Archaeological investigations in Igaliku

Excavations in the meadow 2012-2013

Orri Vésteinsson

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REYKJAVÍK 2014

FS517-12151

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Cover photo: Kite photo of the 2012 excavations taken by Garðar Guðmundsson 10.08.12.

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1. Introduction

Orri Vésteinsson

The small farming community of Igaliku, at the head of Igaliku Kangerlua Fjord in Kujalleq municipality, southern Greenland, was established in 1783. It has long been recognized as the site of Garðar, the seat of the bishop of the Norse settlements in Greenland during the Middle Ages. Extensive ruins from the medieval period attracted notice already in the 18th century and several small scale excavations were undertaken there in the 19th century. More or less accurate maps of the ruin area were made by Gustav Holm in 1880, Daniel Bruun in 1894 and Mogens Clemmensen in 1910 but the most thorough investigation of the site was carried out by Paul Nørlund in 1926 (Nørlund 1929). Nørlund produced an accurate map and descriptions of the whole site but his excavation concentrated on the cathedral and adjacent building complex, the episcopal residence flanked by two very large byres. His excavations greatly clarified the layout of the farm, especially in its final phases and threw light on the building history of the cathedral. A sizeable collection of artefacts was retrieved (Nørlund 1929, 136-65), as well as both animal bones (Dagerbøl 1929; Nørlund 1929, 136-40) and human bones from the cemetery (Lynnerup 1998, 14-16). Nørlund's excavation clearly defined the central part of the farm site, what is essentially a farm mound, demarcated by the episcopal residence and great hall to the east, the cathedral and a large byre to the north, an even larger byre to the south and a well at the foot of the mound to the east. Efforts at maintaining the Norse ruins at Igaliku and making them visible to the public have concentrated on this central part of the site. The limited excavations which have taken place in Igaliku since the 1920s have primarily been small trenches dug by Knud Krogh in the 1960s and 1970s in the context of rapairs and maintenance of these ruins. Although other parts of the site, most notably the putative assembly site some 500 m to the north of the cathedral (Gulløv 2008, Sanmark 2010) have been the subject of considerable scholarly attention there have been no systematic excavations outside the farm mound at Igaliku until the project described in this report. The only exception, and one that has bearing on the issues discussed here,

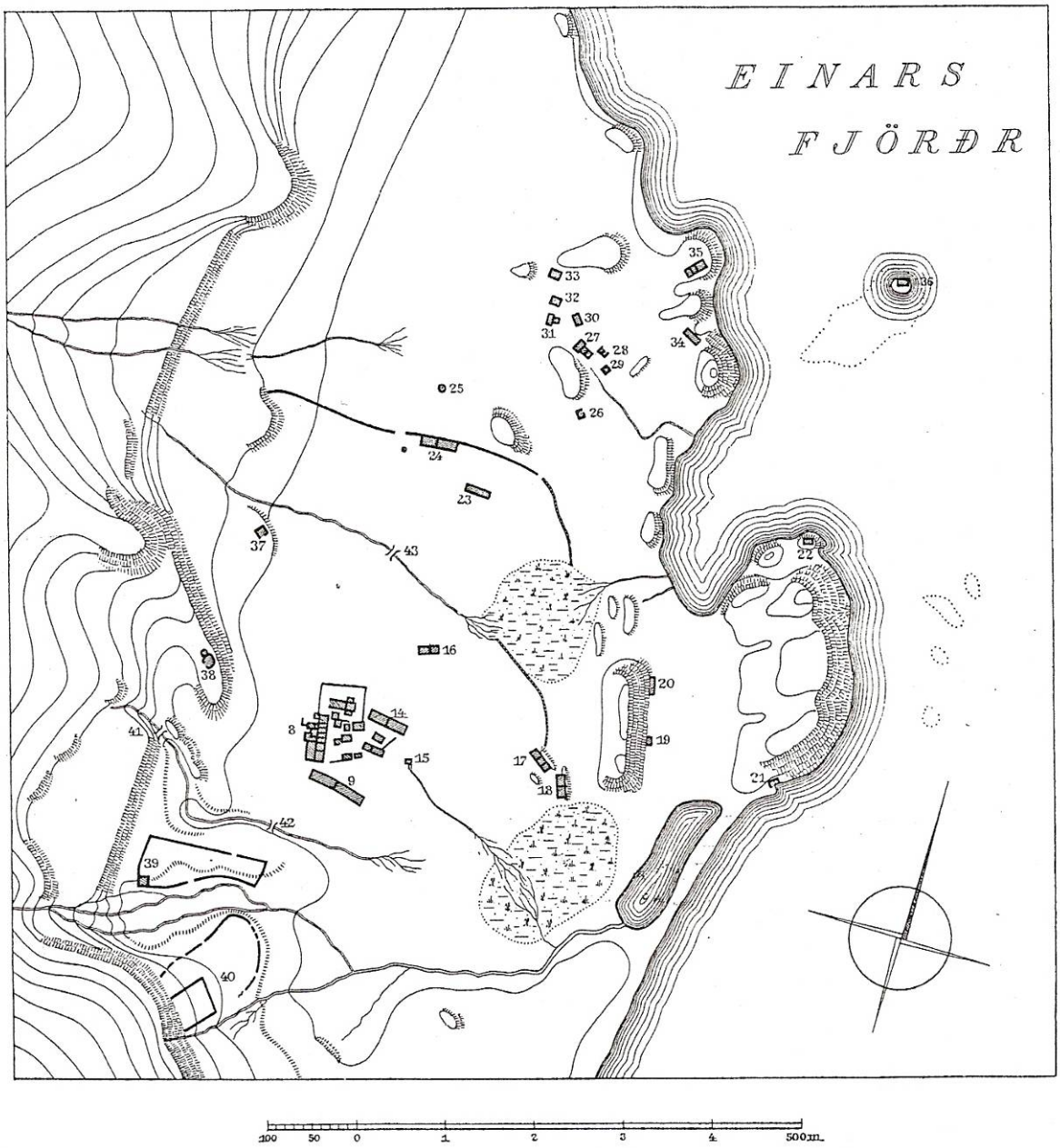


Fig 1. Plan of Garðar made in 1926 (Nørlund 1929, p. 9).

is an investigation of possible irrigation channels and dams at Igaliku (Edwards & Schofield 2012) throwing light on water management at the site.

The community established at Igaliku in 1783 raised cattle and grew vegetables in plots on and adjacent to the Norse ruins and the ruins themselves were quarried for stone to build dwellings and outhouses. Several stone-built houses from the 19th and (mainly) early 20th century are preserved and give the Igaliku village a unique character. Gardening still takes place on the outskirts of the main ruin complex but significant changes to the historic landscape of Igaliku are also associated with the introduction of sheep farming in the first half of the 20 century

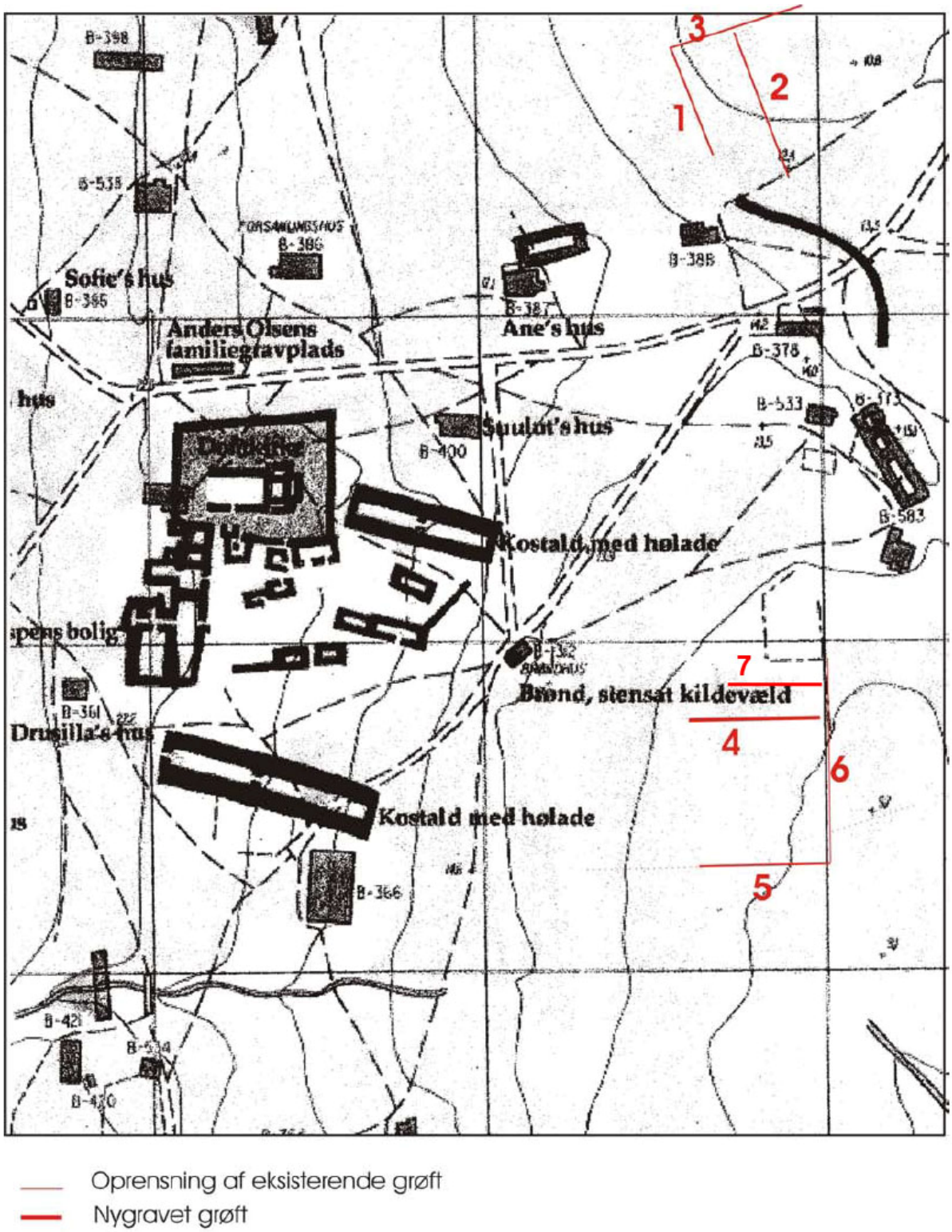


Fig. 2. Plan of a part of the Igaliku village, annotated by Kapel to show the ditches (in red, numbers 1-6) which he investigated in 2005. The length and location of the ditches is approximate and no 7. is added by the present author.

leading in the second half to the draining and leveling of fields to facilitate machine operated mowing and harvesting of hay for fodder. The largest part of the home-field of the Norse farm was on dry and well-drained land which lends itself to modern

farming without much modification but to the southeast and northeast there are lower lying and wetter areas which have been made machine operable by digging drainage ditches.

These wetland areas are shown on most of the early maps of the Norse ruins in Igaliku and had not been associated with any archaeological finds or features. It therefore came as something of a surprise when following the digging of a short new ditch some 110 m due east of the gable of the great byre defining the southern edge of the farm mound, well preserved wooden artefacts and animal bones were found in the spoil heaps in August 2005. At that time Hans Kapel examined the newly dug ditch and several others which had been cleaned on the same occasion and/or the previous year. He observed an up to 0,5 m thick cultural layer with charcoal, animal bone and worked wood in the western end of the new ditch (which he called Grøft 4, hereafter G4, while the one parallel to it to the north is G7 and the N-S ditch which the smaller ones drain into is G6 – see map 2). The thickness of this cultural deposit receded eastwards and southwards although cultural material was also noted in another ditch some 70 m to the south (G5) where the layer was 0,1 m thick. Kapel also examined freshly cleaned ditches in the more northerly wetland basin but found no pre-modern anthropogenic deposits in that area (Kapel 2005). Also in August 2005 the site was visited by Paul Buckland, Kevin Edwards, Eva Pangiotakopulu and J. Edward Schofield. They cleaned three sections along the new ditch (G4 - see Fig. 3), took samples for pollen, palaeontomological and radiocarbon analyses and carried out a coring survey to define the extent of the anthropogenic deposits (Fig. 4) (Buckland et al. 2008, 2009; Panagiotakopulu & Buckland 2012). They estimated that the anthropogenic deposit covered an area of +90x80 m and that it included a smaller area of c. 25x25 m with greater concentrations of charcoal to the west of the new ditch (G4). Two radiocarbon determinations were obtained which suggested that the base of the anthropogenic deposit dates to 1040-1250 AD (SUERC-8575) and that it terminated in 1290–1400 AD (SUERC-8576). They suggested that turf had been stripped from this area to construct farm buildings in the 11th century and that the preserved cultural layer had only begun to form in the early 12th century. While both the pollen and the palaeontomological evidence indicated a wet environment, the archaeological remains and the presence of synanthropic insects indicated that there had been significant input of materials from dwellings, presumably of the farm

Fig. 3. Ed Schofield observing Sampling Point B in 2005, looking west along G4. Photo courtesy of Kevin Edwards.

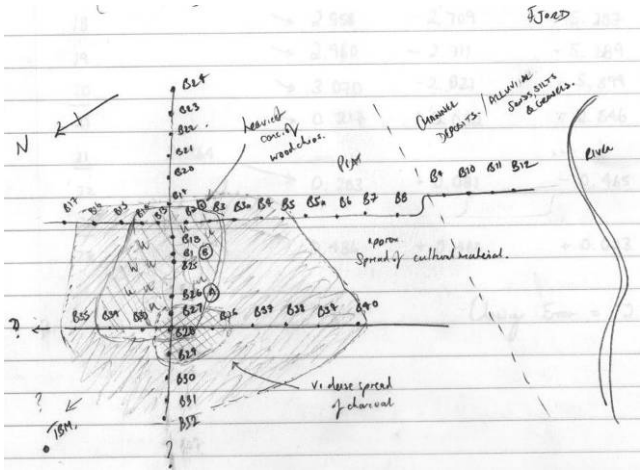


Fig. 4. Buckland et al's sketch map of their 2005 coring survey showing concentrations of anthropogenic deposits. Image courtesy of Kevin Edwards.

up-slope from the meadow. This they interpreted as evidence for soil amendment, that the layer with cultural remains was a type of plaggen soil laid down in an area which was also being irrigated.

In 2010 palaeobotanist Peter Steen Henriksen revisited the sections from 2005 and analyzed macrofossils from one of them (T0 in G4). His result is that the seeds suggest an initially wet environment which was augmented by introduced plants in the Norse period. Indications of high levels of nutrition may suggest that the area was fertilized in the Norse period, but after the site was abandoned the meadow became drier with the earlier signs of high nutrition absent. He also agreed that the frequent twigs found in the medieval layers relate to the deposition of cultural material rather than trees growing in this place (Henriksen 2012).

The detection of significant cultural deposits in the field and the manner of their discovery – the digging of a drainage ditch – raised concerns that the preservation of these remains was bound to deteriorate. Apart from bone hardly any organic materials were retrieved in Nørlund's excavations on the farm mound in 1926, suggesting that conditions for organic preservation were poor in that part of the site. The find of well preserved organic remains in the meadow in 2005 raised the possibility that it might contain a large assemblage of animal bone, artefacts and other archaeological and palaeoenvironmental remains. A large assemblage of this kind would constitute invaluable evidence for the history of Garðar and the Norse

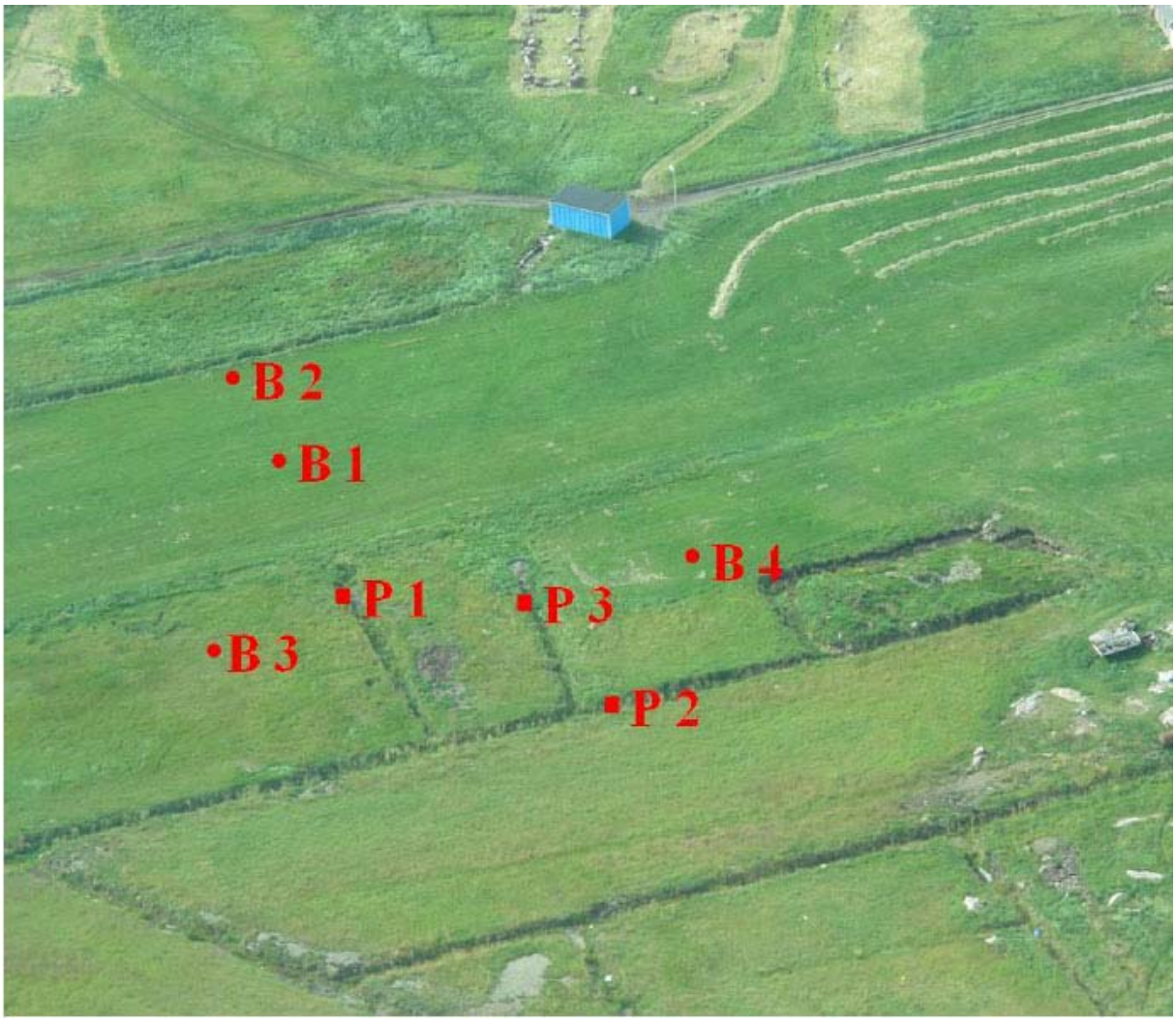


Fig. 5. Oblique areal photograph of the meadow showing Henriksen's sample locations in 2010. (Henriksen & Hansgaard 2011, p. 13). P1 is the same place as Sampling Point C in 2005. P1 is in ditch G4, P3 in G7 and P2 in G6.

settlements in Greenland, and as its preservation was being compromised by the drying-out of the meadow, it was clear already in 2005 that efforts had to be made to examine the nature and scope of the archaeological remains and to assess the degree and speed of their deterioration.

Efforts at securing funding for systematic fieldwork in Igaliku were not successful until 2011 when the National Science Foundation awarded a RAPID grant to carry out an excavation (OPP 1119354 & 1202692). The grant application was submitted by Thomas H. McGovern of the City University of New York (CUNY) and the project is a collaboration between Greenland's National Museum in Nuuk (NKA); Denmark's National Museum (DN); the University of Iceland; the Institute of Archaeology, Iceland (FSÍ); CUNY; the North Atlantic Bio-Cultural Organization (NABO) and the University of Stirling. The project is managed by Georg Nyegaard of

Fig. 6. The larger part of the 2012 crew on coffee break at the beginning of fieldwork. From left: Peter Steen Henriksen, Garðar Guðmundsson, Kristborg Þórsdóttir, Orri Vésteinsson, Norie Manigault, Cameron Turley, Michael Nielsen, Nuka Nathanielsen and Jade de la Paz.

Greenland's National Museum; the excavation and post-excavation is directed by Orri Vésteinsson of the University of Iceland, assisted by Konrad Smiarowski (CUNY; in charge of zooarchaeological analyses) and Guðrún Alda Gísladóttir (FSÍ; in charge of material culture analyses).

In 2012 fieldwork took place from July 24th to August 19th. Several small trenches were dug but two larger areas, Area A and Area B, 10x8 and 5x7 m respectively, absorbed most of the effort that season. The crew was manned by: Michael Nielsen (student, Univ. of Greenland), Garðar Guðmundsson (FSÍ), Guðrún Alda Gísladóttir (FSÍ), Hermann Jakob Hjartarson (student, Univ. of Iceland), Kristborg Þórsdóttir (FSÍ), Norie Manigault (student, CUNY), Nuka Nathanielsen (student, Univ. of Greenland), Georg Nyegaard (NKA), Jade de la Paz (student, Univ. of Massachusetts), Ian A. Simpson (Univ. of Stirling), Konrad Smiarowski (CUNY), Peter Steen Henriksen (DN), Cameron Turley (student, CUNY) and Orri Vésteinsson (Univ. of Iceland).

In the field assistance was kindly given by Hans Kapel and Henrik Høier, (Museum Sydøstdanmark). Niels-Christian Clemmensen (Kulturstyrelsen) made a digital elevation map of the Garðar ruin-complex, including the 2012 area of investigation, which forms the base of the maps presented here.

Additional funding was provided by Utanríkisráðuneytið (the Icelandic Foreign Ministry – travel grant for student participation).

A much smaller follow-up operation took place on August 13th-19th 2013 with Nuka Nathanielsen (student, Univ. of Greenland), Georg Nyegaard (NKA) and Orri Vésteinsson (Univ. of Iceland).

Apart from the authors of this report post-ex analysis was aided by Oddgeir Isaksen (FSI, digitization and illustration), Hermann Jakob Hjartarson (student, Univ. of Iceland, distribution maps) and Jan Bruun Jensen (conservator, DN).

This report describes the preliminary results of the fieldwork carried out in 2012 and 2013. Further excavation is planned and much analysis remains to be done on the finds so far retrieved. Some tentative conclusions about the nature of the deposits in the meadow are discussed in the conclusions to this report.

2. The cultural deposits – their extent, stratigraphy and dating

Orri Vésteinsson

Introduction

When archaeological remains were first observed in the meadow in 2005 it was immediately apparent that the greatest concentration was in the vicinity of the freshly dug ditch (G4), which is the more southerly of two with an east-west orientation, approximately 100 m east of the well-house which is at the foot of the farm mound. Both these ditches (G4 and G7) drain into a longer ditch (G6) with a north-south orientation which channels water southwards towards a stream which drains into a brackish lagoon on the coast. The coring survey carried out by Buckland, Edwards, Panagiotakopulu and Schofield in 2005 suggested that the cultural deposits might be even more substantial, or at least with more charcoal, to the west of the ditch-heads of G4 and G7, in the direction of the well.

In 2012 work began by cleaning several sections in the existing ditches (T1-T7 – see Appendix 1) confirming that the thickest cultural layers (20-30 cm) are indeed towards the western end of the two ditches, and although the layer itself is also substantial in the N-S ditch G6 (15-20 cm in T4 and T5) the twig, wood-chip and animal bone density was considerably lower than further west (T2, T3 and T7). Fresh 1x1 m trenches (T8, T9 and T10) were dug in the area between ditches G4 and G7, and T13 on the south side of G4, to obtain a better understanding of the stratigraphy and find-density and establish the eastward limit of the charcoal horizon. All these ditch-sides and trenches exhibited the same basic stratigraphy: below the topsoil there was in some places evidence of modern disturbance but below that a substantial peaty silt layer above a cultural layer which in turn is on top of sterile sand. Only in the westernmost trench, T10, was there sign of a charcoal horizon at the top of the cultural sequence. A coring survey, replicating the survey carried out in

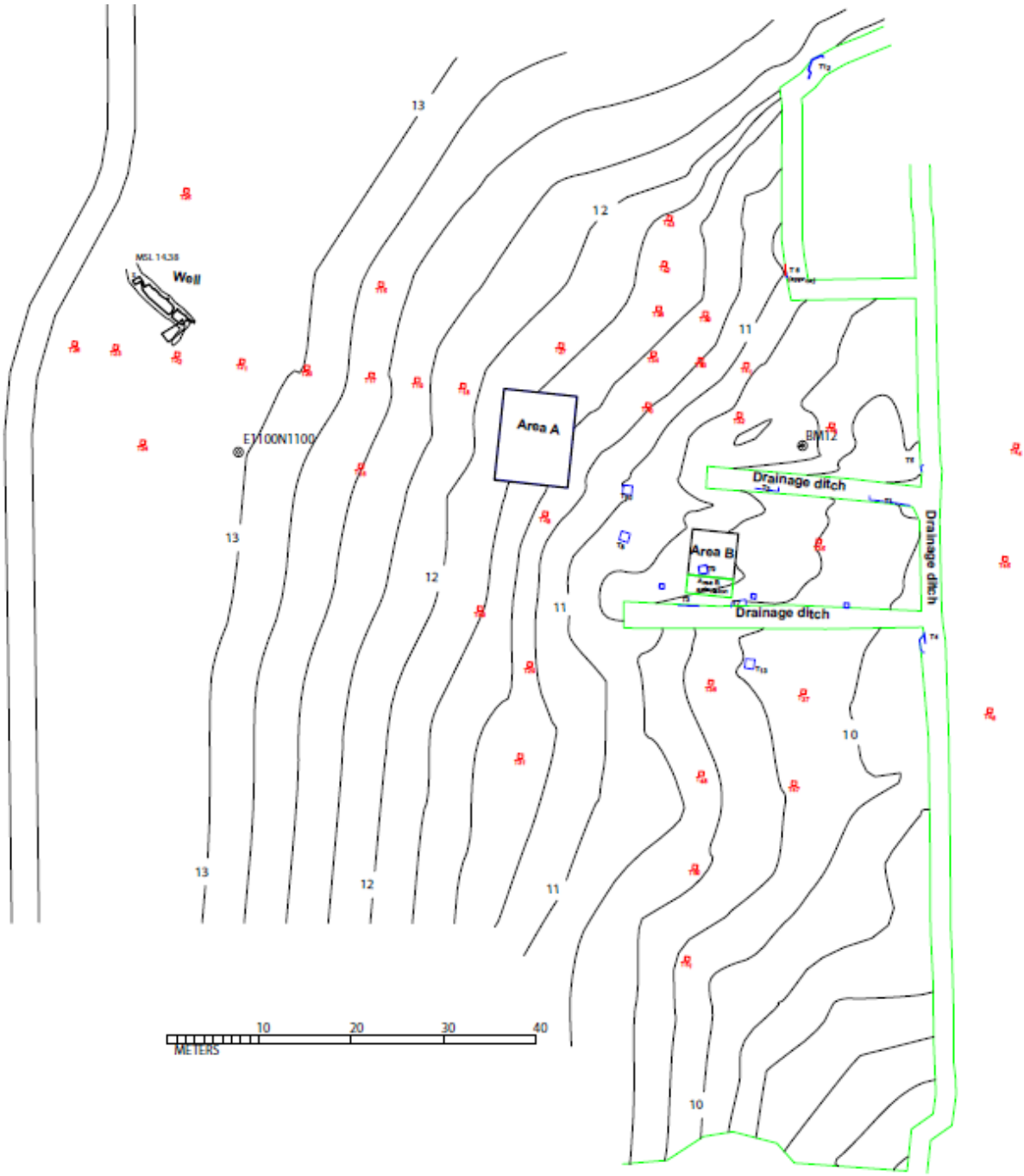


Fig. 1. Location of trenches and excavation areas in 2012-2013.

2005 as its exact location could not be tied down, established that the charcoal horizon was most substantial in an area of c. 30x20 m in the drier and slightly higher part of the field some 15 m west of the western end of ditch G7. An in-filled ditch runs N-S at the eastern edge of the area of greatest charcoal density which is also associated with a dense rock scatter. T11 was another 1x1 m test trench dug to establish the nature of these deposits. It was not dug through the stone horizon as it was already clear that these charcoal and stone deposits were very different from the

cultural deposits observed further east and would require an open area excavation to understand.

On the basis of these preliminary investigations it was decided to open two larger excavation areas:

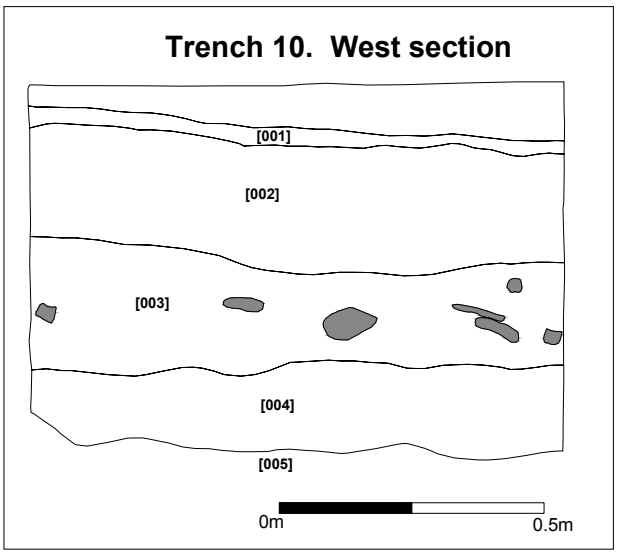


Fig. 2. Section of Trench 10, one of the trenches dug to assess the distribution and nature of cultural deposits before open area excavations commenced. 001: Topsoil. 002: Peat =[1002]. 003: Charcoal horizon =[1003]. 004: Wood-chip layer =[1004]. 005: Natural substrata.

Area A is 10x8 m in size, its eastern edge determined by the in-filled ditch (the LoE set about 1 m from the western edge of that ditch) and its location determined by the greatest density of charcoal and stone. Excavated contexts in Area A were numbered from 001 to 039.

Area B was originally 5x5 m in size and later extended by 2 m to the south to become 7x5 m. It was placed over the location of T9 which had produced by far the largest volume of finds, to cover the area between it and T3 which also had considerably greater find density than T13, T7, T2, T10 or T10. Excavated contexts in Area B were numbered from 501 to 507.

The size of both areas was determined by assessments of the concentration of cultural remains and assessments of how much excavation could be accomplished within the season. The goal in Area A was to understand the charcoal/stone horizon and its relationship with possible underlying deposits while in Area B the aim was primarily to retrieve a substantial sample of the archaeological remains preserved in the cultural layer.

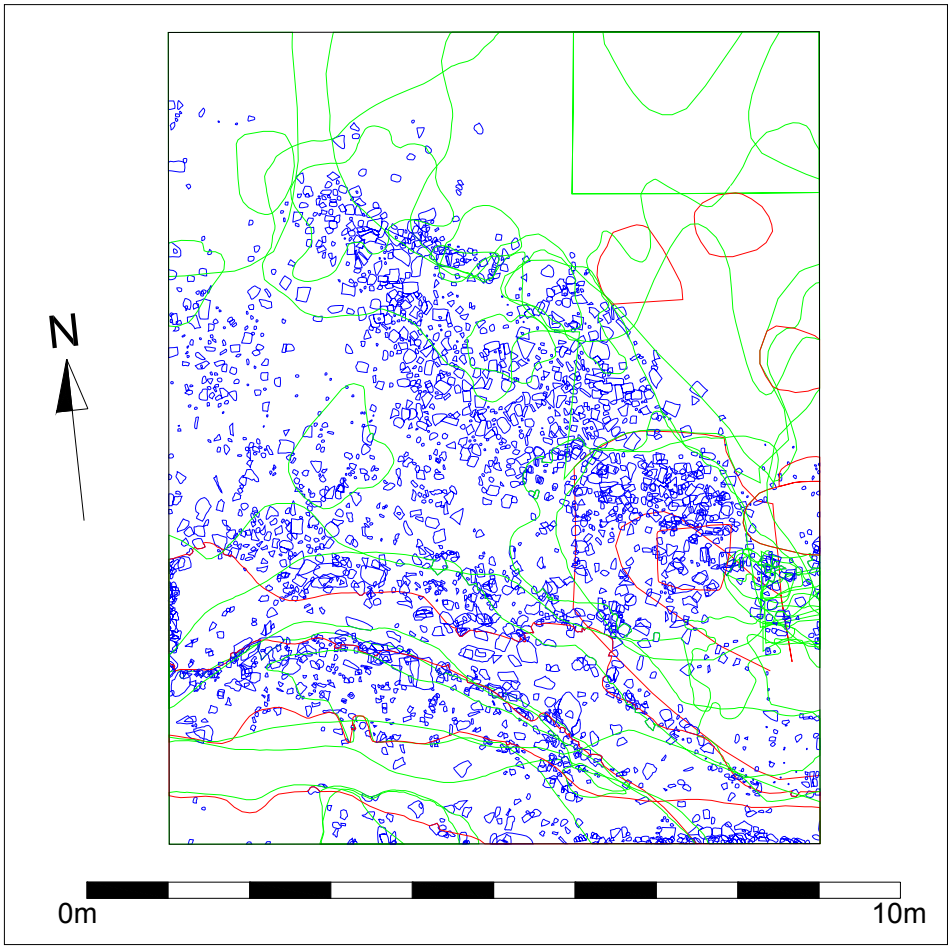


Fig. 3. Area A, showing all contexts.

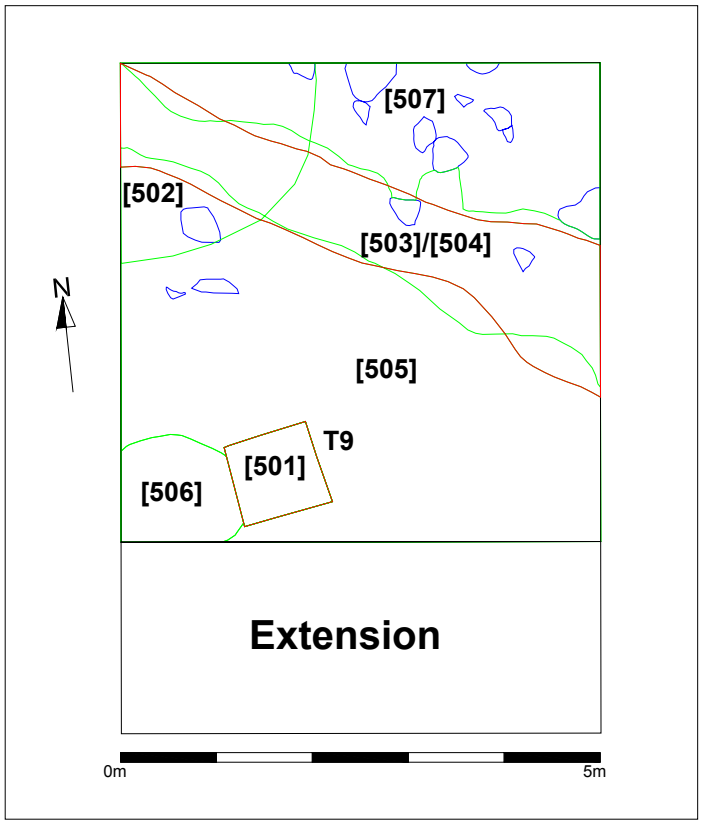


Fig. 4. Area B, showing all contexts

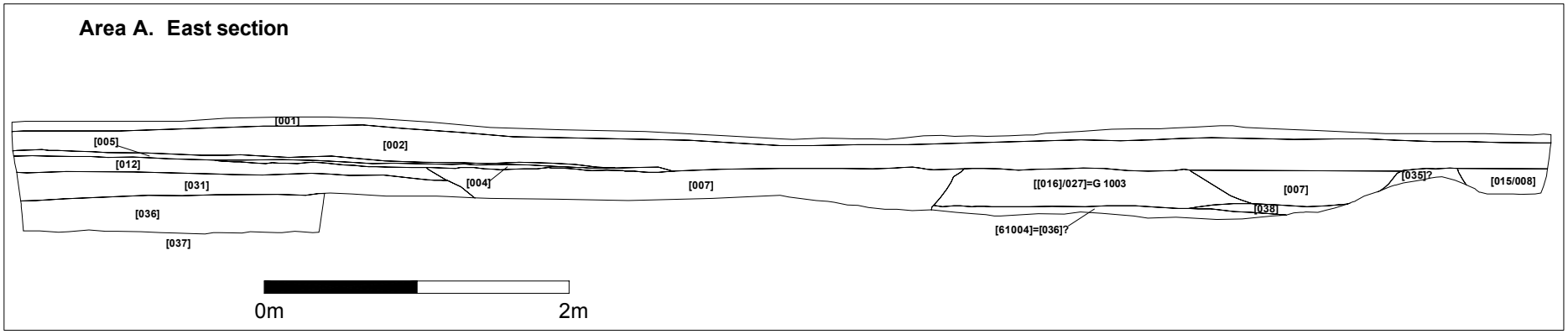


Fig. 5. East section of Area A.

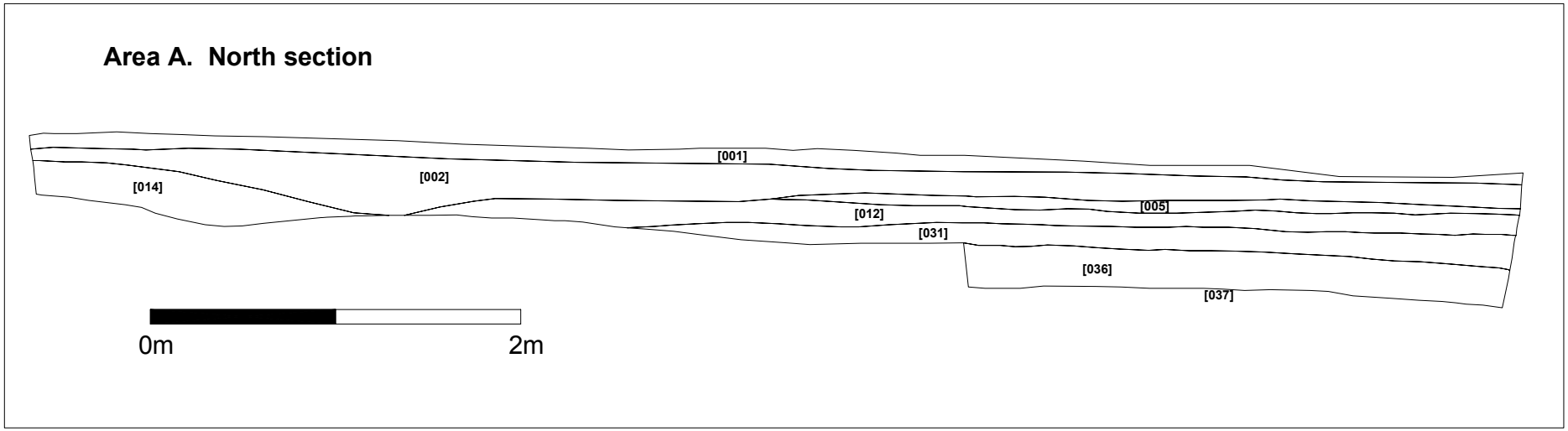


Fig. 6. North section of Area A.

