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From Tents to Pit Houses: A Quantitative Study of Dwelling Trends in Mesolithic Norway, 9500–4000 BC

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A quantitative analysis of 150 Mesolithic dwellings in Norway, dated to between 9500 and 4000 cal BC, forms the core of a chronological and regional study based on fifteen variables, including floor size and shape, floor modifications and wall features, internal hearths, numbers and distribution of artefacts, traces of maintenance or reuse, and the number of dwellings per site. The study identifies a distinct change in dwelling traditions between the Early and Middle Mesolithic, around 8000 cal BC. Tents are typical of the Early Mesolithic, whereas remains of pit houses dominate in all later phases of the Mesolithic. The study also sheds light on variability in dwelling traditions after 8000 cal BC, which appears to relate to changes in social structure, growing territoriality, and regional differences.

Keywords: Norway, Mesolithic, tents, pit houses, dwelling attributes, quantitative study

Introduction

The archaeological remains of dwellings, that is, built shelters, tents, huts, or houses, constitute one of the most informative aspects of the prehistoric record. They regularly form the basis of interpretations concerning demography, the organization of society, gender divisions, levels of hierarchy, seasonality of occupation, and degrees of mobility or sedentism. This article presents the main findings of a quantitative study of 150 Mesolithic dwelling units in Norway, designed to explore the chronological and geographical distribution of dwelling attributes believed to be relevant to general interpretations. The attributes selected refer to aspects of the dwellings' floors, walls, hearths, assemblages, and maintenance or reuse. A dwelling unit is understood as a group of archaeological features pertaining to the building or structure as well as features associated with a given dwelling, such as artefact scatters, middens, internal hearths, etc. The dwellings referred to as pit houses are characterized by having floor levels dug below the ground surface (so-called 'house-pits'). Pit houses tend to be interpreted as permanent, fixed structures, though not necessarily for year-round or long-term occupation. The dwellings referred to as tents, on the other hand, represent mobile architecture which leaves few distinct traces

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(Fretheim et al., 2017) They may contribute to the spatial structuring of other features on site, and sometimes include arrangements of stones around the perimeter of the assumed floor areas (tent rings).

The number of excavated and well-documented Mesolithic dwelling units from all over Norway is remarkable in a European context. This abundance is largely owed to a fortuitous combination of sites having been spared from destruction by previous farming activities or changes to the landscape, a national cultural heritage act ensuring that land development projects are surveyed archaeologically and (if necessary) excavated, and such projects not being limited to a few central areas and thus resulting in overall coverage. As far as I am aware, no quantitative study on this scale has previously been published on Mesolithic dwellings. The objective is to identify cultural and demographic transformations, by detecting and evaluating patterns in the chronological and regional distribution of these dwellings, to shed light on changes in settlement dynamics and lifestyles during the 5500-year-long Mesolithic period, and to add to our understanding of European Mesolithic settlements more generally.

In northern Fennoscandia, large-scale studies and analysis of prehistoric dwelling remains ('house-pits') have played a significant role in the construction and assessment of long-term settlement histories. However, the emphasis has been on the Neolithic and later periods, since the bulk of known 'house-pits' from these regions postdates 4000 cal BC (see Engelstad, 1988; Lundberg, 1997; Olsen, 1997; Norberg, 2008; Mökkönen, 2011; Damm et al., 2022). The Mesolithic in northern Europe (9500–4000 cal BC) is widely recognized as a time of major cultural and societal change, involving migrations and pioneer settlements, the use of broader resource spectra in more confined geographical areas, enhanced regional cultural differences, and increased social stratification. Large-scale studies and syntheses of Norwegian Mesolithic settlement patterns have been based on the analysis of lithic records (including spatial analyses of lithic scatters) and site-landscape relationships, supplemented with data from a limited number of key sites with preserved organic remains and/or dwelling features (Indrelid, 1978; Nærøy, 2000; Bjerck, 2008; Breivik & Bjerck, 2017). In recent years, summed probability distributions of radiocarbon dates have been added to explore variation in demography and settlement intensity (Solheim & Persson, 2018; Jørgensen, 2020; Bergsvik et al., 2021). Mesolithic dwellings, however, are still elusive over much of Europe, and published papers on the subject are mainly case studies (but see Grøn, 2003; Larsson & Sjöström, 2011; Mithen & Wicks, 2018; Warren, 2021). Hein Bjerck (2008) maintained that the most distinct change in dwelling traditions in Norway occurred between the Early and Middle Mesolithic, around 8000 cal BC, with the Early Mesolithic dwelling evidence dominated by small, non-sunken floor areas, sometimes with a central hearth, surrounded by stone arrangements interpreted as tent rings, contrasting with the solid subterranean house remains found in the Middle Mesolithic. Here, I examine how this holds up against the more recent record of Mesolithic dwellings from all over Norway, and how we determine whether this and other observed variations follow chronological trends rather than represent local or regional adaptations, seasonal movement patterns, or differences in site activities and duration.

Materials and Method

A dataset was created in SPSS (Statistical Package for the Social Sciences, now IBM

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SPSS Statistics), with information on dwelling attributes for each individual dwelling unit. Because of the statistically limited size of the dataset, and the many bias factors (see below), the analysis of the data was kept on a highly transparent level, with the focus mainly on bivariate relationships and heavy reliance on graphic visualization throughout the process. Formal statistical testing was not applied. The full dataset is available in the Supplementary Material.

Data selection

The following criteria were used when selecting dwelling units for analysis:

- The dwelling units had to have been totally or partially excavated (not merely surveyed), and their interpretations convincingly backed by the documentation available.
- The dwelling units' dating to the Mesolithic had to be based on radiocarbon dates from reliable contexts and/or associated diagnostic artefacts (see Supplementary Material S3). Coastal dwelling dates based on shoreline displacement data were only included if supported by the associated artefact assemblage (presence of diagnostic Mesolithic artefacts and absence of diagnostic artefacts from later periods).
- Dwelling interpretations based only on distribution patterns of artefacts and/or ecofacts (e.g. phosphate) were not included (to avoid circular inference when exploring relations between distribution patterns and dwelling floors).
- Dwelling interpretations based only on attributes indirectly associated with the presence of dwellings were not included (e.g. areas cleared of stones, or the presence of feature types often found in 'indoor' contexts).

With every criterion, there is an unavoidable grey area where the inclusion of one dwelling unit and the exclusion of another may be debated, and suggested Mesolithic dwelling forms are too diverse for applying an 'attributes checklist' (Fretheim, 2019). In most cases, the interpretation made by the archaeologists reporting on the excavation has been upheld.

