MILJÖARKEOLOGISKA LABORATORIET

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Environmental archaeological analysis of samples from the site Cederslund/ L2020:3335, Skredsvik Socken, Bohuslän

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Sample information

Analysis type: Macrofossil analysis of unfloated samples, charcoal screening and soil chemical analysis.
Number of samples: 4 macrofossil sample, 2 samples for charcoal screening and 12 soil chemical samples.

Introduction

A Neolithic settlement was excavated at Cederslund, Uddevalla municipality. The archaeological findings consisted of pieces of flint and ceramics. Few archaeobotanical and soil chemical samples were taken from profiles at the excavated area. The results from the analyses will try to answer questions concerning the preservation and taphonomic conditions at the site as well as to give more information about the cultivated plants, the surrounding vegetation, etc. Botanical material from the samples was selected for 14C in order to enable the dating of the settlement.

The samples were provided by Benjamin Grahn Danielson, Picea Kulturarv.

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 about 2 liters and after it between 20 to 150 ml. The sieved material was sorted and identified under stereomicroscope. Charcoal fragments were identified under microscope with reflected light. The results from the analyses have been presented in Table 3&4.

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%. Two samples contained enough material for charcoal screening and about 10 pieces were identified from each of them.

The determination of plant species was done using reference literature for wood (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&4.

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)

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-χlf) and MS550-χlf (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 Johan Linderholm, Samuel Eriksson and Kristian Hristov.

Results

Macrofossil analysis

Four samples were analysed for macro remains. All samples contained relatively small amounts of charcoal fragments, no more than 25% of the floated sample volume. All charcoal fragments were very small, less than 5 mm which made their identification very difficult or impossible.

Two of the samples contained sufficient material for the conduction of charcoal screening. Ten charcoal fragments were selected for identification from each of them. Other botanical remains comprised of few spruce (Picea abies) needle fragments. The rest of the samples volume consisted of modern vegetative parts such as roots and stems. The result from the analyses is presented in Table 3&4.

Sample 20_0037_0001/ P3

The sample volume before floatation was 2 litres and after flotation – 20 ml. The amount of charcoals comprises three very small charcoal fragments. They were defined as diffuse porous wood and sent for 14C dating. The rest of the sample was presented by modern vegetative parts such as roots and stems.

Sample 20_0037_0002/ P4

The sample volume before floatation was 2,5 litres and after flotation it was 150 ml. The floated sample consists of about 25% of charcoals. A spruce needle fragment (*Picea abies*) was the only preserved botanical remain. The sample contained mainly modern plant material.

The amount of charcoals in the sample was sufficient for charcoal screening and 10 wood pieces were identified. The results from the screening showed that deciduous and coniferous wood was presented in the sample but deciduous trees were prevailing. All coniferous fragments were too small for further identification. The most common species were birch (cf. *Betula* sp.) and hazel (cf. *Corylus avellana*), but also alder (*Alnus* sp.) was identified. One charcoal fragment of birch (cf. *Betula* sp.) was selected for 14C dating.

Sample 20_0037_0003/ P5

The sample volume before floatation was 1,8 litres and after floatation it was 75 ml. The amount of charcoals in the sample was less than 25% of the floated sample volume. Two needle fragments of spruce (*Picea abies*) were recognized. The rest of the material in the sample was modern vegetative parts. One wood fragment determined as birch (*Betula* sp.) was sorted for 14C dating.

Charcoal screening was performed on the sample and about ten pieces identified. Their determination shows diversity of the used wood: birch (*Betula* sp.), alder/ hazel (*Alnus* sp./ *Corylus avellana*), and juniper (*Juniperus communis*).

Sample 20_0037_0004/ P6

The sample volume before floatation was 1,9 litres and after flotation – 20 ml. The floated sample consisted almost entirely of modern plant material. Only few very small pieces of charcoal were detected but their weight was not enough for 14C dating.

Soil chemistry

12 samples were analysed for four parameters. The complete results can be found in table 2.

Table 2. Results from the soil chemical/physical analysis.

MALNo	FieldNo	DepthTo_cm	MS	MS550	CitP	LOI	MSQ
20_0037_0001	P 3	0,60	5	31	92	4,0	5,7
20_0037_0002	P 4	0,50	3	58	29	9,3	18,7
20_0037_0003	P 5	0,25	4	154	38	11,3	41,6
20_0037_0004	P 6	0,50	5	63	131	6,2	12,1
20_0036_0001	P 7		6	30	153	1,8	5,5
20_0036_0002	P 8		6	33	136	4,8	5,9
20_0036_0003	P 9		4	388	72	18,2	94,6
20_0036_0004	P 10		3	135	35	11,3	47,7
20_0036_0005	P 11		6	68	131	2,2	12,2
20_0036_0006	P 12		3	28	73	13,4	8,4
20_0036_0007	P 13		3	191	44	11,8	59,0
20_0036_0008	P 14		4	415	41	16,1	109,5

