



HÁSKÓLI ÍSLANDS

Hugvísindasvið

Whetstones from Viking Age Iceland

As part of the Trans-Atlantic trade in basic commodities

Ritgerð til M.A.-prófs

Sigríð Cecilíe Juel Hansen

Október 2009

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Fornleifafræði

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Sigrid Cecilie Juel Hansen

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Abstract

Whetstones were essential sharpening tools from the Iron Age and well into modern times. They were an important part of people's personal kit and indispensable to anyone using knives, axes, arrows, sickles, scythes, needles, scissors and any other iron implement or weapon with a cutting edge or point. As Viking Age Scandinavia was an Iron Age society particularly dependent on their iron tools for survival and geographic expansion stone types particularly suitable for whetting were much valued and transported over long distances.

Only limited firm archaeological evidence is available to contribute to our understanding of Trans-Atlantic trade in the pre medieval period and no broad scale research has been carried out on the whetstone material in the area yet. There is no good quality stone to produce whetstones from in Iceland so almost all the material is prima facie evidence of trade and foreign connection and the fact that the trade in this commodity is well known throughout Scandinavia from the late Iron Age onwards makes it all the more promising to look at the Icelandic material.

Analysis of whetstone material from nine selected farmsteads and all burials containing whetstones will be undertaken and compared to foreign reference collections in England and the Scandinavian homelands. It will primarily be the stone types used for whetting that is compared but other conditions such as the fragmentation will also be considered in order to explore Iceland's setting in the Trans-Atlantic trade during the 9th to 12th centuries.

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Introduction: research aims, methods and objectives

The aim of this research is to identify the stone types used for whetstones in Iceland during the Viking age and compare the Icelandic whetstone collection to other Viking period sites abroad. The results will hopefully contribute to a revaluation of Iceland's place in the Trans-Atlantic trade and exchange networks in the 9th to 12th centuries.

Whetstones have not received much academic attention and so far no major studies have been carried out on either the Icelandic or the North Atlantic whetstone material. In Iceland only Kristján Eldjárn has shortly mentioned the whetstones, primarily the ones found in graves, but not in any great detail (Eldjárn and Friðriksson 2000, 252). Another study on the geological determination and intra site analysis of the whetstone material from Hofstaðir in Mývatnssveit is in process¹. In addition whetstones are commonly described shortly in preliminary excavation reports but seldomely with much detail. And no studies have given an overview of the Icelandic whetstones based upon several sites, or tried to incorporate this information into the understanding of Iceland's position in the Trans-Atlantic trade.

Besides the fact that whetstones have not previously been the subject of any systematic study in Iceland, there are several other excellent reasons for studying this particular artefact group. As many stone artefacts, whetstones are common finds, in fact they are ubiquitous on settlement sites, and they are often very well preserved in the archaeological context. It is therefore possible to assume that all the whetstones discarded on a site are still present and that these, potentially, could all be retrieved. Because of that it is possible to systematically compare and suggest the volume, need for and use of the stone at each site. It is also important that whetstones are found at all site types ranging from marginal farms and shieldings to large central farms and church centres. Everyone needed a good whetstone and the results of a whetstone study therefore can be applied to society as a whole. Rotary grinding stones were also to a minor degree used for sharpening edges in Viking age Iceland but only few of these have been found in archaeological excavations. They are mostly made of sandstone but schist has also been used. These have, however, been excluded from this study to maintain the focus on the whetstone material.

¹ ¹ 'The Whetstones: Petrography and Provenance' by H Askvik with C E Batey, in: G. Lucas (ed.) forthcoming, *Hofstaðir. Excavations of a Viking Age Feasting Hall in Iceland*. Institute of Archaeology Monograph No.1, Reykjavík.

In Iceland, the whetstones are a good indicator of exchange with other countries as almost all the whetstones are of foreign provenience. It is possible macroscopically to classify the two most common stone types used for whetstones in both Iceland and the western part of the Viking world. Only a few percent of the Icelandic whetstone collection consist of other stone types. Both main types are of schist; one dark grey and very fine-grained and the other light grey and fine-grained. The latter can be sourced with confidence to Eidsborg in the Telemark region around in the town of Skien in Norway. This gives important information about the contact between Iceland and Norway and connects Iceland to the Western European exchange network.

1.1 Parameters of the research

The focus of this research is on Viking age Iceland (settlement to ca. AD 1100) though material included from a few sites might extend into the 12th century. This period is particularly suitable since there have been a relatively large number of excavations of Viking age sites, and thereby more excavation to chose between, in order to establish a solid foundation for interpreting whetstones from Icelandic contexts. Excavations from the later medieval period are, on the other hand, greatly underrepresented in Icelandic archaeology. Another reason for choosing this period is that sites with well-researched whetstone collections in Scandinavia are all within the same time period, whereas work on medieval sites is less extensive and sporadic.

One of the aims of this research is to contribute to the understanding of Iceland's setting in the Trans-Atlantic trade or exchange during the Viking age. An important element when analyzing the Icelandic whetstone collection has therefore been to compare it with results from the rest of the Viking world. There is a well-researched change occurring in the whetstone collections in Scandinavia during the 10th century that can be summed up as a dramatic increase in the export of light grey Eidsborg type of whetstone material from Norway during the turn of the 11th century. As a result this type became dominant in the Western part of the Viking world in the late Viking age and during the medieval period². To be able to explore whether increased export can be traced in the Icelandic material it has been important to analyze material from secure contexts and divide the

² See: Section 2.2 for more detail

material according to the known occurrence of change. The chosen divider is AD 1000 though this should not be considered as an exact year, but rather as the period around which the change occurs. Several of the Icelandic sites featuring in this work are only datable to the 11th century, but are, nevertheless, considered within the pre AD 1000 category – or rather considered together with sites showing none or little influence of the change in whetstones export.

As an individual artefact a whetstone is not typologically datable as the same stone types were used for centuries. Therefore this study only considers those excavations where modern methods have been employed, preferably containing other datable artefacts and contexts framed by securely dated tephra layers or with accurate carbon-dating of Viking age layers. For the same reason stray finds have been excluded from the study, but whetstones from pagan burials are included as these can be confidently dated to the 9th-10th centuries even if the excavation methods in many cases leave much to be desired. As an example of sites that were interesting but not selected are the settlements in the valley of Þjórsárdalur. Most of the whetstones from Þjórsárdalur are not from secure contexts and many are stray finds. Although Sámsstaðir was excavated in the 1970s (Rafnsson 1977) and Stöng partly in the 1980s (Vilhjálmsson 1986), neither has been included due to the uncertainty that still remains about the dating of the abandonment of these farms. It would be interesting for a future project to look at the whetstone material from Þjórsárdalur, particularly as the whetstone assemblage is quite impressive with more than 150 pieces. For instance the only, to date, known piece of raw whetstone material in Iceland with a likely Viking age date is from Skallakot in Þjórsárdalur (Guðrún Alda Gísladóttir 2004).

This study is not based on petrological analysis of the whetstones but a few stones have been thin sectioned, with the kind assistance of geologists Sveinn Jakobsson and Gísli Örn Bragason, in order to determine their provenience. In addition, whetstones from Hofstaðir in Mývatnssveit, Aðalstræti and Herjólfssdalur had previously been analyzed by geologist Helge Askvik, who is an expert on the whetstone source material. Askvik's study and methods form the basis of the determinations of the material type of the rest of the Icelandic whetstone material³.

³ See Section 3.1 on geological sources and research for further detail

The number of stones analyzed during this research, from 9 settlement sites and all known burials with whetstones, is 208 pieces including fragments. This is not a very large number of stones and the maximum amount of whetstones from one site was 39 whereas the average is about 20 whetstones for the settlements and one, sometimes two stones in the burials. A rough estimate would be that between 1/3 and 1/2 of the excavated whetstone material that can reasonably be dated to Viking age (not incl. individual stray finds) have been included in this study.

1.2 Comparative material

One of the problems faced in this study is the lack of material in other countries comparable to the Icelandic sites. Research on whetstones is rather limited in general and the material that has been analysed is primarily from towns and trading sites. The Icelandic sites, on the other hand, are primarily rural sites consisting of farmhouses of varying status, with no evidence of large scale trade or exchange. This makes comparisons problematic. Ideally, farm sites in Scandinavia and the British Isles should be studied for comparative data but the reality is that no such sites, to my knowledge, have any published data on the whetstones. The only exception is the chieftain's seat in Borg in Lofoten, but this settlement is of much higher status than any of the Icelandic sites analyzed. Although not directly comparable, it is nevertheless valuable to consider the whetstone material from Viking age towns, trading sites and high status settlements outside Iceland, to throw light on the principal patterns and trends.

Four sites have been chosen to provide comparative material: Hedeby in northern Germany close to the Danish border; Kaupang close to modern day Oslo, southern Norway; Borg in Lofoten in northern Norway and York in England. These four sites were selected because their whetstone collections have been thoroughly analysed and they contain the same types of stone materials used for whetting as the Icelandic sites, in contrast to for example Swedish and Baltic Viking age sites⁴. These sites are therefore more likely to belong to the same network of whetstone distribution as Iceland. Further detail on the individual sites used for comparison is presented in Section 4.1.

⁴ More on these differences in Section 4.1.5
























































1.3 Registration

Because there are no previous large scale studies of the Icelandic whetstone collection, an important aspect of the work has been creating a method and standard of registration that contains all the necessary information of the whetstones from secure contexts, with the aim of placing the analysis on a sound footing.

The basis of the registration form closely resembles the registration methods developed by Resi in her work on the Hedeby and Kaupang material (Resi 1990 and 2008), in particular concerning the shapes of whetstones. The numbers of the illustrations in the registration form refer to ID numbers from the Hedeby registration cards (Resi 1990, 12) and the registration has been compiled in a simple excel spreadsheet.

Below is an example of how the registration form works, showing a pendant whetstone from the burial at Hemla. In the top are the standard information on the finding surcomstances and general reegistrstion of the artefact.

Figure 1 Whetstone registration form

Whetstone registration form					Site name Hemla	Site code + year 1932/37	Find nr. 11332
Context nr. Kuml 1	Area	Type of context Kuml	Dating of context Viking Age	Other:	Nr. of fragments 1	Preservation condition: <input checked="" type="checkbox"/> Good <input type="checkbox"/> Bad <input type="checkbox"/> Stable	Photo ID Hemla-11332
Type of stone: <input type="checkbox"/> Eidsborg schist <input checked="" type="checkbox"/> Dark grey schist <input type="checkbox"/> Sandstone <input type="checkbox"/> Dolerit <input type="checkbox"/> Unknown <input type="checkbox"/> Other					Geological origin: <input type="checkbox"/> Norway <input type="checkbox"/> Iceland <input checked="" type="checkbox"/> Unknown <input type="checkbox"/> Other		
Colour of stone: <input type="checkbox"/> Light grey <input checked="" type="checkbox"/> Dark grey <input type="checkbox"/> Mid grey <input type="checkbox"/> Purplish <input type="checkbox"/> Other					Grain size: <input checked="" type="checkbox"/> Very fine <input type="checkbox"/> Fine <input type="checkbox"/> Medium <input type="checkbox"/> Coarse		Size of stone: Small <input type="checkbox"/> Medium <input type="checkbox"/> Very small <input checked="" type="checkbox"/> Large <input type="checkbox"/> Unknown <input type="checkbox"/> Very large <input type="checkbox"/>
Dimensions: length: 6,7 width: 1 thickness: 0,7 weight: 7,2							
Type of whetstone: <input checked="" type="checkbox"/> Used <input type="checkbox"/> Fragment <input type="checkbox"/> Unknown <input type="checkbox"/> Unused <input type="checkbox"/> Production Fragment <input type="checkbox"/> Raw material					Unusable fragment <input type="checkbox"/> Usable fragment <input type="checkbox"/> Usable whetstone <input checked="" type="checkbox"/>		
Degree of usage: <input checked="" type="checkbox"/> Moderately <input type="checkbox"/> Extensively <input type="checkbox"/> Unknown <input type="checkbox"/> Sparely <input type="checkbox"/> Re used after breakage							
Part of the whetstone: <input checked="" type="checkbox"/> Whole piece <input type="checkbox"/> Whole but chipped <input type="checkbox"/> End piece only <input type="checkbox"/> End and middle piece <input type="checkbox"/> Middle piece <input type="checkbox"/> Fragmented							
Shape of the broad side:			Shape of the narrow side:		Shape of the cross section:		
 8  16  9  13  10  14  11  15  19 Other			 20  28  21  25  22  26  23  27  31 Other		 34  35  36  37  38  39  40 Other		
Shape of the thickest end piece (mark both broad and narrow side):					Edges:  		
 43  44  45  46  47  48  49  50  51  52  53					Suspension:  87  88  89  90		
Shape of the thinnest end piece (mark both broad and narrow side):					 91  92  93  94		
Comments, drawings etc.: A whole very nicely shaped pendant whetstone. Slight iron smear. Purple phyllite type of stone.					Shape of the grinding surface:  107  108  109  110 Grinding marks/grooves: None  111  112  113  114  115 Nr. of grinding surfaces: 4 Other (use of stone etc.): Very little sign of use		

The numbers relate to registration form by G. H. Resi 1990 "Die Wetz- und Schleifsteine aus Haithabu"

In the rates Types of stone, Geological origin and Colour of stone the most commonly found examples in the Icelandic whetstone collection are shown. Variations to each of the categories can be added in the rate “other”. Grain size is an estimate made macroscopically. The size of the whetstone is defined as:

Very small: less than 10 cm long

Small: around or just under 10 cm long and narrower than 1,5 cm

Medium: around or just over 10 cm long and broader than 1,5 cm

Large: around or over 15 cm long and both broader and thicker than the medium sized whetstones

Very large: Over 20 cm long and broader and thicker than the large whetstones

The definition of size will often be an estimate, but largely following the measurements above. In addition it is recorded whether the whetstone preserved is an usable or unusable fragment or even usable full size whetstone. And the standard measurements of weight, length, thickness and with is given.

In “Type of whetstone”, “Degree of usage” and “Part of the whetstone” the general condition of the preserved whetstone is registered, according the the given choices.

The shape of the broad side, narrow side, cross section, grinding surface and suspension method are chosen according the the illustrations and then the edges are marked as either sharp or rounded. The end pieces, if they are preserved, are also described according to the illustrations. The shape of the broad side is marked with nr. 1 and the narrow side with nr. 2 in case the shape differs. If the whetstone has grinding marks or groves they are also described according to the illustrations and the use of the stone, based on the wear marks, can be further described underneath if needed and the number of used grinding surfaces is recorded (usually 2 or 4).

In the bottom further comments or drawings of the whetstone can be added.

1.4 Statistical issues

Important parts of the analysis involve deriving statistical information from the database and comparing the Icelandic sites to each other as well as with the foreign sites. Inspiration for the elements of the whetstones to register for comparison is derived from the work of Resi in both Hedeby and Kaupang (Resi 1990, 2008). The significant difference is that this project deals with nine individual habitation sites and 22 grave sites scattered around Iceland, not urban sites like Kaupang and Hedeby. This complicates the statistical analysis for several reasons. First of all, the Icelandic sites produced small numbers of whetstones and in several cases it simply makes no sense to attempt larger intra-site statistical analysis on such limited material. The sweeping comparisons and analyses applied to the material from Kaupang (<500 whetstones) and Hedeby (<10,000 whetstones) is better suited for sites with large numbers of whetstones. Even minor irregularities in a small collection can create great statistical variations and therefore the assessments of the Icelandic results need to be made with greater care.

This is one major reason that the analysis of individual sites is focused on the distribution of stone types used as whetstone material (predominantly schist types). The general composition of the collection in terms of preservation, the quality of the preserved whetstones and the presence of stones that differ from the norm will also be considered.

1.5 Thesis structure

Chapters 1-3 deal with more general introductory matters introducing the state of the art and describing the parameters for the research, which will be used during the analysis of the whetstones in chapters 4-5. Chapter 6 deals with the results of this whetstone analysis, including a comparison of the material. The overall results of the research are discussed and summarized in chapter 7.

2 Whetstone exchange and state of the art

Whetstones of Norwegian schist were a well-known commodity in the Viking age and such stones were brought by Norsemen to the British Isles, the Baltic area and the North Atlantic islands, though some of these areas already had local sources of whetstone material (Crosby and Mitchell 1987, 484). Within Norway the schist whetstones are found widespread, implying distribution throughout the country from the quarry sites (Petersen 1950, 254-56). This is apparent from the late Iron Age, but increasingly from the onset of the Viking age (*ibid*). The recovery of substantial numbers of schist whetstones from Kaupang and Hedeby (Resi 1990, 2008) indicates movement of goods to market places and their widespread recovery in Iceland attests to the distribution of such goods to areas lacking local sources of stones for whetting tools. In addition, finds of schist whetstones in ships wrecked both close to Ribe (Jensen 1990) and Kaupang (Klåstad ship: Christensen 1978; Myrvoll 1986, 174, Bøle ship⁵: Livland 1992, 7, Nymoen 2005, Daly and Nymoen 2007) provide evidence for overseas trade in Norwegian schist whetstones in the Viking age and medieval periods.

Schist whetstones have been found outside Norway in Viking age sites all over the Viking world: **Greenland** and **Eastern Canadian Arctic** (Several aboriginal sites: Sutherland 2009), **Faroe Islands** (Toftanes: Hansen 1991), **Britain and the British Isles** (York: Mainman and Rogers 2000, and a large number of smaller sites see: Crosby and Mitchell 1987), **Ireland**: (Dublin: Wallace, 1987), **Sweden** (Birka: Ambrosiani et al. 1973; Uppsala: Elfwendahl and Kresten 1993; Löddeköpinge: Svanberg and Söderberg 2000, Lund and Sigtuna: Myrvoll 1986), **Denmark** (Ribe and hinterland: Jensen 1990, Århus Sønder vold: Andersen, Crabb and Madsen 1971; Fyrkat: Roesdahl 1977; Aggersborg Mitchell et al 1984, Trelleborg and Gamle Lejre: Myrvoll 1986 and a large number of smaller studies see: Crosby and Mitchell 1987), **Germany** (Hedeby: Resi 1990, Ralswiek: Herrmann 2005, 15-28), **Belgium** (Dorestad: Kars 1983), **Poland** (Wollin: Mitchell et al 1984). In most of these sites only enough information is available to determine that Norwegian schist has been found, and they have therefore not been included as comparative material for this research⁶.

⁵ NB: The Bøle ship is dated to ca. AD 1300

⁶ This list should not be considered as a full list of sites representing analyzed whetstone material but is the overview the author had in hand April 2009.

2.1 Historiography of whetstone research in Norway

Scholarly interest in whetstones can be traced back to the beginning of the 20th century in Norway, but earlier topographical works such as travel literature and local works on geology and landscapes in Norway also mention sources for whetstone manufacture (e.g. Kraft 1826, 151-53)

The first systematic study was made by the geologist Rolf Falck-Muus and published in 1922 (*ibid*), He focused on the whetstones from Eidsborg in Telemark discussing the geology, history and use of this stone, even with some references to archaeological artefacts of Eidsborg type, but his work primarily had a geological rather than an archaeological focus. Although he includes some archaeological material it was not until Jan Petersen in 1951 published his work on Viking Age tools that the archaeological artefact became the primary focus. He also included whetstones made from other stone types than the Eidsborg schist. Petersen's publication was followed by a break in the research of Norwegian whetstones for decades. In 1992 H. Livland published an extensive treatment of the Eidsborg whetstones, their history and regional importance from the Viking age to modern times. This work can be seen as an update of the Falck-Muus book from 1922 and is an important compilation of sources and research on the Eidsborg schist whetstones both historical and ethnographic, but again, not with an archaeological focus.

In addition there is sporadic written evidence in both narrative and non-narrative sources mentioning the whetstone trade. Although such sources are later than the Viking age they contain important indicators of the importance of the whetstone trade (See e.g.: Espelund 2004, 102; Falck-Muus 1921, 22-28).

2.2 Viking age exchange of basic commodities with focus on Norway

Traditionally, scholars writing about trade and exchange have focused on luxury trade and gift exchange and until the 1980s low-end exchange of basic goods, both local and regional, was largely neglected in the context of medieval "history". It is particularly important to understand the exchange networks of this type of find because they are used ubiquitously and Iron Age societies everywhere depend on access to high quality whetstones. Analysis basic consumption goods, like

whetstones, will help us understand this sort of exchange and reconstruct the mechanisms that brought such goods to Iceland from their source regions.

Trade or exchange in low value basic commodities was an important element in the extension of trading activity that developed from the 8th century onwards in Scandinavia (Baug 2006, 6; Jensen 1990, 130-32; Hodges 1989, 117-29) and the first Scandinavian trading sites such as Hedeby and Ribe were probably connected to this new type of exchange (Munch, Johansen and Roesdahl 2003, 292).

In Norway, the trading site Kaupang developed around AD 800 (Skre 2006, 445) and though of great importance in the intra-Scandinavian trade and as redistribution centre for Norway's natural resources, such as whetstones, steatite, and iron from the Telemark region, it never gained the size of Ribe, Hedeby or Birka. This early incorporation of Norwegian natural resources into the intra-Scandinavian exchange networks can be observed within the distribution of the Eidsborg schist whetstones, which so far is the best documented and studied of the whetstone materials. Few sites show Eidsborg stones in contexts predating AD 900 while the earliest evidence of export is the cargo of the Klåstad shipwreck C14 dated to AD 800 ± 80 (Christensen 1978), as well as in the emporia of Kaupang⁷, Hedeby and Ribe (Myrvoll 1986, 174, Jensen 1990, 123). Eidsborg stones are also thought to have been used locally from the late Iron Age onwards, but there is still not much archaeological evidence for this (Livland 1992, 10).

After 900 AD, trade in Scandinavia intensified and Eidsborg schist has been found in nearly all known Viking trading centres, except Paviken in Gotland, and in larger quantities than previously (Myrvoll 1986, 174-175, Michel et al 1984, 171-172). At this time, however, the Eidsborg schist is still only accounted for 1/3-1/4 of the whetstone collections and was still not as well-represented as the dark grey schist type, which dominated Scandinavian sites from the beginning of the Viking age⁸.

As a precondition for the organization of regular trade, the mining and local transportation of these commodities must have been organized (Baug 2006, 14). The early organization of the export of

⁷ Found in well stratified deposits from Kaupang predating AD 850 (Feveile and Jensen 2000, Fig. 11; Skre ed. 2006, 187)

⁸ See also Chapter 3 on geology and provenience and Chapter 4 on the proportions of schist types from individual sites.

local natural resources was probably the influence for the development of the trading site and later town of Skien around AD 1000, a development which marks not a beginning, but rather the intensification and increased organization of the Eidsborg schist whetstone exchange (Myrvoll 1986, 164).

Archaeologically this intensification can be traced in all larger Scandinavian towns with contexts from the late Viking age and medieval periods. In these towns Eidsborg schist entirely dominates the whetstone material in Denmark and eastern England, whereas Eidsborg schist accounts for ca. 1/5 of the whetstone collection from the countries around the Baltic Sea (Myrvoll 1986, 174, Myrvoll 1984, 53). Written evidence also attests to the importance of Eidsborg schist, as seen in first town privilege records for Skien in 1358 when King Hákon Magnússon emphasised that the trade in *hardstein* /whetstones should continue as it had traditionally⁹. Archaeological excavations in Skien revealed a large amount of raw Eidsborg blanks measuring around 5 x 3 x 30 cm, which were stored at the site and ready for further export (Espelund 2004, 10, Myrvoll 1983, 161 and 1984, 53.). This was also the standard size of whetstone blanks in the 19th century when the whetstones were still mined and prepared for distribution manually (Livland 1992, 23). It seems to have been the ideal size for transporting the stone down the valleys to Skien¹⁰.

The selection of the best whetstone material in the mines, the cleaning of irregularities and rough parts in the stones and the cutting of the schist into standard blanks was carried out in the mining areas. Afterwards, the blanks would be transported from the quarries in upper Telemark down the rivers, or by sledges on ice in winter, to the harbour in Skien. This system of local transportation is described in great detail by Myrvoll (1986, 161-65), but greater uncertainty remains about how the export from Skien was organised. Myrvoll suggests that Skien probably was a site for transit trading rather than the market where individual traders went to acquire the whetstones specifically. But exactly how the distribution of the whetstone blanks took place both from Skien to the trading sites and towns from where they were sold and further redistributed outside the region, is still not well understood.

⁹ As mentioned in e.g. Espelund 2004, 102.

¹⁰ Few whetstone blanks have been recorded in Iceland to be much longer (70 cm) (Elðjárn and Friðriksson 2000, 352) but they have not been analyzed during this research and the stone types of these have not been determined. But they indicate that there perhaps there might be variations of the sizes of raw blanks.