The selected units were excavated between 1938 and 2015 (60 per cent of these were excavated after 2000), and nearly all were rescue archaeology projects. The relevant attribute data were extracted from published excavation reports (49 per cent), published case studies and reviews (23 per cent), unpublished excavation reports (12 per cent), unfinished reports or personal communications (10 per cent), and unpublished dissertations (6 per cent). The dwelling units are distributed between ninety archaeological sites, from forty-seven different excavation projects (Figure 1).

Dwelling attribute variables

A fundamental question when selecting variables for quantitative analysis of archaeological features revolves around which measures or descriptions lead to useful cultural information. In the present study, attribute variables were selected and applied with the intention of identifying practices of use as well as practices of building. Clearly the variables also reflect the types of observations and features usually included in our interpretations of dwellings. In its final form, the analysis included fifteen variables relating to ten dwelling (or site) attributes: floor size, floor shape, floor area modifications, wall features, entrance indicators, internal hearths (position and type), artefact distribution, number of artefacts, evidence of

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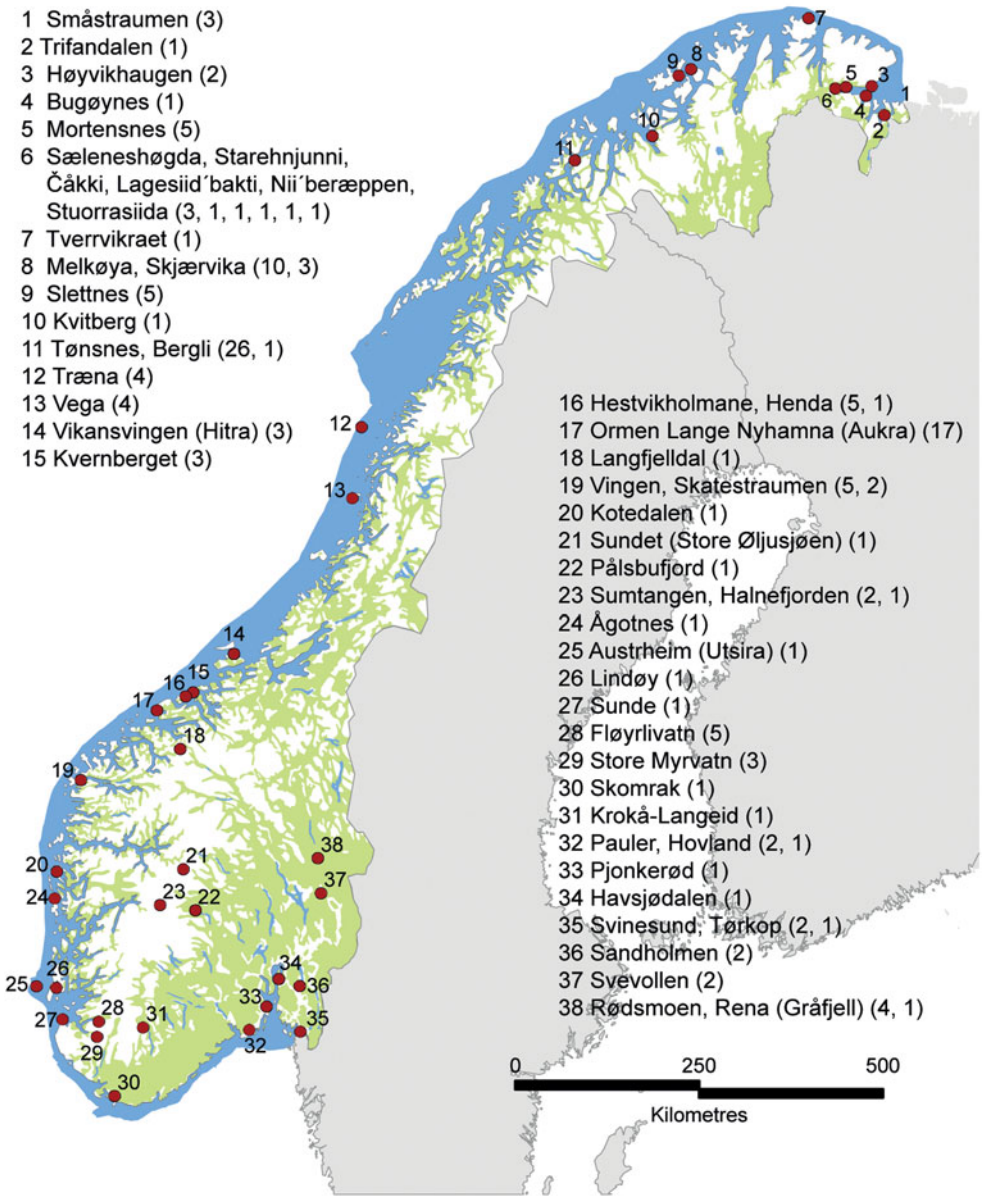

Figure 1. *Distribution map of all projects including dwelling units used in the quantitative study. The numbering of some of the projects is shared, given the scale of the map. Number of dwellings in brackets.*

maintenance or reuse, and number of dwellings per site (Fretheim, 2017; Supplementary Material S1 and S2). Each of these attributes are commonly used in interpretations beyond that of the dwellings themselves (Table 1). Floor size and shape are both seen as having social significance in hunter-gatherer societies (e.g. Flannery, 1972; Binford, 1990; Vaneeckhout, 2010): the nature of the floor and wall remains, the presence of hearths, and the number of associated lithics may be indicative of the time invested in the dwelling, its length of

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Table 1. *Dwelling attributes analysed.*

Dwelling attributes	Relevance
Size, shape, and modifications of floor area	Dwelling layout and type; time invested in construction; duration, phases, and seasons of occupation; size of inhabitant group
Wall features	Construction (layout, type, sturdiness of walls and superstructure); position of entrance; maintenance; reconstruction; occupation phases
Internal hearths	Internal activities, duration, and season of occupation; layout and headroom of dwelling; occupation phases
Artefact distribution	Internal activities/activity zones; extent of floor area/presence of walls; duration of occupation; clearance/maintenance; position of entrances
Artefact number	Length of occupation; type of settlement
Number of dwellings on site	Size and type of settlement; size of inhabitant group; settlement patterns; character of site reoccupation

occupation, and seasonal variability; the artefact distribution and position of internal hearths may reveal social units and practices of clearing associated with reuse or long-term use; and the number of dwellings per site may indicate group organization as well as group size.

