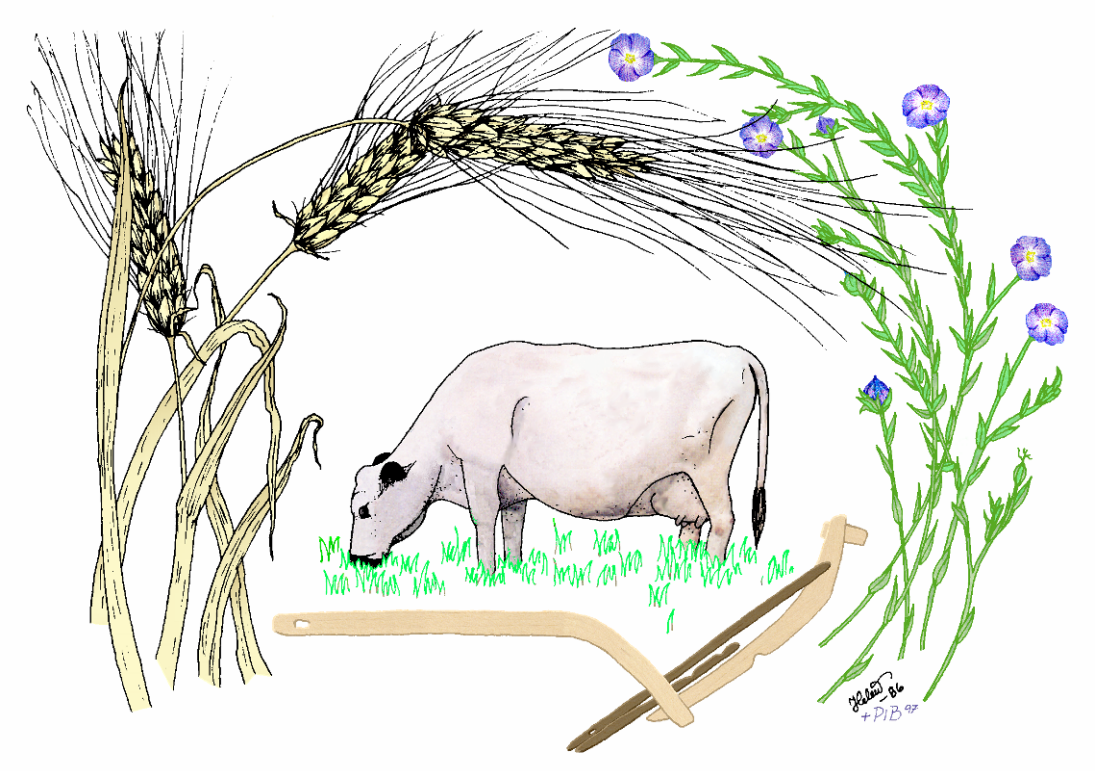
MILJÖARKEOLOGISKA LABORATORIET

RAPPORT nr. 2020-024



Environmental archaeological analysis of samples from the site Skee 1010/ L1968:6711, Skee Socken, Bohuslän

Ivanka Hristova, Samuel Eriksson, Kristian Hristov

INSTITUTIONEN FÖR IDÉ – OCH SAMHÄLLSSTUDIER

UMEÅ UNIVERSITET

Environmental archaeological analysis of samples from the site Skee 1010/ L1968:6711, Skee Socken, Bohuslän

Ivanka Hristova, Samuel Eriksson, Kristian Hristov

Sample information

Analysis type: Macrofossil analysis of unfloated samples, charcoal screening and soil chemical analysis
Number of samples: 8 macrofossil sample, 4 samples for charcoal screening and 8 soil chemical samples

Introduction

A settlement site situated by the lake Nedre Färingen in Skee parish was investigated by the Kulturlandskapet. During the excavations about 60 features were detected and 81 samples collected from them. The found material was sparse and consisted of a few ceramic fragments and flint pieces. Several large cooking pits were examined, some of them up to 2-2.5 m in diameter.

Selected samples were provided for archaeobotanical and soil chemical analyses. The result from the analyses could contribute to the site interpretation and reveal aspects of the use of the different structures. Additionally, the wood identification could help for the reconstruction of the surrounding vegetation as well as shows preferences in the used wood species at the site. An interesting question is distinguishing the different phases of the site and how the environment has changed through time. Botanical material has been selected from each sample and sent for 14C which could aid answering these questions.

The samples were provided by Linda Wigert, Kulturlandskapet.

Materials and Methods

Macrofossil analysis

Before the analysis the samples were stored in a drying room (+30°) until the moisture has disappeared. Afterwards they were floated using sieve meshes of 2 mm and 0,5 mm. The samples volume before floatation was between 1,9 and 0,9 liters and after it between 30 to 300 ml. The sieved material was sorted and identified under stereomicroscope. The results from the analyses have been presented in Table 3.