2.3 Iceland in the context of Viking age exchange in basic commodities

The settlement period in Iceland is commonly believed to have begun around the end of the 9th century and recent work tends to emphasize that the colonization progressed rapidly. Already by the 10th century there was a complete deforestation of the lowland areas and even marginal areas were being exploited (Vésteinsson et al. 2002, 106). However, strontium isotope work shows that foreign-born people were dying in Iceland in the late 10th century (Price and Gestsdóttir 2003), possibly indicating a continuation of the colonization process.

During the settlement period the contact with the homelands was probably good, if only because many trips were needed to bring enough people over to populate Iceland, and the flow of new commodities to the country was potentially continuous, though not necessarily sufficient to meet the demands of the Icelanders. It is important to remember that several natural resources were different in Iceland than in the homelands of the settlers and that people probably brought with them the necessary equipment from their homelands to start their new life in Iceland. This also includes whetstones, meaning that the variation in stone types is expected to be larger in the earliest contexts as people presumably came from wider areas in Scandinavia and the British Isles with access to different stone types.

The closest comparable to whetstones is probably steatite artefacts which is also a low-value basic commodity primarily imported from Norway. Comprehensive research, also including Iceland, has recently been carried out on the steatite trade by Amanda Forster (Forster 2001 and 2004). The import of steatite to Iceland can, according to Forster, be divided roughly into three periods: firstly, a period of original import of personal possessions from the beginning of settlement to ca. AD 900, then a replacement period from ca. AD 900-1100, and finally a period of increased trade connections in the early medieval period ca. AD 1100-1400, strongly linked to the stock fish trade through Bergen and resulting in an increase in good steatite artefacts exported to Iceland (Forster 2004, 346). Throughout the post-settlement periods steatite artefacts are never found in large amounts in Iceland and Forster's research suggests that trade in steatite was more sporadic than it would have been if it had been a part of a trade network. She believes that the most likely mechanisms for replacement in the later phases were through travelling elites and/or itinerant merchants (*ibid*, 361-62). A general problem for studies of these low-level goods of Norwegian origin is that they cannot be placed within models for trade and exchange in the north Atlantic region, because such models simply do not exist (*ibid*, 342).

Both schist and steatite are not locally found in Iceland and to procure them the Icelanders were therefore dependent on foreign import, primarily from Norway. What Forster notices in the Icelandic steatite collection is that the steatite artefacts found in archaeological contexts from the post-settlement period show a large degree of secondary reworking (Hvítárholt), and in extreme cases (Sveigakot), the extensive reworking results in the preservation of only small fragments (*ibid*, 323-26). This indicates that replacement of broken vessels and other objects was extremely limited in the period roughly between 900-1100 in Iceland and only fragments that were no longer useful for reworking were discarded, whereas Norse sites closer to the source areas for steatite have a higher proportion of better preserved fragments¹¹. In contrast to steatite, which could be replaced by other types of stone material or iron vessels, there was a continuous need for new whetstones in Iceland and the archaeological evidence does not show a similar adaptation to the conditions in the new regions. On the other hand it is possible that, like the steatite, the whetstones brought by the initial settlers differed from those imported later as will be further discussed in the conclusion (Chapter 7).

Studies of Viking age beads found in Iceland also provide interesting material for understanding Icelandic trade or exchange. Beads belong to a different type of trade goods than the whetstones and are normally considered in the context of gift exchange of luxury goods. Domestic basic goods were probably transferred over as short distances as necessary, whereas the luxury trade in beads, jewellery and weapons was of a different nature and often shows strong links to Eastern Europe and Asia during the Viking age. This link can also be seen in several of the beads found in Iceland (E. Hreiðarsdóttir 2005, 182), though many of the beads could also have been produced in Scandinavia, inspired by foreign design. They were probably traded from or even produced in much the same trading sites and towns as the whetstones were exported from (Ribe, Kaupang, Hedeby and York) (*ibid*, 146-58), and might have followed similar trade or exchange routes as the whetstones. The beads seem to be particularly connected to Birka and Hedeby. It is unlikely that the whetstone trade went through Birka (Resi 2008, 57), as the collection there is very different from the whetstones in Iceland. On the other hand, Hedeby is a very likely source for the whetstone trade, in particular for the period before ca. AD 1000 when the local transit trade in Eidsborg schist began to build around the new town of Skien. The Icelandic whetstone collection from contexts predating AD 1000 is

¹¹ Such as in Greenland, Norway

similar to the one in Hedeby, when looking at the schist types used for grinding¹². There are also correspondences in terms of proportions of bead types between Iceland and Hedeby (E. Hreiðarsdóttir, 149). There seems to be an increase in the import of beads to Iceland towards the end of the 10th century, but this does not necessarily mean an increase in import in general as the same trend has been noticed in the Scandinavian countries (*ibid* 186). This is virtually the opposite of the development of the steatite exchange, suggesting that the exchange patterns of these two very different find types cannot be expected to be similar. The trade or exchange clearly continued throughout the entire period and there must have been continuous contact with Iceland, but the pattern is too complex to describe on the basis of only a few artefact categories.

Support for the notion of continuous contact can be found in the written sources which mention Icelanders travelling to Norway and some chieftains owning seafaring ships at least until the 12th century (Helgi Þorláksson 1999, 85, Jón Jóhannesson 1956). If this is true, then at least those chieftains who were in possession of ships could have gone to Norway to acquire luxury goods and the necessary basic commodities that were needed by themselves and their clients. Whether they purchased exchangeable goods of commercial value or relied on gift exchange, connections and personal favours in Norway remains unknown.

Clearly the Icelanders were influenced by and connected to the developing market-based exchange systems that provided them with both basic necessities and luxury goods, but the exact relationship between Iceland and these Viking and medieval trading sites and later towns is, however, difficult to judge and as Forster also point out, “[f]uture research into material culture is required before archaeologists can adequately consider questions of adaptation, exchange and the socio-political dynamics of the North Atlantic Region.”(Forster 2004, 373).

Since one of the aims of this thesis is to explore Iceland’s place in the North-Atlantic trade in the Viking age it is necessary to discuss the perceptions of whetstone trade in this period. It can be concluded that very little is actually *known* about early Viking age trade in basic commodities and research based on archaeological evidence mostly relates to the late Viking age and medieval periods when the trade in bulk-goods picked up.

It is important to recognize that exchange in whetstones did exist in the Viking age and that Iceland was somehow connected to this exchange. Now the question is if the whetstone material can contribute further to our understanding of how Iceland is connected to this trade

¹² see: Chapter 4.1.1

3 Introduction to the study of Icelandic whetstone material

Initially, the goal was to include all excavated Icelandic Viking age sites, but the final amount of settlements studied has been narrowed down to nine and 22 burial sites. The intention with this study is to establish basic knowledge about the types of stones used for whetting in Iceland during the Viking age and on that basis to compare the Icelandic sites with foreign collections and possibly add to the understanding of trade or contact with the rest of the Viking age world. In order to achieve this goal it was more important to concentrate on assemblages of whetstones from securely dated contexts than to produce an exhaustive survey of all finds.

The selection of sites for this study was based primarily on whether the contexts were secure and datable because the whetstones themselves provide no means for dating. Secondly, the amount of whetstones was considered as it makes little sense to interpret a settlement site based on less than 10 whetstones. Lastly an effort was made to achieve a representative geographic distribution of sites from across Iceland, but priority was given to the first two criteria.

This chapter will provide background to the geological sources represented in the Icelandic whetstone collection (Section 3.1) as well as an overview of the common types, shape and preservation condition of the Icelandic whetstones (Sections 3.2 and 3.3) in order to provide background to the analysis given in Chapters 4/Settlement sites and 5/Burials.

3.1 Geological sources and research

Whetstones are amongst the most commonly recovered artefacts from Scandinavian Viking Age sites and they are also amongst the least studied. Research with a more specific focus on the geology of the whetstones began in the 1960s and 1970s with Ellis and Moore and their research on the petrography of the English whetstone material (Ellis 1969 and Moore 1978). They continued their research both individually and together and have contributed greatly to the understanding of the petrography and provenience of the English Viking age and medieval whetstone material from several archaeological sites (Ellis and Moore 1990, Moore 1983 and 1990).

With better understanding of the petrography of the various whetstone types, more detailed provenience studies were required to make use of this new information. In 1983 the first Potassium-argon research on schist whetstones began with samples from Kaupang, Wollin, Hedeby and

Aggersborg. This was carried out by G.H. Resi, H. Askvik and J.G. Mitchell (1983), and soon followed by similar studies of the English schist material from multiple sites and a comparison with Scandinavian sites (Crosby and Mitchell 1987). In addition the collections from individual sites have been analyzed, such as the material from Viking age Ribe in Denmark (Hald 1991 and Myrvoll 1991).

These types of provenience studies have not yet been carried out in the North Atlantic islands. However, since neither the light grey Eidsborg schist type nor the dark grey schist type occur naturally in these areas, studies on the raw material of whetstones have great potential to provide information about long-distance trade and exchange. Supported by the already existing knowledge of the provenience of the most common stone types used for whetstones, it has been possible to carry out the research of the Icelandic whetstone collection with a relatively basic geological analysis. The two main stone types are easily recognisable even on a macroscopic level without the aid of any instruments.

In the following sections (3.1.1 and 3.1.2), the geology of the two main schist types will be described, while information about the few other stone types found within the whetstone material in Iceland will be provided in Section 3.1.3.

3.1.1 The Eidsborg schist type / the light grey schist type

This type of stone is a light grey, fine-grained, muscovite quartz rock with a prominent mineral lineation caused by the alignment of elongated mineral grains¹³. This lineation and the parallel cleavage direction make this stone type liable to split into elongated pieces (Askvik 2008, 5), which is often how the fragments are found archaeologically. In some whetstones of this type, black mineral grains are visible on a macroscopic level, while other stones have small holes in the mineral grain structure. Both cases have been recorded in the Icelandic collection. The stones range from very light grey to mid grey which could indicate that they were quarried in different parts within the Eidsborg region. This stone has been given various names such as “grey, lineated psammitic mica-quartz-schist” or “Norwegian Ragstone” (Ellis 1969), “Quartz-muscovite schist (Moore 1983;

¹³ For more detailed geological description of this stone type on a microscopic level see Askvik (1990, 135-137; 2008, 5-7)

Mitchell & al. 1984) or “Muscovite quartzite” (Askvik 1990). In this paper it will be referred to as the light grey schist type or the Eidsborg type.

Studies of provenience dating whetstones of this type from archaeological contexts have been carried out since 1969, when Ellis described this stone type from English Viking age contexts. He refers to a radiometric K-Ar age of 950 ± 30 million years for one sample of this type. Mitchell et al. (1984) determined the geological age of metamorphism for four whetstones of this type, found in the Viking age sites of Kaupang (Norway), Aggersborg (Denmark), Hedeby (Germany) and Wolin (Poland), and they all showed ages between 900 and 950 million years (K-Ar age). K-Ar-ages like these are characteristic of the Precambrian of South Norway, reflecting the late Proterozoic Sveco-Norwegian orogeny (Askvik 2008, 6).

This type of schist has been obtained from numerous quarries spread out over a large area in the Eidsborg region in Vest Telemark and the whetstones have for centuries been known for their high quality. Quarrying began in the late Iron Age and continued up until ca. 1950 (Livland 1992, 10). The organized trade of the Eidsborg whetstones began around the turn of the 11th century with the town of Skien as the starting point of a major trade network (Myrvoll 1984, 53). The archaeological evidence from Skien shows a large amount of Eidsborg schist stones in all phases, from just before AD 1000 to early AD 1200 (Myrvoll 1984, 1986, 164), predominantly raw material intended for trade (Myrvoll 1986, 166).

During the medieval period this whetstone type became dominant in most Scandinavian and Norse sites, but it is also well-represented in earlier Viking age sites all around the Viking world, albeit in lower percentages and not outside the local area in pre-Viking contexts (*ibid*). There are two types of light grey schist from Eidsborg: *blaustein* and *hardstein*. *Blaustein* is softer, has a higher content of calcite, and is less common than the harder type *hardstein* type. The softer stone was preferred locally but was more difficult to mine and found in lower quantities than the hard stone (Askvik 2008, 7; Espelund 2004, 102; Livland 1992, 10, Falck-Muus 1922). Examination of several whetstones finds, carried out by Askvik, suggests that the softer stone is very common in the archaeological record during the Viking age, though the harder stone also occurs (Askvik 2008, 7). One of the last workers in the modern whetstone quarry in Eidsborg mentions that it was only the hard stone that was quarried and exported while he worked at the site, in the first half of the 20th century (Livland 1992, 67).

It has not been possible within this study to distinguish between these two types as it would require geological assistance in the classification of each whetstone. The only Icelandic site with such information is Hofstaðir in Mývatnssveit where Askvik identified both stone types, although the majority was of the soft Eidsborg type¹⁴. Espelund, who has worked in particular with iron smelting and smithing, mentions that both types of the Eidsborg stone were of high quality, but that the softer one was generally preferred. The harder stone was useful for whetting harder steel implements (Espelund 2004, 102).

There is also another, very uncommonly found, light grey schist type that is not from Eidsborg¹⁵. As there are no means to distinguish this type from the Eidsborg stones without petrological analysis this type could also potentially be in the Icelandic whetstone material, wrongly categorized as light grey Eidsborg schist. It is, however, not expected that this rarity in any way would be able to change the overall analysis of the Icelandic whetstone collection and no examples of this stone type has yet been found in either Kaupang or Hedeby, where the stones have been analyzed by a geologist.

3.1.2 The dark grey schist type

This schist type consists of a very fine-grained grey or dark grey stone with a tint varying from blue or green to red or purplish (Resi 1990, 137). It often has a distinct foliation and tends to split parallel to the mineral lineation, which is caused by elongated and parallel oriented mineral grains (Askvik 2008, 7). Their prominent mineral lineation closely resembles the light grey schist of the Eidsborg type, but the two types differ significantly in grain size¹⁶. Several geologists have analyzed and described this stone and it has been given various names. In the literature used for this project, however, this stone is most commonly described as blue or purple phyllite (Ellis 1969,

¹⁴ Comment to an unpublished archive report of the whetstones collection from Hofstaðir Mýv. by Helge Askvik. This aspect is not mentioned in the forthcoming publication on Hofstaðir Mýv. by Gavin Lucas (ed.)

¹⁵ Studies from Norse sites in Newfoundland have shown that a hitherto unknown type of light grey schist similar to the Eidsborg type is found locally there. These are still preliminary results received as a personal comment from Patricia Sutherland September 2008. It seems unlikely though that this type would be present in the Icelandic collection.

¹⁶ More detail on the petrography of this stone type in Askvik (1990, 137-138) and Resi and Askvik (2008, 7-8)

Crosby and Mitchell 1987) or dark-grey, very fine-grained muscovite-quartz (Askvik 1990, 2008). In this paper I will refer to this stone as the dark grey schist type.

The provenience of this stone type is not as well known as the light grey Eidsborg schist type but radiometric dating (K-Ar dating) of whetstones of this type show the age of the metamorphism in the interval between 403 ± 10 million years and 446 ± 7 million years (Mitchell & al. 1984), which is within the time of the Scandinavian orogenic phase of the Caledonian Orogeny. The Caledonides in Europe lie in a belt crossing Scandinavia, Scotland and Ireland but also occur in a zone in central Europe (Askvik 2008, 8). The fact that this stone type, as the light grey schist, is strongly connected to finds related to the Vikings, suggest that both schist types originate in the Scandinavian Caledonian zone. As no quarries have yet been located, however this has not yet been proven. Another issue is that whetstones of the dark grey schist type have several different colour variations, making it likely that they originate from several different areas of quarrying (Resi 2008, 25). This remains an unsolved issue within general whetstone research.

3.1.3 Non-schistose whetstones

Other types of material than schist have, to a varying extent, been utilized for whetstone production. Within the sites studied for this project, both the Icelandic sites and the foreign comparative material, the inclusion of other stone types is in general less than 10% and many of the Icelandic sites contain no other types than schistose whetstones¹⁷. The most common non-schistose material used is sandstone and siltstone, which are both commonly found in Swedish Viking age contexts, but seem to have been less preferred in the western Viking areas. Both English and Norwegian sites do, however, contain sand, silt and quartzite stones of local origin in pre-Viking age contexts (Petersen 1950, 252-54; Crosby and Mitchell 1987, 484). Greenland also has a source of good quality sandstone that the Norse used and exported from its source area in Igaliko, eastern settlement, to sites in the western settlement¹⁸. The Igaliko sandstone is said to be easily recognizable with a light to dark red colour and round pale yellow inclusions most commonly 0.5-1

¹⁷ Detailed overview of the stone types in the whetstone collections analyzed in Chapters 4 and 5 and summarized in section 6.2.

¹⁸ Personal comment by Mogens Skaaning Høegsberg October 2008 And Patricia Southerland September 2008.

cm in diameter, but with variations in size¹⁹. This whetstone type has not yet been detected in the Icelandic whetstone collection, though it is not unrealistic to believe that they could have been brought to Iceland.

In the Icelandic sites analyzed for this study only a few of these other stone types have been detected²⁰ and none of them have been geologically determined. It is therefore impossible to assess whether these stones are of foreign or local origin.

It was initially part of the aim of this project to determine whether local Icelandic rock had been utilized for whetting, and at least in the Viking period, the find material clearly indicates that Icelandic stone was not generally, and possibly never, used for whetstones. The only possible native Icelandic whetstone of Viking age date is from the excavation of the *skáli* underneath the presidential residence of Bessastaðir, but this find has not been geologically determined. It does, on the other hand, macroscopically look very similar to two other whetstones, with Icelandic provenience, dating from later medieval contexts (Kolkuós and Hofstaðir Mývatn). These whetstones have been thin sectioned and analyzed by geologist Gísli Örn Bragason and are both of laminated dolerite, which seems to be the usable Icelandic source of rock for whetting (*ibid* 2008, 15-25). Samples were taken at three locations where place-names indicate whetstone sources. Two of these sites were petrologically very similar to the whetstones from Kolkuós (Sauðanes) and Hofstaðir (Hörgárdalur) (*ibid* 2008), both medieval contexts.

Whetstones can be grouped into first and second rate quality. First rate whetstones were those stones that were quarried and exported particularly for their high quality, whereas second rate whetstones consist of various types of local rocks with some whetstone quality usually utilized in the absence of better whetstones of the first rate kind (Moor 1978). The Icelandic rock is most definitely a second rate whetstone compared to the imported schist stones because the composition minerals in the rocks makes them harder and the surface does not keep the bite for long. The reason is that the Icelandic stone has a combination of minerals with a hardness measure of 5.5-6.5 Mohs, whereas the Eidsborg schist combines hardness measures of 3 (mica) and 7 Mohs (quartz). This makes the Eidsborg schist both harder so that it easily grinds iron, which has the hardness of 6

¹⁹ See: Picture 1 in Section 9.1

²⁰ Three possible red sandstones from Suðurgata (Chapter 4.2.1), Two from Hofstaðir Mývatn (Chapter 4.2.2) and two from the Viking age *skáli* at Bessastaðir, which have not been included into this study.

Mohs, and at the same time soft enough to continuously loosen the minerals and create new surfaces with good bite for future grinding (*ibid* 2008, 28). These desirable qualities are not inherent in the Icelandic dolerite, which only grinds well on a rough new broken surface and needs to be replaced often to keep a good bite on the whetstone²¹ as the minerals do not loosen as the mica grains in the Eidsborg schist.

In addition to the classic whetstones, there are a small number whetstone shaped pendants of likely symbolic function. They are all made of multi-coloured siltstones that are more or less useless for whetting. There is only one of this stone type in the Icelandic collection (the burial at Ásláksholl), but it has been found in both Hedeby and Borg (Resi 2008, 62)²².

3.2 Types and shape of whetstones

No typology of whetstones has been developed and the same shapes seem to have been in use with only little variation for centuries. In general the whetstones fall into three main groups:

1. Bar-shaped medium sized whetstones, used for knives scythes etc. This is by far the most common group and there are great variations within it²³.
2. Smaller pendant whetstones for personal use with or without means for suspension²⁴.
3. Large stationary whetstones for larger implements or swords²⁵.

Much variation exists within these general groups. This can be the result of different uses to which the stones were put, but is also influenced by more random factors like the quality of the raw material, the production of the stone and reuse after breakage, thereby limiting the usefulness of shape as an analytical criterion.

²¹ Guðmundur Ásmundsson, former farmer, Personal comment to Gísli Örn Bragason 2008 when whetting a scythe with a stone sample from Hörgárdalur that Gísli had supplied him with.

²² More on this type of whetstones in Chapter 5.2

²³ See: e.g. Pictures 7 and 9 in Section 9.3

²⁴ See: e.g. Picture 17 in Section 9.6

²⁵ See: e.g. Picture 16 in Section 9.5

Certain combinations of shapes and stone types have been observed in Viking age collections. The most common types are the bar-shaped whetstones generally of medium size (ca. 10 cm) with some variations in size between schist types. The dark grey schist whetstones are generally longer and slimmer and the light grey schist broader relative to the length, but both types commonly have rectangular cross sections (Resi 2008, 61). The same pattern can be seen in the Icelandic collection (Section 6.1).

Another common type is the small needle or pendant hone (less than 10 cm) often with a strap hole, but also commonly found without any means for suspension. Perhaps these were kept in a purse, pouches or needle cases attached to the belt (Mainman and Rogers 2000, 2497). In few cases pendant hones have a horizontal or, in few cases, also a vertical groove carved around one end into which a thong or a strap could be wrapped (Resi 1990, 80 plate 12-13, Mainman and Rogers 2000, fig 1209 and Hrísbú 2008-21-48+237). The pendant whetstones, found in both male and female burials, seem to have been for personal use and do not indicate specialized use by craftsmen. Often they are referred to as needle hones (Blindheim et al. 1999, 131), but this term wrongly relates them to females rather than males and furthermore they seldom show signs of the grooves that would occur if used to sharpen pointed edges (Resi 2008, 54). Therefore they will be referred to here as pendant hones though they have not all been carried as actual pendants. This type of whetstone seems to have been particularly common during the Viking age though they are well-known from medieval contexts as well, but rarely found in more recent sites.

Lastly, there is a number of large and very large whetstones ranging from around 15 cm to more than 20 cm in length that are usually also broader and thicker than the medium sized bar shaped types. These whetstones must have been for more stationary use as they must have been too large to control with one hand. These are often referred to as long or sword whetstones, but must have been used for a greater variety of implements. There are few such stones in the Icelandic collection but usually one is found at each of the settlement sites and sometimes one or two in burials²⁶.

Both the dark and light grey schist whetstones are generally found in all excavations and it is not uncommon also to find one of each type in burials (Resi 1987, 98 and 2008, 51-55). The two schist types seem to have been established as a set complementing each other with the coarser light grey stone supposedly used for the initial grinding of the edge or remaking of damaged blades, whereas

²⁶ See references to these in Chapters 4 and 5 where such examples will be described

the dark grey schist was more suitable for the honing or finishing of the edge or keeping the edge sharp²⁷. This might also explain why the pendant hones are most commonly made of dark grey schist as they were used to maintain the tools on a more regular basis. Another indication of the preference for using both types are caches of whetstones found in boxes or bundles in connection with iron or wood working at various sites where both stone-types are present (Resi 1987, 98). However, it must be possible to use just one type for both stages of the grinding process as late Viking age and medieval sites almost exclusive used the light grey schist type, and in Borg²⁸ the dark grey schist type was almost exclusively used.

It is not possible to say if the whetstone material was imported to Iceland as raw material, as finished products, or as partially worked objects. There are only few known examples of raw material and most of them are not datable (some of these are mentioned in K. Eldjárn and A. Friðriksson 2000, 352). There is archaeological evidence from several sites in Scandinavia showing that schist arrived at the towns and trading sites as raw material, and shipwrecks with cargo loads of raw material of Eidsborg stone contribute to this picture (Klåstad ship: Christensen 1978; Myrvoll 1986, 174, Bøle ship²⁹: Livland 1992, 7, Nymoen 2005, Daly and Nymoen 2007). There are no examples of either raw material or clear production waste from any of the Viking age sites analyzed for this project. On the other hand sawing and breaking marks are common, suggesting how, but not where, the stone was shaped/produced. Whether the stones were shaped roughly and were almost ready for use when they arrived in Iceland or whether they came as semi-fabricated large raw blanks is difficult to determine.

From the medieval trading site or landing place at Gásir in northern Iceland several possible roughs or blanks of schist and other types of stone have been recovered. Petrological studies need to be carried out to determine their provenience and answer whether these stones would have been suitable as whetstone elements or whether they are perhaps just random ballast stones. A few of these, however, show clear signs of use and must be considered as grinding slabs³⁰.