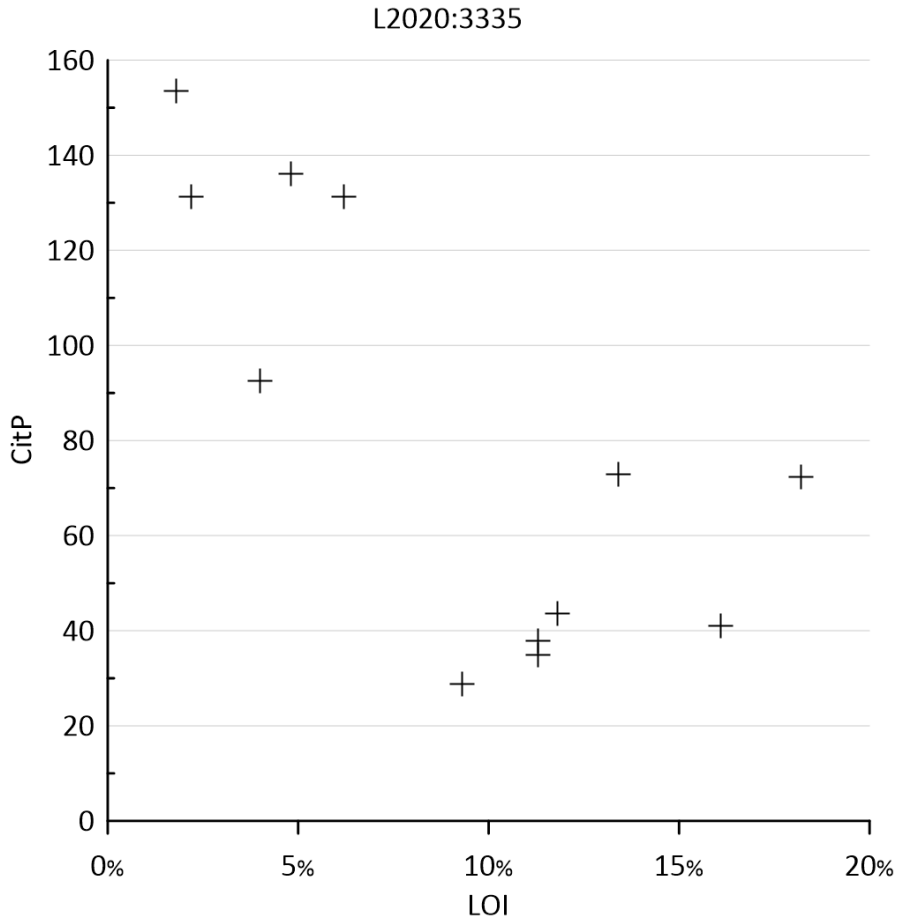

Fig. 1. LOI as a function of CitP.

Discussion and Conclusions

All studied archaeobotanical samples contained very small amounts of charcoals, which indicated lack or very limited burning activities in the studied areas. The botanical remains comprised of few spruce needle fragments (*Picea abies*) found in samples 20_0037_0002/ P4 and 20_0037_0003/ P5.

The analysed wood shows a diversity of the used species represented by both coniferous and deciduous trees. The identified species such as birch, hazel, alder and juniper are common for the studied region and represent the surrounding vegetation.

The pictures supplied by Picea Kulturarv indicates a cultivated top soil overlaying what might be an old B-horizon of a Calluna podsol. The matrix is a fine grained silty material and the analysis indicates wet soil conditions with possible gleying (MS and MSQuota) and growth of organic material/peat (LOI). The amount of inorganic phosphates indicates very low or no accumulation as a result of cultural impact.

Additional analysis of the elemental composition of the material (eg. xrf analysis) could provide further information on the taphonomic properties.

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Figures and tables

Table 3. Archaeobotanical results from the studied sites.

MAL nr	P.nr	Material	Weight
20_0037_0001	P3	diffuse porous wood	3,6 mg
20_0037_0002	P4	cf. *Betula*	24 mg
20_0037_0003	P5	*Betula*	18,9 mg

Table 4. Botanical material selected for 14 C dating.

MAL nr	20_0037_0001	20_0037_0002	20_0037_0003	20_0037_0004
Prov nr	3	4	5	6
Charcoal fragments	three fragments	x	x	few fragments
Picea abies - needle fragment (spruce/ gran)		1	2	
cf. *Alnus* (alder/ alar)		2		
Alnus/Corylus (alder/ alar; hazel/ hassel)			5	
cf. *Betula* (birch/ björk)		5		
Betula (birch/ björk)			3	
cf. *Corylus avellana* (hazel/ hassel)		4		
Juniperus communis (juniper/ en)			3	
diffuse porous wood	3			
volume before flotation (L)	2	2,5	1,8	1,9
volume after flotation (ml)	20	150	75	20

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