The amount of woody charcoal was estimated as relative proportion of the floated sample volume as follows: x = up to 25%, xx = up to 50%, xxx = up to 75%, xxxx = about 100%. Four samples were selected for charcoal screening and about 10 pieces were identified from each of them. Additional 8 charcoal samples were provided in case the flotation samples do not contain

enough charcoal material but they were not analysed as the floatation samples provided sufficient amount of charcoals.

The determination of plant species was done using reference literature for plant seeds and wood (Cappers et al. 2006; Schweingruber 1978; Schweingruber 1990) as well as the laboratory reference collections. The names of the identified plants are given according to the Nordens flora (Mossberg and Stenberg 2018) and the Virtual Flora (Anderberg and Anderberg, u.d.). Swedish names of the identified plants are included in Table 3.

Sample processing was performed by Kristian Hristov, and further analysis and species identification by Ivanka Hristova.

Soil chemistry

Prior to all analyses the samples were dried at 30°C. Samples were then passed through a 1.25 mm sieve and any presence of material of cultural significance noted (such as bone, charred material, ceramics etc.). The chemical methods employed here are the same as those used in Swedish soil chemical studies following the methodological approach of Engelmark and Linderholm (1996 and 2008). The parameters analysed and abbreviations used are explained in Table 1.

Table 1. Geoarchaeological methods and abbreviations as used in this report.

Abbreviation	Method	Description
MS	Magnetic Susceptibility	Magnetic susceptibility measured on 10g of soil, with a Bartington MS3 system with an MS2B probe (Dearing 1994). Data are reported as SI-units per ten grams of soil, (corresponding to X_{lf}, 10^{-8} m^3 kg^{-1}) (Thompson & Oldfield 1986).
MS550	Magnetic Susceptibility after burning at 550ºC	Magnetic susceptibility after 550° C ignition (units as above)
LOI (%)	Loss On Ignition	Soil organic matter, determined by loss on ignition at 550° C, in percent (Carter, 1993).
Cit-P	Inorganic phosphate content (mg P/kg dry matter, ppm)	Extraction with 2% citric acid (corresponding to the Arrhenius method (Arrhenius 1934)
Cit-POI	Total phosphate (mg P/kg dry matter, ppm) (inorganic & organic)	Extraction with 2% citric acid on ignited soil
P quota	**Cit-POI /Cit-P**	Ratio of inorganic & organic to inorganic phosphate

These methods have been developed and adapted for soil prospection and the bulk analysis of occupation soils and features. Analysed parameters comprise organic matter (loss on ignition [LOI], Carter 1993), two fractions of phosphate (inorganic [Cit-P], and sum of organic and inorganic [Cit-POI]) (Engelmark and Linderholm 2008, Linderholm 2007) and magnetic susceptibility (MS-χ_{lf}) and MS550-χ_{lf} (Linderholm 2007, Engelmark and Linderholm 2008). These analyses provide information on various aspects concerning phosphate, iron and other magnetic components and total organic matter in soils and sediments, and their relation to phosphate.

Soil chemical analyses were undertaken by Samuel Eriksson and Kristian Hristov.

Results

Macrofossil analysis

Eight samples from cooking pits and pits were analysed for macroremains. Four of them were selected for following charcoal screening. Most of the samples consist entirely of charcoal fragments. Other types of botanical remains are very scarce. The material is preserved only in charred state. The result from the analyses is presented in Table 3.

Sample 20_0007_0001/ P17

The sample volume before floatation was 0,9 liter and after flotation is 75 ml. The amount of charcoals comprises about 100% of floated sample volume. The only preserved plant remains different from charcoals were two flower buds. Additionally few pieces of so called black lumps were selected. Many of the charcoal fragments are small twigs/ branches. One of them was selected for 14C dating and identified as hazel (*Corylus avellana*).

This sample was one of the selected for further charcoal screening. The results from the screening showed that the wood from the studied cooking pit is diverse. It comprises from pine (*Pinus* sp.), hazel (*Corylus avellana*) and oak (*Quercus* sp.). Among them hazel seems to be prevailing. It is possible that more species are presented but the results are based on the identification of just ten pieces.

Sample 20_0002_0002/ P27

The sample volume before floatation was 1,9 liter and after flotation is 30 ml. The floated sample consists of about 25% of charcoals. The identified macros are one flower bud and a seed of pine (*Pinus* sp.). The pine seed was selected for 14C dating. Few fungal species (*Cenococcum* sp.) were also found in the sample. *Cenococcum* is one of the most common ectomycorrhizal fungal species encountered in forest ecosystems.

