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Hunting High and Low: Postglacial Colonization Strategies in Central Norway between 9500 and 8000 cal BC

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In this article, we examine aspects of the Postglacial colonization processes that took place in central Norway during the Early Mesolithic (c. 9500–8000 cal BC). The distribution of sites from this period shows that the colonizers approached and exploited two very different landscapes and resource situations—from archipelagic to alpine. Based on twelve artefact assemblages from central Norway we investigate how colonizing populations met the challenge posed by varying ecozones. Did they organize their settlements and technologies in similar ways or did they modify sites and activities in relation to the different locations? The aspects studied are site organization, artefact composition, projectiles, and lithic raw material use. It appears that the sites are of a similar size and structure across ecozones. Apart from some variations in tool composition, there is no evidence in the lithic material for any technical adaptation towards specific ecozones. We conclude that using a standard, generalized lithic technology, combined with high mobility and small group size, enabled the colonizing groups to overcome the risks and difficulties associated with settling and seeking out resources in new and unknown landscapes.

Keywords: Norway, Early Mesolithic, coastal and mountain environments, generalized adaptation

Introduction

Colonization processes—the movement and development of human populations into and in new lands—are a constant feature of prehistory and history. These processes are of great interest and value to a range of disciplines, including archaeology and anthropology. Examining past colonization processes offers the opportunity to focus on a broad spectrum of issues such as technology, mobility, ethnicity, settlement structure, risk management, and ecological knowledge, to mention but a few. In this paper, we use the term colonization to describe the period of significant and persistent human presence in Norway that started roughly around 9500 BC and continued for 1500 years. The archaeological record of this period, as it appears to us today, probably includes evidence of early 'landfall' events as well as more regular and habitual settlement. However, neither the technical nor the chronological resolution is currently sufficient to confidently separate one from the other. Rather, we view the sites as a long-term record of how early populations dealt with the challenges of colonizing a new landmass through many generations in the

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Early Mesolithic period at the start of the Holocene. In the context of early Postglacial Scandinavia, the Early Mesolithic settler generations were literally opening new roads into a pristine natural landscape that had emerged and developed after the retreat of the Scandinavian ice sheet. In this article, we examine some aspects of the Postglacial colonization processes that took place in central Norway during the Early Holocene.

During the last glacial maximum (*c.* 20,000 cal BC) the Scandinavian Peninsula and much of the Nordic Seas were covered in ice (Andersen & Borns, 1997: 9). Although large areas of the Norwegian coast were free of ice already in the Allerød phase, in *c.* 13,000–12,000 cal BC (Mangerud et al., 2011), the landmass was not settled until after the Younger Dryas cold event (Bjerck, 1995; Bang-Andersen, 2003b). The whole Norwegian coast seems to have been colonized within a few centuries at the beginning of the Early Mesolithic period, dated to 9500–8000 cal BC (Bjerck, 1995) and, for 1500 years, highly mobile hunter–gatherer groups utilized the emerging land.

The distribution of Early Mesolithic sites shows a distinct pattern where some 96 per cent of sites are located in the coastal zone (Bjerck, 1983; Svendsen, 2007; Nyland, 2012; Breivik, 2014). Sites from the same period have also been recovered in mountain contexts (Tørhaug & Åstveit, 2000; Bang-Andersen, 2003a, 2012, 2013; Bjerck & Callanan, 2005; Callanan, 2008). The colonizers therefore approached and exploited two very different landscapes and resource situations. In this article we refer to these broad topographical zones as ecozones. The *coastal ecozone* ranges from the archipelago of the outer coast to more sheltered channels and fjord heads on the inner coast. Palaeo-oceanographic data suggest a highly productive marine environment, which gradually changed from arctic to sub-arctic during the Preboreal period (Breivik, 2014). The outer coast, with its myriad skerries and islands, seems to have been especially bountiful and would have housed a wide range of sea mammals, fish, and waterfowl throughout the period. The *mountain ecozone* ranges from alpine to subalpine environments. Climatic data and osteological evidence from the Late-Glacial period indicate that reindeer were present from an early stage and through the whole phase, and smaller species such as polar fox, arctic hare, and wolverine may have been present in the first phase of the Early Mesolithic (Hufthammer, 2001, 2006). As the glaciers retreated and temperatures increased, arctic species were partly replaced by a more temperate fauna (Hufthammer, 2006; Grøndahl et al., 2010).

On the basis of the distribution of sites across different ecozones, Early Mesolithic hunters are interpreted as specialized maritime hunters who adapted to coastal landscapes and resources, and at the same time as reindeer hunters who followed age-old traditions from the continental Palaeolithic cultures. In fact, finds from this period have recently been interpreted as evidence of two separate, synchronic specializations, with one group based in the mountains and the other on the coast (see Wygal & Heidenreich, 2014). Most authors recognize the existence of a dual economy based on the seasonal exploitation of mountain and coastal resources in the Early Mesolithic. However, studies still tend to focus on the primacy of one ecozone over the other. In this article we wish to examine how human activities in the mountain and coastal ecozones were combined and integrated during the 1500-year-long period of colonization of Norway. Similarities and differences between coastal and mountain sites have previously been emphasized on a number of

occasions (e.g. Tørhaug & Åstveit, 2000; Bang-Andersen, 2003a, 2003b, 2012; Callanan, 2007; Svendsen, 2007; Bjerck et al., 2008; Fuglestvedt, 2009, 2012). In this article we focus systematically and in detail on these similarities and differences from an adaptive/strategic perspective: How did colonizing populations meet the challenges posed by different ecozones? Did they organize their settlements and technologies in similar ways, or did they modify sites and activities according to the different locations? Do we find ecozone-specific adaptations and specializations?

Central Norway is ideally suited to the study of these questions: Early Mesolithic sites have been preserved and investigated in both ecozones and the relatively short distances between mountain and coastal sites in the region mean that they are likely to have formed part of the same mobility system in the past (Figure 1). In order to better understand the similarities and differences between coastal and mountain sites during the Early Mesolithic, we compare four aspects of sites located in both ecozones: site organization, artefact composition, projectiles, and lithic raw material use. Their examination will allow us to discuss the questions outlined above.

Twelve Early Mesolithic Artefact Assemblages From Central Norway

Central Norway is located between 62° and 65° N and comprises three counties: Møre and Romsdal, Sør-Trøndelag, and Nord-Trøndelag. The topography ranges from skerries, islets, and islands, through sheltered sounds and narrow fjords, to

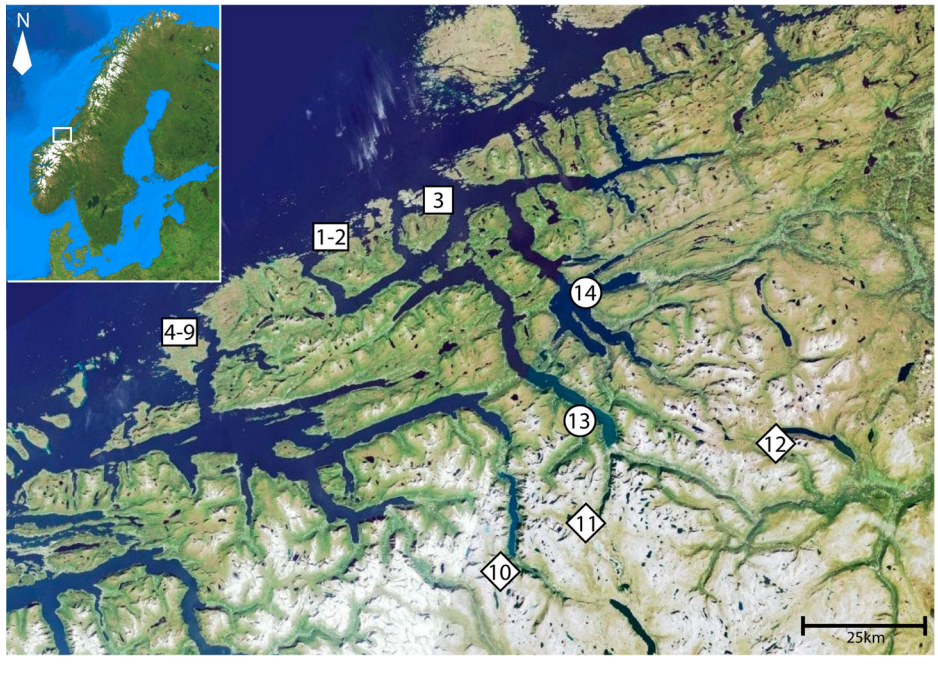


Figure 1. *Location of coastal (square) and mountain (lozenge) sites in central Norway included in the analysis. Nos. 1–2: Hestvikholmane Site 2–2012 & 3; no. 3: Kvernberget Site 20; nos. 4–9: Ormen Lange Site 48 Units A, G, I, J and Site 72 Units X & Y; no. 10: Sandgrovbotnen; no. 11: Reinsvatnet R1; no. 12: Brannhaugen. Other sites mentioned in the text: no. 13: Innvik and no. 14: Torvik.*

mountain plateaux and subalpine landscapes. A recent detailed synthesis of the region shows that *c.* 250 Early Mesolithic sites are distributed along the coast–inland axis (Breivik & Bjerck, in press).

Nine assemblages from five coastal sites and three assemblages from mountain contexts were chosen for the present study (Table 1). All the selected sites are well documented, with artefacts recorded within square metres or quarters, and with all excavated deposits sieved. In all cases, the excavated areas are assumed to cover a substantial part of the occupation site and are all interpreted as clean contexts, undisturbed by later activity. The assemblages recovered are thus considered to be representative of the Early Mesolithic period in the region. The selected sites date to different periods within the Early Mesolithic, but recent studies show a continuous use of the same toolkit and technology throughout the period and area (Breivik, 2014). The sites and assemblages selected for this study are considered, on this basis, as comparable and suitable for the study presented here. We shall start with giving some details of the sites selected.