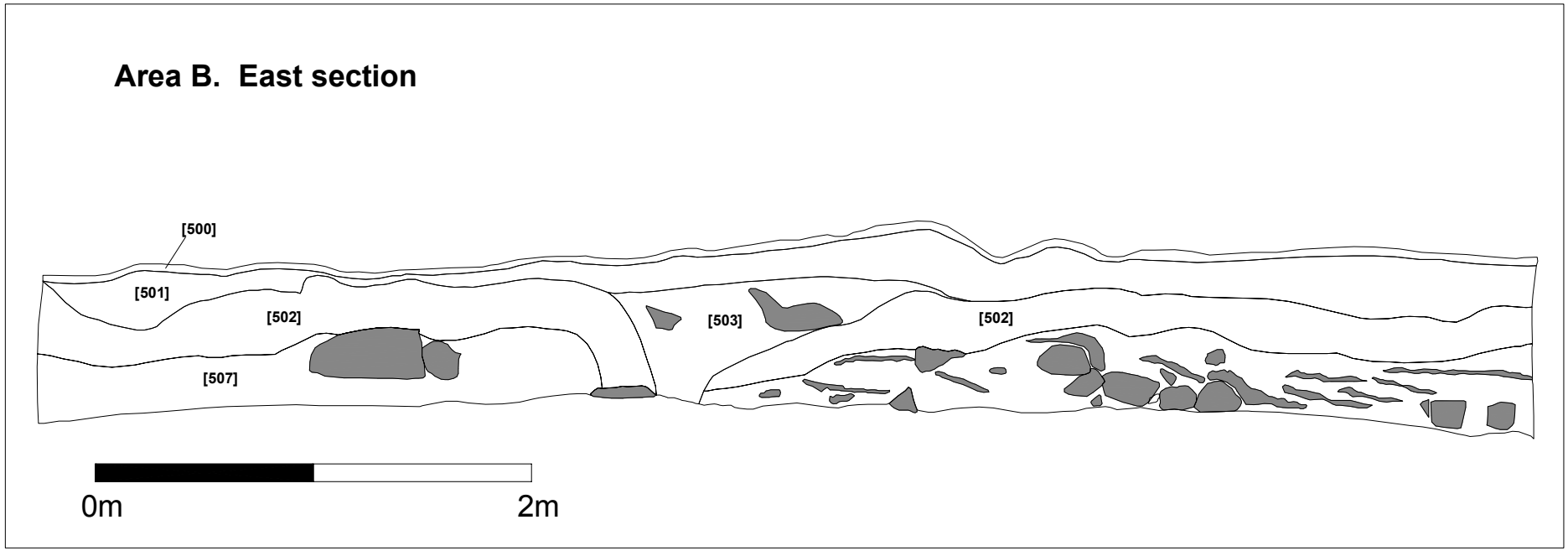


Fig. 7. East section of Area B.

The preliminary investigations established the basic stratigraphy of the site. In the excavation archive and in this report the excavated/observed contexts are classified into six groups:

[1000]: Topsoil
[1001]: Modern disturbance
[1002]: Peaty silt above cultural layers
[1003]: Charcoal and stone horizon
[1004]: Widespread wood-chip layer
[1005]: Natural substrata

The excavation was allocated the identification number KNK2728 by the National Museum in Nuuk.

In effect the medieval layers consist of two extensive and quite different kinds of deposits. Lower in the sequence is an accumulation of peaty silt with wood chips and other anthropogenic material [1004]. The anthropgenic material in this layer is almost entirely organic in nature, wood predominating and animal bone frequent, but only a few pieces of leather and occasional stone artefacts. This layer is very widespread although the density of finds is variable. Wood chips are ubiquitous and are observed in an area of at least 80x60 m although they recede in volume to the east and southeast from Area B. The concentration of other anthropogenic finds, artefacts and bones, is more restricted to the western and northern part of the deposit. Fieldwork in 2013 was aimed i.a. at defining more exactly the extent of this deposit and the variability of find density within it. The results are shown on maps X-XX (more in Appendix 3). They indicate that Area B is in the middle of the greatest concentration of anthropogenic material within this layer but that there are also other substantial concentrations, in particular to the north, to the south and to the southwest of Area B. One of the principal research questions of this project is about the nature of this deposit: how did it form and how were the wood-chips, twigs, bones and artefacts deposited in it? Is it a dump, a secondary deposit brought in from elsewhere, e.g. to improve the fertility of the meadow, or is it in some way differently formed?

The other principal deposit [1003] overlies [1004] and is completely different in nature. This is a series of layers, more or less charcoal stained, with frequent burnt bone and associated with dense but irregular scatters of stone of varied nature, some dressed and/or burnt. The finds assemblage in this deposit is almost entirely inorganic, with steatite predominating and most of the preserved bone being burnt. Although the two deposits overlap, the [1003] group is further west, on higher and drier ground, than the wood-chip layer [1004]. Although quite different in nature and location the charcoal/stone horizon [1003] also has some characteristics of a secondary deposit. Explaining what it represents is another principal research question of this project.

Methods

A site-grid was established at the start of fieldwork in 2012. This has its 0 points on the E and N axes approximately 1 km to the south and west of the meadow site, and hence far outside the known and likely distribution of archaeological remains in Igaliku. It can therefore be used in future to describe other parts of the archaeology of Igaliku. The E1100/N1100 point is indicated on Fig 1. As a temporary benchmark the highest point of a large earthfast boulder north of G7 was used (BM12 on Fig 1). Heights were measured with a conventional dumpy level in 2012, and a laser level used in Area B to accurately level the spits. In 2012 a digital terrain model was produced of the whole site and this forms the basis of the height measurements for the trenches dug in 2013.

The excavation strategy consisted of a mix of coring, trenching and open-area excavation. Cores were only used to assess presence/absence of charcoal but the trenching can be divided in two: In 2012 the trenching was essentially exploratory, carried out to establish basic information about the archaeological deposits and to inform decisions about the placement of the larger excavation areas. Basic information about the thickness and nature of cultural deposits was recorded in all cases but systematic retrieval of finds through sieving was only carried out for T8, T9, T10 and T11. These were all 1x1 m trenches (T9 and T11 inside the later areas B and A respectively). T14 was an exploratory trench (1x1 m) dug in the ruin complex, at the northern end of the hall, in order to assess preservation conditions. From this trench a number of soil samples were taken for further analysis but soil samples were

otherwise only taken from the open area excavations A and B. In 2013 37 trenches were dug in order to obtain more detailed information about the extent and distribution of cultural deposits in the fields and meadows east of the farm mound. All these trenches were 0,5x0,5 m in size and dug down to natural (except T22 and T23 which stopped short of a compact cultural layer). The sections were recorded schematically and pH levels measured in the cultural layers. Finds were retrieved by hand. This trenching programme concentrated on defining the extent of the cultural layers observed in 2012 and also investigated cultural deposits in the vicinity of the well, at the foot of the farm-mound, which was designated Area C. In addition observations were made of cultural layers in ditches in the southern part of the fields, 80-100 m south of the excavation areas.

Area A was excavated with conventional open-area, single context recording methodology. Each context was defined, planned and removed. Samples for flotation and insect analysis were taken from all principal cultural deposits. The more extensive deposits were divided by grid-squares or ad-hoc boundaries for the purposes of find and sample recording. In Area A time did not permit full excavation of all the anthropogenic deposits. Emphasis was placed on fully excavating the charcoal horizon and this was nearly achieved: only basal layer [035] and part of rock scatter (west of E1133) were left unexcavated. Excavation of the underlying [1004] deposits concentrated on getting a substantial sample from the northeast corner of the excavation where natural substrata were reached in an area of 6 m^2.

In Area B there was only one pre-modern cultural layer ([505] = [507]), but as this represents an accumulation it was decided to excavate it in 10 cm spits and record finds by these spits as well as by a subdivision of the 5x5 m excavation area into four equally sized areas (NW, SW, NE, SE). When the area was extended by two metres to the south, this was divided in two (Extension East and Extension West). The spits are labelled 0-5, with 0 at the top and 5 at the base. Samples for flotation and insect analysis were collected from each spit and each sub-area. All deposits in Area B were fully excavated down the natural substratum. Samples for micromorhological analyses were taken both from the charcoal-horizon and the wood chip layer.

All cultural layers in both areas were wet-sieved although as far as possible larger finds were retrieved by hand before sieving. Twigs, charcoal and plant macro fossils were taken as samples while worked wood was recorded as artefacts. Soil

samples were taken from all contexts, both for flotation and palaeoentomological analysis. Flotation was carried out in the field, but sub-samples of soil from each context were retained for curation.

The wet-sieving was made possible by pumping brackish water from the lagoon on the beach to the east of the site. As the water used was salty the artefacts were (as a rule) washed in fresh water before bagging.

Fig. 8. Area B matrix

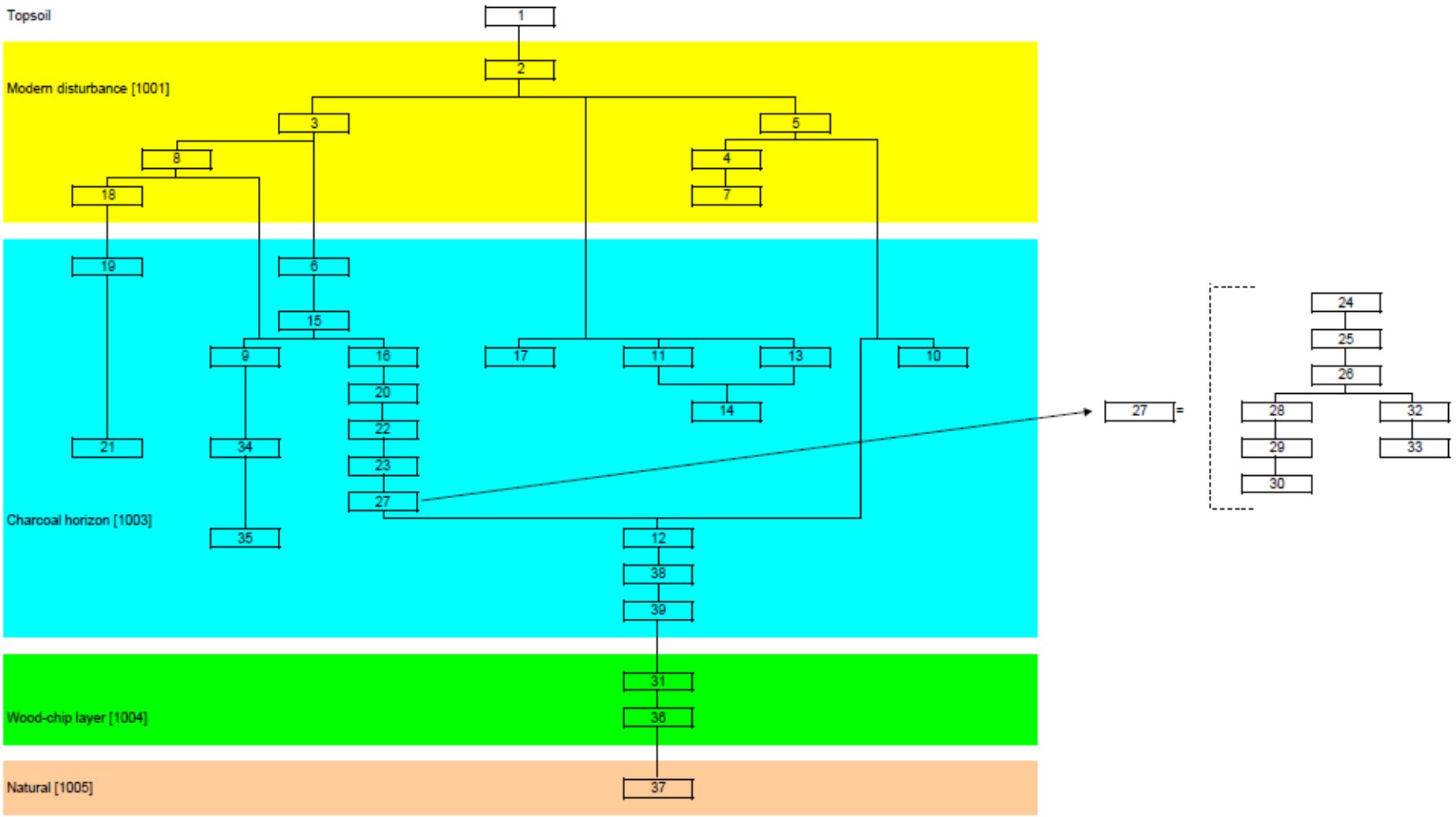


Fig. 9. Area A matrix.

Description of the archaeological sequence

The following description is ordered by principal stratigraphic features, the latest described first, and where applicable subdivided by excavation areas and trenches. A few features (in Area C and in the southern part of the meadow) which cannot be confidently tied in with the sequence are discussed separately at the end.

Modern disturbance [1001]

The excavations were carried out in an area which has been extensively modified by modern farming. At present a system of ditches drains the meadow and it is evident that these ditches have been dug at different times and in some cases older ditches have been infilled while new ones have been added. The digging of the ditch G4 in 2004 or 2005 precipitated this project and at the same time older ditches (G5 and G6 as well as others farther afield) were cleaned/re-dug (Kapel 2005). At some point prior to that a north-south ditch which cuts through the area of densest cultural material had been in-filled. This ditch was not opened or investigated but its coarse fill of gravel and stones makes it easily visible in the field and the eastern limit of excavation of Area A was placed just short of its western side. Inside Area A there were irregular pits ([007] with fill [004]) alongside this ditch which probably relate to either its digging or its infilling. The layer at the top of the sequence in Area A ([002]) was heavily mixed and included much disturbed archaeological material from below. This deposit is consistent with the effects of repeated harrowing, while the disturbed deposits below it ([005] and [003]) were less mixed, and included large intact pieces of cultural layers from the underlying charcoal horizon. These intact bits were sieved separately and the finds retrieved and labelled so that they can be added to the [1003] group. This lower, less mixed, part of the modern disturbance in Area A is consistent with the flattening of uneven ground with a tractor shovel and no doubt represents the initial levelling of the meadow to make machine workable hay-fields. In Area B this phase is represented by [501], a 20-40 cm thick layer of mixed material which, unlike Area A, does not include earlier archaeological remains in any quantity. Here the machining had not breached the [1002], the natural accumulation on top of the archaeological sequence, partly because it may have been thicker than up slope

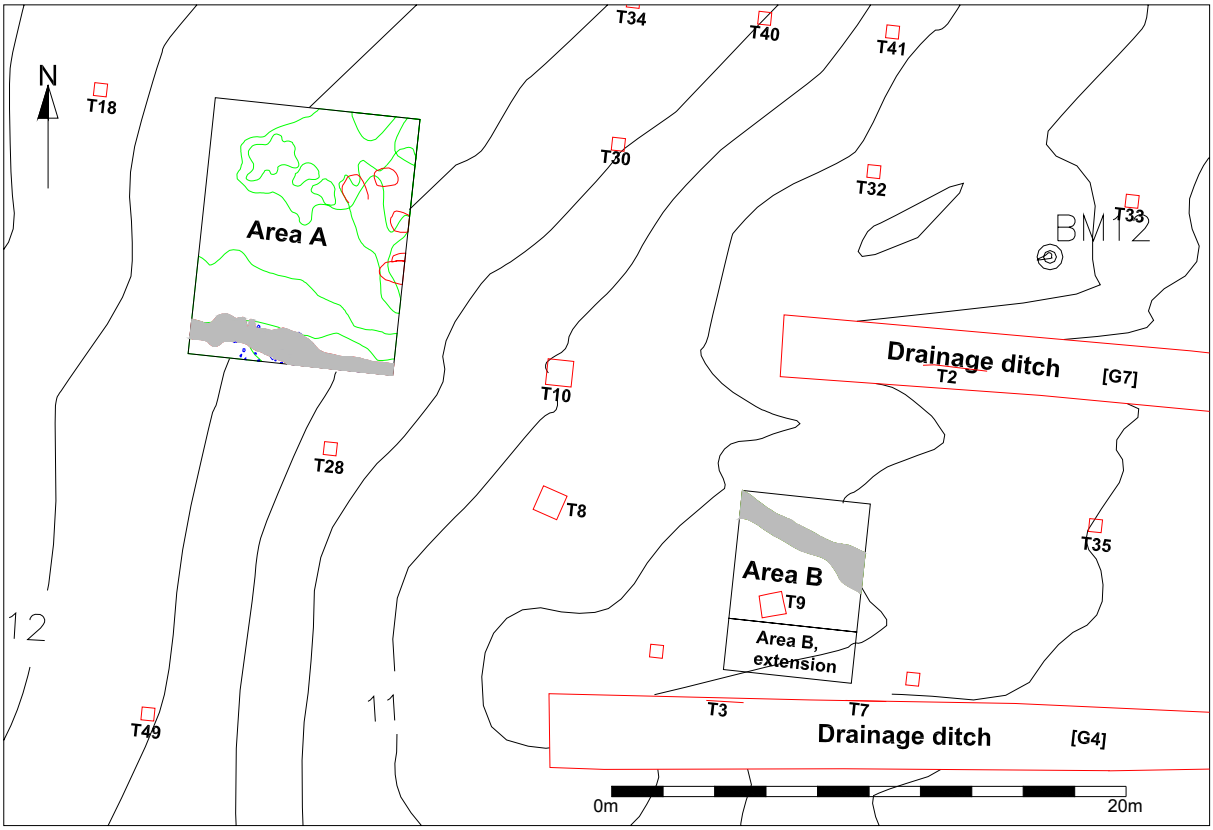


Fig. 10. Areas A and B showing the irregular ditch [008], [504] with grey shading.

in Area A and partly because the much wetter and softer ground in Area B may not have been amenable to any sort of machining until later, when the ditches had made it drier. Despite the ditches the ground in and around Area B is still quite soggy and seems not to be regularly mowed.

Predating the layout of the drainage ditches (which presumably goes no further back in time than to the 1970s or 1980s) an irregular ditch ([008] = [504]) channelled water from the direction of the well across the meadow in a generally easterly direction. The fill of this ditch in Area B [503] included modern beer bottles, plastic and aluminium suggesting that it was filled in no later than the 1970s, possibly marking the start of mechanised farming and field levelling in this area. In Area A this feature is shallow and bears no unequivocal signs of anthropogenic modification but in Area B its continuation cuts right through both [502] and [505=507] with such steep sides that it is unlikely that it can be other than man-made. It seems likely that this channel is partly a natural water course which has been straightened and deepened, probably in the 20th century, possibly as an early drainage measure but definitely pre-dating the creation of machine workable hay-fields in this area.

Not all small finds from the [1001] group were collected; a selection of modern materials was kept (e.g. x-133, 134) but most of the finds in contexts [002] and [005] were pieces of steatite which clearly derive from earlier archaeological deposits.

Natural peaty silt [1002]

In Area B and most of the trenches dug in 2012 and 2013 the archaeological layers were overlain by a natural peat accumulation, typically 10-15 cm thick ([502] in Area B). This layer was missing altogether in Area A and in all the trenches dug to the west of it (T15-T25) except a 6 cm layer in T26 which is the westernmost trench drug, by the roadside which hugs the foot of the farm mound. The same kind of peaty material was observed as part of the mixed contexts [002] and [005] in Area A and it seems that this layer has been obliterated by machine levelling in the upper and drier parts of the field. It is likely that in this area the layer was also thinner than it is in the lower and wetter parts represented by Area B.

Detailed observations by Buckland et al. 2009, 111-112 and Henriksen 2012 suggest that this layer began to form at the time of abandonment in the late middle ages and that the vegetation represents peat-forming mire communities.

The border between [1002] and the underlying [1003] cultural deposits is quite distinct when observed in section but because of the soggy conditions in Area B a number of small finds form the top of [505=507] were bagged with [502].

The charcoal horizon [1003]

A widespread charcoal horizon was documented stretching from T10 in the east to T26 in the west, at the foot of the farm mound, over a space of some 65 m. It may well extend further westwards and join other deposits associated with the farm mound. West of Area A this horizon has a generally east-west orientation and is less than 30 m across from north to south. On this stretch it is uneven and discontinuous and contained practically no finds. It is much more substantial and find-rich in and around Area A. There it fans out in both directions along the edge of the wettest part of the meadow over a stretch of some 60 m (between T31 and T43) which has a NNE-SSW direction. It is missing altogether from trenches 20 and 21 although it is

likely that this is the result of modern field-levelling in an area where this horizon was particularly thin.

In Area C a different, more compact, charcoal stained cultural layer was observed in trenches 22, 23 and 24. This is described separately below but the stratigraphic relationship between this layer and the more widespread charcoal layer is not clear and will require more extensive excavation to determine. Thin layers with charcoal, ash and burnt bone were also observed in ditch-sections much further south. It is possible that they belong to the same horizon but as this cannot be demonstrated they are also described separately below in the sub-chapter **Other features**.

In Area A the charcoal horizon turned out to be made up of a series of heterogenous deposits formed on top of a dense stone scatter. At the top of the sequence is the fill [006] of a water-course [015]. The fill was undisturbed and contained a number of medieval artefacts, including a baking plate (x-496) but it likely post-dates the activity that created the [1003] series. The water-course [015] cuts through the [1003] series (ctxts [009], [016], [034], [035] and the rock scatter [038]) and may represent some change in the management of the run-off from the well further up-slope towards the end of the medieval occupation.

The [1003] series consists of alternating bands of more or less charcoal stained silt, separated by lenses of sand and silt, usually so small in extent that it could not be determined whether they were natural accumulations or dumps of natural material, although the latter option seems more likely. In general these deposits are concentrated in the southern part of Area A, increasing in thickness and complexity towards the east. [009], [016] and [010] represent the final phase of this accumulation, all charcoal rich layers with burnt bone and frequent stone artefacts. Possibly coterminous is a possible hearth [011] which goes under the western limit of excavation and sits on top of a layer of turf [014], probably collapse or a dump rather than an in situ wall. The turf contains lenses of midden. [013] is a small patch of a charcoal stained wood-chip deposit on top of turf [014], possibly up-cast from some medieval digging into the [1004] layers below. Another turf deposit [021] was at the southern limit of excavation overlain by a discrete charcoal lens [019]. [016] was the most substantial of the later [1003] series and represents an accumulation rather than a single event. Trench 11 was dug down to the top of this context. [016] was

Fig. 11. Possible hearth [011], looking west.

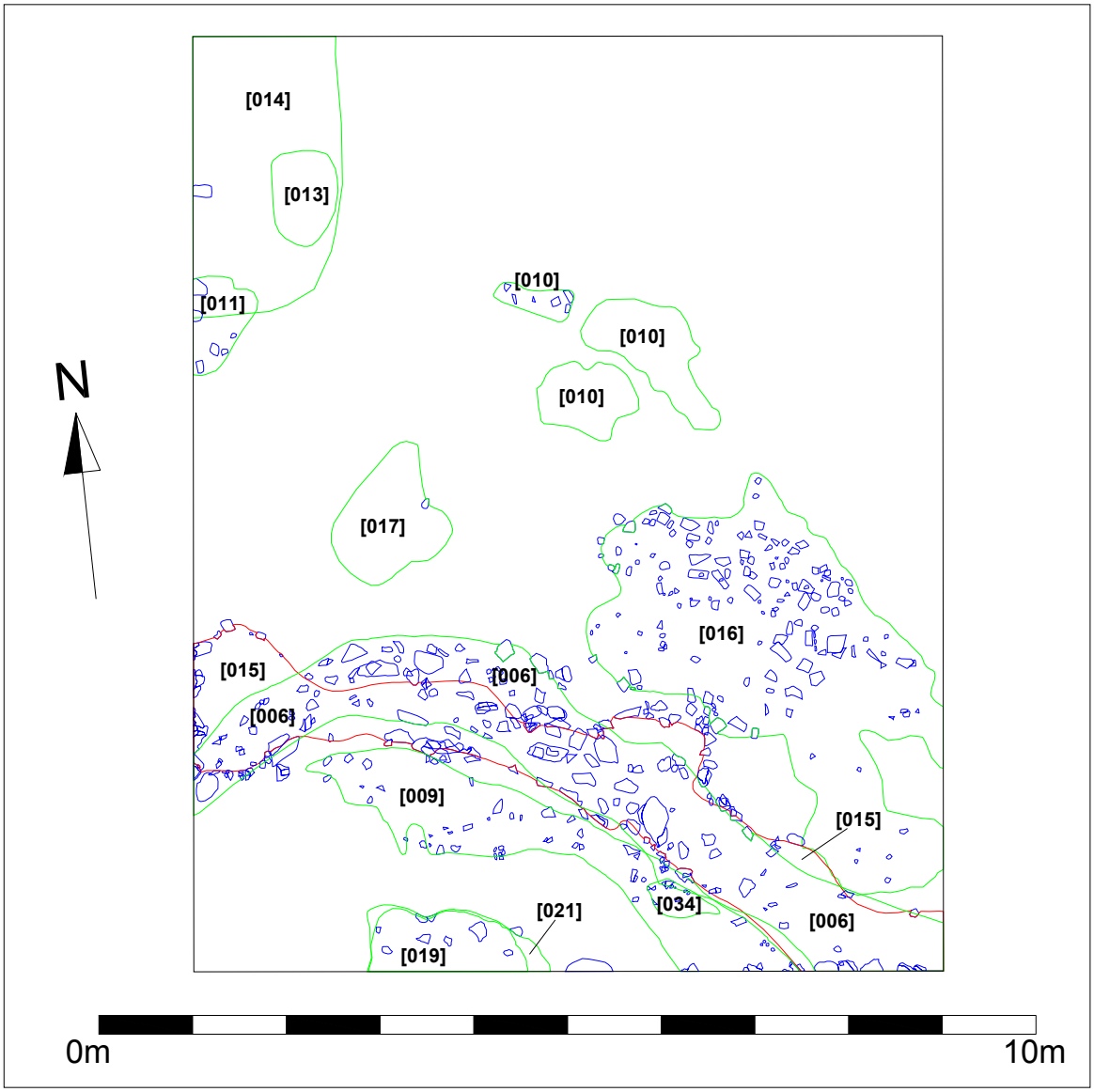


Fig. 12. Contexts belonging to the upper portions of charcoal horizon [1003] in Area A.

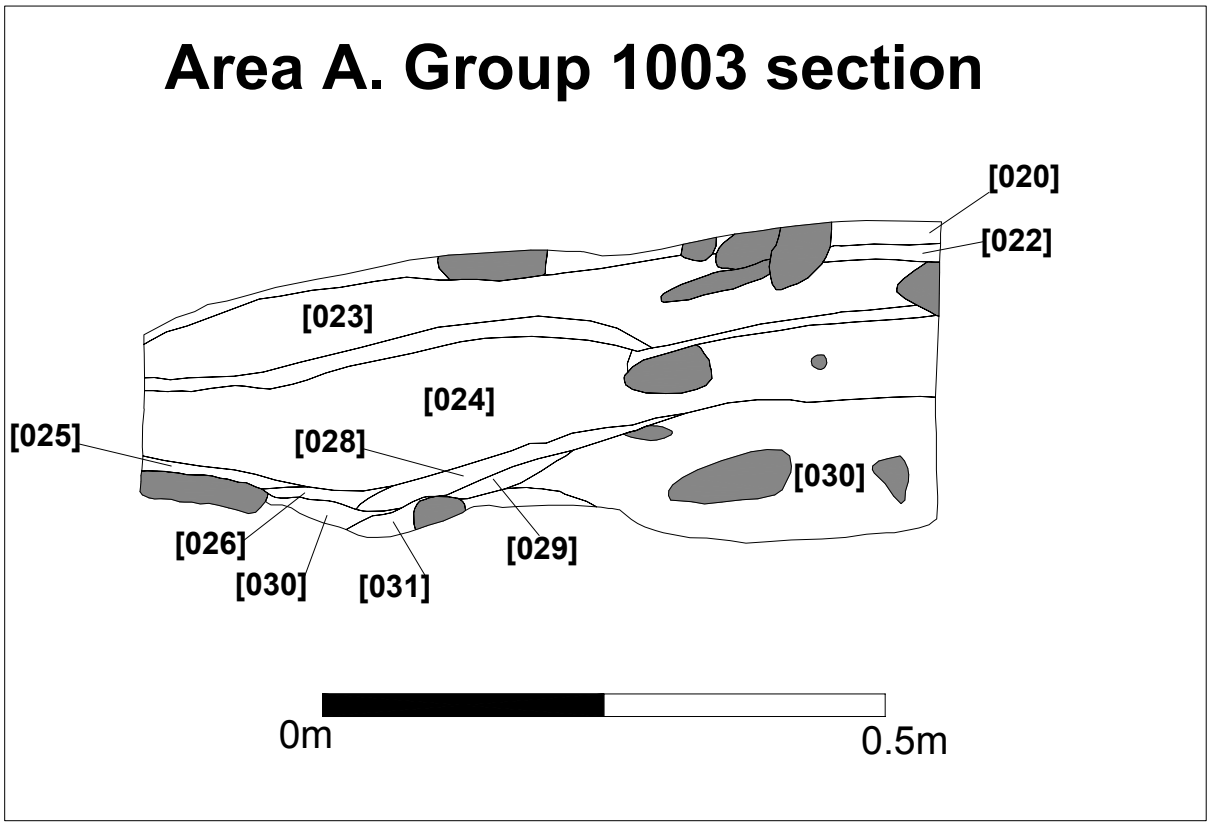


Fig. 13. East facing section through a part of the charcoal horizon [1003], 0,7 m west of the eastern limit of excavation in Area A. Contexts [024] – [031] are subdivisions of group [027].

Fig. 14. Alternating lenses of brown and charcoal-stained peat in group [027].

laminated with alternating bands of charcoal and burnt bone in a sandy silt matrix, interspersed with lenses of homogenous mid-brown silt. Although separated by water course [015], [009] represents the same layer as [016], capping a small patch of more turfy silt [034] on top of [035], which, like [012] is transitional between [1003] and [1004]. [017] is also a discrete patch of the same material as [016]. Below [016] was a series of contexts, small in area but thick enough that they could be given separate descriptions: [020] was a lens of mid-brown silt on top of charcoal lens [022] which in turn sat on top of layer [023] with the same matrix as [020] but more mixed with traces of ash, burnt bone ans charcoal as well as lenses of sand. All these deposits were less than 1 m^2 in area but below [023] was a more widespread (c. 6 m^2 inside Area A) group [027]. This was similar in nature to [016], made up of a series of very thin deposits, charcoal-stained lenses alternating with mid-brown silt or sand. [027] increased sharply in thickness towards the east and a section through it 0,7 m from the eastern limit of excavation allowed the subdivision of the group into layers which exhibit the same characteristics of [1003] in general: lenses of charcoal and ash alternating with sand and silt. At the top was charcoal stained layer [024]; below that peaty yellow-brown silt [025] on top of grey silty sand with burnt bone [026]. This sat on top of two layers: [028] is mid-brown peaty silt on top of charcoal layer [030] which in turn sat on top of charcoal stained peaty silt [030]. The other layer below [026] was charcoal layer [032] on top of greyish-brown silty sand [033]. Below group [027] was a widespread charcoal stained peaty layer [012] which unlike the other layers in the [1003] series had frequent finds of wood. This is a transitional layer between the wood-chip layer [1004] and the charcoal horizon [1003] and represents the start of the activity which produced these deposits. It was considered to be stratigraphically later than the dense scatter of stone [038] but the overlap is small and essentially these two contexts can be seen as the beginning of the [1003]

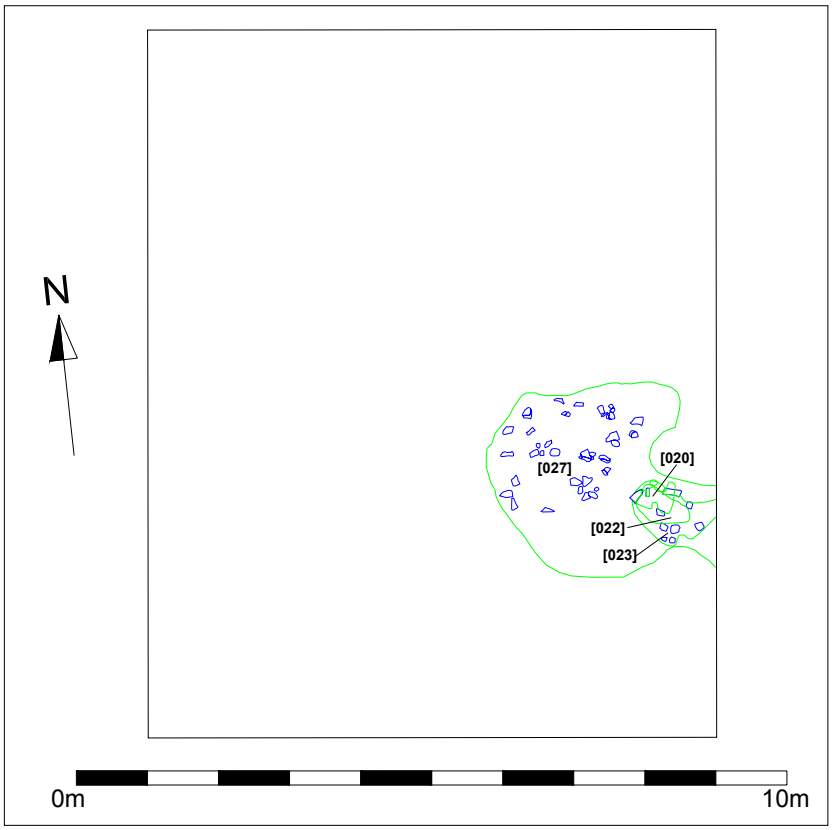


Fig. 15. The lower portions of charcoal horizon [1003] in Area A. The section shown on Fig. 12 cuts through these deposits.

charcoal horizon. Stone scatter [038] is made up of 5-20 cm large stones, many of which are fire- cracked or have fire marks while others show signs of dressing. The scatter has a distinct northern edge across Area A and covers a much smaller area than the charcoal horizon. Stones were seen in association with the charcoal horizon in T28 suggesting that the scatter extends at least 5 m south of Area A It was not seen in the other trenches nearest Area A: trenches 27 (to the north), 30 (to the northeast) or 18 (to the west) suggesting that it covers an area between 10x10 m and 15x15 m. These stones have clearly been brought to this place and laid down in the soft peaty wood-chip layer below ([031]), but they also fill a regular cut feature [039], a sub-rectangular area 2,8 m in width and at least 4 m in length (it extends east of the limit of excavation) with a 20 cm vertical cut and a 10 cm deeper central trough. There was no surface layer associated with this feature which was cut through the wood-chip layer [031] down to the sand/gravel natural substratum [037]. Although this feature has the dimensions of a small building the absence of any associated deposits or posts makes it unsafe to hypothesize about what it might represent. Its digging may or may not be associated with the subsequent laying down of the stone

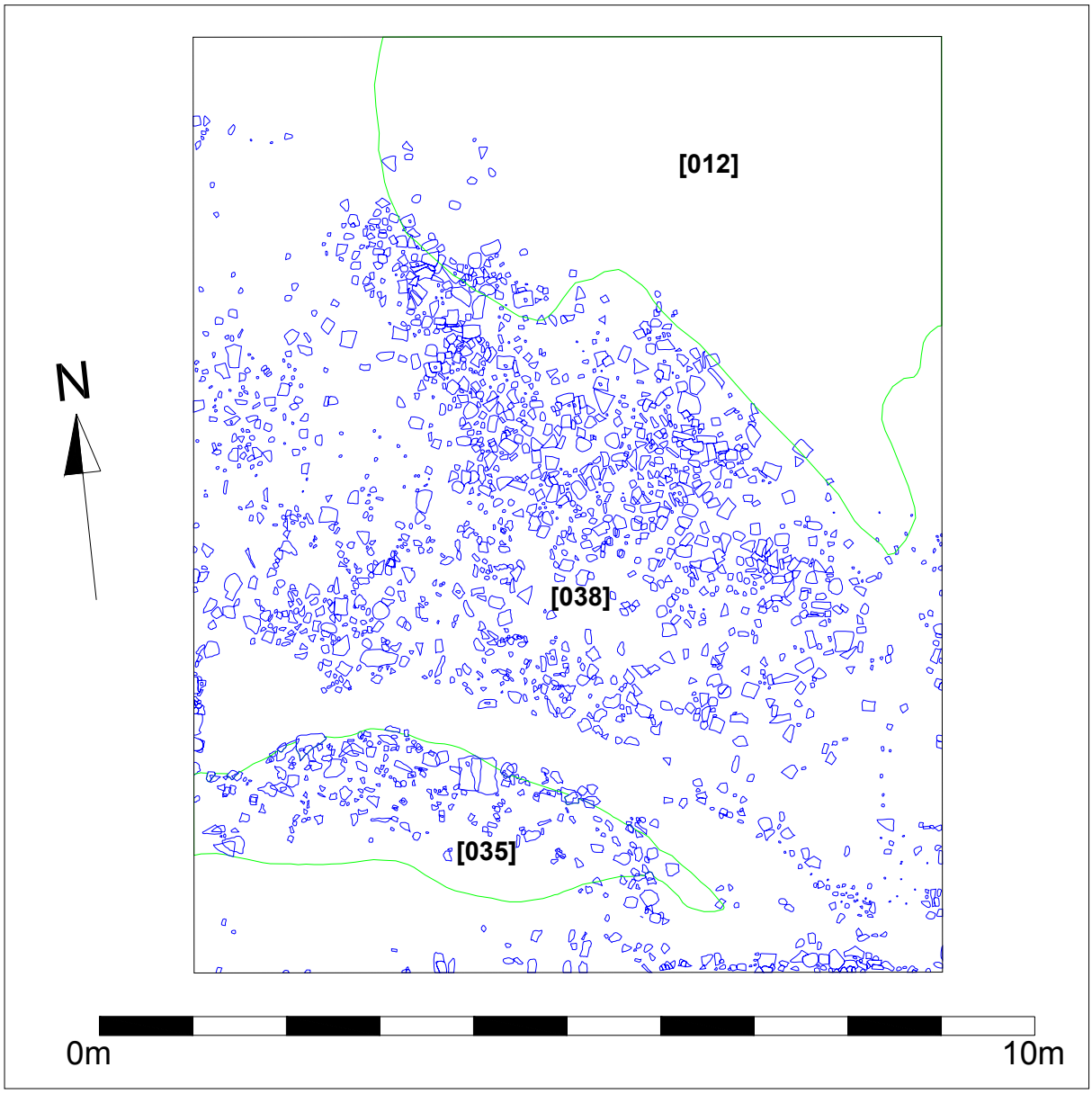


Fig. 16. The stone scatter [038] and associated deposits, at the beginning of the sequence of the charcoal horizon in Area A.

scatter but that feature can plausibly be interpreted as a measure to make it easier to walk on the damp ground.

