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Expanding Horizons

Settlement Patterns and Outfield Land Use in
the Norse North Atlantic

Dawn Elise Mooney, Lísabet Guðmundsdóttir, Barbro
Dahl, Howell Roberts and Morten Ramstad (eds.)



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The wood artefacts on the left side are from Borgund, Norway while the artefacts on the right side are from Norse Greenlandic sites.

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Irene Baug

Outland exploitation and long-distance trade AD 700–1200 – seen in the light of whetstone production and distribution

An aim of this paper is to explore exploitation of outlying resources within a socio-political and economic context, where whetstone quarries form the basis for the discussion. Geological analyses of whetstones in Ribe in Denmark demonstrate that most of the finds were quarried within present-day Norway, in Eidsborg in Telemark and Mostadmarka in Trøndelag. Production in Mostadmarka started in the early 8th century, and in Eidsborg approx. a century later. Both sites should be seen in connection with an intensified exploitation of woodlands and mountainous areas that took place in the Scandinavian Peninsula from the early Viking Age onwards. The paper discusses how important products from the outlands were for the Viking-age economy and urban sites, and demonstrates that outlying areas were integrated parts of wider economic, social, and cultural systems.

Introduction

During the Viking Age until the late Middle Ages, an intensified exploitation in woodlands and alpine regions took place, and the Scandinavian Peninsula was a source for hides, furs, walrus ivory and iron - along with different types of stone products. These were desirable commodities on the European continent as well as in the British Isles. Whetstones represent essential equipment for maintaining sharp-edged iron tools, such as weapons, knives, needles, scissors, axes, hoes, ards and other farming implements, and were used daily in both household activities and farming, as well as in professional craft. Geological analyses of whetstones in Ribe in Denmark demonstrate that most of the finds were quarried within the territory of present-day Norway, in Eidsborg in Telemark and Mostadmarka in Trøndelag (Baug *et al.* 2019, Baug *et al.* 2020). These types of whetstones have also been uncovered in other Viking Age and medieval towns and trading places by the coasts of Northern Europe, which suggests that they were widely distributed and available.

Issues to be addressed are what triggered large-scale exploitation of outlying resources, and how important such products were for the Viking-age economy and urban sites. I also discuss how the production and trade of whetstones were organised, and to what extent people in these rural areas of Scandinavia were involved in long-distance trade. Because of the wide dating frames of whetstones and their use, I also consider and discuss the issue of change and stability in production and trade from the early 700s to approx. 1500s.

Outlying resources

Norway is largely shaped by the mountain ridge that runs from the far north towards the south, and where arable land is most limited. Settlement is largely sea-bound, but also extending up into valleys with cultivable moraines (Skre 2018, pp. 782-783); ultimately, less than three per cent of the total land mass is cultivable (Øye 2005, p. 11). Hence, much of the activity took place in outlying areas, in forests and mountainous areas that offered resources that were vital not only within local rural households, but also within the urban economy as traded commodities. Evidence of this trade is the distribution of products from present-day Norway over large parts of Northern Europe, such as reindeer antler combs, quernstones of mica schist, schist whetstones, soapstone vessels and furs (e.g. Resi 1990, Ashby *et al.* 2015, Baug 2015, 2017, Hansen 2017, Baug *et al.* 2019, Rosvold *et al.* 2019).

Special mineral outcrops offered opportunities of creating surpluses and were exploited on a nearly industrial scale from the Viking Age onwards. Quarries and stone products, such as soapstone vessels, quernstones and whetstones, represent non-perishable objects where it is possible to study both production and distribution. Provenance studies show that such items were widely distributed, and quarrying was aimed at larger markets. Extraction of whetstones started in the early 8th century, as seen below, with soapstone vessels a century later, whereas large-scale production and distribution of quernstones date to the latter half of the 10th century (e.g. Resi 2008, Baug 2011, Resi 2011, Baug 2015, Hansen *et al.* 2017, Baug *et al.* 2019). Large-scale production of whetstones and other stone products co-occur within a larger pattern of outfield exploitation aimed at long-distance trade.

During his visit to King Alfred's court c. AD 890, Ohthere from Hålogaland listed a variety of commodities achieved through hunting and regarded as prestigious items, such as whale bone, feathers, hides and furs from marten, bear, otter, reindeer, and seal (Bately 2007, p. 46). Such products were in high demand among the elites in Northern Europe. Exploitation of wild reindeer also provided other products, such as antler important for pre-modern craft and industry in urban sites, specifically for producing items such as combs and gaming pieces (e.g. Ashby *et al.* 2015, Rosvold *et al.* 2019). Hunting of reindeer was carried out in mountainous areas in several places in present-day Norway. Dating of reindeer traps is rather difficult, as preservation is generally poor and organic material from their construction is rarely left in the pitfalls (Bergstøl 2015, p. 53). The finds do, however, indicate that the reindeer population was heavily harvested. Many people must have been involved in hunting and trapping, since the sites required well-organised construction, maintenance and operation (Jordhøy and Hole 2015, p. 13).

Woodland was exploited for a variety of resources - timber, firewood, wood for charcoal production and tar (Øye 2002, pp. 362-364). Tar can be extracted from most types of wood, and is used for many purposes, such as leatherworking, as protection from corrosion and as sealant for wood constructions. From the 8th century, a shift from small-scale to large-scale tar production is documented in the present-day geographical area of Sweden. Tar became an in-demand commodity, and is found in Viking-age towns such as Ribe and Hedeby (Hennius 2018).

Iron was another valuable raw material in great demand. Within the territory of present-day Sweden, iron production may have started as early as the later part of the Bronze Age (Hjärthner-Holdar 1993, p. 38), whereas extraction of iron in present-day Norway dates to

the Pre-Roman Iron Age, where in several places it exceeded the local need (Myhre 2002, pp. 154–157). An increase in iron production is clear from the 10th century onwards (e.g. Stenvik 1997, Tveiten 2012, Rundberget 2013, 2015). The production took place across large parts of the forested areas and upper valleys of present-day southern Norway, and characteristic for most of the iron-producing sites is their location in marginally arable areas. It is therefore suggested that people involved in iron production depended on a supply of cereals from the more central agricultural districts (Tveiten 2013, p. 213). The number, size and complexity of the iron production indicate that many actors of varied competency were involved, and that the activity may have been organised by specialists (Tveiten and Loftsgarden 2017).

Whetstones were thus only one of several commodities transported along the west coast of Norway. Most of the objects and raw materials exploited in the outlying areas were meant for the general populace, not only for the elite, and thus were produced in large quantities. These were things that most people could afford and use in their everyday lives, such as household utensils. Many of the commodities, however, have not survived in the archaeological record, and are also difficult to provenance; we have earlier argued that whetstones may, in contrast, be used as a proxy for the trade with Arctic commodities (Baug *et al.* 2019, p. 66). They constitute an important source material for studying interactions and networks between outlying areas and urban sites in Northern Europe.