Sample 20_0007_0003/ P30

The sample volume before floatation was 1,2 liter and after floatation is 220 ml. The whole sample was represented by charcoal fragments. Only two needle fragments of pine (*Pinus* sp.) and few pieces of bark were recognized. The bark fragments are difficult, often impossible to identify but in the current case they remind those of pine. Among the charcoals a lot of twigs were visible. One wood fragment determined as hazel (*Corylus avellana*) was sorted for 14C dating.

Sample 20_0007_0004/ P47

The sample volume before floatation was 1,8 liter and after flotation is 300 ml. The floated sample consists entirely of charcoals. The identified macroremains are represented by fragments of hazelnut shell (*Corylus avellana*) and a needle fragment of spruce (cf. *Picea abies*). Few pieces of bark and black lumps were recognized, as well as *Cenococcum.* One charcoal fragments was selected for 14C dating, identified as hazel (*Corylus avellana*).

Charcoal screening was performed on the sample and about ten pieces identified. Their determination shows diversity of the used species in the cooking pit: pine (*Pinus* sp.), poplar/willow (*Populus/Salix*), hazel (*Corylus avellana*), ash (*Fraxinus* sp.), and alder (*Alnus* sp.).

Sample 20_0007_0005/ P51

The sample volume before floatation was 1,4 liter and after flotation is 50 ml. The amount of charcoals comprises about 75% of the floated sample volume. No other macrofossil remains were found in the sample, rather than the charcoals, one piece of bark and a flower bud. A charcoal fragment was selected for 14C dating and identified as hazel (*Corylus avellana*). The prevailing wood in the sample seems to be coniferous but no detailed screening or charcoal identification was performed so this statement is preliminary.

Sample 20_0007_0006/ P62

The sample volume before floatation was 1,8 liter and after floatation is 200 ml. The whole sample was represented by charcoal fragments. No other macrofossil remains were obtained. Among the charcoals quite a lot of bark fragments and small twigs/branches were noticed. One charcoal fragment was selected for 14C dating and defined as hazel (*Corylus avellana*).

Charcoal screening was performed on the sample and about 10 wood pieces were determined. Their identification showed almost equal distribution of pine (*Pinus* sp.) and hazel (*Corylus avellana*), which also confirms the results from the screening – a mix between coniferous and deciduous trees. One fragment was determined as poplar/willow (*Populus/Salix*).

Sample 20_0007_0007/ P72

The sample volume before floatation was 1,1 liter and after floatation is 125 ml. The sample consists entirely of charcoals. No other macrofossil remains were noticed. One charcoal fragment was selected for 14C dating and determined as Pomoideae. Pomoideae can represent different sorts of apple, pear, cherries, rowan (Sorbus/ oxlar). Among them rowan is the most common for the region but also wild species of apples and pears cannot be excluded. During the sorting most of the observed wood fragments resembled coniferous wood but as detailed charcoal screening was not performed, the results are very preliminary.

Sample 20_0007_0008/ P79

The sample volume before floatation was 1,5 liter and after floatation is 110 ml. The floated sample volume consists entirely of charcoals. No other macroremains were established in the sample. One piece of charcoal identified as hazel (Corylus avellana) was selected for 14C dating.

According to the charcoal screening the wood species resemble mainly deciduous trees. Species like oak (*Quercus* sp.), ash (*Fraxinus* sp.), and hazel (*Corylus avellana*) were determined. It seems that hazel was the most common in the studied structure.

Soil chemistry

Table 2. Soil chemical analysis results.

MALNo	FieldNo	Feature	MSlf	MS550lf	CitP	CitPOI	PQuota	LOI
20_0007_0001	17	10	398	1197	89	239	2,70	14,3
20_0007_0002	27	16	221	281	62	245	3,96	6,1
20_0007_0003	30	23	185	292	85	162	1,91	8,9
20_0007_0004	47	21	352	462	90	204	2,27	9,2
20_0007_0005	51	40	311	292	115	215	1,87	3,2
20_0007_0006	62	49	287	630	71	196	2,77	7,1
20_0007_0007	72	41	171	286	57	140	2,46	5,2
20_0007_0008	79	59	331	339	112	163	1,46	6,2

Discussion and Conclusions

All of the studied samples consist entirely of charcoal fragments. The big amounts of charcoals in the samples give evidence for an intensive fire in the studied structures. The only exception is sample number 20_0007_0002 (P27) which contains very low quantities of charcoals and indicates that the burning activities in that structure were not that concentrated comparing with all the rest studied features.

The number of other botanical material in the structures is quite scarce. It comprises of few pine and spruce needle fragments, a pine seed and pieces of hazelnut shell. The only sample that contains hazelnut shells is 20_0007_0004 (P47, Anl 21) coming from a cooking pit. Hazelnut shells are quite common botanical remains and their findings indicate the use of the plant by the society.