²⁷ The trade aspects of this use of both types of schist stones is dealt with in Chap. 3.1 on the trade routes

²⁸ See: Section 4.1.3

²⁹ NB: The Bøle ship is dated to ca. AD 1300

³⁰ Personal comment by Howell M. Roberts and preliminary assessment by author November 2008

3.3 Preservation conditions of whetstones

In general whetstones preserve very well in the archaeological record though often only as fragments. This fragmentation is, however, considered to have occurred during use of the stone rather than due to deterioration afterwards. Some degree of erosion of the whetstones does, on the other hand, sometimes occur and it predominantly attacks the light grey schist types that are sometimes found with a very fragile or even crumbly surface. It is known from modern times that the Eidsborg whetstones were sometimes produced with a burned surface that made the stones much lighter grey and the surface softer so that the mineral grains would loosen easily and presumably be better for grinding (Livland 1992, 49). A majority of the eroded light grey schist stones of the Eidsborg type in Iceland are found in a condition where burning definitely could be the explanation for their poor preservation, although it is difficult to determine for certain whether the state of the stone is due to intentional burning or erosion factors such water or weathering.

Nevertheless, Askvik has suggested heat/burning as a possible explanation for the only two very fragile pieces of Eidsborg schist from Hofstaðir in Mývatnssveit³¹.

³¹ Comment to an unpublished archive report of the whetstones collection from Hofstaðir Mýv. by Helge Askvik. This aspect is not mentioned in the forthcoming publication on Hofstaðir Mýv. by Gavin Lucas (ed.)

4 Settlement sites

The analysis of the Icelandic whetstones from settlement sites is presented in this chapter while the whetstones found in burials are presented in chapter 5. The first section of this chapter (4.1) addresses the foreign sites chosen as comparative material to the Icelandic sites. They all contain the same two main types of schist as the Icelandic sites and they were all part of the same trade network as Iceland during the Viking Age. In the following section (4.2) each of the Icelandic sites will be discussed, including presentation of the excavations, analysis of the stone types used for whetstones, characterization of the overall condition of the collection and descriptions of a few of the more interesting individual whetstones. The sites will, as far as possible, be compared to the previously described foreign sites. Speculations about the potential of individual collections to shed light on the use and work taking place at the sites will be included in this chapter, but priority will be placed on exchange and trade connections in Viking age Iceland. Results of the comparisons between the Icelandic sites and the foreign collections will be presented in chapter 6, discussing the implications for the understanding of exchange and connections between Iceland and the rest of the western Viking world. The results and perspectives of the analysis of the whetstone collections will be provided in the concluding Chapter 7.

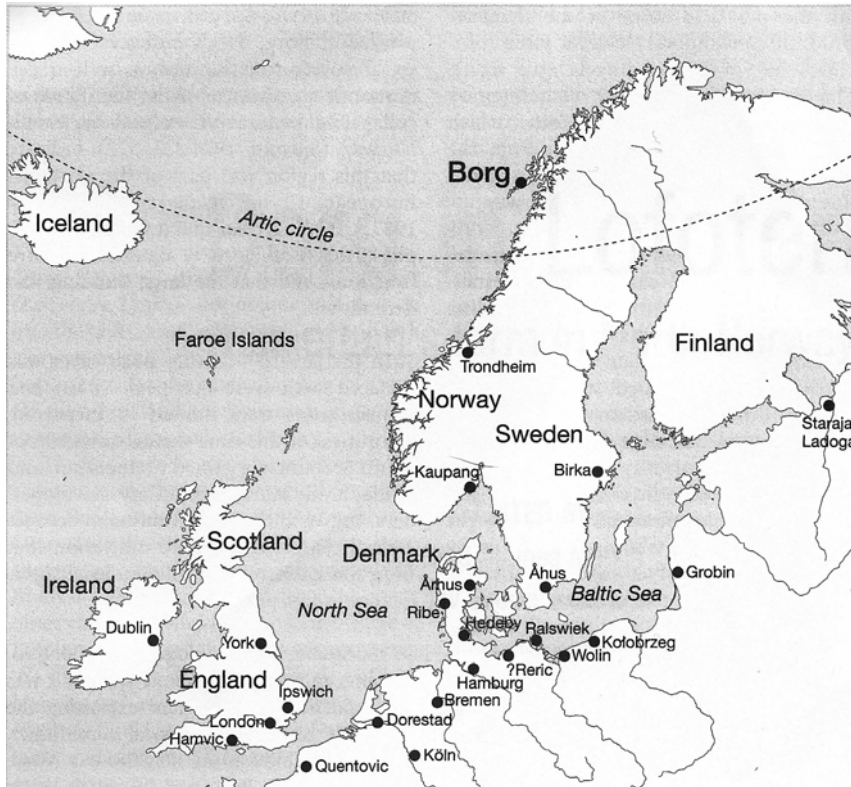
4.1 Foreign comparisons

Four sites have been chosen to provide comparative material: Hedeby in Northern Germany close to the Danish border, Kaupang close to modern day Oslo, Norway, Borg in Lofoten in Northern Norway, and York in England (Map 1).

These sites largely cover the entire range of the Viking age c.800-1050/1100, but also individually cover both examples of early, late, and the entire span of the Viking age sites, as shown in Table 1. This distribution of periods is interesting to consider in context with the known changes in the whetstone trade around ca. AD 1000 and how this influenced the whetstone collections at various sites³².

³² See: Section 1.1 and 2.2

Map 1 Important Scandinavian, north European and English trading places and early towns, 8th-late 10th centuries.



Source: Munch, Johansen and Roesdahl eds. 2003, 291

Table 1 Dating of comparative sites

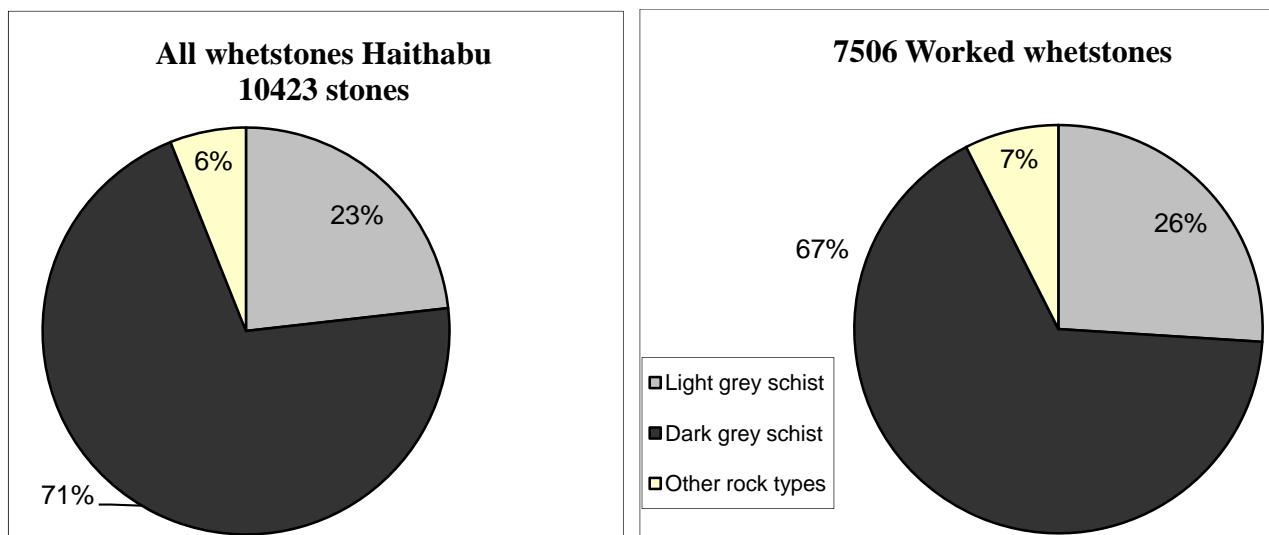
Site	Date (main period)
Borg	8 th -10 th century (9 th century)
Kaupang	9 th -10 th century (10 th century)
Hedeby	Hedeby 8 th -11 th century
York	10 th -11 th century

4.1.1 Hedeby

Hedeby or Haithabu is situated close to modern day Schleswig in Northern Germany and was one of the most important trading sites in the Viking age Scandinavia. The site has been investigated several times but the most extensive excavations were carried out from 1962-1969 revealing an enormous whetstone assemblage. The analysis of the whetstones was carried out by the Norwegian archaeologist Heid Gjøstein Resi as part of her PhD thesis (Resi 1990) and includes petrological analysis by Askvik, Moore and Schlüter (1990). A staggering 10740 whetstones and grinding stones were found at the site and though it has been problematic to date the individual contexts, schist whetstones can with certainty be said to have been imported to the site during the entire occupation period from the late 8th century until the first half of the 11th century (Resi 1990, 42-43). The study of the Hedeby whetstone collection is one of the most comprehensive to date; all whetstone finds are registered in great detail and a large proportion are assessed geologically. The material is defined both according to stone types, distribution and shapes, and great effort was made to trace the provenience of the whetstones.

The collection is comprised of mostly dark grey schist and light grey schist, but also includes various other stone types, some of local provenience (Figure 2).

Figure 2 Whetstone types Hedeby



(Source Resi 1990)

The complete collection of 10423 stones includes fragments, raw material and grinding stones, but as shown in Figure 2 the proportions between the stone types do not differ much when only the

worked and used whetstones are included. This proportion is very similar to several of the Icelandic sites predating AD 1000, as will be shown in Chapter 4.2., in particular Suðurgata 3-5 and Hrísbú, but also Hvítárholt to some degree (Figures 7, 8 and 17). Unfortunately it is not possible to divide the Hedeby material into periods pre- and postdating AD 1000 and it is thus not possible to estimate whether the introduction of the light grey schist types were primarily a later phenomenon as might be expected³³.

The size and shape of the stones, the use, preservation, grinding marks, etc. (Resi 1990, 12) have also been analyzed in great detail, providing much interesting information about whetstone use in the Viking age. This will not be described in further detail here and only limited analysis of this type has been carried out on the Icelandic collection, though most of the same measurements have been registered and such work will therefore be possible. Such detailed studies would be difficult to carry out on the small whetstone collections from Iceland and the amount of work required for such analysis on nine individual sites would be far greater than the importance of the results could justify. In some instances, however, individual examples of whetstones found in Iceland have been compared to whetstones from Hedeby and Kaupang.

4.1.2 Kaupang

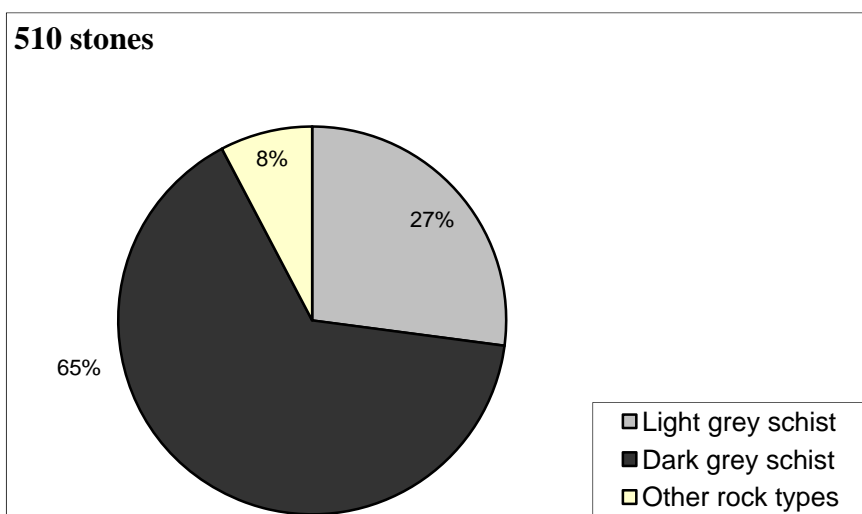
Kaupang is situated near the mouth of the Oslo-fjord in south-western Norway. Written documents describe a trading site, Skíringssalr, to which the merchant trader Óttarr travelled on his way to England in the end of the 9th century. It is believed that this was in fact Kaupang (Blindheim 1969, 5-39, Skre ed. 2006, 13-24). The settlement can be dated to the 9th -10th century or c. AD 800-960/80 (Skre ed. 2006, 179-190) with the more intensive habitation concentrated in the 10th century (Blindheim 1982, 10). Charlotte Blindheim carried out extensive excavations between 1950 and 1969 of both the burial sites and the occupation area with the intention of finding the trading site mentioned in the documentary sources. The excavations identified a trading site with periodic settlement and recovered a large number of artefacts (*ibid*). This site is relatively small compared to the other well-known Scandinavian trading centres of Ribe and Hedeby. New excavations were carried out between 1998 and 2006 led by Dagfinn Skre (*ibid* 2006). Since the whetstone material from the latest excavations has not yet been published, this project analyses only the whetstone

³³ See: Section 2.2 on trade and the Section 3.1.1 on the export of Eidsborg schist material.

material from the excavations of Blindheim (1950-1969). Unfortunately the stratigraphical conditions in the settlement areas do not provide a basis for more precise dating of the individual whetstone finds (Resi 2008, 68).

Like at Hedeby, the collection of whetstones from Kaupang has been analyzed by Resi and petrologically determined by Askvik (Resi 2008), but the assemblage size is more moderate with 510 whetstones. The combination of stone types used for whetting in Kaupang is almost identical to the stone types in Hedeby. The whetstones from Kaupang are made up of ca. 70% dark grey schist, 30% the light grey schist, and less than 10% of other stone types. The registration methods are practically identical to the ones used in Hedeby. The comparison of the Kaupang material with the analyzed sites in Icelandic predating AD 1000 is therefore identical with the previous descriptions given in Section 4.1.1 of Hedeby.

Figure 3 Whetstone types Kaupang



Source: Resi 2008

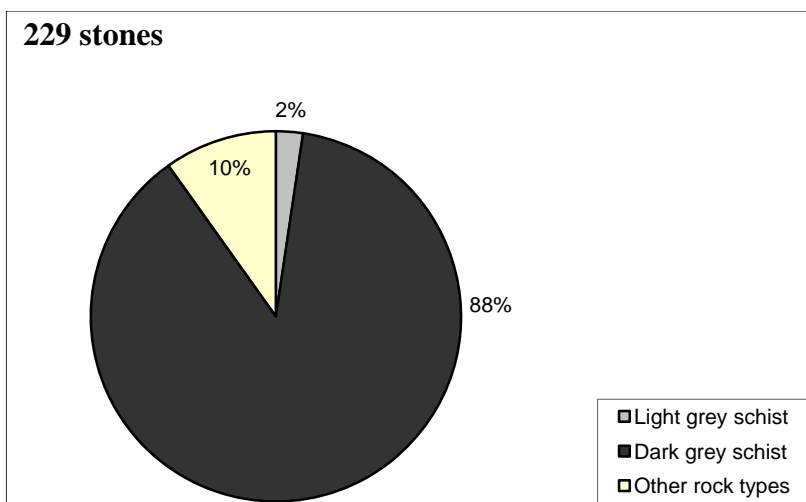
4.1.3 Borg

In the Lofoten archipelago, Northern Norway, the chieftain's farm Borg has been excavated. Borg was a high status site occupied ca AD 200-1300 (Borg areas I-III) with a role in the trade in exotic luxury goods such as furs, hides, and walrus tusks. Foreign luxury goods such as gold, glass vessels and beads, were brought to Borg, though the peak of the gift giving or exchange is of pre-Viking

date (Munch, Johansen and Roesdahl eds. 2003, 11-18). The site is not considered a trading centre, but was rather a social and political centre of a farming community (*ibid*, 290).

Olav Sverre Johansen, Karsten Kristiansen and Gerd Stamsø Munch have analyzed the whetstone material from the site and this publication forms the basis of my interpretation of the site. The majority of the whetstones (90%) were found in the Borg I area associated with the later building phases and dating to 8th to 10th centuries. Only the whetstones from this can be securely dated to Viking age, and therefore also the only ones utilized as a reference collection in this study³⁴. At Borg the dark grey schist dominates and the few whetstones of light grey schist all originate from the 10th century phase of the main house at Borg (Figure 4). It has therefore been suggested that the north-bound trade with the light grey Eidsborg schist must have been a later phenomenon (*ibid*, 151), whereas Kaupang shows Eidsborg schist in contexts predating AD 850 (Fevile and Jensen 2000, Fig. 11; Skre ed. 2006, 187). The Eidsborg schist is also likely to have occurred early in Hedeby, but the whetstone materials have not been broken down according to dating as the phasing of the contexts is unclear.

Figure 4 Whetstone types Borg in Lofoten



Source: Munch, Johansen and Roesdahl eds. 2003

There could be several other reasons for this difference in the whetstone collection at Borg. Maybe the dark grey stone was preferred to the light grey. Perhaps it was easier to obtain through local

³⁴ Though 20% of the material is stray inds from layers disturbed by ploughing they are interpreted as belonging within this period (Munch, Johansen and Roesdahl eds. 2003, 141)

Norwegian trade networks or perhaps they participated in a different trade system than the one bringing Eidsborg stones to Iceland and England, where this stone seems to have been very common. A good source of the dark grey schist could also, potentially, be situated closer to Borg and therefore have been used more.

Only one Icelandic site, Herjólfssdalur, shows a similar pattern in the use of schist types³⁵.

4.1.4 York, Coppergate

Analysis of artefacts from the excavations of the Anglo-Scandinavian settlement in Coppergate (AD 867-1066) shows that both trade and craft production was important activities for the town of York (Mainmann and Rogers 2000).

Geological analysis by Gaunt shows that this site has a very different collection of whetstones compared to the other Viking age sites. In the earliest pre-Viking phases of the settlement from the mid-9th century until ca. 930 (phases 3 and 4A) the collection consists primarily of locally obtained stones such as sandstone, but the two schist types are also represented in small amounts (Mainman and Rogers 2000, 2485). No English archaeological site shows any of the schist whetstone types in contexts earlier than ca. AD 800 and the introduction of these new types are clearly a sign of Scandinavian influence (Crosby and Mitchell 1987, 485).

When Scandinavians became dominant in York during the periods 4B (AD 930/5-975) and 5B (AD 975- early/mid 11th century) the picture changes drastically and the whetstones used were primarily the light grey Eidsborg schist and the dark grey schist, whereas only just over 10% of the whetstones were made of sandstone (*ibid*, 2485)³⁶.

³⁵ See Section 4.2.4.

³⁶ Ref. to Figures 5 and 6 on stone types used for whetstones

Figure 5 Whetstone types York Coppergate – early period

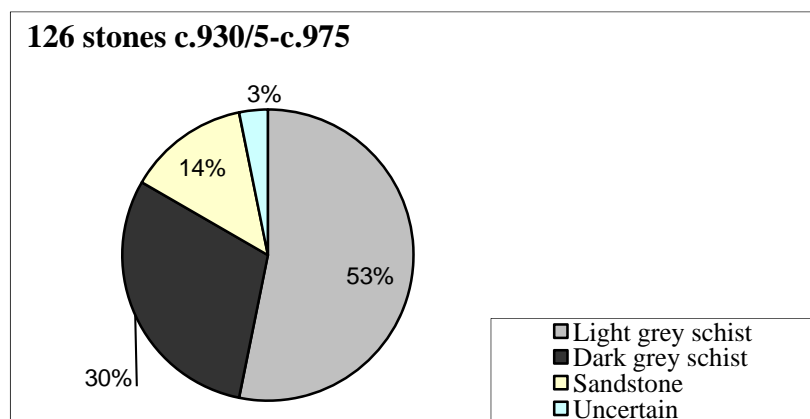
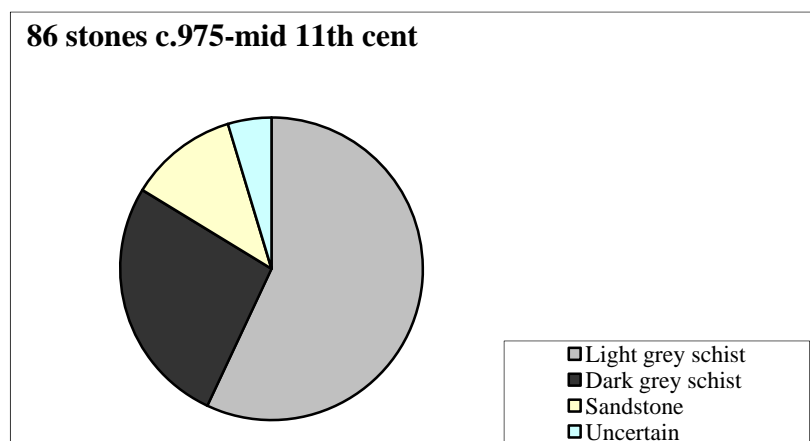


Figure 6 Whetstone types York Coppergate – late period



Note to figures 5 and 6: The category light grey schist used in this paper is in the publication of the whetstone collection from York referred to as Norwegian ragstone, which is geologically the same as the light grey schist or Eidsborg type. The category Dark grey schist is referred to as phyllite in the York publication. Source: Mainman and Rogers 2000

Richards has questioned the number of Scandinavians actually resident in York (Richards 2000, 67) and the small amount of steatite supports this view that few Scandinavians and probably primarily traders and craftsmen lived at the site (Forster 2004, 320). Clearly the schist stones were brought in by Scandinavians and this stone type seems to have been preferred by the craftsmen in Coppergate whether they were ethnic Scandinavians or not. Moreover the collection includes both used whetstones and more roughly finished unused material with saw marks, probably manufactured or finished at the site, indicating that some trade in whetstones must have taken place (Mainman and Rogers 2000, 2497, Resi 2008, 64f). The question is on what scale and from where? Rogers

suggests that the trade routes to York were more likely from Dorestad (Kars 1983, 31ff, Resi 2008, 64).

The question of the origin of the whetstone export still remains. The collection is very different from the major Scandinavian trading sites, as the light grey schist is overrepresented also in the contexts from York securely predating AD 1000, whereas the dark grey schist dominates in Hedeby, Kaupang and Borg in Lofoten as previously shown³⁷. This could be explained by the fact that York only present contexts from the 10th and 11th centuries where the light grey schist type is known to be present in greater amounts than earlier. Interestingly, most sites in Iceland also show high percentages of light grey schist even in contexts predating AD 1000.

4.1.5 Other sites

Other sites have been considered for this study in the search for comparative material and a few of these will be briefly mentioned in this section. They fall into two categories: one in which the whetstone collections are similar to Iceland in terms of the stone types used, and another with very different types of stones utilized for whetting.

The trading site Ribe in Denmark has produced various coarse sandstone types that were used during the Late Iron Age, but from around the early 8th century there was a shift towards a light grey schist stone, though not of Eidsborg type. This other schist type was probably from the Rhine area. The more common schist types such as the dark grey schist, and in particular the Eidsborg type, were introduced to Ribe sometime in the 9th century and dominate in the late Viking age and medieval settlement layers (Jensen 1990, 123). In addition four blocks of raw material of Eidsborg schist were found on the south side of the Ribe river bank, probably belonging to a cargo load lost on its way to the trading site.

Another site that would have been interesting to compare with the Icelandic whetstone collections is Toftanes, a Faroese farmstead that contains the same types of stones as Iceland. This assemblage has however not been analyzed in detail and the amount of material and the distribution between schist types is unknown. But almost all the whetstones were found in the floor layers, including a 25 cm large mullion of probable semi-manufactured whetstone (Hansen 1991, 48).

³⁷ See: Sections 4.1.1 to 4.1.3

In the category of sites containing mainly other stone types for whetting are e.g. both the major trade and burial site at Birka where sand and silt stone resources from Sweden seem to have been preferred to the Norwegian schist stones (Sundbergh, and Arwidsson 1989, 102-3) and Löddekjöping in Skåne where the same types of sand and silt stones were used (Svanberg and Söderberg 2000, 129-34). To a lesser degree, schist occurs at both of these Swedish sites. This variation of stone types used within Scandinavia is quite interesting because several sites in the western parts of both Denmark and Norway show a preference for schist whetstones³⁸. Perhaps the eastern part of Scandinavia shows a different picture overall (including the eastern part of Denmark), but no research has to my knowledge been carried out on this.

Another site with connections to the Viking trade is Dorestad in Belgium, which also contains Norwegian schist types, but a much higher proportion of local or central European stone types, most likely from the Rhine valley (Kars 1983, 88f, Jensen 1990, 130). This site is therefore also unlikely to have taken part in the distribution of schist whetstones though this has been suggested by Rogers (Mainman and Rogers 2000, 2497).