In search of the quarries

Raw materials suitable for whetstones were rock types containing many small, hard mineral grains that could act as abrasives during whetting (Resi 2008, p. 21). Different types of stones can be used, but some distinguish themselves as superior to others in their honing properties.

Earlier studies have indicated that material for whetstones during this period frequently came from the territory of present-day Norway, with two types of schist predominating. One is *light-grey, fine-grained muscovite-quartz schist*, here referred to as *light-grey schist*, the other is *dark grey or purple very fine-grained muscovite quartz schist*, here referred to as *very fine-grained schist* (Ellis 1969, Mitchell *et al.* 1984, Crosby and Mitchell 1987, Askvik 1990, Resi 1990, Hald 1991, Myrvoll 1991, Baug *et al.* 2019).

Light-grey schist has since the 1970s been considered to stem from the quarries in Eidsborg. The provenance was based on macroscopic identification and microscopic studies of thin sections on whetstones of *light-greys schist* from Kaupang, Hedeby, Wolin, Aggersborg, Ribe, and various sites on the British Isles (Moore 1978, Mitchell *et al.* 1984, Crosby and Mitchell 1987, Askvik 1990, Hald 1991, Askvik 2008, Resi 2011, Askvik 2014). Eidsborg schist belongs lithostratigraphically to the Eidsborg Formation, the uppermost formation in the Bandak Group of the Proterozoic Telemark Supergroup (Ofte Dahl 1980). The proposed Eidsborg provenance of whetstones of *light-grey schist* was based on radiometric dating (K-Ar) of mica, displaying a cooling age between 900 and 950 million years, typical of the Precambrian rocks in this region (Mitchell *et al.* 1984).

Radiometric dating (K-Ar) of whetstones of *very fine-grained schist* dates this rock type to between 403 ± 10 and 446 ± 7 million years (cooling age for mica), coinciding with the late phase of the Caledonian Orogeny (Mitchell *et al.* 1984). The Caledonides in Europe occur in a belt crossing Scandinavia, England, Scotland, and Ireland, as well as in a zone in central Europe. Within this area, Norway has been considered as the most likely place of origin

due to both geological and cultural reasons (for further explanation see Mitchell *et al.* 1984, Crosby and Mitchell 1987, Askvik *et al.* 2008). In Norway, the Caledonian rock units cover approx. 1,700 km from Rogaland to the North Cape (Mitchell *et al.* 1984, Askvik 2008, pp. 8, Figure 2), giving quite a large area of opportunity for whetstone quarries (Figure 1).

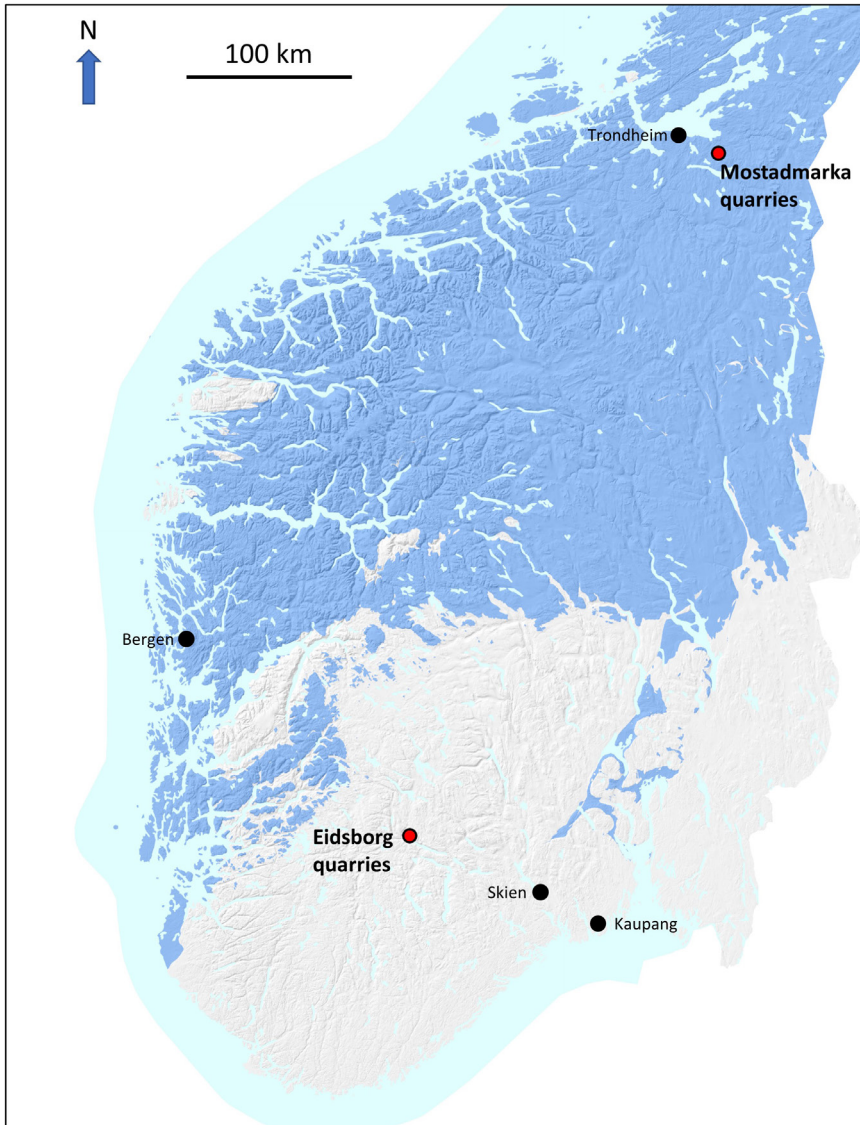


Figure 1. Caledonide rock units, marked in blue. Important sites referred to in the text are indicated (Map: Map data from the Geological Survey of Norway and Kartverket).

Recent geological analyses of whetstones in Ribe carried out in 2019, both petrographic analyses of thin sections and geochemical whole-rock analyses (major element analyses by XRF), gave new opportunities for provenancing whetstones. Samples from eleven quarries

within four different sites in present-day Norway have been studied: two quarries in Mostadmarka and two quarries in Soknedal in the Trøndelag region (Figure 2), six quarries in Eidsborg in the Telemark region and one quarry in Hardanger in the Hordaland region were compared with samples from 14 whetstones from Ribe (See Baug *et al.* 2019, pp. 52–57, for further explanations of the geological analyses).

The analyses confirmed Eidsborg as the origin of whetstones of *light-grey schist*. The provenance of the *very fine-grained schist* was also established: this type, in both purple and grey colours, originates in Mostadmarka in Trøndelag, where two different quarry sites have been identified: Heingruva and Rollset (Baug *et al.* 2019, pp. 56–57). So far, only whetstones from Ribe have been analysed; however, mineralogical descriptions of whetstones in other Viking-age towns, such as Kaupang and Hedeby, indicate that both types of schist, *light-grey schist* from Eidsborg and *very fine-grained schist* from Mostadmarka, are present there too (See for instance Ellis 1969, Mitchell *et al.* 1984, Crosby and Mitchell 1987, Resi 1990, Askvik *et al.* 2008, Resi 2011).

