An Early Viking Period Grave with Smiths' Tools, from Nordheim, Sogndal.
An Interim Report

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Seksjon for ytre kulturminnevern

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Cover photo - Vertical photo of the find, after initial cleaning - H.M.Roberts

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SUMMARY

The remains were accidentally discovered at the farm of Nordheim in the county of Sogn and Fjordane, whilst Leif Arne Nordheim was removing some large stone slabs from his garden for landscaping purposes.

The first objects discovered were a pair of iron tongs, a hammer and a sword. The county authorities were rapidly informed, and visited the site on 2/9/2014. The author together with Asle Bruen Olsen of the University Museum of Bergen were immediately made aware of the find, and requested to carry out a rescue excavation - which commenced on 8/9/2014.

As work progressed an exceptional number of well preserved objects were recovered - including the one-edged sword, an axe, 2 arrows, a knife, 3 hammers of various size, an anvil, smiths tongs, ember tongs, a fire rake, an ember pan, 2 draw-knives, a celt, a fire-steel, a scythe, a sickle, a draw-plate, a drill, a chisel, fragments of whetstone, fragments of a forge-stone, a pair of scissors, fragments of bone comb, and a selection of nails, possible tools, fragments and indeterminate objects (in total 200 artifacts/fragments).

This material is currently being treated at the conservation laboratory of the University Museum of Bergen. As such a full and final analysis is not yet complete. The assemblage includes weapons, blacksmiths and carpenters tools along with just a few personal items. These must represent the property of a person of some wealth, likely respected in his community. Graves with smiths tools are rare, but not extraordinary - however, the total number of objects and levels of preservation at Nordheim are quite exceptional. They are perhaps the most imposing find of this sort, in the county, for a century.

The finds were recovered from the centre of a shallow sub-circular cut into the natural sediment, within a deposit including a lot of charcoal and burnt (calcined) small bone fragments along with a number of placed stones (circa 10-30cms each in maximum dimension). The bone has is believed to be the partial remains of a human cremation (see below). Artifact typology suggests a date around 800AD, or a little before. Two radiocarbon dates are also consistent with the later part of the 8th century.

BACKGROUND

The farm of Nordheim is situated a few kilometres NW of the town of Sogndal, and the find is located at circa UTM 32 V 0394798/6791725, and at circa 345m above sea level. The find itself lies within land parcel 11/92, registered to the landholding of Nes, but now forming part of the garden of the Nordheim farmhouse.

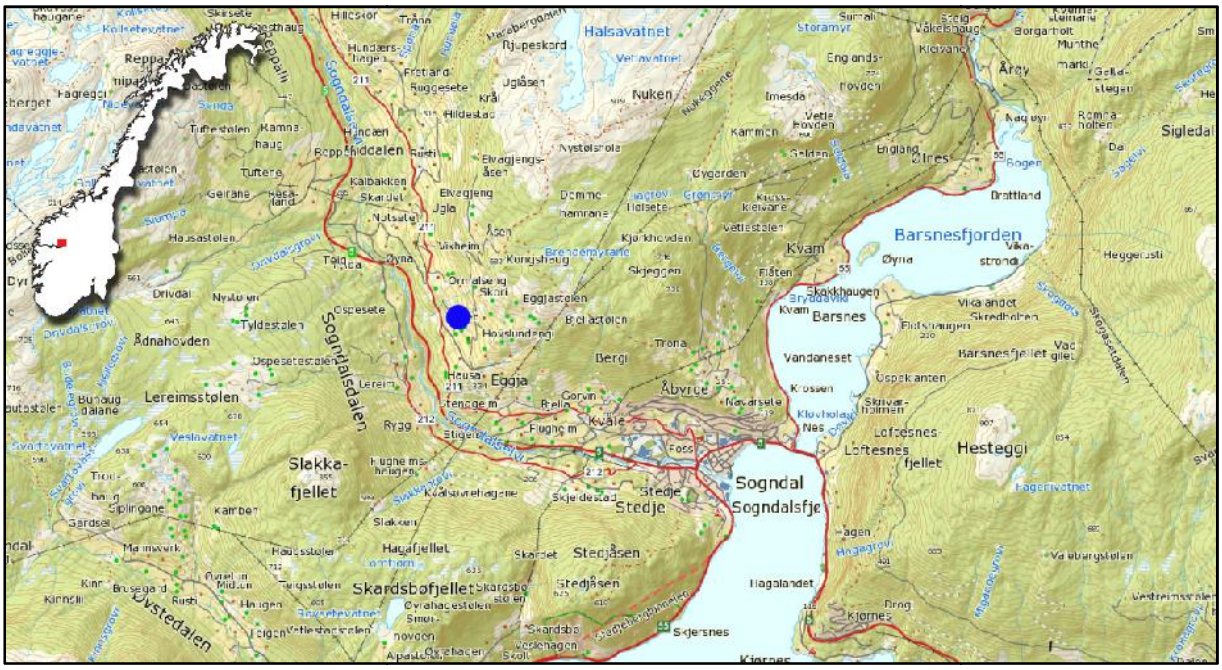

Figure 1 - Site Location (in blue)

The find spot is currently at the edge of a well maintained recreational garden, only a few metres from the farmhouse itself. The ground cover is grass turf, on a small broadly flat terrace, with the ground rising steadily to the northeast, and dropping abuptly into the valley at the southwest.

Figure 2 - Find Spot (in blue)

DISCOVERY

The find was made accidentally, by the resident Leif Arne Nordheim and his family, during the course of landscaping work to remove a number of stone slabs from the garden. The upper objects came to light immediately upon the removal of a stone slab. Whilst the antiquity of the smiths tongs could have been ambiguous, the sword was clearly of archaeological significance, and the County Authorities were immediately informed. The mechanical removal of the stone slab entailed limited truncation of a small area adjacent to the western limit of the grave, but does not appear to have compromised the grave itself. Inevitably, the removal of the slab may have shifted the location of the uppermost finds to some extent, but this appears to be at worst very limited, and no recent mechanical damage was noted.

Glenn H. Orkelbog of Sogn og Fjordane fylkeskommune visted the site on 02/09/14, and made a preliminary assessment of the find. His report is appended (Appendix 1). Asle Bruen Olsen of the University Museum of Bergen was immediately made aware of the find, and requested to carry out a rescue excavation - which commenced on 8/9/2014, with the assistance of the current author. Upon arrival, the find was covered by geotextile and tarpaulin. Removal revealed the find as described by Orkelbog. Soil conditions were dry, with loose material, tree roots and remants of grass turf amongst the visible artefacts.

Figure 3 - The find prior to excavation. Facing west - scale is 50cms.

AIMS AND METHODS

Upon discovery, the security of the find was obviously of some concern. Emergency funding was made available by the Rikisantikvariat to rapidly investigate and recover the find. Public knowledge of the discovery was controlled until the find was secured and excavation under way.

Excavation commenced with the removal of turf, topsoil and tree roots, establishing an irregular excavation area measuring in total approximately 8m². Control points were established using a Trimble S6 Total Station Theodolite, with location data derived from fixed datums provided by the local authorities. Recording of the find was conducted using the Intrasis archaeological data package, the Total Station Theodolite, sub-vertical photography for the creation of photogrammetric models, oblique digital photography, and conventional hand written records and descriptions.

Loose soils removed from the grave were selectively dry and/or wet sieved through 4mm and/or 2mm meshes. Bulk environmental samples were recovered in situ, from discreet charcoal concentrations thought least likely to be subject to turbation and contamination. Recovered objects were numbered in a simple series, extending the record begun by Orkelbog. In parallel, all finds recovered in situ were uniquely identified using the Intrasis data protocol. Excavation proceeded by means of single context excavation and recording.

Figure 4 - Detail of finds at surface - Context (001). Vertical - north is up.

RESULTS

The uppermost finds were discovered at the surface or within loose unconsolidated turbated material - Context (001) - see Figure 4. The remainder of the finds were discovered within Contextual Units (289) and (433). The layers are described below, in stratigraphic sequence.

Unit	Description
(001)	Loose non-stratifed surface finds.
(289)	Loose, medium grey brown sandy silt, including moderate quantities of burnt bone and charcoal. Turbated (tree roots). Upper part of cremation deposit.
	Occasional, small-medium sub-angular stone (up to 0.2m). Disturbed. Truncated by machine, extensive bioturbation
(433)	Firm, black sandy silt. Very frequent charcoal, frequent small fragments of burnt (calcined) bone.
	Occasional, small angular gravel, occasional sub-rounded stones up to 0.3m.
	Significant root action, more disturbed at surface
	Occasional small lenses of pale orange brown coarse sand (waterborn?)
(533)	As 433, but with slightly larger extent, becoming more diffuse/ less consolidated towards limits
(625)	Friable, pale grey to pink sandy silt at base of feature. Localised indications of rubefaction, with occasional small lenses of fine charcoal.
	Remnant of heating in situ? Outer limits slightly overlain by small quantities of yellow/orange sand and gravel - indicating compression of grave feature?

Table 1 - Context decriptions

The recorded deposits were excavated from within a shallow irregular sub-circular cut, truncating the natural ground surface. The cut measures up to 2.1m NNW-SSE and 1.8m ENE-WSW, with a maximum depth of 0.18m.

The lower most deposit (625) appears to indicate some degree of heating in situ. However, the small quantities of calcined bone and charcoal recovered, together with the very limited indications of rubefaction in deposit (625) seem to argue against an interpretation of an undisturbed cremation in situ. This is discussed further below. Furthermore, the perceived similarities in alignment of the artefacts (see below) also argue against the random processes of collapse and settling implied by a funeral pyre. Rather, it is suggested the find represents the arranged remains of a cremation, that may or may not have occured at this exact location. Prior to the extensive excavation of a much larger area around the find, it is difficult to determine which of these possibilities is more credible. There are no current plans to excavate further.

There remains the potential for further discoveries at the site - although no clear targets could be immediately defined, and no immediate threat was discerned.

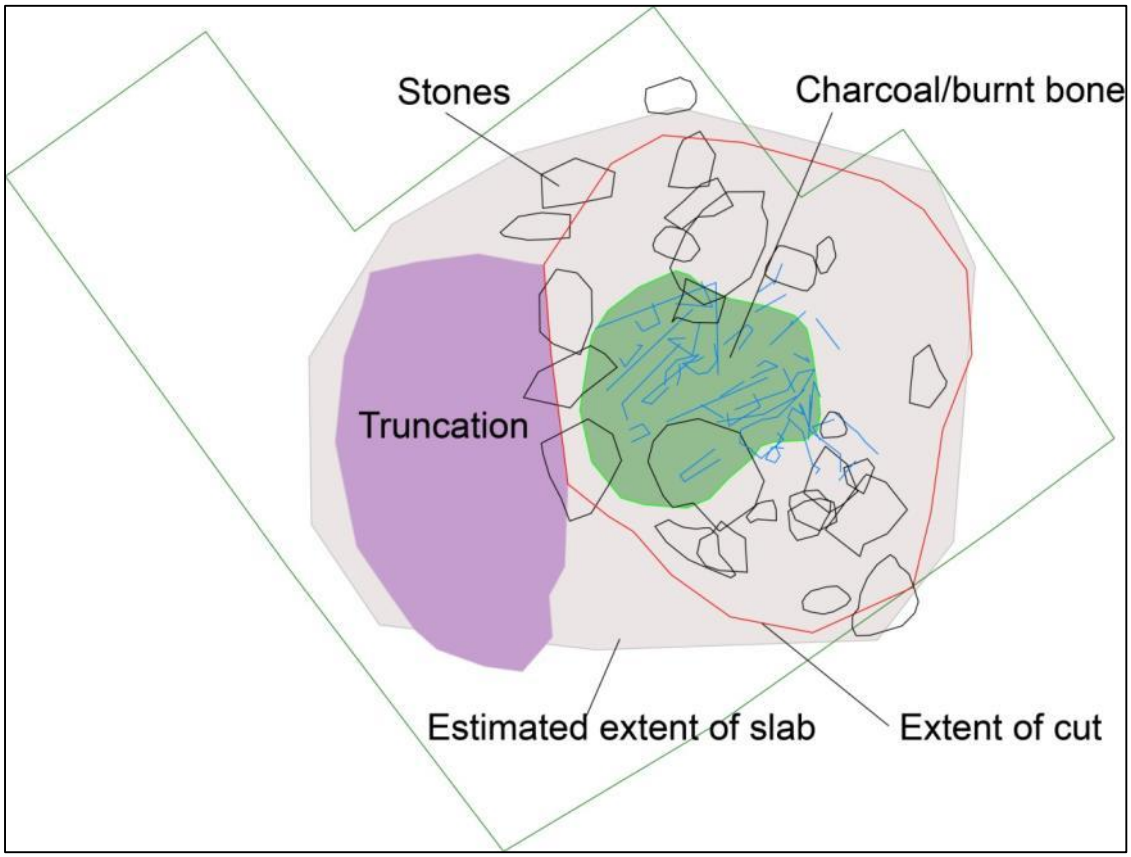

Figure 5 - Schematic of the grave - finds are indicated in blue.

