HUMPPILA JÄRVENSUO — A PREINVESTIGATION FOR AN ARCHAEOLOGICAL AND PALAEOBOTANICAL PROJECT IN SW FINLAND

M. AALTO[1], A. SIIRIÄINEN[2] and I. VUORELA[3]

[1] Univ. of Helsinki, Dept. of Botany, Unionink. 44 SF-00170 Helsinki
[2] Univ. of Helsinki, Dept. of Archaeology, Nervanderink. 13, SF-00100 Helsinki
[3] Univ. of Helsinki, Dept. of Geology, Snellmaninkatu 5, SF-00170 Helsinki

Abstract

An as yet unexcavated neolithic dwelling place of a type so far unknown in Finland is presented. The objects found and the nature of the site are reminiscent of bog 'dwellings' in the Eastern Baltic area. ^{14}C dates on the artefacts cover the period 4200—4800 B.P.

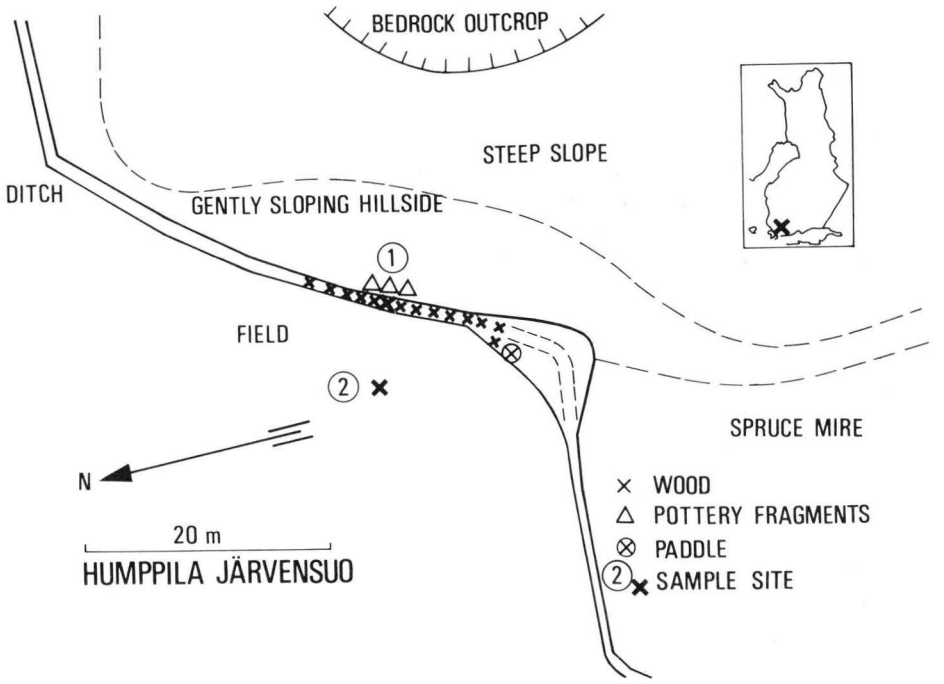

Fig. 1. Map of Humppila, Järvensuo-bog and the location of the sites 1 and 2.

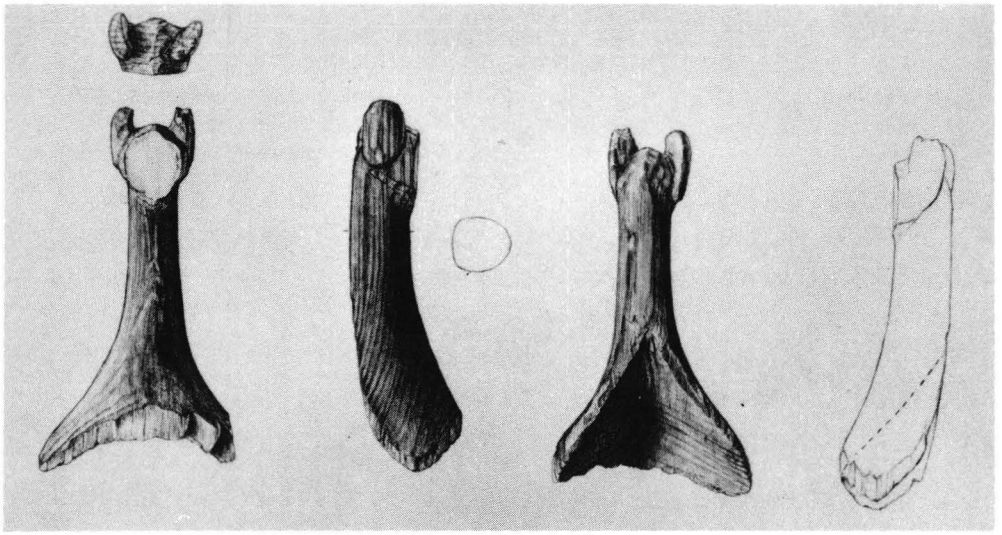

Fig. 2. Wooden scoop.

An increase in the heliophilous pollen flora together with the macrofossil records helps in determining the vertical position of the cultural layer in the gyttja. A rich macrofossil assemblage of useful plants (including *Trapa natans)* is recorded.

