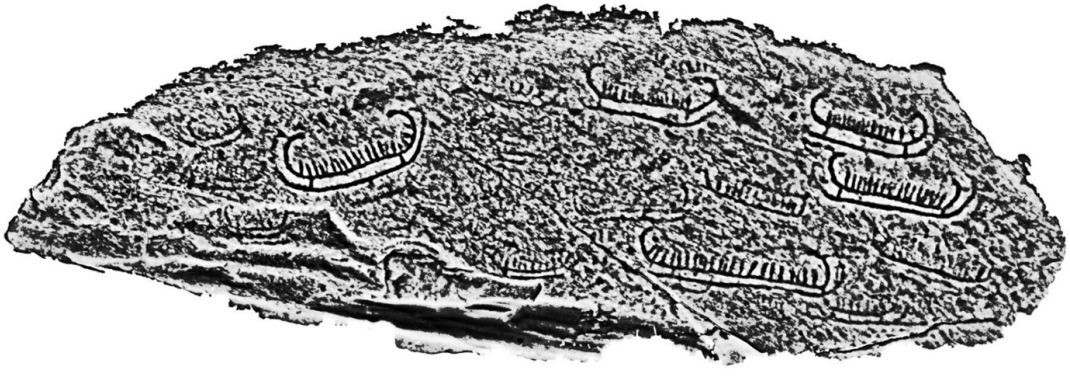
Primitive
tider



24

arkeologisk
tidsskrift

24

Primitive tider
2022 24. årgang

Primitive tider utgis av Mari Arentz Østmo (redaktør), Svein Vatsvåg Nielsen, Guro Fossum, Isak Roalkvam, Knut Ivar Austvoll, Astrid Tvedte Kristoffersen
Sektretær: Elisabeth Aslesen

ISSN 1501-0430

Postadresse:
Primitive tider
Postboks 6727, St. Olavs plass
0130 Oslo

E-post: kontakt@primitive-tider.com

Internett: https://journals.uio.no/PT/index

Ombrekk: Isak Roalkvam

Trykk: Reprosentralen ved Universitetet i Oslo

Forsideillustrasjon: Hodnafjell (Id 34638) dokumentert i form av et TVT dybdekart. Illustrasjon: Annette Øvrelid, Am, UiS. Fra artikkelen «Refleksjoner rundt ny teknologi som supplement til etablert praksis: Eksempler fra dokumentasjon av Rogalands bergkunst med 3D-skanner» av Wenche Brun og Annette Øvrelid, s. 65-80.

Skrive for Primitive tider?

Primitive tider oppfordrer spesielt uetablerte forfattere til å skrive. Vi er interessert i artikler, kommentarer til tidligere artikler og rapporter (enklere, ikke fagfellevurderte tekster). Kanskje blir din artikkel neste nummers debattema! Send inn ditt manuskript og la det få en faglig og seriøs vurdering av redaksjonen. Husk at hele prosessen kan være tidkrevende, så planegg i god tid. Innleveringsfrister finner du på våre nettsider. Det er likevel ingen grunn til å vente til siste øyeblikk, send gjerne inn før fristen!

For å lette arbeidet for deg og for oss, er det helt nødvendig at du setter deg godt inn i forfatterveiledningen og følger den. Forfatterveiledningen finner du på våre nettsider:

https://journals.uio.no/PT/index

Vi ser fram til å høre fra deg!

Kontakt oss per mail: kontakt@primitive-tider.com

INNHOLD

David Graeber og David Wengrow 2021: The Dawn of Everything: A New History of Humanity. Farrar, Straus and Giroux, New York. 704 s. ISBN: 9780374157357 **119**

Hallvard Bruvoll

Tales of Middle Mesolithic cultural transformations and marine adaptation:
The case of a simple hatchet of whale bone

Birgitte Skar
NTNU Vitenskapsmuseet, Institutt for arkeologi og kulturhistorie

Jørgen Rosvold
Norsk Institutt for naturforskning, Terrestrisk naturmangfold

Pål Nymoen
Norsk Maritimt Museum, Arkeologisk seksjon

Introduction

Environmental trajectories in the studied region

Due to varying thickness of the ice-cover during the last glaciation the Norwegian coastal landscape displays complex patterns of isostatic land uplift and sea level fluctuations. In southwestern Norway where the glacial icesheet was relatively thin and postglacial land uplift consequently limited, the coastline is influenced by transgressions during the transition from the younger Dryas to the Preboreal chronozone prior to the period of study. Later the Tapes transgression during the early Atlantic chronozone (app. 7700 BP) and the Storegga tsunami caused by several landslides dated to 8250–6100 cal BP affected at least part of this coastline (Bondevik *et al.* 2012). The succession of settlement during the Mesolithic on the south and southwest coast, is thus challenging to reconstruct (Nymoen and Skar 2011; Glørstad *et al.* 2020). While the southwestern exposed coast towards the North Sea would have eroded sites that remained inundated after the sea-level fluctuations, the more protected waters of the archipelago along the southern coast affords potential for the discovery of well-preserved submerged Mesolithic sites. The hatchet from Kirkehavn discussed in this article is an example of a submerged site from this area.

Direct evidence of faunal and botanical resources available to the human population of the Middle Mesolithic is very limited in Norway, both in terms of sub-fossil and archaeological finds, and the ecological basis for the human population during this part of the Holocene is usually inferred from other sources. While the paleo-ecological conditions for settlement during the Preboreal chronozone for central Norway have been reconstructed by Breivik (2014), similar studies have not been carried out regarding the following Boreal chronozone and the southern coastline of Norway. The bone material from three archaeological occupation phases at the west Swedish site of Huseby Klev (Boethius 2018) presently provides the best source of evidence currently available informing about subsistence strategies of Mesolithic coastal settlers in Central Scandinavia and may serve as a proxy to the situation on the south coast of Norway. The evidence from Huseby Klev points to a heavy reliance on marine mammals like white-beaked dolphin, grey seal, and harbour porpoise during the Preboreal to Early Boreal period (10300–9600 cal BP). This was likely caused by favorable conditions for marine mammals due to freshwater mixing in the sea because of the massive glaciers melting. During the two following occupation phases (9600–8700 cal BP) and (8000–7700 cal BP) the ocean became less nutritious with the cessation

of freshwater mixing, and the continued human reliance on this prey led to a marine mammal collapse (Boethius 2018:110). While Huseby Klev is a very important site illustrating Swedish west-coast subsistence patterns during the Mesolithic, further studies are needed to explore the paleo-ecological conditions close to the Norwegian southern and southwestern coastlines to do a direct comparison.

From an environmental point of view the present find of a bone hatchet made of whalebone is thus important evidence of the history of the species as well as an indication of resources available to Middle Mesolithic settlers.

Hatchets in the Mesolithic

Here we report the find of a neatly decorated Mesolithic hatchet made of bone that was found at the harbor floor at Kirkehavn (Hidra) in southern Norway (Figure 1).