Figure 6 - Excavation area, prior to removal of layer (289), at centre. Photomosaic.

Figure 7 - Detail of finds within layer (289). Photomosaic - north is up.

Figure 8 - Oblique view - facing west, scale is 40cms.

Figure 9 - Post Excavation - photomosaic, north is up.

Finds

A total of 200 artefacts, or fragments thereof, were recorded as 123 separate items. These await the completion of conservation treatment. An interim list of objects is presented below, but is subject to revision and expansion upon completion of conservation work. A selection of working photographs follows. The collection is dominated by iron artefacts, in excellent condition, but also includes objects of stone, bone, cu alloy, and glass.

In addition, sieving recovered a small quantity of burnt bones, listed as finds 124-129.

Figure 10 - Finds locations, overlain on surface photomosaic. North is up.

Table 2 - Finds

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
1	3FJ225	1	Celt	Celt	c	Iron	Petersen fig 93	1
2	3FJ229	1	Crucible fork	Digelgaffel	a2	Iron	Bøckmann s.80, fig 36	1
3	3FJ241	1	Scraper	Høvljern	c	Iron	Carpentry scraper. Petersen fig. 114	1
4	3FJ245	1	Sickle	Sigd	d	Iron	Petersen fig 83	1
5	3FJ234	1	Rotary sharpening stone	Roterande slipestein	a	Stone	Bøckmann s 77, Lønborg s.28, (Petersen fig 136 - "Roterande slipestein" ?). Refits F34, F42, F50.	2
6	3FJ205	1	Sword	Sverd	b	Iron	Single edged sword, Type H(?)	1
7	3FJ210	1	Axe	Skjeggøks	b	Iron	Bearded axe, Petersen type B(?), R559	1
8	3FJ213	1	Large anvil	Stor ambolt	a1	Iron	Petersen fig 67	1
9	3FJ231	1	Fire rake	Ildrake	a	Iron		1
10	3FJ208	1	Tongs	Tang med krumt nebb	a1	Iron	Petersen fig 62 (61)	1
11	3FJ221	1	Small sledge hammer	Slegge-hammer	a1	Iron	(smaller) Petersen fig 57	1
12	3FJ217	1	Large sledge hammer	Slegge-hammer	a1	Iron	(larger) Petersen fig 57	1
13	3FJ249	1	Chisel	Meisel	a1	Iron	Petersen fig. 71	1
14	3FJ253	1	Small anvil	Liten ambolt	a2	Iron	Petersen fig 66 (R392) and fig 67 (R393) sd.91	1
15	3FJ257	1	Handle	Skrinhank	e	Iron	See also F37	1
16	3FJ260	1	Drawplate	Trådjern/saumlo	a1	Iron	For drawing wire. Petersen fig 72/73	1
17	1FJ264	1	Arrowhead	Pilespiss	b	Iron	R539, tapered point	1
18	1F265	1	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Well preserved small whetstone. Incomplete.	1
19	1FJ282	1	Nail	Spiker	g	Iron	One nail, one possible nail/spike	2
20	1FJ283	1	Nail	Spiker	g	Iron		2
21	1FJ284	1	Nail	Spiker	g	Iron		1
22	1FJ285	1	Nail	Spiker	g	Iron		1
23	1FJ286	1	Nail	Spiker	g	Iron		1

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
24	1FJ287	1	Stretching hammer	Bretthammer	a2	Iron	Bøckmann s 79 Petersen fig 56	1
25	sieve	289	Comb	Kam	f	Bone	Very small fragment, cu alloy nail, ring/dot decor	1
26	sieve	289	Nail	Spiker	g	Iron		1
27	sieve	289	Nail	Spiker	g	Iron		1
28	sieve	289	Nail	Spiker	g	Iron		1
29	sieve	289	Nail	Spiker	g	Iron		1
30	sieve	289	Object		g	Iron	Possible nail shaft fragment	1
31	sieve	289	Nail	Spiker	g	Iron		1
32	sieve	289	Object		h	Iron	Unidentified fragments, nail heads etc?	8
33	sieve	289	Object		h	Iron	Curved flat iron strip, seemingly not a blade, no sharp edge.	1
34	sieve	289	Rotary sharpening stone	Roterande slipestein	a	Stone	Fragment of grinding stone. Refits F5, F42, F50.	2
35	3FJ315	289	Drill/bore	Skjeformet bor	c	Iron	Petersen fig. 122, R 418	1
36	3F317	289	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone	1
37	3F319	289	Handle	Skrinhank	e	Iron	Petersen fig 239 (see also 242). Casket handle??	1
38	3FJ322	289	Tool?		h	Iron	Unidentified - flat iron rod, possibly part of tool	1
39	3FJ324	289	Scythe	Ljåblad	d	Iron	(fragment of F#40?)	1
40	3FJ326	289	Scythe	Ljåblad	d	Iron	Petersen fig 88. See also F#39	1
41	3FJ334	289	Ring/band		a	Iron	Flat iron strip, bent to form ring, support for handle (eg for hammer). Slightly narrower at one side, ie slightly conical form.	1
42	1F340	289	Rotary sharpening stone	Roterande slipestein	a	Stone	Bøckmann s. 77. fragment of sharpening stone, re-used.	6
43	1FJ341	289	Object		h	Iron	Two flat plates, joined by round section rod, bent to almost parallel. 2nd loop/rod attached. For suspension?	1
44	3F342	289	Knife	Redskapkniv	c	Iron	R404, Petersen fig 107	1
45	3F344	289	Object		h	Iron	Similar to F#43, only one plate surviving, more substantial loop with double rod attached.	1

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
46	3FJ348	289	Coal shovel	Kullskuffe	a	Iron	Long handled flat pan	1
47	3F358	289	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone	3
48	3F362	289	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone	1
49	3F364	289	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone	1
50	3F367	289	Rotary sharpening stone	Roterande slipestein	a	Stone	Bøckmann s 77, Lønborg s.28,(Petersen fig 136 - "Roterande slipestein" ?) Fragment of sharpening stone. Refits F5, F34, F42.	1
51	1FJ372	289	Nail	Spiker	g	Iron		1
52	1FJ373	289	Object		g	Iron	Possible nail shaft, bent 90°	1
53	3FJ416	289	Shears	Smedsaks	a2	Iron	Bøckmann s. 75. Sheet metal shears. Petersen 65	1
54	1FJ428	289	Nail	Spiker	g	Iron		1
55	1FJ429	289	Nail	Spiker	g	Iron		1
56	1FJ430	289	Nail?	Spiker (?)	g	Iron	Tapered point, head absent	1
57	1FJ431	289	Plate		h	Iron	Small sub-rectangular iron plate, with stud attached. Function unclear.	1
58	1FJ432	289	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone Fragment of large whetstone	1
59	3FJ447	433	Tool?		c	Iron	Elongated Fe object with tang, broader body, and tapered point. Possibly a carpentry tool?	1
60	1F561	433	Whetstone	Polerstein/bryne	a	Stone	Bøckmann s. 78. Fragment of large whetstone Fragment of large Fragment of large whetstone	1
61	1FG557	433	Bead	Perle	f	Glass	Unpierced green glass, flat one side	1
62	1FJ558	433	Nail	Spiker	g	Iron		1
63	3FJ559	433	Clench bolt	Klinknagle, saum	g	Iron	Large circa 65mm total length, one square head, one rounded.	1
64	1FJ561	433	Nail	Spiker	g	Iron		1
65	3F562	433	Whetstone	Polerstein/bryne	a	Iron	Bøckmann s. 78. Fragmentary	8
66	1FJ564	433	Nail	Spiker	g	Iron		1
67	1FJ565	433	Nail	Spiker	g	Iron		1
68	3FJ566	433	Arrowhead	Pilspiss	b	Iron	R538(?) rounded point	1

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
69	3FJ573	433	Draw knife	Skavkniv, Skavjern	c	Iron	Petersen fig 1/6	1
70	1FJ578		Nail	Spiker	g	Iron		1
71	n/a	1	Strike-a-light, firesteel	Ildstål	a	Iron	Petersen fig 231	1
72	n/a	1	Handle	Skrinhank	e	Iron	See also F37, F15	1
73	n/a	1	Nail	Spiker	g	Iron		1
74	n/a	1	Spike/nail	Spiker	g	Iron	Nail shaft?	1
75	n/a	1	Object		h	Iron	Small iron plate with small nail	1
76	n/a	1	Nail head	Spiker	g	Iron	Fragmentary	1
77	n/a	1	Nail	Spiker	g	Iron		1
78	n/a	1	Nail	Spiker	g	Iron	Head and part of shaft	1
79	n/a	1	Nail?	Spiker	g	Iron	Fragments of shaft?	2
80	n/a	433	Comb	Kam	f	Iron	Tiny fragments, ring/dot decor	4
81	n/a	433	Object		h	Iron	Small flat oval plate with spikes at either end (perpendicular), spikes bent at tip.	1
82	n/a	433	Whetstone	Polerstein/bryne	a	Iron	Bøckmann s.78. Fragments of large whetstone	36
83	n/a	433	Nail	Spiker	g	Iron		1
84	n/a	433	Nail	Spiker	g	Iron		1
85	n/a	433	Nail	Spiker	g	Iron		1
86	n/a	433	Nail	Spiker	g	Iron		1
87	n/a	433	Nail	Spiker	g	Iron		1
88	n/a	433	Nail	Spiker	g	Iron		1
89	n/a	433	Nail	Spiker	g	Iron		1
90	n/a	433	Nail	Spiker	g	Iron		1
91	n/a	433	Nail	Spiker	g	Iron		1
92	n/a	433	Nail	Spiker	g	Iron		1
93	n/a	433	Nail	Spiker	g	Iron		1
94	n/a	433	Nail	Spiker	g	Iron		1

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
95	n/a	433	Nail	Spiker	g	Iron		1
96	n/a	433	Nail	Spiker	g	Iron		1
97	n/a	433	Nail?	Spiker	g	Iron	Shaft fragment	1
98	n/a	433	Nail?	Spiker	g	Iron	Shaft fragment	1
99	n/a	433	Wire/stud?		f	Cu alloy	Small, flat sub circular object, with fragment of wire	1
100	n/a	289	Object		g	Iron	Fragments - nail heads etc?	9
101	n/a	289	Nail	Spiker	g	Iron		1
102	n/a	289	Nail	Spiker	g	Iron		1
103	n/a	289	Nail	Spiker	g	Iron		1
104	n/a	289	Nail	Spiker	g	Iron		1
105	n/a	289	Nail	Spiker	g	Iron		1
106	n/a	289	Nail	Spiker	g	Iron		1
107	n/a	289	Nail	Spiker	g	Iron		1
108	n/a	289	Nail	Spiker	g	Iron		1
109	n/a	289	Nail	Spiker	g	Iron		1
110	n/a	289	Nail	Spiker	g	Iron		1
111	n/a	289	Nail	Spiker	g	Iron		1
112	n/a	289	Nail?	Spiker	g	Iron		1
113	n/a	289	Nail?	Spiker	g	Iron		1
114	n/a	433	Plate		h	Iron	2 small flat sub-rect plates - function unknown	2
115	n/a	433	Rove		g	Iron	Rhomboidal	1
116	n/a	433	Nail	Spiker	g	Iron	plus fragments - from PK552	1
117	n/a	433	Object		h	Wood	Fragment of mineralised wood	1
118	n/a	433	Rod		h	Iron	Tapered flat rod - possibly tang fragment?	1
119	n/a	433	Nail	Spiker	g	Iron	Small nail head	1
120	n/a	433	Nail	Spiker	g	Iron		1
121	n/a	433	Nail	Spiker	g	Iron	Shaft fragment	1
122	n/a	433	Nail	Spiker	g	Iron	Shaft fragment	1

F_No	IS_No	Unit	Type_EN	Type_NO	Class	Material	Comment	Quant
123	n/a	433	Object		g	Iron	Unidentified fragments, nail heads etc?	5
124	n/a	289	Cremated bone		n/a	Bone	53.3g of burnt bone fragments	
125	n/a	433	Cremated bone		n/a	Bone	4.85g of burnt bone fragments	
126	n/a	433	Cremated bone		n/a	Bone	46.6g of burnt bone fragments	
127	n/a	533	Cremated bone		n/a	Bone	7.04g of burnt bone fragments from PK 568	
128	n/a	533	Cremated bone		n/a	Bone	0.34g of burnt bone fragments from PK 552	
129	n/a	u/s	Cremated bone		n/a	Bone	16.6g of burnt bone fragments	

Where appropriate, references in Table 2 are to Petersen (Petersen, Jan. - *Vikingetidens redskaper* - Oslo, Dybwad, 1951) and/or Rygh (Rygh, Oluf. - *Norske Oldsaker* - Kristiania 1885), and/or Bøckmann (Bøckmann, Jan - *"Smedverktøy" fra norske jernaldergraver* Hovedfagsavhandling i arkeologi, IAKH, Universitetet i Oslo, 2007)

The preservation of the finds is variable, but generally excellent. Iron objects appear to have suffered very little corrosion or encrustation, and seem to retain a high metal content (prior to more definitive study during the conservation process). Stone artefacts on the other hand are in a more variable condition. Some of the larger pieces are well preserved (for instance F5, a rotary sharpening stone) - whilst the whetstones (for instance F82) are highly fragmentary. A single cu alloy object (F99) exhibits corrosion, whilst a fragment of bone comb (F25) is also in poor condition.