The site and its archaeology

A sub-neolithic site was recently discovered at Järvensuo, Humppila, in south-west Finland (Fig. 1), where the archaeological material was deposited in a layer of coarse detritus gyttja (see stratigraphic description) immediately below a gentle till slope which does not contain any signs of prehistoric habitation. The site was obviously situated in the littoral zone of a small lake, either on a platform or on a floating peat raft. The artefacts collected before and during a preliminary inspection include the following items (more details in Siiriäinen, 1983):

— a wooden paddle (cf. Edgren, 1984)
— a handle of a wooden scoop with a bear or elk head sculptured on the top (Fig. 2)
— sherds of at least four, possibly five, clay vessels (Fig. 3)
— a fragment of a stone adze
— fragments of a wooden fish-trap (?)
— three bark fishing net floats
— quartz cores and flakes

Radiocarbon determinations have been made from the paddle (4210 ± 140 BP; Hel-1004), charcoal fragments (4880 ± 120 BP; Hel-1696), pieces of wood (4430 ± 120 BP; Hel-1694) and gyttja from the archaeological horizon (3610 ± 120 BP; Hel-1695).

The Järvensuo site is exceptional in Finland in several respects. It is the first site so-far located in which artefacts made of organic material are preserved, and it is also one of the very few sites which could be classified as a »bog site» (cf. Vuorela and Aalto, 1982). Such sites are known from north-east Europe and especially from the Eastern

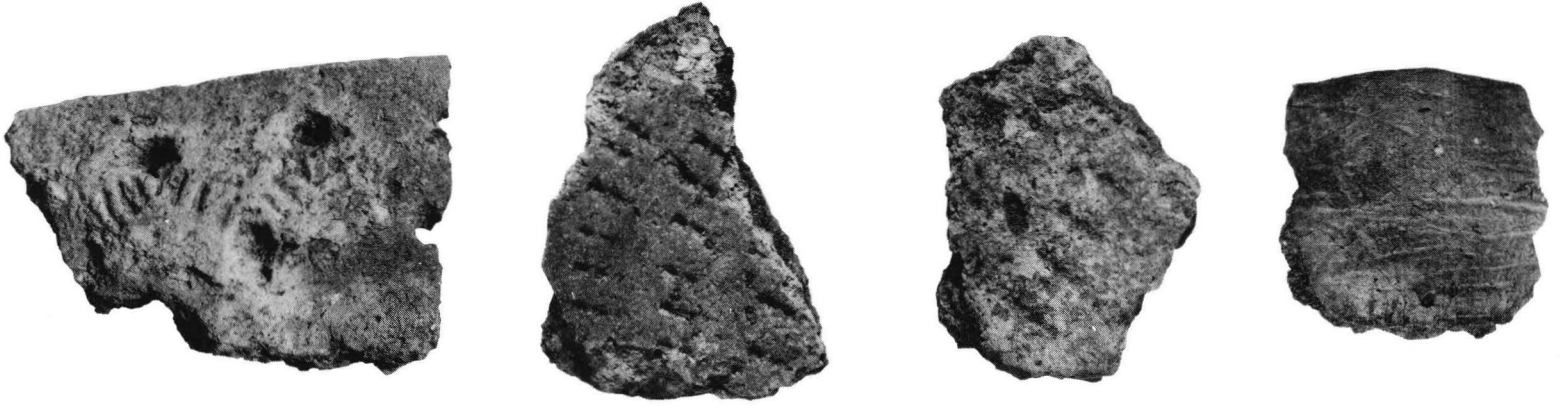

Fig. 3. Clay vessel fragments from site 1.

Baltic countries (eg. Vankina, 1970; Lože, 1979; Rimantiene, 1979). In this connection it is interesting to note that while the pottery from Järvensuo apparently belongs to the late comb ceramic type it also shows ornamental features which are rare in Finland and possibly connect it with certain Eastern Baltic traditions.

Palaeobotanical material and methods

In order to investigate the potentialities of the Järvensuo site pollen and macrofossil analyses were carried out. Two profiles were collected in 1981—82. Profile 1 (Figs 1, 4 and 5; 38 × 15 × 15 cm) was cut from the vertical open section of a ditch at the site of the archaeological finds. Profile 2 (Figs 1, 6 and 7), located at 9 m distance from site 1 towards the center of the basin, comprises two parallel profiles, one taken with a small Russian peat sampler, for pollen and macrofossil analyses, the other with a piston sampler for ^{14}C-dating.

The stratigraphy of core 1 situated under a recently cultivated field layer of 30 cm is as follows:

0 — 5 cm	current agricultural soil
5 —10 cm	well humified *Carex* peat containing charcoal and wood particles
10 —12.5 cm	Limnotelmatic horizon containing mixed *Carex* peat and gyttja, uncarbonized wood and large plant fragments.
12.5—25 cm	Laminated fine detritus gyttja
25 —38 cm	Coarse detritus gyttja containing sand, uncarbonized and carbonized wood and coarse plant fragments.
38 — cm	till

The stratigraphy of core 2 was as follows:

95 —117.5 cm	*Carex* peat
117.5—145 cm	Fine detritus gyttja
145 —247.5 cm	Clay gyttja
247.5—250 cm	Coarse sand

In both profiles the stratigraphy points to a transgressional rise of the lake surface interrupted by a sudden drying up of the lake.

