up. To me it is obvious that ritual is a factor we cannot reject in archaeology. It has most likely played an active role in the deposition of material on sites – like it or not. At times it represents an irritating factor that is somewhat difficult to control archaeologically. But that it is difficult does not allow us to ignore it – if our aim is to conduct serious research. Ethnoarchaeology may be one way of overcoming some of the shortcomings inherent in the excavated materials with regard to this aspect – even though traditional archaeologists should be very much aware that ethnoarchaeology is not a magic box which contains answers to everything an archaeologist could possibly hope for.

In general I feel that the papers presented in this session clearly indicate that Mesolithic archaeology has reached a new stage and that we have accumulated so much material that it is now possible to formulate more refined generalisations than previously. One can now only hope for that the disturbing lack of resources for the excavation of new and informative Mesolithic sites, a situation that has been experienced in some countries, shall not stop this positive development.

References.

Becker, C.J. 1953. Die Maglemosekultur in Dänemark: Neue Funde und Ergebnisse. *Congrés International des Sciences Préhistoriques 1950. Actes de la IIIe Session*, 180–183.

Bernot, L. 1982. The two-door house. In: Izikowitz, K.G. and Søensen, P. (eds.) *The Intha example from Burma. East and Southeast Asia. Anthropological and architectural Aspect*, 41–48. London.

Bourdieu, P. 1970. La maison Kabyle ou le monde renversé. In: Pouillon, J. and Maranda, P. (eds.) *Échanges et communications. Mélanges offerts à Claude Lèvi-Strauss à l'occassion de son 60ème anniversaire*, 739–758.

Childe, G.V. 1946. *Scotland before the Scots*. London.

Clarke, D.V. and Sharples, N. 1985. Settlements and subsistence in the third millennium B.C. In: Renfrew, C. (ed.) *The prehistory of Orkney*, 54–82. Edinburgh.

Doxtater, D. 1991. Reflections on the Anasazi cosmos. In: Grøn, O., Engelstad, E. and Lindblom, I. (eds.) *Social Space. Human Spatial Behaviour in Dwellings and Settlements*, 155–184. Odense.

Eliade, M. 1976. *A History of Religious Ideas* I. Chicago.

Fock, N. 1986. Et sted i skoven – en verden – et univers. *Jordens folk* vol 21(2), 61–69.

Grøn, O. 1995. *The Maglemose Culture. The reconstruction of the social organisation of a mesolithic culture in Northern Europe*. BAR International Series 616. Oxford.

Gracheva, G. 1989. Nganasan shamans' ways and worldview. In: Hoppal, M. and Pentikänen, J. (eds.) *Uralic Mythology and Folklore*, 233–238. Budapest – Helsinki.

Mellaart, J. 1967. *Çatal Hüyük. A Neolithic Town in Anatolia*. London.

Ohnuki-Tierney, E. 1972. Spatial concepts of the Ainu of the Northwest Coast of Southern Sakhalin. *American Anthropologist* vol.74(3), 426–457.

Parvia, R. 1991. The Finnish concept of space. A mythical spiritual view. In: Grøn, O., Engelstad, E. and Lindblom, I. (eds.) *Social Space. Human Spatial Behaviour in Dwellings and Settlements*, 149–154. Odense.

Ränk, G. 1951. *Das System der Raumeinteilung in den Behausungen der nordeuroasischen Völker* vol.2. Stockholm.

Tanner, A. 1979. *Bringing Home Animals. Religious Ideology and Mode of Production of the Mistassini Cree Hunters*. London.

Tanner, A. 1991. Spatial organization in social formation and symbolic action: Fijian and Canadian examples. In: Grøn, O., Engelstad, E. and Lindblom, I. (eds.) *Social Space. Human Spatial Behaviour in Dwellings and Settlements*. Odense, 21–39.