The artefacts associated with the charcoal horizon are overwhelmingly inorganic – 83% of the stone in the 2012 excavation came from [1003] but only 27% of the wood and 28% of the much more rare leather. 20% of the bone-find numbers are from [1003] but as these are largely very small amounts of burnt bone, compared to large volumes of unburnt bone from [1004], the real difference is much greater. Some 75% of the stone artefacts from [1003] are steatite fragments, the rest mainly whetstones. It is likely that the majority of the unburnt, organic finds from [1003] are

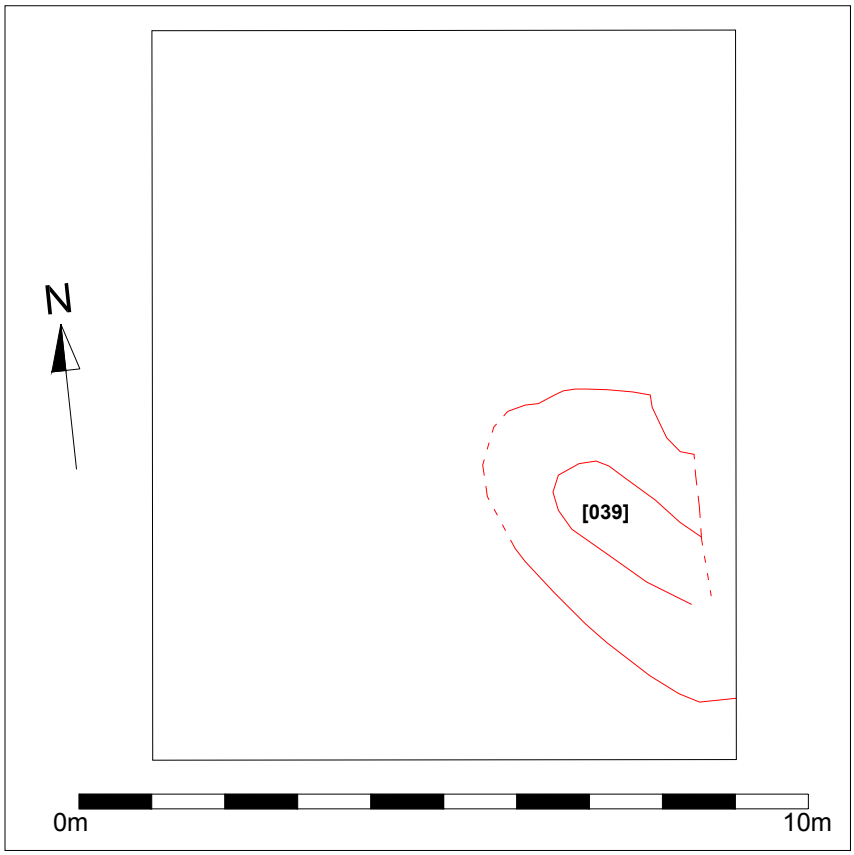


Fig. 15. Negative feature [039] at the interface between the charcoal horizon [1003] and the wood chip layer [1004] below.

Fig. 16. Negative feature [039], looking west

residual from the underlying wood-chip layer underlining how stark the difference is between the two principal deposit types. They clearly represent two very different types of material and depositional processes. It is possible that the much smaller organic component in [1003] is a result of the processes that created these layers but it is also possible that it is a matter of preservation. The relatively good condition of the few organic finds in [1003] suggests that this is not primarily a conservation issue and that the [1003] layers are a result of processes which sorted out or destroyed organic materials. Burning is the obvious culprit.

Although a clear-cut distinction between the charcoal horizon and the wood-chip layer emerged from the investigations in Areas A and B there are indications that the relationship may be different in other parts of the meadow. In T29 there was a substantial wood-chip like layer ([3]) with artefacts of leather and wood, but very few animal bones, above the charcoal horizon ([4]) which was on top of another more bone-rich wood-chip layer ([5]). In T48 and T50 the principal cultural layer ([3] in both cases) appeared like a mix of the two and in the trenches to the northeast of Area A although the basic stratigraphy was essentially the same with charcoal rich deposits on top of the wood-chip layer the upper layer had more peat in it and greater densities of wood and bone. It is possible that the focus of activity or dumping that produced the charcoal-horizon deposits moved around the edge of the wettest part of the meadow and that in some places the wood-chip layer formation processes continued meanwhile and afterwards whereas in Area A the charcoal-horizon clearly represents the final episode of Norse activity in the meadow. In so far as it is possible to judge from the small test trenches it does not seem however that the cultural material is different from one place to the next. In other words it seems that it is just these two different processes that are at work in the meadow and that it is only their chronological association that is variable.

In Area A the excavation cleared all [1003] layers except the stone scatter [038] west of E1133 and the discrete layer [035] which is stratigraphically comparable to [012]. Only in the northeastern square (E1133/N1105) was the excavation carried fully through to the underlying [1004] deposits.

The wood-chip layer [1004]

Below the charcoal horizon but with a more generally easterly and much wider distribution is a substantial peat formation with frequent anthropogenic, primarily organic, material. Unlike the layers of the charcoal horizon, this wood-chip layer is not a conventional archaeological deposit. Rather it is a natural peat formation with extraneous anthropogenic material mixed in. A clue to the circumstances of this mixing comes from the heavy concentration of finds in and around Area B. Levels taken on the natural substratum show that the original land surface drops sharply between Areas A and B. There the incline is some 100 cm over a distance of 16 m while it is more subtle both to the west and to the east, in both directions less than 40 cm over the same distance. The implication is that materials moved by water piled up at the foot of this very slight slope. The nature of the finds also suggests water-sorting as the principal mechanism responsible for their accumulation in this place. The assemblage is not only almost entirely organic but it also has a size range suggesting that the force of the water was not strong enough to deposit large pieces of bone or wood in this place. Comprehensive measurements have not been carried out but preliminary assessment suggests that there are very few pieces of bone or wood heavier than 100 grams, and the majority weighs less than 20 grams.

In Area B [506] was recorded as a separate context within the wood-chip layer [1004]. It was a 1-5 cm thick layer in the SW corner of the excavation area, a little over 1 m^2 in size, on top of [505] and can be regarded as equivalent to its spit 2 in the SW quadrant and to context [004] in trench 9. Apart from this no meaningful stratigraphic divisions could be made of the wood-chip layer in Area B. As a result it was all recorded as one context ([505] south of the modern ditch [504] and [507] to the north of it) and excavated in 10 cm spits. Despite the absence of layering this deposit represents an accumulation, with frequent horizons of darker and lighter colouring, and sand lenses becoming increasingly frequent towards the base. In Area A the wood chip-layer could be divided in two. On top there is reddish peat [031] which looks similar to [502] but is less dense and more uniform, lacking the horizons evident in Area B. Below it [036] is greyer and more mixed. In both areas the wood-chip layer was 40 cm+ in thickness.

Radiocarbon dates obtained on finds from the wood-chip layer are consistent with the interpretation that it represents a build-up over time. It is clear that the

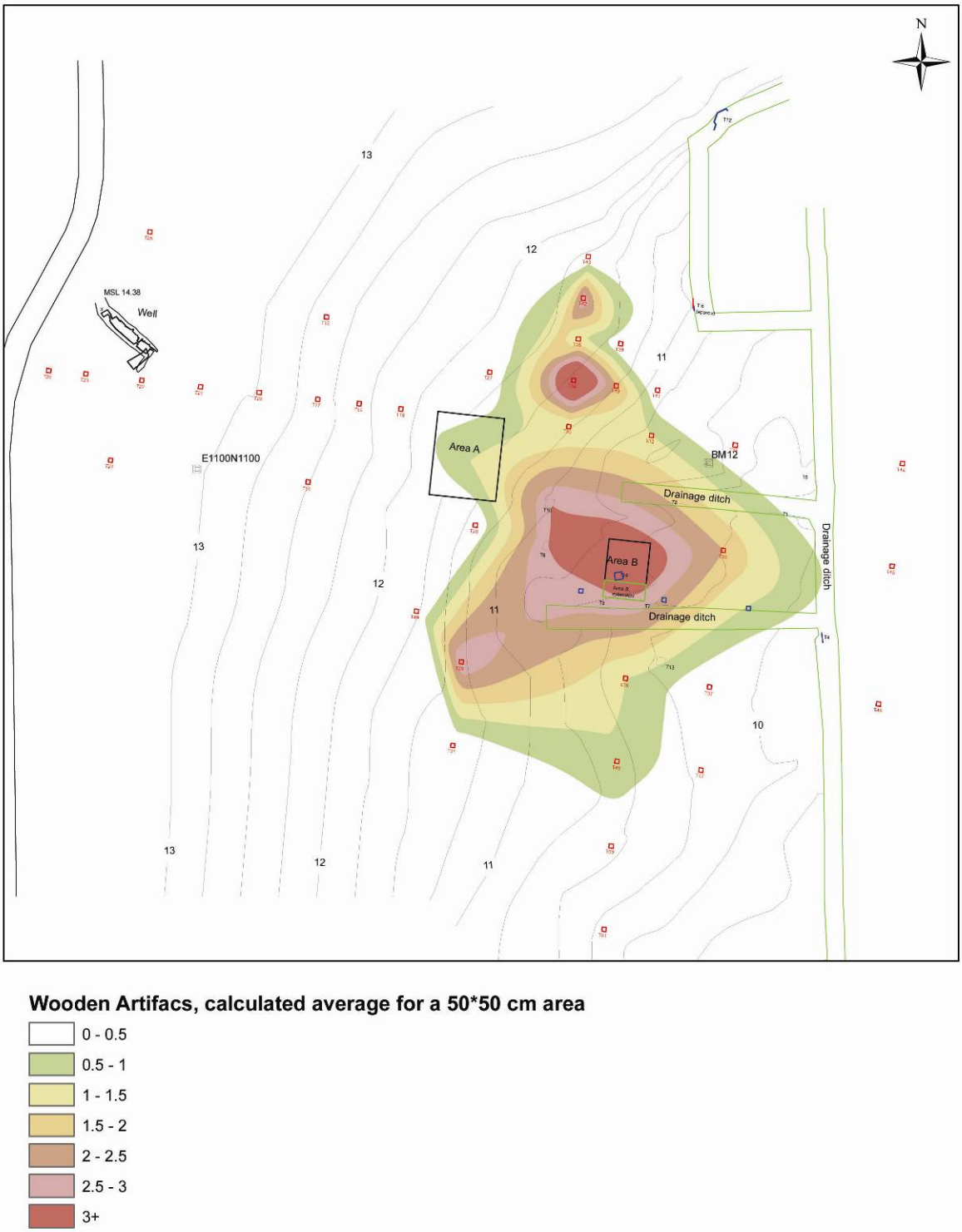


Fig. 17. Modelled distribution of woden artefacts in the wood-chip layer based in trenching in 2012 and 2013. By Hermann Hjartarson.

bottom part of the layer is significantly earlier than the top part but the dates from the middle spits in Area A suggest some mixing and possibly a rapid build-up, as the dates for spits 3 and 4 are essentially the same (see below and ch. 7).

In both areas the preservation of wood was excellent but less good of bone (seem Smiarowski's discussion in ch. 5. below). The density of bone and wood was likewise similar between the two areas. Trenching in 2013 suggested that there are higher densities of organic remains in this layer to the northeast of Area A, immediately to the south of it and also, possibly connected to the last mentioned concentration, some 20 m south of Area B (see Fig. 17 and Appendix 3). The trenching also showed that the wood-chip layer does not extend much further west than the western edge of Area A and it also has a sharp border to the north some 20 m north of the northern edge of Area A. The artefacts, bones, wood chips and twigs in this layer have essentially the same distribution although it may be that twigs and smaller wood-chips are spread over a slightly larger area, 20-30 m further south and east than the other material groups, and bone density may be more uneven within the core area than the densities of the other material groups (the difference in bone vs wood quantities between T26 and T29 is particularly pronounced). The spread of anthropogenic material is limited to a boat-shaped area at the upper edge of what must have been in the middle ages a bog at the foot of drier meadows but the peat formation in which the material is embedded has a much greater distribution to the south and east although it is, as a rule, only 5-15 cm thick outside the area of material culture accumulation. The concentration of the material culture in one corner of this widespread layer is another reason to think that the layer itself is a natural formation. It is another matter to what extent this natural process should be seen as a consequence of human modification of the landscape and this will be considered below.

Natural substrata [1005]

Below the wood-chip layer there was everywhere a dense gravely sand, frequently with large stones ([037] in Area A, not given a number in Area B), undoubtedly an old sea-bed.

The open area excavations in Areas A and B did not corroborate the interpretation of Buckland et al. that there was a sharp border between the underlying natural layers and the wood-chip layer. If true this would imply, as Buckland et al. (2009, 114) explain, that the original land surface had been stripped, perhaps to use

Fig. 18. Natural substrata exposed after removal of wood chip layer [505]=[507]. Kristborg Þórsdóttir drawing the section shown on Fig. 7.

the turf for building, and that would account for the lack of evidence for any deposits that could be associated with earliest settlement around 1000 AD.

Observing the transition from natural to wood-chip layer in the open area trenches it looked decidedly gradual with frequent lenses of sand mixed in with the peat towards the base of the wood-chip layer. Considering the fundamentally different nature of these deposits in one sense the border between them cannot be anything but sharp, but unequivocal evidence for stripping was not found during the 2012-2013 investigations.

Other features

As explained above remains of charcoal and burnt bone have been observed in different parts of the Igaliku fields but it is not possible to relate all these places conclusively to the charcoal horizon [1003]. In Area C, close to the well, trenches 22 and 23 had a cultural layer ([003] in both cases), a charcoal stained greasy layer of sandy silt with crushed burnt bone and ash, which was in many respects similar to contexts [016] and [027] in Area A and could represent a separate but similar activity

Fig. 19. Location of sections recorded in ditch G5 shown on Google image from 2011. The red shading indicates the approximate area of dense cultural material in the meadow.

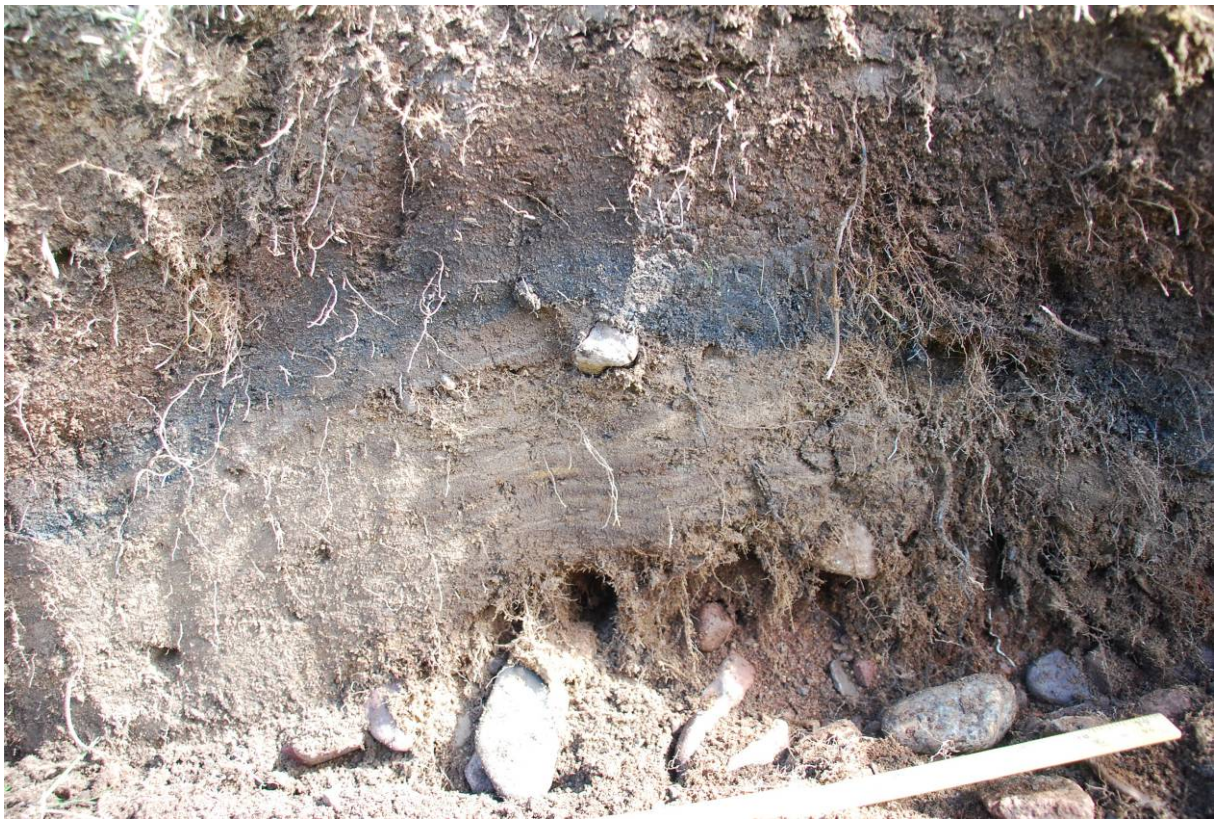


Fig. 20. Banded peat (=turf?) below a charcoal horizon in section G5-3.

area, but also possibly a floor inside a building. Whether an open air activity area or a building its location suggests that it is associated with the well.

A number of sections cleaned along G5, some 80 m south of the excavation Areas A and B and of the well, revealed a charcoal stained layer, at most 7 cm thick, with small pieces of charcoal and burnt bone. The soil matrix of this layer was different from that of the charcoal-horizon [1003] proper, more peaty and essentially no different from the underlying non-charcoal stained peat formation which in the area of G5 was entirely free of wood chips or other intrusive material although it is no doubt the same natural deposit. The G5 sections suggest the same basic sequence: peat formation preceding the deposition of charcoal but the charcoal in this area is more akin to an actual spread, as would result from manuring of midden deposits, than the more definite cultural layers in the [1003] group. It is possible that there is a relationship but it is not possible to claim that these horizons are one and the same.

In a north facing section cleaned at the junction of G5 with the ditch that channels water southwestwards from the well there was a 6-12 cm thick layer of pale-brown peat, with short undulating lenses of sand. This may be a turf construction, possibly a field boundary.

Farm mound

The limited quantity of organic remains retrieved in the 1926 excavation on the farm mound suggests that organic preservation is poor in this part of the site. To assess conditions on the farm mound some observations were made in 2012 through coring and the digging of a single trench (T14).

Peter Steen Henriksen cored in five places where a midden is indicated on Paul Nørlund's map of the site and in four of those a 17-35 cm thick midden layer was observed in the core. The animal bone looked degraded but the results suggest that the middens layers observed in 1926 have not been completely dug away.

T14 was placed north of the great hall (Nørlund's room IX) as far north as possible inside the fence around the ruin area. The trench hit the top of a turf wall (possibly the north wall of rooms XI and XII, or other walls slightly further north) and

Fig. 21. Kite photo taken 10.08.12 showing Trench 14 under excavation.

Fig. 22. Collapsed turf wall [004] in Trench 14.

was as a result not as informative as had been hoped. The topsoil [001] was 8 cm thick, below that was a 14-16 cm thick layer [002] of mixed brown silt with frequent small stone and modern glass, probably from 19th-20th century cultivation. [003] was a 18 cm thick layer of turf debris with lenses of ash, traces of charcoal, some pebbles, wood chips and a single piece of unburnt bone. The state of preservation of the organics is poor. This layer was 100% sampled. Below this was more compact turf from a wall [004], possibly collapsed. The turves are 20x8 cm and include lenses of ash. This was not dug into.

These very minimal observations (see also Henriksen's report below) confirm that there is preservation of organics on the farm mound although it is poor, at least in the top 50 cm. They also indicate that the midden layers recorded in 1926 were not completely removed. No dating evidence was obtained from these limited interventions.

Dating

Preliminary analyses of the artefact assemblage suggest a general post-Viking Age, medieval date (see Interim finds summary below). None of the artefacts allow a narrower date-range to be suggested and the vast majority are in fact completely undiagnostic in terms of chronology. The only possible exception is the suggested Raeren, late 15th century, ceramic sherd x-843 from context 036 discussed in ch. 3 below. If this identification is confirmed it would suggest not only a significantly later end to the settlement than traditionally assumed, but also that the site chronology is badly mixed up.

Two radiocarbon determinations had previously been obtained on seeds retrieved in 2005 but a further 12 were added from the 2012 assemblage (see Table 1 in ch. 7). These suggest at date range of 1279-1419 (2σ) for the charcoal horizon [1003] and a range of 994-1400 (2σ) for the wood-chip layer [1004] although the majority of the determinations fall within the 12th and 13th centuries with a definite bunch-up in 1150-1250 (see also Schmid's discussion in ch. 7). It is quite possible that peat-formation continued in the lower lying areas represented by Area B after the charcoal-horizon began to accumulate as recorded in Area A, and that therefore, despite the clear stratigraphy these groups are partly contemporary.

A cherry stone retrieved from the bottom spit of [505] proved to be modern. It is from the edge of the modern cut [504] and is obviously intrusive to [505]. Although all the other determinations confirm medieval dates this one has to serve as a warning that there may be more modern contamination in the assemblage.

The earliest date – 994-1154 (2σ) – is on a hazelnut from [505], spit 4, the second lowest, above the basal spit. A determination on a cattle bone from spit 2 gave an almost identical date to a bone from spit 5 and is therefore out of sequence. These results may indicate that the nut and the bone were old when deposited or that the layer is mixed. Both options are in fact likely: the finds undoubtedly represent a secondary deposition and the wet and spongy nature of the soil in the bog means that only the slightest trampling by humans or animals could easily move individual pieces around. Considering this it seems all the more remarkable that the other 11 determinations line up in a chronological sequence.

The radiocarbon sequence can be interpreted in two ways: either these deposits formed gradually over a long period of time, perhaps c. 1050 to 1420, or they accumulated in a much shorter space of time. Dates for the charcoal horizon [1003] overlap in 1304-1325 and in 1384-94 (due to a wiggle in the calibration curve) and clearly follow very closely in time from the formation of [031], the upper wood-chip layer in Area A, which has dates between 1270-1316 and 1355-1389. It is therefore safe to ascribe the charcoal horizon [1003] a 14th century date and it is conceivable that it was laid down in less than a decade. Seven out of ten determinations for the wood-chip layer overlap in 1163-1223 while the two latest overlap in 1290-1389. This suggests a minimum formation period of 150 years while the possibility cannot be excluded that the peat formation progressed in fits and starts. The wood-chip layer most likely dates from c. 1150-1300 although its greatest part seems to have formed in 1150-1250.

Conclusion

The principal result of the 2012-2013 investigations is that the archaeological deposits in the meadow do not represent a single element as had been previously thought (Buckland et al. 2008) but two distinct and separate layers with different dates and distribution. On top there is a charcoal horizon with a limited distribution at

the upper edge of the wettest part of what must have been in the middle ages a quite wet bog. This dates from the 14th century, quite likely a fairly short space of time, and represents an activity area of some kind, the nature of which remains enigmatic. It is conceivably related, in chronological sequence if not function, to the spreading of midden as manure in different parts of the field. The charcoal horizon partly overlies an earlier wood-chip layer which has formed in the bog proper, mostly in the period 1150-1300. The wood-chips, animal bones and artefacts have piled up at the upper edge of the bog in an area of c. 80x60 m but the peat formation which they are embedded in is much more widespread and is itself the result of natural processes.

The open area excavations in 2012 produced large volumes of artefacts and animal bone, the preliminary analyses of which are described in separate chapters below. The finds constitute not only important evidence in their own right with implications for Norse Greenlandic problems of various kinds, but they also form a part of the puzzle about how these archaeological deposits formed and what they tell us about medieval Garðar. Some tentative ideas on this matter will be described in the final chapter of this report.

The very limited and tentative investigations carried out on the farm mound in 2012 suggest that although there is preservation of organic materials it is poor, and much poorer than in the meadow. It is not possible to state that preservation conditions in the mound have deteriorated since 1926 and it remains possible that conditions are more favourable in deeper parts of the mound. One of the reasons for carrying out major research in the meadow was concerns that its organic materials were in danger of decomposition on account of warmer climate and drainage of the soils. The excavations showed that the drainage ditches are having a negative effect on the preservation of the organic material in the meadow, although the visible effects are limited to a 1-2 m zone around the ditches where the soil has dried out and where the preservation of wood and bone was significantly worse than further away. In this zone the development is rapid – the ditches dug for the first time in 2004-2005 have clearly already had a significant negative impact and it is to be expected that unless the drainage is reversed or the materials salvaged the archaeological remains preserved for centuries in the meadow will be severely reduced.

3. Interim finds summary

Guðrún Alda Gísladóttir

with contributions by *Jette Arneborg, Karsten Sacher and Per Kristian Madsen*

Introduction

In the 2012 excavations in Igaliku, 8004 finds (animal bones/food waste excluded) were retrieved. By far most of the material is wood (7495, 94%), and the largest finds group (6535, 82%) is made up of worked wood; i.e. sawed, cut and whittled but unidentifiable pieces of wood.

Everything that came out of the ground was kept, the larger pieces were handpicked in the excavation and the rest retrieved in the sieving process (100% in most contexts). For the wet sieving brackish water was used, as there is a shortage of fresh water in Igaliku. Therefore it was noted in the excavation database if the finds had been in contact with salt water or not. Most of the finds were then washed in the field with fresh water. All finds were packed in the field and as the site was water-logged organic materials are kept wet until conservation is finished. Other finds were dried out slowly. All finds were registered and photographed in the field, finds work continued at the National Museum in Copenhagen in March 2013 and at the Institute of Archaeology in Iceland in May that same year.

The excavation was divided in two main areas, A and B. Before those areas were opened an extensive test trenching had been carried out, trenches 1-13 (see ch. 2 above).

Trench no	Count of finds	Trench no	Count of finds
1	9 + animal bones	8	107 + animal bones
2	4 + animal bones	9	581 + animal bones
3	9 + animal bones	10	303 + animal bones
4	8	11	9 + animal bones
5	0	12	0
6	0	13	134 + animal bones
7	13 + animal bones	14	1 + animal bones

Table 1. Table of finds from test trenches 1-14. Total count: 1178. See also Table 1 in ch. 2.

Area A is within a cultivated home field but area B is in non-cultivated area but within the home field. Draining trenches have been dug in the non cultivated area in preparation for cultivation. In both areas finds of stone (steatite incl.), leather, textile and lead were found. In area A, additionally; ceramic, glass and vitrified material was retrieved. In area A 2842 finds + animal bones; were found (Fig. 1. In area B the find count is 3991 + animal bones (Fig. 2) and 1178 finds + bones were found in trenches 1-14 (Table 1). Note the total absence of iron and copper alloys, only two lead finds,

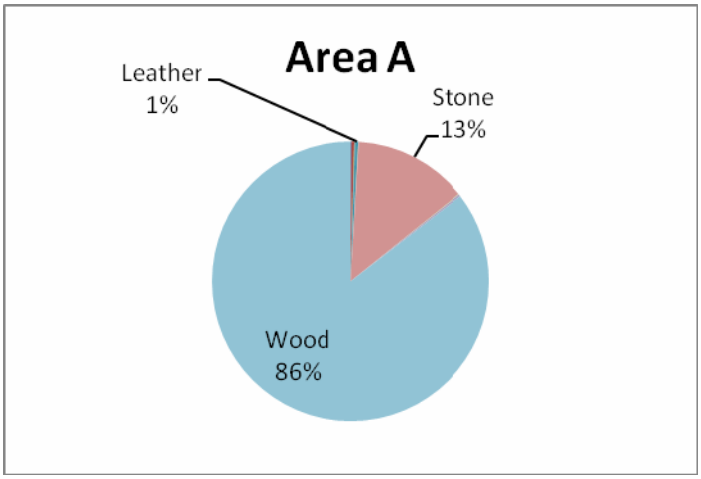


Fig. 1. Finds from area A. The material types are: Bone 3, ceramic 9, glass 2, lead 1, leather 10, seed 1, nut 1, stone 383, textile 2, vitrified material 6, wood 2424. Other materials than wood, stone and leather are less than 1%.

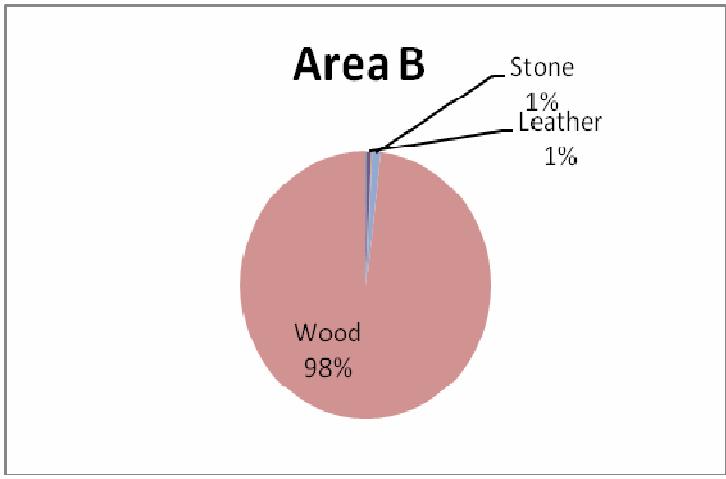


Fig. 2. Finds from area B. The material types are: Bone 4, fruitstone 1, lead 1, leather 17, barley seed 2, hazelnut 3, stone 45 and wood 3918. Other materials than wood, stone and leather are less than 1%.

both weights, were found.

Deposits were grouped by stratigraphy: 1001, 1002, 1003 and 1004 (see also ch. 2). In Table 2 are only listed deposits that included finds - unstratified finds are not listed.

Group no	Area A Deposits	Area A Find count	Area B Deposits	Area B Find count	Test Trenches	Test trenches Find count
1001: Modern and mixed. Top soil and disturbance from recent ploughing, ditch digging and leveling of the homefield	002, 003, 004, 006, 018	228	0	0	0	0
1002: Post-Medieval. Turfy silt above cultural	0	0	502	214	0	0
1003: Charcoal layer	005, 011, 013, 016, 019, 020, 023, 024, 025, 026, 027, 038	1106	0	0	0	0
1004: Wood-chip layer	012, 021, 031, 036	1450	505-0, 505-1, 505-2, 505-3, 505-4, 505-5, 506, 507-3, 507-4	3777	8, 9, 13	732
1002/1004	0	0	0	0	8	86

Table 2. Find numbers by groups in Areas A and B.

Definite modern artefacts were found in the uppermost deposit 002 in area A, mixed with secure medieval material. Deposits 003, 004, 006 and 018 are also within group

Fig. 3. Map of area B, trench through the area and drainage ditch south of the area. North is up.

1001 and are affected by modern disturbance but no definite modern finds were spotted. Modern artefacts were found in trenches 1 and 2, but those are loose finds. It became clear when excavations started in area B that a modern trench [had been dug through the targeted area. The trench lies through NW corner towards SE and affects all corners except the SW and the extensions, which however are very close to ditch G4 (Fig. 3).

The disturbance from the trench does not cover the hole SE-quarter and e.g. no ceramic or glass was found, but there is an obvious modern disturbance near the edges of the trench but very minimal as the bulk of the finds are indisputably medieval. The distribution of finds in area B by quarters is shown in Table 3. The differences clearly relate primarily to the area of modern disturbance in each quarter.

Quarter	Number of finds	Quarter	Number of finds
NW	263 (unidentifiable wood 220) artefacts 43	**SE**	796 (unidentifiable wood 220) artefacts 43
NE	75 (unidentifiable wood 64) artefacts 9	**SW (not affected)**	1278 (unidentifiable wood 1102) artefacts 176

Table 3. Distribution of finds by quarters in Area B.

The finds summary below is organized by material and within each category there is an attempt to let the function of the finds govern the order. This incomplete overhaul is a small window into the fascinating material retrieved in Garðar 2012 and hopefully only a first step towards a holistic research and identification of this material in comparison in the wider context.

Fig. 4. Sorting of finds from the sieving process. The finds were processed in the tent on the right. Camera facing NW.

Find categories

Wood (count 7495, 94%)

There was excellent preservation of wood in both areas A and B, although individual pieces closest to G4 in Area B were visibly dried out. Species identification of the wood has not yet been concluded.

Worked wood - unidentifiable pieces (count 6535, 82%)

As mentioned earlier the largest finds group is wood, which has been worked but cannot be identified further. These finds are diverse in form and size. Some are substantial pieces whilst other are just shavings and splinters and there are different species of tree present. This ver large body of material has great research potential that can address several important issues, e.g. import of wood to Norse Greenland, the utilization of driftwood and wood-working technology.

Fig. 5. Examples of the worked wood, left X-384 and X-422.

Vessels, possible vessels and objects connected to vessels (count 79)

Staves, lids/bases, turned fragments and stoppers. In the assemblage 79 fragments of vessels, possible vessels or objects connected to vessels were registered. The objects are all fragmented lids or bases, staves and stoppers. The vessels fragments are both turned and carved.

The vessel staves is the largest group (count 40). They are recognized by the groove above the lower edge, are curved in plan and usually taper slightly upwards, and many have hoop imprints. The staves are usually plain, they are all from rather low and probably small vessels. The length of the complete staves

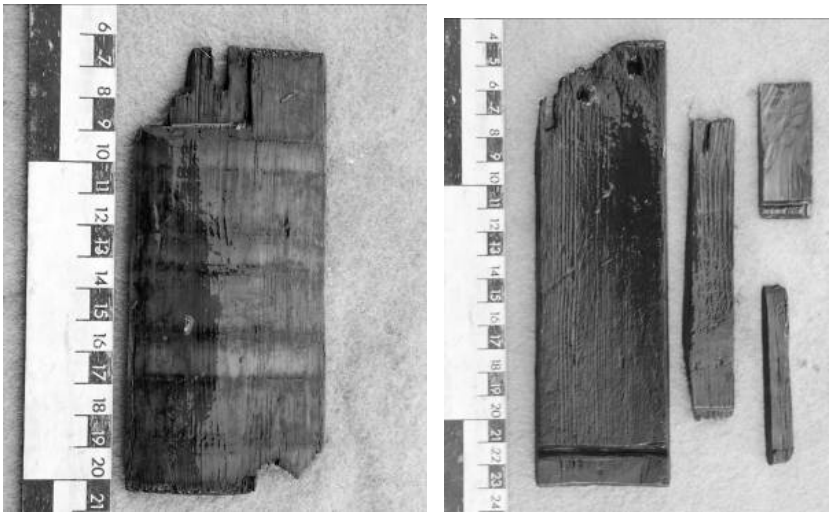


Fig. 6. Staves from vessels. Left x-848, hoop marks visible and x-883 to the right. The latter has two perforations by the upper edge, the one in the middle is reworked; the sides and end have been altered.

varies from 106-195 mm. An owner's mark is visible on one, x-325 (X with a long mid-line). Some of the staves are raised and perforated for fastening a hoop.

Elongated rectangular formed pieces are here registered as possible vessel staves, total count of 20. They have the above mentioned characteristics of staves, some have the curved plan but some are straight and have no groove. Some of the pieces have both ends broken, or instead of the groove the stave is narrowed from the point where the groove should be and downwards to the base rim/edge. Similar objects have been noted in Icelandic medieval material but their function is not fully understood (e.g. Byggðasafnið í Skógum, D-109). It is quite possible that the plain straight 'staves' have nothing to do with stave built vessels but could rather be

Figure 7. Left, x-427. The stave to the left has a hole for a handle, the rest are possible staves and the second from the left has an 'open' groove. Right, x-589, fragmented but worked rectangular shaped plates, some curved, two with possible handle holes, slight carvings on two.

connected to textile production e.g. thread winders. Many of these pieces are nicely worked and some have owners' marks and runes. Here are few examples: x-051 is convex in cross section and has carved grooves on the outside; x-589 are fragmented rectangular shaped plates, some curved, two with possible handle holes and slight carvings are on two; x-948 is a plate with one long edge split. One end is cut square, the other is rounded. In the middle is a perforation. Along the complete long edge is a groove, lining the edge, turning at one side of the hole. Another line is on the other side of the hole, turns at the edge and fades out, size 129x 32x9 mm; x-949 are two plain plates, all sides worked and straight, edges tapering, not curving.

A) Has owner-marks and runes, 155x57x7 mm, see Imer's discussion in ch. 4. below). See also discussion of thread winders below.

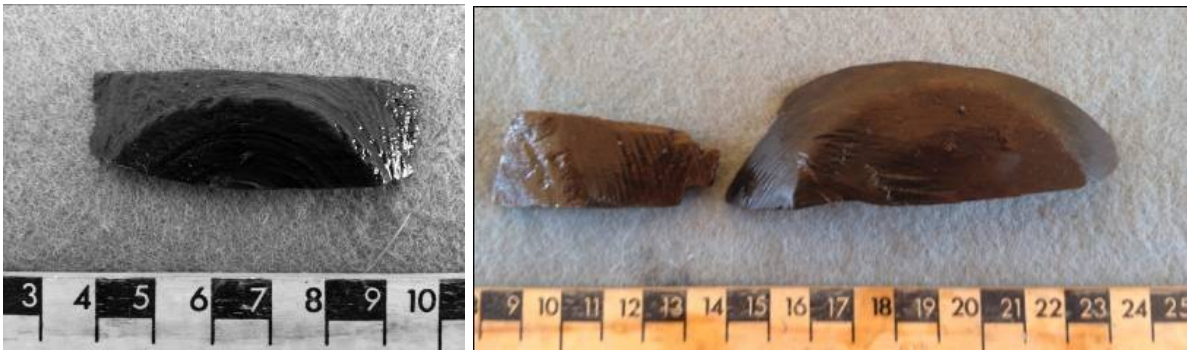


Fig. 8. Vessels, left x-053, right x- 578, B) to the left, A) right.

Two definitely turned vessel fragments are within the collection. A further two vessel fragments are carved/handmade and two more cannot be differentiated with certainty. X-053 is a turned bowl fragment. Half a base and few mm of the wall, 57x20x4 mm. X-405 are two small bowl fragments, from a wall: A) is a plain from light coloured wood. It is made by hand or lathe-turned, 86x30x3 mm. B) the inside of the fragment is plain, but the outside has a curved flange. Lathe-turned - turn marks, 50x24x10 mm. Vessel fragments x-578 include a base and a wall. A) is a bowl, base fragment. Shallow grooves on the base. Made by hand or lathe turned. 96x35x8 mm, B) is hand-made bowl fragment, base and wall present, 55x22x13 mm.

Seven fragments of lids or bases are present. It is not always possible to distinguish between those if the fragments are plain. The characteristics are the disc shape, but the edges can be either tapering or cut square. That difference can also be seen in the stave grooves indicating the difference in the shape of the edges. Here, three examples will be presented: Fragment x-844 (Fig 9) is made of multiple pieces, edges tapering. Two holes, one with a wooden nail and a groove from the straight edge towards the round one. Two dowel holes are bored into the straight edge, size 165x84x7-10 mm. X-846 (Fig 10) is a lathe-turned lid fragment with a (ribbled) rectangular notch for raised stave, now damaged. The top is convex and the lid is thick with a thinner flange for resting on the vessel rim. The notch is probably a later addition. Size 113x44x8-30 mm. X-357 is a lid fragment with a rectangular notch to fit a raised stave of a stave built vessel. The surviving edge is round and tapers from both sides. Seven fine, round grooves are visible on one side and at least five on the other side, 143x67x7-13 mm.

Fig. 11. Stoppers and stoppers? from Igaliku, x-231.