The Coastal Sites

The Ormen Lange excavations on the island of Gossa in Aukra were conducted

Table 1. *Information on the Twelve Early Mesolithic Assemblages Analysed.*

Site	Ecozone	m asl	Radiocarbon dating BP/calibrated BC Calibrated dates generated using OxCal 3.10 (Bronk Ramsey, 2005)	Probable age cal BC	Reference
Ormen Lange Site 48, Unit A	Coastal	21		8800–9000	Bjerck et al. (2008)
Ormen Lange Site 48, Unit G	Coastal	20.6	9410 ± 55 BP (TUa-3576)/8760–8620 cal BC; 9515 ± 70 BP (TUa-3297)/9120–8740 cal BC	8800–9000	Bjerck et al. (2008)
Ormen Lange Site 48, Unit I	Coastal	20.1	9445 ± 130 BP (T-16928)/9150–8550 cal BC	8800–9000	Bjerck et al. (2008)
Ormen Lange Site 48, Unit J	Coastal	20	9480 ± 125 BP (T-17186)/9130–8630 cal BC	8800–9000	Bjerck et al. (2008)
Ormen Lange Site 72, Unit X	Coastal	18.5	9485 ± 110 BP (T-17001)/9120–8630 cal BC	8800–9000	Bjerck et al. (2008)
Ormen Lange Site 72, Unit Y	Coastal	18.5	9380 ± 70 BP (TUa-4589)/8750–8560 cal BC; 9480 ± 125 BP (T-17002)/9130–8630 cal BC	8800–9000	Bjerck et al. (2008)
Hestvikholmane Site 3	Coastal	31–33		8500–9000	Wammer (2006)
Hestvikholmane Site 2-2012	Coastal	39–40		*c.* 9500	Brede (2012)
Kvernberget Site 20	Coastal	40–45		*c.* 9300–9500	Strøm & Breivik (2008)
Reinsvatnet R1	Mountain	890	9495 ± 65 BP (TUa-6248)/9120–8650 cal BC	8600–9100	Callanan (2006, 2007)
Sandgrovbotnen	Mountain	1000		8000–9500	Sjøvold (1970)
Brannhaugen	Mountain	650		8000–9500	Bjerck & Callanan (2005)

during two field seasons in 2003 and 2004 (nos. 4–9 on Figure 1). The project included seven Early Mesolithic sites (Bjerck et al., 2008). On the largest site, Ormen Lange Site 48, over 70,000 lithic artefacts were recovered. The artefacts were distributed over eighteen units (Units A–R), each containing one or more lithic deposits—in most cases centred on a fireplace. On the basis of a series of radiocarbon dates as well as detailed analyses of the artefact distribution, the units were interpreted as traces of up to thirty occupations that took place within a timespan of some one hundred years, probably between 9000 and 8800 cal BC (Bjerck et al., 2008: 230, fig. 3.231). Four units (A, G, I, and J) are included in our analysis. Together they give a representative picture in terms of size and composition of the Ormen Lange Site 48 complex.

Ormen Lange Site 72 is located close to Site 48 but is much smaller in size. Here two separate units (X and Y) were identified (see Figure 2). Both are included in our study. In Unit X a rounded concentration of small, sorted stones was interpreted as a dwelling floor, perhaps in a tent. A fireplace and lithic deposits were recovered in association with this floor. Unit Y also included a stone dwelling floor and a fireplace. Artefacts were found scattered in and around the features. Both units were interpreted as single occupation events that occurred most probably within the same period as Site 48, i.e. between *c.* 9000 and 8800 cal BC (Bjerck et al., 2008: 436–44; Åstveit, 2009).

The agglomeration of separate units, as at Ormen Lange Sites 48 and 72, is not common in the Early Mesolithic record, where sites usually consist of a single occupation unit. For the purposes of the inter-site comparisons in the following analysis, we treat units from the Ormen Lange excavations as equal to individual sites.

Twelve Mesolithic sites were excavated in 2006 and 2012 on Hestvikholmane in Averøy (nos. 1–2 on Figure 1). Two Early Mesolithic sites from these excavations are included in this study. At Hestvikholmane Site 3, a tent ring with a central fireplace was recovered. A small quantity of lithics was associated with this structure, lying scattered inside the ring of stones. A large number of lithic artefacts was found together with a second fireplace in an area a few metres away from this dwelling structure. This was interpreted as the area where the main tool production took place. The site was believed to represent at least two different occupation events, and dated to *c.* 9700 BP (9200 cal BC) by shore-displacement curves (Wammer, 2006).

Hestvikholmane Site 2–2012 appeared as an extensive concentration of unsorted rocks during the initial stages of excavation. A dwelling floor consisting of a circular cleared area with an accumulation of artefacts was recovered amidst the rocky area. Two lithic deposits within the feature were interpreted as knapping areas and two concentrations of fire-cracked artefacts outside the dwelling were interpreted as the traces of fireplaces. The site was thought to be a camp used on two or more occasions, and dated to *c.* 10,000 BP (9500 cal BC) by shore-displacement curves (Brede, 2012).

At Kvernberget, Kristiansund, excavations were conducted in 2006 and 2007, and included three Early Mesolithic sites (no. 3 on Figure 1). Kvernberget Site 20 lay in an area with scattered lithics. A tent ring with an internal fireplace was recovered on the site. A large part of the artefacts were found in association with these structures. The site was interpreted as a single occupation of short duration (Strøm & Breivik, 2008) and the local shore-displacement curve places its use around 9800-1000 BP (9300–9500 cal BC).

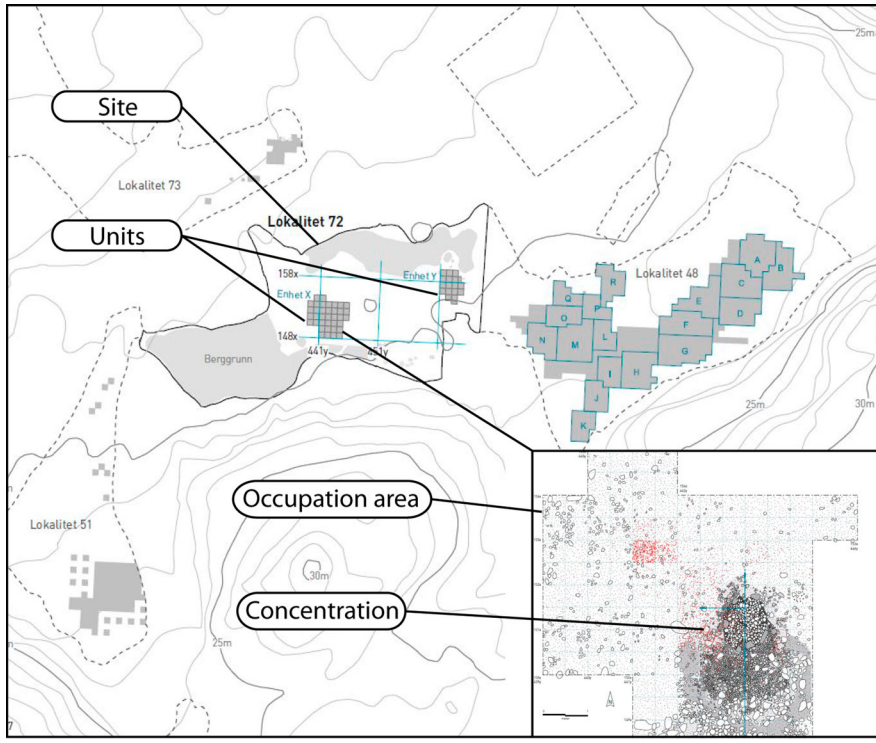


Figure 2. *Terms used in the analysis to describe different site elements. The example is based on Site 72 from the Ormen Lange complex (Bjerck et al., 2008: figs. 3.573 & 3.576).*

The Mountain Sites

The mountain site Reinsvatnet R1 (no. 11 on Figures 1 and 3) was excavated during two seasons in 2006 and 2009 and consisted of a fireplace surrounded by lithics. The lithics analysis indicated two activity areas in close association with each other. Production debris was concentrated around the fireplace, while a distinct work zone, characterized by a number of discarded tools, lay close by. The site was interpreted as the result of a single occupation. The fireplace was radiocarbon-dated to 9100–8600 cal BC (Callanan, 2006).

Sandgrovbotnen (no. 10 on Figure 1) was a small site discovered in the 1960s and excavated in 1970. This revealed an area of *c.* 6 m^2, cleared of stones and boulders, within which lithics were deposited (Sjøvold, 1970). Sandgrovbotnen has since been interpreted as a short-term occupation because of the size and character of the site. Typologically the lithics place the site in the Early Mesolithic or 9500–8000 cal BC (Callanan, 2007: 45–46).

Brannhaugen (no. 12 on Figure 1) was excavated in 2001. Parts of the site were disturbed during the construction of a mountain cabin, but the material recovered on the site suggests that this site was visited more than once. The distribution of the lithics indicates that a small temporary structure like a tent had probably been erected during occupation. The site was dated typologically to between 9500 and 8000 cal BC (Bjerck & Callanan, 2005).

Figure 3. *Landscape contrasts in central Norway. Views of excavations at two Early Mesolithic sites, the mountain site at Reinsvatnet R1 and coastal sites at Hestvikholmane.* Photograph by permission of NTNU University Museum/Martin Callanan (top) and Silje E. Fretheim (bottom).

These sites and units (hereafter simply referred to as 'sites') and assemblages will be compared in terms of the factors listed below.

Factors Studied

In order to investigate how Early Mesolithic sites were organized and used in different ecozones within the same geographical region, we charted the similarities and differences between the twelve artefact assemblages. Four different factors were taken into account: site organization, artefact composition, projectiles, and lithic raw material.

Site Organization

In a comprehensive study of Stone Age living spaces on the coast of western Norway, Nærøy (1988, 2000) analysed past behaviour as reflected in the relationship between artefact distribution and structural features on several sites (Nærøy, 2000: 90). His analysis encompassed elements including structural features, site size, artefact numbers, and distribution patterns. The aim was to identify activities undertaken on site and to single out individual activity areas. In the current study, we largely follow this approach by focusing on characteristics related to site organization: the quantity of artefacts deposited, the number of times the site was used and reused, the size of the site, and the type of structures associated with it. Similarities or differences across these categories should cast light on how the spatial organization of sites varied across the landscape.