Context variables

Chronozones

Bjerck (2008) has argued that the focus on chronological divisions based on established techno-complexes makes it difficult to identify gradual culture-historical developments and cross-regional trends, proposing instead a chronological framework he calls chronozones: these are segments of time disconnected from regional traditions as well as the time spans of diagnostic artefacts. He defines the Mesolithic as a chronozone dating from 9500 to 4000 cal BC, subdivided into the Early Mesolithic (EM hereafter, 9500–8000 cal BC), Middle Mesolithic (MM, 8000–6500 cal BC), and Late Mesolithic (LM, 6500–4000 cal BC) chronozones, and further subdivisions into segments of 500 years (Table 2). This system suits the purpose of analysing and comparing trends in different regions since it is based on archaeological features rather than artefacts or techno-complexes.

Geographical units

Predetermined geographical units were used to explore regional trends in the dwelling record. These regional units

Table 2. *Mesolithic chronozones, based on Bjerck (2008: table 3.1).*

Chronozones		Date range cal BC	Duration (cal years)		Date range uncal BP	Duration (uncal years)
Early Mesolithic	EM1	9500–9000	500	1500	10,020–9590	430
	EM2	9000–8500	500		9590–9270	320
	EM3	8500–8000	500		9270–8900	370
Middle Mesolithic	MM1	8000–7500	500	1500	8900–8400	500
	MM2	7500–7000	500		8400–7970	430
	MM3	7000–6500	500		7970–7690	280
Late Mesolithic	LM1	6500–6000	500	2500	7690–7110	580
	LM2	6000–5500	500		7110–6560	550
	LM3	5500–5000	500		6560–6090	470
	LM4	5000–4500	500		6090–5680	410
	LM5	4500–4000	500		5680–5230	450

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resemble the preset chronozones, in that their limits are not based on perceived or preconceived cultural boundaries. The five regions, illustrated in Figure 2a, cover between *c.* 50,000 and 100,000 km^2 each and contain some twenty to forty dwelling units each. All five regions include substantial coastal areas, which is where most Norwegian sites are found throughout the Mesolithic. The latitude of Norway ranges from 58° to 71° North, and thus landscape and climate vary considerably between regions. Figure 2b shows the distribution of landscape contexts for the dwelling units in each region.

Chronological and geographical distribution of the dwelling units

Figure 3a shows the chronological distribution of the dwelling units in 500-year chronozones. The black segments of the columns show dwelling units assigned to their chronozones based on their oldest reliable date, presumably the period in which the dwellings were originally constructed. Dwelling units with reliable dates within more than one chronozone are counted again in the red part of the column, one count per represented chronozone; it is assumed that these are chronozones in which old dwellings or dwelling plots were still in use or reoccupied. Many Mesolithic dwelling plots were also in use in the Early Neolithic (EN, 4000–3300 cal BC). Figure 3b details the dwelling units for each region by chronozone. The differences in distribution between the regions may reflect actual demographic dynamics on an interregional level but it is sometimes difficult to differentiate between regional and chronological trends.

Bias factors

As with most archaeological samples from extensive and diverse geographical units over long timespans, there are many bias

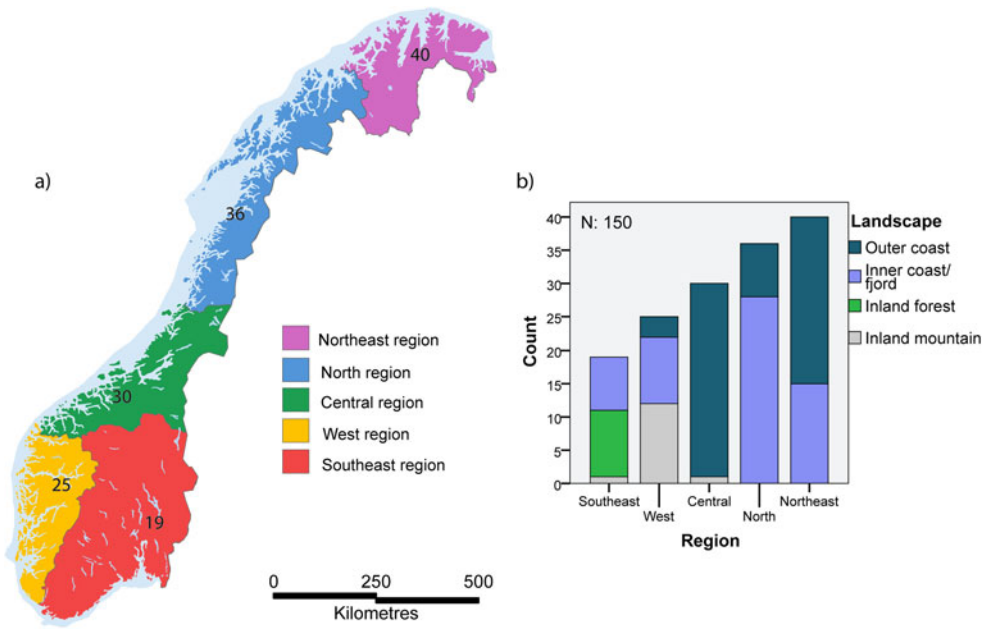

Figure 2. *a) Regions with number of dwelling units. b) Distribution of dwelling units by landscape type for each region.*

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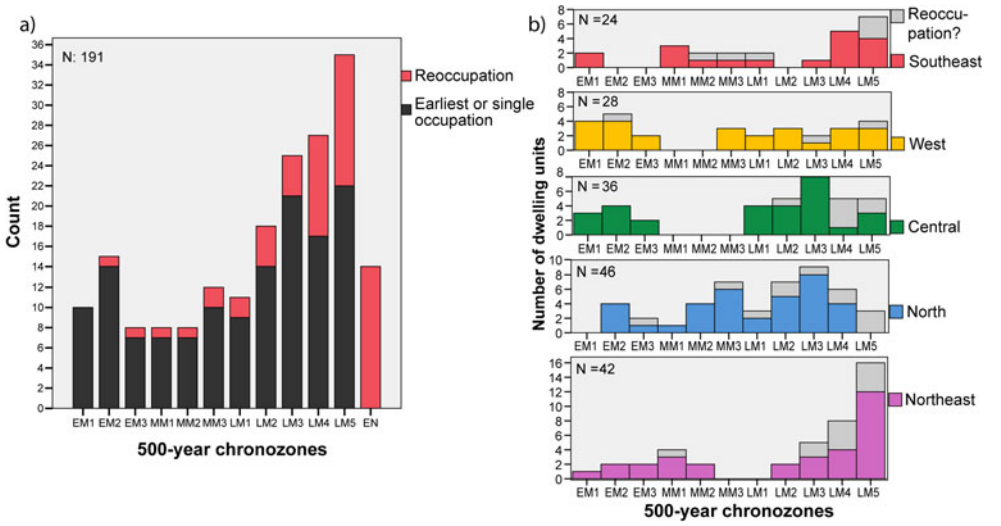

Figure 3. *a) Dwelling units per chronozone, including counts of later (re)occupation of old dwellings or dwelling plots. b) Distribution of dwelling units over time for each region, including counts of later (re)occupation of old dwellings or dwelling plots.*

factors to consider. They relate to the chronological and geographical spread of the evidence, as well as to the forms of dwellings represented. If we keep these factors in mind, the present data may still be used to formulate valid questions and hypotheses concerning trends in the Mesolithic.

