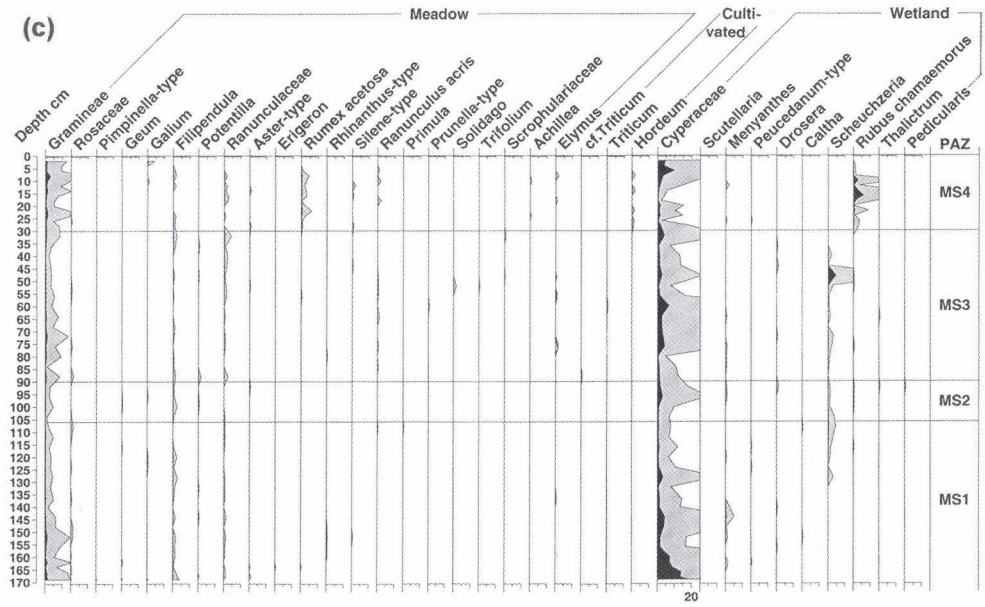
Prior to the abiegnic time the first signs of human impact are so scarce that they must be regarded as suggestive, reflecting probably the influence of the habitation of a hunter-gatherer culture. Here the latter half of the Holocene, ca 4500 BP onwards, contains several meadow and settlement indicators in small quantities. Because also of the obligatory indicators of cultivation, we can justifiably assume that a slash-and-burn culture was practiced, though not at the sampling site but somewhere nearby. By rough interpolations the possible *Triticum* (anyway not a wild cereal) at 89 cm dates back to ca 4600 conv BP, and the single determined *Triticum* grain at 61 cm to ca 2500 conv BP. Demonstrated agricultural land-use at Maikonsärkkä area seems thus to be younger (about 2900 cal BP by a rough interpolation) and not as distinct as in the case of a clearance at Puolanka (Vuorela & Kankainen 1991) in the same county, where it dates back to ca 4000 cal BP.

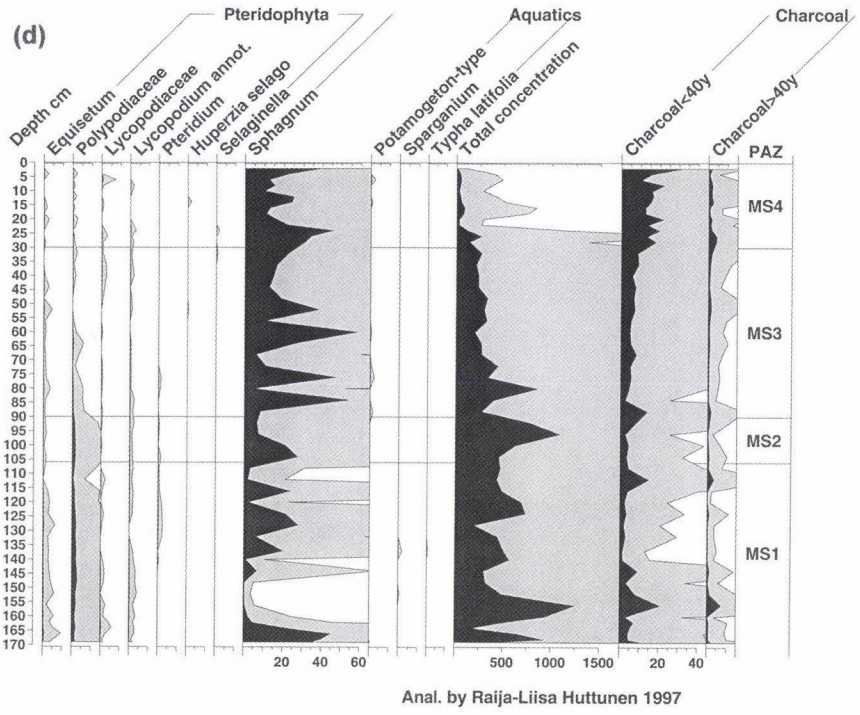
The most recent agricultural phase (from ca 420 BP onwards) is clearly discernible forming the most prominent feature in the sporomorphic archives of the last few millennia. Drastic changes in tree proportions, especially the decrease in *Picea*, increase in Ericales, settlement, meadow and cultivation taxa together with increased charcoal, represent slash-and-burn and field cultivation activities in the region.

From the viewpoint of an archaeologist the first tracts of cultivation can most probably emerge during the Final Neolithic and the Early Metal Period. Connections between Eastern and Northern Finland and North-western Russia became more active. One indicator, which can be interpreted as a sign of a connection between the copper-using Eneolithic culture on the western side of Lake Onega (Zuravlev 1991:129-146) and Eastern Finland, is the copper adze found on the Island of

Fig. 5 a-d. Pollen percentage diagram set at Maikonsärkkä. The gray shaded curves are exaggerated tenfold. For explanation for lithology see Table 1.







Anal. by Raija-Liisa Huttunen 1997

Kukkosaari. Huurre (1982) gave it a date of ca 2000 BC. It is possible that cultivation practises spread into Northern Finland particularly via these routes. Sporadic evidence of early cultivation (ca 5000 BP) has been found, for example, in the Pegrema area, although permanent cultivation emerges also here not earlier than the 13th century AD (Vuorela et al. 2000). This view may be due to the small number of pollen analytical studies carried out in the area so far, but it is still in accordance with the results obtained in Finland. Although it is also possible to connect these early traces of cultivation together with activities of the Late Neolithic and the Early Metal Period from the archaeological point of view, one should not forget that so far the clear evidence of this is still missing.

Although agriculture did not gain a solid footing in Kainuu before the historical period, the results seem still to show that early experiments with slash-and-burn cultivation were made. Whether or not they proved successful, the traditional means of livelihood - hunting and fishing - remained the basis of economy for over three thousand years. The deteriorating climate during the Sub-Atlantic period made the early experiments with cultivation less and less rewarding. Real agriculture in the form of field cultivation did not begin in Kainuu until the rule of King Gustav Wasa, whose politics was directed to colonization and enlarging the area of his kingdom into the wilderness of Russia.

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