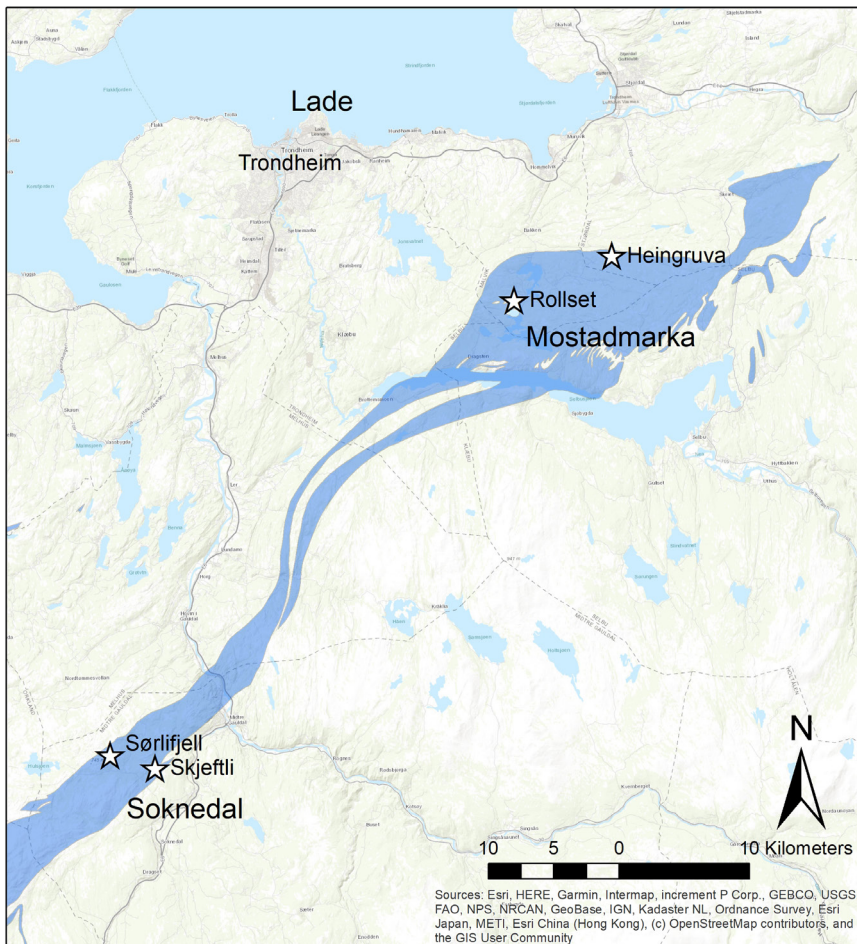


Figure 2. Location of the quarries in Mostadmarka and Soknedal. Both quarry areas are situated in the Støren Nappe (marked in blue), within the Caledonian rock units (Map: Map data from the Geological Survey of Norway and Kartverket).

The quarries in Mostadmarka and Eidsborg

The largest quarry site in Mostadmarka is Heingruva (Figure 3). Today, the quarry appears as a hole of 15x30 m filled with water. The bedrock appears as a semi-circle around the waterhole, entering the spoil-heap to the west. Traces from quarrying - both quarried rock as well as spoil - are visible in an area of approx. 200 m west of the water. East of the waterhole, another smaller quarry is identified. Quarrying is known to have taken place in the 1600s, and allegedly also in the 19th and 20th centuries (Bakmark and Rø 2014, pp. 53-55). Additionally, two small quarries are identified in Rolset (of which one has been examined geologically), approx. 30 km south-east of Heingruva. The quarries are in rather overgrown areas, and extraction traces and spoil heaps are difficult to identify (Figure 4).



Figure 3. The quarry Heingruva in Mostadmarka (Photo: Irene Baug).

Different colour nuances in the rock and on the stones in the spoil-heaps are identified, varying from grey to purple. Whetstones of dark grey and purple *very fine-grained schist* found in Viking-Age sites have earlier been considered to stem from different quarries, due to differences in the colour nuances (Myrvoll 1991, p. 121, Resi 2008, p. 25). However, as is evident from Heingruva, different colour nuances may appear within one quarry site, indicating that colours are not sufficient to discriminate between these whetstones.

Production in Mostadmarka was carried out in open-cast quarries, but difficult to identify due to dense vegetation and the small size of some of the quarries. It is likely that several more quarries lie undetected in this area, which is also indicated by place names and Lidar-data, but so far, no thorough registration has been carried out.



Figure 4. Geologist Øystein J. Jansen at a small whetstone quarry in Rollset (Photo: Irene Baug).

The largest and best-known production site for whetstones in Norway is located in Eidsborg. Quarries are identified over a wide area, mainly located on the mountain ridge between the parishes of Lårdal and Eidsborg; however, no complete registration of the quarries has so far been published. As late as in the 19th century, the production sites belonged to more than 20

farms, but prior to that the quarry area was commons or common land, exploited by local people in the community (Helland 1900, pp. 592-593). Production carried out in these open-cast quarries has strongly altered the natural landscape. In the largest quarries, enormous spoil heaps are located in front of the bedrocks where extraction took place. At some sites, spoil heaps are now covered with vegetation, but at others the spoil appears as enormous heaps of stone completely without vegetation (Figure 5).



Figure 5. Whetstone quarry in Eidsborg (Photo: Irene Baug).

In Eidsborg, large-scale extraction of whetstones continued until the early 20th century (Falck-Muus 1920, pp. 51-2, Livland 1992). Gunpowder was used in the quarries from the 18th century, and was a common technique from the 1830s. From that period and onwards, one worker could extract approx. 400-1000 whetstone blanks a day, even up to 2000 stones daily if the rock was of good quality (Falck-Muus 1920, pp. 54, 60). This later production most likely removed remains from the Viking-age and medieval quarrying in Eidsborg. Whetstone blanks are sticks of stones in various sizes. They were often c. 3-5 cm thick and between 15 and 30 cm in length (Livland 1992, pp. 20-23). However, whetstone blanks found in an undated cargo just outside Turøy in Western Norway are between 60 and 70 cm in length. The stones are presumably from Eidsborg, but scientific provenance studies have not been conducted.

Dating of whetstone production

There have not been any archaeological excavations in the whetstone quarries. Dating of production is therefore based on whetstone finds from datable contexts, such as Ribe, Kaupang and the medieval towns of Oslo and Bergen.

Quarrying in Mostadmarka started already in the early 8th century, as is documented through whetstone studies in the Viking-age town of Ribe in Jutland in present-day Denmark, where whetstones from Mostadmarka have been dated to AD 705-725. They were only few in number at this stage. In the following phase, AD 725-760, Mostadmarka-stones constitute 33 percent of the total number of whetstones in the town, and post AD 760, more than half of the whetstones in Ribe come from Mostadmarka. From c. AD 800 they start to decline in number (Baug *et al.* 2019, pp. 58-62). This tendency continues after the turn of the millennium, and only a few items are found in Ribe from the 11th to 13th centuries. Mostadmarka-stones are at this point completely outnumbered by whetstones from Eidsborg (Baug *et al.* 2020).