28. Encircling the living space of Early Postglacial reindeer hunters in the interior of southern Norway

Sveinung Bang-Andersen

Seven tent rings, six evident and one analytically segregated, found on sites at Store Myrvatnet and Store Fløyrlivatnet in the mountains of SW Norway, are presented. C14-dated between c. 9600 and 9000 uncal. BP these range as the oldest dwelling structures so far known in Norway. The size, form, function and cultural-historical background of the tents used by the "Myrvatn-Fløyrlivatn group" of logistic-mobile reindeer hunters is tentatively interpreted in the light of ethnographical and archaeological data. Further studies will be needed to separate more precisely the different dwelling constructions and activity patterns expressed in the tent rings.

Introduction

In southern Scandinavia, as in other parts of Northern Europe, faint remains of hutfloors often appear on sites from Pre-boreal and Boreal hunter-gatherer groups adapted to densely vegetated environments. These sites provide important – still highly fragmentary – evidence about seasonality, camp organisation and indoor/outdoor work activities (Fredsjö 1953:46 pp; Larsson 1974:5 pp; Blankholm 1987:109 pp; Johansson 1990:15 pp). Some sites have even been interpreted to reflect social factors determining the spatial use of the hutfloors (Grøn 1989:99 pp, 1995:59 p).

As a contrast, dwelling remains from preceding pioneer populations inhabiting open tundra or park tundra landscapes, are of even more slender character, despite the careful excavation of a large number of well-preserved sites in Denmark and on the North European plain. Interpretations of Late Glacial dwellings have mainly been of indirect nature, based on the spatial localisation of hearths, special activity areas, postulated door dumps or potential walls reflected by the artefact dispersal (Andersen 1973:16 pp). Alleged "tent" or "hut" structures do, with some very few exceptions (e.g. Terberger 1997:25 pp), not appear convincing.

The aim of this paper is to bring into discussion tent rings found in Pre-boreal inland sites bordering the mountain lakes *Store Myrvatnet* and *Store Fløyrlivatnet* in Southwest-Norway. Focus will be on the tent rings and their cultural-historical setting within a North-European and Circumpolar context. Other important archaeological aspects opened by these sites will be subject for later analyses, and are not considered in any detail here.

The two lakes are situated 20 km apart in the mountain areas on the southern side of the Lysefjord, 40 and 45 km E and ESE of the city of Stavanger (Figure 28.1).

Both the topographical setting and the character of the sites exhibit important common traits. The lakes are surrounded by open low-alpine landscapes, now only

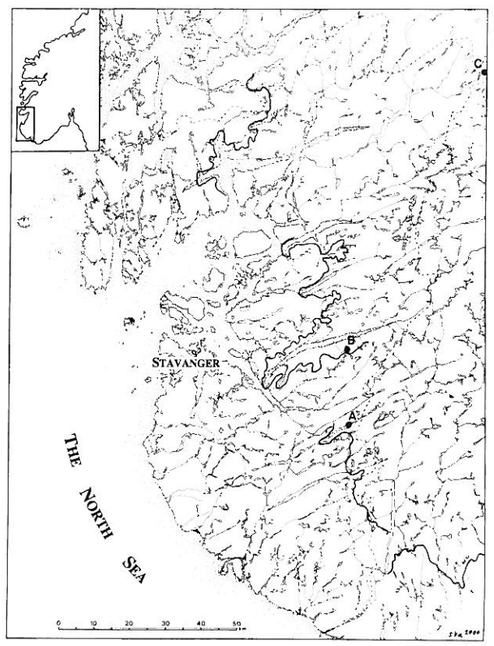

Figure 28.1 Map of SW Norway with solid lines indicating the Younger Dryas ice front position, A: Store Myrvatnet, B: Store Fløyrlivatnet, and C: Holmavatnet.

sporadically used by wild reindeer. As both lakes have been utilised for hydro-electrical purposes since the early 1920s, large beach zones emerge strongly eroded due to water-level alterations. With regard to ice recession chronology, the sites are situated within or immediately behind the Younger Dryas main frontal moraine, the Lysefjord stage, dated between c. 10,900 and 10,700 BP (Andersen 1979:86). Accordingly, any settlement remains found here in unprotected position should be younger than about 10,500 radiocarbon years.