Three projects account for thirty-seven per cent of the total number of dwellings units included in the analysis (Ormen Lange in the central region, Tønsnes havn in the northern region, and Melkøya with Skjærvika/Fjellvika in the north-eastern region) (see Figure 1). A single, large project may thus have a great impact on apparent regional distribution patterns, but it cannot be ruled out that some of the sites with high numbers of dwelling units are not, in fact, typical for the region, but rather represent unique places. For example, seventy per cent of the dwelling units in the northern region are from the Tønsnes havn project, which includes the largest dwellings as well as the site with the largest number of dwellings within the full dataset. However, the notion that Mesolithic dwellings are more frequent in the northern parts of the country than in the south is supported by the fact that most excavations of Mesolithic sites in the last thirty years have taken place in the south, particularly in the south-east. Within the period 1990-2015, four large projects in the south-eastern region included the excavation of a total of forty-six Mesolithic sites, uncovering eight Mesolithic dwelling units (0.2 dwellings per site) During the same period the north-eastern region saw two large projects that comprised twelve excavated Mesolithic sites and seventeen documented dwelling units (1.5 dwellings per site) (Fretheim, 2017: 181).

Other factors that may have skewed the geographical distribution of the dwelling units relate to the visibility and obtrusiveness of the dwelling remains. Visibility, in this context, refers to a site's modern environment, for example the extent to which a site has been buried, submerged, or covered by soil and vegetation since its

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abandonment (Schiffer et al., 1978: 6–7; McManamon, 1984: 224). Thick peat layers obscure the visibility of sites and their features in sheltered coastal areas in many parts of the country. Dense forests also reduce the chance of noticing otherwise distinct features during surveys. Obtrusiveness refers to the probability that particular archaeological remains can be discovered by a specific technique (Schiffer et al., 1978: 6–7; McManamon, 1984: 224). Survey techniques vary with the expected visibility of the sites. In areas with sparse vegetation, distinct tent rings and 'house-pits' surrounded by wall mounds will be quite obtrusive in a surface survey. The sparse vegetation in the sub-arctic region of northernmost Norway is undoubtedly part of the reason why so many prehistoric dwellings are known here (Olsen, 1997: 185). In areas with more vegetation, including peat cover, shovel test pitting is the prevailing survey method. With this method, extensive sites with a non-clustered, high density of artefacts will be the most obtrusive. Distinct dwelling remains where artefacts are confined to a small floor or wall area may go unnoticed.

Since this study deals with excavated dwelling remains only, bias factors relating to visibility and obtrusiveness mainly apply when archaeologists have failed to detect whole sites, or when excavated parts of sites are limited to areas where lithic concentrations have been identified by test pitting. Not all dwellings are associated with high densities of artefacts (Fretheim, 2022). In the last fifteen to twenty years, the practice of uncovering large areas by mechanical excavators has reduced the latter problem. When a site is uncovered, the remains of a sturdy dwelling used over a long period will usually be easier to detect (and accepted) than the remains of a tent or expediently built hut. In the south-eastern region, however, visually detectable cultural deposits are often lost to podsolization and other decay processes, making features such as floors and postholes difficult to observe. In Denmark and southern parts of Sweden, commonly accepted forms of Mesolithic dwelling remains often include non-sunken floors with posthole arrangements along the walls and/or in the floor area (see Grøn, 2003: 688; Hernek, 2005: 67–71; Casati & Sørensen, 2006). If such dwelling types have parallels in south-eastern Norway, leaching processes would make them particularly hard to detect.

The chronological distribution of the dwelling units is also subject to bias factors relating to visibility and obtrusiveness. The dip in the total dwelling count in the MM (Figure 3a) is probably linked to the Holocene (Tapes) transgression, a relative rise in sea level resulting in deposition of marine strata over terrestrial strata culminating in the period 8000–7000 cal BC. Within this period, dwellings along large parts of the Norwegian outer coast are likely to have been washed out, submerged, or covered by beach sediments (Bjerck, 2008).

Results: Chronological Patterns

Floor size and shape

Figure 4 presents the relationships between the dwellings' floor shape and floor size by chronozone, with the average floor size in each chronozone shown by a line. The general trend appears to be a gradual increase in average floor size over the course of the Mesolithic. The floor areas of the EM dwelling units are of similar size and shape all over the country: small (mainly <10 m^2), with circular or oval ground plans. The range of floor sizes increases after the EM. In addition, there is an apparent gap between small/medium (5–15 m^2) and large dwellings (>20/25 m^2) in MM2–LM3 (7500–5000 cal BC), and an apparent closing of the gap and

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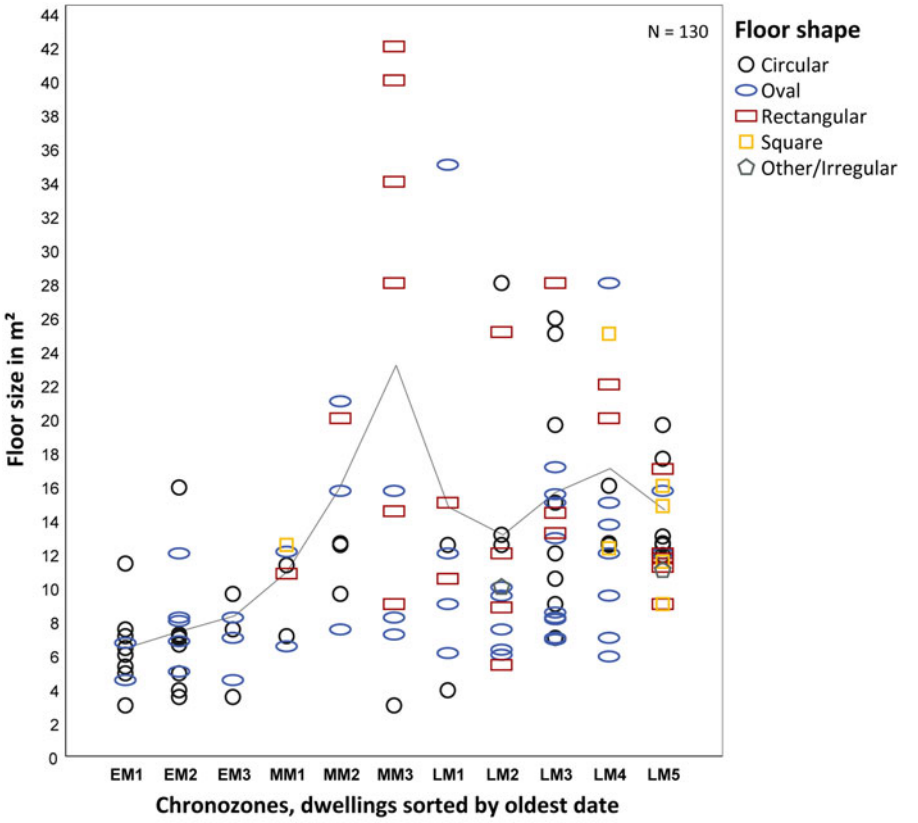

Figure 4. *Floor shape and size over time. The line shows the average floor size in each 500-year chronozone.*

increased uniformity in floor sizes in LM4–LM5 (5000–4000 cal BC). The floor size gap is not restricted to a single region, and hints at new social structures and/or settlement patterns (see below).