The following ^{14}C-determinations were made from site 2:

Event dated	depth cm	Lab.no	^{14}C-age B.P.
Limnotelmatic contact /*Carex* peat	113—120	Hel-1942	3690 ± 130
Limnotelmatic contact /fine detritus gyttja	120—130	Hel-1943	4000 ± 100
Base of clay gyttja	235—245	Hel-1944	6470 ± 110

Pollen slides were prepared by the KOH and acetolysis methods (Faegri and Iversen, 1975). Profile 1 was sampled at 2-cm intervals and profile 2 at 2.5-cm intervals. Pollen frequencies (% 1000 AP), pollen concentration values (Stockmarr, 1971) and loss-on-ignition values were determined. Profile 1 was sampled at 2-cm intervals for macrofossils, which were extracted by using nitric acid (HNO_3) (Backman, 1965). The results are listed in Table 1, and grouped in terms of plants of possible use of man, aquatics, littoral plants, and trees and shrubs. The nomenclature follows that of Hämet-Ahti *et*

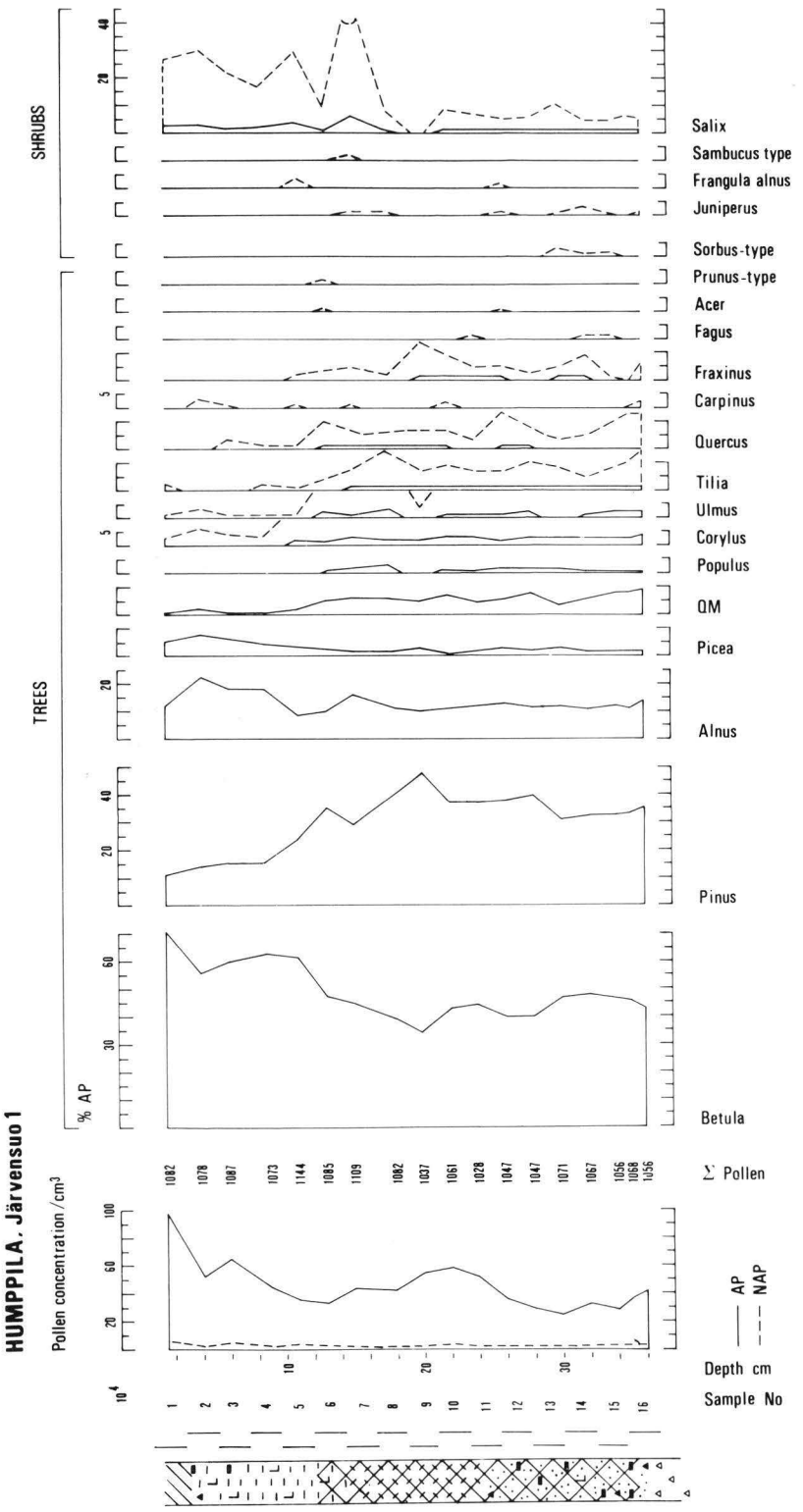

Fig. 4. Relative tree pollen diagram from site 1. For sediment symbols, see the text.