Artefact Composition

Here we examine the relationship between the different artefact types and classes

found in our assemblages. Analysing this relationship reveals what kinds of tools were produced or in use on the sites, and documents how lithic production and maintenance was organized across sites in different zones. Similar inter- and intra-site analyses carried out on coastal sites in central Norway have demonstrated structural similarities in Early Mesolithic lithic assemblages (Bjerck et al., 2008). Given the differences in the distribution of food resources and lithic raw material between the ecozones (see below), it is possible that differences in tool use and raw material reduction will become evident across the assemblages. We compare artefact composition according to tool class, in order to highlight differences and similarities between the sites. The analysis also presents an opportunity to search for higher order structural relationships within and across the inventories. Are there similarities in the types and proportions of artefacts, debitage, and tools recovered? Is there a common basic structure across inventories? In other words, is there a 'typical' Early Mesolithic assemblage?

Projectiles

Analysing assemblages at site level gives a good overview of technical relationships. In order to look more closely at possible ecozone-specific adaptations and specializations, we can also focus on individual classes of artefacts that might reflect these kinds of processes. Projectile points are an interesting category in this regard, as they are present on all sites in both zones and were used to hunt varying prey throughout the region. Earlier comparisons of projectile inventories from Early Mesolithic sites on the coast and mountains of south-western Norway suggest that it is possible to identify discrete chronological and perhaps functional differences between the projectile assemblages found on sites in these zones (Bang-Andersen, 2003b: 13). Perhaps hunting marine mammals and terrestrial mammals demanded different types of projectiles? Is this reflected in the projectiles found on the different sites? We shall compare the metrics of projectile points from the sites under study to see if there are differences in the projectile inventories used in the different ecozones.

Lithic Raw Material

The distribution of useable lithic raw materials varied across the landscape in the Early Mesolithic and throughout the Stone Age. Flint was the lithic raw material most commonly used for tool production in the Early Mesolithic in central Norway. Flint nodules are mostly found in natural secondary deposits on beaches, having been transported on ice floes from primary deposits elsewhere (Pettersen, 1999). Alternatives such as quartz, quartzite, and rock crystal were also available at different locations. Nonetheless, it has been shown that in southern Norway flint is dominant on Early Mesolithic mountain sites, implying that flint was being carried to inland sites rather than replaced by locally available types (Tørhaug & Åstveit, 2000; Bang-Andersen, 2003b: 16). Are the same tendencies discernible in Early Mesolithic central Norway? The aim of this analysis is to see how differential access to useable lithic raw materials affected Early Mesolithic sites across the ecozones of central Norway.

Our analysis is by no means exhaustive; there are numerous additional factors and details that could be compared between the sites. Our purpose is to reveal basic structural similarities and differences that should shed light on the adaptive strategies employed by the Postglacial

colonizers of Norway. In the following section we present the results of these analyses.

Results

Site Organization

Lithics are the main marker of sites from this period and are often scattered over a wide area. However, dense concentrations of lithics are also often visible within this larger framework. In this analysis the term 'site size' refers to the size of the larger lithic scatters, whereas 'lithic concentration' refers to the size of dense lithic accumulations as interpreted by the excavators. While site size reflects the extent of activity on a given site, the size of lithic concentrations gives us a more finely grained impression of how the sites were organized and used in time and space.

Table 2 shows that site size in the coastal zone ranges between 8 and 40 m^2. In recent years, excavations on coastal sites have involved extensive use of mechanical excavators, which is reflected in the data here that includes several modern excavations. Mountain sites are usually excavated manually and delimited by way of test pits. This may be why site size tends to be smaller in the mountain zone. Despite these differences, the size range is very similar in both ecozones. None of the Early Mesolithic sites is smaller than 6 m^2.

Previous studies have shown that the most common Early Mesolithic reduction technique appears to have been soft hammer, direct percussion that produces relatively large amounts of debitage (Kutschera, 1999; Fuglestvedt, 2007). Table 2 illustrates that the number of artefacts recovered from our sites varies from a few hundred to several thousand. The most abundant assemblages are located on the coast as shown by the Ormen Lange assemblages. None of the mountain assemblages is of comparable size; the largest (Reinsvatnet R1) appears as medium-sized when compared to the largest coastal assemblages. On the other hand, smaller, less abundant assemblages are found both on the coast and in the mountains.

Nearly all the sites in the study consist of one dense concentration of lithic debitage and tools. The one exception is the mountain site of Reinsvatnet R1, where two distinct lithic concentrations were identified. The differences between the coastal and mountain zones in terms of size become less clear when looking at the lithic concentrations. While they range between *c.* 2 and 12 m^2 in extent, the majority measure between 6 and 10 m^2 both on the coast and in the mountains.

It can be challenging to estimate the exact number of occupations on a non-stratified site. Early Mesolithic sites are thought to be the product of either single or repeated occupations. Excavators often form a holistic impression of whether a particular site is the product of such single or multiple occupations. In most excavation reports, estimates of the number of episodes within an activity area are based either on the total number of artefacts or on the number of different raw material types recovered. The number of occupations listed in Table 2 is based on interpretations and analyses from the respective excavation reports (see references in Table 1). The results from sites in the coastal zone indicate that several were occupied on two or more occasions. Mountain sites appear more likely to represent single occupations. The site at Brannhaugen is an exception. Although small in size, the site was interpreted as a hunting station used on more than one occasion (Bjerck & Callanan, 2005).

The analysis further shows that fireplaces are a regular feature on Early

Table 2. Analysis of Site Organization on Twelve Early Mesolithic Sites in Central Norway.

Site	Site size	Number of lithic concentrations	Size of lithic concentration (s)	Number of artefacts	Number of occupations	Traces of fireplace	Traces of dwelling
Ormen Lange Site 48, Unit A	20 m^2	1	6–7 m^2	11,020	Multiple		
Ormen Lange Site 48, Unit G	27 m^2	1	6–7 m^2	9366	Multiple	x	x
Ormen Lange Site 48, Unit I	10 m^2	1	3 m^2	2631	One	x	
Ormen Lange Site 48, Unit J	8 m^2	1	1.5 m^2	853	One	x	
Ormen Lange Site 72, Unit X	20 m^2	1	8 m^2	1742	One	x	x
Ormen Lange Site 72, Unit Y	14 m^2	1	7 m^2	511	One	x	x
Hestvikholmane Site 3	40 m^2	1	8–10 m^2	3956	Two or more	x	x
Hestvikholmane Site 2–2012	45 m^2	1	9 m^2	3568	Two or more	x	x
Kvernberget Site 20	20 m^2	1	7 m^2	753	One	x	x
Reinsvatnet R1	40 m^2	2	9–12 m^2	4521	One	x	
Sandgrovbotnen	6 m^2	1	6 m^2	898	One		x
Brannhaugen	10 m^2	1	10 m^2	918	Two or more		

Mesolithic sites within the study area. These fireplaces are often small (<1 m^2), simple stone-set features containing charcoal, and in some cases heated flints. In most cases, the fireplace also served as a focal point for knapping activities. Four of the sites lack recognizable fireplaces. Interestingly, this includes Ormen Lange Site 48, Unit A, which is the largest site in the present analysis. Two of the mountain sites also lack fireplaces, although the records from the excavation at Sandgrovbotnen do mention at least one concentration of charcoal within the site area. In sum, there is no clear evidence for differential use of fireplaces on Early Mesolithic sites between the coast and mountains. However, the absence or presence of fireplaces may well be as much a function of differential preservation as of any variation in past behaviour.

The traces of dwellings found on sites in the study area include tent rings, constructed floor platforms, and cleared living spaces. Tent rings and floor platforms are found on five of the coastal sites (Table 2). Hestvikholmane Site 2–2012 and the mountain site at Sandgrovbotnen have an intentionally cleared living space. None of the mountain sites contained distinct traces of dwelling structures.

Artefact Composition

Figure 4 presents all the artefacts found on the sites studied, and shows the relationship between tools, blades and the different classes of debitage on each site. In this analysis differences across the ecozones are visible. On the coastal sites, flakes and production debris constitute

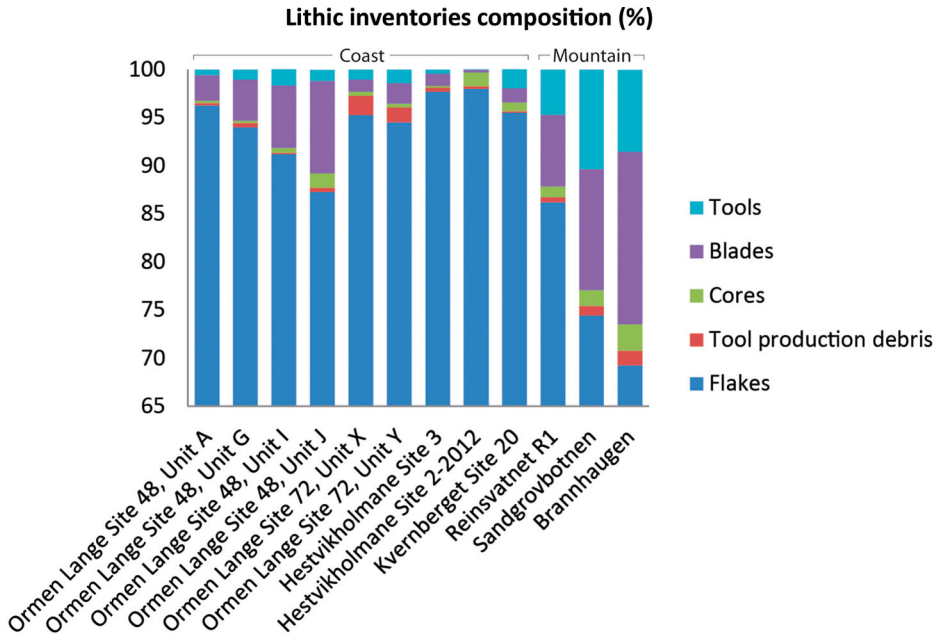


Figure 4. *Comparative overview of the composition of the Early Mesolithic inventories found on the sites included in this study. The inventories are divided into five main artefact categories. The values presented are percentages of the total inventory.*

well over 90 per cent of the total assemblage, with an average at around 94 per cent. Ormen Lange Site 48, Unit J deviates from this pattern with only 88 per cent debitage. The same site has a correspondingly higher percentage of blades. Tools constitute less than 2 per cent of the total assemblage on coastal sites. The mountain sites have a generally lower percentage of flakes and debris: Sandgrovbotnen and Brannhaugen have 70–75 per cent, while Reinsvatnet R1 has 87 per cent. Relatively large amounts of blades and cores are present on all three mountain sites, and a high percentage of tools (*c.* 5–10 per cent) is characteristic.