The assemblage appears to be dominated by equipment associated with smithying, but also contains tools associated with carpentry, agricultural equipment, a number of weapons, and a very few small fragments of items of personal adornment. These are accompanied by a large number of nails, and unidentified items - the purpose of which remains opaque.

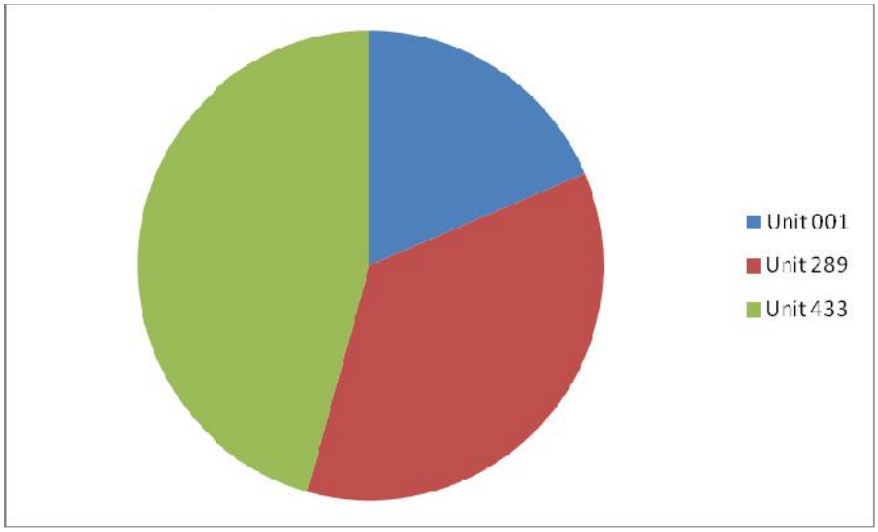

Figure 11 - Finds Totals by Layer. Unit 001 = 37, Unit 289 = 71, Unit 433 = 91

The attempt is also made to examine distribution of the objects by functional classification. Those classes (see Table 2) are as follows;

a) Objects related to metal working
Certain artifacts in this category are (at this stage tentatively) subgrouped as blacksmiths tools (A 1) and "fine" smiths tools (A 2)
b) Weapons
c) Objects related to carpentry
d) Objects related to agriculture activity
e) Other objects identified by function (i.e. handles)
f) Personal equipment
g) Nails/clench bolts
h) Object of iron not identified by function

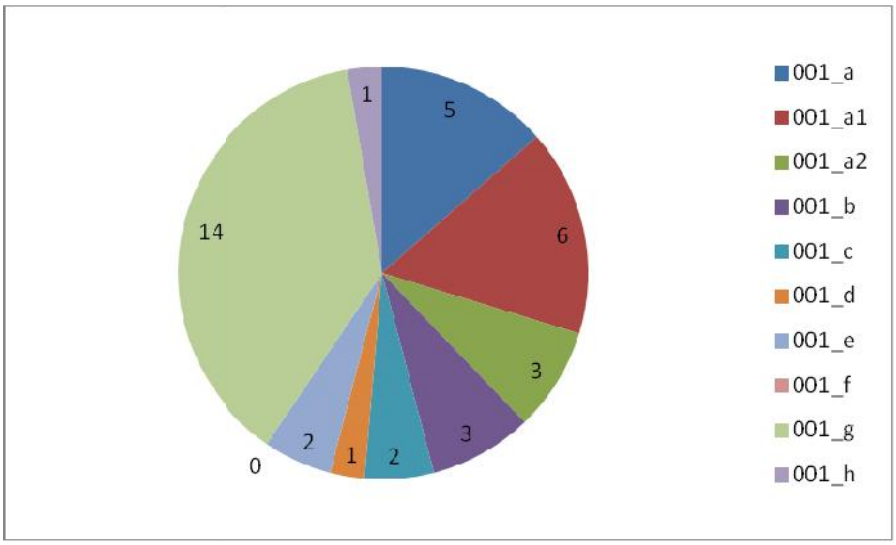

Figure 12 - Finds Totals Unit 001, by functional class

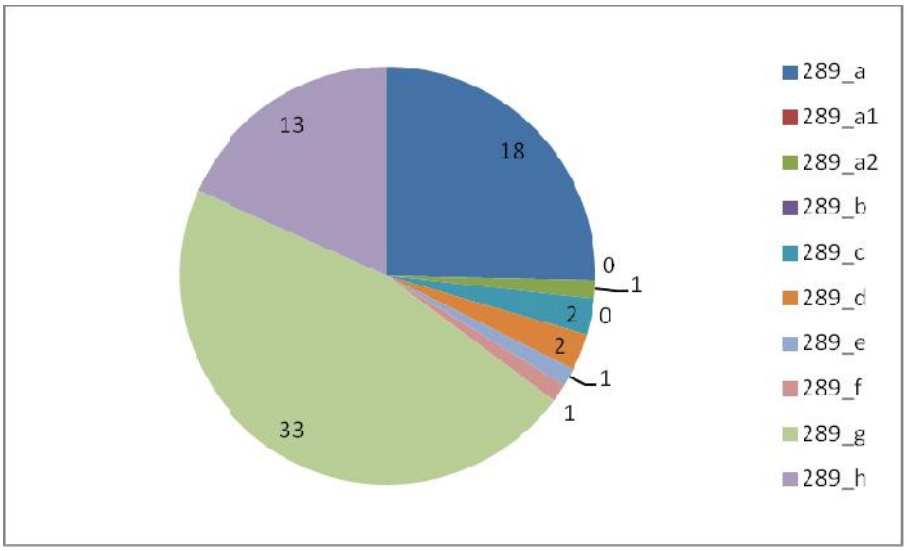

Figure 13 - Finds Totals Unit 289, by functional class

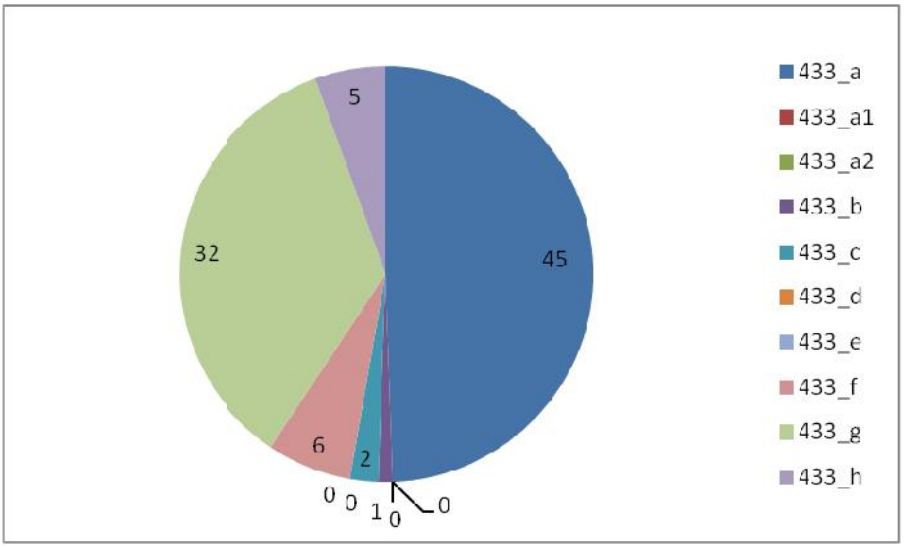

Figure 14 - Finds Totals Unit 433, by functional class

It is clearly seen that there is significant variance in the number and function of artifacts by depositional unit. However, the interpretation of the significance of this data requires further work. It is also seen that nails and whetstone fragments tend to overwhelm the other data classes.

With these objects excluded, a simplified analysis may also be presented, although of course greatly reduces the number of objects considered.

For example, this reduced set maybe classified as follows;
a) - metal working (smithing) tools - iron
b) - weapons - iron
c) - carpentry tools - iron
d) - agricultural tools - iron
e) - other (excluding nails)

	a	b	c	d	e	Total
Layer 001 (level 1)	12	3	2	1	3	21
Layer 289 (level 2)	2	0	2	1	16	21
Layer 433 (level 3)	1	1	2	0	7	11
Total	15	4	6	2	26	53

Table 3 - Reduced Finds Set by Class and Layer

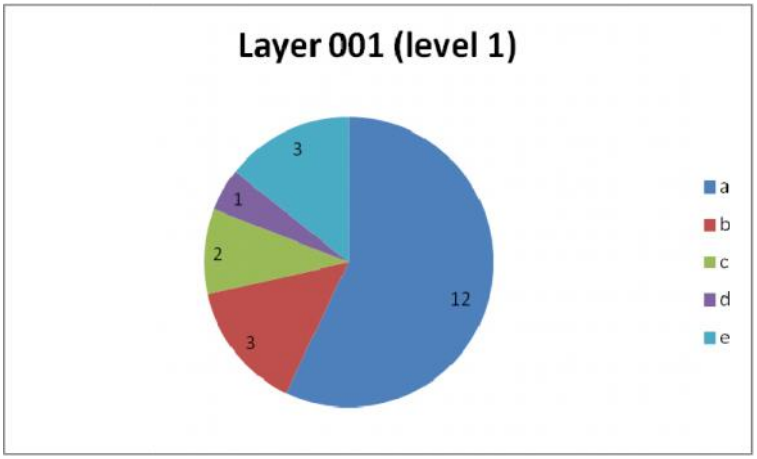

Figure 15 - Reduced Finds Set, Layer 001 by functional class

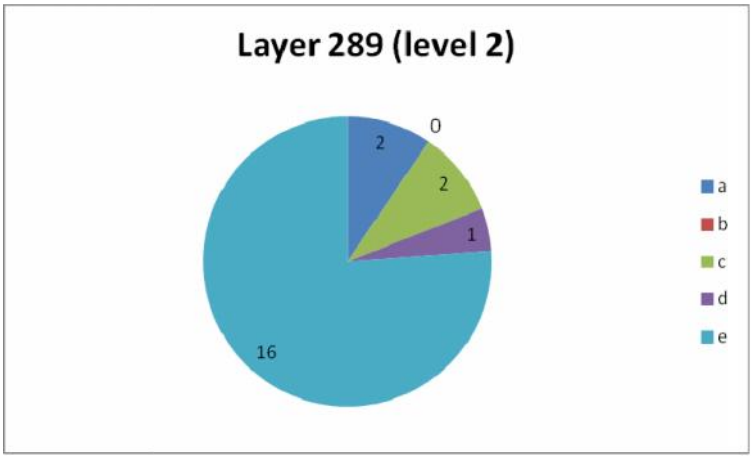

Figure 16 - Reduced Finds Set, Layer 289 by functional class

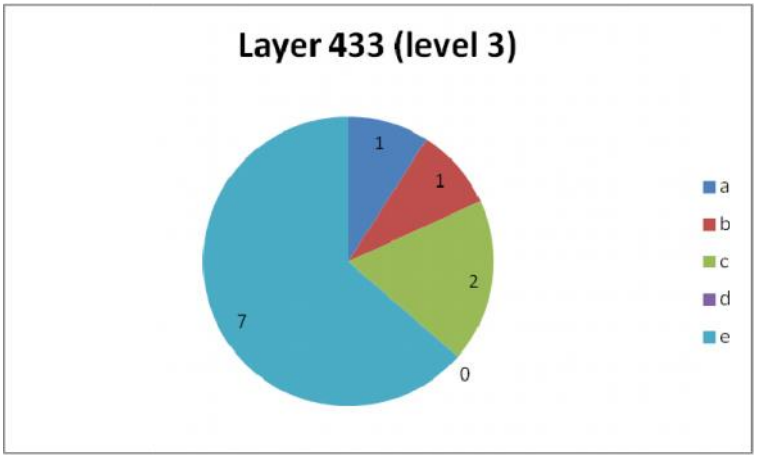

Figure 17 - Reduced Finds Set, Layer 433, by functional class

This alternative presents a somewhat different picture. It perhaps suggests that although the uppermost layer (Layer 001) contains a smaller number of finds in total (see Figure 11), it is precisely these finds that offer most promise in terms of understanding the perceived or displayed status of the individual.

The alignment and placing of the objects (see Figure 10) appears to favour a northeast/southwest alignment (perpendicular to the site contour) but does also include items with a northwest/southeast orientation (parallel to the site contour), particularly at lower levels. Whilst these alignments do seem to be deliberate and non-accidental, their significance remains unknown. For instance, there is no clear association between alignment and perceived function - the northeast/southwest alignment contains items identified as smithying tools, carpentry tools, and weapons.

It may be appropriate to regard these objects as the varied possessions of an individual who carried out multiple roles within his society. A smith who is also a farmer, also engaged in other crafts, and who also possesses weapons - either to meet some military obligation, or for purposes of status. Whilst the gender of the individual cannot (yet) be discerned from the calcined bone fragments, it seems perverse to argue for a female identity in this case. Analysis of the bone fragments remains to be completed.