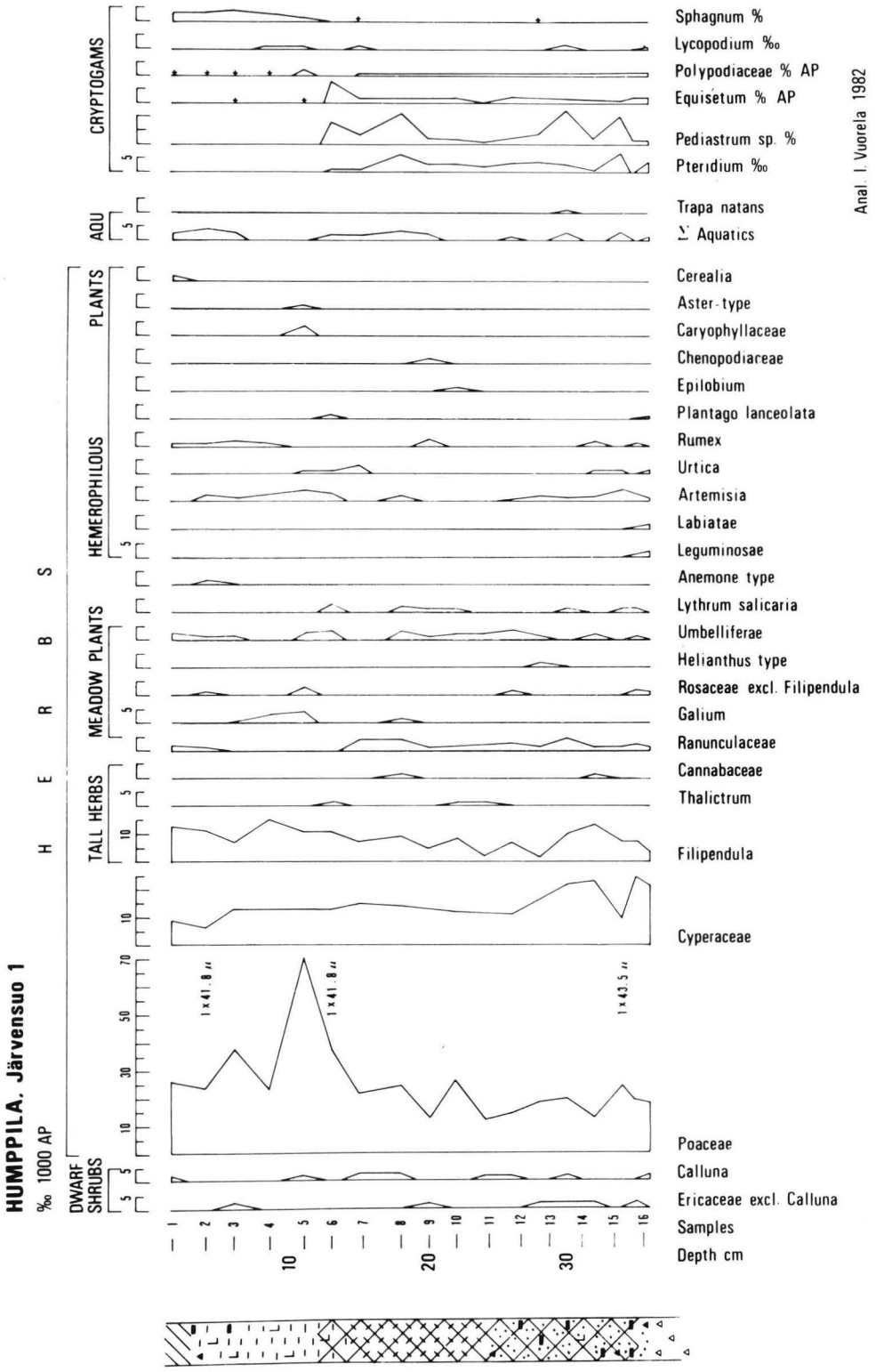

Fig. 5. Relative herb pollen diagram from site 1. For sediment symbols, see the text.