The 'tool' category in Figure 4 can be further divided into two sub-categories: 'formal' and 'informal'. The term 'formal tool' refers to secondarily modified flakes or blades with a recognizable, intentional form and/or function. Formal tools commonly found in Early Mesolithic assemblages include flake- and core-adzes, projectile points, scrapers, burins, and knives. The 'informal tool' category comprises blades and flakes with retouch and/or visible use-wear (see Callanan, 2007). The analysis in Figure 5 shows that in the coastal zone, formal tools generally make up around 40–50 per cent of the total tool inventory. Two sites deviate from this general pattern: both Ormen Lange Site 72, Unit Y and Hestvikholmane Site 2–2012 show a much higher dependence on formal tool categories. In the mountain ecozone, the formal component is lower and lies between *c.* 25 and 40 per cent.

The composition of formal tools on the different sites reveals several interesting trends (Figure 5). Although adzes are absent from three coastal sites, the analysis shows that flake- and core-adzes were common in the coastal zone in the Early

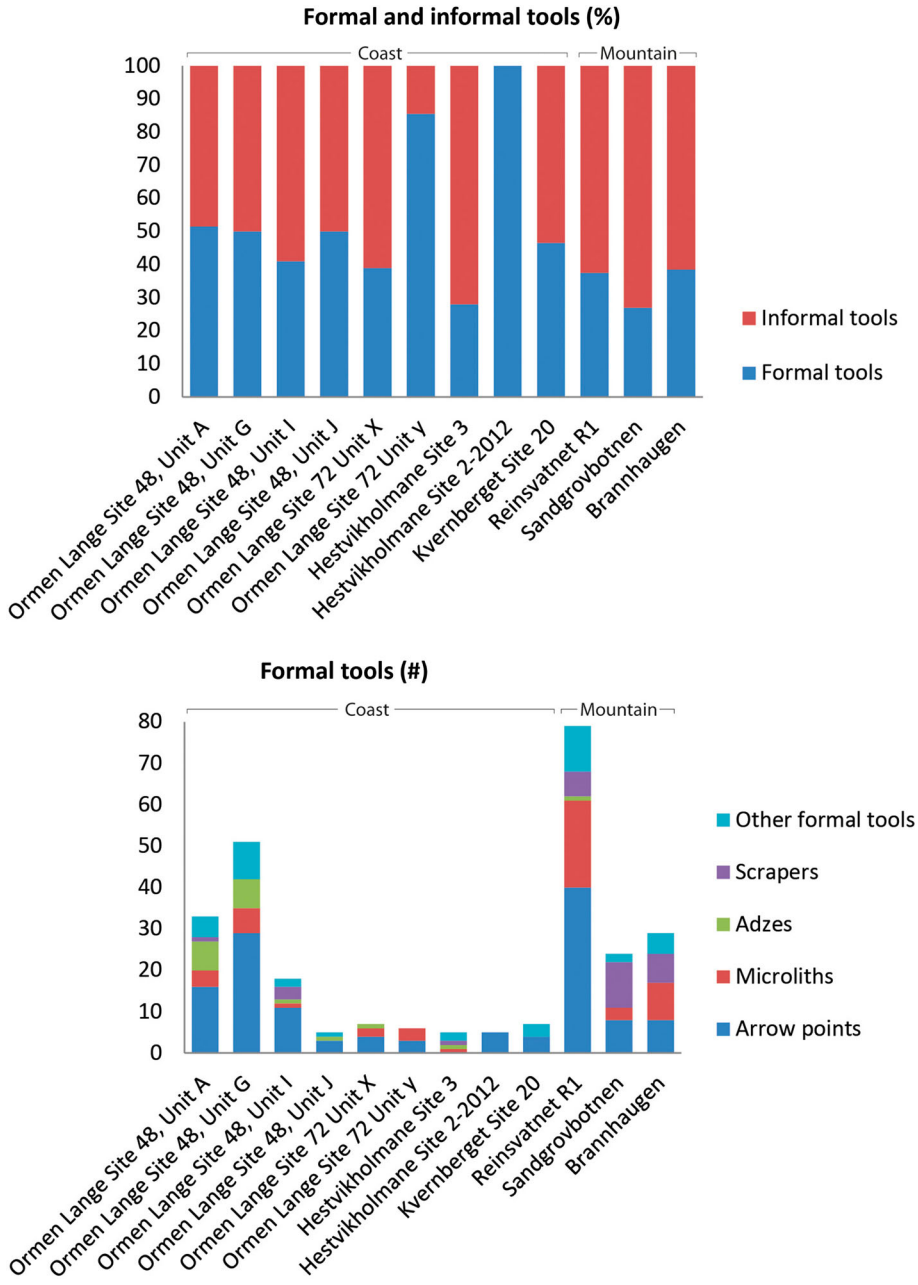


Figure 5. *Formal and informal tool analysis. Top: The relation between formal and informal tools by percentage on each site. Bottom: The number of formal tools, sorted by categories, present on each site.*

Mesolithic. Only one flake-adze was recovered in the mountain zone, at Reinsvatnet R1. This pattern confirms earlier observations regarding the geographical distribution of Early Mesolithic adzes in other regions (Bjerck, 1995: 135).

Projectile points are present in all assemblages. In fact, on two of the coastal sites

(Hestvikholmane Site 2–2012 and Ormen Lange Site 72, Unit Y) projectile points are the only formal categories recovered. The mountain site at Reinsvatnet R1 is the site with the highest number of points, and—generally speaking—projectile points play a more significant role in formal tool inventories in the mountains when compared with the coastal group.

Scrapers too play a more important part in mountain inventories compared to coastal assemblages. A similar tendency was also demonstrated in south-western Norway during the Early Mesolithic (e.g. Bang-Andersen, 2003b: 16).

Projectiles

Projectile points are found on all of the sites considered in this study. We have grouped the material into two main categories: tanged points (including single-edged, obliquely edged, and 'self-pointed' with retouch only in the tang area) and microliths (including lanceolate and rhombic forms) (see Ballin, 1996; Waraas, 2001: 38–48). The analysis is based on all complete and undamaged projectile points recovered (Figures 6 and 7); impact fractured, damaged, or incomplete points have been excluded. Thus the

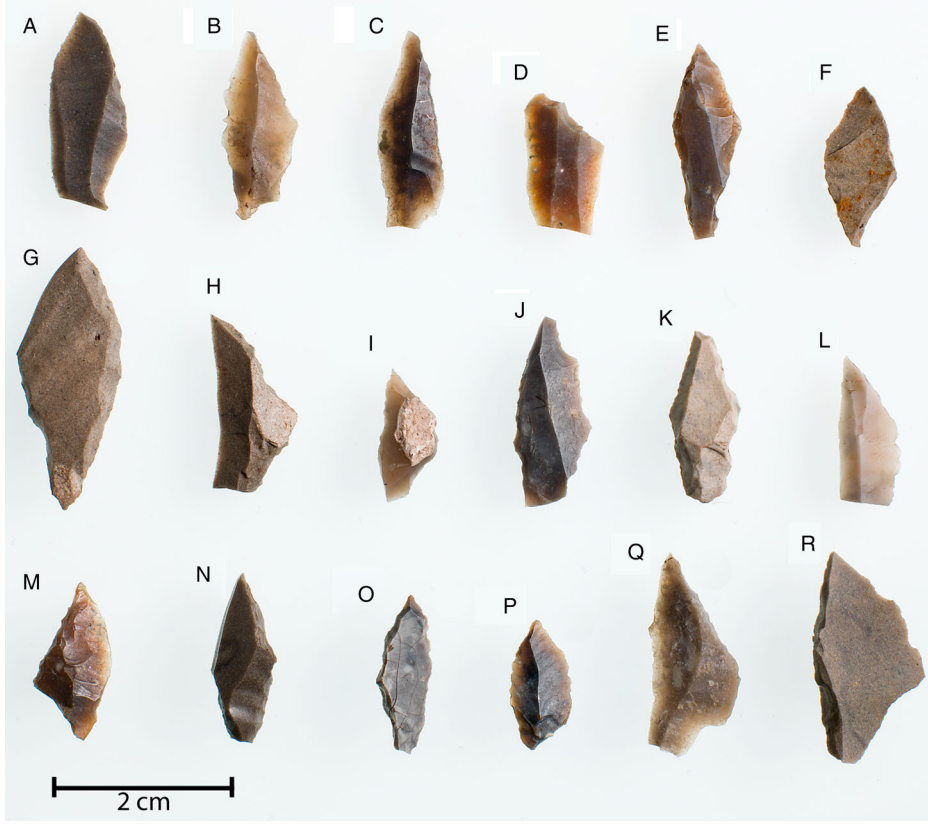


Figure 6. *Early Mesolithic flint projectiles found on coastal sites in central Norway. A–C: Ormen Lange Site 48 Unit G; D–F: Ormen Lange Site 48 Unit A; G–I: Ormen Lange Site 72 Unit X; J: Ormen Lange Site 48 Unit I; K: Ormen Lange Site 48 Unit J; L: Hestvikholmane 3; M & N: Hestvikholmane 2–2012; O & P: Kvernberget Site 20; Q & R: Ormen Lange Site 72 Unit Y.* Photograph by permission of NTNU University Museum/Åge Hojem.