We may also view the great majority of these objects not only as the property of a smith, but also as the products of the same smith. That of course remains unproven, and it is thought unlikely that the sword (for instance) was produced by the deceased.

The deposition of this assemblage represents a substantial investment in the funerary ritual and contains not one or a few but many items of high value. The inclusion and placement of these objects must be seen as a strong assertion of the status of the individual - and the internment as an act of performance intended for a somewhat broader group that immediate family.

Figure 18 - Find F8 - Anvil. Scale is 10cms

Figure 19 - Find F7 - Axe. Scale is 10cms

Figure 20 - Find F12 - Large hammer. Scale is 10cms

Figure 21 - Find F16 - Drawplate. Scale is 10cms

Figure 22 - Find F17 - Arrow. Scale is 10cms

Figure 23 - Find F6 (part) - Hilt of Sword Scale is 10cms.

Figure 24 - Find F53 - Shears in situ Scale is 30cms

Figure 25 - Find F69 - Drawknife. In situ. Scale is 30cms

Figure 26 - Find F10 - Smith's Tongs. Scale is 20cms

Figure 27 - Find F6 after initial conservation (sand blasting)

Figure 28 - Rotary grinding stone (F5, F34, F42, F50) after initial conservation

Figure 29 - Finds after initial conservation (sand blasting).
Clockwise from bottom centre - F14, F8, F10, F12, F11, F13.

Figure 30 - Crucible fork (F2) after initial conservation (sand blasting).

Radiocarbon dating

Two radiocarbon dates have been obtained from 2 samples from Layer 433, towards the base of the grave fill. Full details are appended (Appendix 2), summary data is given below.

SAMPLE : NES1
Conventional Radiocarbon Age - 1210 +/- 30 BP
2 SIGMA CALIBRATION : Cal AD 715 to 745 (Cal BP 1235 to 1205) and Cal AD 765 to 890 (Cal BP 1185 to 1060)

SAMPLE : NES2
Conventional Radiocarbon Age - 1190 +/- 30 BP
2 SIGMA CALIBRATION : Cal AD 725 to 740 (Cal BP 1225 to 1210) and Cal AD 770 to 895 (Cal BP 1180 to 1055) and Cal AD 925 to 940 (Cal BP 1025 to 1010)

As shown, the 2 dates are very similar - a difference within the error margins. Furthermore, they are wholly consistent with a date of circa 800AD, as suggested by the artefact typology.

Wood Indentification

Charred wood from sample PK552/Context 433 has been indentified by Lísabet Guðmundsdóttir of Fornleifastofnun Íslands. Her report is appended (Appendix 3).

Of 175 identifiable fragments, 173 were identified as Alnus sp - either black or grey Alder. Alder is amongst the wood varieties that may be coppiced for the production of charcoal, and requires plentiful water.

The use and characteristics of alder are further discussed in Appendix 4.

Palynology and Macrofossils

Three samples of charred material from discreet concentrations within Context 433 have been analysed by Anette Overland of the University Museum of Bergen. Her report is appended (Appendix 5).

The content of the samples is likely be synchronous with or older than the grave deposits. The result of the analyses generally indicates an open agriculture landscape in the area when the burial took place, characterized by grazing, fodder gathering and perhaps cereal cultivation (barley - *Hordeum vulgare*). The presence of Barley may also be associated with the funerary ritual. The presence of grey alder (*Alnus incana)* is also noted, in concordance with the charcoal evidence (see also Appendices 3 and 4).

Bones

Systematic sieving of the excavated deposits recovered a quantity of burnt/calcined bone. The total weight of the bones is 128.73g. This is approx. 10 % of the average weight of bones left after the cremation of an individual (according to Østigård, T. 2007. Transformatøren - ildens mester I jernalderen, pg. 80. Gøteborg). Only a portion of the bones were deposited in the grave. This is a general pattern in Viking age cremations (*"branngraver*") (Østigård pg. 80).

The bones fragments have been analysed, and include human remains. Full detail follows in Appendix 6. The summary conclusions are as follows:

> "Based on the identifications, weight and number of burn bones from the grave we can conclude that these represent one adult individual. A lower jaw fragment (mandibula) show that the deceased had the teeth intact at the time of cremation (the teeth themselves are not preserved in the sample) . This indicates that the person was not very old"
> *(Email dated 26.04.2016 from Karin Hufthammer, Department of Natural History, University Museum of Bergen)*

DISCUSSION[1]

The excavation gives detailed information about the construction of the grave and the placing and arrangement of the grave goods, which seems to be intentional and not accidental. Even more intriguing is the number and variety of smithing tools and their positions and alignment in relation to other objects in the grave, clearly reflecting a strong intention of the living to underline metalworking skills as an important element in the burial ritual.

These empirical aspects of the grave will be the point of departure for further research with a focus on two main questions: Can the structural features of the grave add new knowledge to our understanding of burial rituals and mortuary practice in the Late Iron Age, and how can the grave contribute to the ongoing debate about the significance of smithing tools in graves, a debate which today questions the traditional interpretation of graves with smithing tools as simply "smiths' graves".

An attempt to illuminate these questions will be based on a detailed functional and intra-contextual analysis of the grave content and a regional comparison of other graves from the Late Iron Age, with a specific focus on cremation graves and graves with metalworking tools.

The grave visualises at least two stages in the death ritual, first cremation and then the final burial ritual by deposition of grave goods added after the cremation. It contained 90 scattered iron nails of which many are visibly burnt, fragments of a fire cracked bone comb and a partly melted glass bead, suggesting that the dead was cremated in a wooden coffin with clothes and some small personal adornments.

The object and layer stratigraphies of the grave indicates that a circular pit was dug, and that the artefacts were carefully deposited from bottom to top in parallel to the infilling of residual sediment from the cremation. From the functional composition of the artefacts and their careful arrangement it is appropriate to regard the deceased as a person related to metalworking.

The Nordheim grave was undisturbed, and stands out as the grave context with the so far largest number and variety of blacksmithing tools in Western Norway.

Asle Bruen Olsen
University Museum, UoB

Howell Magnus Roberts
University Museum, UoB

Randi Barndon
AHKR, University of Bergen

[1] This discussion derives from Olsen, Roberts and Barndon, 2015

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APPENDIX 1

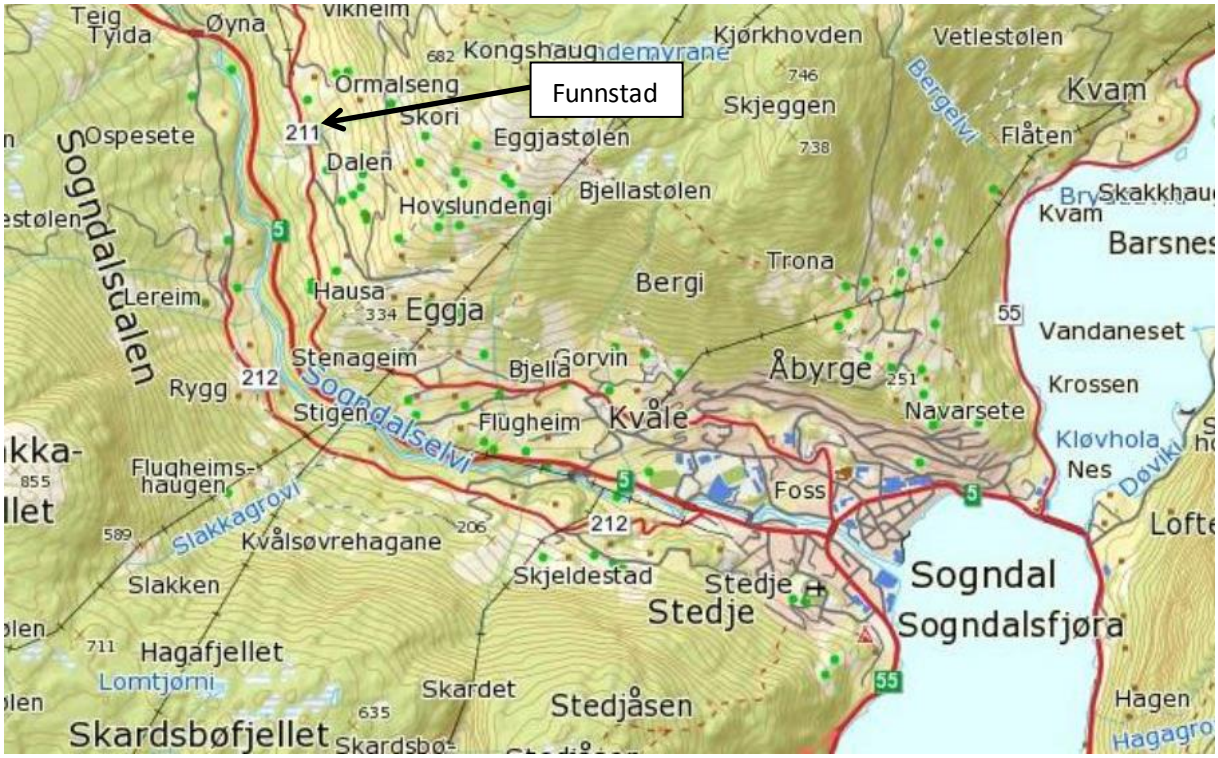
Smedgrav vikingtid - Sogndal kommune – Nordheim gbnr. 11/92

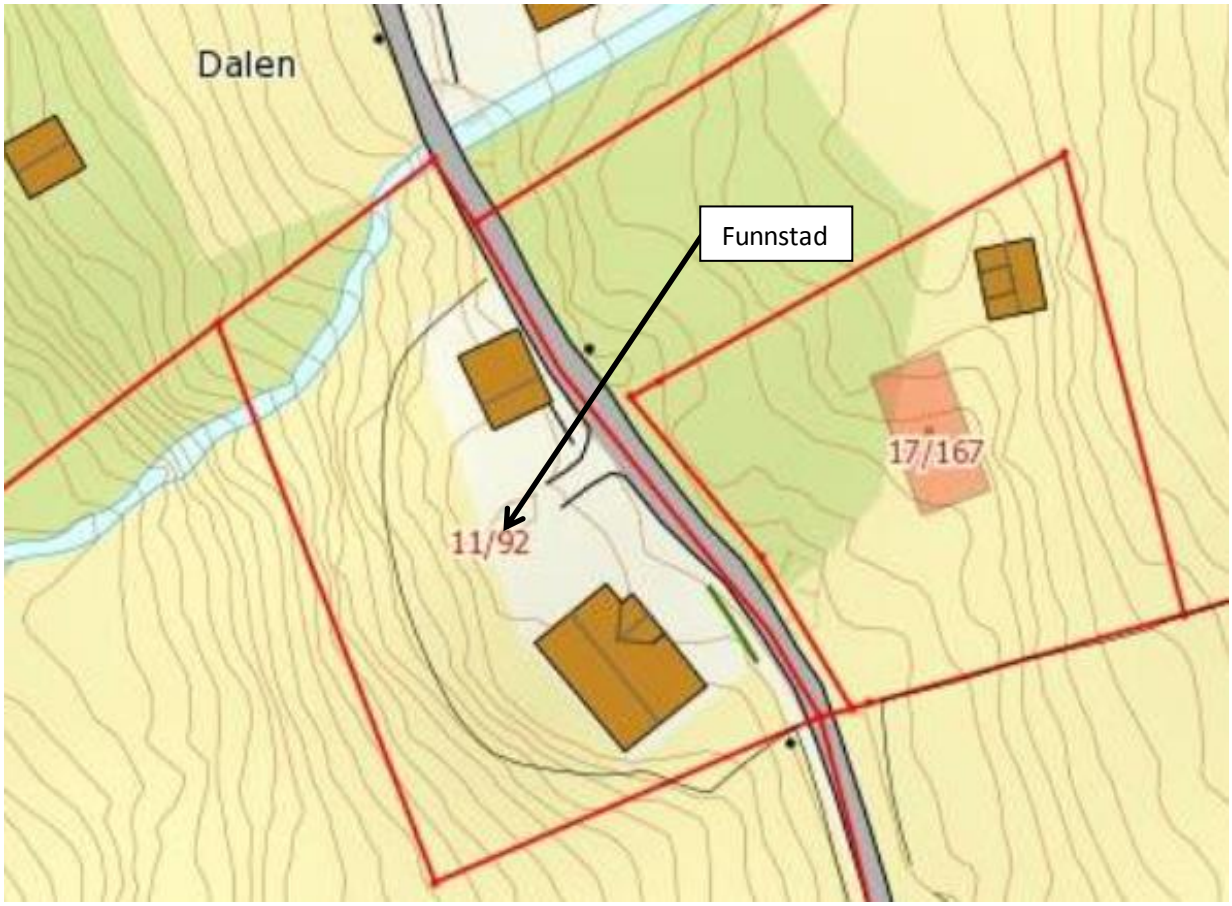
Funnstad

Grava ligg på garden Nordheim ikkje langt frå funnstaden til Eggjasteinen. Tomta er utskilt frå garden og har eige gbnr. 11/92. Funnstaden har koordinatane UTM **32V0394798/6791725**. Frå Sogndal køyrer du gamlevegen (Dalavegen) ca. 4 kilometer frå rutebilstasjonen. Ta til venstre når skiltet til Eggum synleggjer seg. Frå krysset ved Eggumskiltet køyrer du 182 meter gjennom eit lite byggefelt før du tek første avkøyrsel til venstre. Føl grusvegen oppover 380 meter så er du framme. Funnstaden ligg då godt synleg på nedsida av vegen.