The Mesolithic hatchets can be divided into three main morphological groups; simple, cross- and starshaped hatchets, with a wide variety of idiosyncratic features. While the cross and starshaped hatchets are primarily a southwestern and western Norwegian phenomenon, we shall here focus on the simple hatchets, to which the Kirkehavn hatchet belongs. Distribution

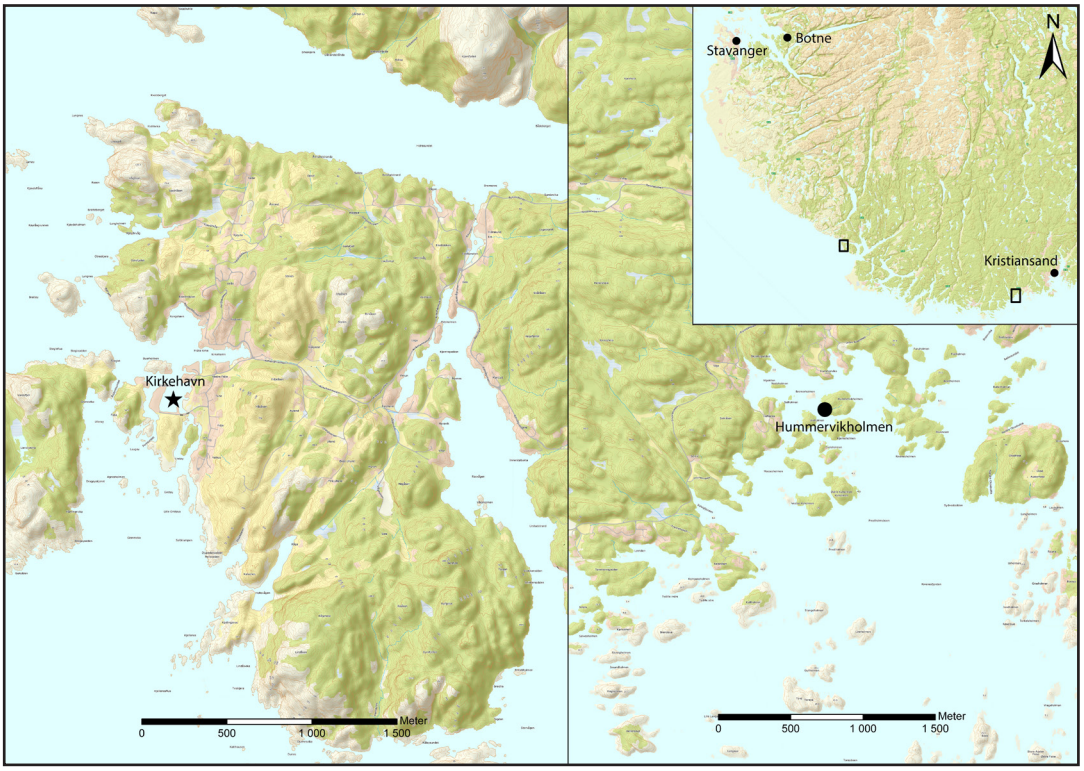


Figure 1: Map of south and southwest Norway. The location of the mentioned find spots. Location of Kirkehavn hatchet (star), the ritual site Hummervikholmen (circle) and the ritual deposition Botne II (circle) on overview map. The boxes on the overview map indicate Hummervikholmen (east) and Kirkehavn (west). Map by Kristoffer R. Rantala, IAK, NTNU.

analyses (Gräslund 1962; Glørstad 1999, Skår 2003; Fløttum Westgaard 2020) have uncovered a main distribution pattern where simple hatchets are dominating in southeastern, southern, and central Norway. A recent analysis (Fløttum Westgaard 2020, appendix 1b) has, however, demonstrated a presence of simple hatchets along the coast as far north as Troms. In Sweden the simple hatchets are concentrated along the Swedish west coast from Västergötland to the Norwegian Border in Bohuslän, but also have a thinner distribution along the many watercourses reaching towards the east coast of Central Sweden. Most often hatchets are made from ground stone, but some are made of bone or antler. In the few cases where they can be directly or indirectly dated, they have a wide chronological frame, earlier assumed to be from app 8500–6800 cal BP (Skår 2003: 67). Even though many are broken particularly through the shaft hole, other signs of use are not consistent with a particular set of work operations. These tools resemble procession weapons rather than part of a working toolkit. Examples of stone hatchets resembling the Kirkehavn tool are known from Aust-Agder. The simple hatchet from Gjerstad (Gjessing 1945:222, fig. 69 no. 2) is one example; however, this tool was made from a soft limestone. The present simple hatchet represents the oldest directly dated example of this type of artefact (Nymoen and Skar 2011). The Scandinavian hatchets are frequently polished and decorated, not seldom carrying anthropomorphic traits. Complete hatchets are rarely found in settlement deposits, but more often as stray finds often in association with the sea, fjords or watercourses and have potentially played a role in connection with ritual activity (Glørstad 1999; 2010). At the Botne II site in Rogaland, peat layers dated between 8368–7428 cal BP (UA-2631, T-10760, T10761, UA-2630, T10759) produced eight fragments representing all three morphological types of hatchets made from stone (Glørstad 1999:40). The deposition in several stratigraphic layers and the date ranges indicate episodic acts. From the damage and lack of use-wear on the majority of the tools, Glørstad (1999:42) concluded that the artefacts were likely intentionally destroyed and thrown into the bog by an estuary. Based on a landscape archaeological analysis Glørstad (2010) noted a remarkable co-occurrence in eastern and southern Norway during the Late Mesolithic between hatchets, Nøstvet axes, late Mesolithic rock art and water (Glørstad 1999:45; Glørstad 2010:226). He interprets these landscape-rooms and the association to waterways as essential for understanding the integration of the late Mesolithic world both in terms of practical communication, hunting and fishing and in a cosmological sense where the water is perceived as a medium to communicate with the worlds of spirits and ancestors for example through offerings or by creating rock carvings as portals to the spiritual world. In the late Mesolithic southeastern context, the elk is ascribed a pivotal meaning both as a motive in rock art and as a very important food resource (Glørstad 2010:226–234). Glørstad develops his line of reasoning to interpret the shapes of the antlers from this favored animal and prey to be mirrored in the shapes of the hatchets, thus melding the founding powers and virility of the ancestor and the elk as one gestalt into the hatchets and later into the carvings. From the dates available at the time, Glørstad sees the two material expressions, the hatchets and the rock carvings, to follow in chronological succession and being associated with a change in structure of authority from big-men to seniors.

The age of the Kirkehavn simple hatchet (9884–9480 cal BP) and its particular context sparked an interest in following up on Glørstad's initial interpretation and to investigate the raw material from which the tool was made. Was this a reminder that big game hunting of cervids carried a particular meaning to the otherwise maritime adapted foragers, as he had suggested?[1]

1 An early ocular inspection of the Kirkehavn hatchet by osteologist Professor Anne Karin Hufthammer, University of Bergen, Department of Natural History, determined the artefact to likely be produced from elk antler.