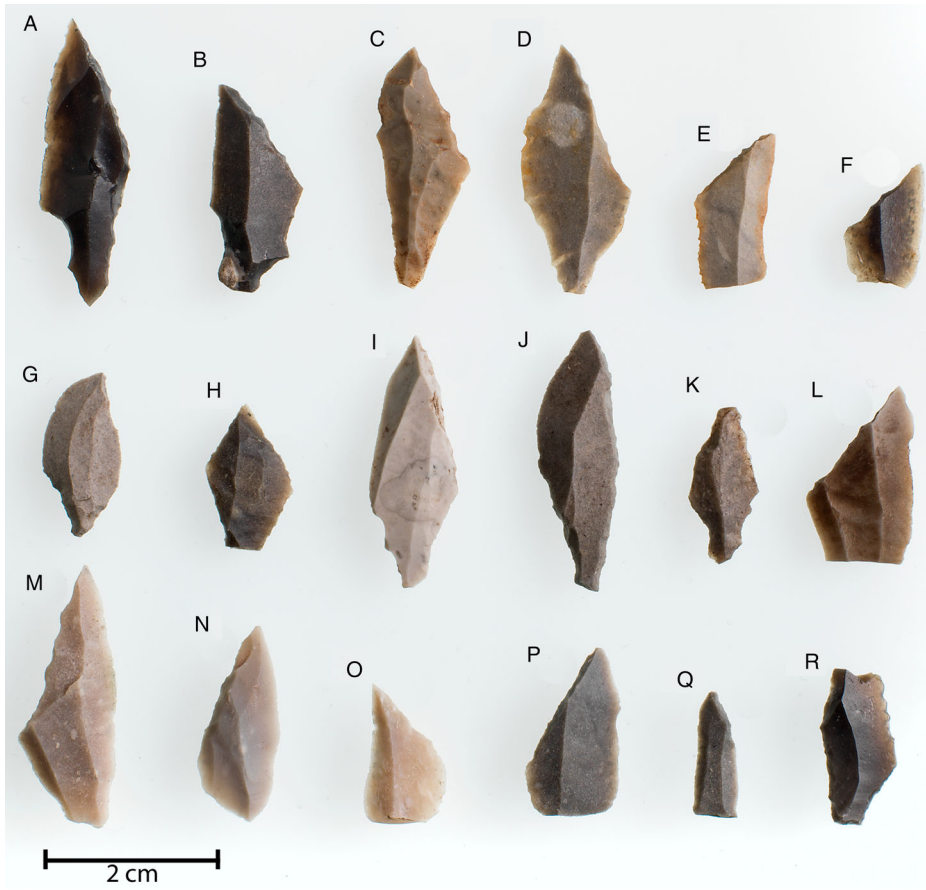
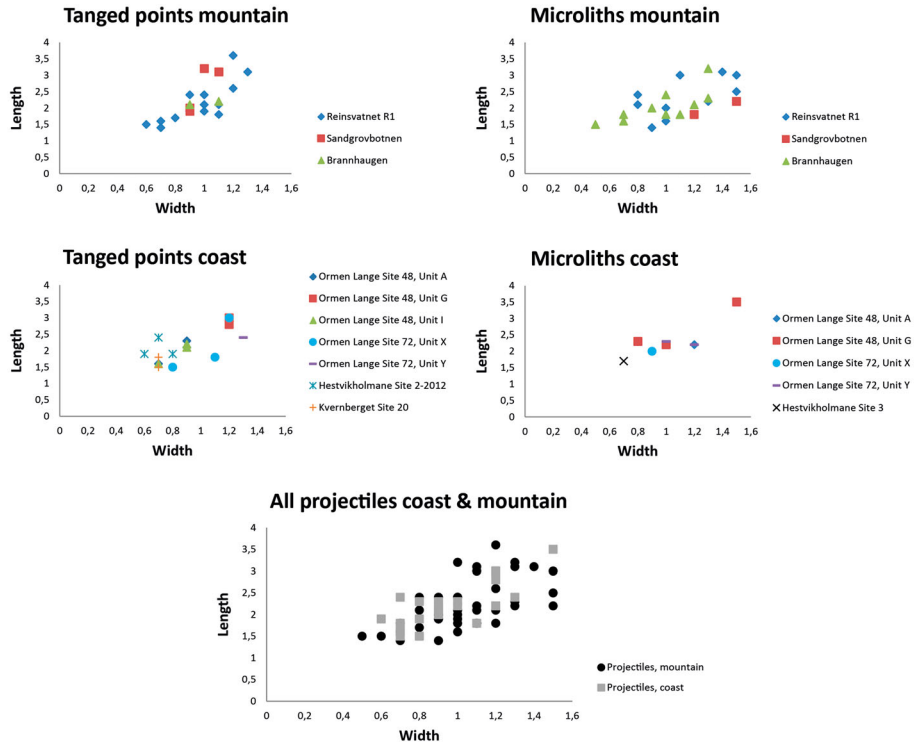


Figure 7. *Early Mesolithic flint projectiles found on mountain sites in central Norway. A–H: Reinsvatnet R1; I–L: Sandgrovbotnen; M–R: Brannhaugen.* Photograph by permission of NTNU University Museum/Åge Hojem.

analysis does not give comparative information about the frequency of projectile classes across the ecozones but focuses on possible metric variations. The maximum length and width of each point is measured.

In Figure 8, the metric values for each point are plotted according to site, typological class, and ecozone. Among tanged points on the coast, the length range is 1.5–3 cm, and the width varies between 0.5 and 1.5 cm. Microliths from the coastal ecozone measure between 1.5 and 3.5 cm in length. However, the majority are under 2.5 cm long and between 0.5 and 1.5 cm wide. In the mountains, tanged points measure between 1.5 and 3.5 cm in length and between 0.5 and 1.5 cm in width. The microliths are 1.5–3 cm long and 0.5–1.5 cm wide. When plotted together the projectiles appear as a homogeneous group with respect to metric dimensions. While there is a slight tendency towards longer and wider points in the mountains, a single lanceolate microlith from Ormen Lange Site 48, Unit G demonstrates that points of comparable size are present in the coastal zone too.

One aspect of the frequency of projectile classes across the ecozones deserves further



	Total number found on site			Total number in analysis		
Site	**Tanged points**	**Microliths**	**Total**	**Tanged points**	**Microliths**	**Total**
Ormen Lange Site 48, Unit A	16	4	**20**	3	1	**4**
Ormen Lange Site 48, Unit G	29	6	**35**	2	3	**5**
Ormen Lange Site 48, Unit I	11	1	**12**	3	0	**3**
Ormen Lange Site 48, Unit J	3	0	**3**	0	1	**4**
Ormen Lange Site 72, Unit X	4	2	**6**	3	0	**3**
Ormen Lange Site 72, Unit Y	3	3	**6**	1	2	**3**
Hestvikholmane Site 3	0	1	**1**	0	1	**1**
Hestvikholmane Site 2-2012	5	0	**5**	3	0	**3**
Kvernberget Site 20	4	0	**4**	2	0	**2**
Reinsvatnet R1	40	21	**61**	14	10	**24**
Sandgrovbotnen	8	3	**11**	4	2	**6**
Brannhaugen	8	9	**17**	3	9	**12**

Figure 8. *Projectile analysis. The metric data for a selection of projectiles are shown with the sites organized according to ecozone. The table gives both the total number of projectiles recovered and the numbers used in the analysis.*

comment. Figure 8 shows the total number of complete and damaged, fragmented or incomplete projectile points found on all sites before selection for the metric analysis. This appears to indicate that microliths are more common on mountain sites than on coastal sites. Despite this, there is little to substantiate the use of differentiated or specialized projectile points in either zone.

Lithic Raw Material

Figure 9 shows that flint is the dominant raw material on all sites. In six of the nine

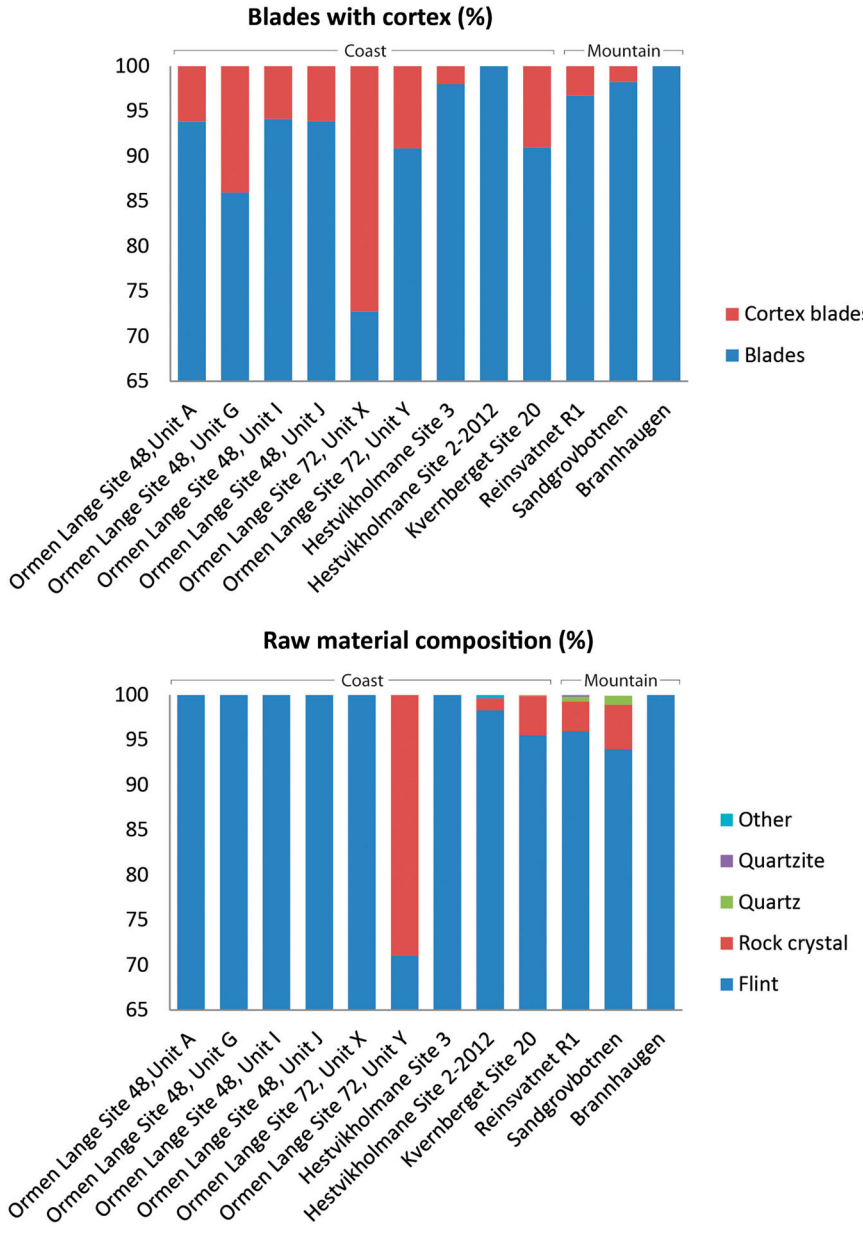


Figure 9. *Reduction strategy and lithic raw material analysis (percentage).*

coastal assemblages, flint is almost the only material present. Hestvikholmane Site 2–2012 has a small porphyry component, but the recovered pieces display no sign of reduction or use. A more striking exception is Ormen Lange Site 72, Unit Y, where rock crystal makes up nearly 30 per cent of the lithic raw material found at the site. Flint is also dominant on the mountain sites. Rock crystal, quartz, and quartzite make up just 4–6 per cent of the total raw material on

two of the three mountain sites. At Brannhaugen only flint was used.