Funnstaden ligg på toppen av ein flate som stikk seg ut i frå den omliggjande hellinga. Flata har vorte noko utfylt i sør samband med oppføringa av bustadhuset. Som følgje framstår flata som større en kva den opphavleg har vore. Jamfør grunneigar Leif Arne Norheim bestod funnstaden av delvis attgrodd og ulendt beitemark når han kjøpte tomta.

Funnstaden er i dag grasplen og ein del av hagen til eigedommen.




Dalen
Funnstad
17/167
11/92

Bakgrunn for funnet

Leif Arne Nordheim ville fjerne det han oppfatta som større steinar som låg nett under grasmatta og som var til bry når plenen skulle klippast. Med traktor vart fyrst 2-3 større steinheller fjerna i område sør for, men inntil funnstaden av grava. Under desse hellene var det ikkje nokre direkte indikasjonar på at det skulle vere gravfunn i område.

Ved fjerninga av ei stor steinhelle, som låg delvis synleg i dagen, fann Nordheim ein hammar. Han stogga gravinga for å ta hammaren nærare i augesyn. Det var då han påviste dei øvrige gjenstandsfunna i grava. Gjenstandane låg i eit tynt jordsjikt like oppunder steinhella.

Han tok gjenstandane ut men la dei attende på sin opphavlige plassering etter oppmoding frå Berit Gjerland.

Gravfunnet

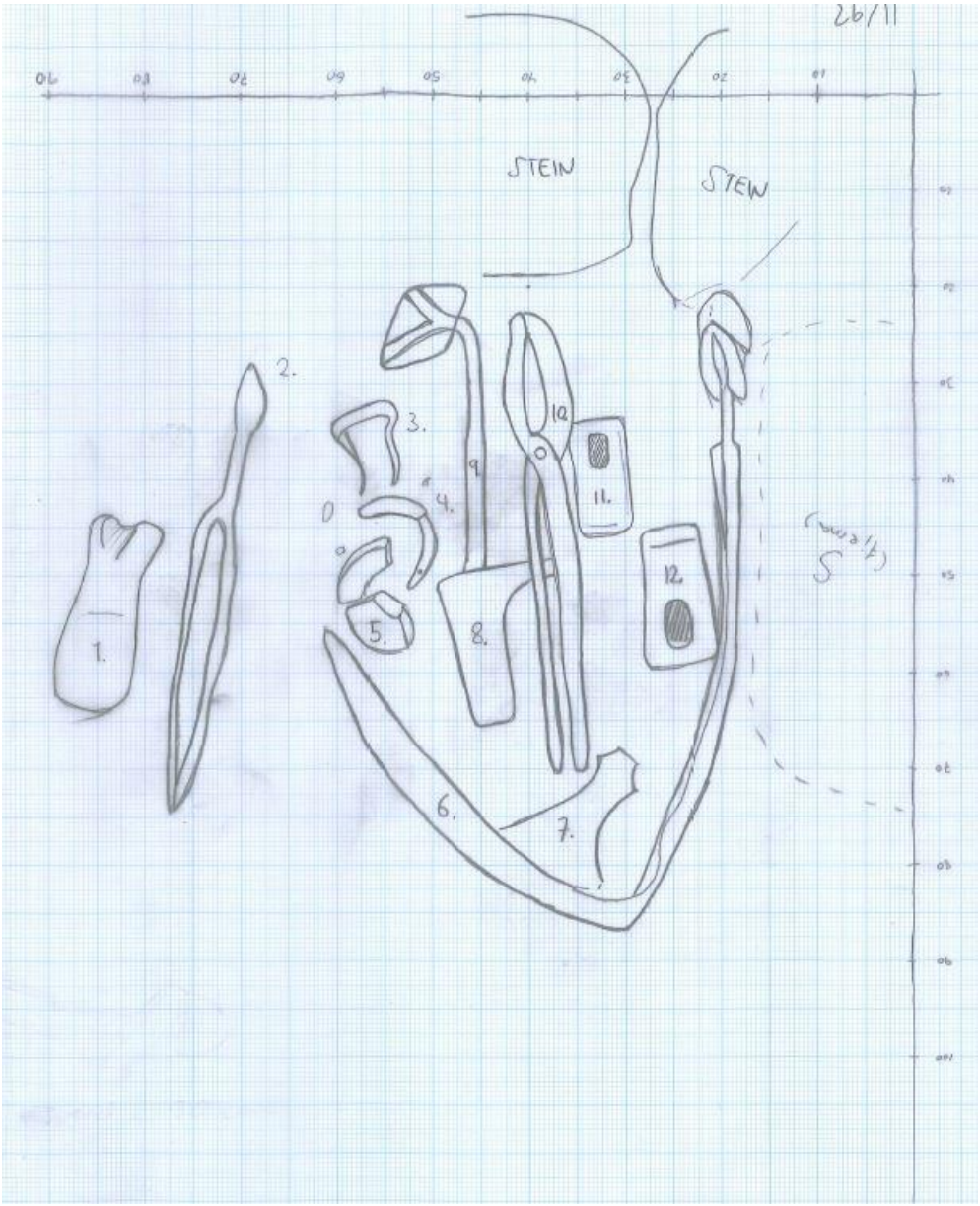
Steinhella som dekte grava

Glenn Heine Orkelbog synfarte funnstaden den 02.09.2014. Gjenstandane ligg framme i dagen under ein presenning.

Grava ligg orientert i lengderetninga mot NNA/VSV. Grava er kantsett med steinar. Storleiken er på grava er på om 90x90 cm. Gjenstandane ligg i toppen. Massane i grava inneheld trekol og brend bein, og skil seg markant frå den omliggjande lysare matjorda.

Hellene som dekte plassen og den aktuelle hella som dekte sjølve gravfunnet er lagt til sides. Hella som dekte grava er uvanleg stor og måler 140x130 cm. Tjukkleiken er på mellom 30-40 cm.

12 gjenstandar er synlege i grava;



1. Holkøks: 17 cm lang. Øksa ligg litt utanfor sjølve gravkammeret, mest truleg som følgje av forskyving når hella vart fjerna.
2. Avlang gjenstand om lag 45 cm lang. Spiss i eine enden og forma som ein stemmegaffel i andre enden. Truleg ein smedreiskap.

3. Boga metallgjenstand, mogeleg høvel som endar i to klør som kan ha fungert som feste for eit handtak av tre.
4. Sigd/ljåblad, knekt i tre delar. Bladet er om lag 1,5 cm i breidda.
5. Halvmåneforma slipestein i ein fin sandsteinstype. Knekt på midten.
6. Eineggja sverd mogeleg av eldre H – type. Bladet er om lag 90 cm langt. Sverdet er bøygd for å få plass nedi grava
7. Skjeggøks. God stand. Enden på «skjegget» kan vere knekt av.
8. Ambolt i jern.
9. Eldrake. 30-40 cm lang. Handtak i eine enden og ei fastnagla halvmåneforma plate i andre enden.
10. Smedtang. God tilstand. Om lag 45 cm lang.
11. Liten hammar. 13x7 cm.
12. Stor hammar. 15x10 cm.

I tillegg førekjem det små jernnaglar spreidd kring om i massane.

Sjølv om ein del av gjenstandane er tekne ut og no lagt til bake att vurderer eg tilstanden på gjenstandar og på funnsituasjonen som god. Det er god mogelegheit for å gjere fleire gjenstandsfunn nedover i massane.

Funna ligg framme i dagen berre tildekt av ein presenning. Dei bør derfor samlast inn så snart som mogeleg. Dersom de stiller i Sogndal i løpet av måndagen vil eg og Eva Moberg møte dykk der.

Mvh Glenn H. Orkelbog

Sogn og Fjordane fylkeskommune

415 30 612

APPENDIX 2

Beta Analytic Inc.
4985 SW 74 Court
Miami, Florida 33155 USA
Tel: 305 667 5167
Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Consistent Accuracy . . .
. . . Delivered On-time

September 30, 2014

Dr. Asle Bruen Olsen
Universitetet i Bergen
Bergen Museum, SFYK
Postboks 7800
Bergen, N-5020
Norway

RE: Radiocarbon Dating Results For Samples NES1, NES2

Dear Asle:

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO-17025 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO-17025 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood

Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Asle Bruen Olsen

Report Date: 9/30/2014

Universitetet i Bergen

Material Received: 9/23/2014

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 391017	1220 +/- 30 BP	-25.7 o/oo	1210 +/- 30 BP
SAMPLE : NES1			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal AD 715 to 745 (Cal BP 1235 to 1205) and Cal AD 765 to 890 (Cal BP 1185 to 1060)			
Beta - 391018	1180 +/- 30 BP	-24.3 o/oo	1190 +/- 30 BP
SAMPLE : NES2			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal AD 725 to 740 (Cal BP 1225 to 1210) and Cal AD 770 to 895 (Cal BP 1180 to 1055) and Cal AD 925 to 940 (Cal BP 1025 to 1010)			

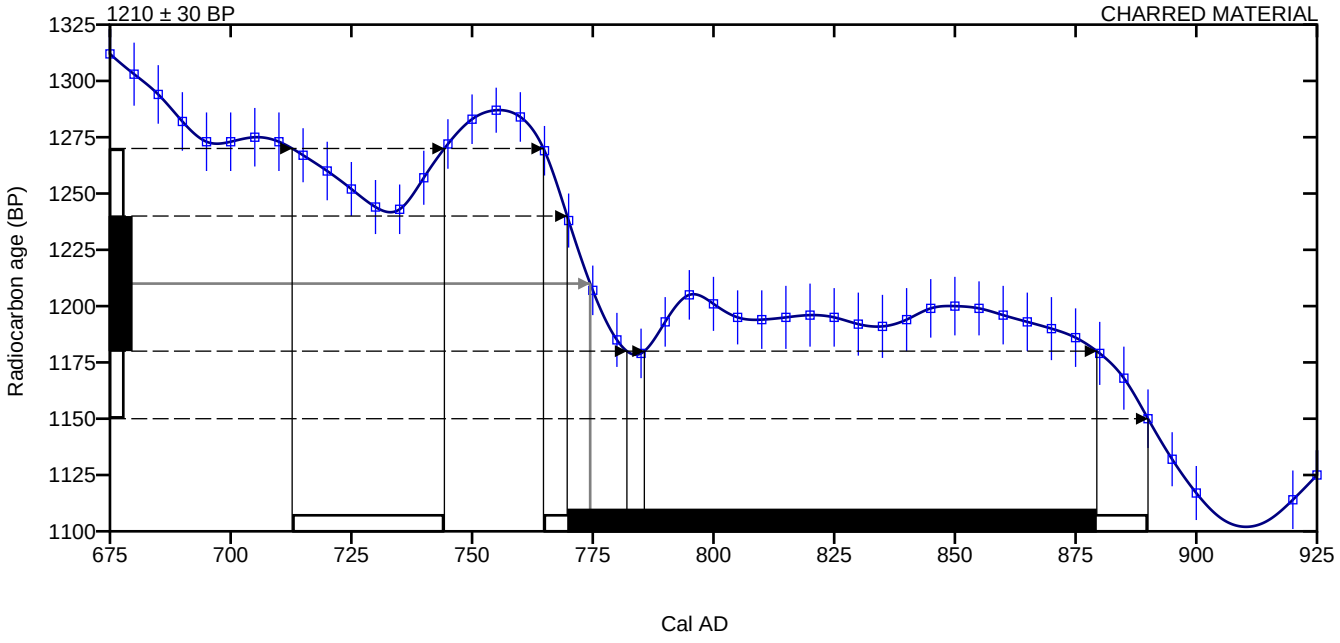
Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -25.7 o/oo : lab. mult = 1)

Laboratory number	**Beta-391017**
Conventional radiocarbon age	**1210 ± 30 BP**
2 Sigma calibrated result **95% probability**	**Cal AD 715 to 745 (Cal BP 1235 to 1205)** **Cal AD 765 to 890 (Cal BP 1185 to 1060)**
Intercept of radiocarbon age with calibration curve	Cal AD 775 (Cal BP 1175)
1 Sigma calibrated results 68% probability	Cal AD 770 to 880 (Cal BP 1180 to 1070)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