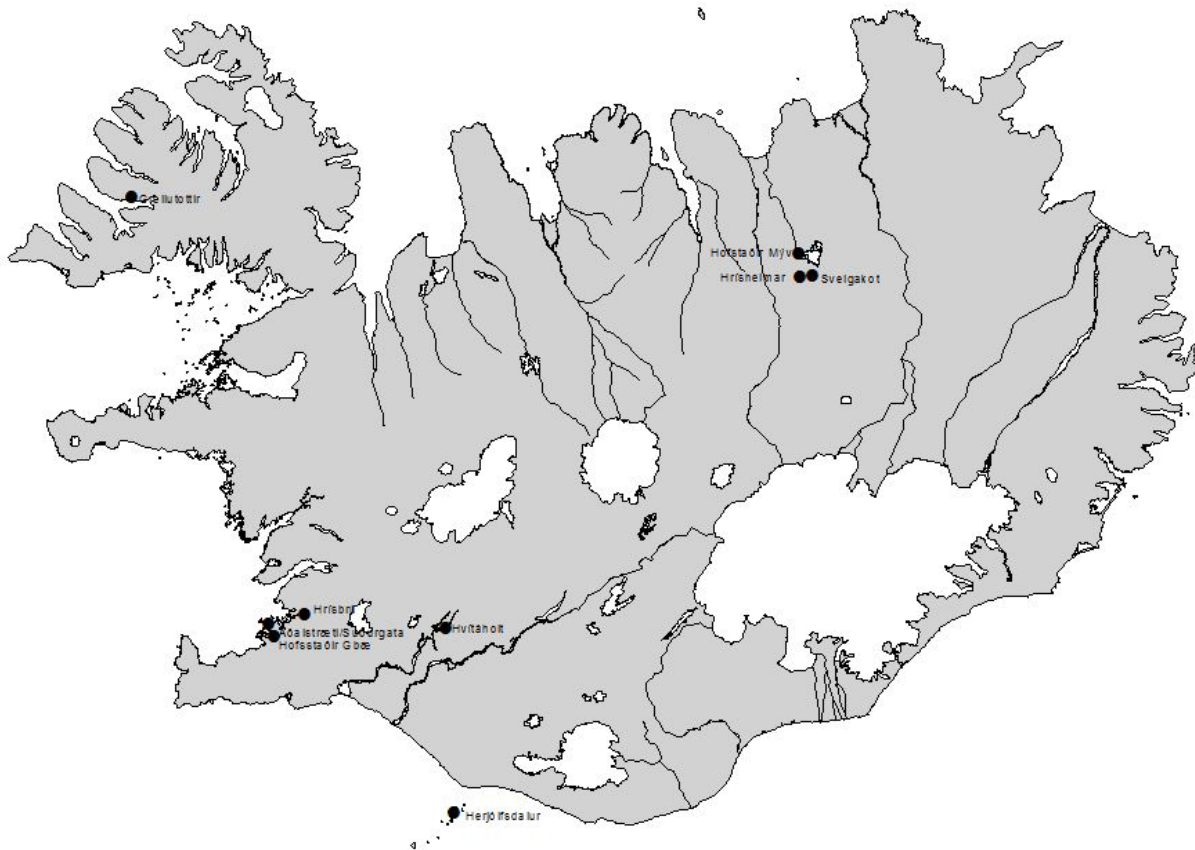
In sum, the evidence suggests that the schist whetstone trade and use seems to have been concentrated around the western Viking world from the onset of the Viking age and continuing into the medieval period, though the schist types exported changed over the duration of this period.

4.2 Settlement sites in Iceland

Nine settlement sites from various parts of Iceland have been chosen for analysis (Map 1).

³⁸ As in e.g. Kaupang, Borg, Skien, Hedeby, Fyrkat, Aggersborg, and Århus.

Map 2 Analyzed settlement sites



Only few sites in Iceland have had their whetstone collection analysed by geologists and no detailed analyses of the types or comparison between Icelandic sites have been carried out. Helge Askvik analysed the whetstone collection from Hofstaðir in Mývatnssveit where Colleen Batey carried out the overall finds analysis. Askvik has also analysed the collections from Herjólfssdalur and Aðalstræti³⁹ and geologist Magnus A. Sigurgeirsson has preliminarily analysed the stones from Hofstaðir in Garðabær, but he did not determine the specific types of schist. A few samples have been identified by geologist Gísli Örn Bragason with thin sectioning as part of his BS thesis in geology, but apart from that, all analysis of the stone types presented here has been carried out by the author macroscopically. In addition a few of the preliminary excavation reports contain some analysis of the whetstone material and suggestions of geological determination and classification, which in most cases has been consistent with my determinations.

³⁹ Only one stone from Aðalstræti 2001 was of Viking age date. This has been included statistically in the Suðurgata 3-5 material.

Table 2 List of Icelandic settlement sites analyzed

<i>Place</i>	<i>Dating</i>	<i>Site type</i>	<i>Reference</i>	<i>Amount of whetstones incl. fragments</i>
Hofstaðir Mývatn	10 th -11 th cent.	Farm/high status	A. Friðriksson & O. Vésteinsson (eds.) 1996, 1997, 1998, Lucas 1999, 2000, 2001, 2002, Bruun & Jónsson 1909	16
Hofsstaðir Gbæ.	Viking Age c.. 9-11 th cent.	Farm	Traustadóttir (in process)	18
Hrísbrú	9-11 th cent.	Farm/high status	Byock et al. 2007, 2008, 2009	21
Sveigakot	9-12 th cent.	Farm/low status	O. Vésteinsson (ed.) 2001,2002,2003,2004,2005 and 2006	39
Hrísheimar	Late 9 th cent – Early 11 th cent.	Farm	R. Edvardsson & McGovern, T. 2007	39
Hvítárholt	Viking Age	Farm	Árbók 1972	12
Grelutóttir	Viking Age c. 900-1000	Farm	Árbók 1979	5
Herjólfsdalur	Viking Age	Farm	M. Hermanns-Auðardóttir 1989	7
Suðurgata 3-5 /Aðalstræti 14-18	9 th -11 th cent. c. 872±2-1000 ⁴⁰	Farm	Roberts, H. (ed.) 2001, Nordahl, E. 1988	25
9 sites				182 whetstones

The dating of the sites relates to the dating of the contexts used for this study on Viking age whetstones and not the overall period of habitation at the site and likewise the amount of whetstones relates only to the Viking age contexts. The references are the main sources used for this study and do not include all publications concerning these sites.

⁴⁰ Nordahl 1988, 110-111 (with adjustment of the dates on the *landnáms* tephra)

4.2.1 Suðurgata 3-5 and Aðalstræti 14-18

The excavations at Aðalstræti 14-18 and Suðurgata 3-5 are located within the central historic district in Reykjavík. Archaeological investigations were carried out first in 1971-74⁴¹ and further extended in 2001⁴² due to development in the area. All but one of the 25 whetstones analyzed came from the investigations at Suðurgata 3-5. The whetstones included from Suðurgata are from the longhouse, the courtyard and the oldest smithy associated with the longhouse and the oldest layers under the earliest building phases at the site (Nordahl 1988, 39). The dating of the structures is based mainly on artefact studies, tephrochronology and C14 dates. The tephrochronology seems to be the most accurate and dates the oldest phases of the settlement to between or just around the time of the settlement tephra 871±2 and the Katla 1000 tephra (Nordahl 1988, 110-111). Whetstones chosen for this research are all from the first settlement period at the site with a longhouse, smithy and courtyard.

The whetstone collection:

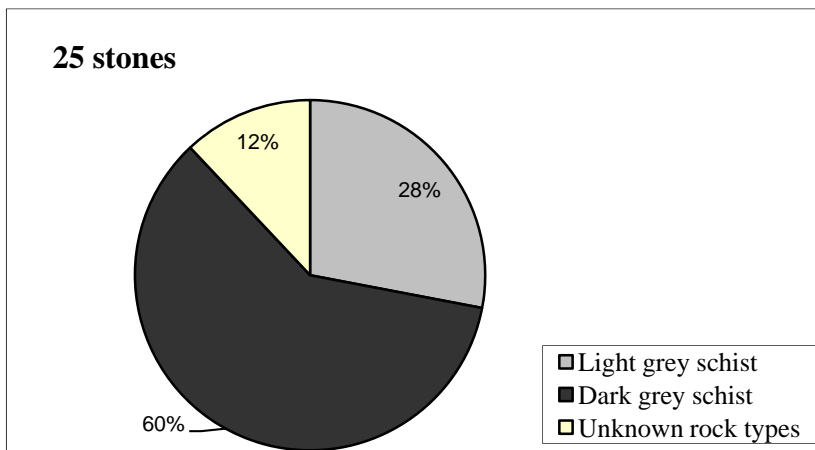
Of the whetstone collections from Icelandic sites, the assemblage of stone types found in Viking age contexts in Suðurgata 3-5 and Aðalstræti 18 has the closest resemblance in stone types to the collections in Hedeby and Kaupang⁴³. As shown in Figure 7 the majority of the whetstones, or 60%, is of the very fine-grained dark grey schist type and only 28% consists of the light grey fine-grained Eidsborg schist type. In addition, there are three whetstones of what appears to be a reddish brown, rather coarse, sandstone type and another schistose whetstone, but these will need geological identification to classify further.

⁴¹ Nordahl 1988

⁴² Roberts 2001

⁴³ See: Section 4.1

Figure 7 Whetstone types Suðurgata 3-5



About 50% of the uncovered whetstones from the site were preserved in sizes still usable for whetting, which is a rather high percentage compared to the other settlement sites. This could indicate that the access to new whetstone material was rather stable as usable pieces were discarded or left when the site fell out of use⁴⁴.

The collection of whetstones ranges from several of the large stationary whetstone types to a few pendant hones, but most of them are fragments of medium sized whetstones, estimated to have been around ten cm in length during the use of the stone. There are a few particularly interesting pieces in the collection. Three whetstones of reddish brown sandstone type (S5-651, S5-414 and S5-519⁴⁵) are all very large, close to 20 cm of length, and weigh around 1/2 kg each. They have most likely been for stationary use, perhaps for initial grinding of rough or damaged blades as they all show several grinding furrows and uneven grinding surfaces from extensive use. These are perhaps of local origin, but further geological analysis will have to be carried out to provenience date them. Other stones of special interest in this collection are two unusually long and narrow whetstones with an almost quadratic square section of the Eidsborg schist type. Find nr. S3-647 is just over 10 cm in length and S5-493 is close to 14 cm long, while both stones are close to 1 cm in both width and thickness⁴⁶. They are both nicely shaped with all grinding faces preserved and rounded edges. Another fragment could possibly be of the same type (S3-701) but as only the end piece is

⁴⁴ See: More on fragmentation of whetstones and its implications in Section 6.2

⁴⁵ See: Picture 2 in Section 9.2

⁴⁶ See: Picture 4 in Section 9.2

preserved it is impossible to determine. In most cases, end pieces with these dimensions in width and thickness (up to 1x1cm and under 10 cm in length) would be classified as pendant hones, but evidently this is not always necessarily the right classification. However, this long and narrow type has, in the analyzed Icelandic material, only been found in Suðurgata in two examples and in Hvítárholt in one example (1967-318-735) and must be considered exceptional. Functionally they could have served the same purpose as the pendant hones, but they are rather long to be carried around as personal possessions.

Another interesting stone (S5-551) is of very fine-grained dark grey schist with the end and middle part preserved. The remaining length of this stone is just over seven cm, but originally, it was most likely over 10 cm in length and therefore belongs to the medium sized whetstones. It has a very irregular shape due to intensive use, with several deep grinding furrows and one side with a concave grinding surface. The stone tapers towards the end and all the edges are rounded. This whetstone must have served some particular purpose and is unusually worn compared to the general collection of whetstones found in Iceland⁴⁷.

4.2.2 Hvítárholt

Hvítárholt is an inland site on the plains of southern Iceland. The farm consists of ten houses, including three halls of the common Viking age type, five pit houses and two barns or byres. The settlement was built after 871±2 as the landnám tephra is found in the turf and fell out of use by the medieval period. Based on the building types of the halls and the datable artefacts the settlement has been roughly dated to the 10th century (Þ. Magnússon 1972, 76f).

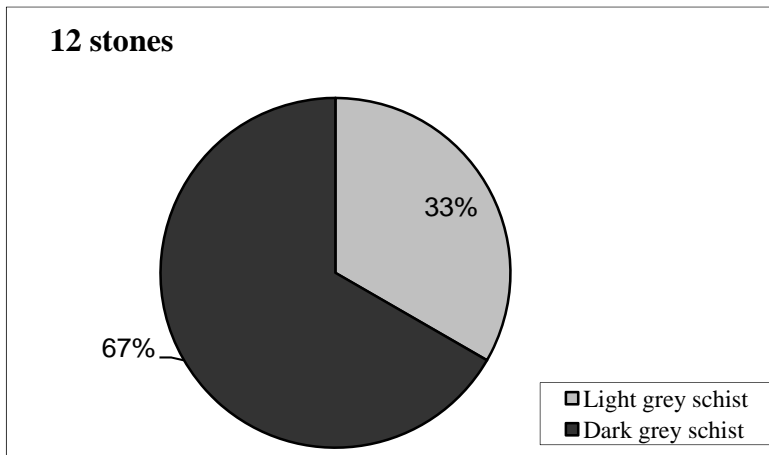
The Whetstone collection:

12 whetstones were found at Hvítárholt and the assemblage has, as shown in Figure 8, a high percentage of the dark grey schist type, which is common in pre-AD 1000 settlements in Iceland. The collection also resembles the assemblages from Kaupang and Hedeby in that light grey schist makes up less than 30% of the collection. Other stones types only appear in very low percentage.

⁴⁷ See: Picture 3 in Section 9.2

Hvítárholt consequently has an assemblage proportion of dark grey schist similar to Kaupang and Hedeby⁴⁸.

Figure 8 Whetstone types Hvítárholt



Half of the whetstones from Hvítárholt are preserved at a size still usable for whetting, and the overall collection from Hvítárholt contains many well-preserved and high quality stones. Hvítárholt also has the full range of types from very large stationary whetstones to small pendant hones.

The whetstones providing information on production, shape or use in this collection are:

Find no.1964-283-425⁴⁹ is an end and middle piece of a light grey schist medium sized whetstone preserved to 8 cm of length, 2.2 cm in width and 1.2 cm in thickness. It has a very fine trapezoid shaped end with rounded edges, and all four grinding surfaces are preserved. Two distinctive parallel grinding furrows appear down one broad side. These furrows could be caused by a distinctive use pattern, but both follow the edges of the stone in full length so distinctly that they might also be decorative. If the latter is the case, then this is a very unusual whetstone type as decorations have not been found on any other of the medium sized whetstones in the analyzed Icelandic material.

⁴⁸ See the description of the foreign sites in Section 4.3

⁴⁹ See: Picture 6 in Section 9.3

Find no. 1967-318-735⁵⁰ is the end piece of a small and narrow Eidsborg schist whetstone with a quadratic cross section, possibly the same as the rather uncommon type mentioned from Suðurgata 3-5 (S3-647 and S5-493)

Find no. 1964-283-424⁵¹ is a dark grey, very fine-grained schist whetstone showing production marks on the end piece. It was clearly first sawn partially through on several sides and then broken off. The end was not reshaped but left rough during the use of the stone. The preserved fragment shows both end and middle piece of a medium sized whetstone, 7.5 cm in length, 1.5 cm in width, and 1 cm in thickness. It tapers towards the broken end where the stone is about half as thick as the preserved end piece. It is rather common to find such tapering end pieces in the Icelandic collection where the stone has been worn down so much during use that it breaks around the centre of the stone. This does, however, not necessarily mean that they fell out of use. There are several examples of broken stones being reutilized in the analyzed Icelandic collection indicated by rounded edges of the broken end or even grinding furrows across it. This particular stone does on the other hand not show particular signs of reuse.

Find no. 1965-360-517⁵², also of the dark grey schist type, is with its 21.5 cm length among the largest examples found in the Icelandic collection. Such large examples are not very common and in particular not amongst settlement finds. Overall it has a rough finish, but this does not seem to have limited its purpose and it has been extensively used. The grinding surfaces are very wavy due to use and it has grinding grooves at several places both on the surfaces and on the edges.

Finally find no. 1967-318-719⁵³ is noteworthy because it has unusually rough inclusions of quartz or other hard grains in the structure. The preserved stone includes the end and middle piece of a middle sized light grey schist whetstone, 6.5 cm in length, 2.5 cm in width, 1.5 cm in depth, and a rectangular square section. The stone is quite regular in shape and has several grinding furrows. Modern ethnographic sources describe how irregularities of the Eidsborg blanks were cut off and dumped before they were transported down from the mining areas (Livland 1992, 21-21) and one would assume the same practice during the Viking age to limit the transportation of less valuable,

⁵⁰ See: Picture 5 in Section 9.3

⁵¹ See: Picture 7 in Section 9.3

⁵² See: Picture 8 in Section 9.3

⁵³ See: Picture 9 in Section 9.3

poor quality whetstones. It is also rather uncommon to find such irregularities in the grain structure in the Icelandic whetstone material, but in some cases they occur and this stone had clearly been utilized in spite of its inferior quality. But the wear of the whetstone is in particular visible on the one grinding surface that has no irregular grains.

4.2.3 Hofstaðir in Mývatnssveit

Hofstaðir (HST Mýv.) is located just west of Lake Mývatn in Northern Iceland and consists of an extensive complex, which in the Viking age consisted of both a hall and several pit houses (Lucas 2001, 3). There have been several archaeological investigations at the site, but the artefacts analyzed here are all from the excavation seasons 1997-2002⁵⁴.

The dating of the site is based on both tephrochronology and radiocarbon dates that reveal a date ranges for the main settlement at between AD 930-970 and AD 1050-1100. The whetstones included in this research are all from the phases I and II datable to ca. AD 940-1030 (Lucas (ed) forthcoming, Chapter 3)

The whetstone collection:

A total of 49 whetstones have been found at Hofstaðir but only 17 of these are from secure Viking age contexts, the rest are either from the older excavations lead by Bruun (Bruun, Jónsson, 1909), surface finds, or from medieval contexts. Of these 17 finds, 16 could be dated to pre-AD 1000 contexts and the analysis of the whetstones from this site have been carried out on these 16 stones. All the stones in this collection have been analyzed by geologist Helge Askvik and as shown in Figure 9 this site contains a rather high percentage of the light grey schist type that generally both in

⁵⁴ For more detail on the excavations in Hofstaðir and its history see: Friðriksson and Vésteinsson 1998:58ff The best overviews are in Adolf Friðriksson, Orri Vésteinsson og Thomas H. McGovern 2004, 'Recent Investigations at Hofstaðir, northern Iceland.' *Atlantic Connections and Adaptations: Economies, environments and subsistence in lands bordering the North Atlantic*, R.A. Housley & G.Coles eds., Oxbow Books, Oxford, 191-202.

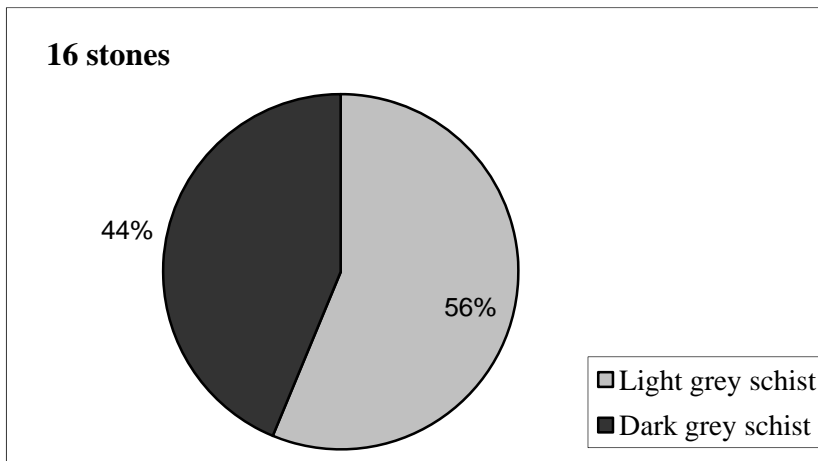
And

Lucas, Gavin 2007, 'The Viking settlement at Hofstaðir in Mývatnssveit.' *priðja íslenska sögubíngið 18.-21. maí 2006. Ráðstefnurit*, Benedikt Eypórsson & Hrafnkell Lárusson ritstj., Reykjavík, 198-204.

Lucas, Gavin 2007, 'Víkíngaaldarbyggðin á Hofstöðum í Mývatnssveit.' *Árbók 2004-2005*, 101-18.

Iceland and abroad is more common in post-AD 1000 contexts. Other sites from the same region also show high percentages of light grey schist in early contexts. The possible explanations for this regional difference will be discussed in the section 6.5.

Figure 9 Whetstone types Hofstaðir in Mývatnssveit



The whetstone collection from Hofstaðir in Mývatnssveit includes several interesting examples of whetstones though most of them are somewhat fragmented and degraded. Most of them have been extensively used and only 20% is preserved in a size still usable for grinding. Apparently whetstones were not in such abundance that whole pieces were left at the site, suggesting that they were a valuable commodity to the inhabitants of this farmstead⁵⁵.

The collection contains the entire range of whetstone types from a more stationary large whetstone to several small pendant hones, but most of the assemblage is made up of medium sized examples preserved in or estimated to have been just around 10 cm in length. The large whetstone (HST01-25⁵⁶) is of the light grey schist type and the preserved stone is 14 cm long, 4 cm broad, and close to 3 cm thick. The stone is clearly broken in one end. This is one of the broadest and thickest whetstones in the analysed Icelandic collection, but unfortunately the stone is badly preserved and almost all the grinding surfaces are deteriorated, which according to a note by Askvik could be

⁵⁵ More on the fragmentation and suggestions to the impact of the fragmentation rate in Section 6.2

⁵⁶ See: Picture 14 Section 9.4

explained by exposure to high heat⁵⁷. Another interesting whetstone is a small pendant hone (HST-99-268⁵⁸) with two strap holes, one in each end only just over 3 cm apart. The preserved stone is 5.5 cm long. This is the only whetstone of this type found in Iceland so far, but a similar example, though in dark grey schist, was recovered in Hedeby (Resi 1990, table 7). Sawing marks from the production of the whetstone are visible on the preserved end piece and one grinding surface is almost intact, but the stone must have broken into multiple fragments and only three pieces remain, making up for half of the whetstone. Another rather fragmented stone is HST01-167 but all the conjoining fragments have been retrieved. It is a rather large whetstone with long grooves running parallel down the majority of one broadside⁵⁹ this is quite similar to find no. 1964-283-425 from Hvítárholt though the grooves are not quite as distinct⁶⁰.

Finally there is an intensively used whetstone in the collection (HST98-119⁶¹) just over 10cm in length, of the dark grey schist type with a rather coarse mineral structure in large parts of the stone and very rough finishing, perhaps due to breakage. This does, however, not seem to have affected the usefulness of the stone and all surfaces have been used for grinding. Close to one end there is a vague depression, possibly the beginning of the process of drilling a hole but this would be both a large and unusually rough stone to use as a pendant hone but a similar example can be seen in Hedeby (Resi 1990, 69 Table1).

In addition to the whetstones there is one possible grinding slab (not included in the 16 registered whetstones from the site). A grinding slab is an irregular block of stone that in some way has been used for grinding. Usually they are made of the same rock material as the whetstones. It is uncommon to find grinding slabs in Iceland but they are well known from both Kaupang (Resi 2008, plate 5, 10 and 11) and Hedeby (Resi 1990, plate 19 and 22). The grinding slab (HST01-

⁵⁷ Comment to an unpublished archive report of the whetstones collection from Hofstaðir Mýv. by Helge Askvik. This aspect is not mentioned in the forthcoming publication on Hofstaðir Mýv. by Gavin Lucas (ed.) Also see: Section 3.3 on the preservation conditions of whetstones.

⁵⁸ See: Picture 13 Section 9.4

⁵⁹ See: Illustration 1 Section 9.5

⁶⁰ See: 4.2.1 on Hvítárholt

⁶¹ See: Picture 12 Section 9.4

363⁶²) and one whetstone (HST01-179a⁶³) from a medieval context at Hofstaðir are both of apparently similar stone material. The whetstone has been geologically determined to be of Icelandic dolerite, most likely from Hörgádalur within the same region as Hofstaðir (Gísli Örn Bragason, 2008, 20)⁶⁴.

4.2.4 Hofstaðir in Garðabær

The Hofstaðir farm in Garðabæ (HST Gbæ) is located just south of Reykjavík and was excavated between 1994 and 2000. The excavation revealed a large hall, an enclosure and several cooking pits. Dating of the settlement has not yet been completed and there are several phases but what can be determined is that the site was settled after the 871±2 tephra fell, partially rebuilt after the Katla 920 tephra fell and abandoned before the AD 1262 tephra fell (Traustadóttir, in process). The artefacts can also typologically be dated to somewhere between 9th and 11th century and thereby provide a corroborating date range (*ibid*).

Given that whetstones provide no means for typological dating, only the whetstones belonging to the hall and enclosure will be included and will, as the typologically datable artefacts, be related to the period 9th – 11th century.