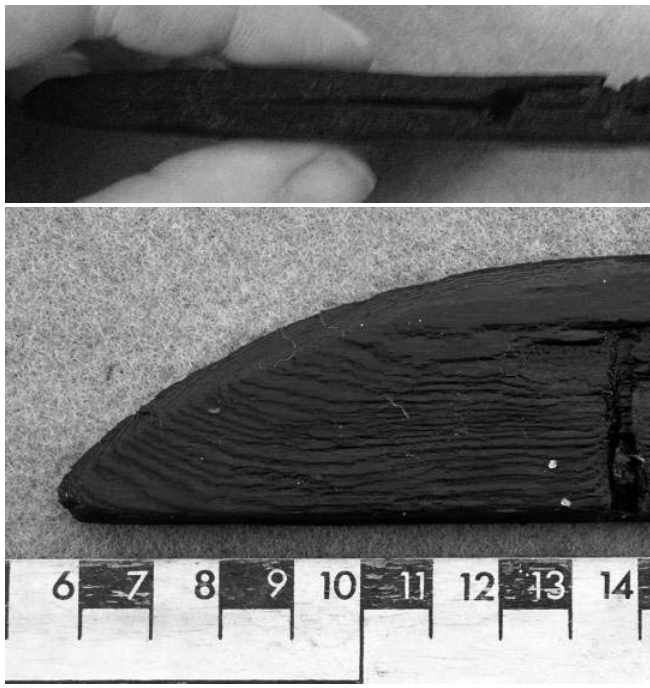


Fig. 9. Lid x-844

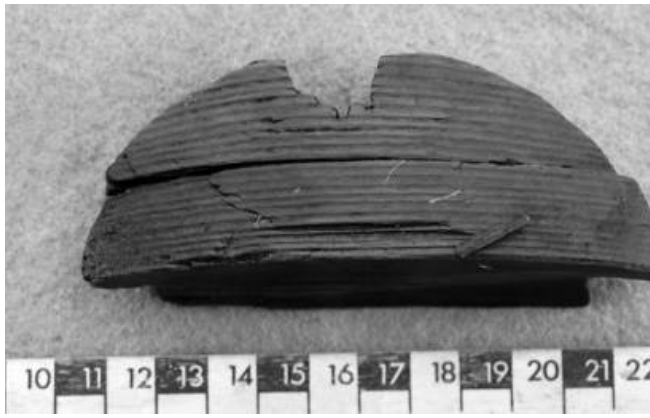


Fig. 10. Lid x-846

Stoppers have in common a round or circular cross section in the tapering lower peg. The grip or the handle can have several forms; thick, tapering or wedge shaped. The difference between pegs and stoppers is often blurry especially when the material is fragmented and the difference between stoppers is large. Only one definite stopper is identified within the material but a few are probable. Find x-231 includes: A) Stopper with a thick sturdy handle and round square cross section, 27x27. The end is cut straight. The pin has circular in cross section 18 mm in diam. end broken. B) is a whittled object, fragmented and split, possibly a stopper? 93x33x22 mm.

Textile production

Spindles (count 3). The three definite spindles bear the same characteristics; a stick tapering towards both ends and a gently sloping widening/thickening nearer to one end. This form is seen in the 'earlier' Icelandic material, but a typology or time frame has not been established. The known 19th century spindles in Iceland are different in shape than the ones found in earlier contexts, that is, the spindle widens just beneath the whorl and usually tapers evenly to the end (Eldjárn & Gestsson 1952, 48-49). Spindles of the 'earlier type' are well known from Greenland (e.g. Roussell 1936, 131-133, fig. 118, 119; Pedersen 1984, 88-89) and e.g. Norway (Østergård 2004, 47-49) and Coppergate, England (Morris 2000, 2332) and might represent a type where the spindle whorl was not needed, the thickening of the spindle replaced the additional weight (e.g. Roussell 1936, 133; Pedersen 1984, 89; Østergård 2004,48).

Fig. 12. Top, spindle x-064 and bottom, x-297

Spindle X-064 is complete, cross section is round: 8-17- 8 mm and the length 218 mm. Spindle X-851 is not complete but surviving length is 237 mm.

Thread winders? (count 5). Sub-rectangular wood tablets within the assemblage; plain, well worked, sometime with a waist are here suggested as possible thread winders (see similar e.g. Roussell 1936, 131, fig. 115). Some are very similar to staves but lack the curve in plan and the groove. In addition to those presented here are x-519, an incomplete plain plate. X-949 is a plain plate with runic inscription; see Imer's discussion in ch. 4 below.

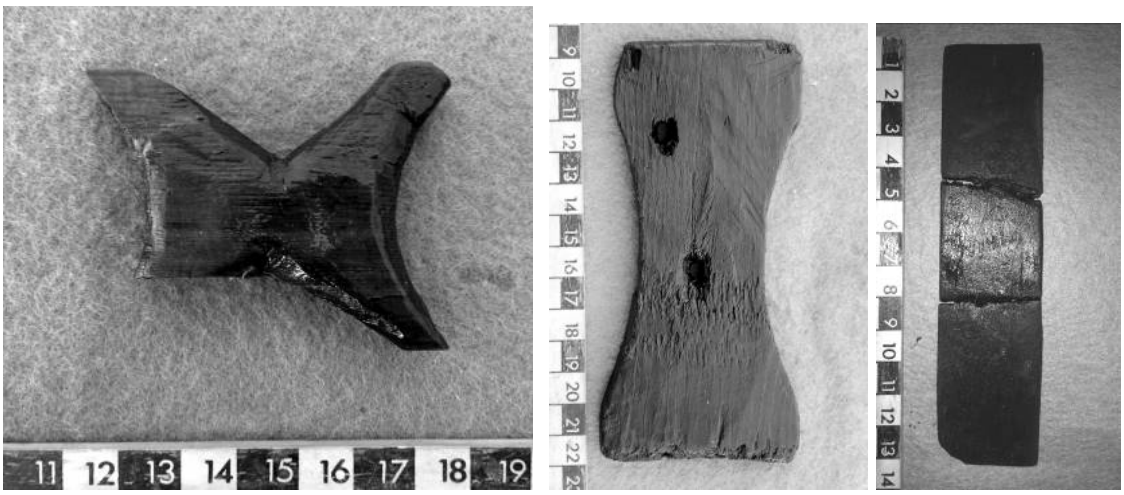


Fig. 13. From left, x-175, x-923 and x-019.

Bodkin (count 1). One possible wood bodkin is in the material, x-210, unstratified from area B (group 1004). It is a perforated flat sectioned pin, the head is broader, 14,5 mm across. The perforation is 5 mm in diameter. Nicely made piece. Size: 76x8,5-14,5x4,5 mm. See fig. 24, and a bone bodkin below.

Sword beater or a knife beater? (count 1). X-715 (Fig. 20) is a possible sword beater or a knife beater (see Øye 70-71, 82). The object is slightly curved, elongated and made of one piece, but now split long-ways. It consists of a narrow, broken projection with a rectangular cross-section, 6x8 mm. The other side is connected to a broad spade, 24 mm by the junction, tapering towards the end where it is 13 mm broad. Thickness by the junction is 11 mm, 5 mm by the spade's end. One edge is slightly thicker than the other, 7 mm versus 5 mm. The length of the fragment is 195 mm.

Pin beater (hræll) (count 2). There are two possible pin beaters, x-383 and x-729. X-383 is a fragment, streamlined and partly split longways. The surviving surface is

worn. Ends are complete and blunt. Size: 96x14x9 mm. X-729 is ca. 110 cm. Icelandic pin beaters vary in length from ca. 100 - 200 mm (Sarpur: Menningarsögulegt gagnasafn 2013).

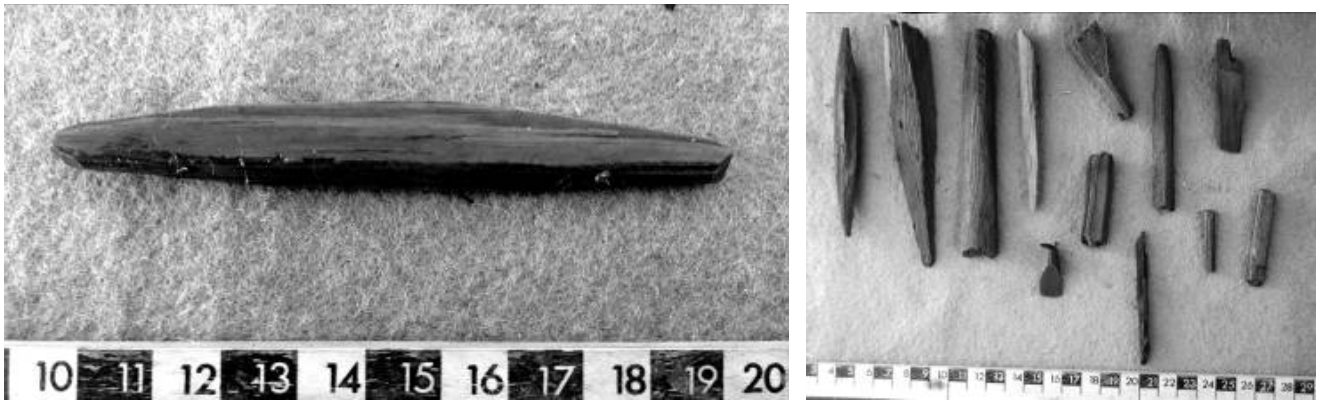


Fig. 14. Left x-383 and right, x-729, furthest to the left is the possible pin beater.

Pegs and nails (count 364)

This is a large and diverse group within the find material. They come from both areas and trenches 8, 9, 10, 11 and 13. The material is fragmented so the total length of the objects is usually unknown, but furniture fittings/nails are more dominant than structural fittings/nails, based on the size and dimensions of the pegs. A head is present only in 26 instances, only two come near to what is categorized as a 'differentiated' head (see Morris 2000, 2376 fig. 1176), pegs with abrupt division between the head and shaft, x-783. The nail heads are usually rounded, the head flat, raised high and rounded but still sometimes faceted, usually with four facets. Interesting is the category of pegs and nails with one side flat, probably wedges of some kind for securing fittings. The shanks are circular in cross section, some taper evenly on four sides, others on two, the end can be pointed, round or wedge shaped.

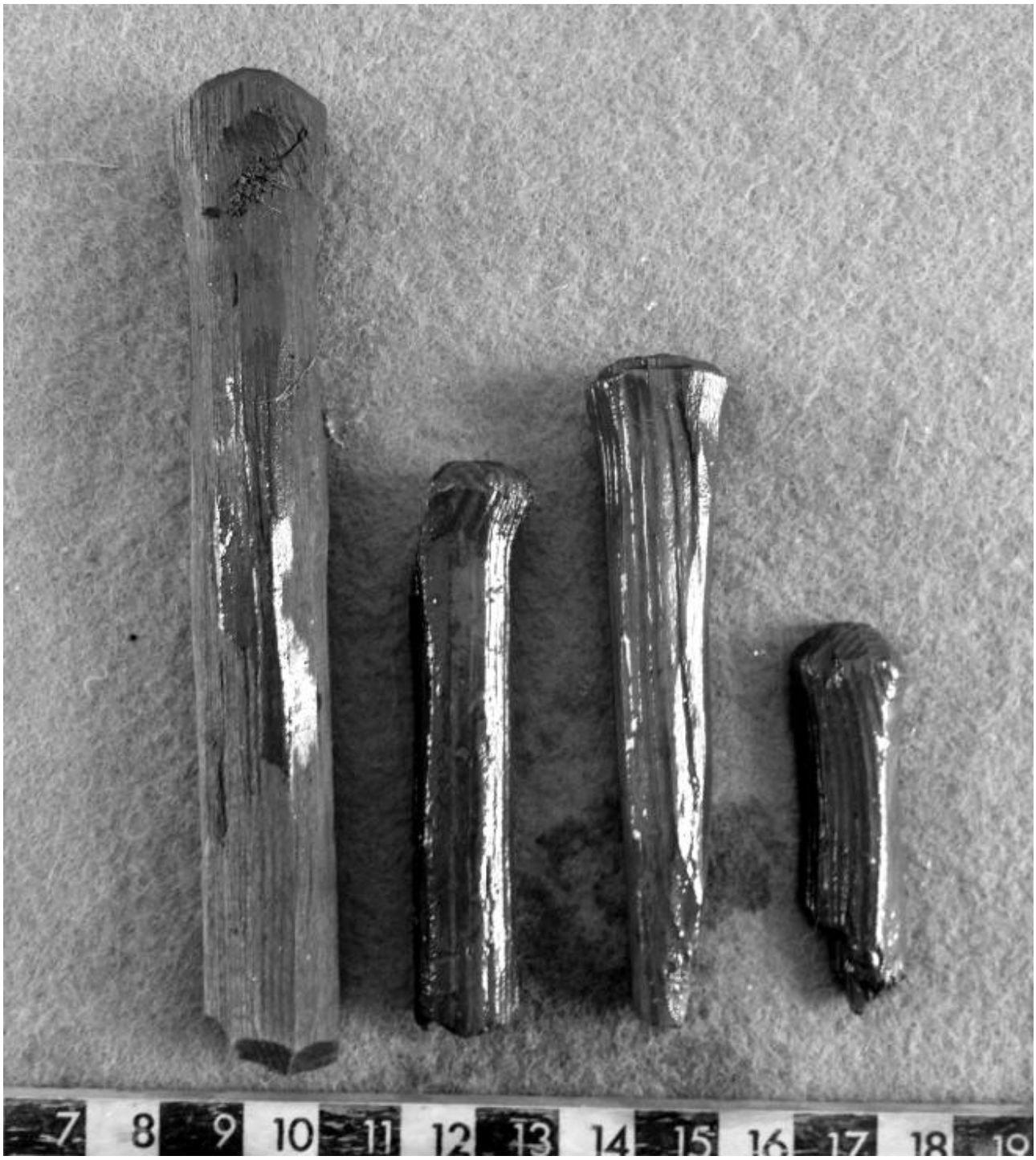


Fig. 15. X-512: Pegs and nails, two are complete, the one on far left is 128x17 mm with high rounded head and non tapering sides, end blunt. The second from the right is complete, 85x8-13 mm a nail with flat rounded head. The nail furthest to the right has four faceted head.

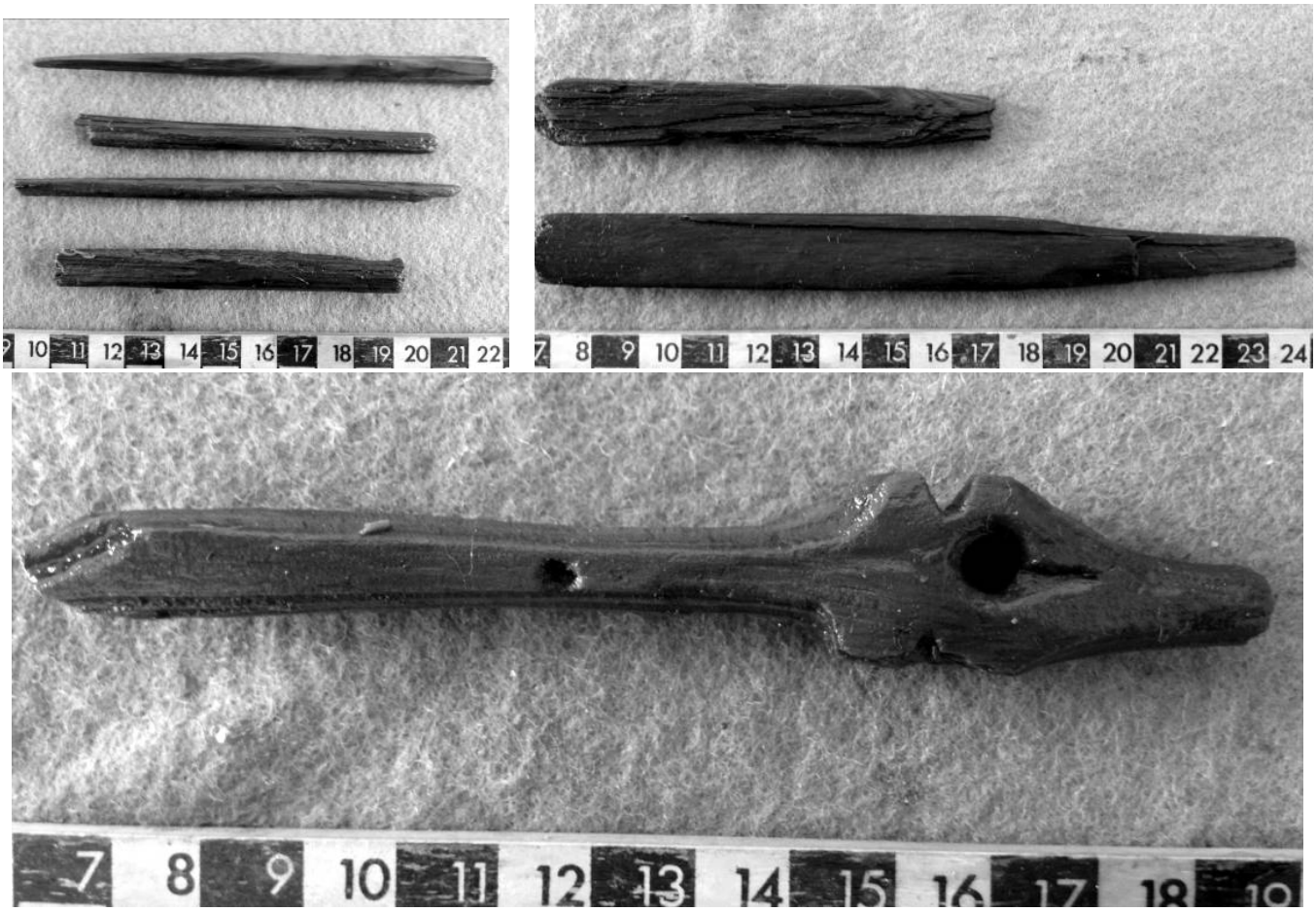


Fig. 16 Top left x-580, top sausage pin and then second from bottom. Top right, x-230, examples of flat sectioned fragments. Both those examples show handle? and a flat sectioned projection. Below, X-281, animal headed pin with perforaton. End reworked.

Pins (count 112)

The pins are of diverse form and size and the only thing they have in common is a slender structure. Their function is difficult to decide and the material is fragmented, but there are interesting patterns noted. A portion of the pins are flat sectioned with the dimension of 10-11x5-7 mm. These fragmented parts are so similar that it must be consider that they have definite purpose. The category of sausage pins or probable sausage pins counts 22, those pins bear specific characteristics, are rather straight with round cross section and pointed tip. One of the pin is decorative, x-281, a carved animal headed pin. The head is ca. 48 mm long. The snout is elongated and the end broken. The eyes are perforated through the head. A triangular shaped notch is carved into the upper edge, just behind the eye are the ears, the lower side is plain. The head has the widest dimensions, 12x19 mm. The shank is narrowest

near the head, 8x9 mm, but thickens towards the end 8x11 mm. The end has been reworked, possibly a mending when the shaft broke, surviving length is 125 mm.

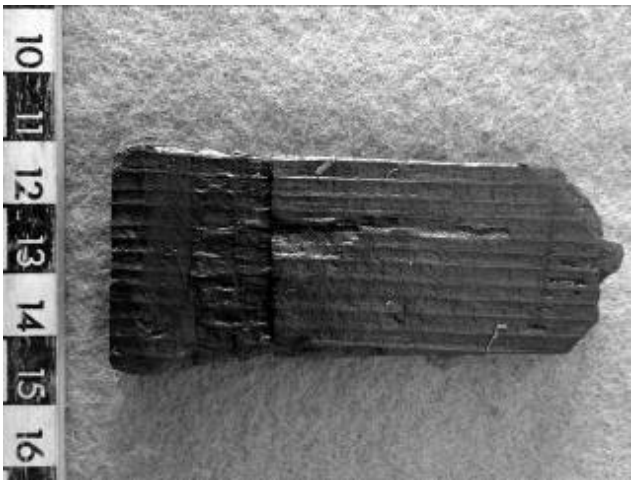


Fig. 17. Cross end?, X-189

Cross? (count 1)

X-189 is a possibly a end of a cross arm. The flat sectioned plate has a groove and sides rippled by the complete end, which is also cut straight and turns outwards from the groove. The plate tapers slightly towards the broken end. Fragment size: 75x28-36x11 mm.

Tally sticks? (count 6)

The possible tally sticks all have notches or some kind of grooves and stand out in the assemblage. They are of various quality in how they are made and also in preservation. Some of the sticks in this category have decayed or damaged surface so the grooves are vague.

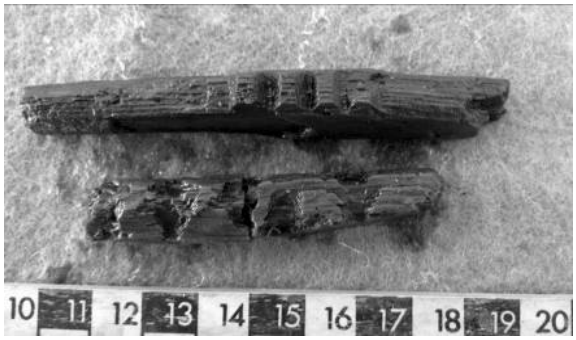


Fig. 18. Tally sticks? Left x-408, right x-190.

Toggles (count 2)

Two toggles are present. X-295 is an oblong stick with a tapering round end, the other is broken, and ca. 15 mm groove in the middle. The cross section is half spherical, surviving length is 96 mm. X-564 is probably a badly made toggle. It is a whittled twig, all twisted, ends broken. The traditional groove is in the middle. L: 112

mm. Rope ends were fastened to the toggles, in Iceland such objects are associated with riding gear, the rein (beislistyppi) at least in the 19th century, but sheep legs could also be used to dasten or secure the end of a rope through a loop. Roussell points out that similar objects were found in the Oseberg ship associated with the rigging and have also be found in Inuit contexts associated with lines for dog sledges (Roussell 1936, 103)

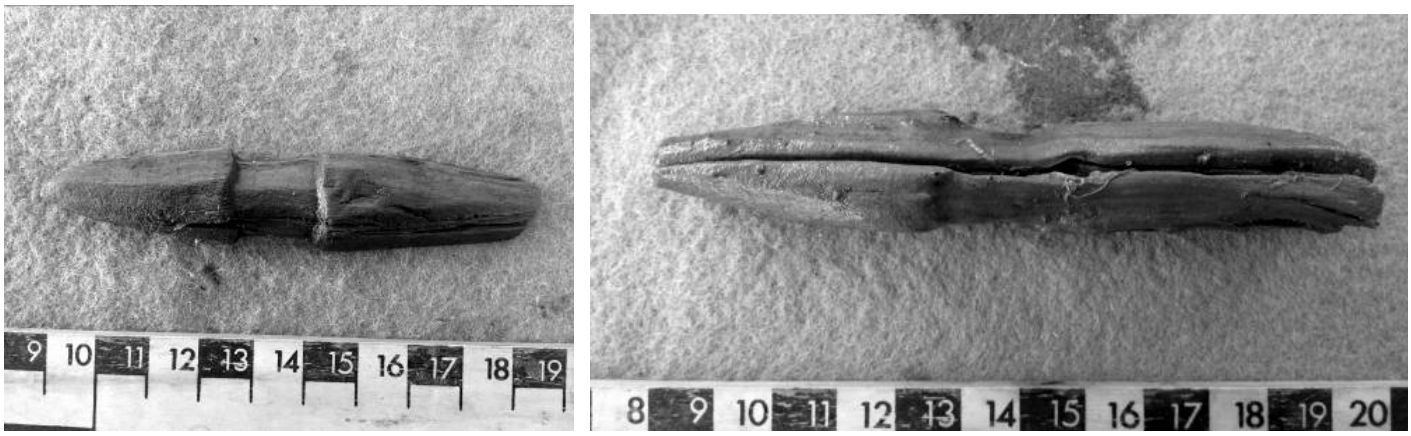


Fig. 19. Toggles. Left x-295 and right x-564.

Toy? (count 1)

A horse figure x-421 was found in area B. It is carved but the head is broken away. This is a flat figure with angular and curved edges, thickness 8 mm. Surviving length: 65 mm. Longest surviving breadth 36 mm. A X-mark is on the horse belly and the figure is able to stand alone.

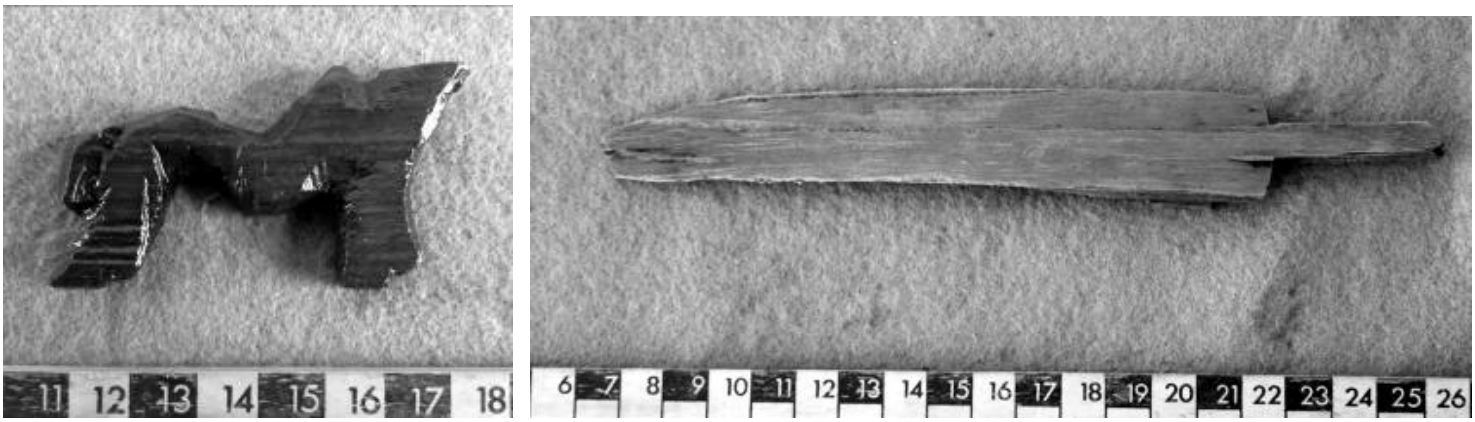


Figure 20. Toy horse x-421 and possible a sword beater or a knife beater x-715, see discussion above.

Comb (count 1)

X-583 is a complete connecting plate of a single sided comb. The plate has soft trapezoid form, a decorative groove along the long edges. Eleven rivet holes are along the plate which has a convex cross section and a flat backside. The object is broken in two conjoining pieces. Saw-marks from the making of the tooth plate are visible on a part of the lower edge.

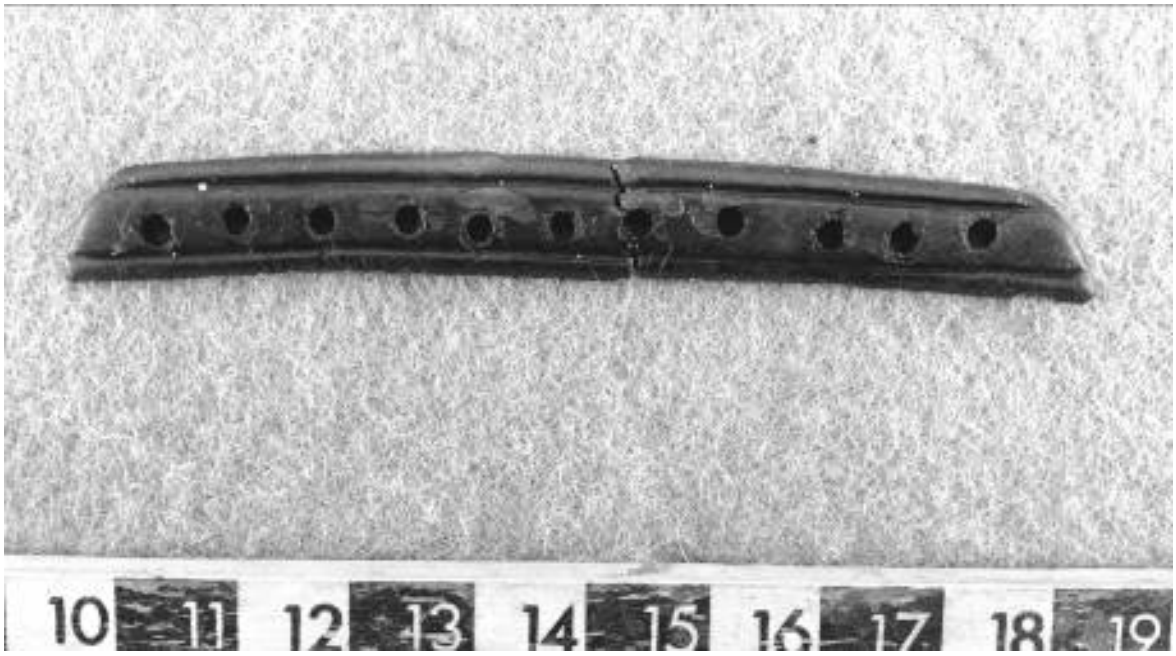


Fig. 21. Connecting plate X-583

Tools and objects (unidentified)

Below are listed a few finds that have specific form and stand out in the assemblage as definite objects, although further identification is yet lacking. X -407 is a tool, broken at both ends. The cross-section is flat round, 14x8 mm by the handle and the narrower arm is 10x5 mm. L: 111 mm. X-607 is a tool with a spatulate head and a broken handle. The handle has a faceted round cross-section, ca. 10 mm. It is attached to the spade by the upper edge. The spade tapers towards the end, the side edges are cut straight, 5 mm below, 7 mm on the shank side. L: 84 mm. X-567 is an elongated one piece wooden tool, one end broken. Complete handle, end cut square, cross section round triangular 16x11 mm. Carved wood collar (hilt) by the junction, ca 15 mm broad, cross section round rectangular 15x9 mm. The tool has a flat round section, 12x9 mm, surviving stub ca. 17 mm. L: 107 mm. X-205 Whittled tool? Complete ?handle and projecting pin? Flat sectioned, 16x6 mm by the broader end,

10x5 mm by the narrower end. The ?handle has six plains and has a possible owner mark X marked on one side. This part is ca. 93 mm long. The narrower part is whittled and broken. L: 110 mm. X-116 is a fragment of a round object. It is a round plate with a hole in the middle. The surviving sides are round. A 7 mm flange is inside the hole by the edges. There is a small decorative triangular pattern along the edges, opposite each other (8 visible by the hole and 8 by the outer edge). Two fine grooves frame the triangular pattern by the outer edge. Two pairs of fine grooves are above the triangular pattern, by the hole edge. A large, irregular ring and dot pattern is visible in the mid-area, the rings are double-lined (four and a half are visible, size varies). Size is 110x70x12 mm, the flange is 8 mm thick. X-406 A) is a curved plate with two perforations, one edge partly complete, the other broken. Possibly a stave from a vessel. Size: 124x47x8 mm. B) is an oblong stick, with both ends broken, and a flat rectangular cross section, 14x7 mm. The object tapers towards both ends. An elongated rectangular hole is nearer to one end. Length: 173 mm. C) is possibly a

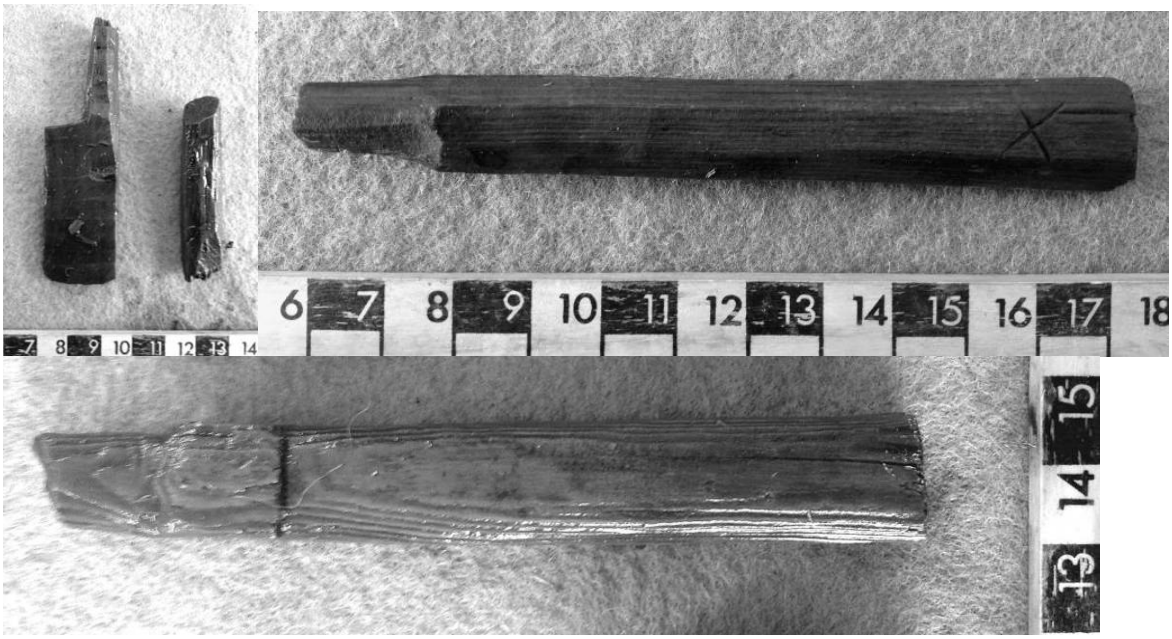


Fig. 22. Top left x-607, top right x-205, bottom x-567

handle and is similar to hilts. It is a curving object with a soft triangular cross-section. There is a rectangular perforation in the middle and slightly narrower notches to the sides of the hole. Complete object. 97x33x20 mm. X-183 is in one piece, a complete object. It narrows towards one end. It has a rectangular cross section and the shape in plan is sub-rectangular. The object has a carved notch into one side and a

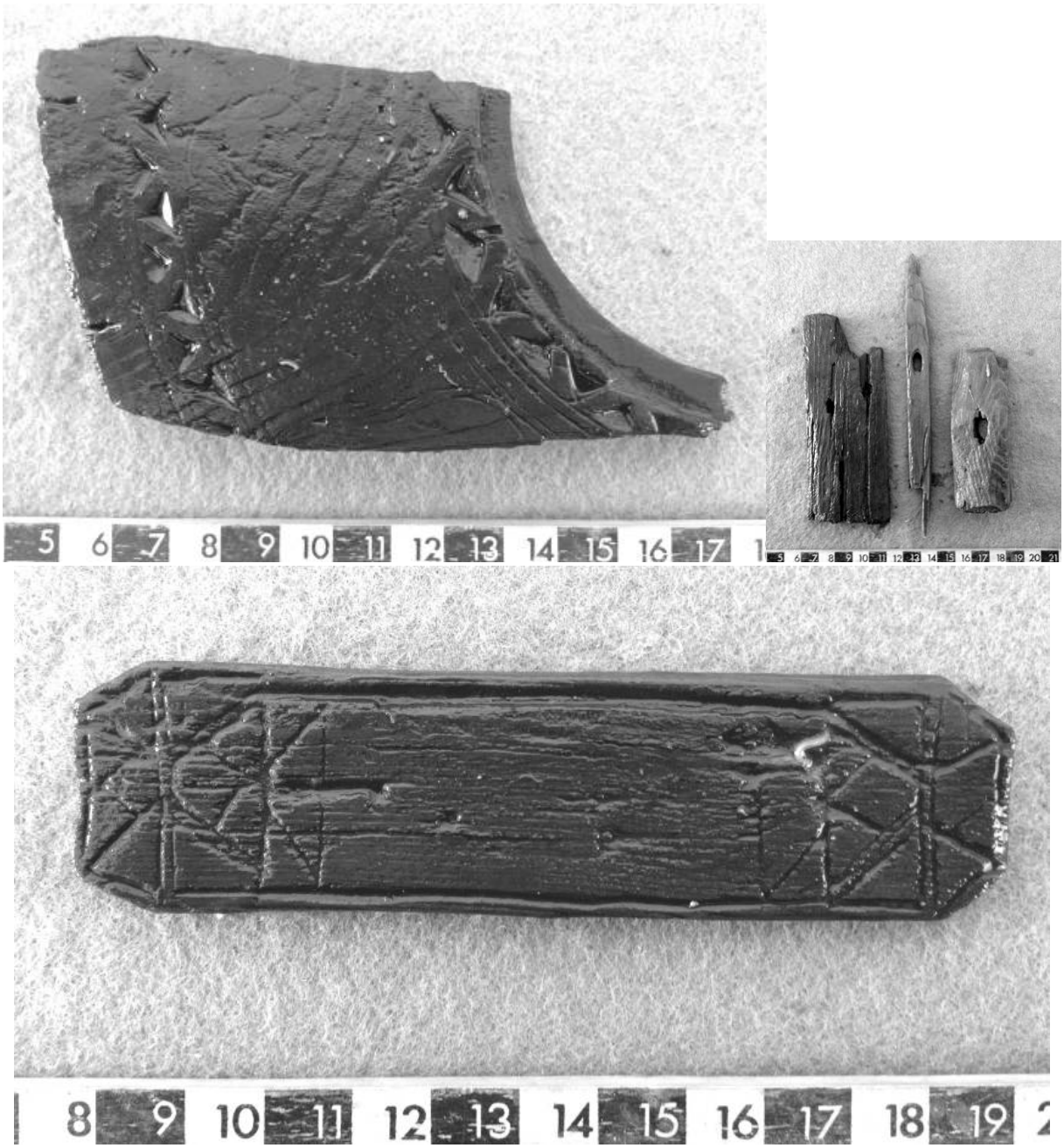


Fig. 23. Upper left x-116 and Upper right x- 406. Bottom, x- 115.

triangular shaped groove. Size: 95x14,5-20x12 mm. X-115 is a decorated complete plate. The long edges are straight but the corners are cut oblique. Both end sides are decorated and there is a groove along the edges on both sides. The middle part is completely plain. Size: 108x30x6 mm.