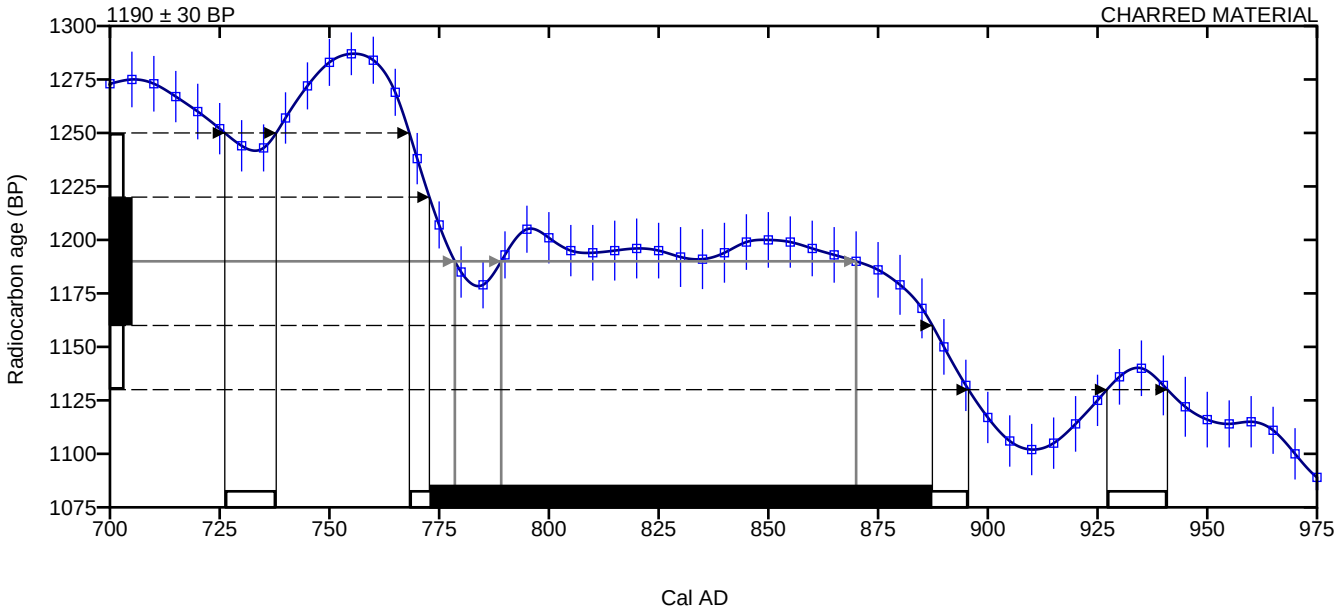
References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0– 50,000 years cal BP. Radiocarbon 55(4):1869– 1887.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -24.3 o/oo : lab. mult = 1)

Laboratory number	**Beta-391018**
Conventional radiocarbon age	**1190 ± 30 BP**
2 Sigma calibrated result 95% probability	**Cal AD 725 to 740 (Cal BP 1225 to 1210)** **Cal AD 770 to 895 (Cal BP 1180 to 1055)** **Cal AD 925 to 940 (Cal BP 1025 to 1010)**
Intercept of radiocarbon age with calibration curve	Cal AD 780 (Cal BP 1170) Cal AD 790 (Cal BP 1160) Cal AD 870 (Cal BP 1080)
1 Sigma calibrated results 68% probability	Cal AD 775 to 885 (Cal BP 1175 to 1065)



Database used

INTCAL13

References

Mathematics used for calibration scenario

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References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0– 50,000 years cal BP. Radiocarbon 55(4):1869– 1887.

APPENDIX 3

FORNLEIFASTOFNUN ÍSLANDS
SJÁLFSEIGNARSTOFNUN

Wood identification on charred wood (A433/PK552) from a Viking age grave in Nes (Nordheim), Sogndal, Sogn og Fjordene, Norway.

In all 175 charcoal pieces were identified to genus level. Of 175 fragments 173 were identified as alder sp. (*alnus sp.*), either black alder (*alnus glutinosa*) or grey alder (*alnus incana*), but these two species can not be differentiated anatomically. The other two fragments were identified as willow sp. (*salix sp.*) and pine sp. (*pinus sp.*). Both genera are easely distinguishable from alder sp. (*alnus sp.*) especially the pine (*pinus sp.*) fragment which is a conifer while all other fragments were from decidous trees.

Identification	Identification No	Quantity
Alnus sp.	Or sp.	173
Pinus sp.	Furu sp.	1
Salix sp.	Viere sp.	1

Not all fragments were identifiable due to small size. In some instances the fragments originated from the outermost layer of the tree where there are no characteristics which can be used for identification. However 90% of the sample was identified.

Lísabet Guðmundsdóttir
Archaeologist
e-mail: lisabet@instarch.is
Reykjavík, 2014

APPENDIX 4

Appendix 4

The use and characteristics of alder
Lísabet Guðmundsdóttir

In Norway two species of alder (*Alnus sp.*) grow naturally, black alder (*Alnus glutinosa*) and grey alder (*Alnus incana*).[1] These two species cannot be differentiated anatomically in a microscope.[2] In Norway black alder *(Alnus glutinosa)* has an optimal area along the western coast of Norway. It is typically found in waterlogged soils along streams and brooks, in wet or moist soils on flushed hillsides and on waterlogged soils in flat seasonally flooded sites. In western Norway it is also found in hillsides in not particularly wet sites.[3] Grey alder (*Alnus incana*) is not as dependent on wet soils as black alder (*Alnus glutinosa*), but prefers fresh mull humus soils, however it can grow in dryer less nutritious soils in higher altitudes.[4] Growth rates of alders (*Alnus sp*.) are fast for the first 7 – 10 years but then slows down rapidly. Both alder species are short lived trees which can live up to 60 to 70 years.[5] Black alder and grey alder were commonly used in Norway as fodder. The alder trees were coppiced or pollarded. The young robust twigs of alder were used for fodder or leaves plucked off the trees and dried, the branches were harvested in late summer or autumn but the trunks were often left standing until winter, when they were chopped for firewood. This was done about every 5 -7years or so to.[6] The timber of alder is soft, weak and contains high water content, it therefore requires long seasoning before it will burn freely. Due to its softness it was often used for household items such as bowls and spoons and was especially favored for clogs since it was easily turned and carved. Alder species make however excellent charcoal and was preferred over other species due to high calorific value.[7] It is therefore more likely that ready made charcoal was used for the cremation in Nes rather than freshly cut wood.

[1] Lid, J., Lid, D. T., 1994. pp. 77-78.
[2] Schweingruber, F. 1990. pp. 74.
[3] Fremstad, E., 1983. pp. 393.
[4] Kullman, l. 1992. pp. 445.
[5] Claessens. H. Et al. 2010. pp. 163.
[6] Austad, I. Hauge, L. 2006. pp. 4-7.
[7] Edlin, H. L. 1973. pp. 23-24.

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APPENDIX 5

Paleobotanisk rapport fra
Avdeling for naturhistorie, Universitetsmuseet, Universitetet i Bergen

Anette Overland

Paleobotaniske analyser av gravkontekst 433, Nes, Sogndal kommune, Sogn og Fjordane

Nr. 2 - 2015

Innhold

Innledning

I forbindelse med arkeologisk undersøkelse av en grav på Nes i Sogndal, ble det tatt inn tre makrofossilprøver til pollen- og makrofossilundersøkelse, 1PM469, 1PM503 og 1PM551 (Fig. 1). Makrofossilprøvene ble tatt inn fra under «in-situ» steiner i gravens sentralområde, fra kontekst 433 (se arkeologisk rapport, Fig. 1). Graven ble radiologisk datert til overgangen merovingertid - vikingtid; 1220 ± 30 BP, cal. AD 715–890 (Beta 391017); og 1180 ± 30 BP, cal. AD 725–940 (Beta 391018). Den arkeologiske frigivningsundersøkelsen ble utført av personale ved Seksjon for ytre kulturminnevern ved Universitetet i Bergen sommeren 2014. Prosjektansvarlig var Asle Bruen Olsen.

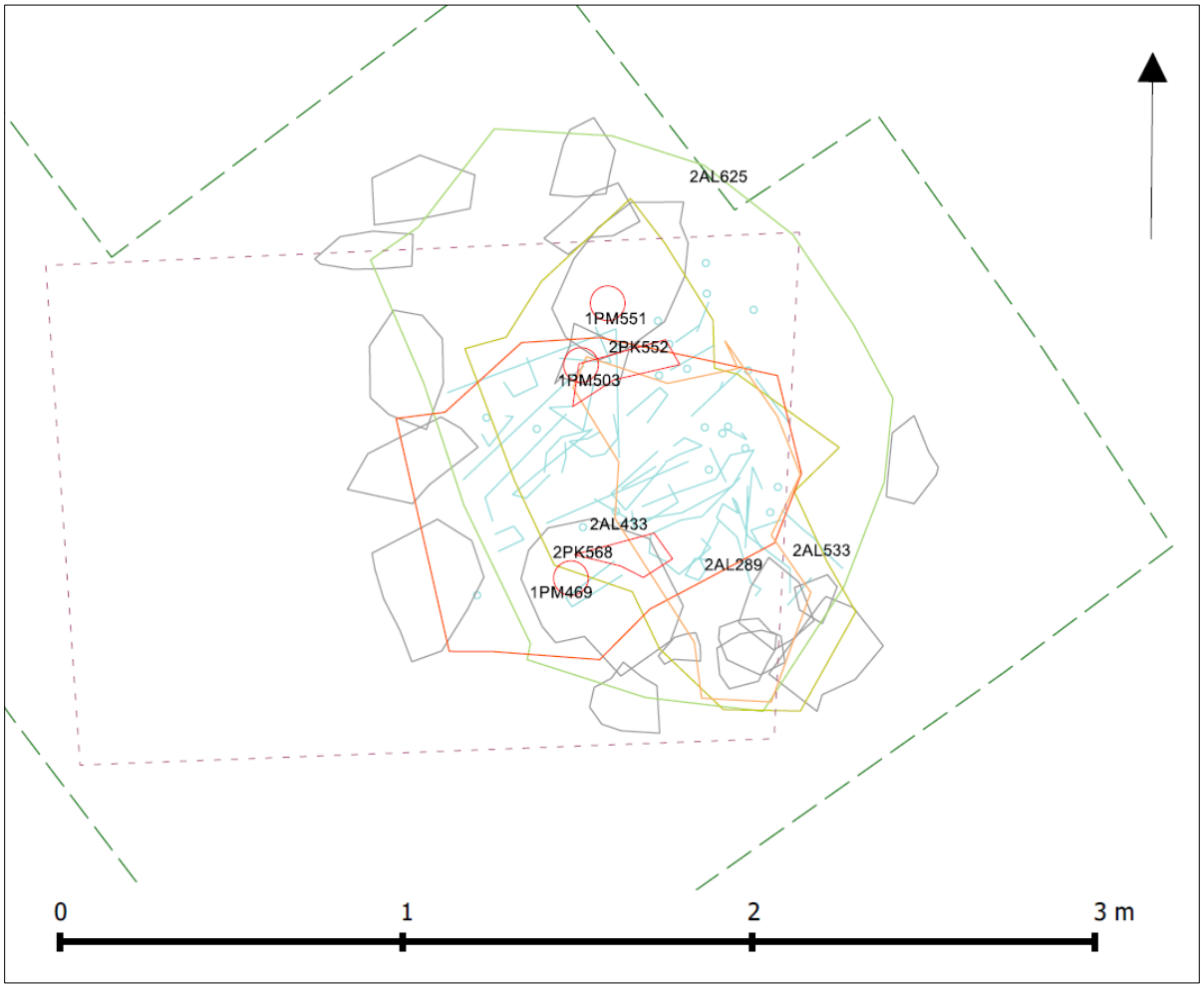

Fig. 1: Lokalisering av makrofossilprøvene 1PM469, 1PM503 og 1PM551 fra gravkontekst 433. Figur: Utsnitt fra Howell Roberts.

Laboratoriemetoder

Makrofossilanalyse

Prøvene til makrofossilanalyse ble vasket gjennom siler med maskestørrelse 1 mm; 0,5 mm og 0,25 mm. For å fjerne minerogent materiale fra prøvene ble de flottert før prøvene ble lufttørket, sortert og analysert. Total volum av prøvene før siling ble målt.

Til hjelp ved bestemmelsene av frø og frukter ble Berggren (1969, 1981), Anderberg (1994), Cappers *et al.* (2006) og referansesamlingen av makrofossiler ved Universitetet i Bergen benyttet. Nomenklaturen følger Lid & Lid (2005). Makrofossilanalysene ble utført av Anette Overland og Kari Loe Hjelle.

Resultatet av analysene er vist i diagram der antall identifiserte frø/frukter er presentert. I noen tilfeller ble klassifiseringen A (abundant); F (frequent); P (present) benyttet. Makrofossilene er også klassifisert etter om de er forkullet (oppbevaringsdyktige og med potensiell høy alder) eller uforkullet (trolig moderne). Også mengden trekull i hver prøve ble estimert.

Pollenanalyse

Det ble tatt ut 1 cm^3 materiale til pollenpreparering fra hver makrofossilprøve, som hver ble tilsatt 1 *Lycopodium*-tabelett (nr. 177745) (Stockmarr 1971). Pollenprøvene ble preparert etter prosedyrene beskrevet i Fægri & Iversen (1989) der man bruker KOH for å fjerne humussyrer, varm HF for å fjerne uorganiske partikler, og acetolyse for å fjerne cellulose. Prøvene ble deretter farget med fuchsin og tilsatt glyserol. Pollenprøvene ble talt med et Zeiss (Imager.M2) mikroskop, med fasekontrast og objektiv med 63× forstørrelse.