The whetstone collection:

The 18 whetstones from Hofstaðir were all found in connection with the hall. The collection is very much dominated by the light grey Eidsborg schist type and only three of the 18 stones were of the dark grey schist type. The three finds of the dark grey schist type are all related to the earliest phases of the site. This is the Icelandic site with the highest percentage of the light grey whetstone type (Figure 10), which usually dominates in contexts postdating AD 1000. Due to the unsecure dating of the site it is possible that the contexts are predominantly late 11th century which would explain the high occurrence of the light grey Eidsborg schist type⁶⁵. Other explanations might

⁶² See: Picture 11 Section 9.4

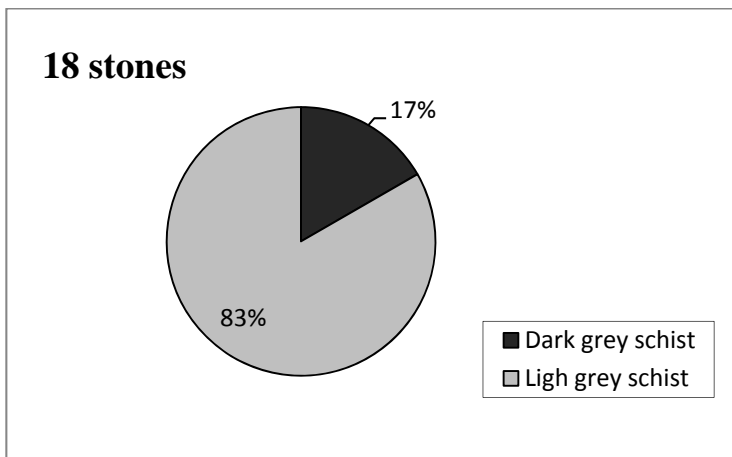
⁶³ See: Picture 10 Section 9.4

⁶⁴ Work on the utilization of Icelandic stones for whetting is being conducted by Gísli Ö. Bragason and Sigrid C. J. Hansen with expected publication in 2010.

⁶⁵ See: Section 2.2

contribute to an understanding of this high degree of light grey schist stones as will be discussed in Chapter 7.

Figure 10 Whetstone types Hofstaðir Gbæ.



Most of the pieces are very fragmented, heavily used, and poorly preserved, and many of the light grey schist types have badly eroded grinding surfaces, possibly due to the preservation conditions at the site. A factor for the bad preservation could be high heat or fire impact before or during use, as some have soot smears⁶⁶. There are no large whetstones present in the collection and all are under 10 cm in length and can be described as small to medium sized examples. Both pendant hones, though none with holes, and medium sized bar-shaped whetstones of more stationary use are present at the site. Some might have belonged to much larger whetstones that were ground heavily, while the remaining stones are all rather small and fragmentary. Most stones show heavy use and have very wavy grinding surfaces and several grinding grooves on both surfaces and across the sides. This could either be due to a specific use of the whetstones which demanded grinding down the edges of damaged blades in order to reshape them or be caused by long-term use, in indicating limited access to new whetstone material. Many of the whetstones (40%) are, on the other hand, of such size that they would still be usable meaning that the need for new material cannot have been extreme.

⁶⁶ See: Section 3.3 on preservation condition of the whetstones

4.2.5 Herjólfssdalur

The farmstead Herjólfssdalur is situated on the Westman Islands south of Iceland. It was first excavated in 1924 by Matthías Þorðarson (Árbók 1925-26, 20) but the whetstone collection analyzed belongs to the excavations by M. Hermann-Auðardóttir from 1971-83. The farmstead consists of a longhouse surrounded by several buildings, in total 11 structures (Hermann-Auðardóttir 1989, 9-17) that all can be dated from the early settlement period to ca. 1000/1050 (*ibid* 64).

The whetstone collection:

Seven whetstones were found in the excavation, all from inside or in close relation to structures. Interestingly all the whetstones are of the dark grey schist type, which is a common stone type in contexts predating AD 1000. This collection is the only example of the exclusive use of this stone type in Iceland and this fact could have chronological implications. The only comparable foreign whetstone collection is from Borg in Northern Norway where 88% of the collection was of this dark grey schist type. This whetstone type must with all probability have served the most general grinding purposes and all whetting at the site would have been accomplished with this type, since no other stones were included in the collection. The collection of only seven whetstones is strikingly small for such a large settlement site with several houses, possibly suggesting that the occupation of the site did not last long.

The whetstone collection at Herjólfssdalur contains both a large whetstone 25 cm in length and a few fragments of pendant hones, thus providing a full range of the most common types. The large whetstone (2001-21-135⁶⁷) is very rough and only has two full grinding surfaces. There are several grinding grooves but all rather shallow. Two of the pendant hones (2001-21-362 and 2001-21-353) have a strap hole in the end piece⁶⁸. Find no. 2001-21-362 is broken in half lengthwise and although only half the stone remains the whetstone is preserved in its full length of 5 cm. It seems to have been triangular in shape, which has only been seen in two other pendant hones in the Icelandic

⁶⁷ See: Picture 17 Section 9.6

⁶⁸ See: Pictures 15 and 16 Section 9.6

collection, the unusual banded schist piece from the burial in Áslákshóll⁶⁹ and one piece from Sveigakot (SVK-00-121).

4.2.6 Grelutóttir

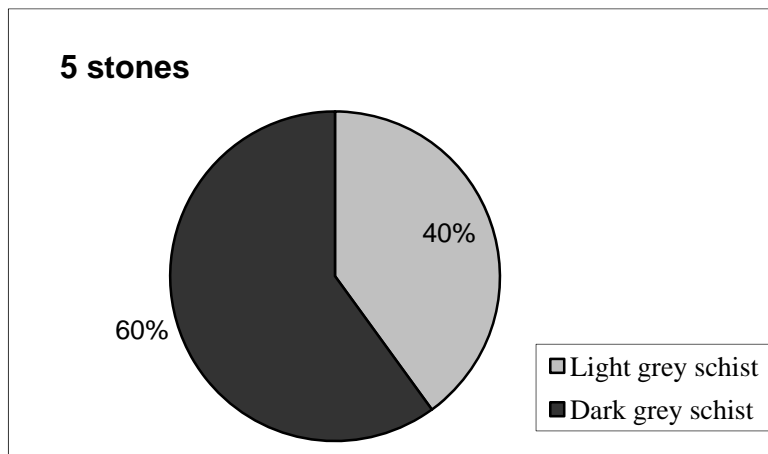
The site Grelutóttir is a single phase site situated in the west fjords of Iceland and was excavated in 1977. There is no tephra from the historical period at the site, but the settlement can be dated to ca. AD 900-1000 based on C14 results and the excavator thought that this was a settlement period site and a precursor for the nearby Hrafnseyri (G. Ólafsson 1979, 25). There are no finds to give closer dating beyond the general Viking age, although the presence of larger steatite pot fragments at the site suggests a settlement period date. Analysis of the Icelandic steatite material has shown that larger steatite fragments are characteristic of the settlement period where e.g. steatite pots were brought as part of the initial import whereas these did not get replaced by subsequent import (Forster 2004, 323). A hall with two associated pit houses and two smithies were excavated, but there are still several structures at the site remaining. It can be described as a mid to low status farmstead rather amongst the smaller than the larger settlements (G. Ólafsson 1979, 67).

The whetstone collection:

The stone types from this site are predominantly the dark grey schist, but the light grey schist is also well represented. Since the collection contains only five whetstones, the percentages shown underneath in Figure 11 should not be over-interpreted.

⁶⁹ More information of this example in chapter 5.2.1

Figure 11 Whetstone types Grelutóttir



Though the collection from this site is small it is rather unusual and contains several interesting and well-preserved examples and no small fragments which otherwise are very common⁷⁰. There are three large whetstones (40% of the collection) that all have been used rather intensively. Two of these are of the dark grey schist type. Find no. 1978-139-23⁷¹ has a preserved length of 17.5 cm and consists of a nicely shaped pointy end-piece and, presumably, the majority of the middle piece. The grinding surfaces are wavy due to use and the stone has distinctive grinding grooves in the end, where it has broken, and must have continued to be in use for quite some time after breakage. The other, find no. 1978-139-32⁷², is a stone with a preserved 14.5 cm length and both the end pieces missing. This piece has a rougher finish than 1978-139-23 and has a triangular cross section, which is very unusual in the Icelandic collection with only four other known examples of this type, two from Hrísheimar (HRH00-7 and HRH06-46), one from Sveigakot (SVK05-35), and one from the burial at Ketilsstaðir (1938-12442). For comparison this type was only found in 24 of the 689 whetstones that were preserved in complete condition from Hedeby (Resi 1990, 27) and 23 of these were also of the dark grey schist type, while only seven of the 138 whetstones with full width and thickness preserved from Kaupang (Resi 2008, Figure 16) were of this type. The last one of the large whetstones from Grelutóttir, find no. 1978-139-26⁷³, is of the light grey schist type, 23 cm in length. It is very badly preserved and all the grinding surfaces are almost entirely eroded, but the

⁷⁰ See: Section 6.2 on fragmentation

⁷¹ See: Picture 19 Section 9.8

⁷² See: Picture 20 Section 9.8

⁷³ See: Picture 21 Section 9.8

shape is still preserved. The whetstone tapers toward both ends and is unusually narrow for the light grey schist types that in general are broader and thicker than the dark grey schist whetstones⁷⁴.

4.2.7 Sveigakot

Sveigakot is situated in Northern Iceland close to Lake Mývatn and the two contemporary farms of Hrísheimar and Hofstaðir. The farmstead at Sveigakot was excavated between 1999 and 2006. Despite extensive erosion, remnants of settlements during the period from the 9th to the 12th century were found, with intact floor and midden deposits (Vésteinsson 2001, 50). Sveigakot may always have been a somewhat marginal farm and was abandoned for a period in the late 11th century. The first occupation consisted of a substantial byre (S7) and a pit house (P1) that went out of use already before AD 940 (Gísladóttir and Vésteinsson (eds.) 2008, 18). Thereafter several pit houses, some with evidence of settlement occupation, and a hall (S4) was built in the late 10th century. It has been suggested that the site belonged to a larger farm and was inhabited by slaves or workers in the pit house period before the building of the hall (Vésteinsson (ed.) 2005, 53). Moreover there is substantial activity in the areas in between the houses, indicating that important economic activities took place outdoors. Several of the whetstones were found in the extensive midden excavation in area M divided into upper and lower midden defined as before and after 940. The dating of the site is from shortly after 871 and until the 12th century. The latest phases are therefore possibly outside the limits of the research period for this project all finds have been analyzed but the material has been divided into pre- and post-AD 1000 collections⁷⁵.

The whetstone collection:

The total amount of whetstones uncovered in Sveigakot is 39 of which 14 are from contexts securely predating AD 1000. The material has been divided into two groups, the first with contexts securely predating AD 1000 (Figure 12) and the second with the rest of the material, primarily dating to 11th-12th centuries, but with some finds only datable to the period 10-11th century or the

⁷⁴ Evidenced in the material from both Hedeby and Kaupang (Resi 1990, 22f, Resi 2008, 31) but is also the general trend in the Icelandic whetstone collection.

⁷⁵ As defined in Section 1.1

11th century (Figure 13). These have been excluded from the analysis of the finds securely predating AD 1000 in order to decrease the likelihood of this collection being influenced by the known intensified export of the light grey Eidsborg schist stones around the turn of the 11th century⁷⁶.

Figure 12 Whetstone types Sveigakot – predating AD 1000

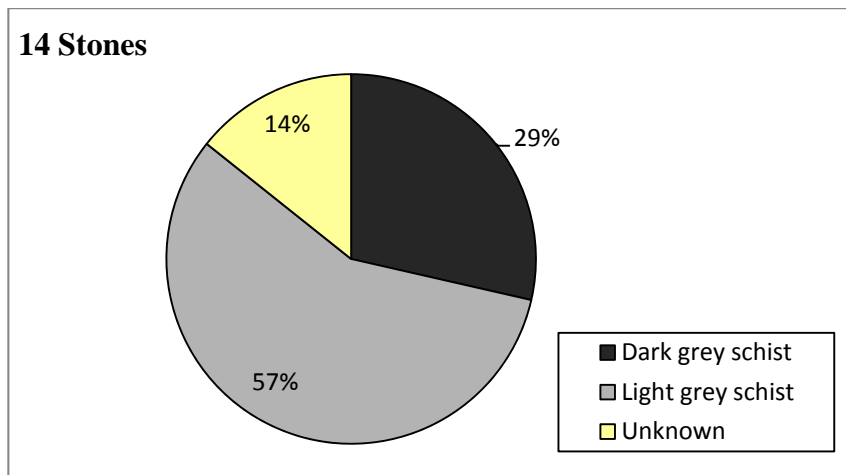
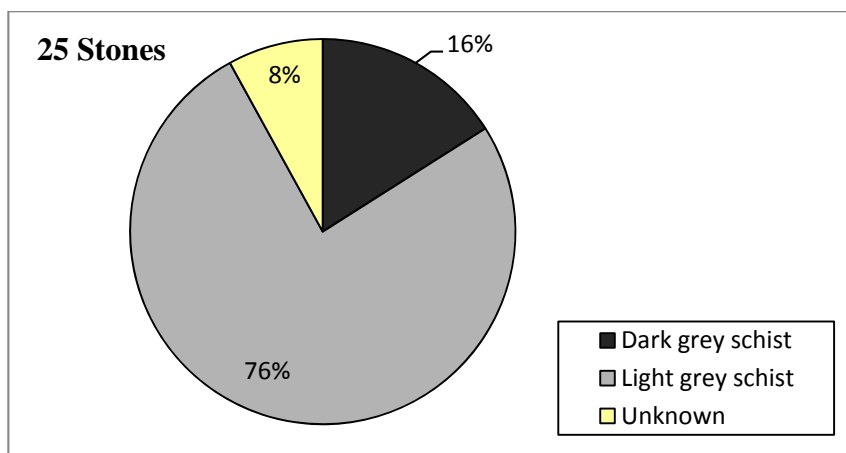


Figure 13 Whetstone types Sveigakot – Postdating AD 1000



The proportion of Eidsborg stones from the early phases of the settlement (Figure 12) is very high compared to the other analyzed Icelandic sites, in fact almost proportionally opposite to the usual pre-AD 1000 picture that generally shows around 1/3 light grey schist and 2/3 dark grey schist.

This trend at Sveigakot, similar to the other sites from the Mývatn area, could have several explanations, further discussed in Section 6.4.

⁷⁶ See: Section 2.2

When looking at the collection of whetstones dated to the 11th and 12th centuries (Figure 13), the tendency is that the total percentage of light grey Eidsborg type increases, as expected closer to the medieval period⁷⁷. Many of the light grey schist whetstones are badly preserved and heavily fragmented. Several have soot smears which may suggest that they have been exposed to high heat and therefore become fragile⁷⁸. This is, however, not unusual and other sites contain several badly preserved light grey schist stones.

It is in particular the whetstones from contexts postdating AD 1000 that contain a high degree of unusable whetstone fragments whereas the pre-AD 1000 collection from Sveigakot holds more usable pieces, though it at the same time has more small fragments⁷⁹. In general there are many fragmentary whetstones from the site, which could partially be explained by the extensive midden excavations are expected to yield larger numbers of discarded material including unusable whetstone fragments⁸⁰.

The overall collection from Sveigakot contains the full range of whetstones from very large stationary types to the small pendant hones. But when dividing the collection into pre- and post-AD 1000 groups, then only the period after AD 1000 has very large whetstones and none of the small pendant hones, whereas the pre-AD 1000 collection only consists of medium and small sized whetstones.

Interesting whetstones predating AD 1000:

Find no. SVK-01-027⁸¹ is a pendant hone of the dark grey schist type, but is only fragmentarily preserved with a length of 2.6 cm. It has a drilled hole near the end that has broken off and possibly the beginning of another drilling closer to the preserved end piece. The hole is situated several cm from the preserved end piece, which is rather unusual and could indicate that it is a fragment of a relatively large pendant hone. On the other hand, it could also be from a very small pendant hone if one imagines the hole belonging to the end that has broken off. In that case it would have had a

⁷⁷ The export of the light grey Eidsborg schist is known to increase from around ca. AD 1000 (Section 2.2)

⁷⁸ See Section: 3.3 on preservation condition

⁷⁹ See: Section 6.2 Figure 19 and 20.

⁸⁰ More on issues with fragmentation in Section 6.2

⁸¹ See: Picture 29 Section 9.10

character more similar to a pendant rather than a functional whetstone. In any case it is an unusual type of pendant hone.

Find no. SVK-99-015⁸² is a 7.5 cm long rather badly preserved whetstone. It is grey with a red-brownish silvery tint, very fine-grained and presumably schist but this will need further geological analysis to determine. In one end there is a small whole, possibly an unfinished strap-hole and towards the other end it seems to have broken around an older strap-hole. There are also deep furrows across the stone in and the specimen is in all ways very intensively used.

Find no. SVK-05-165⁸³ is the end piece of a light grey schist whetstone with tapering sides and all four grinding surfaces preserved, though the piece is slightly eroded on the surface. It is as such not a very interesting whetstone type, but it has a very distinct grinding groove along most of one broad side of the preserved fragment. This intensive use and the low number of intact and large whetstone fragments could indicate how extensively the whetstone material was used at this site and that new whetstone material was probably not available in abundance.

Interesting whetstones postdating AD 1000:

The collection in the category postdating AD 1000 includes the Find no. SVK-01-10,⁸⁴ which is heavily used and very large, in fact the one of the analyzed whetstones that is closest, in dimensions, to a whetstone blank, 25x2.8x2.2 (blanks ca. 30x5x3).

Another interesting whetstone, SVK-05-035⁸⁵, is preserved as a fragmented end piece, 3.7 cm in length and with several vague grinding grooves across one of the two preserved grinding surfaces. This piece has a triangular cross section, which is very unusual in the Icelandic collection with only four other examples of this type, two from Hrísheimar (HRH00-7 and HRH06-46), one from Grelutóttir (1978-139-23), and one from the burial a Ketilsstaðir (1938-12442).

⁸² Picture 28 Section 9.10

⁸³ Picture 31 Section 9.10

⁸⁴ Picture 30 Section 9.10

⁸⁵ Picture 33 Section 9.10

Finally there is one whetstone, or perhaps rather a grinding slab, from the collection predating AD 1000, which is quite interesting (SVK-04-096⁸⁶). The stone type is unknown and will need to be determined by a geologist. This piece could possibly be the rim piece of an artefact that has been re-utilized for grinding, probably after breakage. Two distinct grinding grooves are visible on one of the grinding surfaces.

4.2.8 Hrísheimar

Hrísheimar is situated in Northern Iceland in the lake Mývatn region, in close proximity to the farms of Sveigakot and Hofstaðir. The archaeological excavations at Hrísheimar began in 2000 and have concentrated on extensive midden excavations. The investigations were carried out until 2006, but the final report is still in process and the info used in this work is thus from the preliminary reports (September 2009).

Radiocarbon dates, tephrochronology, and the datable artefacts date the occupation at Hrísheimar to between the late 9th century and the beginning of the 11th century (Edvardsson and McGovern 2007, 16). The site seems to have been a substantial farm at least in the 10th century with a flourishing farm economy and heavy investment in iron smelting (*ibid*).

The whetstone collection:

In total 39 whetstones have been found during the excavations at Hrísheimar, making it one of the largest collections from an Icelandic Viking age settlement. A significant number of the whetstones are surface finds, primarily found during the first two seasons of 2000 and 2001. It cannot be absolutely ruled out that these are more recent, but the fact that all other datable surface finds are of Viking age date, and that there is no evidence of any later settlement at the site, makes it likely that all the whetstones are in fact from the Viking age and could fall under the pre AD 1000 period as defined in section 1.1. In addition all finds from 2005 cannot be divided into pre and post AD 1000 contexts as the phasing information is not yet available⁸⁷. In order to show the differences in the

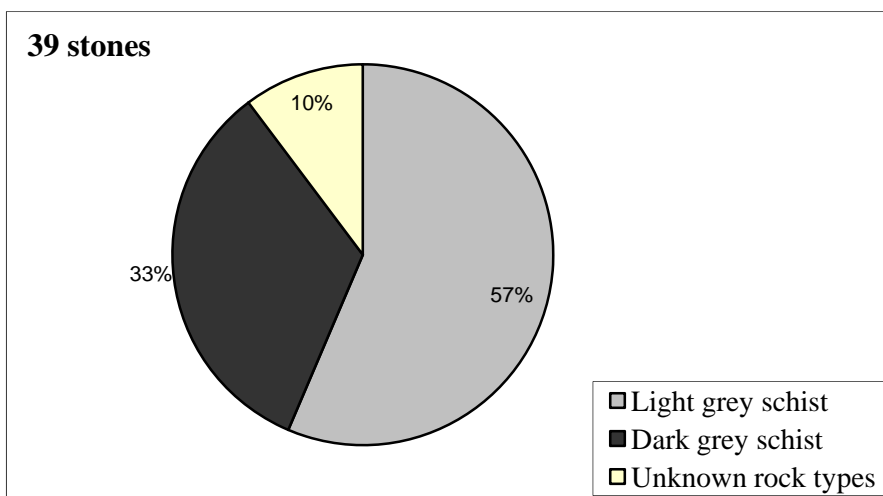
⁸⁶ Picture 32 Section 9.10

⁸⁷ The report is still in process and no context list with phasing is available (March 2009)

collections all finds from surface contexts and all finds from 2005 have been dated to Viking age in general and are shown in Figure 15 in contrast to the whetstones that can be securely dated to pre AD 1000 (which are shown in Figure 16).

The whetstones, when looking at the entire collection (Figure 14), are dominated by the light grey schist type. The light grey schist is in general more common from the 11th century onwards⁸⁸, but also seem to be rather common during the earlier settlement period in the analyzed settlement sites from the Mývatn area⁸⁹.

Figure 14 Whetstone types Hrísheimar – whole assemblage



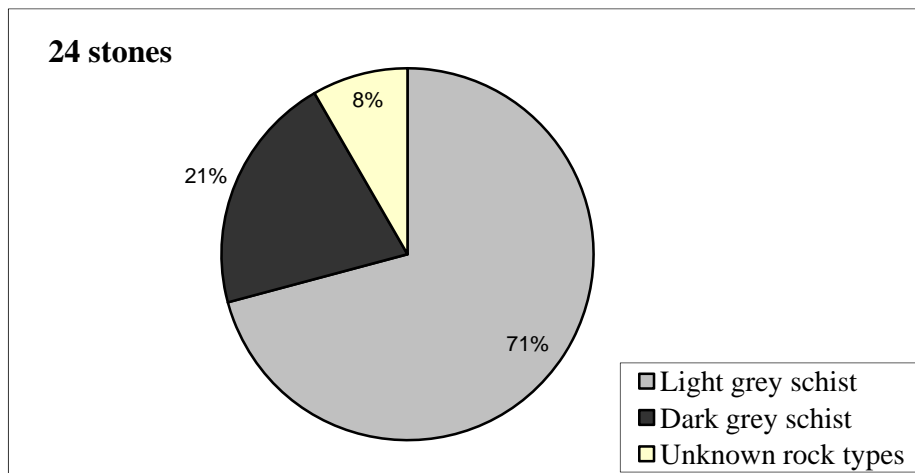
Since most of the light grey schist whetstones can only be dated to the Viking age in general (Figure 15), it cannot be absolutely ruled out that these are finds from the occupation after AD 1000 or even more recent deposits, which would make a higher proportion of light grey schist more in line with the general trend. But it is most likely that these could in fact be from pre-AD 1000 contexts⁹⁰ and thereby make the combination of stone types in this assemblage similar to the other Mývatn sites.

⁸⁸ See: Section 2.2

⁸⁹ More information on the possible regional differences in the whetstone collections from Sveigakot, Hofstaðir and Hrísheimar in Section 6.5

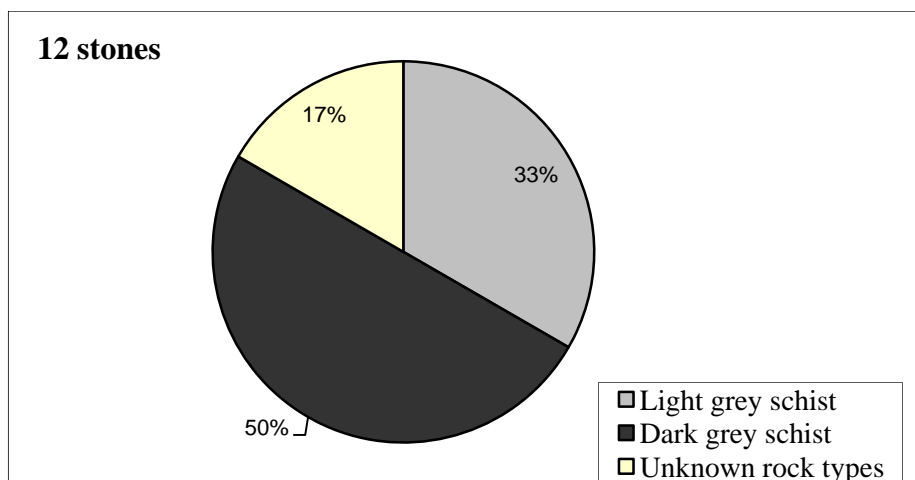
⁹⁰ As defined in Section 1.1

Figure 15 Whetstone types Hrísheimar – Viking age general/unsecure contexts



When looking at the finds securely belonging to contexts predating AD 1000 (Figure 16) the collection is more similar to other pre-AD 1000 sites both in Iceland and abroad, consisting predominantly (50%) of the dark grey schist type⁹¹.