Rectangular floors are present in all chronozones after the EM. Among the dwellings with floor sizes of 20 m^2 or more, nine out of sixteen dwellings are rectangular (56 per cent), while the overall ratio is thirty-two out of 146 (22 per cent).

Floor area modifications and wall features

The variation in types of floor area modifications over time is illustrated in Figure 5a. Sunken floors are the most frequent form of modification (40 per cent) and dominate from the moment of their introduction in MM1 onwards. There is no chronological tendency for the sunken floors or 'house-pits' to become deeper after their first appearance. Non-modified floors are most frequent in the EM chronozones.

Figure 5b shows the variation in wall features over time. Stone arrangements along the perimeter of the floors (interpreted as tent rings) dominate in the EM, and wall mounds (raised features of diverse composition along the perimeter of the floor) dominate in all later Mesolithic chronozones. Wall mounds are clearly associated with sunken floors (present in forty-five out of fifty-five sunken floor

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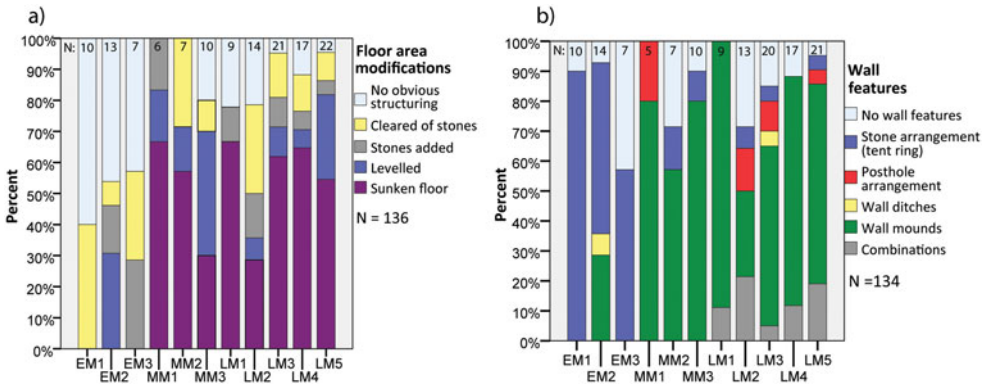

Figure 5. *a) Modifications of floors over time. b) Wall features over time.*

cases). Indeed, the mounds are often the direct result of soil being redeposited from the floor area onto the surrounding surface. However, sunken floors also appear without wall mounds, and wall mounds sometimes surround non-sunken floors. Some mounds may also have been created by the repeated or long-term use of the dwelling, as revealed by the inclusion of debris or midden material in their composition (Fretheim, 2019: 25–28). It seems that the proportion of distinct wall mounds increases over the course of the Mesolithic, which may indicate that structures became more solid (the mounds could represent remains of the actual walls, or support for the walls). The distinct wall mounds tend to contain more midden material (lithics, fire cracked stones, etc.) than the indistinct mounds, however, suggesting that the increasing distinctness relate more to practices of reuse and/or maintenance, such as floor clearing (Fretheim, 2017: 202–03).

Internal hearths

Figure 6a shows the variation in the position of internal hearths, if present. A first point of note is that no traces of a hearth were found in more than a third of the dwelling units. The share of dwelling units with identified hearths increases markedly from EM1 to EM3, and from EM2 to EM3 central hearths dominate over of non-central hearths (usually situated in the entrance area). If tents were the main type of EM dwelling, this could indicate a shift in preference from conical to ridged tents, given differences in the location of greatest headroom between the two forms. For example, in the ethnographically known ridge tents of the Inuit, the hearths are close to the entrance, where the headroom is at its maximum (Faegre, 1979: 125–35).

More than half of the internal hearths appear as unstructured concentrations of charcoal and/or fire-cracked stones and burnt lithics. The most common form of structured fireplaces is associated with stone settings, interpreted as heat conservers (Bjerck et al., 2008: 252–53). In the EM cases, these stone settings have diameters of 0.80 to 1.50 m, with pebbles in a single layer above soot-stained sand or gravel; this sooting is presumably caused by a fire on top of the stone setting later washed down between the stones. The first dwelling units with more than one internal hearth appear from LM2 onwards. There is seemingly no correlation between the number of hearths and floor size (Fretheim, 2017: 208).

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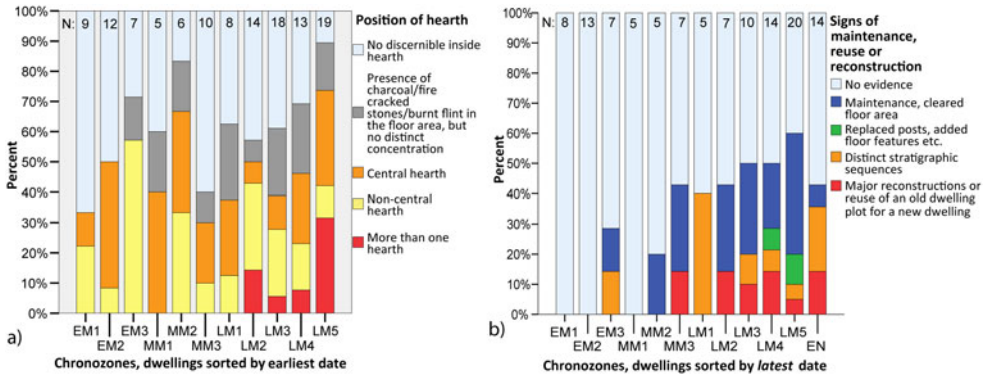

Figure 6. *a) Position of internal hearths over time. b) Evidence of reuse or maintenance over time. The dwelling units are arranged chronologically by their last phase of occupation, including the Early Neolithic.*

Traces of maintenance or reuse

The chronological variation in documented signs of reuse or maintenance is shown in Figure 6b. These traces include evidence of floor clearing, replaced or added dwelling features, layers forming distinct stratigraphic sequences, and major reconstructions or reuse of an old dwelling plot for a new dwelling. Note that the dwellings in that chart are sorted by the latest date relating to their occupation, unlike in the rest of the charts; this sorting by most recent date means that the reuse of Mesolithic dwellings in the EN is included.