Handles (count 6)

Knife handles and handles from unidentified tools are present in the material. X-782 is probably a complete one-piece knife handle. The cross section is round, 23x25 mm at the end. The rippled hole in the handle is triangular in shape and suggests a knife projecting from the handle. L: 105 mm. X-835 is possibly a handle. It is a L-shaped piece, with a diamond-shaped cross-section. The complete end is cut straight, the other broken. The object tapers slightly from the end, 55-46 mm, more below. Ca. 65 mm from the end on the lower side there is a projecting bit, possibly a stopper or support (some kind of halt) for the hand. The size of this object is 102x55x36 mm. X-437 is a handle for wood object and a projecting stub has triangular cross section, wood knife? The handle is diamond shaped and the end is cut square. Total length of the object is 72 mm. X-225 is a possible handle from an unidentified wood object. It is

Fig. 24. Left, knife handle x-437. Right, possible handle x-225.

an interesting and much worn piece. The object curves but its sides are flat and the edges rounded. The end of the object is whittled on two sides, roof shaped, the other

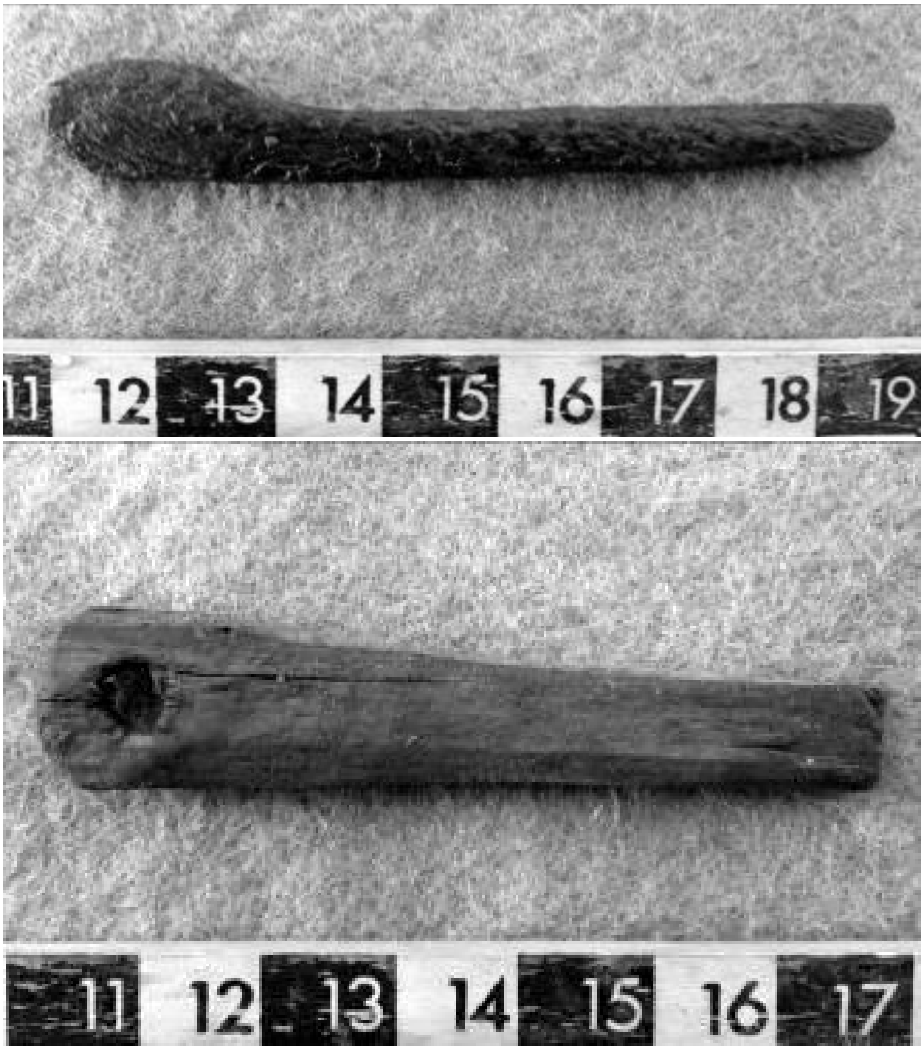


Fig. 25. Worked bone objects. Above x-300 and below x-210.

end is broken. Faint marks and scratches cover the surface. Dimensions are 200x17x25 mm. x-410 Wood handle from wood object. One end is broken and the object is split long-ways, cross-section half spherical. There is a slight tapering towards the upper end, and a small round projection near the broken end. 65x18x10 mm.

Worked bone (count 7)

Only one identified object is within this group, a piece of caribou antler, x-300 from context 506 in area B. This fragment is probably a bodkin, a needle (sometimes without an eye) e.g. to make holes when working with textiles (for example see Pedersen 1984, 76; Roussell 1934, 122).

Leather (count 34)

The 34 leather pieces retrieved all await further analysis. They are all fragmented but within the material are interesting objects e.g. sheaths, belts and shoes. The most intriguing find is the decorated object x-611 from deposit 031 in area A. It still awaits further analysis but few preliminary comments can be made. The object is a double strap sewed together on three sides. By on end are four holes that suggest a fastening of another material, now missing. The leather pieces are found within both areas A and B, as in trenches, 8, 9, 10 and 11.

Fig. 26. Leather object x-611. Photo Jan Bruun Jensen, conservator, The National museum of Danmark

Textile (count 3)

Two of the pieces were found in area A, at least one, x-135 from deposit 002, is a woven piece but the other, x-886 is yet unidentified. One piece was found in area B, x-532, from deposit 505-0, also a woven piece, very fragmented. All of above mention finds need further analysis.

Stone (count 433, 5%)

The quern stone, cherts and flints were analysed by Karsten Sacher.

Steatite (count 351, 4%)

Steatite makes up the largest group, 351 pieces (4% of the finds material). Most of the finds are unidentifiable fragments where no surface has survived, and no work marks are visible, total 159. There are 73 pieces with a worked surface but which are too small or fragmented to allow identification.

Steatite vessels and possible vessels (count 108). There are 91 vessel fragments (body, base or rim) in the assemblage and 17 possible vessel fragments, usually small curved pieces, likely body fragments. The typological classification of Jette Arneborg (Pedersen 1984) was used in the analysis. Of the 108 pieces it was possible to identify 24 further (some of the following points could be attributed more than once to an object): Edgeform: Two had edge-form **16** (rim flat on top and edges ca. 90°), four **19** (rim flat on top and the vessel wall slants inwards), seven **20** (rim flat on top and the vessel wall gently slopes inwards) and three **21** (rim convex and sides straight sides).

Because how fragmented the material is, it was only possible to identify if vessels had a round/circular opening (type **12**) – of which there were nine instances. One had a possible opening type **14** (square) or **15** (trapezoid) and one **14**. Only one handle fragment was possible to identify to type **34b** (handle high, near the rim). Decoration is visible on four fragments, three are in the category of type **40** (two grooves on the top of the rim) and one of type **42** (two grooves on the outside of the rim). The wall thickness of the fragments was measured 5 – 55 mm, but gives very limited information of the structure of the vessels as the fragments are from different parts of the objects. An X-mark is visible on two. Rework or alterations are visible on

ten vessels, mainly as being reused as weights, probably loom-weights because of their flat plan, see discussion below.

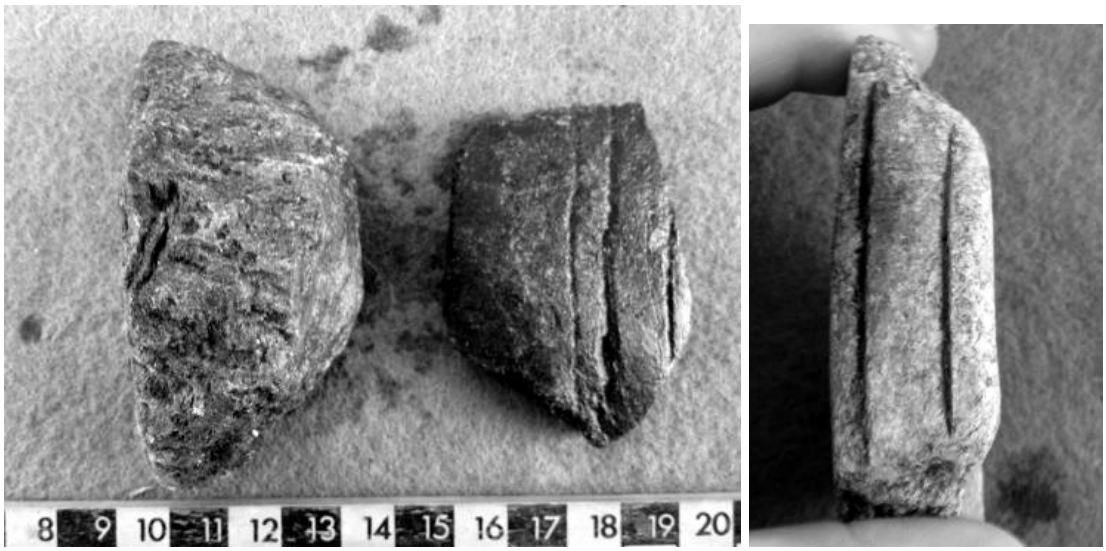


Fig. 27. Left, steatite vessels, x-506. Left, fragment of a very fine steatite vessel, note deocoration type 41, with grooves on the outside. Right, the work is coarse and the tool marks are softly oblique on the inside, from the rim and curve down. The grooves are straighter on the outside. Right, steatite vessel fragment x-510 with decoration type 40.

Steatite weights (count 14). Possible weights are five, vessels reused as weights are ten. The sides of the reworked pieces are sometime worn and smooth. Loom-weights are the largest finds group from the Norse settlements and often reworked from broken vessels (Pedersen 1984,91)

Fig. 28. Weights. Left picture, x-222, reused vessel on the left, broken weight on the right. Right picture, x-238, both reused vessel fragments.

Steatite mould (1). X-565 from area B, deposit 505-4 is a very fragile and fragmented steatite mould. The mould is a cross within a circle shaped boundary. The circle is ca. 16 mm in diameter, the arms of the crosses are ca. 10 mm across. A crack is through the mould. The lump, in which the mould has been carved, is irregular and broken, its size is ca. 67x49 mm.

Fig. 29. X-565

Steatite spindle whorl (1). One spindle whorl is present, x-142, from deposit 002 in area A. It is half a whorl, original diameter is 34,5 mm and thickness is 15 mm. The perforation is large, 12 mm in diameter. The base-edges are little lower than the rest of the base and the whorl is slightly flat on top. The object is not very well made and the stone surface is uneven with small holes and grooves but not decorative. The steatite is very light and fine compared to other steatite found in Igaliku 2012. The whorl can be located in the Bryggen typological sequence of spindle whorls as Bryggen type A (Øye 1988, 38).

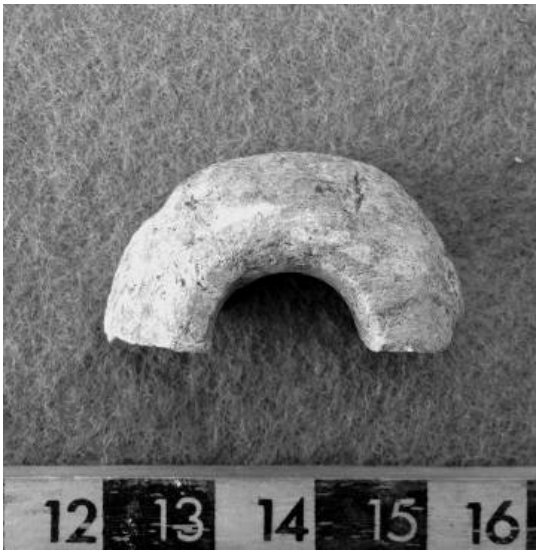


Figure 30. Spindle whorl, x-142

Other stone types

Quern stone (count 3). Four over-piece fragments of a quern stone were found, probably all from the same object. The pieces are all found in area A, and two fit together, x-141 is found in mixed deposit 002 but x-365 in deposit 011. The thickness is 51 mm. The stones are fragments of volcanic tuff and are well suited for grinding.

Fig. 31. Quern stone fragments, x- 141

Baking plate (count 1). A baking plate fragment, x-496, was retrieved in area A, context 006. The fragment has the conventional crisscross grooves surviving on one side but is split and therefore the surface is smooth on the other side. This baking plate fragment does not seem to differ from the baking plates that have been found in Icelandic material, and in an

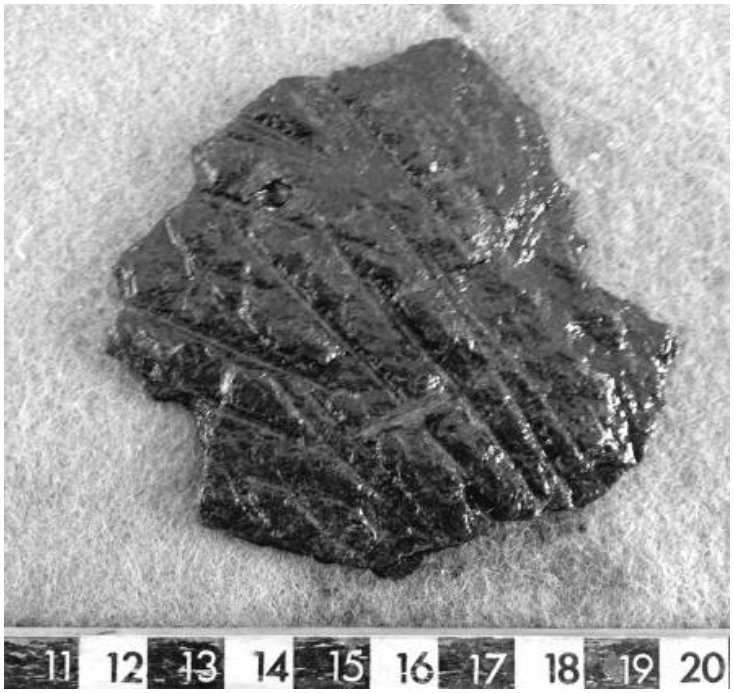


Fig. 32. Baking plate x-496

Icelandic context those artefacts are Norwegian imports from the period 1200-1400 (Gísladóttir & Snæsdóttir 2011, 68) The surviving fragment is 78x83x7 mm, in size. Only one other baking plate fragment is known from Greenlandic, but information of the find circumstances are unclear (Jette Arneborg and Georg Nyegaard pers. comm. 2012).

Whetstones, sandstones, manuports, flints and cherts (count ~70)

There are more than 70 stones in the assemblage that require specialist attention. All the whetstones found are of sandstone, probably all of the local Igaliku sandstone also used as building material. It was possible to identify 12 whetstones, usually fragments with one or more worked and worn sides. It is questionable how to interpret the other Igaliku stones present in the material, that is, the unworked material; whether they should be treated as manuports, raw material or consider them non-archaeological if not abraded. Cherty slate x-686, flinty chert x-745 and x-847 and quartz chrystal x-891 were looked at and none of them are worked. All of above mentioned material can be local but x-891 is probably from Tunulliarfik (Eiriksfjord).

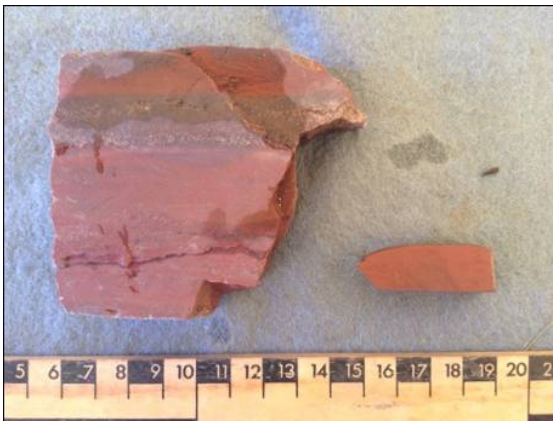


Fig. 33. X-131: Igaliku sandstone fragment. A) Small fragment with polished surface, whetstone fragment, 39x17x14 mm. B) Larger, unworked, 84x68x30 mm.

Metal (count 2)

Metal is almost absent in the material. Greenlandic finds assemblages are not rich of metals but the Igaliku 2012 excavation is unusually sparse. The only metal finds retrieved are the two weights, discussed below. The absence was complete, no traces of iron was found, no rust or spots in the earth, and no copper alloys.

Lead (count 2)

Lead weight x-543 was found in area B, deposit 505-0, and lead weight x-744 is from area A, deposit 027. X-543 is a flat spherically shaped weight. The surface is badly preserved and flaked. Thickness: 12 mm, diam. 15 mm. X-744 is a pear shaped weight with a knob on top. The weight is widest just above the base, 16 mm in diameter. The neck between body and knob is 8 mm in diam. The knob is widest 9,5 mm in diamer. Green tinge (copper) and rust (iron) visible, probably a iron core. No marks visible. Decayed, rusted and very fragile. H: 15 mm. Diam. 16 mm.

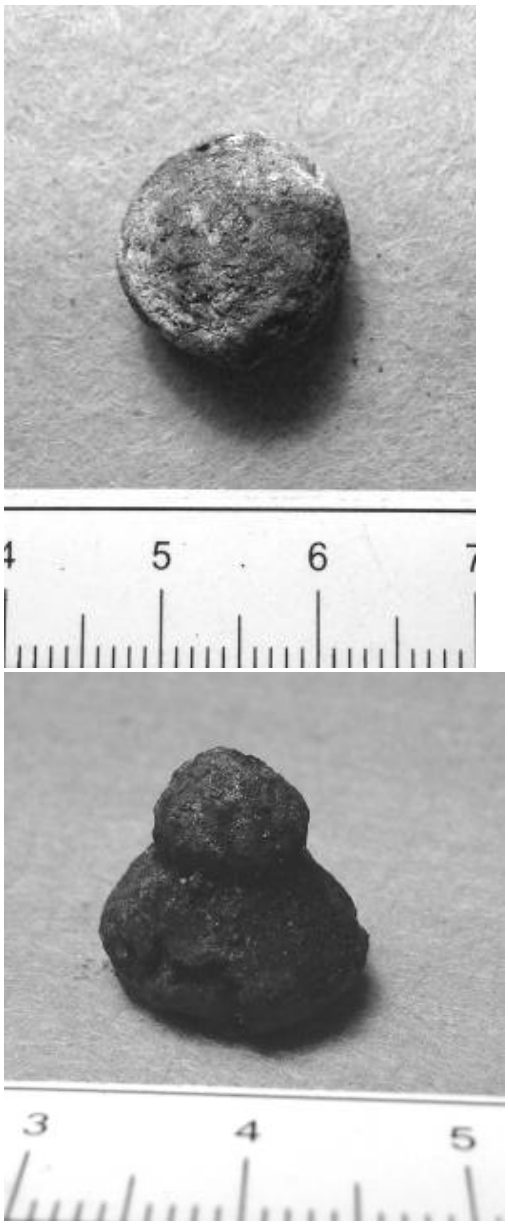


Fig. 35. Left, spherical weight x-543 and right, pear shaped weight, x-744

The spherical weight might be of a Viking age date. Of the 74 registered weights from pre-Christian graves and Viking age farmsteads in Iceland (Eldjárn 2000,608) only one is definitely pear shaped (Gísladóttir 2004, 25-28). Pear shaped or cup shaped weights have not been found in a definite Viking age context in Iceland, nor Norway (Bakka 1980, 155). In Norway, pear shaped weights seem to appear in the medieval period (Færden 1990:244) and Rygh does not show any examples of such forms in his Viking age catalogue (Rygh 1999, 476-485). The five pear shaped

weights that were found in the archaeological excavation in Gamlebyen in Oslo are all dated to ca. 1325-1400 (Færden 1990: 241) but other examples found in Norway have been dated to the 12th -13th century (Steauer 2002:47-48).

Ceramic and glass (count 14)

Preliminary analysis of the medieval ceramics by Per Kristian Madsen and Jette Arneborg, National Museum of Danmark.

The ceramics and glass are found in area A and trenches 1 and 2. Of those objects eleven are of modern date but two ceramic vessel fragments are of medieval date, retrieved in area A. X-689 is a medieval vessel wall fragment made of Faststeinzeug (near stoneware), from deposit 012. This fragment is of earlier date than x-843, from deposit 036. This vessel wall fragment is suggested to be of late Raeren type, which can be from late 1400s. If the find can be dated so late, it is intriguing as it suggests a time after the termination of recorded navigation between Norway and Greenland.

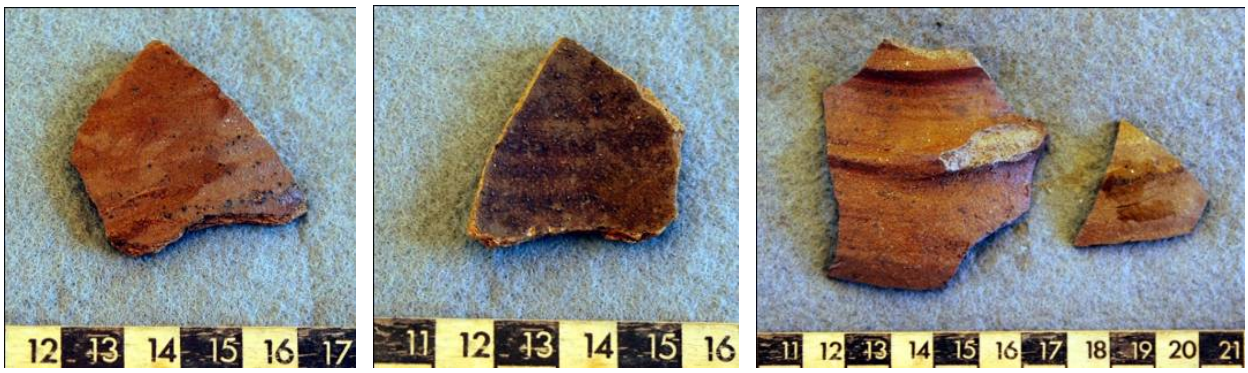


Fig. 36. Left and middle: Medieval ceramic fragment, X-689. Right, late medieval ceramic fragment, x-843

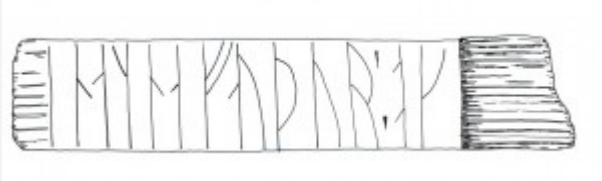
4. Nye fund af runeindskrifter i Grønland

Lisbeth Imer

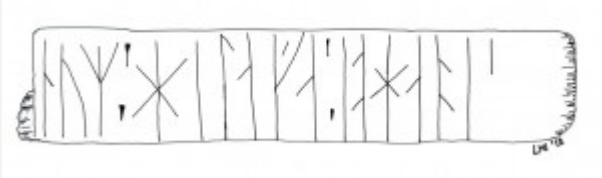
Denne sommer [2012] har forskere fra Grønland, USA, Island og Danmark gravet i Sydgrønland, i Igaliku, den plads som i middelalderen var bispesædet i Grønland, og som vi i nordboforskningen kalder for Garðar ('gårdene/gærderne'). Her blev der fundet fem små træpinde med runer i et udsmidslag, hvor bevaringsforholdene var særdeles gode for organisk materiale, herunder træ. Jeg har nu haft dem til bedømmelse i København, og det var ikke den nemmeste sag i verden. Når man arbejder med gammelt og vådt træ, må man hele tiden sørge for at holde det vådt, så træet ikke begynder at sprække eller falde sammen. Metoden er derfor at lægge stykkerne i en lille skål af plexiglas og fylde vand i, til det dækker genstanden. Næsten som at koge kartofler! Uden kogedelen forstås. Herefter kan man i ro og mag undersøge genstandene under mikroskop, selv om vandets spejlinger kan genere læsningen lidt. Her nedenfor er en foreløbig redegørelse. Det er muligt, at der kommer flere detaljer af indskrifterne frem, når genstandene er færdige hos konservatoren og har fået en mere stabil overflade.

X-108. Piece of wood with the Latin inscription "...et benedictus fructus ventris tui" meaning 'and blessed is the fruit of thy womb'; the end of the Ave Maria prayer.

Den første genstand er en lille tyk træstump, som er beskrevet med runer på begge sider. Den har desværre fået en lille ”retouche” af graveskeen på den ene side, så en del af indskriften er gået tabt. Ved første øjekast havde jeg svært ved at få rede på indskriften – der er tale om meget høje runer med en masse kviste. Men så fik jeg øje på det sidste ord ”tui” og kom i tanke om afslutningen af den latinske Ave Maria-bøn, som afsluttes *et benedictus fructus ventris tui* ’og velsignet være frugten i dit liv’. Og det er netop hvad der står på den ene side af genstanden, udformet med meget komplicerede binderuner, som interessant nok har paralleller helt ovre i Sigtuna i Sverige! Det er sjovt at tænke på, at man har skrevet på samme måde i to geografisk set meget adskilte områder af Norden. Genstanden skal altså opfattes som en lille amulet, som har kunnet tjene til sygdomsafværgelse eller helbredelse – lidt på samme måde som blyamuletterne, som vi ofte finder i Danmark.



X-070. Cross arm with the inscription '... father and ...'



X-070. Other side of arm '... holy John.'

Den næste genstand er en tilskåret, rektangulær træpind, som har et indhak eller en fals i den ene ende. Jeg tror, der må være tale om en korsarm, hvor det lille hak giver plads til den lange korsarm, som kommer ned på tværs. Indskriften er desværre meget fragmenteret, og man spekulerer på, om resten af korset stadig ligger i affaldsdyngen deroppe? Denne genstand er også beskrevet på begge sider. På den ene side kan man skelne ordene ’hellige Johannes’ og på den anden ordet ’fader og’. Man har aldrig fundet et kors på Garðar endnu, selv om der er fundet mange indskrifter her, og selv om gården er bispesædet, men en rigtig god parallel til det nye fund er et af korsene fra Herjolfsnes (som er kendt for sin kirkegård med rige fund af f.eks. tekstiler og trækors med runeindskrifter) med indskriften ’Maria, Eloihim, Johannes fader. Jesus, min gud, Eloi og søn og ånd.’ Spændende at der nu er et

kors også fra Garðar, og man tænker på, om alle fornemme folk har haft sit eget andagtskors?

X-515. Carved piece of wood with very faint runes, where the only visible word is 'runes'.

Den tredje genstand er en tilskåret træpind med meget fint ristede runer. Faktisk er de så fint ristede, at man må imponeres over, at udgraverne overhovedet opdagede dem. Kun første del af indskriften er bevaret. Her står 'runer'. Dernæst kommer der et 'r', og man kunne tænke sig, at der har stået 'runer ristede NN'. Sådanne indskrifter kan man opfatte som øvelsesindskrifter – det var jo nødvendigt at øve sig for at blive en dygtig runerister.

X-370. Piece of wood with cryptic runes. Unfortunately no sollution yet!

Den fjerde genstand er endnu en aflang træpind med lønrunelignende tegn på den ene side. Jeg har tidligere skrevet om, hvad lønruner er her på bloggen http://runer-moenter.natmus.dk/hvad-er-l%c3%b8nruner/, så det skal jeg ikke trætte yderligere med. Jeg har sendt fotos af genstanden til min kollega i Norge, Jonas Nordby, som er ekspert i lønruner, og vi har tegnet og diskuteret frem og tilbage. Men vi kan desværre ikke komme med en løsning på indskriften endnu. Der er for mange kviste

på hovedstavene til, at indskriften kan give mening, så indtil nogen får en genial idé, må vi vente i spænding på en løsning. Lønruner er der ikke fundet mange af i Grønland (der er en på storgården Sandnes i Vesterbygden, hvor en del af navnet 'Gudorm' er skrevet med lønruner), men de findes over store dele af Norden og vidner om vidtrækkende kontakter blandt runeristere.

X-401. Small piece of wood with rune-like characters. Maybe a practice inscription?

Endelig blev der fundet en lille træstump, som var meget grov i overfladen. Indskriften ser ikke ud til at være regulære runer, men måske en slags efterligning. Det kunne se ud, som om nogen har øvet sig i at skrive.

De fem nye indskrifter kunne tyde på, at mange flere genstande ligger og venter på at blive opdaget i den grønlandske muld. Næsten hver gang man stikker spaden i jorden på nordbogårdene i Grønland, finder man nye indskrifter, og de vidner om, at skriftkulturen har været meget udbredt – også ude på de helt små gårde i de yderste bygder. Og det er et interessant aspekt, for her under de mere sydlige himmelstrøg har vi ikke den samme mulighed for at undersøge skriftkulturen, som den så ud på landet i middelalderen; den er ganske enkelt pløjet væk. Men også i Grønland forringes bevaringsforholdene med hastige skridt, især for organisk materiale, og det kan være et spørgsmål om tid, før denne uvurderlige skat er borte for evigt. Vi må derfor håbe, at der kommer gang i udgravningskampagnerne, så vi kan få reddet denne vigtige del af verdenskulturarven.

Tillæg:

Ved gennemgangen af fundene fra sommerens udgravninger i marts 2013, to trægenstande med indskrifter blev opdaget.

X-735 er 10,5 cm lang og ca. 1 cm bred pind, som er brækket i begge ender. Runerne står i pindens længderetning ved den ene ende, og indskriften ser ud til at være fragmenteret. Runerne kan læses (foreløbigt) **ki(a)(l)a…** og giver ikke umiddelbart sproglig mening. Runerne i parentes er usikkert læst. Det skyldes formentlig at noget af indskriften mangler. Runerne er meget svage, og skader i træets overflade forstyrrer læsningen.

X-949 is 15,5 cm lang og ca. 6 cm bredt tilskåret træstykke med runer i nederste højre hjørne. Runerne kan læses **fuþ(a)(n)h** efterfulgt af et lønrunelignende tegn, som genfindes på Kingitorssuaq-stenen. Den usikre **a**-rune kan også være en **k**-rune. Indskriften er formentlig et forsøg på at skrive futharken, altså runealfabetet (fuþarkhniastbmlR).

1 2 3 4 5 6 7 8 9 10 11 12

5. Preliminary report on the 2012 archaeofauna

Konrad Smiarowski

Introduction

The 2012 archaeofauna came from two major excavation units, Area A and Area B, as well as from several test trenches (see discussion on field methods in ch 2). Excavation area B (trench) was divided into 6 sections (SE, SW, NE, NW, Extension E , Extension W) and the archaeofauna was recorded in accordance with this division. Since all those locations represent the same time period, and the collection is small, no such distinction has been made in this report. For the purpose of this preliminary report three contexts were chosen for analysis.

Context [505] is the principal deposit in area B, and is also the thickest and most bone rich layer on site. Since it was very thick, it is most likely a series of layers but the stratigraphy could not be easily distinguished during excavation. The context was divided into six 10 cm deep arbitrary spits. Spit [505-4] was the most bone rich deposit, and contained more bones by volume, than all the other contexts in Area B or A combined. Ca. 95% of the bones have been analyzed, and the results are reported here. Only the smallest, unidentifiable fragments (the remaining 5%) have not been counted yet, due to time constrains, but they will be included in the final, full zooarchaeological report.

Context [36] contains the most bones in the undisturbed deposit of Area A, and has been analyzed in the same way as [505-4]. The final 5% of small unidentifiable fragments will be added to the count in the final report. Based on field interpretations this context is grouped with [505-4] (Group 1004) and is from the same time period.

Context [31] in area A is small, but it is the only undisturbed layer with substantial archaeofauna that is stratigraphically more recent than the previous two (and has been analyzed in the same way as the previous two). It was chosen for this

preliminary analysis to investigate changes over time of the animal husbandry and wild resource use at Garðar.

Laboratory Methods

Analysis was carried out in 2012-13 at Hunter College Zooarchaeology Laboratory by Konrad Smiarowski and Thomas McGovern. Extensive use was made of the major comparative collections of North Atlantic fish and birds housed at the CUNY laboratories and reference was made to the earlier Greenlandic sites such as E172 Tatsipataa, E29N Brattahlíð and E74. All fragments were sorted by family (mammal, fish, bird) and all fragments were identified as fully as possible with current methods. Fragments that could not be fully identified to species level have been placed in the next highest taxonomic level, with the most heavily fragmented and least identifiable specimens being placed in the Large Terrestrial Mammal (horse- cattle sized) or Medium Terrestrial Mammal (sheep-pig sized) categories. All measurements follow the metrical standard of Von Den Dreisch (1976) unless otherwise noted, measurements taken with digital calipers (Mitoyoto CD 6BS) to 0.10 mm. Quantification in this report follows NABO Zooarchaeology Working Group recommendations and widespread North Atlantic regional practice by making NISP (number of identified specimens) the basic quantitative measure, as this simple counting technique has proven robust in numerous sampling experiments and is easily replicable across investigators. Basic data was recorded through the NABO Zooarchaeology working group NABONE system (9th edition, see NABO website www.nabohome for free download). The basic data set (in MS Access 2007 compatibility mode) is available for download through the NABO project management system. Bone specimens are temporarily curated at the CUNY laboratories but will be returned for long term curation at the Zoological Museum in Copenhagen.

Dating and Phasing of the Archaeofauna

Lab no	context	group	material	BP	d13C	1σ	2σ
SUERC-46219	505-4	5004	cattle	827±29	-21.00%	1188-1199 (10.5%), 1206-1257 (57.7%)	1162-1264 (95.4%)
SUERC-46215	36	5004	cattle	837±29	-21.10%	1170-1225 (68.2%)	1155-1266 (95.4%)
SUERC-46213	31	5004	cattle	681±29	-18.20%	1279-1300 (47.2%), 1369-1381 (21.0%)	1270-1316 (60.9%), 1355-1389 (34.5%)

Table 1. Radiocarbon dates of the three deposits. For further discussion on the stratigraphy and dating of the entire excavation see ch. 2.

Contexts [505-4] and [036] are apparently contemporary, and are both within a calibrated two sigma range of 1155-1266 AD, or approximately mid -12th to mid-13th century. Based on the SUERC 46213 date, context [031] can be placed within a calibrated two sigma range of 1270-1389 AD, or approximately late 13th to late 14th centuries. This division would appear to place contexts [505-4] and [36] before the onset of summer sea ice ca. 1275-1300 (Miller et al. 2012) and the associated environmental changes on land and sea, and the context [031] after these changes.

For the purpose of this report NISP counts of [505-4] and [036] were thus combined into a single Phase1 (c. 1155-1266 AD), and will be referred to as such throughout this report. Context [031] is referred to as Phase 2 (c. 1270-1389AD).

Taphonomy Discussion

The excavation at E47 was conducted as a rescue project that aimed to recover as much organic artifacts and ecofacts from a semi-waterlogged area that was being drained by local farmers. Unfortunately the drainage and/or freeze and thaw action

have partially ravaged the collection. From the lab and field observation (the author co-excavated the collection) it is evident that the bones have signs of mechanical weathering produced by strong freeze-thaw cycling. These diagnostic patterns of exfoliation and cracking on long bone surfaces, is widespread in collections from the arctic that have not been deeply buried enough to insulate them from recurring freeze thaw action (Lyman 1996). It is clear that the preservation is biased towards large and dense bones. Many of them are exfoliated none the less, with significant damage to the cortical bone walls. This pattern is often seen on Greenlandic collections especially in exposed upper layers (Smiarowski 2011). Some bones disintegrated in the field, while wet sieving. The fact that Greenlandic Norse collections, including this one, are usually heavily fragmented due to butchery and trampling may have contributed to the poor preservation of the archaeofauna. Small, trampled fragments are in danger of faster decomposition when exposed to freeze thaw action in a wet or moist environment. The shortage of any neonatal bones (which are more porous and fragile than adult ones) of domesticates that were bred on site further demonstrated that this is a partially ravaged collection.

Figure 1. Bones from [505-4]

Overview of species present

Table 2 presents an overview of identified taxa from the three contexts. The total NISP for all contexts combined is 1,541 with 1,356 datable to Phase 1, which is a sufficient sample size to begin a discussion about animal husbandry, hunting and provisioning of the farm during the earlier period. However, context [031] is small (185 NISP), and all the identifiable bones from Phase 2 were analyzed and are presented here. This sample size is below the NABO standard of a minimum of 300 NISP for archaeofauna composed mainly of mammal bones and (despite the comparative graphs below) we should be cautious of over-interpretation of patterns in such a small sample. It should be stressed again that this analysis is only preliminary, and more bones from the time period represented by Phase 2 need to be excavated to test the hypotheses set out in this report.

	[36]	**[505-4]**	**[31]**	**Total**
DOMESTICATES				
Bos taurus (cattle)	10	39	14	63
Equus caballus (horse)		1		1
Canis familiaris (dog)	3	6	x	9
Sus scrofa (pig)	1			
Ovis aries (sheep)		12	3	15
Capra hircus (goat)		16	4	20
Ovis/Capra sp.	16	148	37	201
total Ovis/Capra	16	176	44	236
Total Domesticates	**30**	**222**	**58**	**310**
SEALS				
Erignathus barbatus (bearded)	1			1
Pagophilus groenlandicus (harp)	10	16	1	27
Large seal		1	6	7
Phocid sp.	197	730	104	1031

Total Phocid	**208**	**747**	**111**	**1066**
CETACEA				
Great whale				
Small whale/porpoise	1			1
Cetacea sp.	5	2	3	10
Total Cetacea	**6**	**2**	**3**	**11**
OTHER MAMMALS				
Ursus Maritimus (polar bear)			1	1
Odobenus rosmarus (walrus)	2	24		26
Rangifer tarandus (caribou)	14	78	7	99
Total Other Mammals	**16**	**102**	**8**	**126**
BIRDS				
Corvus corax (raven)	3		1	4
Haliaeetus albicilla (white tailed eagle)	1		1	2
Uria aalge (common guillemot)	7	2	2	11
Uria Sp. (murre family)	2		1	3
Birds unid.	3	4		7
Total Birds	**16**	**6**	**5**	**27**
FISH				
Gadid sp. (cod family)	1			1
Total Fish	**1**	**0**	**0**	**1**
TOTAL NISP (Identified fragments) =	**277**	**1079**	**185**	**1541**
Small Terrestrial Mammal	1	2	1	4
Medium Terrestrial Mammal	281	252	61	594

Large Terrestrial Mammal	33	114	5	152
Unident. Mammal Frags		93	236	329
TOTAL TNF (all fragments) =	**592**	**1540**	**488**	**2620**

Table 2. Number of Identified Specimens present in each context.

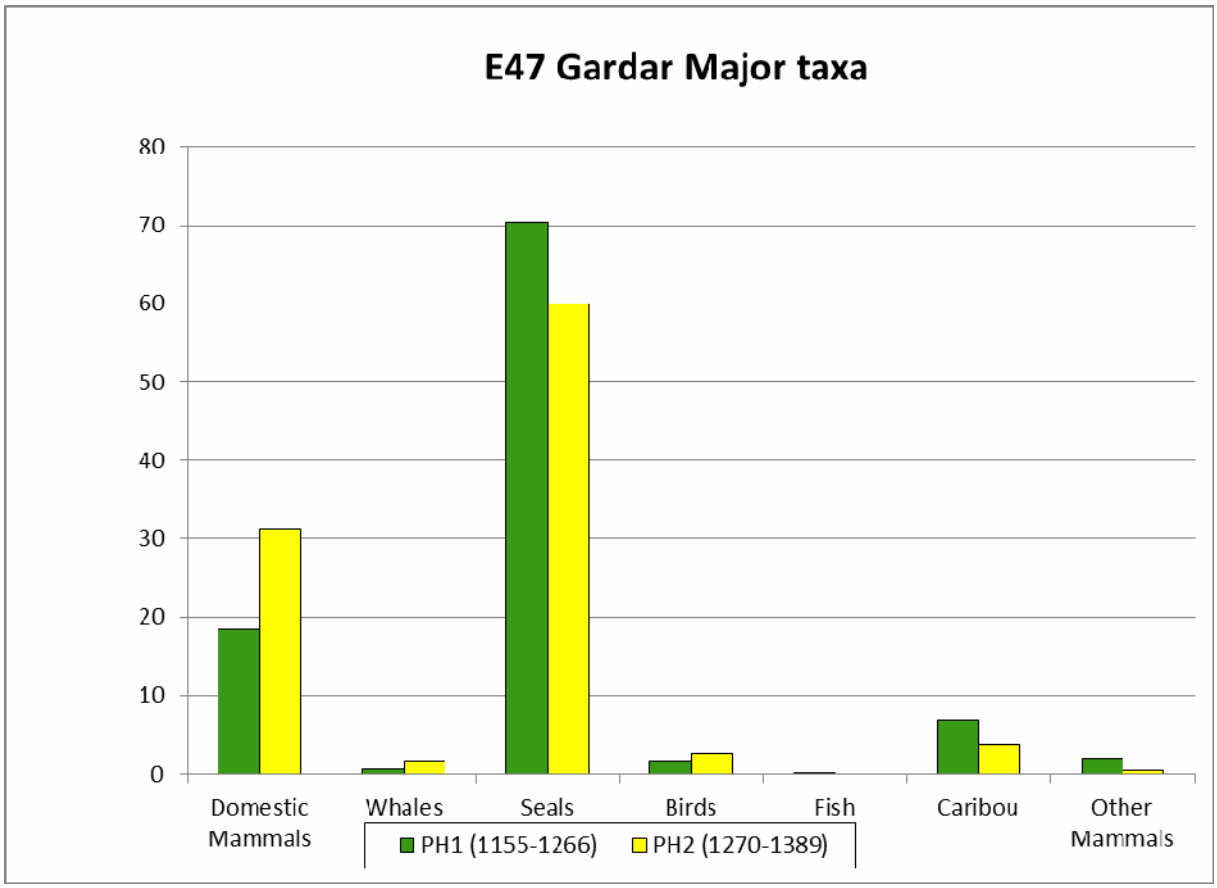


Fig. 2. Major taxonomic groups sorted by phase.