Or could the raw material give other clues of interest?

Demography and cultural change

To contextualize the Kirkehavn hatchet we will in this paragraph describe aspects of contemporary demographic and cultural change that are presently discussed. Recent studies of ancient DNA (aDNA) from some of the oldest human remains in coastal Europe, represented by amongst others the ritual deposit of human individuals at Hummervikholmen dated to c. 9500 cal BP thus overlapping with the date of the Kirkehavn hatchet, have sustained that the individuals represented genetic admixture and contact between populations deriving from the Russian mainland (eastern hunter gatherers - EHG) and the initial pioneer population in Western Scandinavia (western hunter gatherers – WHG) (Günther *et al.* 2018). The finds derive from a submerged site by a small island in Søgne on the southern Norwegian coast, less than 100 km east of Kirkehavn.

The influx of new people into Norway has been seen to coincide with a technological shift introducing complex compound tools based on a specialized production of narrow blades and microblades (Damlien *et al.* 2018). Through contextual analysis of dated sites and lithic technologies from before 9500 BP on the Scandinavian Peninsula and nearby areas in Finland, Russia and Denmark, Manninen *et al.* (2021) manage to throw a more detailed light on migration events, periods of cultural co-existence between the two groups and social transmission of knowledge during a period of c. 1000 years of co-existence along the northern coastline of the Scandinavian peninsula and adjacent areas in Russia. This period is assumed to be followed by a dispersion of groups carrying a new and common cultural tradition southward into the central and southern parts of the Scandinavian peninsula from c. 10 300 cal BP and onwards. It is likely that this trail of west- and southbound human dispersal took place in pulses along several trajectories as the Fennoscandian ice sheet gradually melted (Damlien *et al.* 2018; Kashuba *et al.* 2019; Manninen *et al.* 2021).

Other aspects indicating societal change are the recurring settlement documented through more permanent house types and longer stays on settlement sites (Fretheim 2017) as well as consistent regional distributions patterns of raw material from known outcrops (Nyland 2016). Both aspects point towards a beginning regionalization and regional belonging during this period of the middle Mesolithic. Simultaneously, diversification of foraging strategies has been recorded as an accelerating process throughout the late early Mesolithic to the middle Mesolithic (Damlien 2016; Skar and Breivik 2018, Boethius 2018; Mansrud and Persson 2018; Nilsson *et al.* 2018). Even if a common denominator during this period is repeated returns to base localities with stable marine resources along the coast, the particularly strong marine adaption that has been documented from the Hummervikholmen individuals is so far only documented in the oldest deposits of the mentioned settlement context at Huseby Klev. Stable isotope analysis of the Hummervikholmen individuals indicates an intake of more than 80% marine protein deriving from the highest trophic levels, as for example in seal. This has not been documented from other areas than the south coast in Norway (Skar *et al.* 2016; Günther *et al.* 2018, suppl.), and may therefore represent a regional pattern, but such a conclusion rest on a limited Norwegian record.

The finding and investigation of the Kirkehavn site

The hatchet from Kirkehavn was found by a local fisherman during dredging of a peat layer in the shallow water zone from the harbor floor at Kirkehavn, a fishing harbor on the island of Hidra on the south coast of Norway. The hatchet is 293 mm long with a symmetrical shaft hole 25 mm in diameter for attaching to a handle (Figure 2). The sides and the slightly curved upper surface are decorated with a geometric pattern of lines and notches. Measured from the shaft-hole one end is longer and has a rounded neck while the opposite,

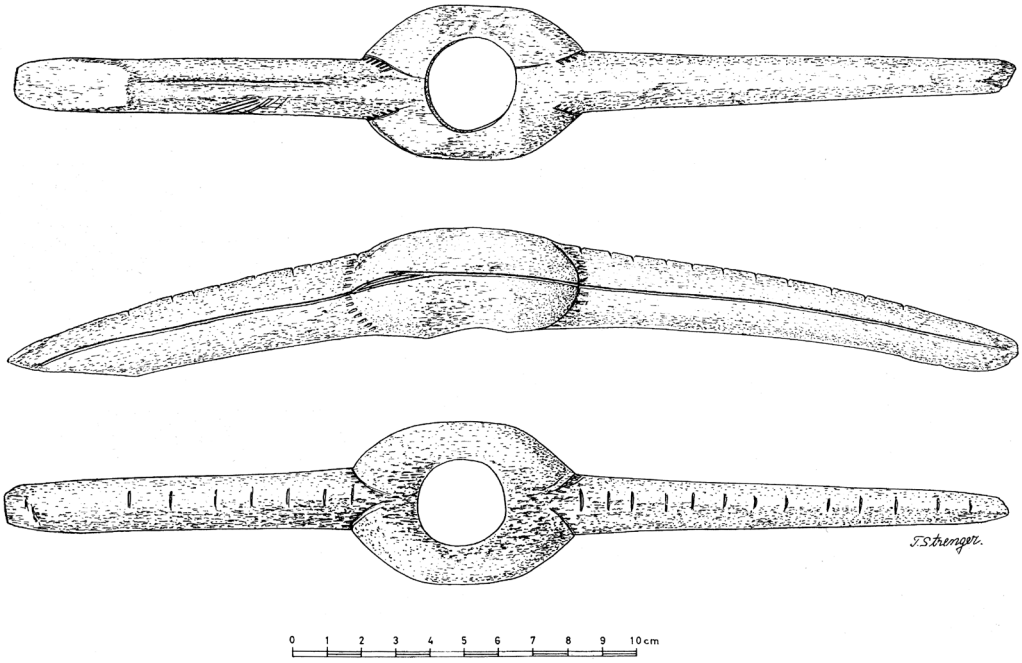


Figure 2. The Kirkehavn simple hatchet of whale bone. Drawing by Tone Strenger (with permission).

shorter end of the hatchet is polished to a sharp transverse edge. Line decoration is common on these types of artefacts, but any exact match has not been found in other Norwegian material.

During a short survey of the site in Kirkehavn in the autumn of 1997 a peat layer was observed extending from land at 0.5–1.5 m depth. Much of this layer had been removed by dredging. A profile was excavated in 1998 to date the peat. The results showed the peat to be much younger than the artefact. A sample from the base of the peat was dated to 3454–3205 cal BP (2σ, Beta-116096), while the top of the peat was dated as 2779–2409 cal BP (2σ, Beta-116097). The peat layer at Kirkehavn can therefore be a marine peat (Sollesnes and Fægri 1951), but no palynological analysis has been carried out. The fishing harbor of Kirkehavn was established in 1990 and no archaeological underwater survey was conducted prior to the dredging operations, which removed as much as 70–80% of the original peat layer from 1.5 m to 6 m depth. Despite unclarity regarding the exact provenience of the hatchet in the marine deposits, the hatched would have derived from layers no deeper than the maximum extent of the dredging c. -6 meters. The post-glacial regression minimum on Hidra outside Flekkefjord would be somewhere between -7 meters (Preboreal/ Boreal) on Lista to the east (Midtbø *et al.* 2000) and -10 meters (Preboreal) by Egersund to the west (Prøsch-Danielsen 1997). As mentioned earlier the exact shoreline displacement for this area is not established, although it is clear that the hachet dates to shortly after the regression minimum (Romundset *et al.* 2015: 395, fig. 6B). It is thus possible that the artefact was originally deposited on land, in shallow water close to the sea, or directly close to the shore in the sea. This area was transgressed during the Atlantic transgression (c. 7700 cal BP) to remain inundated and later overgrown with the

mentioned peat that has served to protect the artefact.