The reuse of dwellings appears to increase steadily from MM2 onwards. Traces of maintenance and minor reconstructions are dominant in the LM, while signs of major reconstructions and distinct stratigraphic sequences dominate among dwellings whose final phase dates to the EN. This may reflect more cultural continuity within the LM than between the LM and the EN.

Artefact distribution and number

For the Mesolithic dwelling units as a whole, artefact concentrations are typically associated with their floors, either covering the floor area and showing an apparent 'wall effect' (i.e. concentrations limited to the floor area; 29 per cent) or limited to parts of the floor (31 per cent). Most of the remaining dwelling units have distribution patterns indicating (partial) clearing of the floor, so-called 'door dumps', or concentrations along or within the wall areas (22 per cent). Clearing seems to become more frequent during the LM (see Figure 6b), mainly at the expense of 'wall effect' patterns, which dominate in the EM and MM. There is no distinct difference between the patterns of the EM and MM.

Dwellings with fewer than 1000 artefacts are only slightly more common in the EM than in the LM (Figure 7a), but dwellings with more than 5000 associated artefacts (mainly between 5000 and 8000) are clearly more frequent in the LM chronozones. This suggests that the variation between dwellings for short-term and long-term occupation was greater in the LM than in earlier periods, as would be expected from settlements with seasonal variation in mobility.

Number of dwellings on a site

Figure 7b illustrates the chronological variation in number of dwellings on all

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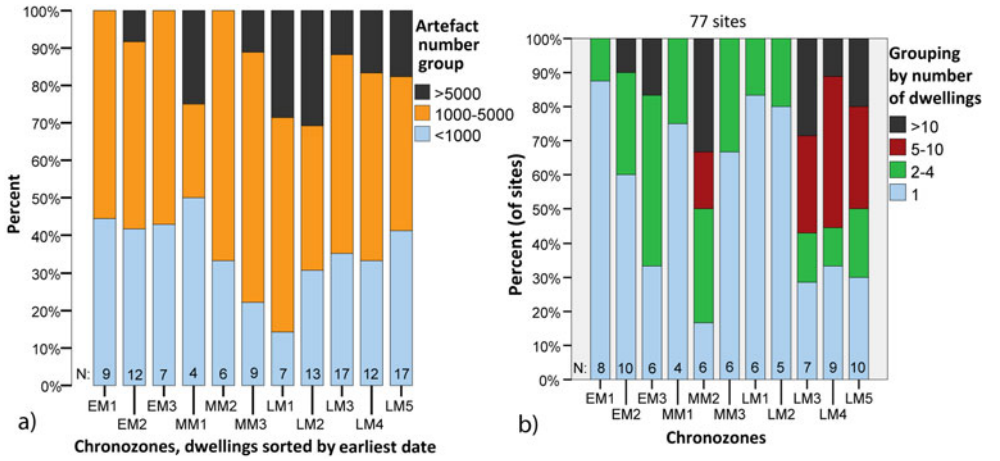

Figure 7. *a) Number of artefacts associated with the dwellings over time. b) Sites grouped by number of dwellings.*

represented sites. There is a marked shift at around 5500 cal BC (between LM2 and LM3), with single-dwelling sites dominating earlier, and sites with more than five dwelling units prevailing later. This implies a profound change in settlement patterns, and possibly social structures, which is particularly noticeable in the northern regions.

Results: Regional Patterns

Regional differences mainly become evident from the MM and onwards and are most pronounced between the northern regions and the rest of the country. This goes for differences in the number of dwellings per site (on average *c.* 6 per site in the north *vs* 1.5–3 in the other regions; Figure 8a), number of artefacts (Figure 8b), artefact distribution associated with the dwellings (fewer artefacts and less distinct distribution patterns in the north), and signs of maintenance or reuse. The south-eastern and central regions have the highest share of evidence for reuse (56 and 48 per cent, respectively; Figure 8c). The pattern exhibited by the western region appears to resemble that of the northern regions, but a large proportion of the dwelling units in the western region belong to the EM (see Figure 3b) and thus may reflect a chronological rather than a regional trend.

Some patterns appear to set the north-eastern region apart from all the others, including the northern region. This includes the share of rectangular dwellings (far greater in the north-eastern region than in the rest of the country; Figure 8d) and the range of floor sizes. In the north-eastern region, no MM–LM dwellings above 20 m^2 are known, whereas the northern region has the widest range (5–40 m^2). The four largest dwellings in the northern region were, however, all found on sites in the same project (Tønsnes), and hence this pattern may relate to these specific sites rather than a general trend in the northern region.

There is a tendency for the sunken floors of the pit houses in the south-eastern region to be deeper than in the rest of the country (Fretheim, 2017: 199–200). While some shallow floors in the south-eastern region may have been lost to podsolization, three out of seven sunken floors recorded in this