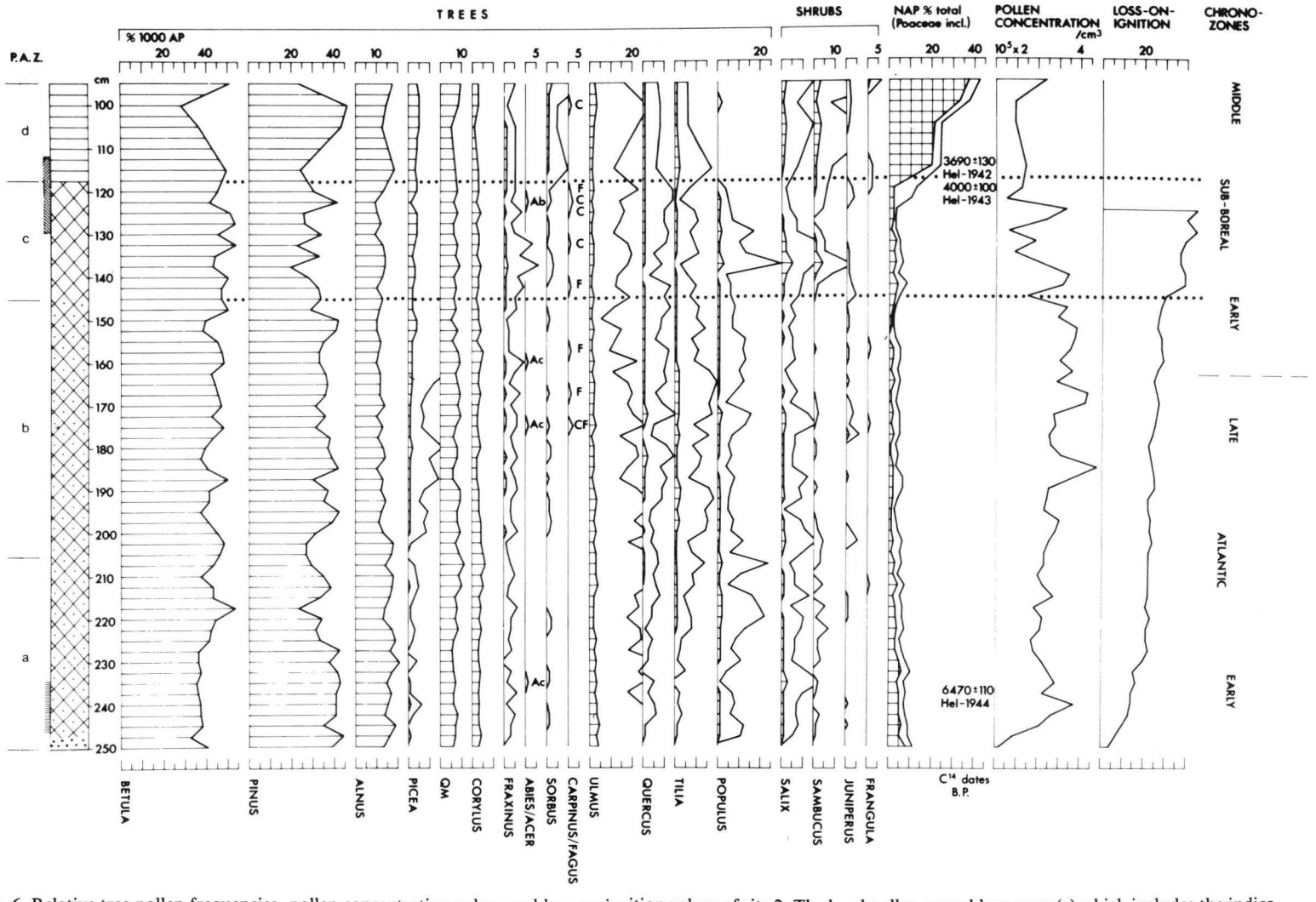

Fig. 6. Relative tree pollen frequencies, pollen concentration values and loss-on-ignition values of site 2. The local pollen assemblage zone (c) which includes the indications of settlement is marked by dotted lines. For sediment symbols, see the text.

al., (1984). In all 46 plant taxa were determined. The exceptionally abundant subfossils of small water animals were also picked out and roughly determined to major groups (Table 1). In addition, a piece of a tooth of a big ruminant *(Bos/Alces;* det. M. Fortelius) was found from the bottomost sediment (38 cm).

Of the three authors Siiriäinen is responsible for the archaeological data, Vuorela for the pollen and Aalto for the macrofossil analysis.

Pollen data

Pollen stratigraphy at site 1 (Figs 4, 5)

Both the ^{14}C-dates and the pollen data of the broad leaved trees (QM) indicate that accumulation commences in the Sub-boreal chronozone (Mangerud et al., 1974).

In the lower part of the profile, corresponding to the settlement period, an hemerophilous pollen flora *(Artemisia, Urtica, Rumex* and Labiatae) is represented together with the dominating shore vegetation *(Filipendula, Carex,* Poaceae). Pollen grains of Poaceae type exceeding 41 microns in size were found from samples No 2, 6 and 16.

Pollen stratigraphy at site 2 (Figs 6, 7)

The profile covers the Late-Atlantic and the Early Sub-boreal chronozones. The period represented by core 1 covers approximately the 100—150 cm level at site 2.

Special features in the pollen data are the uniformly occurring group of hemerophilous pollen types *(Urtica,* Cannabaceae/*Humulus, Rumex* and Chenopodiaceae) and the pollen grains of *Trapa natans* which indicates a nutrient-rich, eutrophic lake (Apinis, 1940; Maristo, 1941; cf. Vuorela and Aalto, 1982).

The diagram was divided into four local pollen assemblage zones (a—d).

P.A.Z. (a) (250—205 cm) reflects the early stage of the lake with a rich shore vegetation (Poaceae, *Filipendula).* Fairly high charcoal frequencies were found in the lowest part of this zone.

P.A.Z. (b) (205—145 cm) includes the main occurrence of *Tilia* thus representing the Late-Atlantic chronozone (Donner, 1971; Tolonen and Ruuhijärvi, 1976).

P.A.Z. (c) (145—120 cm) shows decreasing pollen concentration values (probably due to the transgressive water level) and disturbances among the forest vegetation. The noticeable changes in *Salix* and *Sambucus* pollen frequencies followed by those of *Fraxinus, Populus* and *Alnus* can be dated to 4200—4600 B.P. This increase in heliophilous trees and bushes together with an unstability in the *Pinus/Betula* ratio reflects increasing light in the forest. At the same point a decrease in the Cryptogams, a slight increase in the charcoal values (preliminary determination) and a decrease in the loss-on-ignition values can be seen. These phenomena, which are interpreted as being of human origin, are also confirmed by the macrofossil results. No clear changes can be detected at this level among the ruderals obviously growing naturally at the site. Even the sporadic pollen grains of Cerealia type lack supporting evidence for any kind of cultivation in the area.

P.A.Z. (d) (120—95 cm) covers the start of the post-lake phase and thus remains outside the present problem.