As previously noted, flint was not evenly distributed throughout the region in the Early Mesolithic. By comparing the number of cortex blades found on each site, we gain a more detailed view of how this variable access to lithic resources across the ecozones was managed. Cortex blades are blades where at least 50 per cent of the outer cortex usually found on natural flint nodules is still present. Tracking the number of cortical blades gives an indication of whether the initial reduction of natural flint nodules took place on a given site or not.

On the coastal sites, blade inventories usually consist of between 5 and 15 per cent cortex blades. Ormen Lange Site 72, Unit X is an outlier in this regard, with almost 30 per cent cortex blades. The two Hestvikholmane coastal sites have a very low cortex blade component. The number of cortex blades is also low on the three mountain sites in this analysis: none was found at Brannhaugen, and the cortex blade component on the two remaining mountain sites lies well below 5 per cent.

Discussion

The analysis above underlines a number of structural similarities in how sites were organized and used in both mountain and coastal landscapes during the Early Mesolithic in central Norway.

Across the ecozones, the sites appear as lithic scatters measuring between 6 and 45 m^2. Occupation areas usually contain a denser concentration of lithics that range between *c.* 2 and 12 m^2. The number of lithics contained within these areas ranges between *c.* 1000 and 11,000 artefacts. However, as many sites appear to have seen repeated deposition events, it is likely that the basic Early Mesolithic unit is more in the order of 1000–2000 lithics, as has been suggested by earlier studies (e.g. Nygaard, 1987; Nærøy, 2000; Bjerck, 2008; Bjerck et al., 2008: 564). Although the analysis contains examples of sites that are both larger and smaller than the general measurements, there appears to be a basic settlement size that is repeated across the ecozones during the Early Mesolithic. The dimensions and character of the basic settlement units among the analysed sites thus paint a picture similar to that suggested previously (Bjerck et al., 2008: 565–66): it envisages Early Mesolithic hunters as organized in small groups of a similar size, which remained on specific sites for short periods as they moved across and between the ecozones.

The overall Early Mesolithic site distribution pattern indicates that the coastal zone played a primary role in the settlement system. In our analysis, all the coastal sites were part of larger site complexes situated in topographical settings that were used and reused on several occasions throughout the Early Mesolithic, while the mountain sites were individual sites. It can be argued that intensive archaeological activity and the use of more efficient excavation methods on the coast has resulted in the discovery of larger site complexes there than in the mountain zone. Yet the occupation areas on the coastal sites in the study area tend to have larger lithic accumulations than their counterparts in the mountain zone, perhaps reflecting a more intensive use of the former locations. Our study of organizational patterns across ecozones confirms the impression that Early Mesolithic populations in central Norway relied heavily on the coastal zone, as proposed by other studies from the region (Bjerck, 1983; Svendsen, 2007; Bjerck et al., 2008; Breivik, 2014).

Remains of dwelling structures vary to such a degree that it is difficult to generalize beyond the fact that the living areas

appear to have been of a similar size. There was probably a broad spectrum of dwelling structures in use across the landscape, ranging from open look-out positions to more substantial structures. In a recent study, Fretheim and colleagues (Fretheim et al., in press) emphasize not only the different forms of dwellings that were in use during the Early Mesolithic, but also the level of mobility and permanence that these must have represented. Here it is suggested that fully portable dwellings, such as tents, were the most common dwelling form in this period, and that more substantial structures may have included a combination of fixed construction elements and portable materials (see also Bang-Andersen, 2003a; Bjerck et al., 2008). Locales in the landscape that were targeted for specific reasons may have led to investing in more solid dwelling constructions (Fretheim et al., in press, with references). In our study, we find no evidence for a clear distinction between mountain and coast with respect to the permanence or portability of the dwelling structures in use. Apart from the durable dwelling remains at Ormen Lange Site 72, Unit X, structures in both ecozones seem to be portable and temporary dwellings. The differences that are evident in terms of construction type and portability were probably due to other circumstances.

When it comes to the artefact assemblages, the inventories across the ecozones seem to share a fundamental structure. Though the proportions vary, the inventories appear as accumulations of flakes, cores, blades, and tools that reflect all the steps of lithic tool production, from primary reduction of flint nodules, through production, maintenance, and use, to discard of artefacts. The underlying structure suggested for the group of coastal sites on Ormen Lange, with a fixed repertoire of tools that is likely to reflect similar arrays of activity (Bjerck et al., 2008: 558, 565), appears to be valid for other coastal sites in the region. At the same time, our analysis also highlights differences in tool composition between coastal sites: in two assemblages (Hestvikholmane Site 2–2012 and Ormen Lange Site 72, Unit Y) projectiles are the only formal tool component. These 'deviant' assemblages seem to represent a narrower range of activities than encountered on other sites. It has been argued that there is a correlation between assemblage diversity and assemblage size: small assemblages tend to be limited in diversity, while large assemblages tend to have a broader range. This builds on the argument that large assemblages are archaeological palimpsests made up of multiple occupation events, each of which could involve quite different activities (Bettinger, 1991: 79 with reference to Jones et al., 1983). Our largest assemblages do indeed tend to be quite diverse and similar in composition. However, the small Ormen Lange Site 72, Unit X and Hestvikholmane Site 3 demonstrate that there is no absolute relationship between size and artefact diversity. It is therefore likely that the 'deviant' assemblages are the result of different sets of activities taking place on these sites. When we consider that hundreds of sites have been discovered in the coastal ecozone, it seems only reasonable that there should be a range of different site types and functions governed by various non-functional factors such as the changing seasons, weather conditions, and resource availability. Looking beyond this variation, the general impression is that a wide range of more or less fixed activities were carried out on the coastal sites (see Bjerck et al., 2008). The three mountain assemblages are less varied and show a larger degree of inter-assemblage similarity with respect to tool categories than the coastal sites. Structural similarities across the mountain assemblages are further

reflected in the relationship between formal and informal tools and between tools and production debris. These assemblages thus appear to reflect a narrower set of activities taking place on sites within the mountain ecozone. Yet the lithic package that we see in the mountains is made of elements that originate from the broader repertoire seen on the coast.

Several researchers see a connection between projectiles and terrestrial big game hunting (e.g. Bang-Andersen, 1996: 431; Fuglestvedt, 2005: 132). Fuglestvedt, in particular, argues that reindeer would have thrived on the coast during the Early Mesolithic and would consequently have been hunted in these environments. But projectiles also frequently appear on Early Mesolithic sites on small, remote islands that probably did not support populations of large terrestrial mammals. Projectile points were therefore probably used on a wide range of prey. Overall, the repertoire of arrow points found on all sites in our study are quite similar. It seems unlikely that the relatively small variations in size and form between the coastal and mountain assemblages reflect significant differences in functionality or the type of prey hunted. On the contrary, what we are seeing here appears to be a flexible tool technology, where blades of suitable sizes and properties were worked into projectiles that were then used for prey of different sizes and anatomies. The single notable difference between the projectile inventories is the higher number of microliths on mountain sites when compared with the coast. A pair of Early Mesolithic arrowshafts recovered in Sweden demonstrates that microliths were mounted laterally onto the shafts, presumably to increase the wounding power of the arrows on large prey (Larsen & Sjöström, 2011). Perhaps Early Mesolithic hunters in central Norway adapted their arrows to include lateral edges when hunting reindeer in the mountains. This would go some way to explaining the larger number of microliths on mountain sites. But even if this interpretation proves to be correct, this is still only a slight technical variation within in a projectile repertoire that was fundamentally identical in both ecozones.

The data sets that we have analysed suggest that the Early Mesolithic colonizers were organized in a way that produced similar archaeological imprints across the landscape. Referring to Lewis Binford's forager–collector continuum (Binford, 1980), the sites may be expressions of a 'residential mobility type', where the entire social unit moved to the resources to be gathered. The residential mobility type, which is practised by groups that Binford terms 'foragers', will produce two types of sites: 'residential bases' and 'locations'. The 'residential bases' are the loci from which foraging parties originate and where most processing, manufacturing, and maintenance activities take place (Binford, 1980: 9). They are characterized by a low diversity in tools and features, as well as a high degree of similarity between the site assemblages (Chatters, 1987: 342). A 'location' is a place where extractive tasks are carried out. The overall low visibility of the latter sites makes them hard to detect (Binford, 1980: 9). Forager strategy is further associated with high mobility, low-bulk inputs, and regular daily food procurement strategies organized on an encounter basis, as opposed to collector strategy which is associated with larger social units which split into specially organized task groups that seek out specific resources. Collectors thus tend to produce diverse sites, ranging from large residential bases (often with specialized activity areas and permanent or semi-permanent dwellings), field camps (temporary bases for a task group), stations, locations, and caches (where food is temporarily stored) (Binford, 1980: 9–12).

Our sites clearly represent similarly sized groups that approached the various

resource situations with the same tool technology and site organization. Nevertheless the artefact inventories represent slightly varied patterns of activity and production across the zones. On coastal sites the amount of lithic waste and debris is much greater than on mountain sites. It seems that a higher degree of continuous production and maintenance of tools was taking place here, as if to be ready for a wide range of tasks, including the preparation of cores and blanks to bring along on inland hunting expeditions during certain seasons. The high percentage of tools on mountain sites supports the idea that they were camps where gearing-up and tool maintenance sessions connected to hunting events were undertaken (Callanan, 2007 with reference to Bleed, 1986). The hunting parties probably had a different composition than that of the basic social unit. It may be argued that the colonizers of Early Mesolithic Norway were foragers with occasional collector behaviour (Breivik et al., in press).