Some of the samples contain quite a lot of small twigs/ branches which were used in the fire. The registered flower buds could come from those small twigs/ branches.

In most of the cases the identification of the described above black lumps is impossible as they could represent destructed inorganic or organic material such as wood, bark, slag, etc.

The analysed wood shows a diversity of the used species. In some of the samples like 20_0007_0005 (P51) and 20_0007_0007 (P72) the coniferous species are prevailing while in others like sample 20_0007_0008/ P79 and sample 20_0007_0004/ P47 deciduous wood is prevailing. In third samples like 20_0007_0006/ P62 the coniferous and deciduous species are almost equally spread. The variety in the diversity of the used tree species in the studied features could be explained with the different function of the structures or it could reflect the surrounding vegetation at different time periods if the structures belong to different chronological intervals.

The soil chemical analysis shows no to little impact from phosphate accumulating processes in all samples. The material does not reflect repeated or intense household activities such as food processing or disposal of kitchen waste.

The results for MS and the quota of MS550/MS yields somewhat differing results. The material in samples 20_0007_002, 20_0007_005 and 20_0007_008 show indications of having been the primary recipient in heat generating processes. The other samples likely represent material that has been less exposed to heat generating processes.

References

Anderberg, A.-L., & Anderberg, A. (u.d.). Den virtuella floran. Hämtat från http://linnaeus.nrm.se/flora/welcome.html

Cappers, R. T., Bekker, R. M., Jans, E. J. 2006. Digitale Zadenatlas van Nederland. Digital seed atlas of the Netherlands. Groningen: Barkhuis publishing & Groningen University Library.

Carter, M.R. 1993. *Soil Sampling and Methods of Analysis*. London.

Dearing, J. 1994. Environmental Magnetic Susceptibility. Using the Bartington System. Bartington Instruments Ltd.

Engelmark, R., Linderholm, J. 2008. *Miljöarkeologi: människa och landskap - en komplicerad dynamik.* Malmö: Malmö kulturmiljö.

Linderholm, J. 2007. Soil chemical surveying: a path to a deeper understanding of prehistoric sites and societies in Sweden. Geoarchaeology 22 (4), 417–438.

Mossberg, B., Stenberg, S. 2018. Nordens flora. Naturhistoriska riksmuseet Stockholm.

Schweingruber, F. H. 1978. Microscopic Wood Anatomy. Birmendorf: Eidgenössische Anstalt fur das forstliche Versuchswessen.

Schweingruber, F. H. 1990. Anatomy of European Wood. An atlas for the identification of European trees, shrubs and dwarf shrubs. Verlag Paul Haupt Bern und Stuttgart.

Thompson, R. and Oldfield, F. (1986) *Environmental Magnetism*. Allen & Unwin: Springer, London.

Figures and tables

MAL nr	20_0007_0001	20_0007_0002	20_0007_0003	20_0007_0004	20_0007_0005	20_0007_0006	20_0007_0007	20_0007_0008
Prov nr	17	27	30	47	51	62	72	79
Feature	10	16	23	21	40	49	41	59
Corylus avellana (hazel/ hassel) -shell fragments				7				
cf. *Picea abies* (European spruce/gran) - needle				1				
Pinus sp. (pine/ tall) - seed		1		7				
Pinus sp. (pine/ tall) - needle			2					
bark fragm			4		1	20		
flower buds	2	1			1			
twigs/ stems/ small branches	x		x			10		
Charcoal fragments	xxxx	x	xxxx	xxxx	xxx	xxxx	xxxx	xxxx
Alnus sp. (alder/ alar)				1				
Corylus avellana (hazel/ hassel)	3		1	3	1	5		7
cf. *Corylus avellana* (hazel/ hassel)	2							
Fraxinus sp. (ash/ask)				2				2
Pinus sp. (pine/ tall)	2			2		5		
Pomoideae (poplar/popplar)							1	
Populus/Salix (poplar/ popplar; willows/ viden)				3		1		
Quercus sp. (oak/ ek)	3							4
black lumps	4			3				
Cenococcum sp. (fungi/ jordgryn)		x		x				
volume before floatation (L)	0,9	1,9	1,2	1,8	1,4	1,8	1,1	1,5
volume after floatation (ml)	75	30	220	300	50	200	125	110

Table 3. Archaeobotanical results from the studied sites.

MAL
Miljöarkeologiska laboratoriet
Umeå Universitet
901 87 UMEÅ
090-786 50 00
https://www.umu.se/mal/
mal@umu.se

Jan-Erik Wallin Pollenlaboratoriet i Umeå AB
Sågställarvägen 2A 907 42 Umeå
070-66 15 101
pollenlaboratoriet@ume.se