Until now 17 Early Mesolithic sites have been localised: 7 alongside Myrvatn, 10 at Fløyrlivatn. All are open air sites dominated by lithic inventories devoid of organical remains other than charcoal. In both areas the physical preservation of the sites varies due to differential exposure to the main erosional processes: inundation, wave abrasion and ice pack action. The Myrvatn sites, due to superimposition of thick bog formations, generally contain the physically best preserved cultural layers. In spite of this, the most complete dwelling structures have, paradoxally, come to light at Fløyrlivatn.

A total of 10 Pre-boreal sites have been excavated: 3 at Myrvatn between 1985 and 1998 (Bang-Andersen 1990:215 pp), 7 at Fløyrlivatn in 1999 (Tørhaug and Åstveit 2000:35 pp). The investigated sites contain findbearing activity areas between c. 10 and 45 sq.m. with lithic inventories ranging from about 100 to 3900 artefacts. According to a total of 26 radiocarbon analyses of charcoal, the Myrvatn sites date between 9600 and 9000 BP (Bang-Andersen 1990:218 pp) and the Fløyrlivatn sites between 9750 and 9350 BP (Bang-Andersen 2000:28 p). The radiological time setting is supported by the artefact material in the sites: rich projectile inventories based on tanged points and microliths, a flint manufacture technology dominated by unifacial blade cores with opposed tilted platforms, and rock crystals reduced bipolary.

All sites were excavated in an optimally uniform manner by hand-troweling units of 1/4 sq.m followed by water screening to ensure approximately total find recovery. Accordingly, a sound basis should exist both for inter- and intrasite comparisons.

The Myrvatn sites

The discovery of a group of Pre-boreal settlement sites at Lake Store Myrvatnet (610 m a.s.l.) in 1984 was sensational by the favourable preservational conditions in some sites with plentiful survival of charcoal for radiocarbon datings and palaeo-ecological reconstructions (Bang-Andersen 1988a:124 pp, 1988b:45 pp, 1990:215 pp, 1995:65 pp, 1996b:229 p). Indications of dwelling structures were, however, of slender nature and confined to three sites (Figure 28.2).

Site I, containing an inventory of 1350 stone artefacts within the investigated area of 32.5 sq.m, has been interpreted as the result of one short encampment episode (Bang-Andersen 1990:216).

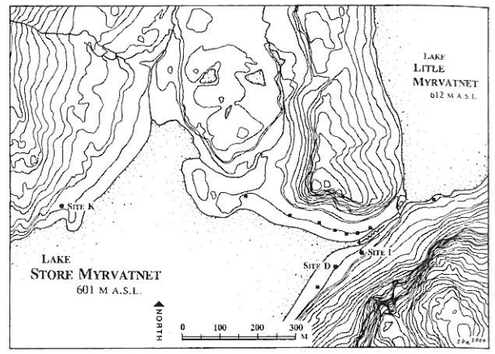

Figure 28.2 Reconstructed shore-line of NE part of Store Myrvatnet with Mesolithic sites (squares) and sites containing tent rings (dots) specified. Contour intervals: 5 m.

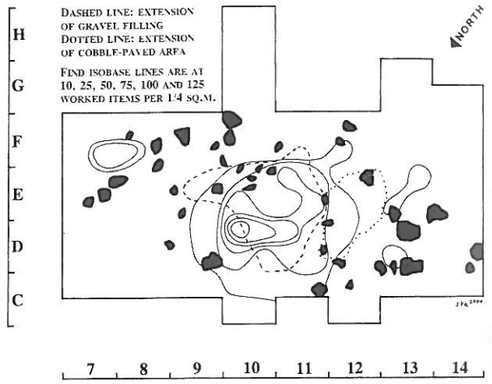

Figure 28.3 Simplified plan of Myrvatn Site I with stones (in black) interpreted as tent weights out of context. Plan size units: 1 m.