Analysing the hatchet - methods

Age determination

A sample of the hatchet has previously been radiocarbon dated by accelerator mass spectrometry (AMS), which resulted in an uncorrected ^{14}C age of 8980±75 years before present and an associated $\delta^{13}C$ value of -16.6 ‰ (TUa-1583). Based on the species identification (see below), we calibrated this ^{14}C date and corrected for marine reservoir effect using a ΔR value of 7±11 yr, which is recommended for organisms living in the surface waters of the open North Atlantic during the Holocene (Mangerud *et al.* 2006). This was performed using the Calib 7.0.2 program with Marine13 correction (Stuiver and Reimer 1993, Reimer *et al.* 2009). Unless otherwise stated, all terrestrial and lab referenced dates reported in the text are in calibrated ages (Oxcal 4.4 using the IntCal20 calibration curve; Reimer *et al.* 2020).

Species identification

In order to determine the species from which the bone hatchet was made, we sampled about 40 mg of bone powder which was drilled out from the interior side of the shaft hole. DNA was extracted from this powder using a modified version of the Qiagen DNeasy Blood and Tissue Kit protocol (as described in Bjørnstad and Røed 2010) at a dedicated clean-lab at NMBU Faculty of Veterinary Medicine. Several precautions were taken to ensure amplification of authentic DNA from the sample (e.g. Cooper and Poinar 2000). All equipment and working surfaces were cleaned using sodium hypochlorite, ethanol and UV-light. Drilling and extraction were performed in a designated lab that is physically separated from post-PCR laboratories, and where modern material of relevant species had never been present. Lab coats and breathing masks were used, and gloves were changed frequently. The outer surface of the sample was removed before drilling of the bone powder. Blank extractions or PCR controls were used in each reaction and the DNA sequences were replicated from three different PCRs.

PCR amplifications were done using two different primer pairs that amplify different parts of the mitochondrial 16S rRNA gene. For this we used the "16Smam" primers (Taylor 1996), and the primer pair "N16S3" (5'- CGAGGGTTT-TACTGTCTCTTACTTCC-3'/5'-AAGCTCCA-TAGGGTCTTCTCG-3') which was originally made to identify Scandinavian ungulates from highly degraded DNA. The PCR was carried out in 25 µL volumes using 8µL of the DNA extracts, 0.625 U of Pfu-Turbo Hotstart DNA Polymerase (Stratagene), 2.5 µl 10xPfu buffer, 12.5 pmol of each primer, 2.5 µg bovine serum albumin (Sigma) and 200 µM of each dNTP. The PCR protocol was 2 min denaturation at 95°C followed by 46 cycles of 30 s denaturation at 95°C, 60 s annealing at 50°C, 60 s of extension at 72°C, and a final extension step of 10 min at 72°C. Amplified PCR products (inspected on gel) were cleaned using ExoSAP-IT (USB). Sanger sequencing of both strands was performed using BigDye terminator cycle sequencing kit v.1.1 on an ABI 3100 automated sequencer (Applied Biosystems). All sequences were inspected and aligned by eye with aid of Proseq 2.91 (Filatov 2002), and in order to identify the species the finished sequences were put through a nucleotide BLAST search (Zhang *et al.* 2000) via GenBank and the National Center for Biotechnology Information (NCBI). Based on these results, the sequences were compared with published sequences of modern Balaenidae (Milinkovitch *et al.* 1994; Arnason *et al.* 2004; 2018; Sasaki *et al.* 2005; Nyhus *et al.* 2016; Allwood *et al.* 2018).

Results

Dating

The corrections and calibration of the ^{14}C date resulted in a calibrated age of 9884–9480 cal

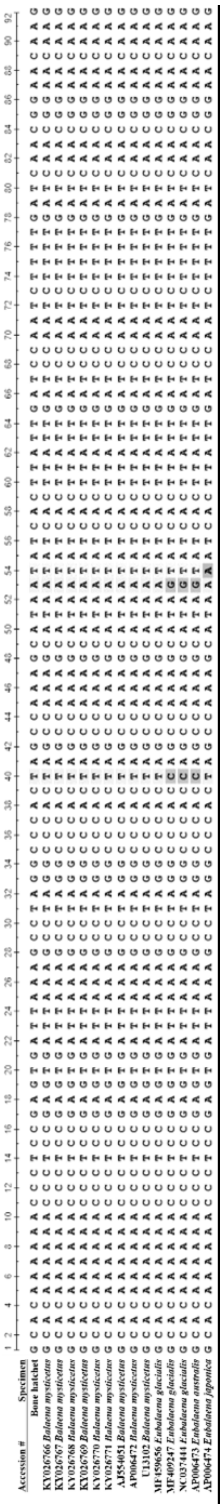


Figure 3. Comparison of the 92 bp long mtDNA sequence (using the 16Smam primers) from the Kirkehavn hatchet (on top) with published sequences of modern Balaenidae. This includes eight individuals of Balaena mysticetus, two individuals of Eubalaena glacialis, one individual of Eubalaena australis and one individual of Eubalaena japonicus. Variable sites that differ from the hatchet are highlighted. Figure: Jørgen Rosvold.

BP (using 2σ ranges). This date places the find within the Early Holocene and the first phase of the Middle Mesolithic (MM1).

DNA analysis

Reproducible sequences were obtained from both primer sets, with no indications of any contaminations (i.e. none of the control samples produced any amplified PCR products). The "N16S3" primers produced a 52 bp long working sequence (TTAATCAGTGAAATTGACCTCCCCGTGAAGAGGCGGGGATAATAAAATAAGA) that identified the bone to likely originate from a whale, while the "16Smam" primers produced a 92 bp long working sequence (GCACAAAAAACCCTCCGAGTGATTAAAGCCTAGGCCCACTAGCCAAAGCATAATATCACTTATTGATCCAATCTTTTGATCAACGGAACAAG) that further identified the bone (Ident.: 100%, E-value: $3e^{-39}$, Query cover 100%, Total score: 171) to belong to either a bowhead whale (*Balaena mysticetus*) or a northern right whale (*Eubalaena glacialis)*. Further inspection of the results show that the sequence is identical to all published sequences of modern bowhead whales, as well as a large sample of sequences from ancient bowhead whale bones (Grond *et al.* 2019). The sequence generally differs by one or two bases from the closely related right whales (*Eubalaena* spp.), but one sample of a modern northern right whale (MF459656, Allwood *et al.* 2018) differs from the others and is identical to the bowhead whales. This result is in line with the previous $\delta^{13}C$ value from the ^{14}C analysis, which indicates a marine diet (Figure 3). No work has previously been done on whales at the laboratory, thus it is highly unlikely that the identification is the result of contamination.