Figure 2 presents a comparison of the major taxonomic groups between the two phases in the 2012 Garðar Archaeofauna. Again it should be stressed that the Phase 1 archaeofauna is of fully quantifiable size (despite a somewhat ravaged taphonomic condition) while Phase 2 is significantly smaller as well as similarly ravaged. Thus while patterns across the phases will be discussed in this report, it should be kept in mind that the sample size in Phase 2 is not comparable to the sample size in Phase 1. Domestic animals, the second most numerous taxon group, comprise ca. 18.58% of all animals in phase 1, and increases to 31.35% in phase 2. Seals, the dominant food source, are apparently declining in numbers with time from around 70% to 60%. The ratio of seals to all domestic mammals changes from 3.79 to 1 to 1.91 to 1 in the current sample. This pattern is not typical to Greenlandic sites,

which normally see significant increase in relative proportions of seal bones in the later phases, including the stratified archaeofauna from Brattahlíð North Farm (McGovern et al. 2006). One question for further investigation will be about differences in overall balance of marine and terrestrial sources in provisioning of the episcopal household during and after the climate changes of the late 13th-early 14th centuries, and the apparent ability of this manor farm to maintain its domestic mammal stocks and maintain its lifestyle. Seals clearly still play an important role in provisioning Garðar, but at present we do not see them increasing dramatically in relative abundance after the initial climate impact. Whales and birds play a minor role in this assemblage, as do "other mammals" represented by walrus and polar bear bones. A single thoracic vertebrae bone fragment of gadidae (cod) family fish was recovered from context [36] in phase 1. Caribou also declines through time (see discussion below).

Domestic Mammals

Domestic mammals were key elements in the economy of the Norse settlers in Iceland and Greenland, as well as cultural identity markers and status symbols. In the E47 Garðar 2012 collection the domestic stock comprises of all the Nordic imported animal species such as cattle, sheep, goats, pigs, horse and dogs.

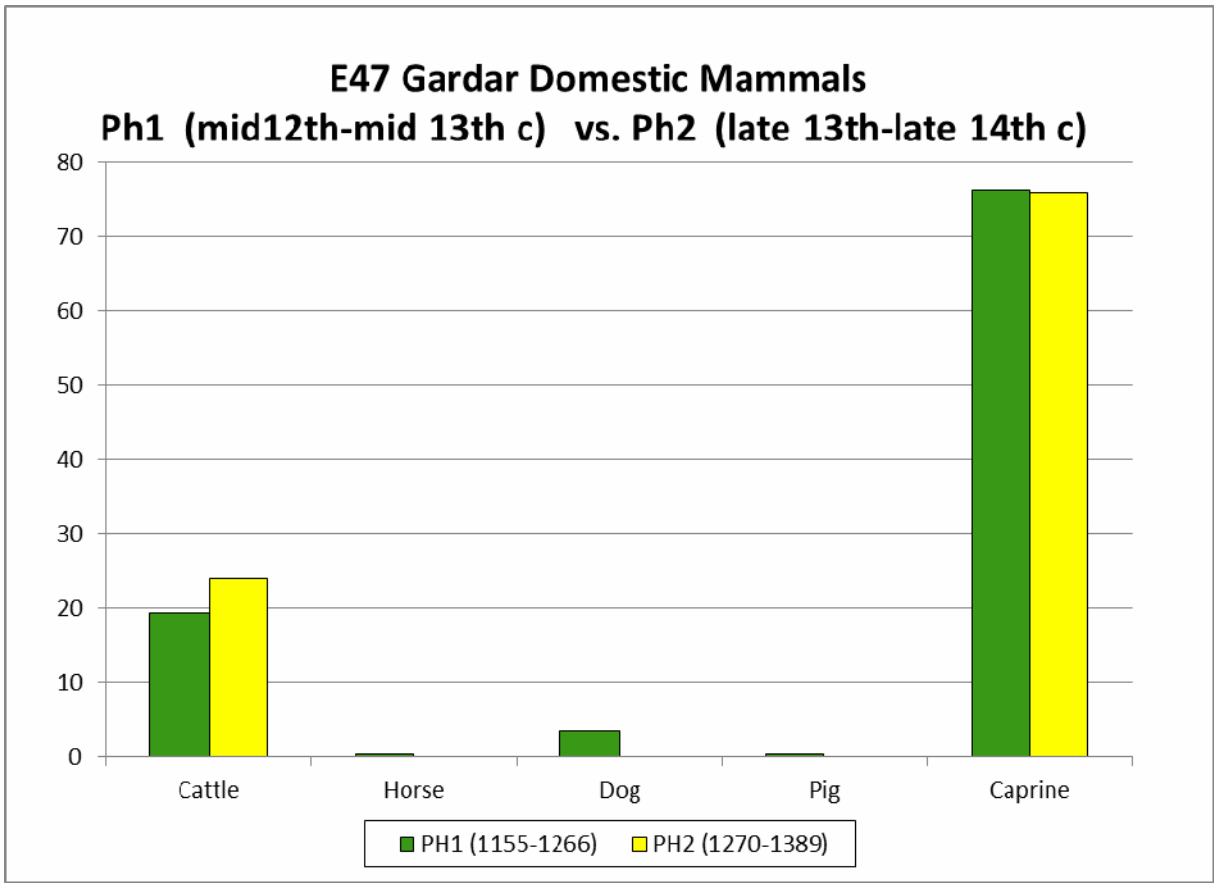


Fig. 3 presents major distribution of % NISP within the domestic mammal group.

Cattle. Cattle were the most prestigious livestock of a medieval farmer in the Norse North Atlantic, and a farm's worth was traditionally accounted in cattle units. In Greenland, cattle probably carried even greater social significance, as they are the most expensive animals to keep in the harsh environment. In the current E47 Garðar archaeofauna, cattle appear to increase in numbers across phases from 3.62% to 7.57% of all taxa (figure 4), and from 19.5% to 24.15% within the domestic mammal group (figure 3) probably reflecting the continued high status of the farm. This pattern is in contrast with other Norse farms that tend to reduce cattle, and increase the numbers of caprine herds through time. In phase 1 the ratio of cattle to caprines is 1 to 3.92, while in phase 2 it decreases to 1 to 3.14. Taphonomic bias, with attrition differentially removing the bones of new born animals (neonates), in this case is likely working to disproportionately reduce the cattle relative numbers in this collection. In most North Atlantic Viking and Medieval archaeofauna, bones of neonatal calves

make up 30-50% of all cattle bones recovered, while neonatal sheep and goat bones are generally rare (below 5%). Thus the ravaged condition of the 2012 archaeofauna will tend to skew these numbers against cattle relative to sheep and goats. Despite sample size and taphonomic issues, it does not appear that cattle keeping was reduced at Garðar in the later time period.

Age estimates to determine mortality rates and culling practices could not be completed, as the numbers of long bones suitable for fusion state analysis are too small, and no mandibles suitable for tooth eruption and tooth wear analysis survived. Only two M3 molars were found and scored (Grant 1982), which is not nearly enough for a basic analysis (table 2 below). Both show high levels of wear and are likely from older adults.

SU	Species	Bone	REF# teeth	dp4	P4	M1	M2	M3
36	BOS	MO3	16					E
36	BOS	MO3	17					J

Table 3. Cattle toothwear score for all available specimens.

Caprines. At Garðar, the caprine herd remains constant in time, relative to other domestic mammals, indicating the stability of the farmstead that seems to be little affected by the changing environmental conditions of the mid-13th century AD. In phase 1 the caprines comprise 76.19% of all domestic mammals, while in phase 2 they are 75.86% of the group (figure 3).

A total of 15 of the 236 caprine bones that could be further identified to species level were sheep, while 20 were goats. As there is no bone density advantage to sheep bone vs. goat bone preservation, it seems likely that this distribution accurately indicates that the herd was almost evenly mixed throughout the two phases, as the ratio of goat to sheep bones is 1 to 0.75 in both phases. A shift towards an all-sheep caprine flock is often associated with an emphasis on wool production, as in most small and medium farms in contemporary Iceland. The lack of such a shift in most farms in Greenland, and at Garðar, where the goats are actually dominant throughout time, indicates a caprine herd aimed at meat and milk supply, rather than surplus

wool production. Caprine long bones and mandibles suitable for age at death estimates are not present in the collection. The data below represents the only available toothwear scores on loose teeth, but the quality and quantity of the data is insufficient for drawing even preliminary estimates of the nature of the cull except to note that both juveniles and old adults were present.

SU	Species	Bone	REF# teeth	dp4	P4	M1	M2	M3
505-4	Goat	MO3	1					G
505-4	Goat	MO3	2					G
505-4	Goat	MO3	3					G
505-4	Caprine	DP4	4	H				
505-4	Sheep	MO3	5					H
505-4	Caprine	DP4	6	H				
505-4	Caprine	DP4	7	G				
505-4	Goat	MO3	8					D
505-4	Goat	MO3	9					B
505-4	Goat	MO3	10					G
505-4	Goat	MO3	11					G
505-4	Sheep	MO3	12					G
31	Goat	DP4	13	H				
31	Goat	Mo3	14					J
31	Goat	DP4	15	G				
505-4	Sheep	MO3	18					H

Table 4. Caprine toothwear scores for all available specimens.

*Horse***.** Only a single horse tooth (m3) was recovered from context [505-4] and probably comes from a working, farm animal.

*Dogs***.** Tooth marks on animal bones were present in all contexts, indicating the access of these animals to the midden area, and presence through all phases. Nine dog bones were present in phase 1 in spatially separated excavation areas, indicating that they do not come from a single individual. The size of the tibia, humerus, and metatarsal bones in both phases, indicates a large sized, long limbed

breed of dog, as noted by previous investigators in Greenland (Degerbøl 1929, 1941, McGovern 1985b) perhaps used for reindeer hunting. While known from multiple sites in both the Western and Eastern Settlements in Greenland these large long limbed dogs (which Degerbøl compared to modern Norwegian elk hounds in conformation) have not yet been identified in Iceland.

*Pigs***.** Only one mandible fragment of a pig was found. The animal could have been brought to Greenland on a ship, as a live food store, or raised in Greenland. More pig bones from this site are needed to be able to speculate further about pig husbandry at Garðar.

Wild Animals

*Caribou***.** The caribou was apparently much less exploited and was probably always much less common in the Eastern Settlement than in the Western Settlement. In the Western Settlement, cairn drive lines associated with Norse-built dry stone *skemma* structures have been documented in several areas above the 250 m contour (McGovern & Jordan 1982), and caribou hunting appears to have significantly provisioned the chieftain's manor at W51 Sandnes (McGovern et al. 1996). In Western Settlement sites the relative percentages of this species range from ca. 5% to over 25%, while it is rare to reach 5% mark in Eastern Settlement. In phase 1 at E47 Garðar, the caribou comprised 6.80% of all species present, which is the highest percentage recorded on any site in the Eastern Settlement. This is a terrestrial resource that appears to be associated with status, and the 2012 Garðar archaeofauna probably reflects the manor's special role in the Eastern Settlement. Even when caribou declined to 3.80% in phase 2 (figure 4), it still was one of the highest ratios in the Eastern settlement when compared to all the other sites, even the high status church farms at E29N Brattahlíð, E149, and E64 (figure 5 below). Further investigations at Garðar may expand our understanding of the role of the church and large manors in the management of the caribou hunt in the Eastern Settlement, and the sustainable harvest of caribou carried out in Norse Greenland.

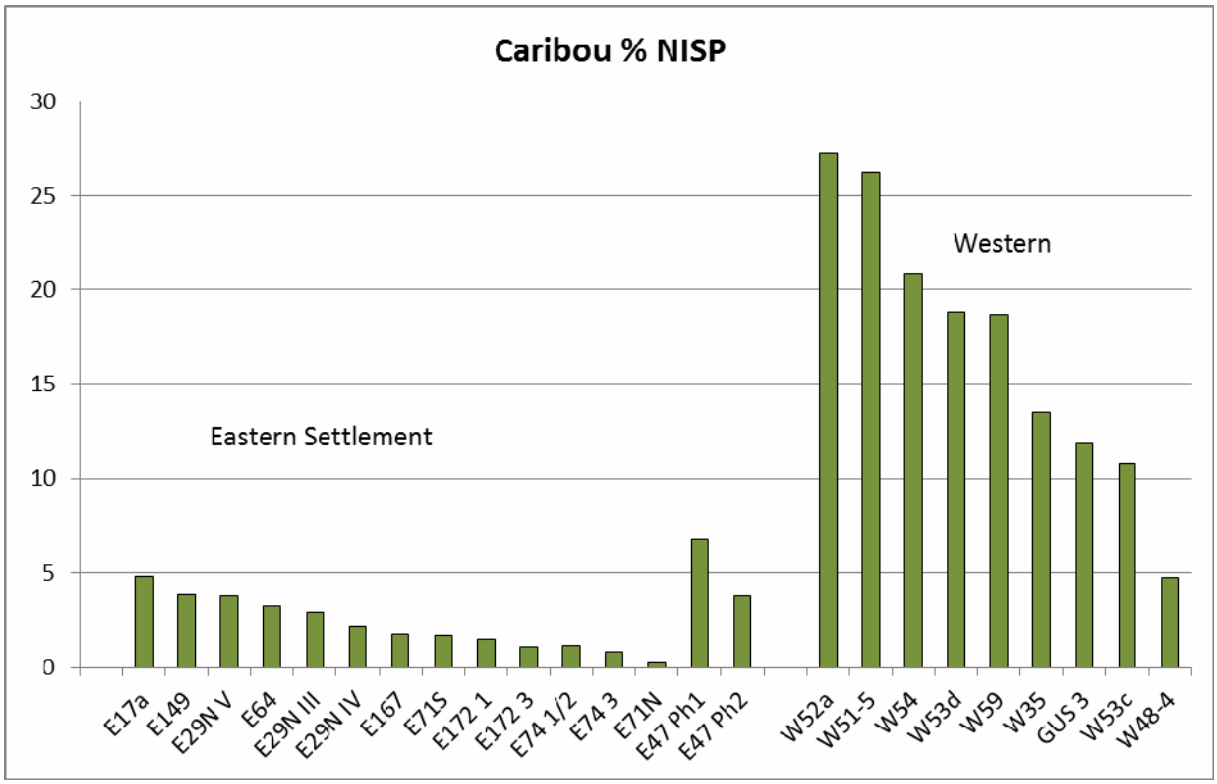


Fig. 4. Caribou remains distribution on Eastern and Western Settlement sites.

*Seals***.** Seals are the most important food source at all Norse sites investigated so far, and E47 is not an exception. The seals comprise 70.42% of all taxa, and decrease to 60% in phase 2. Garðar is the only one of 2 sites that we know where the relative percentage of seals decreases. The other one is E74, a specialized caprine herding station located in the inland of Vatnahverfi. Figure 6 (below) demonstrates that even on high status farms such as E29N Brattahlíð, the importance of marine (seal) component in the diet increases with time. This is especially noticeable after the 1250-1300AD climatic changes force the Norse to increase their hunt to compensate for lost productivity of the farmstead.

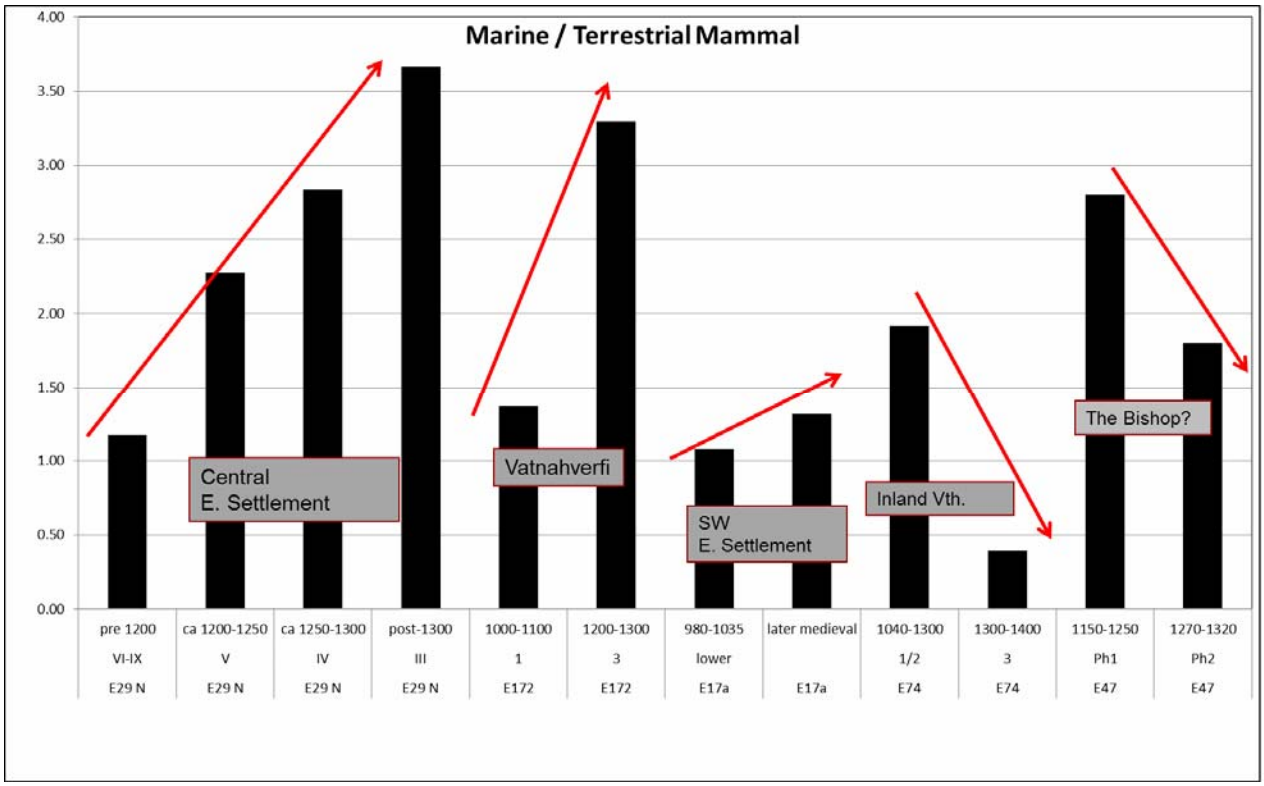


Fig. 5. Terrestrial to Marine bone ratios at several Eastern Settlement sites.

This may be yet another indicator of the special status of E47 Garðar. One observation about sealing at Garðar is the absence (thus far) of harbor seals in both phases. While sample size and taphonomy must be considered, other sites with comparable archaeofauna have produced much more varied seal patterns, including non-migratory harbor seals and (in the Eastern Settlement) hooded seals. There are 27 harp seal bones in the 2012 Garðar archaeofauna, and only 1 bone in the collection that is a bearded seal (identifications are mainly based on the auditory bulla, which is equally robust in all seal species). This is unusual as the bearded seal is a very rare species on Norse sites due to hunting methods. The Norse did not tend to hunt solitary bearded and ringed seals, and concentrated on the high yield hunt of migratory seals travelling in pods. We have collectively speculated on the potential differences in ownership/management of the migratory seals (potentially a communally managed resource) vs. the non-migratory harbor seals (privately owned and managed in Iceland). The absence of harbor seals may indicate that the rights to sealing beaches were not owned by E47 inhabitants and/or that this farm played a

key role in the organizing/sponsoring of the annual migratory seal hunt in the outer fjords, and received payment/share of the catch as part of its role in managing the commons. This however does not explain the absence of the hooded seals in the collection, but there are more bones to be analyzed, and the seal hunting pattern will likely become clearer. Figure 7 below demonstrates the uniqueness of the Garðar E47 seal archaeofauna compared to other sites in both settlements.

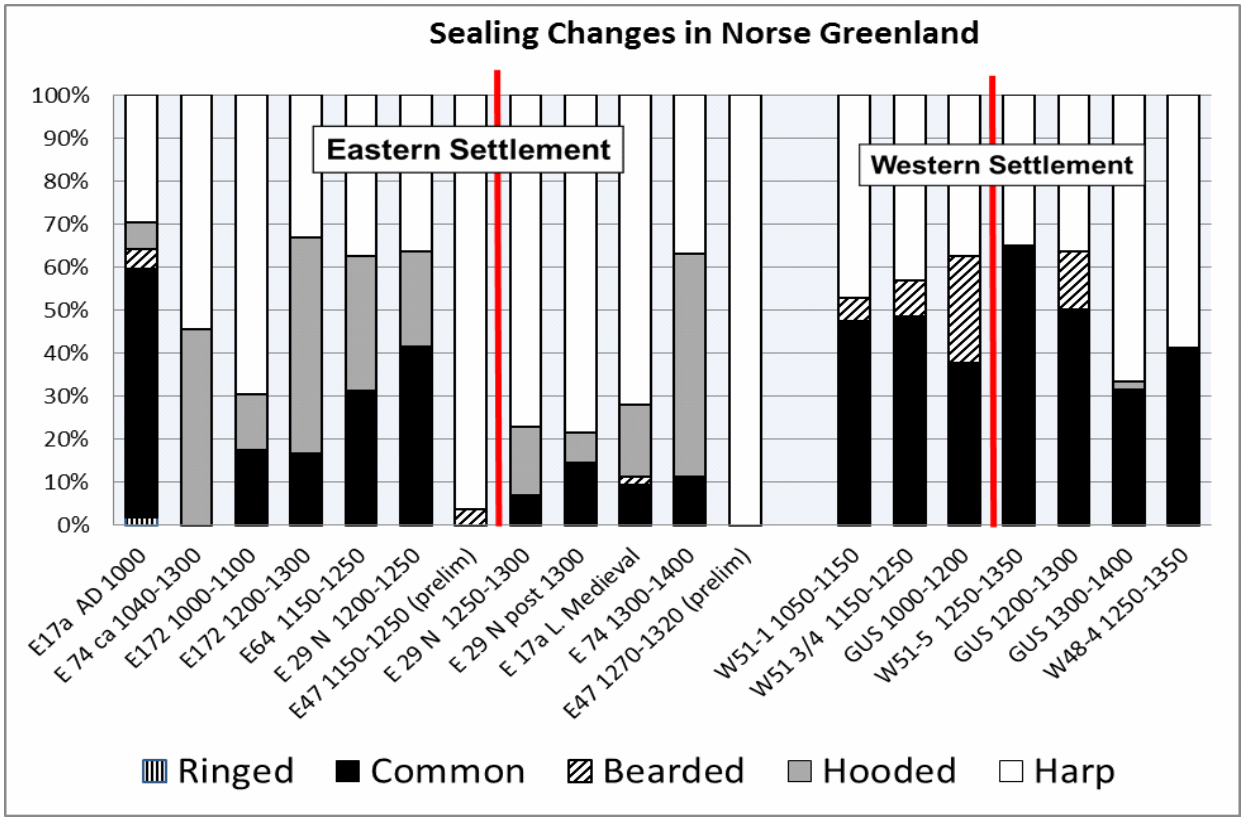


Fig. 6. Seal bone distribution on Eastern and Western Settlement Sites.

*Walrus***.** The greatest walrus concentrations historically have been far from the Eastern Settlement area around modern Disko Bay (Arneborg 2000, Vibe 1967). This was the area known to the Norse as the *Norðursetur* and multiple lines of evidence suggest a large scale summer hunt drew participants from both Eastern and Western Settlements hundreds of kilometres north from their farms in the inner fjords (McGovern 1985a, Dugmore et al 2007). The deeply rooted tusk was not usually extracted at the kill site, but instead the front of the maxilla was cut away and brought back to the home farms for final finishing for export (Roesdahl 2005). Fragments of

the dense maxillary bone have been found on nearly every Norse farm excavated, in both settlement areas and on inland as well as coastal farms.

Walrus remains at Garðar comprise of the maxillary fragments associated with the tusk extraction. A total of 26 maxillae fragments were recovered from phase 1. This site, like other sites in both settlements was part of the acquisition and trade of the walrus ivory, and the byproducts of this industry are represented by this waste material.

*Fish***.** As at most Norse Greenlandic sites fish are virtually absent. Only one cod family (it could not be speciated due to preservation conditions) thoracic vertebrae bone was discovered at Garðar, in context [036]. It is at the moment uncertain if the absence of fish at this site is a taphonomic issue or a part of a wider pattern, but this will be discussed in the final zooarchaeology report, once the whole archaeofauna is analyzed. For now we can only note the presence of at least some marine fish bone.

Fig. 7. Fish from [036].

*Whales***.** There are 11 whale bone fragments from the analyzed contexts, eight from phase 1 and three from phase 2. These are mostly worked unidentified bone fragments, but one is a fragment of small whale vertebrae, possibly a beluga. It has been chopped, indicating it was brought to the site as food.

Fig. 8. Whale bone from [505-4].

Polar Bear. One phalanx no. 3 (the claw) was recovered from [031]. Bears are not regularly present in SW Greenland so the claw most likely travelled to the site as a part of the fur of an animal killed somewhere else. Terminal phalanges are regularly left in skins during field processing and (along with some metapodial bones) are usually removed during final finishing and curing,

and these are the bear elements most commonly recovered on Norse sites in Greenland (McGovern 1985a).

Birds. Four fragments of raven bones in both phases indicate that ravens were killed at Garðar. This may represent an attempt at pest control, but other explanations are possible. Two white tailed eagle fragments were recovered. A claw (phalanx no. 3) was found in [031] and a fragment of distal humerus in [036]. Eagle bones have been found on other Norse sites in Greenland, and may also represent birds killed for stock protection. The most numerous bird species in the 2012 Garðar archaeofauna is the common guillemot (11 fragments), which is probably the only bird identified in this archaeofauna that was actually consumed by humans at Garðar. Guillemot and auk-family birds are by far the most common in all Norse Greenlandic archaeofauna (Enghoff 2003) and in most Inuit archaeofauna from Greenland (Gotfredsen 1997).

Discussion

While the archaeofauna recovered by the international teams from Garðar in 2012 has limitations due to taphonomic attrition and a larger sample size would always be desirable, these collections represent a significant expansion of our understanding of the economy of the bishop's manor. Already, there are patterns present which appear to distinguish this major centre from other known farm archaeofauna in Greenland. Trends in provisioning with wild species (seals and caribou) raise significant questions about communal resource management and response to what we now recognize as major climate change ca. 1275-1300. The presence of walrus and polar bear remains indicate connections to the *Norðursetur* hunt and overseas trade. The domestic stock raising strategy at Garðar remains to be fully documented, but the current evidence suggests that the bishop's manor (like other holdings in Greenland) retained the older Viking Age patterns of cattle to caprine ratios and the high proportion of goats to sheep without showing any of the markers of a transition to a sheep-based wool-surplus producing economy as in contemporary Iceland. Prospects for recovering additional stratified archaeofauna from Garðar appear excellent, and there seems to be excellent potential for expanding on (and probably correcting) points raised in this first preliminary report.

Acknowledgements

The author would like to thank the field directors of the 2012 season Georg Nyegaard and Orri Vésteinsson, and the host community at Igaliku. Thanks are also due to Jette Arneborg, Christian Koch Madsen, and Ian Simpson for their help in field and to Tom McGovern for laboratory support. Special thanks are due to the midden excavations team, Norie Manigault, Jade de la Paz, Cameron Turley, Michael Nielsen, Garðar Guðmundsson, Guðrún Alda Gísladóttir, Nuka Nathanielsen and Kristborg Þórsdóttir. This project has been supported by grants from the US National Science Foundation Polar Programs Arctic Social Sciences (OPP 1119354 & 1202692).

6. Macrofossils. Preliminary report

Peter Steen Henriksen

During the fieldwork at the RAPID Garðar Collaborative Rescue Project excavation in Igaliku in the summer 2012 I worked together with Georg Nygaard NKA sorting out finds from the wet sieving residue. During this work a number of cereals and other plant materials were found (table 1). A hazel nut shell and a plum stone has been dated (table 2).

On the basis of these finds a number of soil samples for macro fossil analyses were taken from the excavated areas (table 1). These samples have not yet been analysed.

sample no.	context	material	sample size
x665	[507] 4, Area B, NE	Hazel, nut shell	
x666	[505] 4, Area B, ext. W	Hazel, nut shell (AMS-dated)	
x667	[505] 4, Area B, ext. W	Hazel, nut shell	
x668	[505] 3, Area B, NW corner	Barley grain	
x669	[505] 4, Area B, SE corner	Barley grain	
x670	[505] 5, Area B, SE corner	Plum stone (AMS-dated : modern)	
x671	[505] 4, Area B, ext. E	Flotation sample	40 l.
x672	[012] Area A	Flotation sample	10 l.
x673	Trench 14, spit 1	Flotation sample	5 l.
x674	Trench 14, spit 2	Flotation sample	5 l.
x703	[036] Area A	Flotation sample	5 l.
x704	[037] Area A	Flotation sample	5 l.

Table 1: Macrofossils and macrofossil samples from Garðar

Lab no	context	material	BP	d13C	2σ
AAR-17478	505-4	hazel nut	983±25	-26,37%	994-1053 (52.8%), 1080-1154 (42.6%)
AAR-17479	505-5	plum stone	219±25	-27,82%	1644-1955

Table 2: AMS datings of plant material from Garðar

Test borings in the ruins

A series of test borings and a trench (14) were made between the ruins to find traces of midden layers in an area marked with midden signature on the map displayed at the ruins (fig. 1). The results are shown in table 3.

	borehole 1	borehole 2	borehole 3	borehole 4	borehole 5
Disturbed soil	0-25 cm	0-30 cm	0-30 cm	0-25 cm	0-90cm
Midden layer	25-60 cm	30-55 cm	30-47 cm	25-60 cm	-
Sub soil	60- cm	55- cm	47- cm	60- cm	90- cm

Table 3. Result of the test borings

In borehole 1 and 2 the midden layer was wet and rather well preserved with degraded bones and a lot of charcoal. In borehole 4 the midden layer was mixed with peat (from walls?). In borehole 5 the midden layers were dug away.

Trench 14 turned out to be dung in the wall instead of the midden. The midden is now covered by a modern kitchen garden.

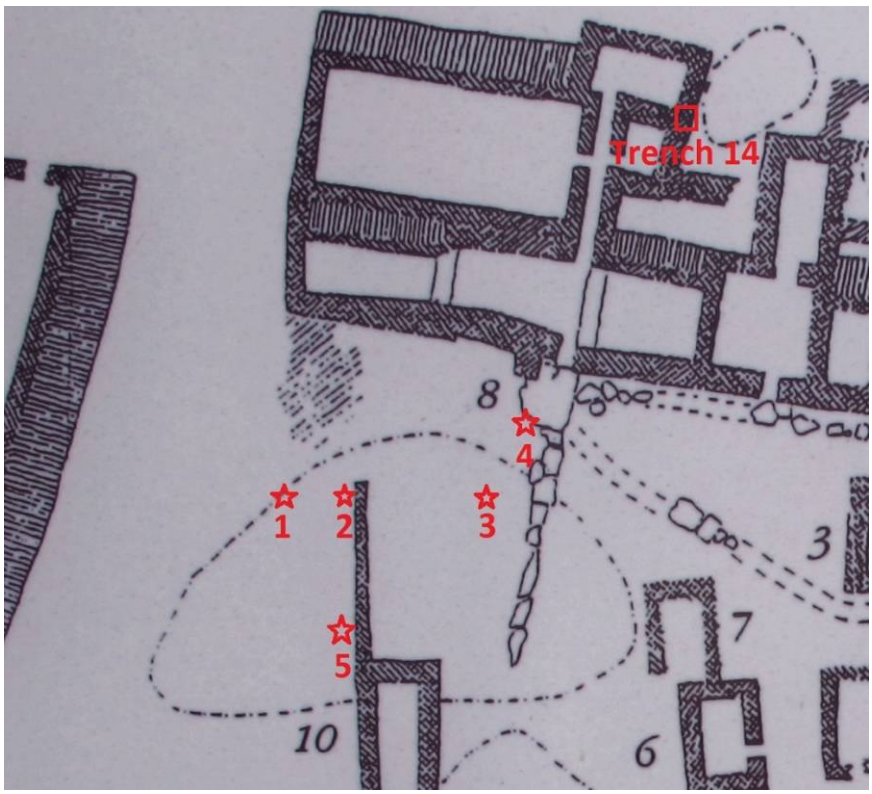


Fig 1: Test borings and trench in midden layers between the Garðar ruins.

7. Radiocarbon dates from Igaliku interpreted within a Bayesian framework

Magdalena Schmid

Bayesian analysis is a very powerful tool to interpret site chronologies; it combines the probability distribution of multiple radiocarbon dates with archaeological information about their stratigraphic relationships (Bayliss 2007). The analysis provides agreement indices that allow quantification of how well the proposed model fits the data; in fact of each radiocarbon date in the model as well as of the overall model itself (Bronk Ramsey 2000). Samples that fall below the 60% agreement indices have to be treated as outliers.

Radiocarbon determinations from Igaliku were calibrated using OxCal Version 4.2 (Bronk Ramsey and Lee 2013). All dates that are included in the model are dated by AMS and are quoted throughout at 95.4% confidence. They derive from known archaeological contexts within the stratigraphic sequence. The 14 samples are of mixed material, one sample is of birch, two are seeds, one hazelnut, one cherry, and nine of animal bones: two caprine and seven cattle (table 1).

Area	Archaeological deposit	Sample number	Context number	Group	Sample material	Conventional ^{14}C age (BP)	$\delta^{13}C$	Prior 2-σ cal range (95.4%)	Modelled 2-σ cal range (95.4%)
A	Charcoal horizon	SUERC -46208	16	5003	Birch	575±27	-25,20%	1305-1419	1307-1411
A	Charcoal horizon	SUERC -46214	27	5003	Caprine	653±29	-19,20%	1279-1394	1305-1395
A	Charcoal horizon	SUERC -46209	38	5003	Caprine	595±27	-20,20%	1299-1410	1302-1392
A	Wood-chip layer	SUERC -46213	31	5004	Cattle	837±29	-18,20%	1270-1389	1269-1308
A	Wood-chip layer	SUERC -46215	36	5004	Cattle	837±29	-21,10%	1158-1262	1166-1260
B	Wood-chip layer	SUERC -8576	505-1	29-28 cm	Seeds	625±35	-28,20%	1289-1400	1276-1324
B	Wood-chip layer	SUERC -46216	505-1	5004	Cattle	764±27	-20,90%	1221-1281	1221-1282
B	Wood-chip layer	SUERC -46217	505-2	5004	Cattle	881±30	-20,40%	1042-1221	1151-1246
B	Wood-chip layer	SUERC -46218	505-3	5004	Cattle	835±30	-21,00%	1157-1264	1167-1260
B	Wood-chip layer	SUERC -46219	505-4	5004	Cattle	827±29	-21,00%	1164-1262	1171-1263
B	Wood-chip layer	AAR-17478	505-4	5004	Hazelnut	983±25	-26,37%	995-1153	996-1153
B	Wood-chip layer	SUERC -8575	505-4/5	47-46 cm	Seeds	875±35	-27,90%	1041-1246	1155-1252
B	Wood-chip layer	SUERC -46223	505-5	5004	Cattle	875±27	-21,00%	1045-1225	1153-1242
B	Wood-chip layer	AAR-17479	505-5	5004	Cherry	219±25	-27,82%	1644-1953	1644-1953

Table 1. Radiocarbon dates from Igaliku

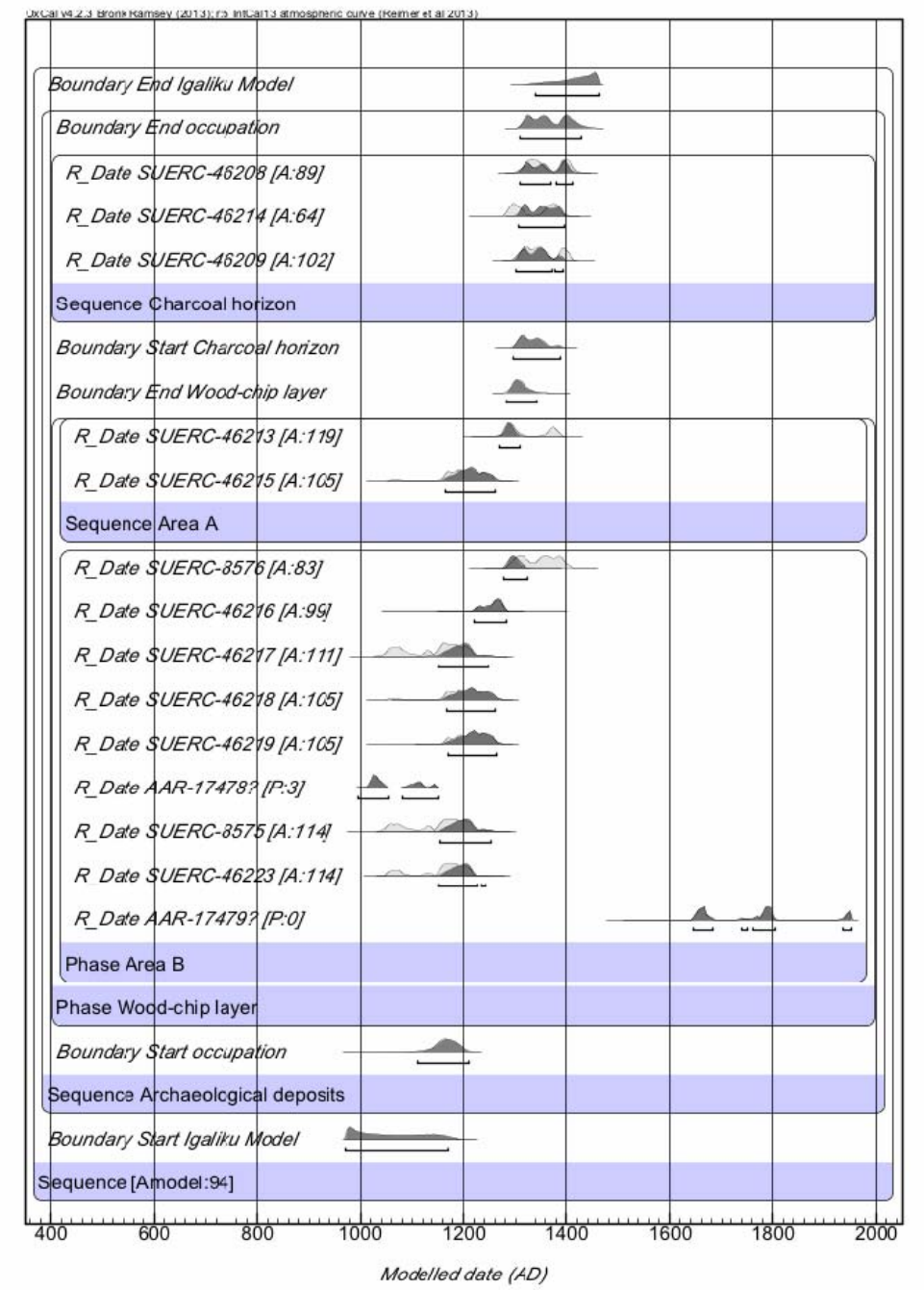


Fig. 1. Bayesian model of the archaeological deposits at Igaliku

The chronological model for Igaliku is based on all 14 AMS radiocarbon dates which derive from two archaeological layers found in areas A and B; the wood-chip layer is stratigraphically below the charcoal horizon. A boundary is introduced between the start of the occupation and the archaeological deposits to allow for the possibility of discontinuity of deposition. Within the wood-chip layer two stratigraphically related samples are found within area A and form a sequence. Nine samples are found

within area B; however, their exact relationship is not known and the samples are therefore placed into the same phase. Three stratigraphically related samples from the charcoal deposit overlay the samples from the wood-chip layer and form a sequence.