Tent rings or other evident dwelling structures were not recognised during excavation. In spite of this, 40 to 45 rounded stones measuring between 20 and 45 cm, spread widely on a homogenous level, may well be taken as structural stones deriving from some kind of tent- or windbreak construction. Charcoal and flint artefacts, directly under the bases, indicate a number of the stones to have been relocated from former positions.

The horizontal distribution of the lithics, with about 75% of the total find amount concentrated within a oval/circular stone-cleared area 2.8–3.2 m across, probably outlines a c. 7 sq.m large tent floor. A 2.8 m wide filling of charcoal-mixed gravel coincided with the artefact concentration (Figure 28.3).

The distribution of burnt flints on Site I, located inside the postulated tent floor, indicates use of interior fire, despite a lack of distinct hearts. Two radiocarbon analyses of charcoal independently date the site to c. 9000 BP (see Appendix for lab. references). Possible tent openings marked by "find tongues" or "door dumps" are not

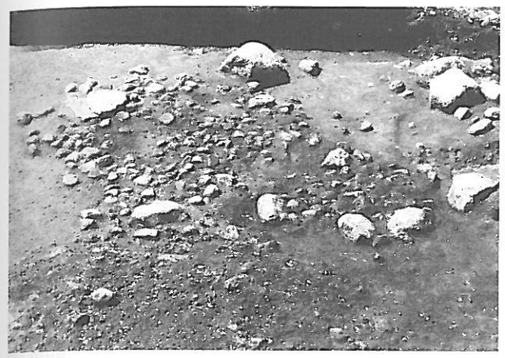

Figure 28.4 Gravel filling (close to camera) and stone paving at Myrvatn Site I. Photo: S. Bang-Andersen.

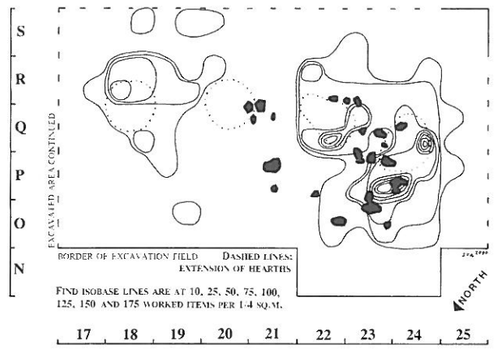

Figure 28.5 Simplified plan of the central parts of Myrvatn Site D with stones interpreted as belonging to a tent ring (in black). Plan size units: 1 m.

apparent from these horizontal distribution of finds. A 1.2 x 1.9 m wide stone paving may, however, have served as drainage outside a highly hypothetical SW facing entrance (Figure 28.4).

Site D, located just 50 m WSW of Site I, contained three find scatters 2–3 meters apart, each interpreted to reflect separate visits. About 3850 stone artefacts were recovered from the 92 sq.m large excavated area (Bang-Andersen 1990:219 pp).

An alignment of stones, evidently a tent ring, soon appeared on the best preserved SW part of the living floor. The structure consisted of about 25 rounded stones, 15–40 cm large, arranged as an irregular oval or rhomb with inner diameter between 1.8 and 2.8 m and net floor area c. 5.0 sq.m. A majority of the stones measured between 20–25 cm. Some stones, superimposing flint artefacts or charcoal appear to have been removed some short distance. No indications of tent openings were found.

Three circular hearths, between 1.0 and 1.4 m in diameter, located to the southern and eastern periphery of the tent ring, stratigraphically reflect one or several settlement episodes *antedating* the construction of the tent ring. This may also apply to most of the stone artefacts, as the highest frequencies of finds were underneath the western tent weight stones (Figure 28.5). As there were only minor amounts of charcoal and burnt flint inside the stone alignment, the tent has probably been without internal hearth. Also by a low number of artefacts inside the tent ring the Site D tent is indicated to have served a more passive function than the analytically segregated Site I tent.