Discussion

Whaling or scavenging?

The Hidra hatchet was made from the bone of a Balaenidae whale, most likely a bowhead whale,

but potentially a northern right whale. Bowhead whale is a large circumpolar arctic species that is generally associated with the pack ice (Curry and Brownell 2014). Several Late Glacial bones of bowheads have been found in southern Scandinavia, and the North Sea area seems to have been a good habitat for bowheads during the Late Pleistocene (Aaris-Sørensen *et al.* 2010; Foote *et al.* 2013; Wiig *et al.* 2019). During the Pleistocene-Holocene transitions, however, their distributions shifted far northwards (Foote *et al.* 2013; Wiig *et al.* 2019), along with the rapidly warmer sea temperatures and retreating sea ice (Moros *et al.* 2004; Risebrobakken *et al.* 2010). At the time of the Hidra hatchet, southern Norway would have been outside of the normal range of bowheads, but bone finds in Denmark of various Holocene ages indicate that these seas experienced occasional stray animals (Aaris-Sørensen *et al.* 2010). The closely related, and morphologically very similar, northern right whale might have been more common at that time, but bone finds of this species are also rare (Aaris-Sørensen *et al.* 2010; Foote *et al.* 2013; Wiig *et al.* 2019).

Historically the bowheads and northern right whales were both included among the "right whales" (similarly "retthval" in Norwegian), a group of whales that were particularly sought after by whalers due to being large and relatively easy to hunt and handle, as they swim relatively slowly and usually float after they are killed. Bowhead whale hunting, using small boats and throwing harpoons, is well known from arctic North America and Greenland and is likely a very old tradition (Seersholm *et al.* 2016). Such a large whale represents a rich supply of resources of meat, bone, baleen and particularly large amounts of blubber. The knowledge of hunting such types of whales might thus have been well known, and the catch could be the result of hunting a straggler, but it is also possible that the hatchet was made from material harvested from a stranded whale.

Cultural contextualisation of the Hidra hatchet

How can the Hidra hatchet be understood in its context in the early middle Mesolithic of newly introduced or developed cultural traditions in western Scandinavia? A general review of other aspects of material culture manifestations helps fill in the picture and illustrate innovations and cultural changes that are introduced during the approximately 500–1000 years from the first transformation observed in change of archery and cutting tools (Skar 2022). These changes may have been introduced as a result of cultural encounters and influx of people.

In the context of the Hidra hatchet it is particularly relevant to draw on contemporary depictions of whales (Figure 4). Depictions of

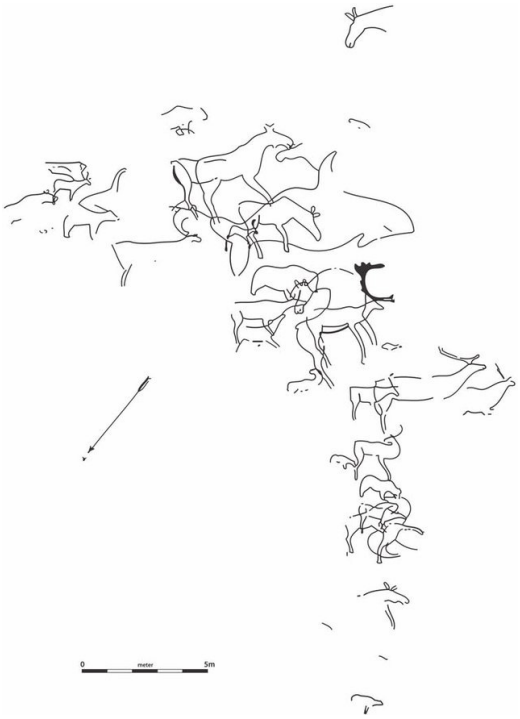


Figure 4. c. 10 000 years old polished rock art at Leiknes I in Nordland, displaying a 7.63 m long whale. By permission from Trond Lødøen.

whales are together with cervides and birds the most common marine motives in arctic/northern rock art that exist from Central Norway and further north (Sognnes 1999; Stebergløkken 2016:89). Many depictions of whales also further to the south have been dated by shoreline displacement to the late Mesolithic and later (Mikkelsen 1977; Stebergløkken 2016). However, some of the polished rock art in Northern Norway illustrating whales are in fact contemporary with the Hidra hatchet. A relatively large amount of the polished rock art has been shoreline dated to the period between 11 200 and 9000 cal BP (Gjerde 2010:386, fig. 275), even though the precision of dating rock art by shoreline displacement may be estimated there are indications that several of the Northern Norwegian sites predate the cultural transformations happening around 9500 cal BP. The naturalistic polished art found in the Ofoten and Steigen areas illustrate different types of prey for a marine adapted population as does the recently found umiak-like boat from Valle, - a vital part of the marine foraging technology (Gjerde 2021). The rock art sites have been taken to represent arenas of ritual practice for the pioneer groups that first arrived in this landscape (Gjerde 2021). The interpretation of the role of rock art as a material culture expression is challenging but can most directly be associated with myths, illustrations of hunting scenes and communication with the other world in a context of rite of passage (Gjerde 2010). A 7.63 m long whale from Leiknes I in Ofoten is shoreline dated to between 10 000 and 9000 cal BP (Gjerde 2011, fig.5). Even though we are missing contemporary hunter gatherer imagery illustrating whales in the vicinity of the southern coast in Norway, there is hardly any doubt that the knowledge of whale-hunting and scavenging of stranded whales as well as the materiality and extraordinary richness of such a "catch" must have been well known to the contemporary coastal population.

The rumor of a caught or stranded bowhead whale – an animal from which old tales were told - would have attracted relatives and associates within a hunter gatherer network from far away and would likely have caused feasting and provisioning for quite some time. The making of a procession weapon like the hatchet from remnant of the whale may have been a manifestation of power over the "catch" and a symbol of the ability of the owner to communicate with the other world. Whether the hatchet from Hidra was intentionally deposited in the sea or in a shallow lake close to the sea is a possibility. As material culture remains hatchets and early rock art share the common landscape denominator of being localized close to the sea and as suggested by Glørstad (1999) may signify ritual landscapes where rites of passage may have taken place during the Mesolithic. The oldest of the arctic rock carvings are so far the oldest archaeologically observed manifestations of ritual practices in Mesolithic Norway. The most recent models of co-existence and social interaction between culturally diverse groups in the Fennoscandian area (Manninen *et al.* 2021) reach back to 11 600 cal BP on the northern and northeastern coast of Finnmark. According to this model the culturally and biologically mixed groups gradually progressed towards the central and southern parts of the Scandinavian peninsula following both an inland and a coastal route to reach the Ofoten area before 10 000 cal BP. The earliest Arctic rock art could thus hypothetically be related to cultural encounters and a need to renegotiate social structures and access to resources.