Olsen (1992: 255), Bergsvik (1995), and Bang-Andersen (1996: 436–39) propose similar settlement models for the Early Mesolithic in western Norway. In these models, coastal bases are linked to special task sites in the mountains by intermediary sites located at strategic points along inner fjord basins. In central Norway, a few sites with clear Early Mesolithic components, such as Innvik and Torvik (see location on Figure 1, nos. 13 and 14), are known from inner fjords (Svendsen, 2007: 85–87), and this would suit such models. Our analysis adds detail to this general picture by demonstrating that forays into the fjord arms and mountain sites were based on sites of a similar size and structure to those used on the coast. Even allowing for a degree of site variation in terms of size and function, the overriding impression is that small group size and high mobility was fundamental to Early Mesolithic settlement across ecozones—it allowed its inhabitants to move easily and quickly through and across the landscapes whenever necessary.

Conclusion

The overall aim of this analysis has been to cast further light on the colonization process that unfolded through time along the western flank of Scandinavia during the Early Holocene. At that time, Early Mesolithic groups moved into a complex and demanding environment and succeeded in populating the region over a short period. During this process, not only did they exploit the coastline and move along it; nearby mountain landscapes were also taken into use. Examining how these populations approached and solved the ecozone puzzle that faced them appears to reveal something essential about Early Mesolithic mobile hunters as expert and successful colonizers.

As people approached the waters along the Norwegian coast shortly after *c.* 10,000 cal BC, they faced a seascape that was familiar, yet different from the territories and landscapes they had left behind in southern Scandinavia. Following the coastline from western Sweden northwards, they mostly passed through passages that were sheltered by islands and skerries. But at times, they also had to cross stretches of open sea that were dangerous and difficult to navigate. Upon reaching south-western Norway they faced a landscape configuration that was radically different to the open, flat landscapes of the north-western coast of Europe and around the North Sea basin. Behind the rich shorelines, skerries, and islands of south-western Norway lay high alpine peaks and mountain plateaux that were clearly visible from the coast. Not only were the distances between these

landscapes relatively short, in many cases they were also connected by long fjord arms that were easily navigable. This gave access to seasonal mountain resources, some of which were well known to earlier Palaeolithic continental hunters. They met the same compressed landscape combination in different places along the coast, as was the case in central Norway. Overviews of the distribution of known Early Mesolithic sites show distinct concentrations in these landscape situations (Breivik, 2014). This distribution is probably no coincidence. Combining and timing their hunting activities both *high* in the mountains and *low* along the coasts gave Early Mesolithic groups access to resources that complemented each other in a 'colonizer package' that was apparently quite successful.

The distribution of Early Mesolithic sites shows that colonizers relied heavily on coastal environments and marine resources. Not only are the overwhelming majority of Early Mesolithic sites located along the coast, several large site complexes and dense artefact accumulations also show how particular maritime habitats, areas, and camp spots were visited repeatedly. Moreover, the colonizers seem to have been seeking the most productive marine habitats, suggesting that their movements into the Norwegian landscape were grounded in well-developed knowledge about marine resources and environments, which included navigation and probably hunting by boat. The question is how did these Early Mesolithic groups combine this reliance on the coastal zone with the opportunities offered by the nearby mountainscapes?

Our analysis suggests that the use of a standard, generalized lithic technology, combined with high residential mobility and small group size, enabled the colonizing groups to overcome the risks and difficulties associated with settling and seeking out resources in new and unknown landscapes. The foragers were organized in social units who mainly moved within the coastal zone, but occasionally reorganized into teams of similar size but probably different composition, maintaining the basic site structure while hunting large game in the mountain zone. By staying mobile and using an all-round technology, they were able to respond quickly and effectively to the landscape and environment as it developed around them. These traits enabled them to explore the new landscape and take whatever prey they came across, whether it was from boats or on the land. Recognizing Early Mesolithic colonizers as highly mobile strategic generalists that were drawn to productive coastal/alpine ecotones is an attractive interpretation. It could explain the differential distribution of sites at a national level and the rapidity with which the roughly 2000-km-long coast was settled.

This generalist adaptation sprang from deeper continental cultural roots. The pioneer groups came to the new landscapes with adaptive strategies that were already well-tested in harsh Late-Glacial environments on the continent. In the Pleistocene/Holocene transition, the groups expanded their mobile approach to archipelagic seascapes. As they continued northwards from the North European plains onto the western Scandinavian coast, they faced a new situation where their regular package of tools, technology, site structure, and social organization may or may not have been suitable. Our study suggests that their lifestyle was adaptive and successfully applied to new alpine environments, with only small adjustments necessary in response to raw material and resource variation. It appears that part of the solution to populating and settling new and dynamic Postglacial landscapes lay in keeping constantly on the move in

small groups, and not specializing technically in favour of one ecozone over another.

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References

Andersen, B.G. & Borns, H.W. 1997. *The Ice Age World*. Oslo: Universitetsforlaget.

Ballin, T.B. 1996. *Klassifikasjonssystem for stenartefakter*. Universitetets Oldsaksamling, Varia 36. Oslo: Universitetet i Oslo.

Bang-Andersen, S. 1996. Coast/Inland Relations in the Mesolithic of Southern Norway. *World Archaeology*, 27(3):427–43.

Bang-Andersen, S. 2003a. Encircling the Living Space of Early Postglacial Reindeer Hunters in the Interior of Southern Norway. In: L. Larsson, H. Kindgren, K. Knutsson, D. Loeffler and A. Åkerlund, eds. *Mesolithic on the Move. Papers Presented at the Sixth International Conference on the Mesolithic in Europe*. Oxford: Oxbow, pp. 193–204.

Bang-Andersen, S. 2003b. Southwest Norway at the Pleistocene/Holocene Transition: Landscape Development, Colonization, Site Types, Settlement Patterns. *Norwegian Archaeological Review*, 36(1):5–25.

Bang-Andersen, S. 2012. Colonizing Contrasting Landscapes. The Pioneer Coast Settlement and Inland Utilization in Southern Norway 10,000–9,500 Years Before Present. *Oxford Journal of Archaeology*, 31(2):103–20.

Bang-Andersen, S. 2013. Prehistoric Reindeer Hunting in South-West Norway with Emphasis on the Period 1000 BC to AD 1000: Overview, Retrospect and Perspectives. In: O. Grimm and U. Schmölcke, eds. *Hunting in Northern Europe until 1500 AD: Old Traditions and Regional Developments, Continental Sources and Continental Influences*. Neumünster: Wachholtz, pp. 41–55.

Bergsvik, K.A. 1995. Bosetningsmønstre på kysten av Nordhordland i steinalder. En geografisk analyse. *Arkeologiske skrifter, Arkeologisk institutt, Bergen Museum*, 8: 111–30.

Bettinger, R.L. 1991. *Hunter–Gatherers. Archaeological and Evolutionary Theory*. New York: Plenum.

Binford, L.R. 1980. Willow Smoke and Dogs' Tails: Hunter–Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity*, 45(1): 4–20.

Bjerck, H.B. 1983. Kronologisk og geografisk fordeling av mesolitiske element i Vest- og Midt-Norge. Unpublished Mag. art. dissertation, University of Bergen.

Bjerck, H.B. 1995. The North Sea Continent and the Pioneer Settlement of Norway. In: A. Fischer, ed. *Man and Sea in the Mesolithic*. Oxford: Oxbow, pp. 131–43.

Bjerck, H.B. 2008. Norwegian Mesolithic Trends: A Review. In: G. Bailey and P. Spikins, eds. *Mesolithic Europe*. Cambridge: Cambridge University Press, pp. 60–106.

Bjerck, H.B., Åstveit, L.I., Gundersen, J., Meling, T., Jørgensen, G. & Normann, S. eds. 2008. *NTNU Vitenskapsmuseets arkeologiske undersøkelser Ormen Lange Nyhamna*. Trondheim: Tapir Academic Press.

Bjerck, H.B. & Callanan, M. 2005. Brannhaugen. Unpublished report. NTNU University Museum, Trondheim.

Bleed, P. 1986. The Optimal Design of Hunting Weapons: Maintainability or Reliability. *American Antiquity*, 51(4): 737–47.

Brede, A. 2012. Arkeologisk undersøkelse i forbindelse med utbyggingsplaner for Hestvikholmane industriområde, Averøy kommune, Møre og Romsdal, 2012.