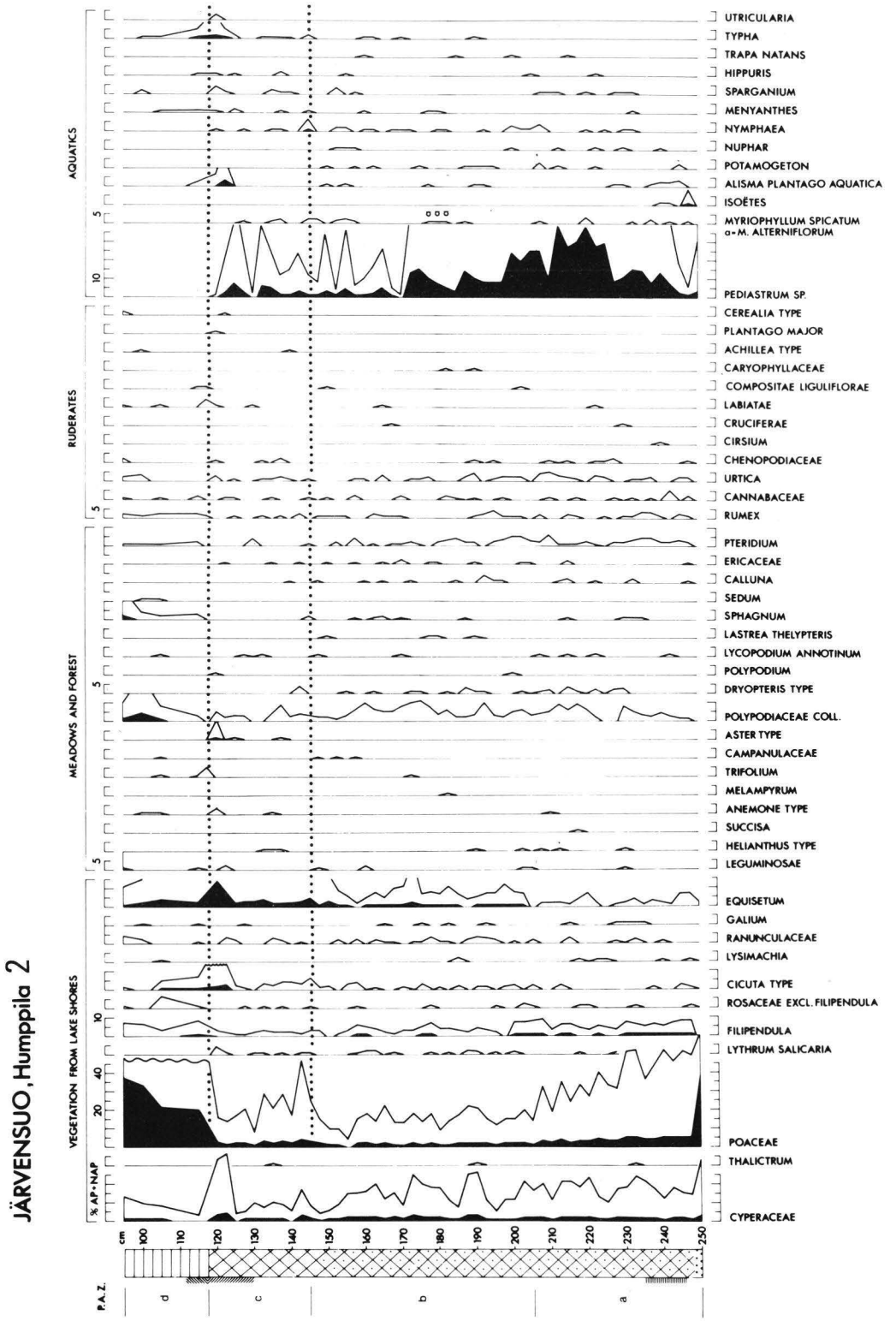

Fig. 7. Relative herb pollen data from site 2. For sediment symbols, see the text.

HUMPPILA, Järvensuo 1

depth cm — 30 — 20 — 10

Type of the sediment

No of sample	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
USEFUL PLANTS: type of remains																
Aegopodium podagraria f				1												
Corylus avellana n		2														
Empetrum nigrum s		4	1	2												
Fallopia cinvolvulus f		2														
Fragaria vesca s		5	2	3	2											
Juniperus communis s			1		1											
Polygonum aviculare f			1													
P. lapathifolius f				4												
Potentilla argentea-type a				1												
Rubus idaeus e		1		3								2	2	1	1	3
R. chamaemorus e																1
Rumex acetosella f																1
Tilia cordata ca		3	+	+	3											
Trapa natans n	3	10	2													
Urtica dioica a			1													
AQUATIC PLANTS:																
Nuphar lutea s	4	4	1		3		1	2								
Nyphaea alba coll. s	2															
Potamogeton graminaeus e	2															
P. natans e	2		6	8					1	1	1					
P. perfoliatus e	5															
Schoenoplectus lacustris n	15	13	17		7		1									
LITTORAL PLANTS:																
Alisma plantago-aquatica a			1	2	2						3	3				
Carex brunnescens/cannescens n																1
C. pseudocyperus n, u	2	6	2	3	5		1					9	2			
C. riparia n, u											4	26				
C. rostrata n, u			2		4						6	18	6	10	6	10
C. vesicaria n, u			4			2					20	50	4	11	1c	
C. sp. n			1			1	1						1			
Cicuta virosa f	1											6				
Eleocharis palustris n			1	1	1											
Equisetum sp. st			2	+				10	3	3						
Iris pseudoacorus l											+	+	+			+
Lycopus europaeus n								1			1	2				
Lysimachia thyrsiflora a										1	1	19	2			1
Menyanthes trifoliata n					1		1			1	1	1	2	1	1	1
Potentilla palustris a			5				3	2	1	4						
Rorippa palustris s										1						
Viola palustrus s														1		
TREES AND SHRUBS:																
Alnus glutinosa f, fs	4	1	2	2	2				4							
A. incana f				1												
Betulan nana f			1													
B. pendula f	3	5	6	2	3			2	2			1				
B. pubescens f	16	9	2	5		2	2	3	3		2					
B. sp. f	10	20	8	>20	>10	6	>10	16	10	6	>20	4	2			2
Pinus sylvestris b, ne	+			2				1				1	1	1		
Populus tremula bs	>50		1	12	3			1								
Salix sp. bs	>50						1									
charred wood c	+++	+++	++	++	++		2	3				2	3	++	++	++
wood	++	++	+	+							++	++	++	++	++	++
TISSUE FRAGMENTS:																
Cyperaceae: Carex l	++	+	++	+	+						+++	+++	+++	++	++	++
Schoenoplectus l	+++	+++	+++	+++	++	++	+	+	+	+	++	++				
Graminae sr	++	+	+	+			+				+	+	+	+	+	+
MOSSES:																
Bryidae sh, l	>50	++		6	5	2		+								
Sphagnidae l				2								+				
FUNGI:																
Cenococcum graniforme sc				1							7	++	++	++	++	++
ANIMAL REMAINS:																
BRYOZOA, cf. Cristatella st		++	+	12	2		10	2		4		2				
INSECTA: Coleoptera w		++	+	>20	>50	3	++	>20	10	9	>10	4		1	1	2
Diptera: Chironomidae m		+++	+	>20	+											
Trichoptera lc	+++		8	>20	6	4		3								
ANNELIDA: Nephelis octocula ec	30	>50	>20	>20	>10	6	6	10	6	1	2					
Piscicola ec	40	>50	>20	>20	>10	7	>20	>20	>10	>10	>10	6	1			
PORIFERA:																
Spongilla lacustris co	14	+	+	5	5											