Conclusion

The contemporaneity of several phenomena indicating societal changes like the changes in lithic technology, the evidence gained from aDNA on human remains strongly indicating an eastern migration (Günther *et al.* 2018), the reporting of ritual deposition of humans (Skar *et al.* 2016), early stages of imagery in rock art and the appearance and ritual deposition of personalized equipment like the Hidra hatchet suggests that the early middle Mesolithic is a dynamic era involving comprehensive societal transformations. The oldest rock carvings, human burials/deposits and sacrifices of prestigious tools may

be understood as modes of engagement with the landscape that upheld the cosmographical order, by marking and maintaining different categories of place during a period of major societal changes (Brück 1995). Despite a fragmented archaeological record from the middle Mesolithic there seems to be clear indications that rituals took new and more visible shapes, as illustrated here, and much earlier than previously suggested. Paired with indications of regionality both observed in settlement (Fretheim 2017) and in raw-material extraction and distribution (Nyland 2016), the conditions for particular political and social roles of power to emerge would likely have been good, leading to more complex stratified societies and rituals related to reproduction and renegotiation of the social structure, as well as the right to access particular resources in which the leader in possession of the hatchet played a central role. The Hidra hatchet predates the Botne context by more than 1000–1500 years thus underlining the early introduction and long-lived tradition of producing this type of procession artefact. Seen in a context of the broad spectrum of material culture indications of major cultural change the hatchet from Hidra and the nearby ritual site on Hummervikholmen indicate a beginning on the southern coast of the establishment of stratified hunter gatherer societies with a need to manifest social territories, a development that progresses to throughout the Mesolithic.

Without the few but very important archaeological sites where the organic record is good, we miss out on crucial aspects of prehistoric societal development. In this article the inundated sites along the southern coast have played an important part, there are a few other Mesolithic contexts of varying kind from which we have for example human remains (Schülke 2022). They are all of the greatest importance. Still, compared to other areas of the Scandinavian and Baltic seas (e.g. Moe Astrup 2019; Hansson *et al.* 2018; Gross *et al.* 2018; Nilsson *et al.* 2018) we have in Norway had very little focus on the richness and crucial importance of the sub-merged record to push archaeological knowledge production ahead.

Summary

*Submerged archaeological sites from the early Holocene, along the south-western and western Norwegian coastline are important sources of new information about stone-age human populations and coastal adaptation. In this article we present a Mesolithic hatchet made of bone that was found at the harbor floor at Kirkehavn in southern Norway in 1997. While radiocarbon dating proved this hatchet to be the oldest directly dated in Scandinavia (9884–9480 cal BP), aDNA analysis has identified the species from which this hatchet was made as either bowhead whale (*Balaena mysticetus*) or northern right whale (*Eubalaena glacialis*). The deposit of the hatchet must be understood in light of other contemporary ritual deposits along the south coast of Norway like the sub-merged Middle Mesolithic ritual site at Hummervikholmen and the cultural transformations taking place during this time. The result supplements the tale of new introductions in cultural practice and in material culture concurrently indicating the introduction of more complex hunter gatherer societies, while the distinctly marine adaptation continued on this part of the coast.*

Literature

Aaris-Sørensen, K., Lund Rasmussen, K., Kinze, C., and K. Strand Petersen 2010 Late Pleistocene and Holocene whale remains (Cetacea) from Denmark and adjacent countries: species, distribution, chronology, and trace element concentrations. *Marine Mammal Science* 26: 253–281.

Allwood, J. S, Scheible, M. K. and S.A. Faith 2018 Demonstration of a basic mitochondrial enrichment method to produce the complete mitochondrial genome sequence of the endangered North Atlantic right whale (*Eubalaena glacialis*). *Conservation Genetics Resources* 10: 483–486.

Arnason, U., Gullberg, A. and A. Janke 2004 Mitogenomic analyses provide new insights into cetacean origin and evolution. *Gene* 333: 27–34.

Árnason, Ú., Lammas, F., Kumar, V., Nilsson, M. A., and A. Janke 2018 Whole-genome sequencing of the blue whale and other rorquals finds signatures for introgressive gene flow. *Science Advances* 4: 1–10.

Bjørnstad, G. and K. H. Røed 2010 Museum specimens reveal changes in the population structure of northern Fennoscandian domestic reindeer in the past one hundred years. *Animal Genetics* 41: 281–285.

Boethius, A. 2018 Huseby Klev and the quest for pioneer subsistence strategies: diversification of a maritime lifestyle. In *Ecology of Early Settlement in Northern Europe: Conditions for Subsistence and Survival. The Early Settlement of Northern Europe, volume 1*, P. Persson, Riede, F., Skar, B., Breivik, H. M. and L. Jonsson (eds.), p. 99–128. Equinox Publishing, Sheffield.

Bondevik, S., Stormo, S.K. and G. Skjerdal, 2012 Green mosses date the Storegga tsunami to the chilliest decades

of the 8.2 ka cold event. *Quaternary Science Reviews* 45: 1–6.

Breivik, H. M. 2016 Dynamic relations between humans and environment in the earliest settlement phase of Norway (9500–8000 cal BC). Unpublished thesis. The Norwegian University of Science and Technology, Trondheim.

Brück, J. 1995 A place for the dead: the role of human remains in late bronze age Britain. *Proceedings of the Prehistoric Society* 61: 245–277.

Cooper, A. and H. N. Poinar 2000 Ancient DNA: do it right or not at all. *Science* 289: 1139.

Curry, B. E. and R. L. Brownell 2014 Family Balaenidae (Right and Bowhead whales). In *Handbook of the mammals of the world. Vol. 4. Sea mammals*, D. E. Wilson and R. A. Mittermeier (eds.), p. 186–213. Lynx Edicions, Barcelona.

Damlien, H. 2016 Between tradition and adaption: Long-term trajectories of lithic tool-making in south Norway during the postglacial colonization and its aftermath (c 9500–7500 cal. BC). Unpublished thesis, University of Stavanger no. 297, Stavanger.

Damlien, H., Kjällquist, M. and K. Knutsson 2018 The Pioneer Settlement of Scandinavia and its Aftermath: New Evidence from Western and Central Scandinavia. In *Technology of Early Settlement in Northern Europe. Transmission of Knowledge and Culture. The Early Settlement of Northern Europe, volume 2*, Knutsson, K., Knutsson, H., Apel, J. and H. Glørstad (eds.), p. 99–138. Equinox Publishing, Sheffield.

Filatov, D. A. 2002 PROSEQ: A software for preparation and evolutionary analysis of DNA sequence data sets. *Molecular Ecology Notes* 2: 621–624.