Figure 16 Whetstone types Hrísheimar – predating AD 1000



The issue of whether the collection did in fact contain a higher proportion of the light grey schist during the occupation phases belonging to the pre AD 1000 period⁹² is quite important. This would support the suggestion of a regional difference in the Mývatn area where both Sveigakot and Hofstaðir also have high percentages of the light grey schist type. Because the statistics of the schist types from before AD 1000 (Figure 16) is based on only 12 whetstones (six dark grey, four light

⁹¹ More on the overall analysis of the schist types and comparison with foreign sites in Section 6.5 and Chapter 7

⁹² As defined in Section 1.1

grey and two other types) the relationship between the two schist types could change considerably if even just a couple of new whetstones were to be added. The 2005 collection consists of 13 whetstones and several of these are potentially from contexts predating AD 1000 so, though it is quite likely, the question will have to remain open as to whether Hrísheimar did in fact have a high percentage of the light grey schist in the contexts predating AD 1000.

The collection of whetstones consists of many small and fragmented pieces and only about 20% of the stones are preserved in a size usable for whetting, while the remaining are too small and fragmented⁹³. This is also one of the collections with the lowest number of usable whetstones, which could indicate that new whetstone material was lacking at the site. This issue will be further discussed in Section 6.2 about the fragmentation of the whetstone material.

Though the preserved whetstones at the site are very fragmented, there are still many interesting whetstone types and shapes present, ranging from small pendant hones to several large whetstones within the medium sized category around 10-15 cm in length. However, there are none of the particularly large whetstones of close to or above 20 cm in length. Without having the statistics to prove this notion, Hrísheimar is probably the Icelandic site with most variety in the stone types used for grinding, showing variations even within the two main categories of light and dark grey schist. But definitions of these types of variations have not been carried out systematically within this project and would require assistance from a geologist. However, there are great variations in the colour of the dark grey schist from the site and distinct differences in the mineral structure, even on a macroscopically level, in the light grey schist.

There are two whetstones with a triangular cross section and only three other whetstones of this shape have so far been found in Iceland (Grelutóttir 1978-139-23, Sveigakot SVK05-035 and Ketilsstaðir 1938-12442). Finds nr. HRH-00-07 and HRH-06-46⁹⁴ are both small end pieces of triangular pendant hones of the light grey schist type. Triangular cross sections are rather uncommon and in particular ones of the light grey schist type and only 1 of the 689 whetstones that were preserved in complete condition from Hedeby (Resi 1990, 27) was of this shape and none of the whetstones from Kaupang had a triangular cross section.

⁹³ See: Section 6.2 and Figures 19 and 20.

⁹⁴ See: Pictures 22 and 23 in section 9.9

Another whetstone with a quite interesting shape is HRH-03-101⁹⁵ that has very sharp edges, plane, smooth grinding surfaces and looks almost unused. This stone is broken across the broadside and only a small piece of the end is preserved. It is by far most common that schist breaks on the long side, following the mineral structure of the stone, rather than over the broad side. A breakage as seen in HRH-03-101, cutting the stone broadways, is likely to have occurred by some sharp and heavy implement almost cutting off the end. The stone type was hard to determine as the surface was covered by a layer/surface that must have developed during its stay in the soil, but it has been analysed by thin sectioning as belonging to the dark grey schist type (Gísli Örn Bragason 2008, 21).

Two of the recovered whetstones showed interesting wear marks. One, HRH-03-140⁹⁶, is an end-piece of a small pendant hone with interesting grinding grooves across the broadside. Pendant hones do not very often show so much wear. The other one, HRH-04-74⁹⁷, is an extensively used light grey schist whetstone, almost preserved intact but with one end broken. All the edges have been rounded due to use and there are several interesting grinding grooves across the broad side. This is otherwise a well-preserved stone, but undoubtedly one of the most extensively used in the analysed Icelandic whetstone collection.

An interesting type of whetstone material with a very fine-grained structure and a prominent purplish tint, with no parallel in the analysed Icelandic whetstone collection, has been found at Hrísheimar. Perhaps this is similar to what is often referred to by British geologists as purple phyllite⁹⁸. Two of the whetstones of this type have been recovered as large fragments and are both presumably pendant hones. Find HRH-05-146, a very small and thin, whole but chipped pendant hone without a strap-hole, was found in the iron working activity area A. Another pendant hone of this type, HRH-04-142⁹⁹, with a strap-hole was found during excavation of the lower midden in 2004. This example is quite fragmented and only one grinding surface is preserved. It has broken along the narrow side, following the mineral structure, and the recovered fragment is only 2 mm thick. Two other fragments, HRH-05-186 and HRH-05-142, were found during the 2005 field

⁹⁵ See: Picture 27 in section 9.9

⁹⁶ See: Picture 26 in section 9.9

⁹⁷ See: Picture 25 in section 9.9

⁹⁸ See: Section 3.1.2 on the dark grey schist types

⁹⁹ See: Picture 24 in section 9.9

season and the situation of the context from which they were recovered is so far unknown¹⁰⁰, but they are very similar to HRH-04-142 and could both be fragments from the same stone, though not conjoining. Unfortunately no geologists have analyzed any of the stones from Hrísheimar and it remains unknown if this could in fact be purple phyllite, commonly grouped within the overall dark grey schist type, or whether this could be another less common stone type. They have been kept within the dark grey schist type register in this project and the two stones registered as unknown rock type are both possibly made of chalk or limestone.

4.2.9 Hrísrú

Hrísrú is located in Mosfellsdalur just outside Reykjavik. Archaeological investigations have been carried out at the site from 2002-2008 and includes both a large Viking age longhouse and early medieval church. All whetstones analyzed for this project are from the excavation of the longhouse 2006-2008 and have primarily been found in floor and bench layers of the house but a few are from midden layers overlying the longhouse.

The Hrísrú longhouse was built before AD 940 and abandoned sometime during the 11th century. Dating of the structures is based on tephrochronology, finds analysis, and carbon dating. The tephra chronology shows that the house was first built sometime between the fall of the landnám tephra 871±2 and 920/40 when the eastern end of the house was rebuilt with turfs containing either Eldgjá-1 tephra from AD 940 or Katla-R from AD 920. Analysis of the beads also shows types that chronologically date to between the second half of the 10th century and the beginning of the 11th century (Byock, Walker and Zori 2009, 15-16). The raw data for carbon dating of barley seeds indicate that the midden layers overlying the longhouse are no more than approximately 100 years later than the last floor layers¹⁰¹.

¹⁰⁰ As the preliminary report is still not available

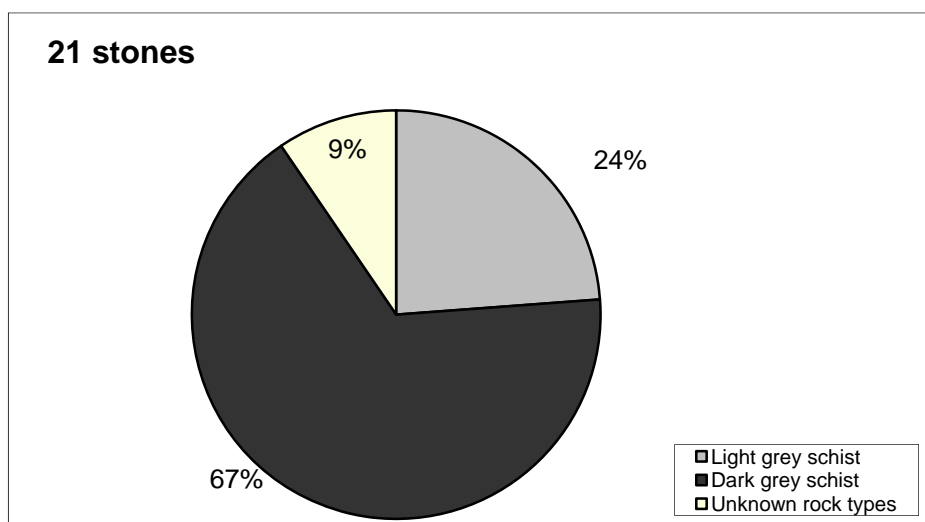
¹⁰¹ Personal comment by Davide Zori August 2009, before final calibration of the data set.

The whetstone collection:

In total 21 whetstones and whetstone fragments have been found during the excavations at Hrísbú primarily from contexts securely predating AD 1100. Almost all the whetstones were recovered from floor and bench layers and only a few from midden layers situated directly above these.

The combination of schist types found at this site (Figure 17) is in close resemblance to the stone types in the collections from Hedeby and Kaupang¹⁰². On the other hand it is quite different from most of the other analyzed Icelandic sites that contain a higher percentage of the light grey schist type. This could be explained by the fact that the main period habitation at Hrísbú probably predates AD 1000 and the whetstone collection is therefore not affected by the later increase of Eidsborg schist import¹⁰³. The light grey Eidsborg stone type only occurs in smaller fragments not usable for grinding whereas a few larger and whole pieces of whetstones of the dark grey schist type are present. The two pieces of unknown rock types are both dark grey and very fine-grained but seem more fragile than the typical dark grey schist type and one of the fragments has a much more distinct lineation. These will need to be analyzed by a geologist for further determination.

Figure 17 Whetstone types Hrísbú



A high percentage of the whetstone collection from Hrísbú is of small whetstone fragments and only around 10% are preserved in a shape still usable for grinding. This is proportionally the highest amount of whetstone fragments found amongst the analyzed sites and one could argue that the

¹⁰² See: Section 4.1

¹⁰³ Further explanation of the impact of schist types in Section 6.4 and Chapter 7

inhabitants at the site must have lacked access to new whetstone material since all had been used so extensively. Another explanation could, in this case, also be that the retrieval of the small whetstone flakes is just very high at the site, which will be further discussed in Section 6.2. It would at least not be reasonable, in relation to the other finds and size of the longhouse at Hrísbú, to argue that it was a poor or marginal site¹⁰⁴.

The most interesting whetstone at the site consists of three separately found pieces (F2008-21-48, 237 and 265)¹⁰⁵ of a small and very finely shaped pendant hone from the same floor context [14]. The strap attachment for the pendant hone is of a quite unusual type with two parallel furrows carved into the top piece instead of the more commonly used strap hole, and this type has so far not been recorded in other Icelandic Viking age whetstones. This type of strap attachment has also been found in Hedeby in a few examples (Resi 1990, 79-81 table 11-13), but not in the analyzed material from Kaupang.

¹⁰⁴ See: Preliminary site reports for excavation seasons 2006-2008 by Byock, Walker and Zori, including general artefact report by author 2007 and 2008.

¹⁰⁵ See: Picture 19 in section 9.7

5 Burials

Whetstones are commonly found amongst the grave goods in burials (Icelandic: *Kuml*) and for this research 30 whetstones have been analyzed from 24 separate graves in 22 different burial sites geographically distributed all over Iceland (Map 2).

Only 25 whetstones from burials have been analyzed at hand. Six whetstones were for various reasons missing from the collection in the national museum (See: Table 4) and one of the two whetstones from Silastaðir was in exhibition in Akureyri but has been determined to stone type by description.

Map 3 Burial sites containing whetstones

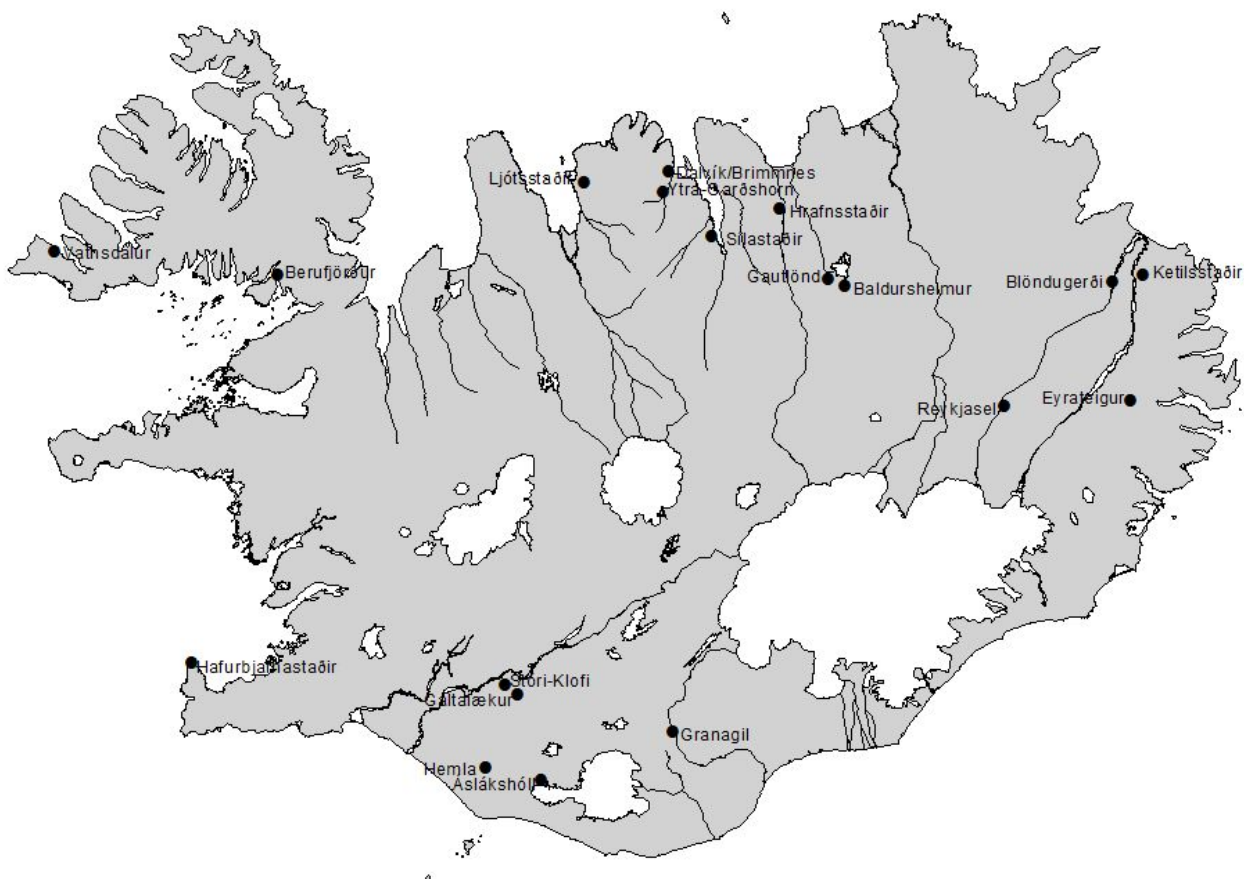


Table 3 *List of Icelandic burials analyzed*

Place name	Dating	Site type	Reference	Number of whetstones
Gautlönd	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 203	1
Hafurbjarnastaðir	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 94	1
Berufjörður	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 109	1
Granagil	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 249	1
Dalvík (Brimnes) From 2 kuml	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 163	2
Hemla	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 49	1
Stóri-Klofi From 2 kuml	Viking Age	Burial/Kuml	Árbók 1933-36, K. Eldjárn og A. Friðriksson 2000, 62	2
Ketilsstaðir	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 228	2
Sílastaðir From 2 kuml	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 177	2
Hrafnstaðir	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 195	1
Ytra-Garðshorn	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 153	1

Place name	Dating	Site type	Reference	Number of whetstones
Ljótsstaðir	Viking Age	Burial/Kuml	Árbók 1965, K. Eldjárn og A. Friðriksson 2000, 144	2
Blöndugerði	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 220	1
Galtalækur	Viking Age	Burial/Kuml	Árbók 1932, K. Eldjárn og A. Friðriksson 2000, 61	2
Baldursheimur	Viking Age	Burial/Kuml	Árbók 1982, K. Eldjárn og A. Friðriksson 2000, 200	1
Áslákshóll	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 45	1
Eyrarteigur	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 231	2
Reykjasel	Viking Age	Burial/Kuml	Eldjárn og A. Friðriksson 2000, 217	1
Vatnsdalur	Viking Age	Burial/Kuml	Eldjárn og A. Friðriksson 2000, 115	1
Total Whetstones #				26

This list includes only the burials with whetstones that preserved in the National Museum of Iceland. The burials have all been given a general Viking age date, though some have a more precise dating. The references are to the main sources used for this study and do not include all publications concerning each site.

Table 4 List of Burials with whetstones missing/not analyzed

Place name	Dating	Site type	Reference	Number of whetstones
Vað Not found	Viking Age	Burial/Kuml	Árbók 1987 p.92-93, K. Eldjárn og A. Friðriksson 2000, 232	1
Hólmur (í landi Árnanes) All 3 whetstones lost	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 241	3
Skogar (Lost) Very large whetstone	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 191-92	1
Húsagarður (gamli) Pendant hone (lost)	Viking Age	Burial/Kuml	K. Eldjárn og A. Friðriksson 2000, 64	1
Total Whetstones #				6

Six whetstones from four burials could not be located at the museum, but have been included in the statistics in Table 5. The references are to the main sources used for this study and do not include all publications concerning each site.

The whetstone collection from burials offers other possibilities for interpretation than the whetstones from settlements as they are often in better and more complete condition, i.e. closer to the original shape and size with grinding surfaces and grooves preserved. Whetstones are also commonly found in connection with implements with cutting edges and this combination may facilitate some interpretations of the use of the different whetstone types. Lastly the position of the stones in the burial may reveal information on how they were used and carried by the individual. But although these are feasible questions to ask it has to be kept in mind that even the simplest tools amongst the grave goods might have had different symbolic meanings, uses, and placements in burial contexts from their meanings and functions in everyday life. There are examples of symbolic whetstone use in burials and several objects that look like whetstones but are not very usable such as are found in both Iceland (Áslákshóll) and the rest of the Viking world (Munch, Johansen and

Roesdahl eds. 2003, 154)¹⁰⁶. Although some whetstones may have been placed in burials for symbolic reasons or to show the status of the deceased, the majority of whetstones in burials appear simply to have been part of the personal possessions of the deceased and do not necessarily have any symbolic intention except as being part of a set of tools with a pointy or edged utensil and whetstone together. Whetstones from burials are clearly interesting to study for insights about economic activities, gender roles, social status and pagan ritual practice. In this project, however, the main reason for including the whetstones from the burials is to study and compare the schist types used, and the general shape and condition of the collection, with the collection from the settlement sites.

In the following chapters some of the whetstones from individual burials will be discussed if they in some way are particularly different from the general collection, but a more detailed study of their context and connection to the rest of the grave goods will not be attempted. Detailed analysis of variations of types and sizes according to gender and status of the burials will not be carried out either and must also remain for future research. But it is evident from both foreign¹⁰⁷ and Icelandic material that whetstones are found in both male and female burials.

5.1 Whetstone types and schist types in Icelandic burials

This chapter discusses both the schist types in the whetstone material and the overall types and shapes in the collection¹⁰⁸.

As with the settlement sites analyzed in Chapter 4, the whetstones from the burials have been analyzed according to their stone types. All 24 burials have been considered as one unit for this analysis and the types of schist in this collection give a similar picture as the farm sites with contexts predating AD 1000: Dark grey schist predominates and there is less of the light grey schist and other or unknown stone types (Figure 18)¹⁰⁹.

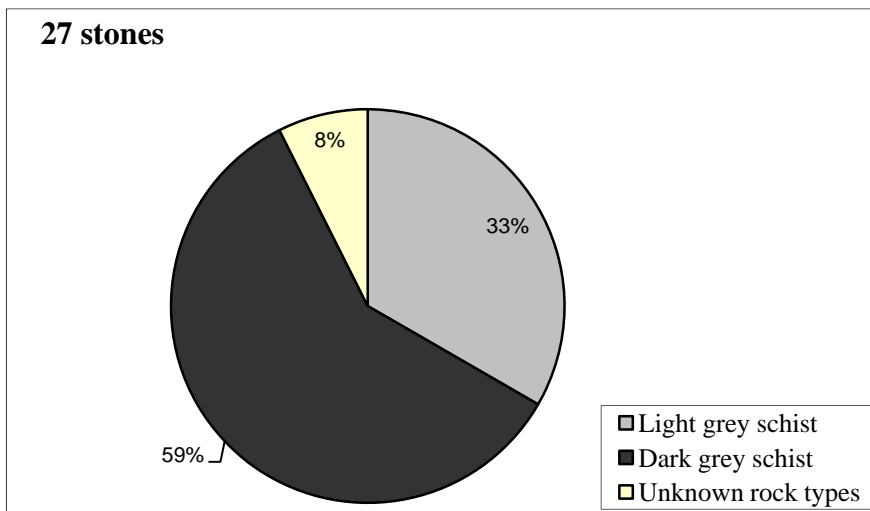
¹⁰⁶ See more description of Áslákshóll in Section 5.2.1

¹⁰⁷ See Section 5.3 on foreign comparisons from Kaupang and Birka

¹⁰⁸ More detail on the individual interesting types and shapes is given in the following Section 5.2

¹⁰⁹ See Section 4.2 for comparisons with schist types in settlement sites in Iceland

Figure 18 Whetstone types Burials



Whetstones by stone type excluding the missing whetstones (Table 4) except the lost whetstone from Vað as the stone type could be indentified by descriptions and photographs. The category “unknown” includes a possible Eidsborg stone that will need thin sectioning for better determination and the banded schist whetstone from Áslákshóll.

Four of the burials contained two whetstones and one contained three whetstones. All the whetstones were found in connection with other grave goods and in almost all cases in connection with iron implements with a cutting edge. In most cases the whetstones were part of grave good assemblages that included several objects of high status such as weapons or jewellery.

5.1.1 Whetstones in pairs

Of the 24 burials containing whetstones four graves (20,8%) contained two whetstones (Ketilsstaðir, Eyrateigur, Galtalækur and Ljósstaðir) and one contained three whetstones (Hólmur), but unfortunately all the artefacts from that site have been lost. In Kaupang a smaller proportion, or only six burials out of 42 (14,3%), contained more than one whetstone (Resi 2008, 51).

Combinations of dark grey schist whetstones of different shades and dark and light grey whetstones occurred at both sites. A combination of dark grey schist and sandstone was found in Kaupang, which has not been seen in Iceland where the use of stone types other than schist for whetting is rare.

Two of the Icelandic burials contain a set of one dark grey and one light grey whetstone (Ljósstaðir and Eyrateigur) and two contain a set of two dark grey whetstones in different shades (Galtalækur

and Ketilsstaðir). The burial in Eyrateigur contains a set of two very large whetstones whereas the three others contain a combination of a small pendant hone and a medium or large whetstone. It has been generally inferred that a combination of a coarser stone for the initial grinding and a finer one for the finishing was preferred in burial deposits (Resi 1987, 98; Sundbergh and Arwidsson 1989, 108), with the smaller almost always being a pendant hone. Though these combinations seem to be the most common, various kinds of combinations of types and shapes have been found, both of two pendant hones together and several large whetstones combined with one small, as mentioned by Petersen (1951, 257) in his overview of whetstones from Norwegian Viking Age burials. In these cases we seem to be dealing with social or symbolic statements. These burials seem to have duplicate stones that go beyond the realm of personal functional possession. More information on the whetstones in the individual Icelandic burials is provided in the following Section 5.2.

5.1.2 Pendant whetstones and very large whetstones

Descriptions and interpretations of the different types of whetstones have already been given in Section 3.2, but it is worth noting that a proportionally large number of the pendant hones from Icelandic contexts and most of the large so-called long or sword whetstones were found in burials¹¹⁰. The burials with large whetstones will be described in Section 5.2 except the one from the burial at Vað as it could not be located at the National Museum.