Production in Eidsborg dates to the first half of the 9th century and seems to have started around a century after extraction in Mostadmarka began. The earliest Eidsborg stones in Ribe occur AD 725-760; however, only a few specimens have been found, and the dating is problematic. It is not until AD 820-850 that securely dated whetstones from Eidsborg are present. In this phase, stones from Eidsborg and Mostadmarka are nearly equally numerous (Baug *et al.* 2019, pp. 58-63). Finds from the 11th century onwards in Ribe, however, clearly differ in petrographic types compared to the previous period, as a vast majority of 60 percent are from Eidsborg, whereas only sixteen fragments (c. 16 percent) relate to Mostadmarka (Baug *et al.* 2020, p. 51). Eidsborg-type stones thus seem to increase in prevalence with time.

The same tendency is seen in the Viking-age town of Kaupang (c. AD 800-960/80). Of the total whetstone material from the excavations in 2000-2002, whetstones of Mostadmarka-type constitute c. 60 percent. In the earliest phase (c. AD 800-805/10), eight Mostadmarka-type whetstones were retrieved, but none from Eidsborg. In the following phase (c. AD 805/10-840/50), Mostadmarka-type (N=81) outnumber those of the Eidsborg-type (N=12). From the last phase, c. AD 830-980, 928 of the Mostadmarka-type and 245 of the Eidsborg-type are identified (Resi 2011, Figures 14.2, 14.6, 14.15). The same tendency is observed in other medieval towns, such as Trondheim, Bergen and Oslo, where Eidsborg-type whetstones are far more common than the *very fine-grained schist*. In 11th to 14th century Oslo, the ratio is 12:1, and in 12th century Bergen 3:1 (Christophersen and Nordeide 1994, p. 255, Lønaas 2001, pp. 15-16, Hansen 2017, pp. 74-76). From the 11th century onwards, Eidsborg-outnumbered Mostadmarka-type stones and started to dominate the market, a situation that lasted for centuries. Whether this is caused by better organisation of production and export in Eidsborg, or a general decline of production in Mostadmarka from the 11th century onwards is not known.

From outlying areas to urban sites

During the Viking Age, present-day Norway was a rural society, with scattered settlement mostly organised in farms and farmsteads, but also central farms belonging to elites in a hierarchically organised society. People living in the rural communities provided themselves with food and non-food commodities. However, farming was probably not particularly profitable, as only a few large stretches of cultivated land exist, and mountainous and forested

areas are far more wide-ranging and dominant than arable land (Skre 2018, p. 783). Thus, it was not necessarily farming and cultivating that created surpluses and wealth, but rather exploitation of outlying areas. As stated above, the general development evident from the early 8th century onwards is that exploitation of natural resources in the outfield was significantly greater than local need, and this most likely represented an important income for people, and a possibility to create surplus.

Both production areas, Mostadmarka and Eidsborg, are located in marginal areas with regard to cultivation, settlement patterns and marketplaces, and they were both intensively exploited. The substantial proportion of Mostadmarka whetstones in Ribe since AD 705-725 demonstrates that long-distance trade between outlying areas in present-day Norway and the southern North Sea zone took place this early. Whetstones were not the only commodity in this trade, not even the dominant one. The quarries were part of a general development from the 8th century with more specialised handicrafts and a more intensified exploitation of the outfield than before. Provenancing of reindeer antler indicates that trade from present-day Norway and Sweden to the southern North Sea zone occurred in the AD 780s-90s (Ashby *et al.* 2015); however, Ashby and his co-authors found indications of even earlier contact with two finished reindeer-antler combs dated to AD 705-725, and thus the same period as the earliest Mostadmarka whetstones (Baug *et al.* 2019, p. 47). Large-scale exploitation of tar is also documented in the 8th century, with distribution to, for instance, Ribe (Hennius 2018).

Production and trade could have been organised in many ways and in a multitude of combinations. Most of the iron production sites are found in areas where local farmers seem to have had property rights, suggesting that it was undertaken by farmers - probably specialised farmers - in the area (Tveiten and Loftsgarden 2017, pp. 119-120). In Østerdalen in present-day eastern Norway, iron production c. AD 950-1300 was the farmers' primary work for parts of the season, whereas in other parts they worked on the farms (Rundberget 2015, pp. 276-277). I have suggested a similar situation for quernstone production in Hyllestad and bakestone production in Ølve and Hatlestrand in Western Norway, where quarries belonged to the farms at which they were located. Owners of farms and quarries seem, however, to have belonged to the societal elite, in the form of local magnates, during the Viking Age, and ecclesiastical institutions during the Middle Ages. Subordinates, tenants, or others who ran the farm most likely carried out quarrying as part-time or seasonal production. Quernstones and bakestones may possibly have been produced as tribute for landowners and formed part of the land rent that the tenants or other subordinate farmers had to provide to landowners (Baug 2015, pp. 120-146). Ohthere described a similar situation, where he got most of his wealth from tribute from the *Finnas* (Sámi) (Bately 2007, p. 46). Stonecutters may have sold whetstones to middlemen or foreign traders, but perhaps it is more likely that the products were collected as tribute. Landowners most likely exerted influence upon the whetstone quarrying, and agents involved in the extraction may have been obliged to produce whetstones for the landowners. Large-scale production and the wide-ranging distribution and trade witnessed in the archaeological record would have been easier for elites than for lower classes.

The intensified exploitation of outlying areas from the 8th century onwards points to a society where some agents were dependent on networks and economic interaction with the outside world. For instance, it is suggested that the large-scale tar production from the 8th century onwards resulted from the increasing demand for tar driven by an evolving maritime

expansion and more far-reaching expeditions. Tar was an important element in shipbuilding, for protecting wood, as well as impregnating and sealing sails (Hennius 2018, pp. 1356–1358). Consequently, it also became an in-demand commodity. In the same way, an extensive need for iron in Scandinavia and beyond led to a massive rise in iron production from the 10th century onwards. The need and desire for these resources made outlying areas integrated parts of wider economic, social, and cultural systems (Tveiten 2013, Baug 2015, p. 113, Tveiten and Loftsgarden 2017, Loftsgarden 2018, Baug *et al.* 2019, Rosvold *et al.* 2019).