Three radiocarbon analyses of charcoal from superimposed hearths, all dating around 9400 BP (Bang-Andersen 1990:221), determine a maximum age of the tent ring.

Site K was found in 1991 denuded by wave erosion on the opposite northern beach of the lake and first noticed by a partly intact tent ring and a concentration of about 100 flint artefacts including a Zonhoven point. The

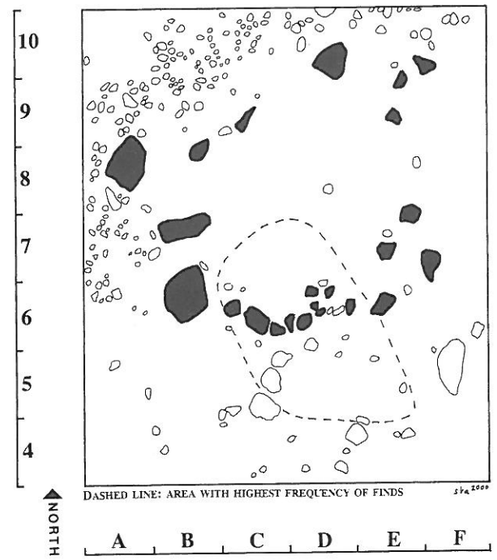

Figure 28.6 Simplified plan of Myrvatn Site K with stones interpreted as belonging to a tent ring (in black). Plan size units: 1 m.

archaeological treatment has so far been restricted to documentation, investigation of intact contexts underneath the tent weight stones and collection of surface finds of lithics and charcoal.

The tent ring consists of 23 rounded stones and blocks, 15–85 cm wide; a majority head-sized. The inner diameter measures 3,8 m, producing a circular or slightly oval tent floor covering 11.4 sq.m (Figure 28.6). A lack of stones in the NW sector facing the land side may indicate a tent opening, or could be the result of ice push or wave abrasion. However, the distribution of surface finds, concentrated within a 5–6 sq.m large area covering the southern sector of the ring and the adjacent area outside,

more convincingly reflects a tent door and a restricted outdoor activity area facing the lake. Charcoal in the southern part of this area, evidently the remains of an exterior hearth, has been radiocarbon dated to about 9500 BP.

Considering the uneven state of preservation and a still awaiting total excavation, the potentiality also of an interior use of fire should not be excluded.

In sum, the Myrvatn sites have left evidence of three tents in Pre-boreal contexts: one *latent* tent floor (Site I) segregated mainly by the distribution of artefacts and a charcoal-mixed floor filling, and two *evident* tent rings (Site D and K) appearing as partly disturbed open oval stone alignments. More "textbook like" tent rings formed as regular, closed stone circles have not been verified.

The net tent floor areas are estimated from 5.0 to 11.4 sq.m, and an interior hearth is only apparent from Site I. The amount of stones interpreted as structural weights used to secure the tent covers to the ground, between 21 and 25, should be taken as absolute minimum numbers. C-14 datings of the Myrvatn dwelling structures range from c. 9500 to 9000 BP.

The Fløyrlivatn sites

The totally distorted or partly blurred tent remains at Myrvatn may be better understood by the results of investigations carried out at lake Store Fløyrlivatn (760 m a.s.l.) as late as 1999.

Four tent rings in all were recorded from three sites (Figure 28.7). A fifth structure, a 3 m long curved stone alignment on Site 15, dated to 9700–9600 BP (Bang-Andersen 2000:28) and interpreted during excavation as a tent ring (Tørhaug and Åstveit 2000:35), more probably represents the foundation of a windbreak and will not be taken into further consideration.