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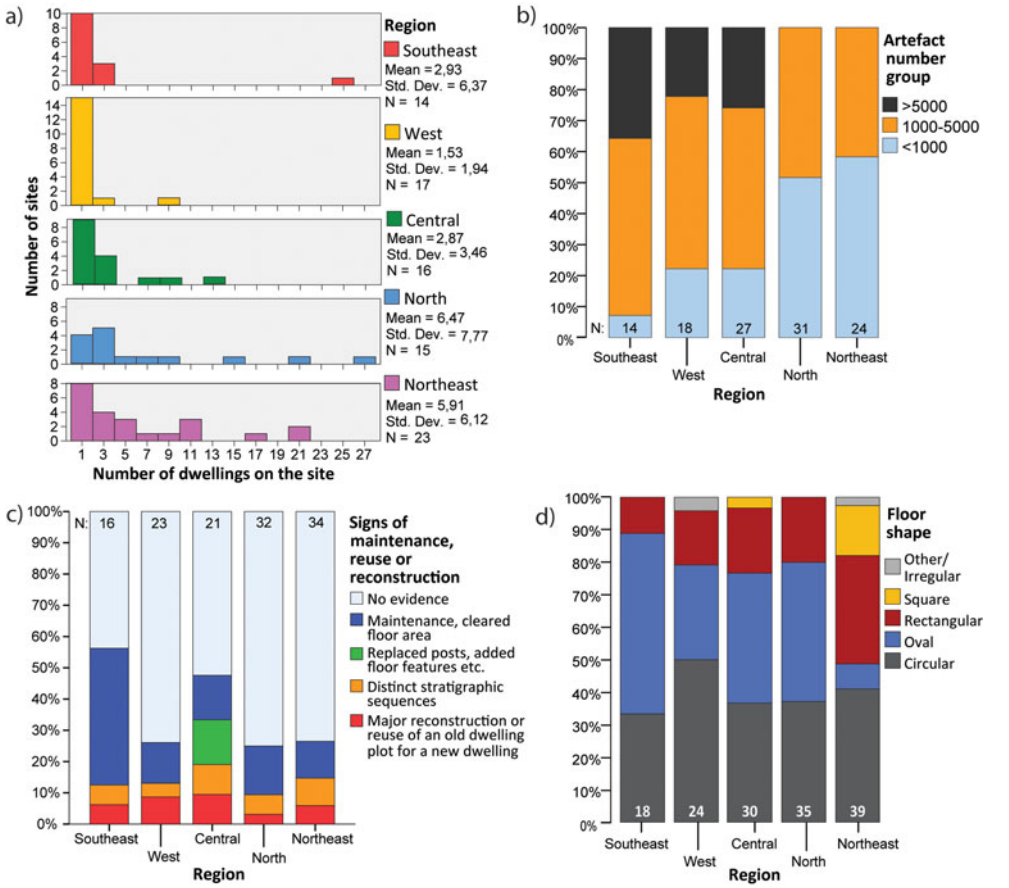

Figure 8. *Regional variations in overview. a) Number of dwellings per site by region. b) Regional variation in number of artefacts associated with the dwellings. c) Regional variation in evidence for reuse or maintenance. d) Floor shape variation between regions.*

region have a maximum depth greater than 60 cm below the surrounding ground surface. In other regions, the maximum depth is 50–60 cm and the average depth is *c.* 20–25 cm. The western region has the largest share of tent rings (stone arrangements along the wall areas), which clearly relates to the large proportion of EM dwellings in that region (see Figure 3b).

Discussion

The results presented indicate that the dwellings of the Early Mesolithic (9500–8000 cal BC) had a similar size and shape throughout the country: small (mainly 5–10 m^2), with circular or oval ground plans, little modification of the floor areas, and few signs of floor clearance. Documented wall features are mainly in the form of stone arrangements (tent rings). The typical dwelling is likely to have been a tent. In this context, it is important to note that EM sites with recorded dwelling remains comprise no more than three per cent of the known total of sites from this period in Norway (25 out of 778 sites – the total as counted in Breivik, 2014: 1480). Considering the

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coastal sites only, which comprise ninety-six per cent of the EM total (Breivik, 2014: 1480), the number is even smaller (17 out of 747 sites, *c.* 2 per cent). Generally speaking, the dwellings of the coastal EM people left no noticeable trace. Given the Late Glacial and early Preboreal climate (Breivik, 2014), it is highly unlikely that the lack of evidence for dwellings is due to people not using artificial shelters. Caves or natural rock shelters along the coast also show few signs of use in Norway until the MM or LM. Fully portable tents are likely to have been part of the 'mobile lifestyle package' of the coastal pioneers, along with boats in which tents could be stored and transported (Bjerck, 2017; Fretheim et al., 2017: 218). Tents are not inferior or expedient versions of huts or houses, but rather specialized equipment made to facilitate a lifestyle suited to a specific environment. The combination of boats and tents would have maximized the flexibility of using campsites in the exposed coastal landscape; with a tent, shelter was always within reach. Invoking a 'mobile lifestyle package' does not imply that there was no room for variation or change. The chronological shift in the position of internal hearths within the EM, away from central fireplaces in EM3 may reflect a change in dwelling trends within the EM. In some cases, the documented 'tent rings' also seem too distinct and structured for the sole purpose of keeping a tent cover in place and could be seen as features in the landscape marking certain locations for future use (Fretheim et al., 2017). Be that as it may, the complete lack of more substantial types of dwellings in the EM record is likely to reflect a way of life that maintained key social practices through several millennia (Warren, 2021: 85–104).

In the Middle Mesolithic (8000–6500 BC), nearly every aspect of the dwelling traditions appears to change. Floor sizes range between 3 and 40 m^2, and rectangular and square floor shapes are added to the round and oval. The floors are usually sunken and surrounded by wall mounds, suggesting that most of the dwellings were pit houses; nonetheless the variety is striking. The transition to the MM in Norway is characterized by forest growth (giving increased access to wood for building), the stabilization of sea levels along the coast, and the final retreat of the ice in the interior areas (potentially permitting unhindered east-west movement of people across the whole Scandinavian peninsula). Research on MM stone technology suggests migration of people from present-day Finland and Russia in that period, from the area of the 'post-Swiderian' complex (Rankama & Kankaanpää, 2011; Sørensen et al., 2013; Damlien, 2014; Kleppe, 2014; Manninen et al., 2021). All these factors are likely to have contributed to the break with the tent-dwelling tradition of the coastal pioneers. So far, however, there is no evidence that the pit house tradition in Norway had an eastern origin; none of the key sites cited in support of the migration theory include remains of pit houses (e.g. Sujala in northern Finland and Fállegoahtesajeguolbba in Varanger, Norway). Excavated remains of pit houses which may predate 8000 cal BC do exist in northern Karelia and the Karelian Isthmus, but they are few and far between (Fretheim, 2017: 249). Palaeogenetic studies indicate mixing of eastern hunter-gatherers with the existing population (Günther et al., 2018; Kashuba et al., 2019), while studies of site variability and site locations in coastal areas indicate little change in settlement patterns and landscape use across the EM–MM transition (Nyland, 2016: 246; Berg-Hansen et al., 2022). The initial changes appear limited to the lithic assemblages and dwelling types, with settlement changes appearing later. Whatever the

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reasons were for beginning to build fixed dwellings intended to be left standing at specific sites, these structures would have signalled a claim to a specific location, and may have contributed to more formalized practices leading towards territoriality.