5.1.3 Burials and gender

A total of 8 burials can be determined by analysis of the human bones to be male¹¹¹ (Stóri-Klofi (kuml 1+2), Dalvík (Brimnes, kuml 2), Sílastaðir (kuml 1+2), Hafurbjarnastaðir (kuml 3), Gautlönd, Vað (kuml 2), Eyrateigur and Reykjasel (kuml 2)). Only one burial (Ketilsstaðir) can be determined by the bones to be of a female¹¹². It has to be borne in mind that a substantially greater

¹¹⁰ More information on the long whetstones from Eyrateigur in Section 5.2.2.

¹¹¹ The analysis of the bones are made by Hildur Gestsdóttir, Jón Steffensen and Eva E. Klonowsky (Eyrateigur)

¹¹² *ibid*

number of burials are male than female¹¹³ so it cannot be concluded that men in general possessed whetstones rather than women. The remaining burials containing whetstones either did not contain bones or have not been sexed.

5.2 Burials with whetstones of particular interest

Compared to the whetstone collections from settlement sites the whetstones in burials are in general of much better condition and show less wear. From the burials there is a higher percentage of whole whetstones, stones with strap holes, and very large whetstones. In this chapter some of the individual whetstone finds that differ particularly from the general collection will be discussed.

5.2.1 Ásláksholl

This burial contains a banded or striped silt whetstone¹¹⁴ that can be dated to the 10th century, based on similar finds abroad (Johansen, Kristiansen and Munch 2003, 155). Unfortunately the status of this burial is unknown as the preservation conditions were very bad due to erosion at the site and the objects were collected as surface finds (K. Eldjárn and A. Friðriksson 2000, 45-46). Banded or striped schist whetstones are almost always pendant whetstones and are often found in connection with knives or swords and occur in both male and female burials. The exact purpose of the banded silt stone is unknown, but due to its very poor grinding abilities it has been suggested to have had ritual or symbolic meaning as it is often found in richly equipped burials (Johansen, Kristiansen and Munch 2003, 156). Raw material for production of this whetstone type has been found in both Borg (Johansen, Kristiansen and Munch 2003, 154-155, Figs. 9B14 and 9B15) and Hedeby (Resi 1990, 89, Table 21). The one from Ásláksholl is the only one of its type found in Iceland and only 84 examples of this type have been found throughout the Viking world. (Johansen, Kristiansen and Munch 2003, 153-155; Resi 2008, 55).

¹¹³ Personal comment Jan. 2009 by Hildur Gestsdóttir. The information is based on ongoing osteological studies as part of her PhD. Of 89 burials 49 were male, 19 female and 21 unknown or undeterminable.

¹¹⁴ See: Picture 34 in section 9.11

5.2.2 Eyrateigur

The burial at Eyrateigur contains two whetstones, one dark grey and one light grey, both 40 cm long and among the largest found in Iceland¹¹⁵. It is tempting to suggest that these were placed amongst the grave goods as a status symbol as they were not part of everyday personal equipment, but were designed for stationary use. They were situated just next to the buried man, under a sword, and are both likely to have been valued objects due to the sheer amount of whetstone material¹¹⁶.

5.2.3 Ketilsstaðir

This is a female burial with two pendant whetstones of the fine-grained schist type. The two whetstones probably had different origins as one is mid-grey and the other is of the purple phyllite type. They are also somewhat differently shaped. The whetstone of the purple phyllite type (no 1938-12441¹¹⁷) is a couple of cm longer and both a bit broader and thicker than whetstone nr. 1938-12442. The smaller stone 1938-12442¹¹⁸ has a triangular shaped cross section, and although no grinding surfaces are preserved, it seems to have been used extensively. The other stone is much less used and seems to have been used for grinding only on one of the broad surfaces.

The stones were clearly used for different purposes and may be representative of the collection of whetstones this woman used in her daily life, except for perhaps coarser blocks of more stationary whetstones that did not follow her into the afterlife.

5.2.4 Galtalækur

As in Ketilsstaðir this burial contained two whetstones of dark grey schist. One very large dark grey whetstone (1929-10484¹¹⁹), 30 cm in length, rounded in one end almost like a handle and broader in

¹¹⁵ See: Picture 35 in section 9.11

¹¹⁶ See: Sections 6.2 and 6.3 on fragmentation and quantification on the relative value of whetstone material.

¹¹⁷ See: Picture 37 in section 9.11

¹¹⁸ See: Picture 36 in section 9.11

¹¹⁹ See: Picture 38 in section 9.11

the opposite end with grinding surfaces. The other (1929-10483¹²⁰) is a small to medium sized pendant hone of fine-grained dark grey schist with rounded edges due to extensive use.

5.2.5 Ljótsstaðir

The combination of stones in this burial is a bit different as the larger one (1959-53+55¹²¹) is just around 18 cm in length and extensively used. It is very fragmented and all sides of the stone show signs of grinding. All edges are rounded and it tapers towards the end due to use. The other whetstone (1959-54¹²²), bar-shaped and sparsely used, is made of dark grey very fine-grained schist. It is the same size (just around 10 cm) as the pendant hones, but does not have a strap hole. However, there are vague signs of attempts to drill a hole at one end. The burial assemblage is comprised of a combination of course and fine-grained whetstones, representing the seemingly preferred set of tools during the Viking age¹²³.

5.3 Foreign comparisons

Whetstones from the cemeteries of Birka and Kaupang are used here as the primary comparative material for the study of whetstones in the Icelandic burials. Both sites contain a much larger number of graves than any burial site in Iceland, but the whetstones from these sites are in many ways comparable to the Icelandic material.

In general there is a higher percentage of large whetstones in the burials than in the settlements and there is a much higher percentage of whole or only slightly chipped whetstones in the burials both in Birka (Danielsson and Werner 1973, 232), Kaupang (Resi 2008, 54) and in Iceland¹²⁴. The occurrence of banded siltstone, with no evidence of use or quality for grinding, is also just found in burials in Birka, as in Iceland, but has not yet been found in Kaupang. Lastly it is not uncommon to

¹²⁰ See: Picture 40 in section 9.11

¹²¹ See: Picture 41 in section 9.11

¹²² See: Picture 39 in section 9.11

¹²³ See: Section 3.2 for more information on the use of the whetstone types

¹²⁴ see: Section 6.3

find more than one whetstone in burials. Several burials from all three countries contain a combination of both a coarse and a fine-grained whetstone amongst the grave goods. The major difference is that the stone types at Kaupang and in Iceland are predominantly schist, one light grey and one dark grey, whereas in Birka sandstone and siltstone dominate (Resi 2008, 58).

Looking at the frequency of whetstones relative to other grave goods shows that whetstones are the 7th most common type of grave goods in Iceland, accounting for 9,1% of the total find collection, according to the division of find categories presented in Table 5.

Table 5 *List of finds in Icelandic burials*

<i>Type of grave goods</i>	<i>Recovered in no of graves</i>	<i>Relative percentage</i>	<i>Type of grave goods</i>	<i>Recovered in no of graves</i>	<i>Relative percentage</i>
<i>Horses</i>	115	35,9	<i>Sickles</i>	4	1,3
<i>Spear heads</i>	57	17,8	<i>Arm rings</i>	4	1,3
<i>Knives</i>	54	16,9	<i>Spindle whorls</i>	4	1,3
<i>Beads</i>	42	13,1	<i>Bells</i>	3	0,9
<i>Saddle remains</i>	41	12,8	<i>Finger rings</i>	3	0,9
<i>Whetstones</i>	29	9,1	<i>Forging tools</i>	3	0,9
<i>Axes</i>	24	7,5	<i>Fish hooks and line sinkers</i>	3	0,9
<i>Bridles</i>	23	7,2	<i>Gaming pieces</i>	3	0,9
<i>Oval brooches</i>	23	7,2	<i>Pendants</i>	3	0,9
<i>Weights and scales</i>	21	6,6	<i>Tongue shaped brooches</i>	2	0,6
<i>Dogs</i>	21	6,6	<i>Penannular brooches</i>	2	0,6
<i>Combs</i>	19	5,9	<i>Iron spits</i>	2	0,6
<i>Textile fragments</i>	17	5,3	<i>Arrow heads</i>	2	0,6
<i>Swords</i>	17	5,3	<i>Belt buckles and strap ends</i>	2	0,6
<i>Strike-a-lights</i>	14	4,4	<i>Weaving implements</i>	2	0,6
<i>Schild bosses</i>	14	4,4	<i>Bone pins</i>	1	0,3
<i>Cauldrons/vessels</i>	9	2,8	<i>Crampons</i>	1	0,3
<i>Ringed pins</i>	8	2,5	<i>Horse crampons</i>	1	0,3
<i>Disc brooches</i>	8	2,5	<i>Buttons</i>	1	0,3
<i>Shears</i>	8	2,5	<i>Hobbles</i>	1	0,3
<i>Chests and keys</i>	7	2,2	<i>Sword chapes</i>	1	0,3
<i>Trefoil brooches</i>	6	1,9	<i>Quernstones</i>	1	0,3

Source: Þóra Pétursdóttir 2009¹²⁵, 26 and K. Eldjárn og A. Friðriksson 2000, 301-302

¹²⁵ Updated list of burials and grave goods given as personal comment by Friðriksson April 2009. The number of whetstones is, however, the same as listed in Eldjárn og A. Friðriksson 2000 page 301. This number of whetstones does not correspond to the amount of whetstones available in the National Museum (Dec. 2008).

The frequency of whetstones in Icelandic burials is not very high compared to the burial sites around Kaupang where the inclusion of whetstones amongst the burial goods amounts to 31% (Resi 2008, 51). There are clearly also retrieval issues that might complicate the understanding of this high amount of whetstones in controlled excavations like in Kaupang in contrast to the majority of the Icelandic burial sites. It would be interesting for further studies to compare these figures with other burial sites such as e.g. Birka which has not been possible for this study.

The second edition of *Kuml og Haugfé* from 2000 reports 157 known burial sites in Iceland with a total of 316 individual graves (K. Eldjárn and A. Friðríksson 2000, 255). Whetstones are known to have been found in 28 separate graves, though some burials are from the same site and some whetstones have been lost. This makes the occurrence of whetstones in Icelandic graves, including all reported whetstones 8,9%. Petersen's study of late Iron Age/ Viking Age burials in Norway also shows significant regional variations with 22,9% of the burials containing whetstones in Vestfold fylke, where Kaupang is situated, (Petersen 1951, 251), but about 1/3 of the Norwegian fylker only showed within 10% whetstones in the burials (*ibid*), which is closer to the Icelandic figures. Overall only 13,7 % of the 1052 burials registered in Norway in 1951 contained whetstones. Petersen mentions that the regions with low percentages of whetstones predominantly are the inland regions and Northern Trønderlag and that the coastal regions often show higher percentages (*ibid*, 252). Unfortunately Petersen does not discuss the implications of these results at any length and there are also no statistics available to show how common whetstones are relative to other grave goods in Norway.

It is difficult, with the material at hand, to determine why these differences in the frequency of whetstones in burials occur, both internally in Norway and between Norway and Iceland. More whetstone research in Norway, and preferably on a broader scale in the North Atlantic area, is required to study this matter further.

6 The Icelandic whetstone collection: comparisons, trends and results

This chapter discusses the main results of the work with the whetstones from Icelandic Viking Age analyzed from the selected settlement sites and burials in Chapters 4 and 5. Many sites still need to be analyzed to give a better overall understanding of the situation in Iceland, but interesting trends can be defined on the basis of the material now analysed. The Icelandic sites will primarily be compared internally, but to the degree possible, also with foreign settlement and burial sites.

The first section of this Section (6.1) presents an overview of sizes and shapes in the Icelandic whetstone collection in comparison to the foreign reference collections. The following Section (6.2) deals with the fragmentation of the whetstone material and discusses the implications fragmentation has on our understanding of supply and accessibility of whetstones. In Section 6.3 an attempt has been made to suggest how much whetstone material was necessary in Iceland in order to assess the relative demand and dependence of stable import. Section (6.4) deals with similarities and differences in the whetstone material and is primarily based upon the patterns revealed from the examination of schist types. Schist types are then used to discuss changes over time in the whetstone material in Section 6.5. In the final Section 6.6 few suggestions are made on the potential use of whetstone material for dating sites.

6.1 Overview of the whetstone sizes and shapes

In some cases it has been interesting to point out some of the special types found in the Icelandic collection and compare these to the reference collections, as has been done throughout the description of the settlement sites and burials in Chapters 4 and 5. In the following will be mentioned the tendencies in shapes, types and sized within the analysed Icelandic whetstone material.

Size: All whetstones have been measured in length, width, and thickness except fragments with no surviving full dimensions. Most sites contain the whole range of whetstones from one or two of the large or very large stationary whetstones to the small or very small pendant hones, but the most common size within all collections, except the burials, are the medium sized whetstones. In most cases the whetstones have not been preserved in full length, but can with reason be estimated to have belonged to these categories. The main difference between the medium and small whetstones,

as they are often around the same length, is that the pendant whetstones are both narrower and thinner, usually under 1cm in both dimensions. The whetstones from the burials differ a bit in size from the settlement settlements by containing proportionally more of both the large whetstones and the pendant whetstones and fewer of the medium sized whetstones.

Shape: The most common whetstone type is the bar shaped whetstone with parallel sides on both broad and narrow side and quadrangular cross section. However, both sides and cross section is often not regular in shape due to intensive use of the stone and it is not uncommon that they are found slightly tapering towards one or both ends due to wear¹²⁶. The dark grey schist type is often longer and narrower than the light grey schist stones that are both thicker and wider compared to their length. This pattern of variations within the shape of whetstone of these schist types is similar to both Kaupang (Resi 2008, 31-32) and Hedeby (Resi 1990, 20-26).

There are various other types of shapes in the analyzed Icelandic whetstone material, most of them due to the use and wear of the stones and reshaping after breakage and many have only been found in one example and cannot be grouped into a certain category type.

A couple of rare types are, however, of interest as they have been found in more than one site and the shapes seem to have been intended when the whetstones were made. One of these, the whetstones with triangular cross sections, can even be compared with whetstones of the same shape from Hedeby and Kaupang. Only five stones with triangular cross section have been found in Iceland, two from Hrísheimar one from Sveigakot one from Grelutóttir and one from the burial in Ketilsstaðir, making this type very unusual in the Icelandic collection (just over 2%). It is also quite uncommon in both Hedeby (ca. 3,5%, Resi 1990, 27) and Kaupang (ca. 4%, Resi 2008, Figure 16), and in particular the occurrence of two (both from Hrísheimar) made of light grey schist are interesting, as only one other whetstone with triangular cross section of this schist type has been found (Hedeby). Unfortunately it has not been possible to determine the significance of this except from the fact that the same shapes of whetstones, even the rare ones, seem to occur both in the major Viking age trading sites and in Iceland.

Another interesting shape, also related to the cross section, is the light grey, relatively long, thin and narrow whetstones with almost regular square cross section¹²⁷. The only two fully preserved

¹²⁶ See e.g.: Picture 7 Section 9.3

¹²⁷ See: Picture 4 Section 9.2

examples of this type have both been found from the excavation in Suðurgata 3-5. Several others could belong to this type, but are only preserved as end pieces. In most cases end pieces of the same dimensions in width and thickness of up to 1 x 1cm and under 10 cm in length would be classified as pendant hones, but evidently this is not always necessarily the right classification. End pieces that are likely to belong to this type have been found in Suðurgata and Hvítárholt, but other sites contain fragments that might be of this type as well but overall it is not commonly found.

Functionally they could have served the same purpose as the pendant hones but seems rather long to be carried along as part of the personal possession.

No reference to this type has been found in the material from Hedeby or Kaupang.

The main focus of this project, however, has been on the stone types used for whetting material and not as much on the morphological issues of defining the various types and shapes of the whetstones, as has been done with both the Hedeby and Kaupang collections by Resi (*ibid* 1990, 2008). This decision was taken, primarily, because it is believed that such statistical work is better suited for larger collections than any of the individual Icelandic sites contain.

6.2 Fragmentation within the Icelandic whetstone collection

Whetstones are everyday practical tools that slowly wear down while used for grinding and ever so often small splinters fall off or the stone breaks. The stone is, however, still usable after breakage and it is not uncommon to find larger fragments of whetstones with grinding marks on the broken surfaces. What is left in the archaeological record is primarily these fragmented pieces of whetstones, though the degree of fragmentation of the stones before they were discarded varies. Whole pieces do also occur, even intact examples, in particular amongst the whetstones found in burials.

In this section the general condition of the Icelandic whetstone collection will be analyzed by looking at the degree of fragmentation and functionality of the recovered whetstone material.

The whetstone material has been divided in the following way according to the degree of fragmentation (See: Figures 19 and 20).

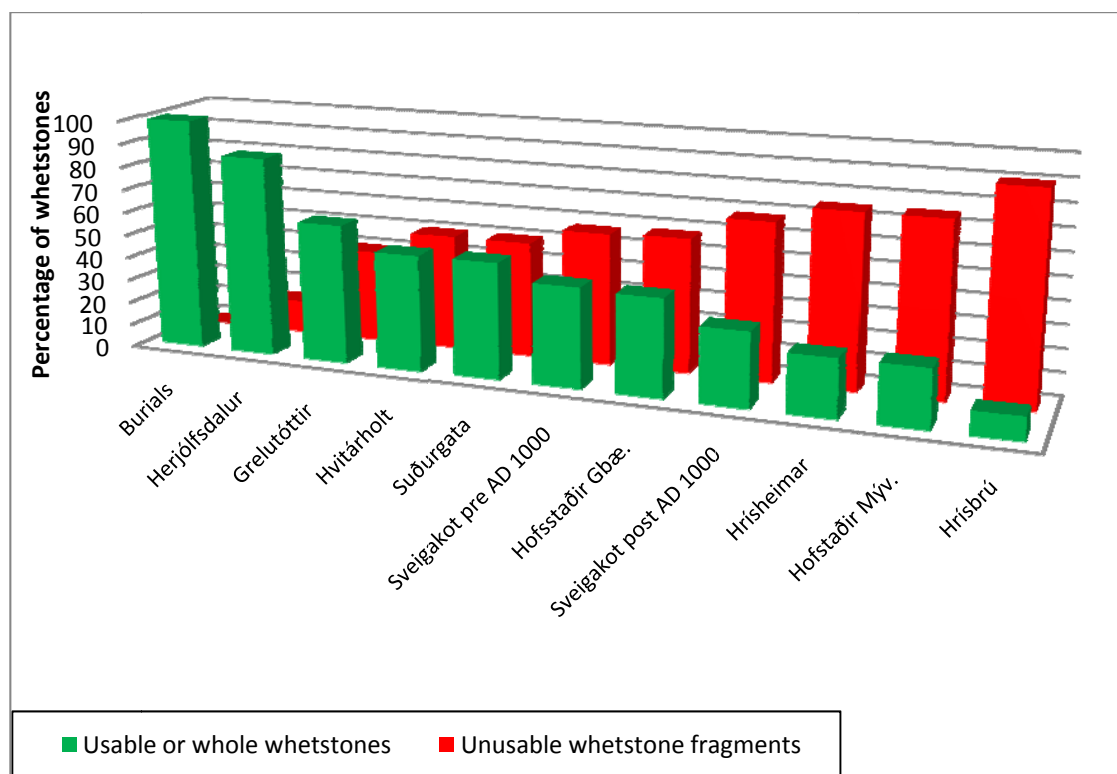
Table 6 Degrees of fragmentation

No 1	Small whetstone fragments without any part of the original dimensions preserved. Usually small splinters.
No 2	End <u>or</u> middle pieces representing less than 50% of the original dimension. Usually with both full width or thickness preserved and one or more grinding surfaces partially preserved.
No 3	End <u>and</u> middle piece preserved together and thereby more than 50% of the original dimension preserved. Usually with both full width and thickness and major parts of the grinding surfaces preserved.
No 4	Whole or only slightly chipped whetstones with all original dimensions preserved.

An important factor when analysing the condition of the whetstone collection at the individual sites is the number of larger usable- and whole pieces, as one would presume that there is a correlation between the discard rate and the value of the whetstone material. In other words the more usable whetstones is discarded the less value the material has, indicating easy access to replacements. The best way to understand this is to look at the proportion of potentially usable stones to unusable

stones deposited. The stones of which more than 50% is preserved are likely to be still usable whereas stones which are less than 50% preserved probably were pieces discarded as useless. Figure 19 shows the correlation between usable and unusable whetstones at the analyzed sites.

Figure 19 *Functionality of the whetstones – degree of fragmentation*



The discard rate of usable whetstones and the degree of fragmentation is probably much influenced by the access to the material. From modern ethnographical source it is known that small pieces of broken whetstones were attached to sheep horns and reutilized by the children who were learning how to sharpen their tools¹²⁸.

Another factor could also be the status of sites and the ability to access new whetstone material. It is for instance possible that it was primarily the chieftains buying the whetstone material and controlled the distribution of the material to their clients, though it is not possible to prove this idea with the available data yet.

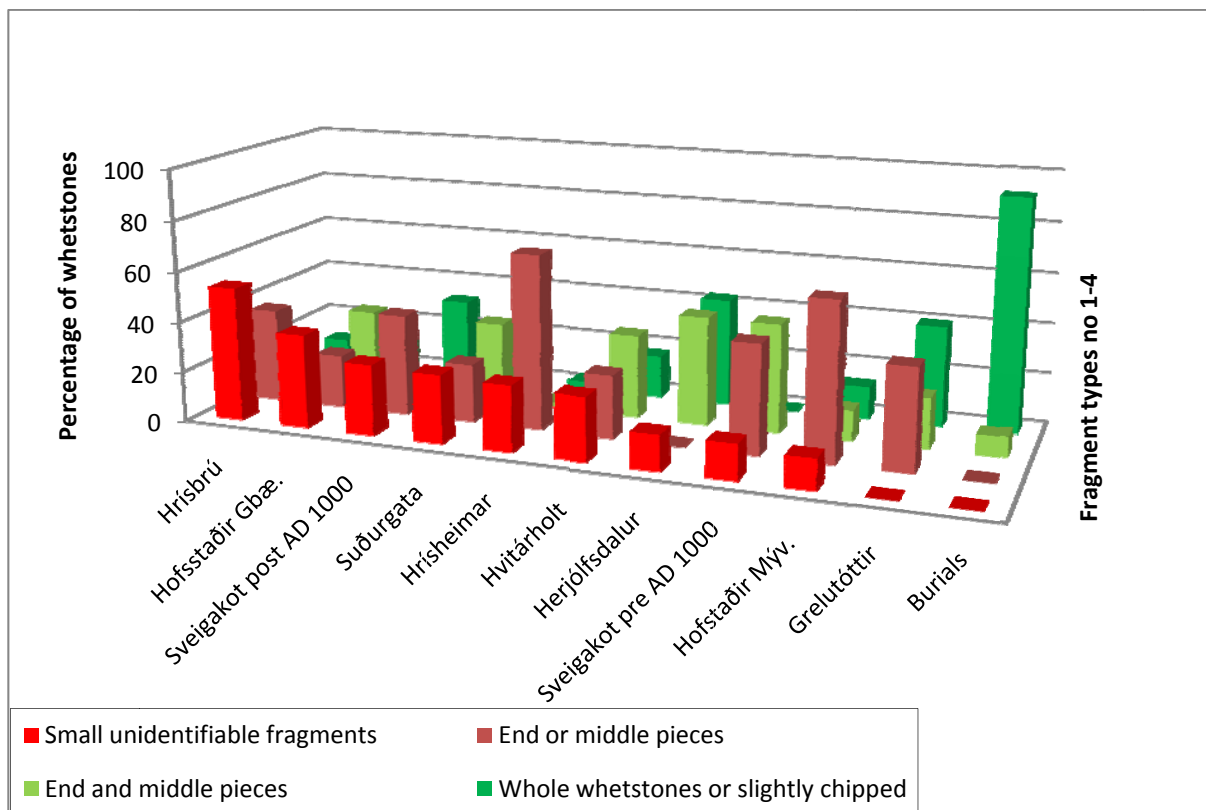
¹²⁸ Mentioned in several of the questionnaires sent out by the ethnographic department of the National Museum of Iceland, e.g. Þjóðhátadeild "016 - Torfskurður og móverk" see: Guðmundur Steinn Einarsson (2805172599) source nr. Nr. 2792)

The degree of fragmentation in the whetstone collections is also affected by post-depositional factors such as preservation, retrieval and types of contexts excavated at the individual site. These factors will all be discussed in the following when interpreting the data from each site.

All whetstones in the burials were preserved in usable sizes, which is perhaps not as unexpected as the dead presumably were buried with whole or at least usable whetstones and any fragmentation most likely occurred due to post depositional conditions at the sites. However, in the case of the burials in Kaupang, as many as 43% of the whetstones are described as somewhat fragmented and very worn (Resi 2008, 54). In the Icelandic collection only two whetstones from the burials were not preserved whole, but in both cases the majority of the stone was still present (end and middle piece).