The model appears reasonably consistent with the archaeological evidence; the radiocarbon determinations line up in a chronological sequence with an overall agreement index of 94% and two outliers. One outlier, a plum stone, retrieved from the bottom spit of the wood-chip layer is obviously intrusive material as it has modern dates. The other outlier, a hazelnut, also derives from a spit from the wood-chip layer. Its modelled radiocarbon date only barely falls under the 60% agreement. It may indicate that the nut was old when deposited or that the layer is mixed.

The archaeological event of interest is the date of occupation of the site and the modelled date for this event is 973-1171 AD. The modelled date for the top of the sequence is 1341-1463 AD. If the uppermost dated archaeological horizons represent the last occupation of the site, this would suggest site abandonment before 1463 AD. The archaeological question to be addressed is if the deposits were formed gradually either over a long or short period of time. The model suggests that the end of the deposit of the wood-chip layer is between 1283 and 1432 AD and the charcoal horizon starts to accumulate between 1295 and 1389 AD. The totality of the radiocarbon samples shows that there is a steady accumulation of the archaeological deposits sometime between 973 and 1463 AD. If we consider a possible start (1111-1220 AD) and end (1310-1427 AD) of the deposits, a minimum formation period is 100 years, possibly much longer.

8. Discussion

Orri Vésteinsson

What are two entirely different kinds of secondary deposits doing in a bog at least 50 m from any of the structures of the episcopal manor at Garðar? The answer to this question is likely to be revealing about everyday life and management practices in Norse Garðar but it is also key to interpreting the large volumes of cultural material recovered so far. Not only are the deposits mostly or entirely secondary but they have been affected by a number of different processes, icluding initial selection, burning, water sorting and taphonomy, which have resulted in assemblages which are likely to be biased in a number of different ways. Understanding these biases is a precondition for any solid interpretation of these finds.

The analysis of the material unearthed in 2012 and 2013 is ongoing and final conclusions have not been reached. Findings of important aspects of the research initiated in 2012 are still not available, most particularly the micromorphological analyses of the charcoal-horizon and wood-chip layers, which will hopefully clarify much about the nature and formation of these deposits. At this stage it is however useful to review the hypotheses that have been aired and suggest directions for future research that might prove fruitful.

On the back of their fieldwork in 2005 and subsequent analysis of pollen and palaeoentomological remains Paul Buckland, Eva Panagiotakopulu, Kevin Edwards and Ed Schofieold have published a number of papers (Buckland et al. 2008, 2009; Edwards & Schofield 2012; Panagiotakopulu & Buckland 2012) where they discuss the implications of the findings for hay-field cultivation and, in particular, irrigation. Their interpretation is that the archaeological deposits in the meadow are evidence for soil improvement through the spreading of midden as manure and with reference to apparent irrigation structures in the hills above the Garðar settlement they suggest that the area was also improved through irrigation. The connection between the suggested irrigation structures (on these see in particular Edwards & Schofield 2012) and the meadow is however problematic because channelling water from behind the

farm mound to the site of the greatest concentration of finds in the meadow would be very difficult and technically challenging. The lower lying basins to the north and south could have been watered in this way but not the higher ridge inbetween where the charcoal horizon and wood chip layer have accumulated. That does not mean that the meadow could not have been irrigated – the run-off from the well may easily have been sufficient for a low dam to hold water on it – only that the structures in the hills above the site cannot be used as evidence for irrigation in this location.

It is entirely plausible that the kind of spring-time irrigation documented in Iceland in early modern times (e.g. Sveinsson 1781), where low turf built dams held slow moving water on gently sloping hay-fields and meadows to warm the soil and add nutrients, was practiced in Norse Garðar. Such dams are notoriously ephemeral, low ridges of turf that needed continuous repairs and even fresh rebuilding every year, and would not necessarily have left any traces in the ground. It is possible that management of this kind could explain the peat formation which is clearly associated with the time of the Norse occupation. Whether or not there was an initial stripping of the turf for building material it is clear that the peat formation was considerably more rapid after the Norse occupation had started and that significant changes in the soil formation processes and vegetation take place around the time of abandonment. It is quite likely that this has something to do with how water was managed in the fields and meadows around the farm. In particular indications that nutrition levels decreased and that the bog became drier after abandonment support the idea of engineered wetness successfully contributing to higher fertility of the soils. This result provides important context but it does not explain what the archaeological deposits are doing in the meadow.

The other notion, of midden spread as manure to fertilize the fields and meadows, is amply supported by the findings of the 2012-2013 seasons. Pre-modern charcoal and ash is found in low quantities all over the present fields and in so far as this can be discerned this practice seems to belong primarily to the later phases of the Norse occupation, possibly a short space of time. It may therefore be contemporary with the charcoal horizon in and around Area A but this is obviously of a different nature than a simple soil amendment exercise. The dense layer of stone is particularly incompatible with field-improvement and the successive deposition of midden material in the same relatively small area is also difficult to reconcile with the notion of manuring.

All available evidence – insects, seeds and pollen – suggest that the wood-chip layer (at least) was a part of a relatively wet environment; it was not a home-field but rather a bog or wet meadow possibly utilized for haymaking. It was suggested in ch. 2 above that the charcoal-horizon and wood-chip layer represent a border area where dry (or at least drier) hay-field gives way to a lower-lying and wetter meadow. The wood and animal bone seems to have accumulated at the foot of a slight but nevertheless distinct drop in elevation, implying that the material had been carried by water from some source up-hill, presumably by or beyond the well. At the upper edge of this accumulation zone an activity area has formed in the 14th century, after the processes allowing bone and wood to accumulate in the bog had been underway for more than a century. The two are therefore not directly linked although they may still be the result of related activities.

What the two principal deposits have in common is that they are secondary; the material in the wood-chip entirely and decidedly so while the charcoal-horizon may include some in situ burning and processing of materials from elsewhere. An explanatory avenue that could be explored is that both deposits relate to the processing of refuse in the broadest sense, presumably primarily for use as fertilizer. It is conceivable that Area A represents a dumping area, where midden layers, floor layers and dung cleaned occasionally from buildings was stockpiled for later redistribution over the fields. Why this would be useful (rather than taking the refuse directly to the fields) is not obvious but it might relate to scheduling issues, that the time of cleaning (spring?) did not coincide with the optimal time for spreading (autumn?). Following this line of thought it is possible that area A represents a relocation and possible expansion, that there was previously another comparable dumping point closer to the buildings on the farm mound, conceivably even by the well where not dissimilar deposits have been observed. If this was so it could be suggested that the wood and bone in the meadow are the result of midden dumping around the well, its run-off catching lighter elements and carrying them downhill to accumulate as soon as the energy level dropped off.

Another possible explanatory avenue would be to see the two as unrelated and the charcoal-horizon as the result of some particular activity, presumably related to food processing as otherwise it would be difficult to account for the burnt bone.

At this stage these suggestions are only so much groping in the dark. The finds from the Igaliku meadow are unique, possibly not because they represent

unique activities, but rather because conventional archaeological investigations in the North Atlantic have not focused on comparable areas. Archaeological work is heavily skewed towards structures and primary middens. It is so for entirely good reasons but the effect is that there is no comparable material which could help to understand what is going on in the Igaliku meadow.

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Appendix 1

Trenches 0-51. Basic information

Trench	Location	Description	Comments
T0	60°59.186 N, 45°25.243 W	Not exposed in 2012	Location of Sampling point A in 2005 and Profile 1 in 2010
T1	60°59.191 N, 45°25.216 W	5 m section exposed in S-side of ditch G4. Cultural layer 40 cm w. twigs, worked wood and some animal bone but also aluminium, plastic and whiteware, suggesting modern disturbance	Finds: x-001 (worked wood), x-002 (glass), x-003 (ceramics), x-004 (bone) - unsystematic retrieval
T2	60°59.195 N, 45°25.231 W	2,5 m section exposed in S-side of ditch G4. Cultural layer 28 cm, twigs, worked wood but no bone.	Same location as Profile 3 in 2010. Finds: x-005 (worked wood), x-006 (glass), x-007 (bone) - unsystematic retrieval
T3	60°59.186 N, 45°25.239 W	1,5 m section exposed in N-side of ditch G5. Cultural layer 25 cm w. twigs, worked wood, burnt bone and unburnt bone in some quantity but no charcoal	Finds: x-008 (worked wood), x-009, 010 (wood obj), x-011 (bone) - unsystematic retrieval
T4	60°59.184 N, 45°25.211 W	1,5 m section exposed in W-side of ditch G6. Cultural layer 16 cm w. twigs and worked wood.	Same location as Sampling point C in 2005. Finds: x-012 (worked wood - unsystematic retrieval)
T5	60°59.194 N, 45°25.211 W	0,5 m section exposed in W-side of ditch G6. Cultural layer 20 cm w. twigs and worked wood	Same location as Profile 2 in 2010: No finds
T6	60°59.205 N, 45°25.220 W	0,5 m section exposed in W-side of ditch G6. No cultural layer. Natural substrata rise sharply to the North	No finds
T7	60°59.187 N, 45°25.232 W	1,5 m section exposed in N-side of ditch G5. Cultural layer 25 cm w. twigs, worked wood, occasional animal bone in much smaller densities than in T3	Finds: x-013 (worked wood), x-014 (twigs), x-015, 188 (bone) - unsystematic retrieval
T8	60°59.190 N, 45°25.246 W	1x1 m trench. Cultural layer 40 cm below surface, 26 cm in thickness, incl. occasional charcoal, burnt and unburnt animal bone, worked wood, twigs. Laminated w. lenses of sand becoming more frequent towards the base.	Finds: x-016, x-073 (worked wood), x-024, 072 (leather frags), x-075 (whetstone), x-017-021, x-074 (wooden objects), Xö026, 071 (bone), x-025 (worked bone), x-023 (vitrified material), x-022 (twigs) - from 100 l sieved sample (from 1004 and intersection of 1002 and 1004

T9	60°59.189 N, 45°25.240 W	1x1 m trench, in SW-part of Area B. Ctxt 1: topsoil, ctxt 2: modern disturbance [1001], ctxt 3: turfy silt [1002], ctxt 4 = spits 1 and 2 of ctxt 505; ctxt 5 = spit 3 of ctxt 505; ctxt 6 = spit 4 of ctxt 505; ctxt 7 and 8 = spit 5 of ctxt 505	Finds from ctxt 004 (120 l sieved): x-054 (leather strip), x-058-59, 064-70 (wooden obj), x-060, 063, 355 (worked wood), x-056, 062 (bone), x-057 (charcoal), x-055 (twigs). From ctxt 5 (160 l sieved): x-027, 036 (leather obj), x-037 (whetstone), x-033-34, 038-040 (wooden obj), x-029, 035 (worked wood), x-028, 031 (bone), x-032 (charcoal), x-199 (seed), x-030 (twigs). from ctxt 6 (100 l sieved): x-045-46, 051-53 (wooden obj), x-044, 050 (worked wood), x-043, 049 (bone), x-047 (charcoal), x-048 (twigs). From ctxt 007 (20 l sieved): x-042 (worked wood), x-041 (bone). From ctxt 008: x-076 (worked wood), x-356 (bone)
T10	60°59.194 N, 45°25.248 W	See Fig. X	Finds from ctxt 2 [1002], not sieved: x-101 (worked wood). From ctxt 003 [1003], 160 l sieved: x-098-100 (wooden obj), x-096 (worked wood), x-082, 095 (bone), x-083 (charcoal), x-097 (twigs). From ctxt 004 [1004], 240 l sieved: x-090 (leather), x-084, 089 (steatite), x-092 (wooden obj), x-085, 091, 094 (worked wood), x-087 (bone), x-086 (charcoal), x-088 (twigs).
T11	60°59.197 N, 45°25.256 W	1x1 m trench, in SE-part of Area A. Dug down to stone horizon [038].	Finds from ctxt 002 [1002]: x-079 (wooden obj), x-080 (leather), x-078 (worked wood). From ctxt 003 ([1003] = [016], 60 l sieved) x-077 (stone), x-081 (burnt bone).
T12	60°59.219 N, 45°25.227 W	0,5 m section in W-side of ditch G6. No cultural layer.	No finds
T13	60°59.183 N, 45°25.232 W	1x1 m trench, 3,5 m south of ditch G5. 60 l of cultural layer (=[1004]) sieved.	Finds from [1004]: x-266, 387-88 (wooden obj), x-386 (stone), Finds: x-265 (worked wood), x-264, 389 (bone), x-385 (twigs)
T14	60°59.220 N, 45°25.433 W	1x1 m trench in farm mound	Finds from 003: x-694, x-696 (worked wood), x-695 (bone), x-571-74, 673-74 (soil samples)
T15	60°59.204 N, 45°25.279 W	0,5x0,5 m trench in field west of Area A	No finds
T16	60°59.197 N, 45°25.281 W	0,5x0,5 m trench in field west of Area A	Find: x-954 (charcoal sample)
T17	60°59.200 N, 45°25.279 W	0,5x0,5 m trench in field west of Area A	No finds
T18	60°59.199 N, 45°25.270 W	0,5x0,5 m trench in field west of Area A	No finds
T19	60°59.198 N, 45°25.269 W	0,5x0,5 m trench in field west of Area A	No finds

T20	60°59.201 N, 45°25.285 W	0,5x0,5 m trench in field west of Area A	No finds
T21	60°59.202 N, 45°25.291 W	0,5x0,5 m trench in field west of Area A	No finds
T22	60°59.202 N, 45°25.300 W	0,5x0,5 m trench in Area C, around the well	Find: x-955 (stone)
T23	60°59.201 N, 45°25.307 W	0,5x0,5 m trench in Area C, around the well	No finds
T24	60°59.196 N, 45°25.305 W	0,5x0,5 m trench in Area C, around the well	Find: x-956 (coal)
T25	60°59.205 N, 45°25.297 W	0,5x0,5 m trench in Area C, around the well	No finds
T26	60°59.203 N, 45°25.313 W	0,5x0,5 m trench in Area C, around the well	Find: x-957 (charcoal)
T27	60°59.203 N, 45°25.254 W	0,5x0,5 m trench in field NE of Area A	Find: x-958-60 (wood and stone)
T28	60°59.193 N, 45°25.256 W	0,5x0,5 m trench in field south of Area A	Finds: x-961-64 (vitrified material and wood)
T29	60°59.183 N, 45°25.256 W	0,5x0,5 m trench in field south of Area A	Finds: x-965-76 (bone, wood, stone and leather)
T30	60°59.199 N, 45°25.244 W	0,5x0,5 m trench in field NE of Area A	Finds: x-977-87 (bone, wood and stone)
T31	60°59.178 N, 45°25.258 W	0,5x0,5 m trench in field south of Area A	No finds
T32	60°59.197 N, 45°25.238 W	0,5x0,5 m trench in field NE of Area A	Finds: x-988-91 (wood and bone)
T33	60°59.200 N, 45°25.226 W	0,5x0,5 m trench in field NE of Area A	Finds: x-992-93 (wood and bone)
T34	60°59.200 N, 45°25.242 W	0,5x0,5 m trench in field NE of Area A	Finds: x-994-1004 (bone, wood, leather and stone)
T35	60°59.190 N, 45°25.224 W	0,5x0,5 m trench in field east of Area B	Finds: x-1005-1009 (bone and wood)
T36	60°59.182 N, 45°25.235 W	0,5x0,5 m trench in field south of Area B	Finds: x-1010-11 (wood)
T37	60°59.182 N, 45°25.226 W	0,5x0,5 m trench in field south of Area B	Finds: x-1012-14 (bone and wood)
T38	60°59.203 N, 45°25.242 W	0,5x0,5 m trench in field NE of Area A	Finds: x-1015-19 (bone, wood and stone)
T39	60°59.203 N, 45°25.238 W	0,5x0,5 m trench in field NE of Area A	Finds: x-1020-22 (bone and wood)
T40	60°59.200 N, 45°25.238 W	0,5x0,5 m trench in field NE of Area A	Finds: x-1023-28 (bone, wood and leather)
T41	60°59.200 N, 45°25.233 W	0,5x0,5 m trench in field NE of Area A	Finds: x-1029-30 (bone and wood)
T42	60°59.207 N, 45°25.242 W	0,5x0,5 m trench in field NE of Area A	Finds: x-1031-36 (bone and wood)
T43	60°59.210 N, 45°25.243 W	0,5x0,5 m trench in field NE of Area A	No finds
T44	60°59.195 N, 45°25.202 W	0,5x0,5 m trench in field east of Area B	Finds: x-1042-43 (wood)
T45	60°59.188 N, 45°25.203 W	0,5x0,5 m trench in field east of Area B	Finds: x-1037-39, 1041 (bone and wood)
T46	60°59.179 N, 45°25.202 W	0,5x0,5 m trench in field south of Area B	Finds: x-1040 (wood)
T47	60°59.177 N, 45°25.222 W	0,5x0,5 m trench in field south of Area B	Finds: x-1044-45 (wood)
T48	60°59.175 N, 45°25.235 W	0,5x0,5 m trench in field south of	Finds: x-1046-49 (bone and

		Area B	wood)
T49	60°59.184 N, 45°25.260 W	0,5x0,5 m trench in field south of Area A	Finds: x-1058 (wood)
T50	60°59.171 N, 45°25.234 W	0,5x0,5 m trench in field south of Area B	Finds: x-1050-54 (bone, wood and stone)
T51	60°59.166 N, 45°25.239 W	0,5x0,5 m trench in field south of Area B	Finds: x-1055-56 (wood)
G5-1	60°59.155 N, 45°25.247 W	Section cleaned in N side of G5	
G5-2	60°59.147 N, 45°25.251 W	Section cleaned 20 m south of G5-1	
G5-3	60°59.157 N, 45°25.290 W	Section cleaned at NE corner of intersection of G5 and N-S channelling water from well	
G5-4	60°59.155 N, 45°25.311 W	Section cleaned in N side of G5, intersection with road	

Appendix 2

Context descriptions for Trenches 15-51. For information on Trenches 0-14 and G5-2 – G5-4 see Appendix 1 above and discussion in ch. 2.

Trench 15

1. Topsoil/ploughzone. At the base there is a 1-2 cm horizon of charcoal and small stones. It is not continuous and likely disturbed by machining. pH 4.6
2. Cultural. Light grey sandy silt w. occasional charcoal and traces of burnt bone but matrix essentially natural. pH 5.1
3. Natural – sand w. humic lenses. pH 5.6
4. Natural sand

Trench 16

1. Topsoil/ploughzone. Cultural material and 10-20 cm stones mixed in. pH 4.0
2. Charcoal horizion, uneven and undulating but continuous. Some burnt and unburnt bone. Sampled. pH 5.6
3. Cultural. Light grey sandy silt w. occasional charcoal but matrix essentially natural w. several lenses of sand. pH 5.8
4. Natural – sand w. some humic lensing, decreasing towards the bottom. Large boulders at base.

Trench 17

1. Topsoil/ploughzone – more peaty than in T15-16
2. Charcoal horizon – sandy silt matrix, traces of burnt bone. pH 6.0
3. Cultural. Mid-grey clayey silt w. sand and humic lenses, possibly turf. Occasional charcoal stains. pH 5.9
4. Natural – coarse sand and large (20 cm) stones.

Trench 18

1. Topsoil/ploughzone – continuous charcoal leneses may be undisturbed. Matrix more peaty than in T15-16. pH 5.1
2. Charcoal horizon w. some wood chips
3. Cultural. Sandy silt but more peaty than T15-16. pH 6.2
4. Natural – sand w. humic lensing
5. Natural – sand. pH 6.2

Trench 19

1. Topsoil/ploughzone – quite peaty and looks less disturbed tha T15-18. pH 5.3
2. Cultural – mid-brown – grey sandy silt w. lenses of greasy charcoal-stained silt and lighter/more yellowish sandy silt, possibly turf. Occasional charcoal. pH 6.1
3. Natural – light grey silty sand
4. Natural – black sand w. stones

Trench 20

1. Topsoil/ploughzone. Heavily mixed light grey sand w. darker more clayey material. Stones up to 20 cm and modern material incl. plastic, ceramics, wood and iron.
2. Natural – grey homogenous silty clay. Possibly some cultural in upper part but no charcoal. pH 6.2
3. Natural – black coarse sand

Trench 21

1. Topsoil/ploughzone – dark humic matrix. pH 6.5
2. Modern disturbance – light grey sandy gravel w. glass and ceramics. pH 7.0
3. Natural – mid-grey clayey silt w. occasional charcoal at the top. pH 6.9
4. Natural – dark brown coarse sand

Trench 22

1. Topsoil/ploughzone. No clear signs of machining. Very rooty.
2. Cultural – mid brown w. occasional charcoal and 1-5 cm stones. pH 5.2
3. Cultural – dark-brown to black, charcoal stained w. stones of various types incl Igaliku sandstone, dressed stone and firecracked. 1 piece of steatite. Not dug through. pH 5.7

Trench 23

1. Topsoil/ploughzone.
2. Cultural – yellowish brown turfy silt mixed w. brown and black. pH 5.1
3. Cultural - charcoal stained fatty sandy silt w. burnt bone and ash. Not dug through. pH 5.7

Trench 24

1. Topsoil
2. Ploughzone / modern disturbance – gravel in mid brown silt matrix w. modern material incl. a piece of coal. Includes also pieces of redeposited turf w. lenses of charcoal and ash. pH 6.8
3. Cultural – compact greyish sandy silt w. ash and occasional charcoal, some wood and bone in less than mediocre condition. pH 6.1
4. Natural – gravel w. water-worn pebbles in brown sand matrix

Trench 25

1. Topsoil – brown grey silt w. gravel/frequent small stones of different origins.
2. Cultural – probably modern levelling although no material culture could indigate age. Sandy silt matrix, heavily mixed w. occasional charcoal and some ash. pH 6.8
3. Natural – gravel in light brown sandy matrix

Trench 26

1. Topsoil – very disturbed w. old material (charcoal, ash, turf) mixed in.
2. Homogenous band of reddish peat, looks undisturbed. Akin to [1002]. pH 5.4
3. Charcoal horizon – greyish black sandy silt, evenly mixed and much less compact than [003] in T23. pH 6.1
4. Natural – beige clay
5. Natural – gravel in dark brown sand

Trench 27

1. Topsoil
2. Reddish peaty turf, disturbed but not as much as in Area A. =[1001/1002]. pH 6.6.
3. Charcoal horizon. Greyish black greasy sandy silt, only small (<5 cm) stones and not frequent. Clearly outside stone layers observed in Area A but still = [1003]. 1 piece of steatite. pH 5.7
4. Cultural – compact mid brown silt – peat = [1004]. pH 5.6
5. Natural – sandy gravel

Trench 28

1. Topsoil
2. Reddish peat, disturbed, =[1001/1002]. pH 7.0
3. Charcoal horizon, many stones, some large (15-20 cm max), =[1003]. pH 6.7
4. Peat w. frequent animal bone and some wood chips = [1004]. pH 5.6
5. Natural – sandy gravel

Trench 29

1. Topsoil
2. Reddish peat, disturbed, =[1001/1002].
3. Cultural – grey-brown peat w. frequent twigs, wood chips and woodden artefacts, piece of leather but hardly any bone. pH 7.0
4. Charcoal horizon, black silt w. frequent burnt bone and lumps of vitrified material
5. Cultural layer, similar to [003] but w. more animal bone although nothing like T28
6. Natural – sandy gravel

Trench 30

1. Topsoil/disturbed
2. Reddish peat, disturbed, =[1001/1002]
3. Charcoal horizon w. frequent charcoal, burnt bone, steatite = [1003]. pH 6.0
4. Cultural layer =[1004] w. frequent bone, wood, some artefacts, incl. steatite and some burnt bone. Laminated w. lenses of charcoal and ash throughout. Lowest 10 cm w. little cultural material. pH 6.2 at ÷50 cm, pH 6.3 at ÷70 cm
5. Natural – sandy gravel

Trench 31

1. Topsoil
2. Reddish peat, disturbed, =[1001/1002]. pH 5.7
3. Cultural – grey-brown peat w. little wood, good preservation. pH 6.4
4. Charcoal horizon, black silt w. frequent burnt bone
5. Cultural layer, similar to [003]. pH 6.7
6. Natural – sandy gravel

Trench 32

1. Topsoil
2. Reddish peat, =[1002]. pH 6.8
3. Cultural – dark grey peat w. ash and charcoal, some wood, 1 piece of unburnt bone and 3 burnt bones. pH 6.8
4. Natural – red-brown silt w. large stones

Trench 33

1. Topsoil
2. Reddish peat, =[1002]. pH 6.2
3. Cultural – grey peat w. some ash, few pieces of wood and a single bone. pH 6.6
4. Natural – red-brown silt w. large stones

Trench 34

1. Topsoil
2. Reddish peat, =[1002]. pH 6.6
3. Charcoal horizon, some characteristics of [1003] but much thicker (30 cm), laminated w. lenses of peat formation and good preservation of both wood and bone. Steatite. Layer could be split in two, upper part is lighter w. less charcoal, pH 6.0, and lower part darker w. more charcoal, pH 5.1
4. Cultural – brown peat w. wood, + 1 piece of leather, =[1004], pH 6.8 at ÷58 and 6.6 at ÷ 77.

Trench 35

1. Topsoil/disturbed
2. Reddish peat, =[1002]. pH 5.4
3. Cultural – brown-grey peat w. some wood and bone, sand lenses towards the bottom, = [1004]. pH 6.7 in upper part, pH 6.5 in lower
4. Natural – packed w. stones in brown sand matrix, above compact sand

Trench 36

1. Topsoil/ploughzone – heavily disturbed
2. Reddish peat, possibly disturbed, =[1001/1002]. pH 5.9
3. Cultural – brown-grey peat w. high sand content, some sand lenses. A few pieces of wood and 1 artefact, =[1004]. pH 6.1
4. Natural – stones in brown silt matrix, above compact sand

Trench 37

1. Topsoil/disturbed
2. Reddish peat, =[1002]. pH 5.2
3. Cultural – grey-brown peat w. some pieces of wood and bone, =[1004]. pH 6.3
4. Natural – large (+40 cm) stones in brown silt

Trench 38

1. Topsoil/disturbed
2. Reddish peat, =[1002]. pH 5.7
3. Charcoal horizon =[1003], no finds.
4. Cultural – dark grey-brown peat, laminated w. some ash lenses but more sand towards the bottom, some wood and bone. 1 steatite loomweight. pH 5.9 at top, Ph 5.7 at ÷58 cm
5. Natural – brown silt w. 10-20 cm stones

Trench 39

1. Topsoil/disturbed
2. Reddish peat, disturbed w. cultural material mixed in, =[1001/1002]. pH 3.8(!)
3. Cultural – dark brown-grey laminated w. charcaol, ash and burnt bone in some lenses. Some characteristics of [1003] but similar to [003] in T34. pH 5.5
4. Cultural – light mid-brown peat w. some ash and charcoal, laminated w. lenses of clay and sand increasing towards the bottom, =[1004]. pH 5.8
5. Natural – brown sterile silt on top of sand

Trench 40

1. Topsoil/disturbed
2. Reddish peat, disturbed w. cultural material mixed in, =[1001/1002]. pH 5.7
3. Cultural – dark brown-grey laminated w. charcaol, ash and burnt bone in some lenses. Some characteristics of [1003] but similar to [003] in T34 and T39. pH 5.1
4. Cultural – similar to [004] in T39 =[1004], but less sand and clay, more stones, some burnt bone at the bottom and particularly frequent wood in lower part. pH 6.3
5. Natural – brown sterile silt on top of sand

Trench 41

1. Topsoil
2. Reddish peat, =[1002]. pH 5.9
3. Cultural – dark grey-brown peat w. ash and some charcoal. pH 5.6
4. Cultural – light mid-brown peat, laminated w. lenses of sand, frequent 5-10 cm stones, 3 pieces of wood, 1 bone. pH 6.0
5. Natural – brown sterile silt on top of sand

Trench 42

1. Topsoil/disturbed
2. Reddish peat, =[1002]. pH 6.5
3. Cultural – dark grey peat w. frequent ash and charcoal, no finds, =[1003]. pH 6.3
4. Cultural – mid-brown and light-brown peat, laminated w. lenses of sand and large stones (+40 cm) n top of cultural material, incl. a large piece of wood at the base, not removed. pH 6.0
5. Natural – brown silt on top of sand.

Trench 43

1. Topsoil
2. Reddish peat, disturbed, =[1001/1002]. pH 5.5
3. Charcoal horizon – doscontinuous, disturbed =[1002/1003]. pH 5.6
4. Natural – pinkish grey gravelly sand. pH 6.4

Trench 44

1. Ploughzone – recently harrowed and re-seeded
2. Peat – alternating bands of dark-brown almost black humic and pale-brown peat, increasingly sandy and stony towards the base. Nothing cultural apart from a few wood-chips and twigs. pH 6.6 in upper part, pH 6.4 in lower
3. Natural - packed gravel and stones

Trench 45

1. Ploughzone – recently harrowed and re-seeded
2. Peat – alternating bands of dark-brown almost black humic and pale-brown peat, increasingly

sandy and stony towards the base. 1 bone and 1 piece of worked wood. pH 6.2 in upper part, pH 6.3 in lower
3. Natural - gravel w. 5-10 cm stones

Trench 46

1. Ploughzone – recently harrowed and re-seeded. Cuts deeper into [002] than elsewhere and has wood chips mixed in
2. Peat – alternating bands of dark-brown almost black humic and pale-brown peat, increasingly sandy and stony towards the base. Nothing cultural apart from a few wood-chips and twigs. pH 5.8 in upper part, pH 5.5 in lower
3. Natural - packed gravel and stones

Trench 47

1. Ploughzone – recently harrowed and re-seeded
2. Peat – alternating bands of dark-brown almost black humic and pale-brown peat, increasingly sandy and stony towards the base. pH 5.8 in upper part, pH 6.3 in lower
3. Natural - gravel w. 5-10 cm stones

Trench 48

1. Topsoil
2. Ploughzone – disturbed material from [003]
3. Cultural - dark brown-grey-black charcoal stained peat, laminated, w. crushed burnt bone, wood and unburnt bone. pH 5.8 in upper part, pH 6.1 in lower
4. Cultural – mid reddish-brown peat w. wood chips and twigs. pH 6.1
5. Natural – sandy gravel

Trench 49

1. Topsoil
2. Reddish peat, =[1002].
3. Cultural - loose sandy peat w. lenses of pale-brown clay and traces of charcoal, ash and burnt bone. Small pebbles frequent – akin to [1003]
4. Natural – mid-brown silty peat
5. Natural – sandy gravel

Trench 50

1. Topsoil
2. Ploughzone – disturbed material from [003], incl. 2 pieces of modern pottery (not collected)
3. Cultural - dark brown-grey-black charcoal stained peat, laminated, w. crushed burnt bone, wood and unburnt bone. pH 6.1
4. Cultural – mid reddish-brown peat w. wood chips and twigs. pH 6.5
5. Natural – sandy gravel

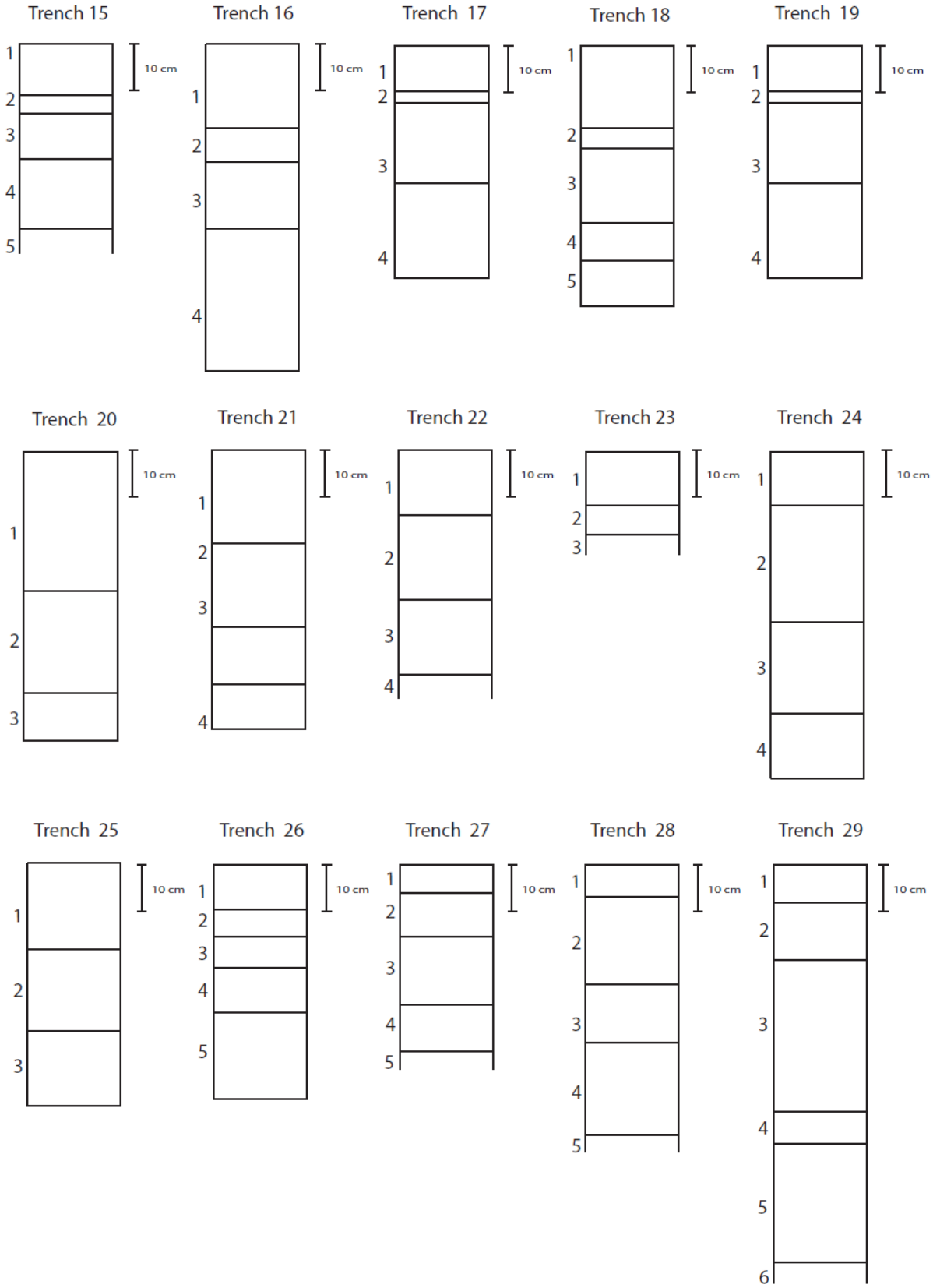
Trench 51

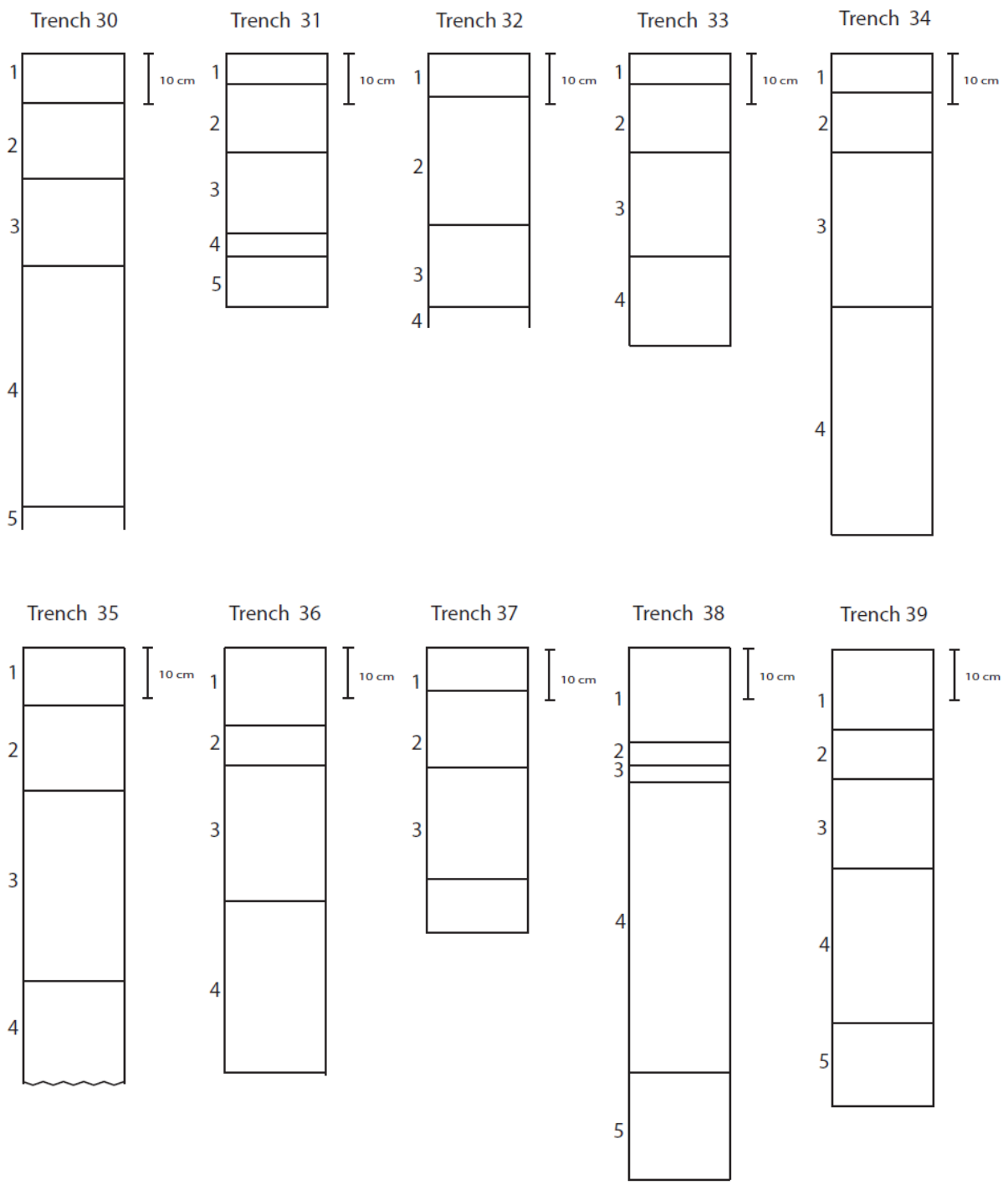
1. Ploughzone – recently harrowed and re-seeded
2. Peat – alternating bands of dark-brown almost black humic and pale-brown peat, increasingly sandy and stony towards the base. More homogenous and has fewer and broader bands in the peat than T45-47. pH 5.8
3. Natural - gravel w. 5-10 cm stones

Trench G5-1

1. Topsoil
2. Dark brown peat, akin to [1002]
3. Lighter, more mixed peat w. blothces of ash, charcoal and crushed burnt bone
4. Same as [003] but without the cultural. Lenses of gravel and sand increasing towards bottom
5. Mid-brown silt w. gravel.