At *Site 9,* atypically located in a boulder terrain bordering the south-western part of the lake, about 120 lithics were recovered within the 27 sq.m large excavated area. The site emerged as strongly eroded, devoid of humic sediments and plant cover. As a number of flint artefacts appeared surfacial, an unknown amount of lithics is likely to have been washed into the lake.

The structural feature at Site 9 is an almost closed alignment of 21 rounded stones adjacent to a large erratic with level upper part. Both a 0.5 x 0.7 m wide stone in the central part of the tent ring, and about 10 stones found in the immediate surroundings, may be weight stones in secondary positions. The structural stones interpreted to lie *in situ* were between 15 and 55 cm in diameter, forming an oval, NE-SW oriented, 2.0 x 2.4 m wide enclosure covering 4.5 sq.m. The SE sector appeared as intact by five weight stones, 22–36 cm in diameter, evenly placed with internal spacing between 12 and 22 cm (Figure 28.8).

Distinct hearths were not found. A slight occurrence of charcoal less than 1 m outside the tent ring, dated by two radiocarbon analyses between c. 9700 and 9500 BP (see Appendix), probably represents an exterior hearth. The horizontal distribution of the sparse remaining stone

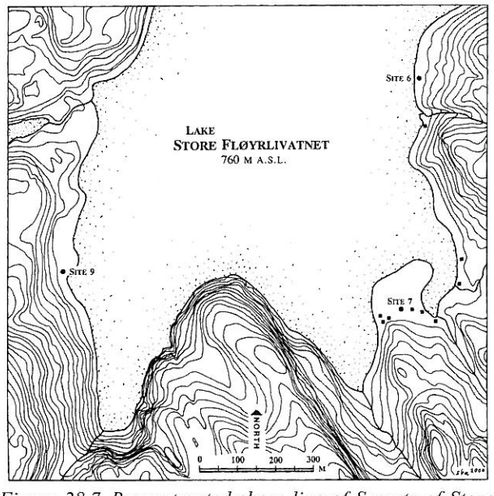

Figure 28.7 Reconstructed shore-line of S parts of Store Fløyrlivatnet with Mesolithic sites (squares) and sites containing tent rings (dots) specified. Contour intervals: 5 m.

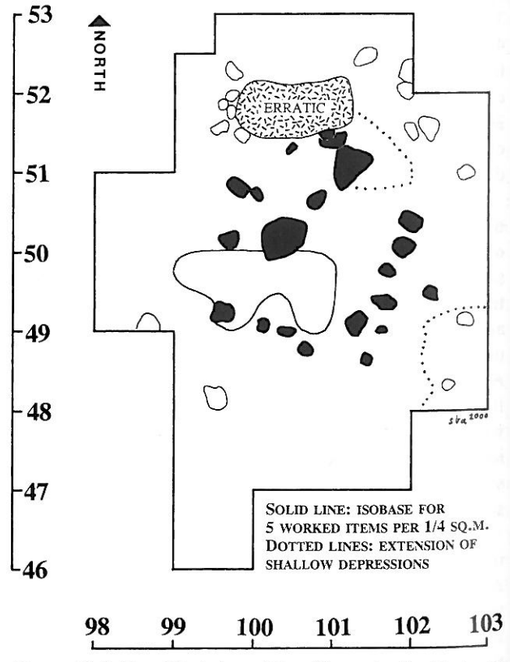

Figure 28.8 Simplified plan of Fløyrlivatn site 9 with stones interpreted as belonging to a tent ring (in black). Plan size units: 1 m.