Pollen- og sporebestemmelsene er basert på nøkkelen i Fægri & Iversen (1989) og sammenligninger med moderne referansemateriale ved pollenlaboratoriet, UIB. *Fragaria vesca* og *Potentilla* spp. er samlet i *Potentilla*-type. *Trifolium* ssp. er delt i *T. repens*-type og *T. pratense*-type etter Odgaard (1994). Kornpollen ble bestemt ut fra Beug (2004) og Fægri & Iversen (1989). Soppsporen *Sordariaceae* (T-55B) er bestemt ut fra Geel *et al.* (2003). Uidentifiserte pollenkorn ble registrert i egen gruppe (Uidentifiserte), og trekullstøv større enn 10µ ble talt.

Resultatene av pollenanalysene er vist i prosentdiagram. Grunnlaget for beregning av prosentdiagrammet er pollensummen (∑P), som er summen av terrestriske pollentyper samt uidentifiserte pollen. Prosentverdiene for sporer og trekull er beregnet ut fra ∑P +

forekomsten av den aktuelle fossiltypen. I pollendiagrammet er de reelle prosentverdiene vist med sorte kurver. De lyse kurvene representerer 10× forstørrelse. Diagrammet er oppstilt alfabetisk innenfor grupperingene trær, busker (B), dvergbusker (DB), urter, uidentifiserte (UI), sporer og trekull. Pollendiagrammet er tegnet i Core 2.0 (Natvik & Kaland 1993). Nomenklatur for høyere planter følger Lid & Lid (2005).

Resultat og tolkning

Pollenprøver

Det ble analysert tre pollenprøver (Fig. 2), som er generelt sett relativt like. Pollenprøvene er karakterisert ved ca. 20 % treslagspollen, 70–80 % urtepollen, og 2–12 % uidentifiserte pollenkorn. Treslagspollenet består av hovedsakelig or (*Alnus*) med ca. 13 %, og bjørk (*Betula*), med ca. 5 %. Av busker er einer (*Juniperus*) og vier/selje (*Salix*) registrert med lave verdier, og av dvergbusker registreres røsslyng (*Calluna*). Gress (*Poaceae*) er best representert av urtene, med 45–50 %, og engsyre/småsyre (*Rumex* sect. *acetosa*) oppnår 10–15 %. En rekke andre urter registreres med lav verdi, som dyrkningsindikatorene burot (*Artemisia*), melde (*Chenopodiaceae*), då (*Galeopsis*) og småsyre (*Rumex acetosella*), og gress- og beitemarksindikatorene ryllik/prestekrage (*Achillea*-type), blåklokke (*Campanula*), halvgress (*Cyperaceae*), smalkjempe (*Plantago lanceolata*), engsoleie (*Ranunculus acris*-type), tepperot (*Potentilla*-type), storkenebb (*Geranium*), hvit- og rødkløver (*Trifolium repens, T. pratense*) og nesle (*Urtica*). Byggpollen (*Hordeum*-type) registreres i prøve 1PM469, og et mulig byggpollen i prøve 1PM503. Trekullverdien er lavest i prøve 1PM469 med 50 %, og høyest i prøve 1PM551 med 90 %. Uspesifiserte bregnesporer (*Polypodiaceae*) har ca. 20–30 %.

Dersom pollenprøvene representerer den lokale vegetasjonen på Nes, så indikerer pollenprøvene et åpent kulturlandskap, trolig med enkelte trær av or og bjørk, og einerbusker, i et landskap som ellers er preget av beite- og muligens dyrknings- og slåttearealer. Pollendataene gir inntrykk av lokalt gressdominert vegetasjon, slik at beiteaktivitet og/eller slått trolig har vært en viktig del av driftsmåten på Nes. Hjelle (1999) har funnet at pollenprøver fra slått vegetasjon har særlig høye verdier av gress (*Poaceae*) og engsyre (*Rumex* Sect. *acetosa*), sammen med registreringer av pollen-taxa som kurvplanter (*Asteraceae* Sect. *Cichorioideae*), hvit- og rødkløver (*Trifolium repens, T. pratense*) og ryllik/prestekrage (*Achillea*-type). Slått kan således ha vært en av driftsmåtene i området. Ellers kan polleninnholdet være preget av evt. gravgaver og tilført plantemateriale (se diskusjon).

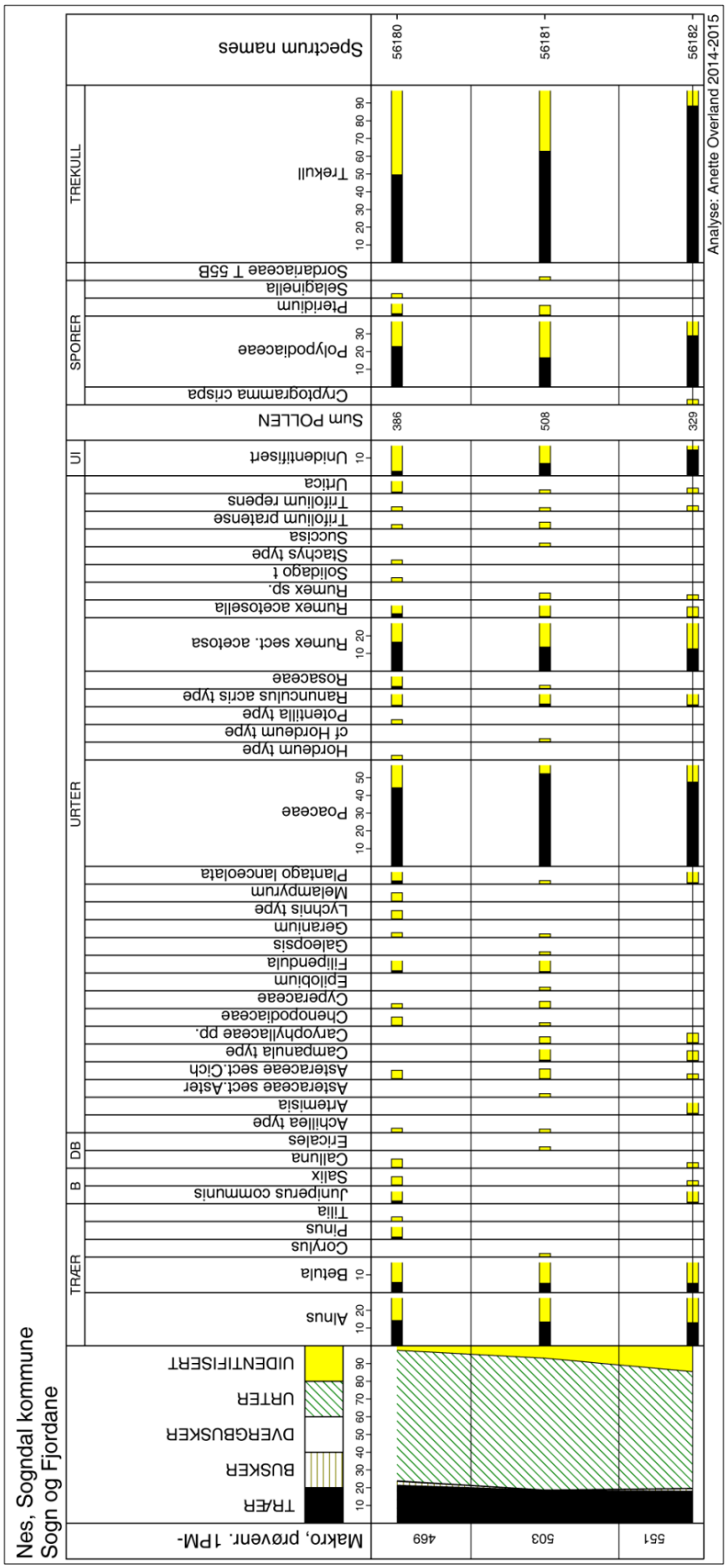

Fig. 2: Pollendiagram fra lokalitet 1. Sort histogram viser prosent, mens farget histogram viser denne verdien ×10.

Makrofossilprøver

De tre makrofossilprøvene er presentert i Fig. 3. Prøvene 1PM551 og 1PM503 inneholdt forkullede kongleskjell av gråor (*Alnus incana*) (Fig. 4), mens prøve 1PM551 også inneholdt et fragment av nøtteskall (*Corylus avellana*) (Fig. 5). I prøve 1PM469 ble det funnet et fragment av stein fra heggebær (*Prunus padus*), mens steiner fra bringebær (*Rubus idaeus*; fig 6) ble funnet i 1PM503 og 1PM469. Forkullet byggkorn, og to forkullede frukter av mulig korn (Cerealia) ble funnet i prøve 1PM551 (Fig. 7 og 8). Mulig korn ble også funnet i prøve 1PM469. Dyrkningsindikatoren småsyre (*Rumex acetosella*) ble funnet i alle prøvene, og kan ha vært lokalt tilstede. Ellers er makrofossilprøve 1PM469 preget av forkullede starrfrukter (*Carex*) som tyder på fuktige habitater, samt gress (*Poaceae*) og et forkullet frø fra dyrkingsindikatoren meldestokk (*Chenopodium album*), mens i prøve 1PM503 ble et forkullet frø av beiteindikatoren (*sensu* Behre 1981) smalkjempe (*Plantago lanceolata*) registrert. Soppsclerotier av *Cenococcum*, som indikerer forstyrret jordsmonn, som tråkk og brenning e.l. (Jensen 1974, Miller *et al.* 1994, Byrd *et al.* 2000), er notert i alle prøver. Også mulige beinfragmenter ble registrert i alle prøver (Appendiks, Fig. A), mens prøvene 1PM503 og 1PM551 inneholdt metallignende fragmenter (Appendiks, Fig. B). Mengden trekull var størst i prøve 1PM551.

Uforkullet ble frø/frukter av starr (*Carex*), nellikfamilien (*Caryophyllaceae*), og bjørk (*Betula pubescens*) registrert, som trolig alle er moderne, samt makrosporangier av bregnen dvergjamne (*Selaginella*).

Prøvene 1PM551 og 1PM503 lå nærmest hverandre og hadde visse likheter, ved at de begge inneholdt forkullede kongleskjell av gråor, samt at de begge hadde registrert metallbiter (cf.). Prøve 1PM469 skilte seg noe ut ved at denne heller var preget av starrfrukter, som kan tyde på fuktig habitat. Alle prøvene hadde forkullede frø fra dyrkningsindikatoren småsyre (*Rumex acetosella*), som vokser på basefattig grunn (Lid & Lid 2005).

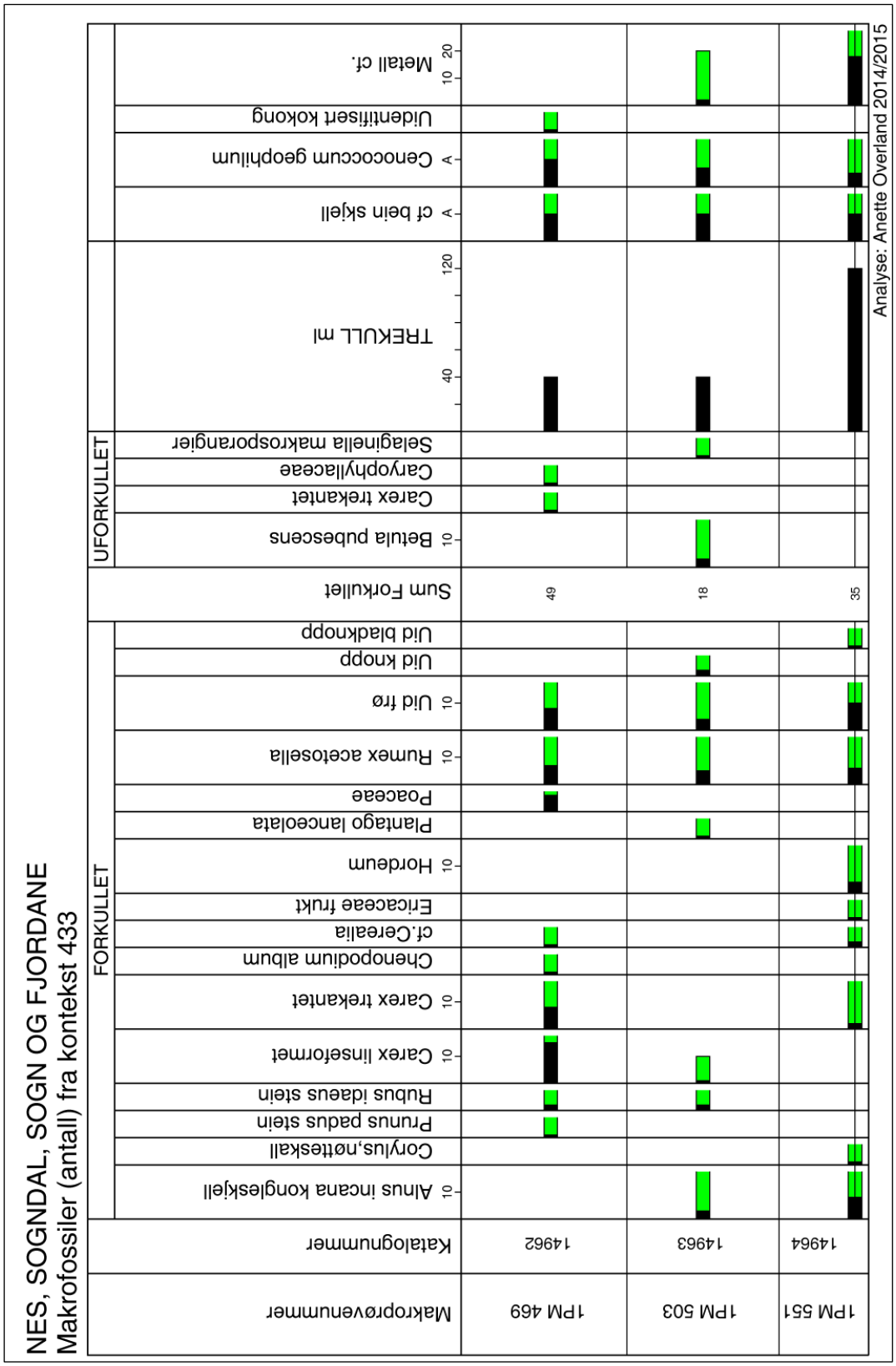

Fig. 3: Makrofossildiagram fra Nes, Sogndal. Sort histogram viser makrofossiler (antall), mens farget histogram (x10 forstørrelse) synliggjør særlig lave verdier. Ved noen tilfeller er mengden makrofossiler angitt som; A: abundant; F: frequent; P: present.