Outfield products were traded as both raw material and in some cases as finished products. Whereas soapstone vessels and quernstones were more or less finished at the quarry sites before exporting them, some raw materials, such as iron, may have been subject to a chain of operations from extraction to finished products. Extraction took place in the outfield, but manufacturing of iron objects was to a certain degree carried out in the towns (Andersson 2015), or at central farms. Eidsborg whetstones seem to have been exported as blanks. This is indicated by sunken cargos with whetstone blanks along the Norwegian coast and along the water-based route from the quarry area to the coast (Nymoen 2008, 2011a, 2011b). A few raw blocks from medieval Bergen have also been identified. Blanks and whetstones without traces of use from Viking-age towns such as Kaupang, Hedeby and Ribe, are, however, few in number (Resi 1979, pp. 40–44, 2008, p. 49). In Ribe, four whetstone blanks were found on the southern shores of the river Ribe Å. The stones are presumed to stem from Eidsborg, but scientific provenance studies have not been conducted. The blanks may come from cargo that was lost on its way up the river towards the town (Jensen 1986–1987).

The markets for these commodities were diverse, ranging from local to international consumers. The occurrence of outfield products, such as antler, combs and various stone products in urban settings and marketplaces from the early Viking Age and into the Middle Ages indicates an organized and commercially-based trade, and regular long-distance sailing. In western Scandinavia, the scattered settlement districts from the Viking Age and the Middle Ages are mainly found along the coast and fjords, and travelling and transport was mostly done by sea. The 8th century is a pre-urban phase in Scandinavia, and within this period ships may have sailed more or less directly from shipping sites near the whetstone quarries to the markets in Northern Europe.

Little is known about people involved in producing and trading objects during this period, and they are difficult to identify in the material objects. We have suggested that whetstones from Mostadmarka may have been distributed via Lade (Old Norse *Hladir*, ‘storing place’ or ‘loading place’) near the mouth of the Trondheim Fjord, and 20–25 km north-west of Mostadmarka. Lade was the residence of the Lade Earls, high-level political agents in Scandinavia from the late 9th to the 11th centuries (Baug *et al.* 2019, p. 64). This suggests a highly organised production and distribution of whetstones from the Mostadmarka quarries, a situation that needs to be understood in relation to the socio-political development beginning from the 7th century along the coast of present-day Norway, which involved a larger political integration of substantial regions. It was also an economic integration of areas with diverse resources (Baug *et al.* 2019). Regional, high-status agents may in this way have been intermediaries and connected peripheral parts of the Scandinavian outfield to interregional trading networks.

In the 8th and 9th centuries, towns were created by kings and petty kings (Skre 2009, pp. 87–88), who then managed to both increase and control trade. Development of the towns

was caused by increasing trade within Scandinavia, but it was also a result of a demand for Scandinavian products elsewhere in Europe (Sawyer and Sawyer 1993, p. 151). The need for a stable and reliable supply of commodities in towns and marketplaces may have led to a good organisation of trade. People transported goods from their home areas to towns and marketplaces, but travel and trade was slow and dangerous. Both merchants and merchandise needed to be protected. Long-distance trade was a growing activity from the early 8th century onwards, and a socio-political organisation that could provide a necessary minimum of security and predictability was needed. During the 8th and 9th centuries, high-level political agents able to secure the coastal sailing route - the *Norðvegr* (the Northern way) - established themselves along the coast and were important for making long-distance trade possible (Skre 2018). This polity was strong enough to guarantee safe sailing for those who submitted to it. By establishing alliances with the sea-kings along the sailing route, arctic traders made transport of commodities along the coast viable (Baug *et al.* 2019, pp. 68-70), and this socio-economic development rendered a steady supply possible. In the towns, kings provided the security the merchants and craftsmen needed.

The increase of Eidsborg stones in Ribe in the first half of the 9th century suggests a change in the preferences of whetstones within trading networks to the north, and it corresponds closely with the establishment of the town Kaupang c. AD 800, located only about 130 km from Eidsborg as the crow flies. Kaupang belonged to southern Scandinavia politically, and was under royal authority of the Danish kingdom, and Ribe appears to have been one of Kaupang's most important connections to the southern North Sea zone (Skre 2011). It is likely that the kings of the Danes got access to important northern resources - also from outlying areas - through Kaupang. This slowly led to the change in whetstone types in Ribe from the first half of the 9th century - when a new production site and new suppliers started to gain importance.

Kaupang came to an end around AD 950, but the demand for whetstones from Eidsborg continued, which may have contributed to the establishment of the town of Skien in the southern part of Telemark. Archaeological investigations in Skien have revealed large amounts of whetstones - mostly blanks - and the town is interpreted as a transit harbour dating from the 10th century (Myrvoll 1984, 1986, pp. 165-166). The quarries in Eidsborg are in the inland, with a rather large distance to the nearest harbour and marketplace. The area consists of many valleys separated by high mountains, and where a network of rivers and lakes connect the different valleys, running from the mountain districts to the coast. This water-based route, consisting of 120 km of lakes, rivers, and portages, has been the main communication line, using boats in the summer or sleds on frozen rivers in wintertime (Myrvoll 1984, p. 50). The route involved several transshipments down the waterway to Skien by the coast from where they were exported (Myrvoll 1986, pp. 175-176, Nymo 2011a).

An important place for transshipment was the farm Kviteseid, where travellers needed to cross over land to continue on their voyage to the coast. The suffix *eid* in Kviteseid comes from the Norse word *eið* and refers to a narrow strip of land surrounded by water, and a place where one had to travel by land instead of water (Norsk Stadnamleksikon). This is one of the richest areas regarding burial finds from the Viking Age in eastern parts of present-day Norway, whereas there are hardly any finds from the Early Iron Age. Thus, Kviteseid seems to have grown rather quickly as a socio-political centre around AD 800, and the rich burials indicate

an economic surplus. This development may connect to the whetstone trade. It is suggested that travellers had to pay duties to people at Kviteseid in order to pass across the strip of land and continue along the water route. Thus, the owners of Kviteseid would earn an income from the export of whetstones and other outfield commodities that needed to be transported this way (Liland 1992, p. 13, Braathen 2006). Another possibility is that people living at Kviteseid were the ones who controlled both production and distribution of whetstones. Interestingly, there are no burial finds from the Viking Age in Eidsborg, which suggests that people in Eidsborg were not the ones who controlled and profited by the production of whetstones. It is suggested that the suffix *borg* in Eidsborg comes from the Old Norse word *björg*, meaning rock. The original meaning of the place name Eidsborg may thus have been “The rock belonging to the farm Eid”, which may refer to the farm Kviteseid (Liland 1992, p. 13, Braathen 2006, p. 304). However, in the tax register of 1647, the farm Kviteseid is not very rich, and it is suggested that at an earlier stage it may have belonged to another, wealthier farm, Fjågesund (Liland 1992, p. 13). Nevertheless, local or regional high-status agents may in this way, directly or indirectly, have controlled the intraregional distribution of whetstones to the nearest town or marketplace, which in this case may have been the town of Kaupang and later Skien.

A few Medieval written sources relate to the whetstone production in Eidsborg. In AD 1395, the farmer *Grjotgard Nikolassön* owed tax to the Church and Crown and was therefore sentenced to pay a fine of four *lestir* whetstones from Eidsborg (Norse: *fjor læstir hardstein*), equal to nearly 1.3 tons, as well as part of a farm, to Bishop Øystein in Oslo. In the Middle Ages, one *lest* is considered to have equalled two pounds, which is c. 160 kg (Falck-Muus 1920, p. 74). The stones should be transported to the town of Skien (DN IV, no. 651), most likely for further export. The document thus indicates that farmers were involved in whetstone production in Eidsborg, and this particular person may have owned quarries, due to the large number of whetstones he was forced to pay with. The Old Norse term *grjót* means stone, thus the farmer’s name also connects him to the whetstones.