At both Herjólfssdalur and Grelutóttir there is a high proportion of usable pieces which could indicate that these sites had easy access to whetstones. However the whetstone collections at both these sites are quite small with seven and five stones respectively, the lack of whetstone fragments is perhaps a result of retrieval and types of contexts excavated. In order to discuss these factors it is informative to look at the degree of fragmentation shown in Figure 20:

Figure 20 Degree of fragmentation – sorted by small fragments¹²⁹



At sites where all the contexts have been either sieved or floated the recovery of small fragments and small fragmentary whetstones (types no 1+2) is likely to be more comprehensive. This clearly is the case with, for example Hríbrú, where all the material has been either sieved or floated and all schist fragments have been recovered from the heavy fraction. In the cases of Grelutóttir, Herjólfssdalur, Hvítárholt and Suðurgata sieving or flotation did not take place undoubtedly affecting the retrieval.

Another factor is that sites with extensive midden excavations are likely to produce greater numbers of fragmentary stones with less than 50% preserved (No 2) as these would have been discarded deliberately. This is clearly the case in Sveigakot, Hrísheimar and Hofstaðir Mýv., that all have large amounts of type no 2 fragments and extensive midden excavations. The smaller type no 1 fragments are produced when the whetstone is used, it breaks or splinters fall off. They are therefore more likely to remain in the layers of the activity area in which they were deposited such as floors and benches. Another activity that produces many small fragments is the production or shaping of

¹²⁹ For the same Figure sorted by whole whetstones see: Figure 21 Section 9 in the appendix

whetstones, but such use has not yet been identified in Iceland¹³⁰ as concentrations of fragments in one place have not been observed¹³¹.

Another factor influencing fragmentation relates to post-depositional preservation conditions. In particular the light grey schist type has a tendency to become very fragile, perhaps due to pre-depositional heat impact as discussed in Section 3.3, and this schist type show a higher degree of fragmentation than the dark grey schist type.

The variation between sites with comparable contexts and retrieval methods show that there must have been variable access, but the interpreted sites are still too few to sustain an interpretation of why this is the case. It is very hard to use the whetstone remains to evaluate the status of the individual site as several other factors than accessibility of the stone material influence the material recovered in the excavations. With that said there seems to be some indication of less fragmentation in sites of higher status and a higher degree of fragmentation towards the beginning of the medieval period, with exception of Hrísbú that is a rather early site with a high degree of fragments. This is a good example of how it is very important to also consider the post-depositional conditions at the individual sites and shows that the degree of fragmentation is not directly comparable to show access. However, all sites in Iceland have one thing in common, no site shows an abundance of discarded usable schist whetstones and the material must at all times have been relatively inaccessible as they are not locally obtainable.

¹³⁰ Preliminary analysis by the author, of the Harbour at Kolkuós does, however, show a large amount of schist flakes in the floor layer of one of the booths, which might be a sign of such activity. Article on this site is in process.

¹³¹ As is the case in e.g. Borg (Munch, Johansen and Roesdahl, Else (eds.) 2003, 149) and Hedeby (Resi 1990, 40-44)

6.3 Quantification of whetstone import

In order to assess the relative value of whetstones it is important to have some idea of the accessibility and demand for new whetstone material.

Whetstones wear down, break and get reused but at some point a replacement is needed. Local Icelandic stones are also usable but they are of much poorer quality than the imported schist¹³². The fact that local stones were used only to a very limited degree may suggest a steady and reliable supply of imports. Also there was some additional “loss” of whetstones during the Viking age as they were commonly replaced in graves. As a result new whetstones were continuously needed and there in this section it will be attempted to assess the scale of that demand.

Whole whetstones vary from around 10 to 775 g in the Icelandic assemblage, from small pendant whetstones to large blocks probably for more stationary use. In average the small to medium sized whetstones weigh around 50 g and an estimate is that one rather large medium sized whetstone of ca. 100 grams would last one man perhaps five years. This includes reuse of the stone as two or more smaller whetstones when it breaks. This is, however, just a qualified guess based upon the knowledge of the common size of whetstones found and mentioning in modern ethnographic records of whetstone use¹³³. No scientific studies are available on how and by what rate the whetstones wear down during use. The need for whetstones is also depending on the types and variation in activities taking place e.g. extensive house building/turf cutting and growing grain/harvesting acquires sharp metal implements and intensive use of whetstones.

A very conservative estimate is that the Icelandic population around AD 1100 was about 50,000 people¹³⁴. If these are reliable numbers then the population would initially have needed to bring about 5 tons of whetstones and be supplied an additional one ton per year to supply the population of Iceland. This is of course a very rough estimate and does not take into account the growth curve during the period of settlement.

¹³² See: Section 3.1.3 on the geology of Icelandic whetstone material

¹³³ Þjóðminjasafn Íslands. Þjóðhátadeild. E.g. „030 - Heyannir V” and ”016 - Torfskurður og móverk”

¹³⁴ See: Laxness 1995, 148-9 for debate on population figures from the early medieval Iceland

The ships in the beginning of the Viking age had a cargo capacity of around 15 tons, in the 12th century this had increased to around 60 tons and by the 1300 AD the cargo capacity was 150 tons (Crumlin-Petersen 1989, 79). Depending on the number of ships sailing to Iceland per year the proportion of whetstones in the cargo could easily be quite sizable. It might also in some cases have been of importance as inclusion in the ballast weight, thereby increasing the economic value of the cargo¹³⁵.

This is not intended to be an attempt to calculate accurately the annual import of whetstone material but is rather a qualified guesswork to give an idea of the general demand for new whetstone material in Iceland and thereby the relative value of it. The result is that it is possible to suggest that the need for new whetstones was not great but constant and that the material easily could become in high demand if new material was not supplied for a couple of years due to unstable foreign contact.

6.4 Indications of changes over time in the stone types used for whetting

A change in schist types represented in the Icelandic contexts occurs around the beginning of the 11th century. While the work of Forster (2004) indicates that the import of steatite decreased after the period of initial settlement the import of whetstones was indispensable and had to continue. Around the same time it is known that the export of Eidsborg whetstones increased and became one of the principal export articles of the new town in Skien, southern Norway (Myrvoll 1986, 165). This development is probably reflected in the Icelandic whetstone material, where Eidsborg schist seems to become dominant from around AD 1000. This can clearly be traced in the whetstone material from Sveigakot where it has been possible to analyze the collection in roughly pre- and post-AD 1000 contexts suggesting a change towards a much higher proportion of the light grey schist type in the post-AD 1000 contexts. Other sites such as Hofstaðir in Garðabær also show a high content of the light grey schist type which could be explained by contexts postdating AD 1000. From the 11th century and throughout the medieval period and beyond Eidsborg schist was almost the only whetstone type reaching Iceland¹³⁶.

¹³⁵ As it has been argued by e.g. Forster (*ibid* 2004, 344)

¹³⁶ Based on preliminary studies by the author on the collection of whetstone material from Hólar, Keldudalur, Kolkuós, Alþingi and Leirvogstunga and suggestions by e.g. Myrvoll (1986, 164) about the same tendencies occurring in Scandinavia.

This change is not represented in the material from Kaupang and Borg as all the whetstones analyzed from these sites are from layers predating AD 1000. In Hedeby it has not been possible to distinguish the material from the later settlement layers to post- or pre-AD 1000, but the settlement ended towards the middle of the 11th century and the light grey schist does not seem to have reached the site in large quantities. The only site representing a collection of primarily light grey Eidsborg schist is York, which is also the only comparative site that includes 10th and 11th century Viking period contexts.

6.5 Similarities and differences in stone types used for whetting

The stone types used for whetstones during the Viking age and early medieval period in Iceland were largely the same as in the Western Viking world. The main difference between the foreign reference collections and the analyzed Icelandic whetstone material is that the percentage of light grey Eidsborg type schist whetstones seems to be slightly higher in Iceland even in the collections with contexts predating AD 1000¹³⁷. Another difference is that non-schist whetstones of sand or silt are less frequent, probably because neither of these stone types can be found in Iceland, whereas these types are local resources in many parts Scandinavia and Britain.

Most of the Icelandic sites have similar collections of schist types used for whetstones as in Hedeby and Kaupang, with about 1/3 light grey Eidsborg schist and 2/3 dark grey schist (in particular true for Suðurgata 3-5¹³⁸, Hvítárholt¹³⁹ and Hrísbú¹⁴⁰). The greatest difference is the lack of stone types other than schist in most sites except Suðurgata, where three large sandstones were recovered amongst the whetstone material.

However, other Icelandic sites show completely different collections of schist types, as for example Herjólfsdalur, where only the dark grey schist type has been found. The closest comparable

¹³⁷ Period as defined in Section 1.1

¹³⁸ See: Figure 7

¹³⁹ See: Figure 8

¹⁴⁰ See: Figure 17

collection is from the chieftain site Borg in northern Norway¹⁴¹, although a few other stone types are represented there as well. These two sites are not comparable in type and size but a few suggestions about their similarity can be suggested:

Borg had known connections with both Kaupang and Hedeby, from where the light grey Eidsborg stone was available, so it seems that the people of Borg shunned the Eidsborg type by choice. The same might be true for Herjólfsdalur. This pattern could also be used to suggest that the people at this site came from an area abroad where the light grey Eidsborg stone was also not used much, perhaps from the northern part of Norway, but this will remain guesswork as the collection of seven whetstones is too small to support such hypotheses. Another thing that the schist type at this site could indicate is that the settlement at Herjólfsdalur is from the early settlement period and was probably not occupied after AD 1000 when the light grey type dominates the import of whetstones.

Other variations can be found in the three sites situated around Lake Mývatn, Hofstaðir, Sveigakot and Hrísheimar¹⁴² and in Hofstaðir in Garðabær¹⁴³ in that these assemblages have inverse proportions to the rest of the Icelandic sites with 1/3 dark grey schist and 2/3 light grey Eidsborg schist¹⁴⁴. This pattern is similar to York where it could perhaps be explained by the fact that York only has contexts from the 10th and 11th centuries where the light grey schist type is known to be present in greater amounts than earlier.

As the light grey schist type seems to have been dominant in York from the beginning of the settlement, then perhaps the high representation of the Eidsborg schist is not only connected to increased export from Norway but could also indicate different trade routes or exchange networks. If this difference in the proportions of light vs. dark schist is connected to different trade networks, then Iceland and England might belong to a common Trans Atlantic trade route, separate from internal trade within Scandinavia and into the Baltic. Other possibilities might be that the

¹⁴¹ See: Section 4.1.3 on Borg and 4.2.4 on Herjólfsdalur, NB only whetstones from the 8-10th century phases at Borg have been included as reference collection.

¹⁴² When looking at the entire assemblage though there are some issues with securely placing all the finds in the pre AD 1000 period. See section 4.2.8

¹⁴³ See: Sections 4.2.3, 4.2.4, 4.2.7 and 4.2.8

¹⁴⁴ See: Sections 4.2.1, 4.2.2, 4.2.5, 4.2.6 and 4.2.9

Scandinavians preferred the dark grey schist and therefore would rather export the more coarse light grey schist or that there was a preference for the light grey schist in the North Atlantic sites?

6.6 Whetstones as means of dating in Iceland

Another outcome of this research is the ability to use whetstones as means of dating in Iceland. It is, however, only possible to roughly estimate the age of a site by the whetstones, which can be done in the following two ways:

1. Where there are several whetstones, the assemblage of schist types may indicate whether the site is early or late Viking Age, as has been argued in Section 6.5 using the changes over time in whetstone import. A site with primarily or only light grey Eidsborg schist whetstones is likely to show contexts from the 11th century onwards.
2. If the dark grey schist type is present in an assemblage it is possible to estimate that the site is probably no later than ca. the 12th - 14th century and this type seems to almost disappear during the medieval period.

Both dating methods will have to be taken with a great deal of caution and preferably be used in combination with other datable artefacts or dating methods, rather as support of the trends than the main dating evidence.

7 Conclusion of the research on the Icelandic whetstone collection

The aim of this thesis was twofold: firstly to establish basic knowledge about Icelandic Viking age whetstones, and secondly to apply this information to increase our understanding of exchange and connections during this period. A few simple parameters, primarily the stone types, but also the degree of fragmentation, have been used in order to explore what the whetstones can reveal about the exchange links.

It can be concluded that the Icelandic whetstone collection in general has a higher inclusion of the light grey schist type than is seen in the Scandinavian homelands throughout the settlement period, but that the Icelanders at the same time continued to use the same two main types of schist for whetstones as in the rest of the Western Viking world. This indicates that the Icelanders, not surprisingly, kept the material culture of the countries they emigrated from and probably both brought with them and sought to acquire the stone types they were used to. The lack of native Icelandic stone types used for whetting shows that adaptation to local resources in the case of the whetstones was almost nonexistent, probably due to the great difference in quality of the available material. However, the whetstone collections seem to change slightly over the duration of the first couple of centuries after settlement and to sum up the results, the main factors and catalysts in this change is the following:

- a) To begin with quite a varied collection of stones was brought to Iceland by the settlers including both dark grey and light grey schist types and to a smaller degree other stone types as well.
- b) This quite varied collection was probably maintained for a period after settlement due to choice. The Icelanders might have had a demand for various stone types as people presumably had different preferences and different connections.
- c) The increased amount of light grey Eidsborg schist towards the beginning of the 11th century could reflect changes occurring in the relations between Icelanders and Norwegians. Perhaps the ability in Iceland to acquire certain goods from relatives or allies in Norway or going themselves decreased and instead they became dependent on commercial traders.
- d) Trans-Atlantic trade routes could also have resulted in a higher degree of the light grey Eidsborg schist type reaching Iceland even though the Scandinavian homelands still mostly

used the dark grey schist type at least before AD 1000. This seems to be paralleled in the collection from York that also contain mostly the light grey Eidsborg schist type. Further research into the whetstone collection in the rest of the North Atlantic area is required to confirm this hypothesis.

- e) A change towards a dominance of the light grey Eidsborg schist stones in Iceland occurred during the first half of the 11th century. During the turn beginning of the 11th century the town of Skien developed close to the source of the Eidsborg schist whetstones and overwhelming archaeological evidence supported by later written records shows that this was a centre for the whetstone trade. The increased organization and mass export of the Eidsborg stone and the simple fact that this type became cheapest and most easily accessible probably caused the change in the Icelandic whetstone collections from the 11th century onwards.

As mentioned in Section 2.2 it is first and foremost important to recognize the implicit assumption that trade in whetstones did exist in the Viking age and that Iceland was somehow connected to this trade. An important question is what the research on the Icelandic whetstone material can contribute to our understanding of this trade during the first couple of centuries after the settlement. In the following a few suggestions will be made.

There must have been some degree of differential access to the material which can be seen in both the variation of schist types used and the various degrees of fragmentation showing that some sites clearly had better access to new material than others. But all sites in Iceland have one thing in common: at no site is there an abundance of discarded usable schist whetstones and the material must at all times have been relatively inaccessible as it is not locally obtainable. Although the need for new whetstones was not great it was constant and demand could rise quickly if new material failed to be supplied.

The fact that the proportion of the types of schist used for whetstones in the various analyzed sites is somewhat different (e.g. the difference between Herjólfssdalur and the sites in the Mývatn area) suggests that there was not one trade network supplying the whole of Iceland, but rather that individual units obtained such commodities from their own contacts. Whether the commodities were obtained by the chieftains or individual farmers, from the same Icelandic or foreign is difficult

to say based on the whetstone material, but the system seems to have been less organised than in the medieval period where predominance of the light grey Eidsborg schist stone suggests a much more homogenous network.

Several factors could influence high degrees of either the light or dark grey schist type. It may reflect different preferences for whetstone material, either for practical reasons or due to custom. If that is true, it implies that the demands of the Icelanders were met by the ones transporting the stones. On the other hand it could also be that the stones arriving in Northern Iceland were simply just what were brought there by the merchants. However, the similarity between the Mývatn sites suggests that they all tapped the same contact, which has implications for our understanding of how the trade operated at the receiving end. There may have been some sort of (re)distribution from a single source suggesting perhaps a higher authority over these sites, or at least a common dependence on a single contact.

These suggestions are as such not new to our perception of Iceland's situation in the North Atlantic trade but only limited firm archaeological evidence has so far been able to support this previous literature-based conception of exchange connections in pre medieval Iceland.

The potential of research into the Icelandic whetstone material has been demonstrated, though many aspects are still unexplored, and as all research it has awaken more new questions than it was initially set out to answer. More extensive research of the material at hand could have even greater implication for our understanding of pre medieval Iceland, and with addition of comprehensive surveys of sites, across the western Viking age world, we would probably be able to create a satisfactory picture of Iceland's situation in the trans-Atlantic trade in basic commodities.

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Personal Communication:

Friðriksson, Adolf. April 2009. Updated list of burials and grave goods

Gestsdóttir, Hildur. January 2009. Information on age and gender in the burials containing Whetstones

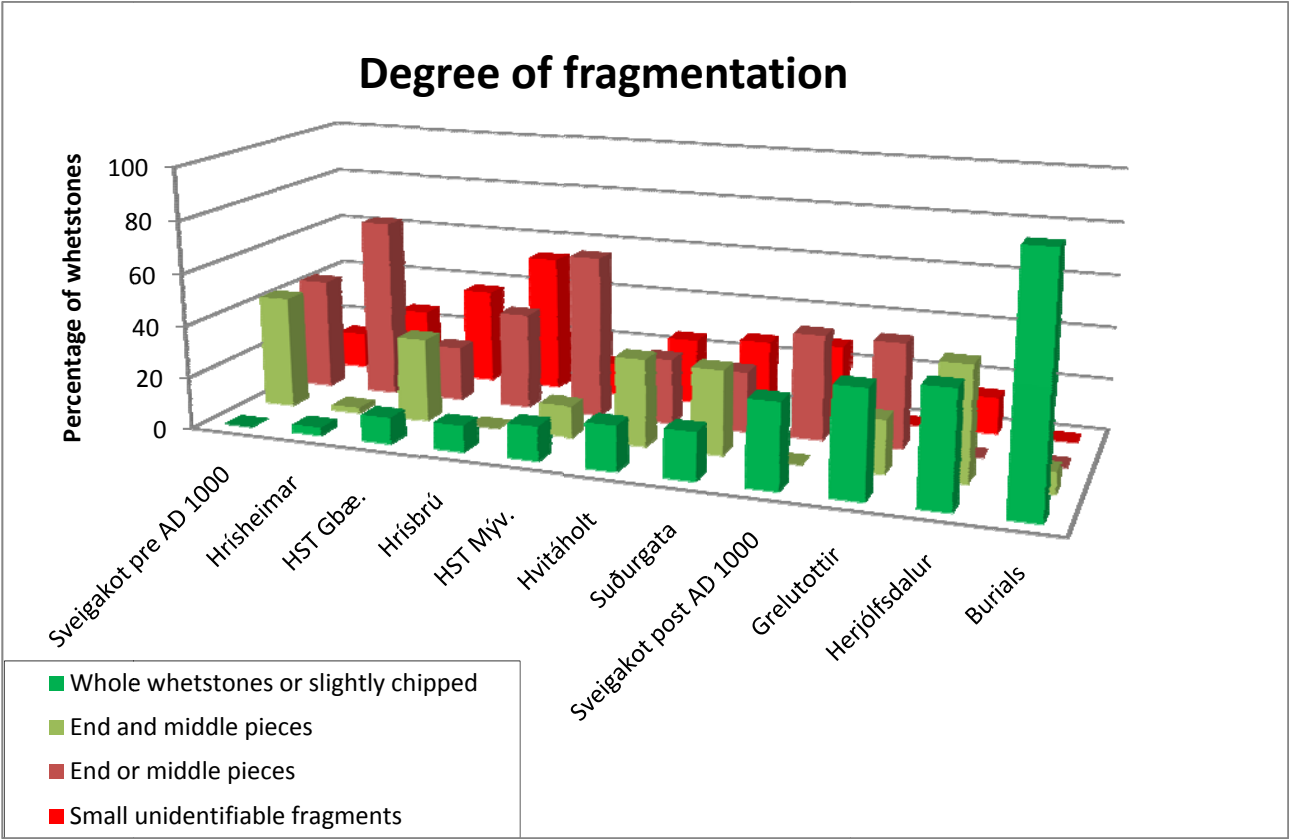
Høegsberg, Mogens Skaaning. October 2008. Information about the Igaliko sandstone

Sutherland, Patricia. September 2008. Information about the Igaliko sandstone and the schist types in the western Canadian Arctic.

Zori, Davide Marco. August 2009. Information on carbon dating of barley before final calibration of the data set

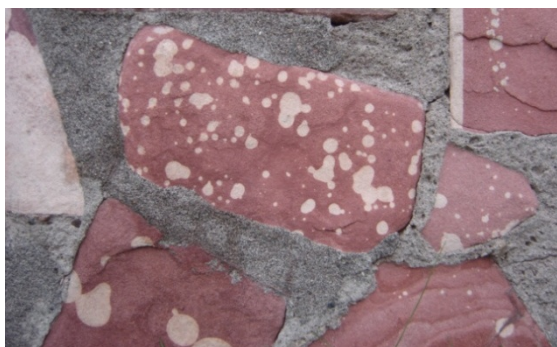
9 Appendix

Figure 21 Degree of fragmentation – sorted by least degree of fragmentation



9.1 Picture of Igaliko sandstone

Picture 1 Igaliko sandstone (Picture taken by: Mogens Skaaning Høegsberg)



9.2 Pictures Suðurgata 3-5

Picture 2 S5-414



Picture 4 S3-647



Picture 3 S5-551



9.3 Pictures Hvítárholt

Picture 6 1964-283-425



Picture 5 1967-318-735



Picture 7 1964-283-424



Picture 8 1965-360-517



Picture 9 1967-318-719



9.4 Pictures Hofstaðir in Mývatnssveit

Picture 11 HST 01-25



Picture 10 HST-99-268



Picture 12 HST98-119



Picture 14 HST 01-363

Picture taken by: Astrid Daxböck

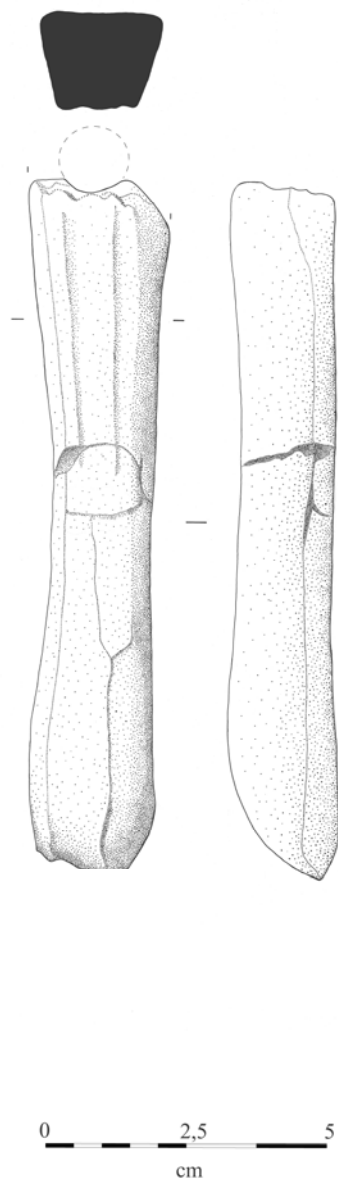


Picture 13 HST 01-179a



9.5 Illustration Hofstaðir in Mývatnssveit

Illustration 1 HST 01-167



Drawing by: Stefán Ólafsson, to appear in forthcoming publication on Hofstaðir by Gavin Lucas (ed.)

9.6 Pictures from Herjólfsdalur

Picture 15 2001-21-362



Picture 16 2001-21-353



Picture 17 2001-21-135



9.7 Picture from Hrísrú

Picture 18 2008-21-48 +237



9.8 Pictures from Grelutóttir

Picture 19 1978-139-23



Picture 20 1978-139-32



Picture 21 1978-139-26



9.9 Pictures from Hrísheimar

Picture 22 HRH 06-46



Picture 23 HRH 00-07



Picture 27 HRH 03-101



Picture 26 HRH 03-140



Picture 24 HRH 04-142

Picture 25 HRH 04-74



9.10 Pictures from Sveigakot

Picture 29 SVK 01-027



Picture 28 SVK 99-015



Picture 31 SVK 05-165



Picture 30 SVK 01-101



Picture 33 SVK 04-096



Picture 32 SVK 05-035



9.11 Pictures Burials

Picture 34 Ásláksholl 1909-5891



Picture 35 Eyrateigur 1995;359 and 360



Picture 37 Ketilsstaðir 1938-12442

Picture 36 Ketilsstaðir 1938-12441



Picture 38 Galtalækur 1929-10484



Picture 40 Galtalækur 1929-10483



Picture 41 Ljótstaðir 1959-53+55



Picture 39 Ljótstaðir 1959-54