Schematic sections of trenches 15-51 and G5-1

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1
2
3
4
5
10 cm
Trench 31
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3
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10 cm
Trench 32
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4
10 cm
Trench 33
1
2
3
4
10 cm
Trench 34
1
2
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Trench 35
1
2
3
4
10 cm
Trench 36
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Trench 37
1
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Trench 38
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Trench 39
1
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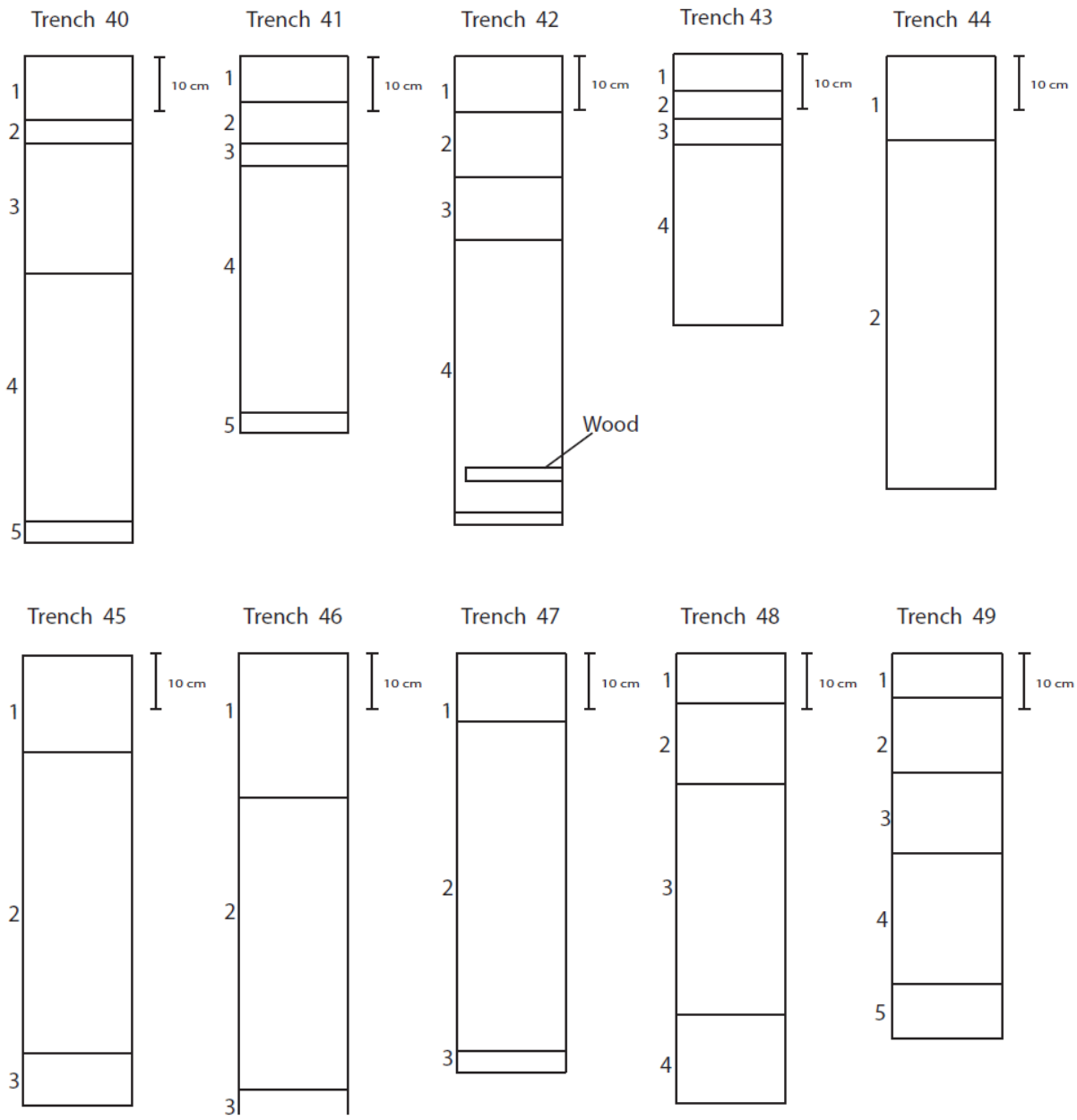
10 cm


Trench 40
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3
4
5
10 cm
Trench 41
1
2
3
4
5
10 cm
Trench 42
1
2
3
4
Wood
10 cm
Trench 43
1
2
3
4
10 cm
Trench 44
1
2
10 cm
Trench 45
1
2
3
10 cm
Trench 46
1
2
3
10 cm
Trench 47
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Trench 48
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Trench 49
1
2
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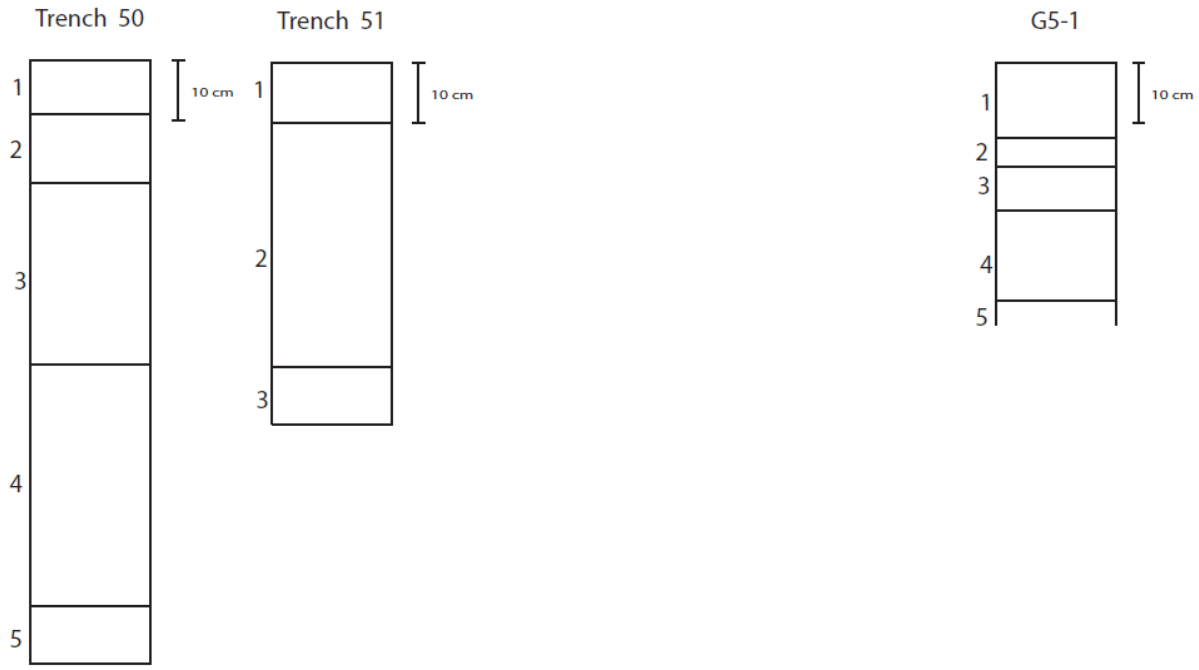
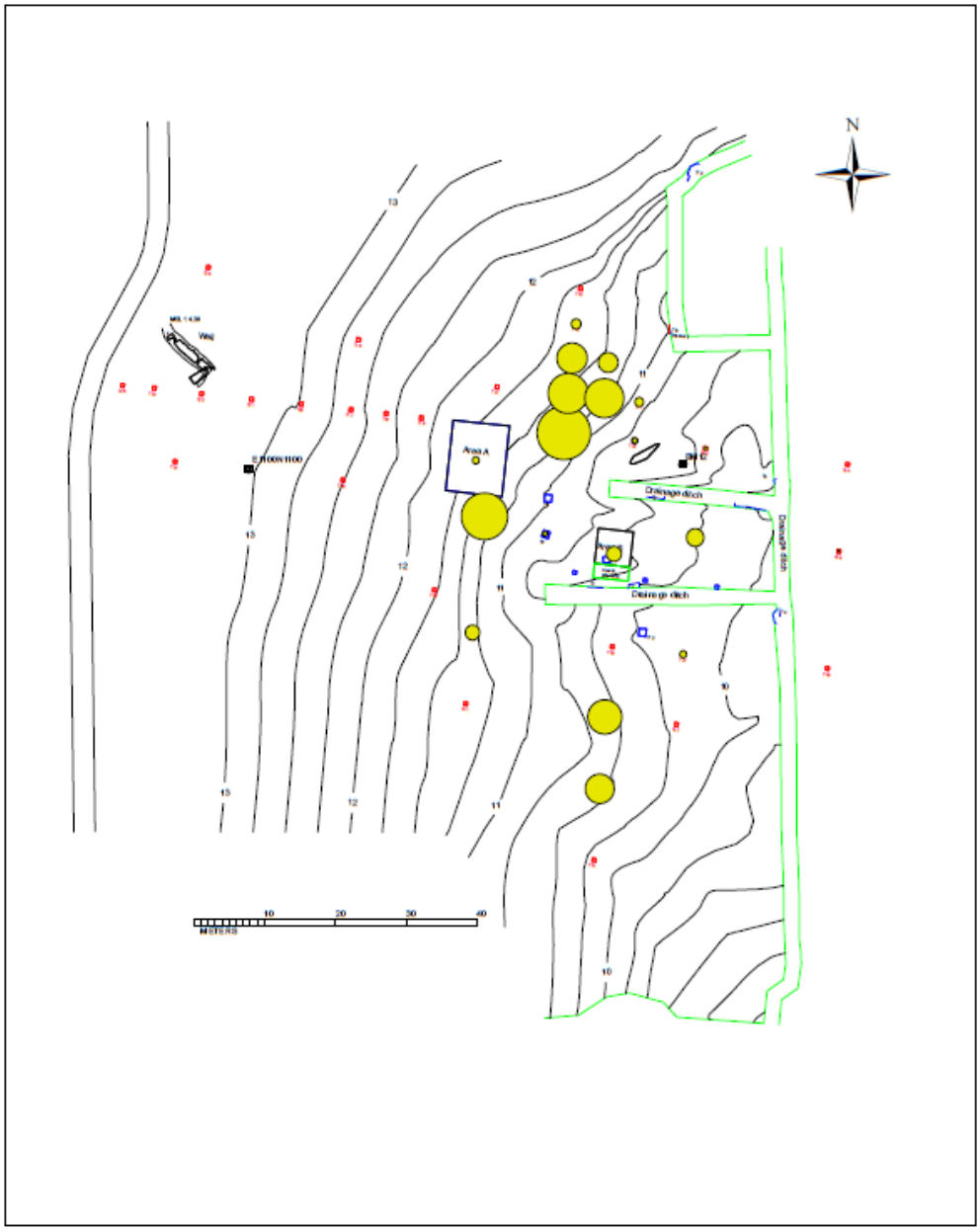
5
10 cm



Sections digitized by Hermann Hjartarson.

Appendix 3.

Distribution maps of finds from trenches in the Garðar meadow. All the maps are made by Hermann Hjartarson as a part of his BA dissertation in Archaeology at the University of Iceland, spring 2014.



Weight in gr.

Garðar

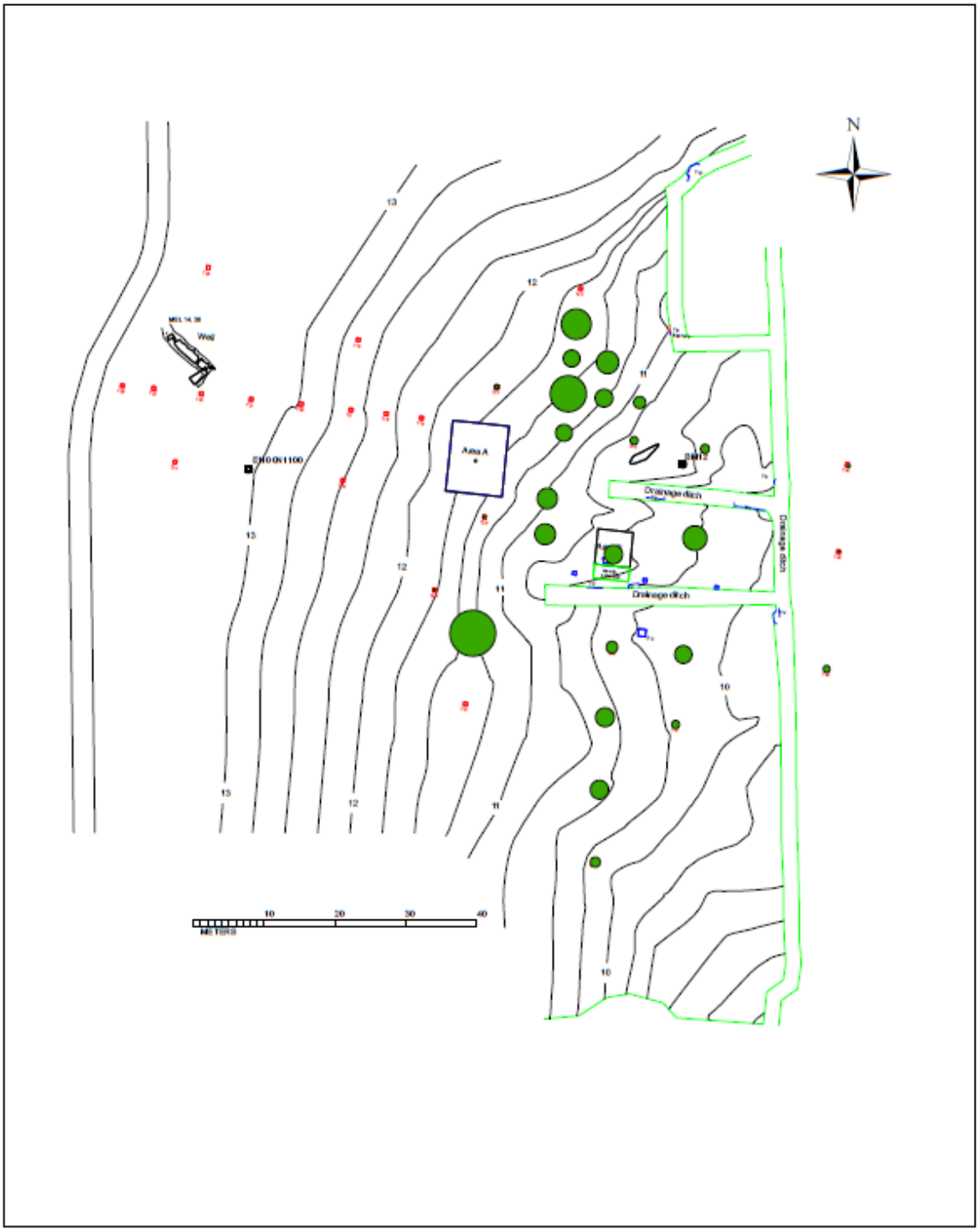
Bones, weight

1

10

100

1,000

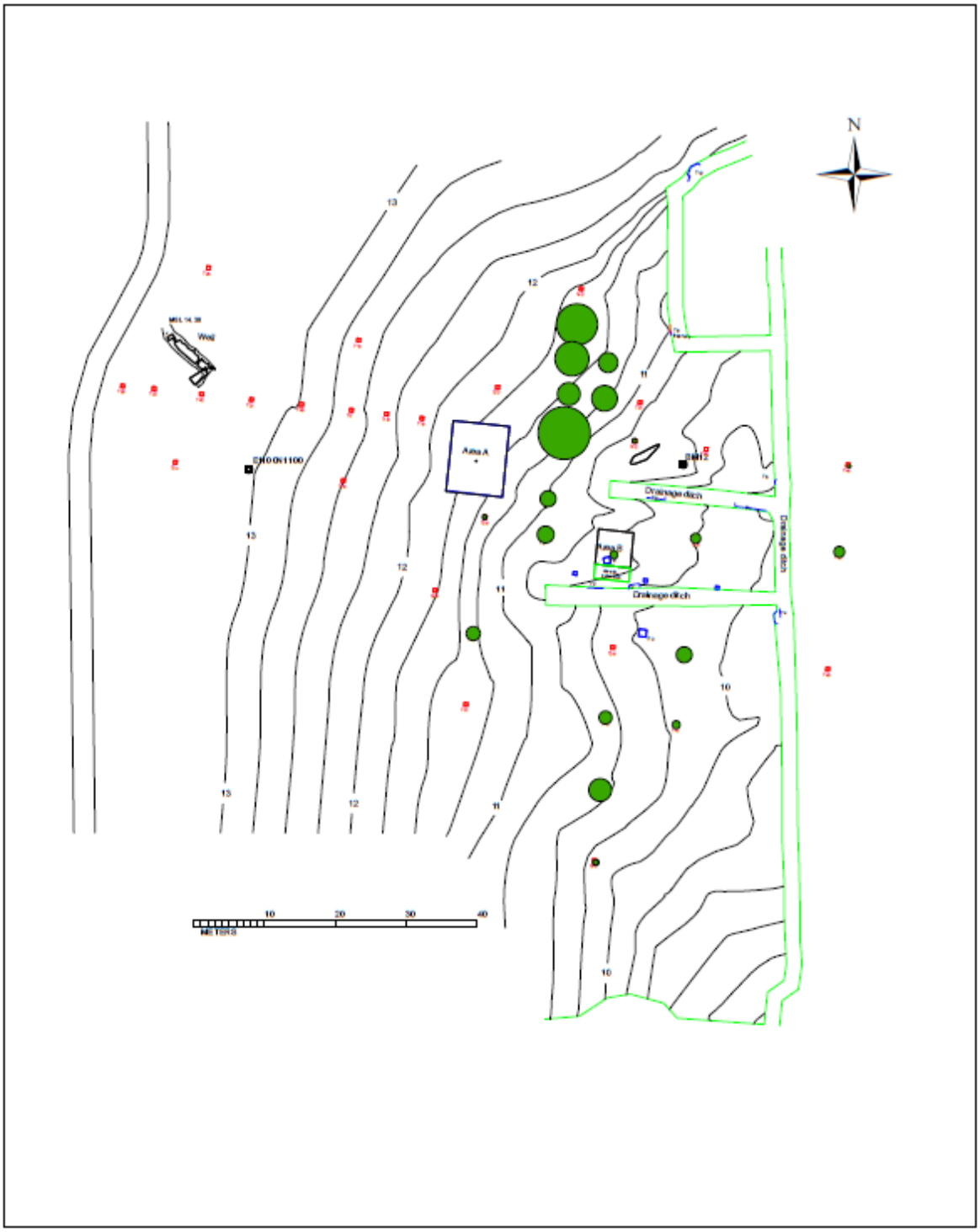


Weight in gr.

Garðar

Worked wood, weight

- 1
- 10
- 100
- 1,000

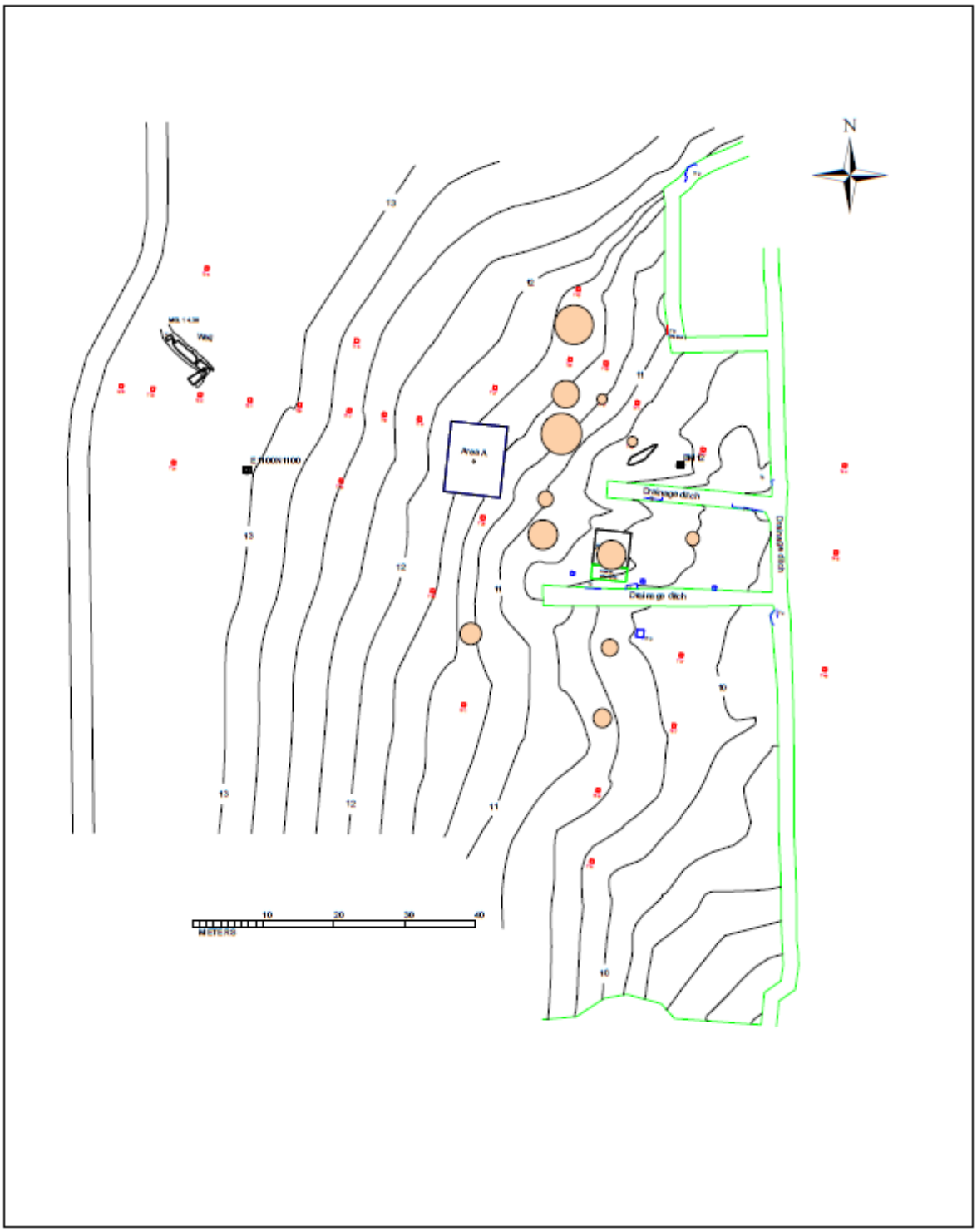


Weight in gr.

Garðar

Twigs, weight

- 1
- 10
- 100

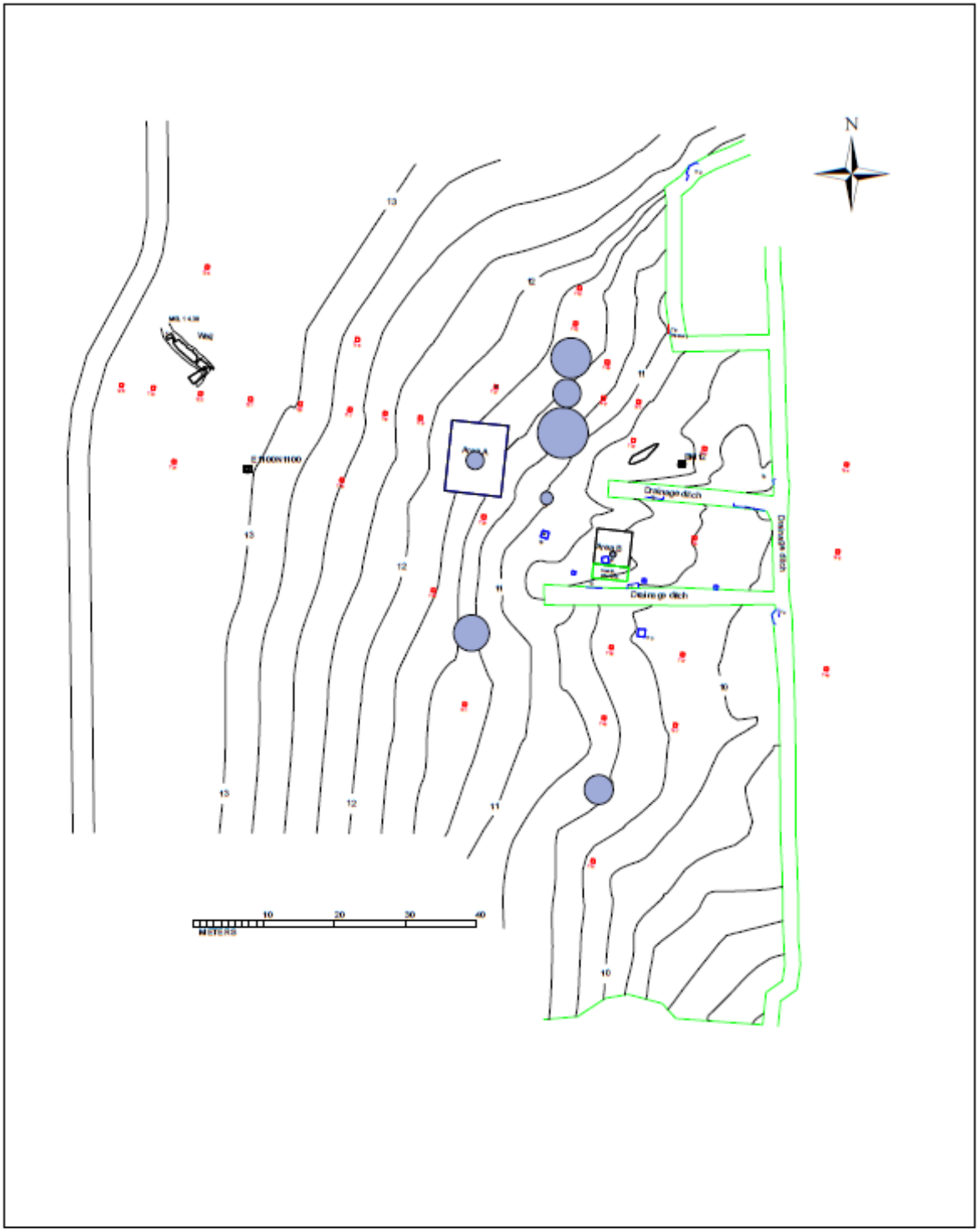


Weight in gr.

Garðar

Weight wooden artifacts

- 1
- 10
- 100

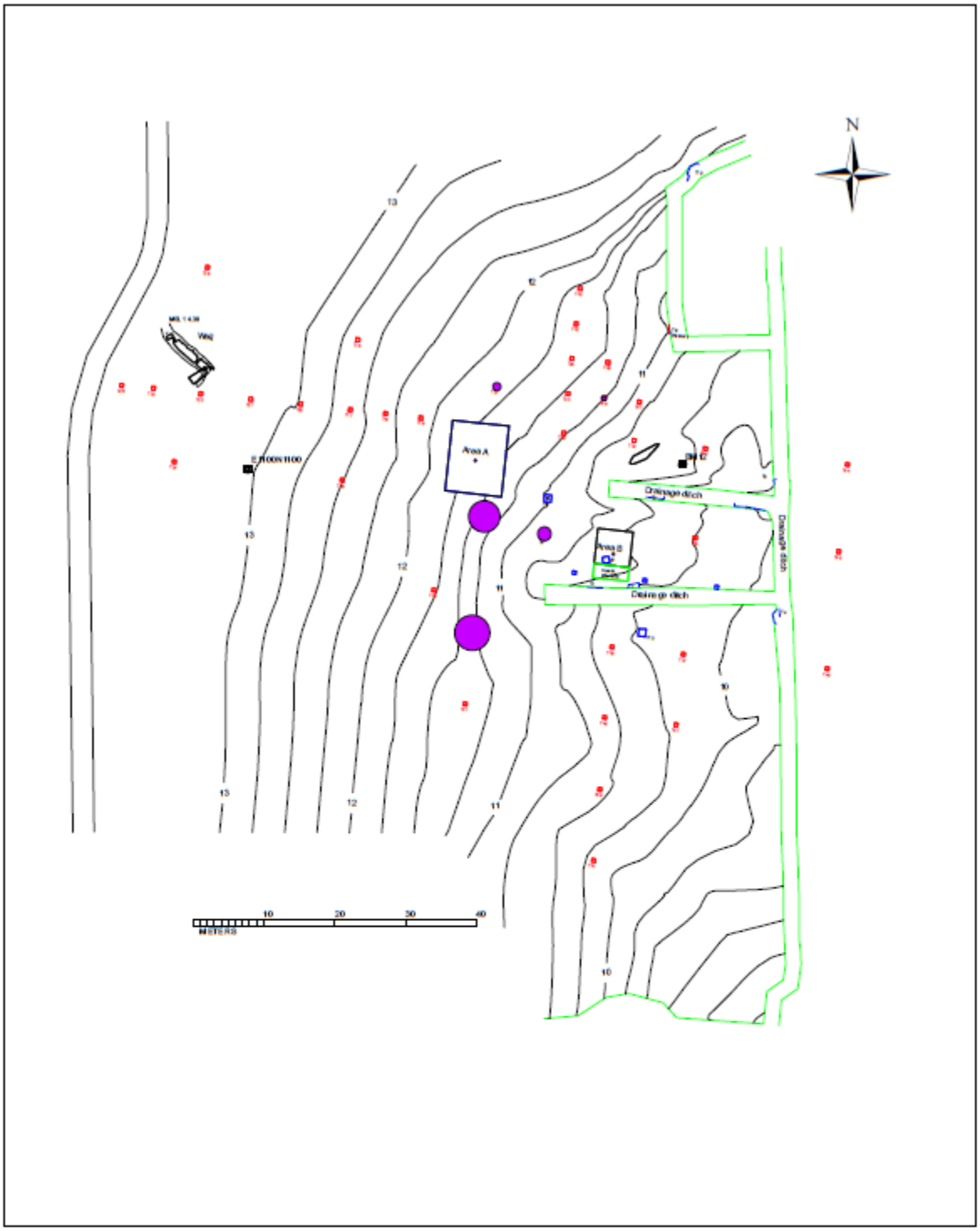


Weight in gr.

Garðar

Steatite, weight

- 1
- 10
- 100
- 1,000

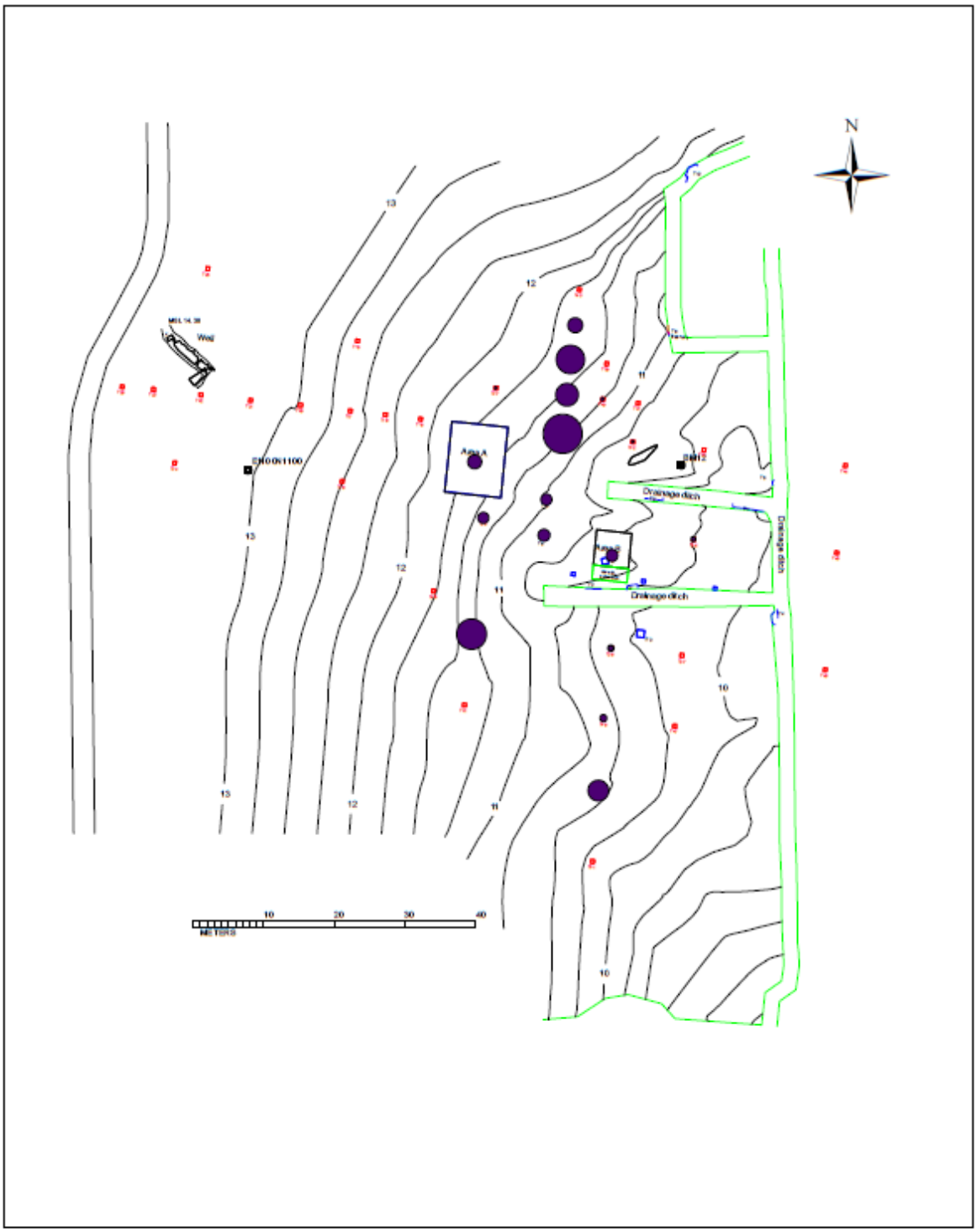


Weight in gr.

Garðar

Other artifacts, weight

- 1
- 10
- 100

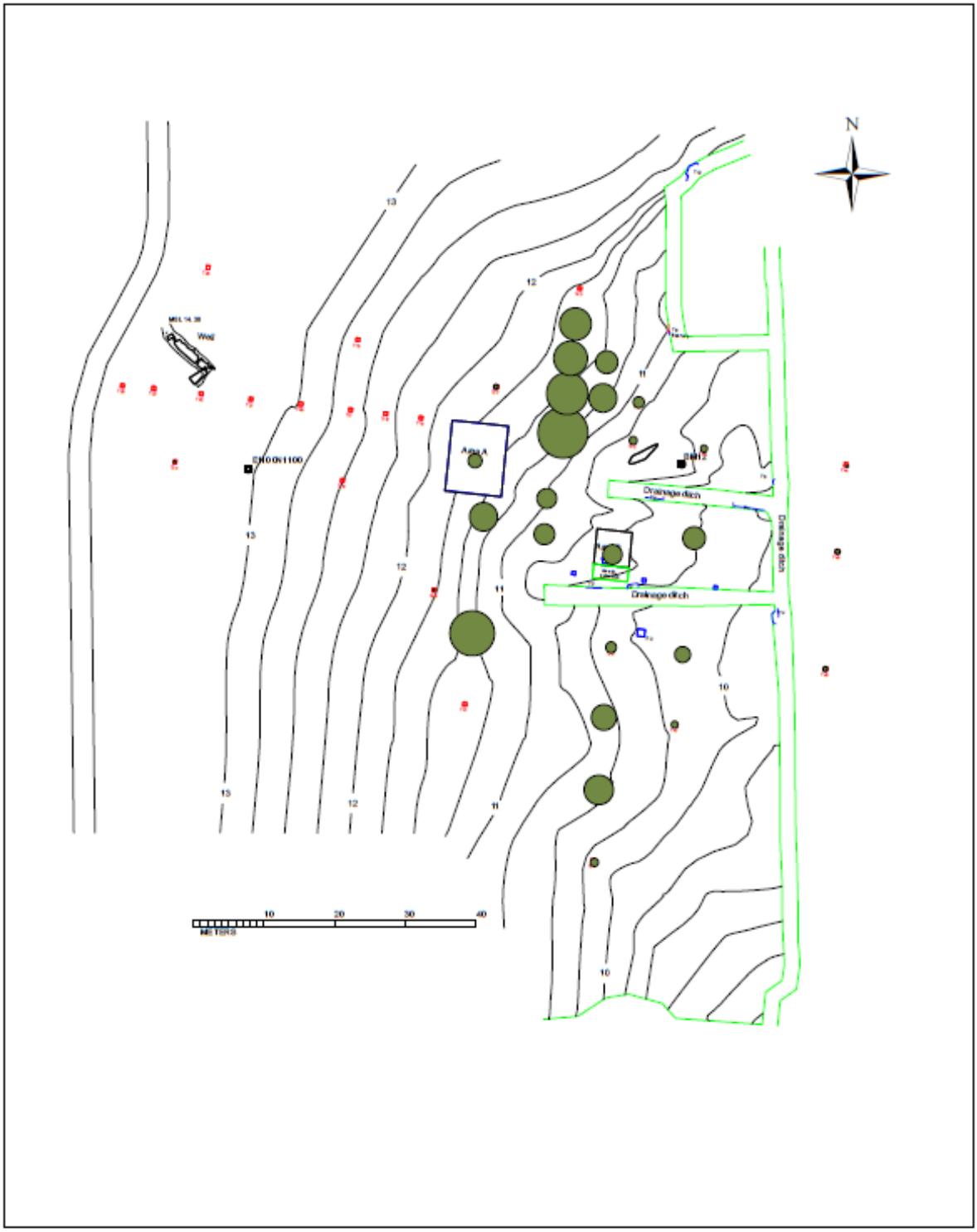


Weight in gr.

Garðar

Total artifacts, weight

- 10
- 100
- 1,000



Weight in gr.

Garðar

Total finds, weight

- 1
- 10
- 1,000