Table 1. Abbreviations: a = achene, b = bark, bs = bud scale, c = charred seed or wood, ca = capsule, co = colony, e = endocarp, ec = egg cocoon, f = fruit, fs = fruit scale, l = leaf, lc = larval case, m = mouth parts of larvae, n = nut or nutlet, ne = needle of Coniferous trees, s = seed, sc = sclerotia, sh = shoot, sr = straw, st = statoblast, w = wings, u = utricle. Frequencies, when not countable: + some; ++ frequent; +++ copious. **Anal. M. Aalto 1982**

Table 1. Macrofossil data from site 1. For sediment symbols, see the text.

Macrofossil data of site 1 (Table 1)

Settlement indicators

The cultural layer (25—38 cm) at the bottom of the lake gyttja contained abundantly charred wood as well as uncharred wood, berry seeds and endocarps, nuts and other plant remains. Finds of cracked nuts of hazel *(Corylus avellana)* and water chestnut *(Trapa natans)* suggest that these species were the most significant and the most nutritive of Stone Age man's menu. Subfossil hazel nuts have been found in mires in Finland from far beyond the present range of the species indicating that more favourable climatic conditions existed in the past (e.g. Hultén, 1971, map 591) and possibly that the shrub was favoured and spread by man (Dimbleby, 1967). Charred nut fragments have also been found in Finland from terrestrial Stone Age dwellings (from the Åland Islands) and from the Iron Age (Aalto, 1982). In the present profile, water chestnut fragments, 15 in all, indicate the use of this exotic plant, which is nowadays extinct from Finland, by Stone Age man. During the Atlantic and Subboreal chronozones *Trapa* was fairly common in Finland up to latitude 63° (Valovirta, 1960). It vanished at the beginning of the Sub-atlantic chronozone (Alhonen and Vuorela, 1974), about the same time as more extensive cereal cultivation began. Cracked fruit fragments have also been found earlier together with archaeological finds, namely in Pennala bog in Orimattila, S-Finland (Vuorela and Aalto, 1982). The large, strach-rich seeds of the water chestnut may have been eaten raw, cooked or roasted, or prepared as flour. It was a kind of Stone Age potato, the taste and properties of which it is reminiscent.

Other useful plant remains are mostly wild berries *(Empetrum nigrum, Fragaria vesca, Juniperus communis, Rubus idaeus),* the use of which is common even today, but was even more so in those ancient times. It is noteworth that many of the endocarps and seeds *(Rubus, Fragaria)* were fragmented, as if they had been bitten by man. Of the other plants the most common are *Fallopia* and *Polygonum* species. They have been widely collected by man (e.g. Renfrew, 1973), and also found from Iron Age sites in Finland (Aalto, 1982). The presence and possible use of *Tilia* and *Urtica* as fiber plants is suggested by capsule and seed finds.

Development of site 1 in the light of plant macrofossils

A macrophytic aquatic flora is most abundant in the lowest sample: *Trapa natans, Nuphar, Nymphaea, Potamogeton gramineus,* and *P. perfoliatus,* together, all indicate a considerable eutrophic lake vegetation. In the coarse detritus up to samples 16—12 these aquatics are common, but in the fine detritus (samples 11—7) less so, perhaps due to deeper water and a longer distance of the shore. Littoral plants in the lake phase represent typical shore plants such as *Alisma plantago-aquatica, Potentilla palustris, Equisetum* sp., *Menyanthes, Cicuta* and tall sedges such as *Carex rostrata, C. vesicaria* and *C. pseudocyperus.* The last mentioned sedge is a very common one in the lists of plants accompanying *Trapa* (Aalto et al., 1981). Its range has also shrunk remarkably since the climatic optimum (Erkamo and Backman, 1960). The last true aquatic *(Potamogeton natans)* was found in samples 7 and 6. At the same time there was an increase in the sedge vegetation, and the sediment turned to *Carex* peat. Of the sedge species, the most interesting is *Carex riparia,* which is seldom encountered in the present Finnish vegetation. Soon after drying up the site evidently obtained a tree cover, as indicated by wood remains and even tree stumps in the sedge peat. The site was eventually taken under cultivation/pasture and the topmost sample, which belongs

to the lowest part of the field horizon (30 cm, not analysed), contains *Rumex acetosella* and *Rubus chamaemorus*. For further comments on the plant list, see Aalto (1983).