Whetstone trade from Eidsborg not only survived into the second wave of urbanisation in Scandinavia that began in the mid-tenth century, it even increased during this period, comprising alone more than 60 per cent of the total amount of whetstones in Ribe in the 11th to the 13th centuries (Baug *et al.* 2020). The whetstone trade was likely important for the Danes, and high-level political agents were most likely interested in maintaining the supply of these commodities. It is suggested that the Danish kings Harald Bluetooth and his son Sweyn Forkbeard may have had connections to Skien at the end of the 10th century - perhaps through a local magnate - because of a demand in Denmark for whetstones and other commodities from the north (Bandelien 2018).

A document from AD 1358 states that people in Skien had the right to trade whetstones ‘as in old custom’ (DN XV, no. 20 1358). Most likely, they bought whetstones from the producers with the intention of selling them and thus may have acted as middlemen in the whetstone trade. Whetstones, most likely from Eidsborg, were also exported from Bergen during the Middle Ages, on board both Norwegian and Hanseatic ships (Nedkvitne 2014, pp. 81, 84, 596-599). In AD 1305-1306, whetstones were recorded as ballast on ships sailing to Kingston upon Hull and Ravensworth (DN XIX, no. 447 1305-1306), and in AD 1401, an English ship loaded with hides, wool, butter, timber, and whetstones was plundered by the Hanseatic

in Langesund along the inner sailing route, not far from Skien (DN XIX, no. 666 1405). In the late 16th century, the priest and writer Peder Clausson Friis described the distribution of whetstones. According to Friis, whetstones were transported from the quarries to Skien in wintertime - on the ice along the rivers and fresh waters that had their outlet in Skien. Upon reaching the town, whetstones were sold as ballast and loaded on large ships together with timber, and transported to Spain (Friis 1632, p. 46).

Distribution of outlying resources could be organised independent of towns; however, there is no doubt that the towns provided access to larger markets. Exploitation of natural resources had a pseudo-industrial character that demanded wider organisation, networks, and markets, where the latter were more easily gained in towns. In Northern Europe, new urban centres were established from the 8th century onwards, which from the very first decades became important arenas and markets for the various products and raw materials from the outlying areas (Ashby *et al.* 2015, Baug *et al.* 2019). Long-distance trade of resources must thus have been encouraged by some form of profit, making the many days of sailing economically viable. The outlying areas provided the towns with valuable and essential goods and raw materials that were geographically restricted and exploited only in certain regions. Thus, long-range networks and access to a variety of non-local products became a vital concern for the towns, and non-agrarian products from the outfield may have been important for the development of regional and interregional trade, and a driving force in the economy. From the early 8th century, the towns were willing to invest energy and resources in communicating with peripheral societies, and a certain reliance on non-local products within towns and marketplaces developed. This suggests stable maritime networks in Northern Europe, where distant outlying areas also played a part.

The agents involved in trade of the various resources changed through the centuries, and so did the nodes and central places along the trading routes. After the establishment of towns in the 11th and 12th centuries in present-day Norway, export was largely channelled through these, which led to changes in redistribution centres compared to the preceding period. Whetstones in Ribe show, however, that networks and contact zones established in the early 8th century persisted throughout the Middle Ages. This is also indicated in the distribution of soapstone vessels and quernstones from quarries in present-day Norway to southern Scandinavia (Baug 2017). Outlying areas were linked to markets in the southern North Sea zone for centuries, and established traditions and contact zones were most likely important for distribution and trade. Despite changes in actors and towns, trading networks seem to have been stable and predictable over centuries.

Conclusions

From the 8th century onwards, an intensified exploitation in woodlands and mountainous areas took place in the Scandinavian Peninsula, and outlying areas became a source for a variety of products regarded as desirable commodities in the southern North Sea zone. Provenancing of whetstones demonstrates that extraction started in the early 8th century in Mostadmarka in Trøndelag, and a century later in Eidsborg in Telemark, and the stones may be used as a proxy for the trade with commodities from distant outfields. They bear witness to an intensified large-scale exploitation that lasted for centuries.

Whetstones from Mostadmarka are among the earliest evidence of long-distance trade in this period. They were obviously desirable commodities in the 8th century, but were nevertheless completely outnumbered by Eidsborg from the 11th century onwards. A new production site and new suppliers started to gain importance - at the expense of Mostadmarka stones.

Evidence points to a highly organised production and distribution of whetstones from both Mostadmarka and Eidsborg, but agents involved in production and trade of whetstones and other products from outlying areas are difficult to identify in the sources. Exploitation of outfield resources represented an important income for people, and a possibility to create surplus and wealth for those in control of the resources. There is no doubt that large-scale production and wide-ranging distribution and trade, which also involved provision of sufficient manpower and ships, would have been easier for elites than for lower classes. A socio-political organisation that could provide a necessary minimum of security and predictability for traders and their commodities was also needed, and long-distance trade should most likely be seen in relation to the development of high-level political agents along the coasts, who were able to secure the coastal sailing route.

Products from outlying areas uncovered in Viking-age and Medieval towns and trading places along the coasts of Northern Europe suggests they were widely distributed, and that their availability was of vital importance to the towns throughout the centuries. This led to an economic and political integration of outlying areas with diverse resources - the outfield became an integrated part of wider economic, social, and cultural systems.

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Literature

- Andersson, H., 2015. What did the blacksmiths do in Swedish towns? Some new results. In: G. Hansen, S.P. Ashby and I. Baug, eds. *Everyday products in the Middle Ages. Crafts, Consumption and the Individual in Northern Europe, c. AD 800-1600*. Oxford: Oxbow Books, 287-299.
- Ashby, S.P., Sindbæk, S.M. and Coutou, A.N., 2015. Urban Networks and Arctic Outlands: Craft Specialists and Reindeer Antler in Viking Towns. *European Journal of Archaeology*, 18 (4), 679-704.
- Askvik, H., 1990. Petrographische Untersuchungen an Schieferwetzsteinen aus Haithabu. *Die Wetz- und Schleifsteine aus Haithabu. Berichte über die Ausgrabungen in Haithabu, Bericht 28*, Neumünster: Karl Wacholtz Verlag, 135-142.
- Askvik, H., 2008. Whetstones from Kaupang; petrographic description and provenance. *The Kaupang Finds, Volume III C. Whetstones and grindstones in the settlement area; the 1965-1974 excavations.*, vol. XXIX. Oslo: Kulturhistorisk Museum. Norske Oldfunn, 5-17.
- Askvik, H., 2014. Petrografisk beskrivelse av skiferbrynene. In: E. Roesdal, S.M. Sindbæk and A. Pedersen, eds. *Aggersborg i vikingetiden. Bebyggelsen og borgen*. Moesgaard: Jysk Arkæologisk Selskab, 303-305.
- Askvik, H. and Resi, H.G., 2008. *Whetstones and grindstones in the settlement area: the 1956-1974 excavations*. Norske oldfunn (trykt utg.), vol. 29. Oslo: Kulturhistorisk museum, Universitetet i Oslo.