Fløttum Westgaard, H. 2020 Spor av rituell praksis i mellom og sen-mesolitikum – en chaine operatoire og landskapsanalyse av hakker og køller fra Midt-Norge og Nord-Norge. Unpublished thesis. The Norwegian University of Science and Technology, Trondheim.

Foote, A. D., Kaschner, K., Schultze, S. E., Garilao, C., Ho, S.Y.W., Post, K., Higham, T. F.G., Stokowska, C., van der Es, H., Embling, C. B., Gregersen, K., Johansson, F., Willerslev E. and M T. P. Gilbert 2013 Ancient DNA reveals that bowhead whale lineages survived Late Pleistocene climate change and habitat shifts. *Nature Communications* 4: 1–7.

Fretheim, S. E., 2017 Mesolithic Dwellings. An empirical approach to past trends and present interpretations in Norway. Unpublished Thesis, NTNU, Trondheim.

Gjerde, J. M. 2010 Rock Art and Landscape. Studies of Stone Age rock art from Northern Fennoscandia. Unpublished thesis, University of Tromsø, Tromsø.

Gjerde, J. M. 2011 En reise i Barentsregionens bergkunst – «litt spreidd småplukk». Fersk forskning, ny turisme, gammel bergkunst. *Alta Museums skriftserie* 1: 16–30.

Gjerde, J. M. 2021 The Earliest Boat Depiction in Northern Europe: Newly discovered Early Mesolithic Rock Art at Valle, Northern Norway. *Oxford Journal of Archaeology* 40(2): 136–152.

Gjessing, G. 1945 *Norges Steinalder*. Norsk Arkeologisk Selskap, Oslo.

Glørstad, H. 1999 Lokaliteten Botne II – Et nøkkelhull til det sosiale livet i mesolittikum i Sør-Norge. *Viking* 62: 31–68.

Glørstad, H. 2010 *The structure and history of the Late Mesolithic societies in the Oslo Fjord area 6300–3800 BC*. Bricoleur Press, Lindome.

Glørstad, H., Gundersen, J., Kvalø, F., Nymoen, P., Simpson, D and B. Skar 2020 Norway: Submerged Stone Age from a Norwegian Perspective. In *The Archaeology of Europe's Drowned Landscapes*, Bailey, G., Galanidou, N., Peeters, H., Jöns, H. and M. Mennenga (eds.), p. 125–143. Springer Nature, New York.

Gräslund, B. 1962 Skafthålsförsedda spetsredskap av sten. *Tor* VIII: 105–150.

Grond, J., Płecha, M., Hahn, C., Wiig, Ø. and L. Bachmann 2019 Mitochondrial genomes of ancient bowhead whales (*Balaena mysticetus*) from Svalbard. *Mitochondrial DNA Part B* 4: 4152–4154.

Gross, D., Zander, A., Boethius, A., Dreibrodt, S., Grøn, O., Hansson, A., Jessen, C., Koivisto, S., Larsson, L., Lübke, H. and B. Nilsson, B. 2018 People, lakes and seashores: Studies from the Baltic Sea and adjacent areas in the early and mid-Holocene. *Quaternary Science Reviews* 185: 27–40.

Günther, T., Malmström, H. , Svensson, E. M., Omrak, A., Sanchez-Quinto, F., Kilinc, G. M., Krzewińska, M., Eriksson, G., Fraser, M., Edlund, H., Munters, A. R., Coutinho, A., Simões, L. G., Vicente, M., Sjölander, A., Sellevold, B. J., Jørgensen, R., Claes, P., Shriver, M.D., Valdiosera, C., Netea, M. G., Apel, J., Lidén, K., Skar, B., Storå, J., Götherström, A. and M. Jakobsson 2018 Population genomics of Mesolithic Scandinavia: Investigating Early Postglacial Migration Routes and High-latitude Adaptation. *PLoS Biology* 16: 1–22.

Hansson, A., Björck, S., Heger, K., Holmgren, S., Linderson, H., Magnell, O., Nilsson, B., Rundgren, M., Sjöström, A. and D. Hammarlund 2018 Shoreline displacement and human resource utilization in the southern Baltic Basin coastal zone during early Holocene: New insights from a submerged Mesolithic landscape in south-eastern Sweden. *The Holocene* 28: 721–737.

Kashuba, N., Kirdök, E., Damlien, H., Manninen, M., Nordqvist, B., Persson, P. and A. Götherström 2019 Ancient DNA from mastics solidifies connection between material culture and genetics of Mesolithic hunter-gatherers in Scandinavia. *Communications Biology* 2: 1–10.

Mangerud, J., Bondevik, S., Gulliksen, S., Hufthammer, A. K. and T. Høisæter 2006 Marine ^{14}C reservoir ages for 19th century whales and molluscs from the North Atlantic. *Quaternary Science Reviews* 25: 3228–3245.

Manninen M., Damlien, H, Kleppe, J. I., Knutsson, K., Murashkin, A., Niemi, A. R., Rosenvinge, C. S. and P. Persson 2021 First encounters in the north: cultural

diversity and gene flow in Early Mesolithic Scandinavia. *Antiquity* 95: 310–328.

Mansrud, A and P. Persson 2018 Waterworld: Environment, Animal Exploitation, and Fishhook Technology in the North-Eastern Skagerak Area During the Early and Middle Mesolithic (9500–6300 cal. BC). In *Ecology of Early Settlement in Northern Europe: Conditions for Subsistence and Survival. The Early Settlement of Northern Europe, volume 1*, P. Persson, Riede, F., Skar, B., Breivik, H. M. and L. Jonsson (eds.), p. 129–166. Equinox Publishing, Sheffield.

Midtbø, I., Prøsch-Danielsen, L and K. L. Hjelle 2000 The Holocene shoreline between Mandal and Kristiansand, Vest-Agder, southern Norway; a preliminary study. *AMS Varia 37*: 37–49.

Mikkelsen, E. 1977 Østnorske veideristninger – kronologi og økokulturelt miljø. *Viking* 40: 147–201.

Milinkovitch, M. C., Meyer, A. and J. R. Powell 1994 Phylogeny of all major groups of cetaceans based on DNA sequences from three mitochondrial genes. *Molecular Biology and Evolution* 11: 939–948.

Moe Astrup, P. 2018 *Sea-level Changes in Mesolithic Soithern Scandinavia. Long- and Short-term Effests on Society and the Environment*. Moesgaard Museum and Jutland Archaeological Society, Aarhus.

Moros, M., Emeis, K.-C., Risebrobakken, B. and E. Jansen 2004 Sea surface temperatures and ice rafting in the Holocene North Atlantic: climate influences on northern Europe and Greenland. *Quaternary Science Reviews* 23: 2113–2126.

Nilsson, B., Sjöström, A. and P. Persson 2018 Seascapes of Stability and Change: The Archaeological and Ecological Potential of Early Mesolithic Seascapes, with Examples from Haväng in the South-Eastern Baltic, Sweden. In *Ecology of Early Settlement in Northern Europe: Conditions for Subsistence and Survival. The Early Settlement of Northern Europe, volume 1*, P. Persson, Riede, F., Skar, B., Breivik, H. M. and L. Jonsson (eds.), p. 335–352. Equinox Publishing, Sheffield.