Archaeological comments

As the stratigraphical situation of the archaeological occurrence and the cultural historical potentialities of the artefact material are highly interesting, an excavation is planned at the site for the summer 1985. The topographical setting of the site also gives it relevance in the economic problematics of the sub-neolithic period. Our view on the Stone Age economy is probably biased towards coastal activities as by far the majority of the sites located and investigated so-far are coastal dwelling sites or sites situated on the shores of large lakes. Thus sites on shores of small lakes, which are not easily found, might add considerably to our knowledge of the resource utilization during the Stone Age.

Acknowledgements

The authors wish to thank Mr. Risto Salomaa, Phil.Lic., for great help in the field, Mr. H. Jungner, (Radiocarbon Dating Laboratory, Helsinki), for the ^{14}C dates, and Mrs. Sheila Hicks, PhD., for help with the English text.

Financial support for the pollen analysis from the Emil Aaltonen Foundation is gratefully acknowledged.

REFERENCES

Aalto, M., 1982. Archaeobotanical studies at Katajamäki, Isokylä, Salo, South-West Finland. PACT 7, 137—147.

Aalto, M., 1983. Humppilan Järvensuon neoliittisen asuinpaikan makrofossiileista (English summary: Macrofossil finds from the Neolithic Lake Side Dwellings of Järvensuo, Humppila SW Finland). Karhunhammas 7, 88—95.

Aalto, M., Taavitsainen, J-P. and Vuorela, I., 1981. Palaeobotanical investigations at the site of a sledge runner find dated to about 4900 B.P in Noormarkku, SW Finland. Suomen Museo 8, 41—65.

Alhonen, P. and Vuorela I., 1974. Lamminjärven kerrostumien siitepöly- ja piilevästratigrafia (English summary: On the pollen and diatom stratigraphy of the Flandrian sediments of Lamminjärvi, Southern Finland). Luonnontutkija 78, 40—47.

Apinis, A., 1940. Untersuchung über die Ökologie der Trapa L. I. Teil. Systematische Zugehörigkeit, Geschichte, Standortsverhältnisse und die Verbereitung der Pflanze in Lettland. II. Teil. Bedingungen der Keimung und Entwicklung der Pflanze. Acta Horti Bot. Univ. Latviensis 13, 84—145.

Backman, A.L., 1965. Växtpaleontologiska studier på Åland. Acta Soc. Fauna Flora Fennica 77 (4) 1—43.

Dimbleby, G., 1967. Plants and Archaeology. 187 p. London.

Donner, J., 1971. Towards a stratigraphical division of the Finnish Quaternary. Soc. Sci. Fennica, Comm. Phys.-Math. 41, 281—305.

Edgren, T., 1984. En paddelåra från stenåldern. Matts Dreijer 80 år, festskrift tillägnad Matts Dreijer på hans 80-årsdag. Mariehamn.

Erkamo, V. and Backman, A.L., 1960. Carex pseudocyperuksen ja Trapa natansin subfossiililöytöjä. In Aario, L. (ed): Suomen kartasto (Map of Finland), map 10.

Faegri, K. and Iversen, J., 1975. Textbook of pollen analysis. 3rd rev. ed. by K. Faegri. 295 p. Munksgaard, Copenhagen.

Hultén, E., 1971. Atlas of the distribution of vascular plants in NW Europe. 531 p. Stockholm.

Hämet-Ahti, L., Suominen, J., Ulvinen, T., Uotila, P. and Vuokko, S. (eds), 1984. Retkeilykasvio. 544 p. Helsinki.

Lože, I., 1979. Late Neolithic and Early Bronze Age of the Lūbana Lowland. Riga (in Russian).

Mangerud, J., Andersen, S.T., Berglund, B.E. and Donner, J., 1974. Quaternary stratigraphy of Norden, a proposal for terminology and classification. Boreas 3, 109—128.
Maristo, L., 1941. Die Seetypen Finnlands auf floristischer und vegetationsphysiognomischer Grundlage. Ann Bot. Soc. 'Vanamo' 15 (5), 1—321.
Renfrew, J.M., 1973. Palaeoethnobotany. 248 p. + 48 pls. New York.
Rimantiene, R., 1979. Šventoji. Narvos kulturos gyventienes. Vilnus.
Siiriäinen, A., 1983. Humppilan Järvensuon kivikautinen löytöpaikka (English summary: Stone Age Dwelling Place in Humppila Järvensuo). Karhunhammas 7, 79—87.
Stockmarr, J., 1971. Tablets with spores used in absolute pollen analysis. Pollen Spores 4, 651—621.
Tolonen, K. and Ruuhijärvi, R., 1976. Standard pollen diagrams from the Salpausselkä region of Southern Finland. Ann. Bot. Fennici 13, 155—196.
Valovirta, V., 1960. Paläobotanische Untersuchung über einen nördlichen Fundort subfossiler Trapa natans. Bull. Comm. Geol. Finlande 188, 41—65.
Vankina, L., 1970. Die Torfmoorsiedlung von Sarnate. Riga (in Russian).
Vuorela, I. and Aalto, M., 1982. Palaeobotanical investigations at a Neolithic dwelling site in southern Finland, with special reference to Trapa natans. Ann. Bot. Fennici 19, 81—92.