Fig. 4: Cf. *Alnus* (or) kongleskjell fra makrofossilprøve 1PM551. Foto: Anette Overland.

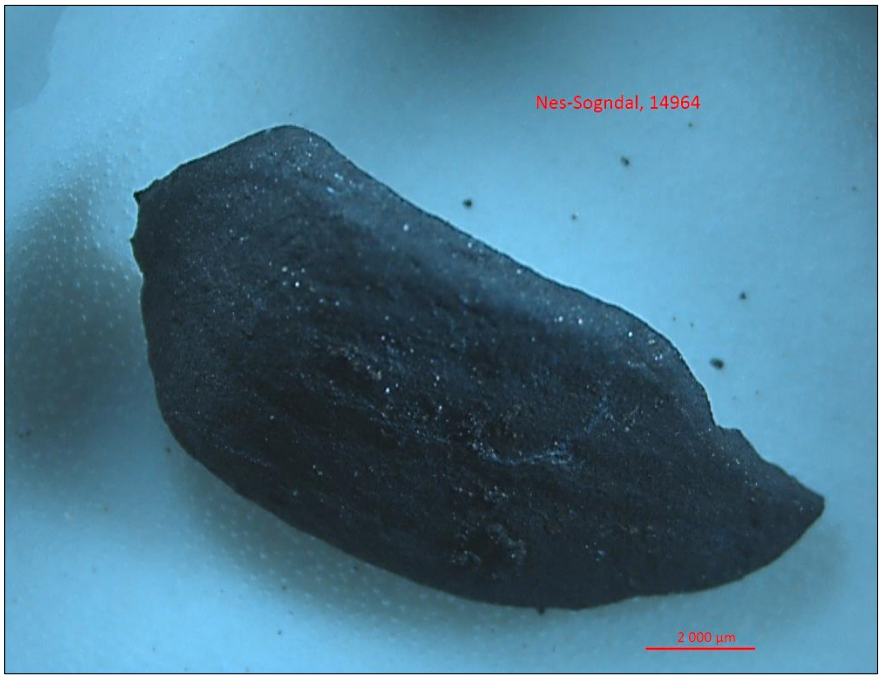

Fig. 5: *Corylus* (Hasselnøtt, skall) fra makrofossilprøve 1PM551. Foto: Anette Overland.

Fig. 6: *Rubus idaeus* stein (bringebær) fra makrofossilprøve 1PM503. Foto: Anette Overland.

Fig. 7: *Hordeum vulgare* (byggkorn) fra makrofossilprøve 1PM551. Foto: Anette Overland.

Fig. 8: *Hordeum vulgare* (byggkorn) og Cf. Cerealia (ubestemt korn) fra makrofossilprøve 1PM551. Foto: Anette Overland.

Oppsummering og diskusjon

Makrofossilprøvene 1PM551 og 1PM503 inneholdt forkullede kongleskjell av gråor (*Alnus incana*), og alle tre pollenprøvene hadde or som vanligste treslagspollen. Også trekullanalysene fra graven viser tilstedeværelse av hovedsakelig or, i og med at 173 av 175 trekullbiter ble identifisert til or (trekullanalyse ved Lísabet Guðmundsdóttir; se arkeologisk rapport). Or kan ha blitt tilført i forbindelse med gravlegging/kremasjon, og det er sannsynlig at or var et av de vanligste treslagene ved Nes. De andre to trekullfragmentene fra trekullanalysene var fra furu (*Pinus*) og selje/vier (*Salix*). Furu er registrert i pollendiagrammet i en prøve, men var trolig ikke utbredt lokalt på Nes. Furupollen spres svært godt og tilstedeværelse av opp til 10 % furupollen i pollendiagrammer regnes ofte som regional tilstedeværelse (Fægri 1944). Selje/vier er registrert i pollendiagrammet i to prøver. Selje/vier er insektspollinert, og var trolig tilstede lokalt.

Makrofossilprøvene inneholder ellers frø/frukter fra gressmark, sanket føde som hasselnøtteskall og bringebær, og fra jordbruksavling som byggkorn. Pollenprøvene gir også inntrykk av at området på Nes er et åpent kulturlandskap som er preget av beite- og muligens dyrknings- og slåttearealer, med forbehold om at pollenprøvene er representative for datidens lokale vegetasjon. Arter/taxa som registreres både som pollen og makrofossil i samme prøve er åkerugresset meldestokk (*Chenopodiaceae* pollen og *Chenopodium album* frø), gress (*Poaceae*), og starr (*Cyperaceae* pollen og *Carex* frø) i prøve 1PM469; smalkjempe (*Plantago lanceolata*) i prøve 1PM503; småsyre (*Rumex acetosella*) i alle tre prøver; og bringebær

(*Rosaceae* pollen og *Rubus idaeus* stein) i prøvene 1PM469 og 1PM503. Det er stor sannsynlighet for at disse representerer lokal vegetasjon og reflekterer kulturlandskapet på Nes. Ellers kan både pollen- og makrofossilinnholdet også være preget av evt. gravgaver og tilført plantemateriale. Det er ikke sikkert at byggkornene som ble funnet i makrofossilprøvene ble dyrket på stedet. De kan ha tilknytning til selve graven (gravgaver), og være tilført fra andre steder. Pollenprøvene viser derimot at landskapet rundt graven trolig var jordbruksland, der beite, slått og korndyrking kan ha foregått.

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Appendiks

Lokaliteten er gitt botanisk BI-nummer 952. Makrofossilprøvene ble katalogisert i de paleobotaniske samlingene og gitt katalognummer 14962–14964, og pollenprøvene ble gitt katalognummer 56180–56182.

Fig. A: Beinfragmenter fra makrofossilprøve 1PM551. Foto: Anette Overland.

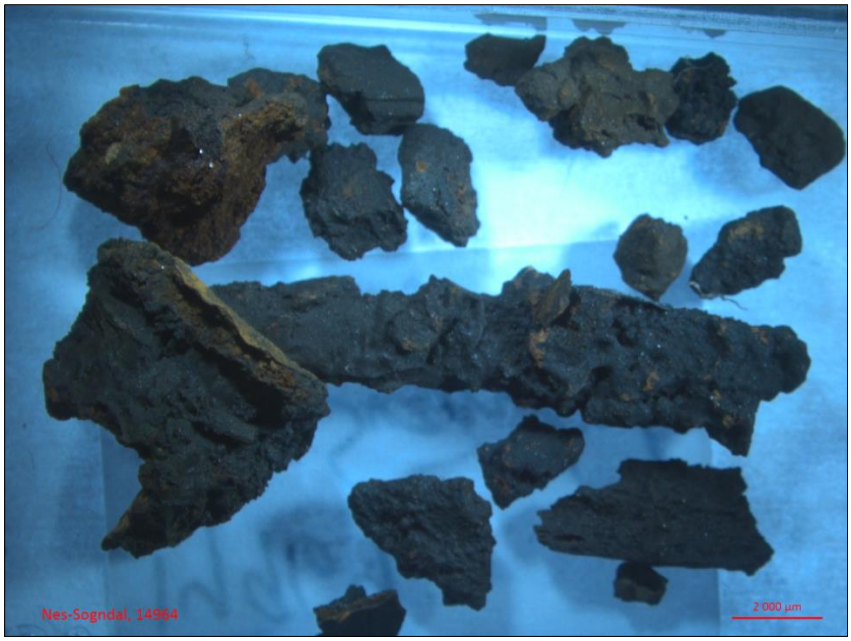

Fig. B: Cf. metallbiter fra makrofossilprøve 1PM551. Foto: Anette Overland.

APPENDIX 6

JS 1736 B1702 Rapport Nordheim - Nes, Sogndal k., Sogn og Fjordane. Brente bein.

Funn	Fam/Art	Klasse	Norsk navn	Beinslag	Beindel	Ant	Vekt,g	Kommentar
(289)								
	Homo sapiens							
		Mammalia	Menneske	Cranium		3	2,8	
Sum Homo sapiens						3	2,8	
	Ubestembar							
		Mammalia	Pattedyr	Ubestembar		1	0,4	Trolig tåledd. Dyr/menneske
		Mammalia	Pattedyr	Lemmeknokler		3	3,1	Trolig menneske. Muligens ett bein
		Mammalia	Pattedyr	Lemmeknokler		1	0,6	Trolig menneske
		Mammalia	Pattedyr	Kjeve		1	0,5	Trolig menneske
		Mammalia	Pattedyr	Cranium		2	0,8	Trolig menneske
		Mammalia	Pattedyr	Ubestembart		1	0,3	Metapodium/Phalanx; mulig menneske
		Mammalia	Pattedyr	Ubestembart		148	31	Dyr/menneske
		Mammalia	Pattedyr	Lemmeknokler		11	8,6	Dyr/menneske
Sum Ubestembar						168	45,3	
Sum (289)						171	48,1	
(433)								

Funn	Fam/Art	Klasse	Norsk navn	Beinslag	Beindel	Ant	Vekt,g	Kommentar
	Ubestembar							
		Mammalia	Pattedyr	Ubestembart		20	3,8	
		Mammalia	Pattedyr	Lemmeknokler		2	0,7	
Sum Ubestembar						22	4,5	
Sum (433)						22	4,5	
A433, PK552								
	Ubestembar							
		Mammalia	Pattedyr	Ubestembart		11	0,4	
Sum Ubestembar						11	0,4	
Sum A433, PK552						11	0,4	
A433, PK568								
	Ubestembar							
		Mammalia	Pattedyr	Ubestembart		106	4,5	De fleste fragmentene er veldig små
		Mammalia	Pattedyr	Ubestembart		4	0,4	Trolig fra tåledd
		Mammalia	Pattedyr	Lemmeknokler		3	1,5	
Sum Ubestembar						113	6,4	

Funn	Fam/Art	Klasse	Norsk navn	Beinslag	Beindel	Ant	Vekt,g	Kommentar
Sum A433, PK568						113	6,4	

C433

Homo sapiens

Mammalia	Menneske	Cranium		Cal	4	3,4	
Mammalia	Menneske	Cranium			1	0,4	
Sum Homo sapiens					5	3,8	

Ubestembar

Mammalia	Pattedyr	Metapodium/Phalan			1	0,9	Trolig menneske
Mammalia	Pattedyr	Cranium			1	0,5	Trolig menneske
Mammalia	Pattedyr	Ubestembart			146	26,9	Dyr/menneske
Mammalia	Pattedyr	Lemmeknokler			23	10,1	Dyr/menneske
Sum Ubestembar					171	38,4	
Sum C433					176	42,2	

u/s

Homo sapiens

Mammalia	Menneske	Cranium		Cal	3	1,4	
Mammalia	Menneske	Lemmeknokler			2	1,5	

Funn	Fam/Art	Klasse	Norsk navn	Beinslag	Beindel	Ant	Vekt,g	Kommentar
Sum Homo sapiens						5	2,9	
Ubestembar								
	Mammalia	Pattedyr		Lemmeknokler		1	1,2	Dyr/menneske
	Mammalia	Pattedyr		Lemmeknokler		3	3,1	Trolig fra ett bein
	Mammalia	Pattedyr		Cranium (?)		1	0,2	
	Mammalia	Pattedyr		Ubestembart		37	5,2	
Sum Ubestembar						42	9,7	
Sum u/s						47	12,6	
Total sum						540	114,2	