- Bakmark, N. and Rø, G., 2014. *Jerngruver, natur- og kulturminner i nærheten av Mostadmark jernverv - Turbok*. Mostadmarka Jernverks Venner. Trondheim.
- Bandelien, B., 2018. Harald Grenske - en småkonge i storpolitikk. In: N.I. Agøy, E. Schrupf and K. Tangen, eds. *Telemark i vikingtid og tidlig middelalder*, vol. 39. Bø i Telemark: Telemark historielag, 17-29.
- Bately, J., 2007. Text and translation. In: J. Bately and A. Englert, eds. *Ohthere's Voyages. A late 9th century account of voyages along the coasts of Norway and Denmark and its cultural context*. Maritime Culture of the North, vol. 1. Roskilde: The Viking Ship Museum in Roskilde, 44-50.
- Baug, I., 2011. Soapstone finds. In: D. Skre, ed. *Things from the Town. Artefacts and Inhabitants in Viking-age Kaupang*. Norske Oldfunn, vol. 3. Aarhus: Aarhus University Press & The Kaupang Excavation Project, 312-337.
- Baug, I., 2015. *Quarrying in Western Norway. An archaeological study of production and distribution in the Viking period and Middle Ages*. Oxford: Archaeopress Archaeology.
- Baug, I., 2017. Soapstone vessels and quernstones as commodities in the Viking Age and Middle Ages. In: Z.T. Glørstad and K. Loftsgarden, eds. *Viking Age Transformations: Trade, Craft and Resources in Western Scandinavia*. London: Routledge, 139-159.
- Baug, I., et al., 2019. The Beginning of the Viking Age in the West. *Journal of Maritime Archaeology* 14, 43-80.
- Baug, I., et al., 2020. Brynesteiner i Ribe - fra fjerne utmarksområder til sentrale markeder. *By, marsk og geest* 32. *Kulturhistorisk tidskrift for Sydvestjylland*. Ribe: Sydvestjyske Museer, Forlaget Lillebjerget, 44-59.
- Bergstøl, J., 2015. Trapping pits for reindeer - a discussion on construction and dating. In: S. Indrelid, K.L. Hjelle and K. Stene, eds. *Exploitation of outfield resources - Joint Research at the University Museums of Norway*. Bergen: University Museum of Bergen, 49-54.
- Braathen, H., 2006. Et vikingtids og mellomaldersk maktsentrum i ei sørnorsk dalbygd. In: H. Glørstad, B. Skar and D. Skre, eds. *Historien i forhistorien. Festskrift til Einar Østmo på 60-års dagen*. Kulturhistorisk museum, Skrifter 4. Oslo: Kulturhistorisk museum, Universitetet i Oslo, 299-307.
- Christophersen, A. and Nordeide, S.W., 1994. *Kaupangen ved Nidelva*. Riksantikvarens skrifter, vol. 7. Trondheim: Strindheim Trykkeri.
- Crosby, D.D.B. and Mitchell, J.G., 1987. A Survey of British metamorphic hone stones of the 9th to 15th centuries AD in the light of Potassium Argon and Natural Remanent Magnetization Studies. *Journal of Archaeological Science*, 14, 483-506.
- DN = *Diplomatarium Norvegicum*. Published by C.C.A. Lange and C.R. Unger, eds. Christiania/Oslo.
- Ellis, S.E., 1969. The petrography and provenance of Anglo-Saxon and medieval English honestones, with notes on some other hones. *Bulletin of the British Museum (Natural History) (Mineralogy)*, 2 (3), 135-187.
- Falck-Muus, R., 1920. *Brynestensindustrien i Telemarken*. Norges Geologiske Undersøkelser, Årbok 1920:5.
- Friis, P.C., 1632. *Norriges oc omliggende Øers sandfærdige Bescriffuelse : indholdendis huis vært er at vide, baade om Landsens oc Indbyggernis Leilighed oc Vilkor, saa vel i forðum Tid, som nu i vore Dage*. Kiøbenhaffn.
- Hald, N., 1991. The Petrography of the Honestones. In: M. Bencard, L.B. Jørgensen and H.B. Madsen, eds. *Ribe Excavations 1970-76*, vol. 3. Esbjerg: Sydjyske Universitetsforlag, 142-146.

- Hansen, G., 2017. Domestic and Exotic Materials in Early Medieval Norwegian Towns. An Archaeological Perspective on Production and Consumption. In: Z.T. Glørstad and K. Loftsgarden, eds. *Viking-Age Transformations: Trade, Craft and Resources in Western Scandinavia*. London: Routledge, 59-94.
- Hansen, G., Jansen, Ø.J., and Heldal, T., 2017. Soapstone Vessels from Town and Country in Viking Age and Early Medieval Western Norway. A Study of Provenance. In: G. Hansen and P. Storemyr, eds. *Soapstone in the North. Quarries, Products and People*. University of Bergen Archaeological Series, vol. 9. Bergen: University of Bergen, 249-328.
- Helland, A., 1900. *Norges Land og Folk. Bratsberg Amt bind II*. Kristiania: Aschehoug & Co.
- Hennius, A., 2018. Viking Age tar production and outland exploitation. *Antiquity Publications Ltd*, 1349-1361.
- Hjärthner-Holdar, E., 1993. *Järnets och järnmetallurgins introduktion i Sverige*. Aun 16. Uppsala.
- Jensen, S., 1986-1987. Glimt fra museerne. Den antikvarisk Samling. *Mark og Montre: Fra Sydvestjyske museer 22-23 årgang*, 189-191.
- Jordhøy, P. and Hole, R., 2015. Wild reindeer exploitation. In: S. Indrelid, K.L. Hjelle and K. Stene, eds. *Exploitation of outfield resources - Joint Research at the University Museums of Norway*. Bergen: University Museum of Bergen, 9-18.
- Livland, H., 1992. *Eidsborgbryner - Eksportvare i Telemark fra vikingtid til våre dager*. Skien: Lårdal.
- Loftsgarden, K., 2018. Salt - ressurser og handelsvare i middelalderen. *Heimen*, 50-61.
- Lønaas, O.C. 2001. Brynestein i middelalderen. En analyse av brynematerialet fra Oslogate 6. Unpublished thesis (MA). University of Oslo.
- Mitchell, J.G., Askvik, H. and Resi, H.G., 1984. Potassium-Argon Ages of schist Honestones from the Viking Age Sites at Kaupang (Norway), Aggersborg (Denmark), Hedeby (West Germany) and Wolin (Poland), and their Archaeological Implications. *Journal of Archaeological Science*, 11, 171-176.
- Moore, D.T., 1978. The petrography and archaeology of English honestones. *Journal of Archaeological Science*, 5, 61-73.
- Myhre, B., 2002. Landbruk, landskap og samfunn 4000 f.Kr.-800 e.Kr. In: *Jorda blir levevei: 4000 f.Kr.-1350 e.Kr. Norges Landbrukshistorie I*. Oslo: Det Norske Samlaget, 12-213.
- Myrvoll, S., 1984. Trade in Telemark and the Earliest Settlement in Skien. *Offa. Berichte und Mitteilungen zur Urgeschichte, Frühgeschichte und Mittelalterarchäologie*, 41, 41-55.
- Myrvoll, S., 1986. Skien og Telemark - naturressurser, produkter og kontakter i sen vikingtid og tidlig middelalder. *Viking*, XLIX 1985/86, 161-180.
- Myrvoll, S., 1991. The Hones. In: M. Bencard, L.B. Jørgensen and M.H. Brinch, eds. *Ribe Excavations 1970-76*, vol. 3. Esbjerg: Sydjysk Universitetsforlag, 115-141.
- Nedkvitne, A., 2014. *The German Hansa and Bergen 1100-1600*. Quellen und darstellungen zur hansischen geschichte. Neue Folge, vol. 70. Köln: Böhlau Verlag.
- Norsk Stadnamleksikon [online]. Available from: <http://www.norskstadnamleksikon.no/grunnord.aspx?grunnordCode=eid> [Accessed 21 February 2021].
- Nymoen, P., 2008. The Bøle Ship, Skien, Norway - Research History, Dendrochronology and Provenance. *The International Journal of Nautical Archaeology*, 37, 53-70.