There is no distinct break in dwelling types between the Middle and Late Mesolithic. In the period 7000–5000 cal BC (MM3–LM3), there is a gap between small (<15 m^2) and large (>25 m^2) dwellings. The lack of mid-size dwellings suggests that either people built small dwellings, perhaps for a family, or relatively large dwellings, possibly for larger task groups or households consisting of more than one family. During the LM, dwellings (mainly pit houses) become far more numerous, and their remains show more signs of maintenance and/or reuse over long periods, sometimes over more than a thousand years (see Fretheim, 2019: 21–25). This may reflect more fixed settlement patterns but does not automatically suggest cultural continuity or decreased mobility. Abandoned pit houses, or even just the visible 'house-pits', may have acted as 'space attractors' in the Late Mesolithic landscape, resulting in the same dwelling plots being used across time and traditions (Piana & Orquera, 2010; Fretheim et al., 2016). The LM shows the greatest variation in the number of artefacts associated with the dwelling units, with a high proportion at both ends of the spectrum (<1000 and >5000 artefacts). If we accept that larger quantities of artefacts indicate longer occupation periods, the difference between dwellings for short-term and long-term occupation is most pronounced in the LM. This may be because some people changed their dwelling location more often than others, or because staying in the same place for increasingly longer periods goes hand in hand with staying away from that place for increasingly shorter periods, in a form of in semi-sedentism.

Distinct signs of regional differences, as well as interregional contacts, are visible in much of the archaeological evidence for the period 5000–4000 cal BC (LM4–LM5) (Nyland, 2016: 258–63). There is a general increase and change in rock art; large, long-term settlement sites (albeit with few documented dwelling units) are established in coastal parts of western and south-eastern Norway (Olsen, 1992; Bergsvik, 2001); the raw materials used for ground stone axes show distinct geographical patterns in the southern regions (Bergsvik, 2006; Nyland, 2016), while polished slate artefacts and Combed Ware are introduced in the far north (Damm, 2006). The final part of the Mesolithic (which includes the early part of the Late Stone Age in northern Norway, i.e. the fifth millennium) is also when regional differences in dwelling practices become most apparent. In southern and central Norway, people appear to have continued using the same dwelling plots, maintaining them or building new dwellings on top of the remains of older ones. In the far north, the dwelling patterns observed in 5000–4000 cal BC mark the beginning of multiple-house sites and (possibly) semi-sedentary forager lifestyles that characterize the northernmost regions in the mid-Holocene (Renouf, 1984; Schanche, 1994; Damm et al., 2022). It may have started with a preference for building new dwellings next to older structures, rather than extensive dwelling reuse. This would explain the occurrence of LM sites with several similar dwellings with relatively few associated lithics in the north *vs* sites with only one or a few well-used dwelling plots with many associated artefacts in the south.

Conclusion

The quantitative study presented here gives strong support to the claim that the

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most distinct change in Mesolithic dwelling traditions in Norway took place between the Early and Middle Mesolithic, with tents as the main form of dwelling in the EM, and pit houses dominant from the MM onwards (Bjerck, 2008). If we take the use of tents in the EM as being part of a 'mobile lifestyle package' that facilitated a specific way of life and upheld key social practices during a period of 1500 years, the rapid introduction of pit houses in MM1 clearly indicates more than a mere change in architectural preferences. Environmental change may have been a driving force, but the EM–MM transition also saw the migration of new people from present-day Finland and Russia into Norway. We do not know whether they brought new architectural forms with them, but they obviously interacted with the existing population, and both groups may have seen the need to leave their mark on the landscape by building fixed, visible dwellings.

The quantitative study of Mesolithic dwellings brought other, less expected, changes to light. The gap between small and large dwellings observed in the period 7000–5000 cal BC (MM3–LM3) hints at new social structures which are not reflected in changes in lithic technology or in the environment. The growing number of dwelling units with evidence of maintenance and/or reuse over very long periods during the LM, and the marked shift in the number of dwellings per site in central and northern Norway around 5500 cal BC, gives new insights into trends across regions. Ideally, the study of Mesolithic dwellings should be expanded to the whole Scandinavian peninsula, to better understand variability between coastal and inland settlement trends.

Although some issues concerning the representativity of the present dataset are acknowledged, the study of variations in dwellings and dwelling practices in Mesolithic Europe, and more generally settlements predating the advent of agriculture, is well worth pursuing. It is hoped that this study's focus on relations between dwelling attributes, dwelling types, settlement patterns, logistics, and long-term reoccupation can inform how these dwelling remains are documented and studied in the future, and in other regions. A quantitative treatment of the dwelling evidence can be a valid alternative to identifying lithic techno-complexes as a basis for studies of long-distance contacts and cultural affinities, demographics, settlement patterns, and social structures.

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Supplementary Material

To view supplementary material for this article please visit https://doi.org/10.1017/eaa.2023.35.

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Des tentes aux fonds de cabanes : une analyse quantitative des habitations du Mésolithique en Norvège (9500–4000 av J.-C.)

Une analyse quantitative de 150 habitations mésolithiques en Norvège datées entre 9500 et 4000 av J.-C. sert à une étude régionale et chronologique basée sur quinze variables. Ces variables comprennent la forme, les dimensions et les modifications des sols, les types de parois, l'emplacement des foyers, la quantité et la répartition du mobilier, les traces d'entretien ou de réemploi et le nombre d'habitations par site. L'auteur identifie une nette transformation des types d'habitations entre le Mésolithique ancien et moyen, autour de 8000 av J.-C. Les tentes caractérisent le Mésolithique ancien, tandis que les fonds de cabanes dominent à partir du Mésolithique moyen. L'étude révèle également que les variations en matière de constructions domestiques après 8000 av J.-C semblent être liées à des transformations sociales, à une conscience croissante du territoire et à des spécificités régionales. Translation by Madeleine Hummler

Mots-clés: Norvège, Mésolithique, tentes, fonds de cabanes, attributs des habitations, étude quantitative

Von Zelten bis zu Grubenhaüsern: eine quantitative Untersuchung von mesolithischen Wohnbauten in Norwegen, 9500–4000 v. Chr.

Eine quantitative Analyse von 150 mesolithischen Wohnbauten in Norwegen, welche zwischen 9500 und 4000 v. Chr. datiert werden, steht im Zentrum einer chronologischen und regionalen Untersuchung. Diese beruht auf fünfzehn Variablen wie Dimensionen, Grundriss und Änderungen des Bodens, Form der Wände, Lage der Feuerstellen, Anzahl und Verbreitung von Artefakten, Zeichen von Erhaltung oder Wiederverwendung und Anzahl von Bauten pro Wohnstätte. Die Verfasserin identifiziert eine deutliche Veränderung in den Bautraditionen zwischen dem Früh- und Mittelmesolithikum um 8000 v. Chr. Zelte charakterisieren das Frühmesolithikum, während Grubenhaüser für die späteren Phasen des Mesolithikums typisch sind. Die Studie beleuchtet auch, wie die unterschiedlichen Wohntraditionen nach 8000 v. Chr. mit Umwandlungen in der Gesellschaft, mit einer wachsenden Territorialität und mit regionalen Besonderheiten verbunden sind. Translation by Madeleine Hummler

Stichworte: Norwegen, Mesolithikum, Zelte, Grubenhaüser, Eigenschaften von Wohnbauten, quantitative Analyse

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