Lokalitet 1 og 2. Unpublished report, NTNU University Museum, Trondheim.
Breivik, H.M. 2014. Palaeo-Oceanographic Development and Human Adaptive Strategies in the Pleistocene–Holocene Transition: A Study from the Norwegian Coast. *The Holocene*, 24(11):1478–90.
Breivik, H.M. & Bjerck, H.B. in press. Early Mesolithic Central Norway: A Review of Research History, Settlements and Tool Tradition. In: H.P. Blankholm, ed. *The Early Settlement of Northern Europe – Economy, Settlement and Society*. Sheffield: Equinox.
Breivik, H.M., Bjerck, H.B., Zangrando, A.F. J. & Piana, E.L. in press. On the Applicability of Environmental and Ethnographic Reference Frames: An Example from the High-Latitude Seascapes of Norway and Tierra del Fuego. In: H.B. Bjerck, H.M. Breivik, S. Fretheim, E. Piana, B. Skar, A. Tivoli and A.F.J. Zangrando, eds. *Marine Ventures: Archaeological Perspectives on Human-Sea Relations*. Sheffield: Equinox.
Bronk Ramsey, C. 2009. Bayesian Analysis of Radiocarbon Dates. *Radiocarbon*, 51(1): 337–60.
Callanan, M. 2006. Reinsvatnet. Unpublished excavation report, NTNU University Museum. Trondheim.
Callanan, M. 2007. On the Edge: A Survey of Early Mesolithic Tools from Central Norway. Unpublished MA dissertation, University of Trondheim.
Callanan, M. 2008. Steinalderpionerene i Storlidalen. *Bøgda vår. Årbok for Oppdal historielag*: 5–15.
Chatters, J.C. 1987. Hunter–Gatherer Adaptations and Assemblage Structure. *Journal of Anthropological Archaeology*, 6: 336–75.
Fretheim, S.E., Bjerck, H.B., Breivik, H.M. & Zangrando, A.F.J. in press. Tent, Hut or House? A Discussion on Early Mesolithic Dwellings Emanating from the Site Mohalsen 2012–II, Vega, Northern Norway. In: H.P. Blankholm, ed. *The Early Settlement of Northern Europe – Economy, Settlement and Society*. Sheffield: Equinox.
Fuglestvedt, I. 2005. *Pionerbosetningens fenomenologi. Sørvest-Norge og Nord-Europa 10 200/10 000–9500 BP*. Stavanger: Arkeologisk museum i Stavanger.
Fuglestvedt, I. 2007. The Ahrensburgian Galta 3 Site in SW Norway. Dating, Technology and Cultural Affinity. *Acta Archaeologica*, 78(2):87–110.
Fuglestvedt, I. 2009. *Phenomenology and the Pioneer Settlement on the Western Scandinavian Peninsula*. Göteborg: Bricoleur Press.
Fuglestvedt, I. 2012. The Palaeolithic Condition on the Scandinavian Peninsula: The Last Frontier of a 'Palaeolithic way' in Europe. *Norwegian Archaeological Review*, 45(1):1–29.
Grøndahl, F.A., Hufthammer, A.K., Dahl, S. O. & Rosvold, J. 2010. A Preboreal Elk (*Alces alces* L., 1758) Antler from South-Eastern Norway. *Fauna norvegica*, 30:9–12.
Hufthammer, A.K. 2001. The Weichselian (c. 115,000–10,000 B.P.) Vertebrate Fauna of Norway. *Bollettino della Società Paleontologica Italiana*, 40(2):201–08.
Hufthammer, A.K. 2006. The Vertebrate Fauna of Eastern Norway – From the Ice Age to the Middle Ages. *Kulturhistorisk Museum Skrifter*, 4:191–202.
Jones, G.T., Gayson, D.K. & Beck, C. 1983. Artifact Class Richness and Sample Size in Archaeological Surface Assemblages. In: R. C. Dunnell and D.K. Grayson, eds. *Lulu Linear Punctated: Essays in Honor of George Irving Quimby*. Ann Arbor (MI): Museum of Anthropology, University of Michigan Anthropological Papers, pp. 55–73.
Kutschera, M. 1999. Vestnorsk tidligmesolitikum i et nordvesteuropeisk perspektiv. In: I. Fuglestvedt, T. Gansum and A. Opedal, eds. *Et hus med mange rom. Vennebok til Bjørn Myhre på 60-årsdagen*. AmS-Rapport, Bind A. Stavanger: Arkeologisk museum, Universitetet i Stavanger, pp. 43–52.
Larsson, L. & Sjöström, A. 2011. Early Mesolithic Flint-Tipped Arrows from Sweden. Antiquity 85(330) (December 2011) [accessed 10 November 2015], Project Gallery. Available at: <http://antiquity.ac.uk/projgall/larsson330/>.
Mangerud, J., Gyllencreutz, R., Lohne, Ø. & Svendsen, J.I. 2011. Glacial History of Norway. In: J. Ehlers, P.L. Gibbard and P. D. Hughes, eds. *Quaternary Glaciations – Extent and Chronology: A Closer Look (Developments in Quaternary Science, 15)*, Elsevier, Amsterdam, pp. 279–98.

Nærøy, A.J. 1998. Stone Age Living Spaces in Western Norway. Unpublished Dr. Art. dissertation, University of Bergen.
Nærøy, A.J. 2000. *Stone Age Living Spaces in Western Norway*. British Archaeological Reports International Series 857. Oxford: John & Erica Hedges.
Nygaard, S.E. 1987. Socio- Economic Developments along the Southwestern Coast of Norway between 10,000 and 4,000 BC. In: P. Rowley-Conwy, M. Zvelebil and H.P. Blankholm, eds. *Mesolithic Northwest Europe: Recent Trends*. University of Sheffield, Sheffield, pp. 147–54.
Nyland, A.J. 2012. Lokaliseringsanalyse av tidligmesolittiske pionerboplasser. In: H. Glørstad and F. Kvaløy, eds. *HAVVIND – Paleogeografi og arkeologi*. Oslo: Norsk Maritimt Museum & Kulturhistorisk Museum.
Olsen, A.B. 1992. Kotedalen – en boplass gjennom 5000 år. *Bind I. Fangstbosetning og tidlig jordbruk i Vestnorsk steinalder: Nye funn og nye perspektiver*. Bergen: Universitetet i Bergen.
Pettersen, K. 1999. The Mesolithic in Southern Trøndelag. In: J. Boaz, ed. *The Mesolithic of Central Scandinavia*. Oslo: Universitets Oldsaksamlings Skrifter Ny Rekke 22, pp. 153–66.
Sjøvold, T. 1970. Arkeologisk registrering ved Grytten kraftanlegg. Rauma kommune. Unpublished report. NTNU University Museum, Trondheim.
Strøm, I.O. & Breivik, H.M. 2008. Arkeologiske undersøkelser. Reguleringsplan Kvernberget lufthavn. Lokalitet 20. Aktivitetsområde fra eldre steinalder. Unpublished report. NTNU University Museum, Trondheim.
Svendsen, F. 2007. Lokaliteter og landskap i tidlig mesolittisk tid. En geografisk analyse fra Nordvest-Norge. Unpublished MA dissertation, University of Trondheim.
Tørhaug, V. & Åstveit, L.I. 2000. Steinalderboplassene ved Store Fløyrlivatn. *Frá haug ok heiðni*, 2000(1):35–39.
Wammer, E.U. 2006. Arkeologiske undersøkelser av lokalitet 3 i forbindelse med utvidelse av Hestvikholmane industriområde på Averøya, sommeren 2006. Unpublished report. NTNU University Museum, Trondheim.
Waraas, T.A. 2001. Vestlandet i tidleg Preboreal tid. Fosna, Ahrensburg eller vestnorsk tidligmesolitikum? Unpublished cand. phil. dissertation, University of Bergen.
Wygal, B.T. & Heidenreich, S. 2014. Deglaciation and Human Colonization of Northern Europe. *Journal of World Prehistory*, 27:111–44.
Åstveit, L.I. 2009. Different Ways of Building, Different Ways of Living: Mesolithic House Structures in Western Norway. In: P. Woodman and S. McCartain, eds. *Mesolithic Horizons 1*. Oxford: Oxbow, pp. 414–21.

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Par monts et par vaux: chasseurs et stratégies de colonisation en Norvège centrale à l'époque postglaciaire entre 9500 et 8000 cal BC

Cet article considère certains aspects du processus de colonisation postglaciaire qui eut lieu en Norvège centrale au début du Mésolithique, entre environ 9500 et 8000 cal BC. La distribution géographique des sites indique que les nouveaux arrivants ont colonisé et exploité une contrée avec des ressources et des paysages et très différents, allant d'un archipel côtier à un environnement alpin. L'analyse de douze ensembles d'objets lithiques provenant du centre de la Norvège nous permet d'examiner comment ces groupes colonisateurs ont fait face à des éco-zones fort variées. Ont-ils aménagé leurs habitats et utilisés leurs connaissances techniques de la même façon ou ont-ils adaptés leurs activités suivant le terrain qu'ils occupaientL'étude de l'organisation des sites, de la composition des ensembles, des techniques de production de projectiles et des matières premières lithiques nous permet d'apporter quelques réponses à ces questions. Les sites étaient apparemment de la même taille et contenaient des structures semblables quoique soient les éco-zones. A part quelques exceptions dans la composition de l'outillage, le matériel lithique ne semble pas différer suivant les zones écologiques. Nous en concluons que l'utilisation d'un outillage lithique générique et standard appartenant à de petits groupes hautement mobiles a permis à ces populations de surmonter les difficultés et les risques associés au nouveau milieu qu'ils ont occupé et exploité. Translation by Madeleine Hummler

Mots-clés: Norvège, débuts du Mésolithique, milieu côtier et montagnard, adaptation généralisée

Über Berg und Tal: nacheiszeitliche Besiedlungsstrategien in Zentralnorwegen zwischen 9500 und 8000 cal BC

In diesem Artikel werden verschiedene Aspekte der nacheiszeitlichen Besiedlungsprozesse, die im frühen Mesolithikum (ca. 9500–8000 cal BC) in Zentralnorwegen stattfanden, untersucht. Die Verbreitung der Fundstellen zeigt, dass die Besiedler auf eine Landschaft mit zwei sehr verschiedenen Geländen—von Inselgruppen bis Hochgebirge—und Rohstoffquellen stießen. Die Auswertung der Befunde von zwölf Fundstellen in Zentralnorwegen ist Anlass zu einer Untersuchung der Art und Weise, wie diese Einwanderer mit den verschiedenen ökologischen Zonen zurechtkamen. Waren ihre Siedlungen und technische Fähigkeiten immer die gleichen oder gab es Anpassungen je nach Bereich? Die Untersuchung der Siedlungsstruktur, der Zusammensetzung der Befunde, der technischen Eigenschaften der Projektile und der Rohstoffe zeigt, dass die Fundstellen hinsichtlich ihrer Flächen und Strukturen in den verschiedenen ökologischen Bereichen ähnlich sind. Abgesehen von einigen Schwankungen in der Zusammensetzung der Geräte, wurden keine Unterschiede oder technische Anpassungen im lithischen Befund in den verschiedenen Ökozonen beobachtet. Wir sind der Ansicht, dass eine standardisierte und allgemein brauchbare Steintechnologie, zusammen mit einer hohen Mobilität und kleiner Gruppengröße, es ermöglichte, die Risiken und Schwierigkeiten einer Besiedlung in einer unbekannten Landschaft zu überwinden. Translation by Madeleine Hummler

Stichworte: Norwegen, frühes Mesolithikum, Küsten- und Berglandschaft, verallgemeinerte Anpassung