Nyhus, E. S., Lindqvist, C., Kovacs, K., Lydersen, C., Wiig, Ø and L. Bachmann 2016 Mitogenomes of contemporary Spitsbergen stock bowhead whales (*Balaena mysticetus*). *Mitochondrial DNA* 1: 898–900.

Nyland, A. J. 2016 Humans in Motion and Places of Essence. Variations in rock procurement practices in the Stone, Bronze and Early Iron Ages, in Southern Norway. Unpublished thesis, University of Oslo, Oslo.

Nymoen, P. and B. Skar 2011 The Unappreciated cultural landscape: Indications of submerged Mesolithic settlement along the Norwegian southern coast. In *Submerged Prehistory*, Benjamin, J., Pickard, C and A. Fischer (eds.), p. 38–54. Oxbow books, London.

Prøsch-Danielsen, L. 1997 New light on the Holocene shore displacement curve on Lista, the southernmost part of Norway. *Norsk Geografisk Tidsskrift* 51: 83–101.

Rankama, T. and J. Kankaanpää 2018 From Russia with Love: Eastern Intruders in the North Norwegian Mesolithic. In *Early Economy and Settlement in Northern Europe: Pioneering, Resource Use, Coping with Change*, Blankholm, H. P. (ed.), p. 139–168. Equinox publishing, Sheffield.

Reimer, P. J., Baillie, M. G. L., Bard, E., Bayliss, A., Beck, J. W., Blackwell, P. G., Bronk Ramsey, C., Buck, C. E., Burr, G. S., Edwards, R. L., Friedrich, M., Grootes, P. M., Guilderson, T. P., Hajdas, I., Heaton, T. J., Hogg, A. G., Hughen, K. A., Kaiser, K. F., Kromer, B., McCormac, F. G., Manning, S. W., Reimer, R. W., Richards, D. A., Southon, J. S., Talamo, S., Turney, C. S. M., van der Plicht,, J. and C. E. Weyhenmeyer 2009. IntCal09 and Marine09 radiocarbon age calibration curves, 0-50,000 years cal BP. *Radiocarbon* 51: 1111–1150.

Reimer, P. J., Austin, W. E. N., Bard, E., Bayliss, A., Blackwell, P. G., Bronk Ramsey, C., Butzin, M., Cheng, H., Edwards, R. L., Friedrich, M., Grootes, P. M., Guilderson, T. P., Hajdas, I., Heaton, T. J., Hogg, A. G., Hughen, K. A., Kromer, B., Manning, S. W., Muscheler, R., Palmer, J. G., Pearson, C., van der Plicht, J., Reimer, R. W. D., Richards, A. Scott, E. M., Southon, J. R., Turney, C. S. M., L. Wacker and F. Adolphi 2020 The IntCal20 nothern hemisphere radiocarbon age calibration curve (0-55 cal kBP). *Radiocarbon* 62: 725–757.

Risebrobakken, B., Moros, M., Ivanova, E.V., Christyakova, N. and R. Rosenberg 2010. Climate and oceanographic variability in the SW Barents Sea during the Holocene. *The Holocene* 20: 609–621.

Romundset, A., Fredin, O. and F. Høgaas 2015 A Holocene sea-level curve and revised isobase map based on isolation basins from near the southern tip of Norway. *Boreas* 44; 383–400.

Sasaki, T., Nikaido, M., Hamilton, H., Goto, M., Kato, H., Kanda, N., Pastene, L., Cao, Y., Fordyce, R., Hasegawa, M. and N. Okada 2005 Mitochondrial phylogenetics and evolution of mysticete whales. *Systematic Biology* 54: 77–90.

Seersholm, F. V., Pedersen, M. W., Jensen Søe, M., Shokry, H., Tze Mak, S. S., Ruter, A., Raghavan, M., Fitzhugh, W., Kjær, K. H., Willerslev, E., Meldgaard, M., Kapel, C. M.O. and A. J. Hansen 2016. DNA evidence of bowhead whale exploitation by Greenlandic Paleo-Inuit 4,000 years ago. *Nature Communications* 7: 13389.

Schülke, A. 2022. Placing – fragmenting – circulating: Mesolithic burial and mortuary practices in Norway in a Northern European Perspective. *UBAS* 12: 123–153.

Skar, B., Lidén, K., Eriksson, G., and B. J. Sellevold 2016. A submerged Mesolithic grave site reveals remains of the first Norwegian seal hunters. In *Marine Ventures: Archaeological Perspectives on Human–Sea Relations*, Bjerck, H. B., Breivik, H. M., Fretheim, S., Piana, E., Skar, B., Tivoli, A. and A. F. J. Zangrando (eds.), p. 225–241. Equinox Publishing, Sheffield.

Skar, B. and Breivik, H.M. 2018. Environment and adaptation of forager pioneers in the North- Western regions of Europe. In *Ecology of Early Settlement in Northern Europe: Conditions for Subsistence and Survival. The Early Settlement of Northern Europe, volume 1*, P. Persson, Riede, F., Skar, B., Breivik, H.

M. and L. Jonsson (eds.), p. 1–16. Equinox Publishing, Sheffield.
Skar, B. 2022 Mobility and Material Culture in the Middle Mesolithic of Fennoscandia – validating the input from Biomolecular Studies. *UBAS* 12: 105–121.
Skår, Ø. 2003 Rituell kommunikasjon i sein mesolitikum. En analyse av hakker og køllers symbolske betydning. Unpublished thesis, University of Bergen, Bergen.
Sognnes, K. 1999 *Det levende berget*. Tapir Forlag, Trondheim.
Sollesnes A. F. and K. Fægri 1951 Pollenanalytisk undersøkelse av to avleiringer fra Norges sydvestlige kyst. *Blyttia* 9: 41–58.
Stebergløkken, H. M. V. 2016 Bergkunstens gestalter, typer og stiler. En metodisk og empirisk tilnærming til veidekunstens konstruksjonsmåter i et midtnorsk perspektiv. Unpublished thesis, NTNU, Trondheim.
Stuiver, M. and P. J. Reimer 1993 Extended C-14 data base and revised CALIB 3.0 C-14 age calibration program. *Radiocarbon* 35: 215–230.
Taylor, P. G. 1996 Reproducibility of ancient DNA sequences from extinct Pleistocene fauna. *Molecular Biology and Evolution* 13: 283–285.
Wiig, Ø., Bachmann, L. and A. K. Hufthammer 2019 Late Pleistocene and Holocene occurrence of bowhead whales (*Balaena mysticetus*) along the coasts of Norway. *Polar Biology* 42: 645–656.
Zhang, Z., Schwartz, S., Wagner, L. and W. Miller 2000 A greedy algorithm for aligning DNA sequences. *Journal of Computational Biology* 7: 203–214.