- Nymoens, P., 2011a. Bøleskipet - og brynesteinseksport fra Norge. In: L. Appel and K. Langsted, eds. *Ressourcer og Kulturkontakter. Arkeologi rundt om Skagerrak og Kattegat. Kulturhistoriske skrifter fra Nordsjælland 1*. Helsingør: Holbo Herreds Kulturhistoriske Centre, Gilleleje Museum. Helsingør: Nofoprint, 83-99.
- Nymoens, P., 2011b. Kun for den smarte skippers regning? Skipsvrak med omsettelig ballast: på sporet av kverstein, kleber og brynehandel fra Norge ca. 800-1800. *Nicolay*, 114, 65-75.
- Oftedahl, C., 1980. Geology of Norway. *NGU*, 356, 3-114.
- Resi, H.G., 1979. Die Specksteinfunde aus Haithabu. In: K. Schietzel, ed. *Berichte über die Ausgrabungen in Haithabu*, Bericht 14. Neunmünster: Karl Wachholtz Verlag, 9-167.
- Resi, H.G., 1990. *Die Wetz- und Schleifsteine aus Haithabu*. Berichte über die Ausgrabungen in Haithabu. Bericht 28, vol. 28. Neunmünster: Karl Wachholtz Verlag.
- Resi, H.G., 2008. Whetstones and grindstones used in everyday life at Kaupang. *The Kaupang Finds, Volume III C. Whetstones and grindstones in the settlement area; the 1965-1974 excavations*. Norske Oldfunn, vol. XXIX, 19-149.
- Resi, H.G., 2011. Whetstones, Grindstones, Touchstones and Smoothers. In: D. Skre, ed. *Things from the town: artefacts and inhabitants in Viking-age Kaupang. Kaupang Excavation Project publication series vol. 3*. Norske oldfunn. Aarhus: Aarhus University Press, 373-393.
- Rosvold, J., Hansen, G. and Røed, K.H., 2019. From mountains to towns: DNA from ancient reindeer antlers as proxy for domestic procurement networks in medieval Norway. *Journal of Archaeological Science, Reports* 26, 1-9.
- Rundberget, B., 2013. *Jernets dunkle dimensjon. Jernvinna i sørlige Hedmark. Sentral økonomisk faktor og premis for samfunnsutvikling c. AD 700-1300*. Thesis (PhD). University of Oslo.
- Rundberget, B., 2015. Iron producers in Hedmark in the medieval period - who were they? In: G. Hansen, S.P. Ashby and I. Baug, eds. *Everyday Products in the Middle Ages: Crafts, Consumption and the Individual in Northern Europe c. AD 800-1600*. Oxford: Oxbow Books, 270-286.
- Sawyer, B. and Sawyer, P., 1993. *Medieval Scandinavia. From conversion to reformation ca 800-1500*. The Nordic Scene, vol. 17. Minneapolis: University of Minnesota Press.
- Skre, D., 2009. Chapter 8: The development of urbanism in Scandinavia. In: S. Brink and N. Price, eds. *The Viking World*. London: Routledge, 83-93.
- Skre, D., 2011. Kaupang: Between East and West; between North and South. In: D. Skre, ed. *Things from the Town. Artefacts and Inhabitants in Viking-age Kaupang*. Kaupang Excavation Project, Publication Series Volume 3, Norske Oldfunn XXIV. Aarhus: Aarhus University Press, 443-449.
- Skre, D., 2018. 29 Sea Kings on the Norðveg. In: D. Skre, ed. *Avaldsnes - A Sea-King's Manor in First-Millennium Western Scandinavia*. Reallexikon der Germanischen Altertumskunde - Ergänzungsbände, vol. 104. Berlin: De Gruyter, 781-799.
- Stenvik, L.F., 1997. Iron production in Mid-Norway, an answer to local demand? In: H.J. Hässeler, ed. *Studien zur Sachenforschung*, vol. 10, 253-263.
- Tveiten, O., 2012. *Mellom aust og vest. Ein arkeologisk analyse av jarnvinna kring Langfjella i yngre jarnalder og mellomalder*. Thesis (PhD). University of Bergen.
- Tveiten, O., 2013. Bondejarn? Produksjon og distribusjon av jarn til Vestlandet. In: S. Diinhof, M. Ramstad and T. Slinning, eds. *Jordbruksbosetningens utvikling på Vestlandet*. University of Bergen Archaeological Series Nordisk 7. Bergen: University of Bergen, 205-216.

- Tveiten, O. and Loftsgarden, K., 2017. The extensive iron production in the tenth to thirteenth century. A regional perspective. In: Z.T. Glørstad and K. Loftsgarden, eds. *Viking-Age Transformations: Trade, Craft and Resources in Western Scandinavia*. London: Routledge, 111-123.
- Øye, I., 2002. Landbruk under press 800-1350. In: B. Myhre and I. Øye, eds. *Jorda blir levevei: 4000 f.Kr.-1350 e.Kr. Norges Landbrukshistorie I*. Oslo: Samlaget, 215-414.
- Øye, I., 2005. Introduction. In: I. Holm, S. Innselset and I. Øye, eds. *'Utmark'. The Outfield as Industry and Ideology in the Iron Age and the Middle Ages*. UBAS - University of Bergen Archaeological Series - International, vol. 1. Bergen: University of Bergen, 9-20.