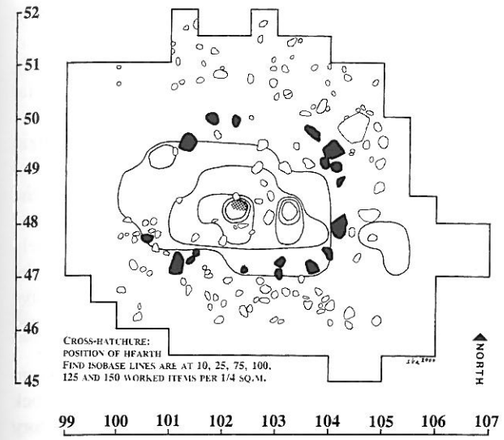

Figure 28.9 Simplified plan of Fløyrlivatn Site 7 with stones interpreted as belonging to a tent ring (in black). Plan size units: 1 m.

artefact material, concentrated to the SW sector of the tent ring, may further indicate a tent opening facing the hearth and the waterfront.

Site 7, on a wide outwash delta on the south-eastern lakeshore, 900 m E of Site 9, contributes with even more detailed dwelling data. The excavation covered a 38.5 sq.m large area, producing about 1700 lithics. 19 stones, arranged as a ESE-WNW oriented open circle, between 2.7 and 3.3 m in inner diameter and covering 8.0 sq.m, formed an almost "ideal" tent ring (Figure 28.9).

The weights, 10–60 cm in diameter, were spaced at irregular intervals with a certain number of stones out of place. Some of these may have been removed to the NW interior part of the structure, where artefacts occurred under the bases of head-sized stones. A stone-free area facing West, reducing the tent ring to a 4/5 of a complete circle, may be due to recent erosion or reflect a former door opening facing the lake. Provided a regular spacing, the tent ring has probably consisted of minimum 25 stones.

A 20 x 30 cm wide scatter of charcoal in the centre of the tent floor, C14- dated to c. 9400 BP, represents a partly washed out interior hearth. Indications of outside hearths are not recorded. The find distribution is clear-cut, with no less than 83 % of the total lithic assemblage concentrated inside the tent ring, most pronounced to the central and southern part.

Site 6 was found on the sloping eastern lakeside 600 m N of Site 7. By its discovery in 1997 the site, like Myrvatn K, emerged as partly surface eroded with flint and rock crystal artefacts and a stone circle (Structure A) clearly visible. The excavation of 168 sq.m produced about 2300 lithics. This states a minimum of artefacts originally deposited, as an unknown amount has been removed by erosion.

Figure 28.10 The NW part of Fløyrlivatn Site 6 with two tent rings. Line of boulders in the background represent the former shore line. Photo: V. Tørhaug.

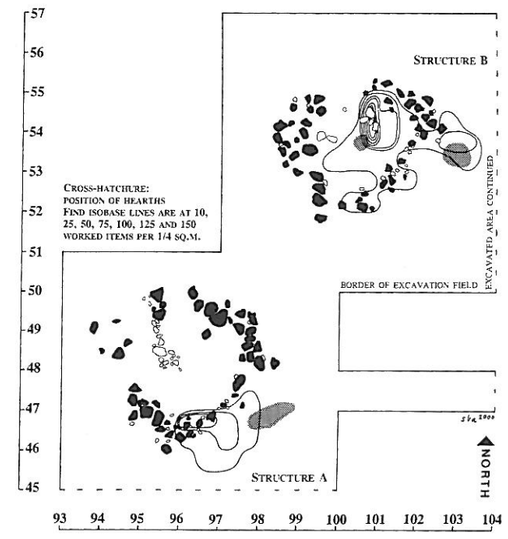

Figure 28.11 Simplified plan of NW part of Fløyrlivatn Site 6 with stones interpreted as belonging to two tent rings (in black). Plan size units: 1 m.

Two tent rings were uncovered on the NW part of the site (Figure 28.10).

Structure A appeared as an approximately circular or rhombic alignment of 55 well-rounded stones, all more or less *in situ.* The tent ring was about 3.2 m by inner diameter, encircling a 7.2 sq.m large floor area. The weight stones varied between 10 and 50 cm in diameter. Three 0.6–0.8 m wide disjunction's in the NW quadrant of the stone circle may be interpreted as one (or several) tent openings facing the lake. Most pronounced of these is a 0.6–0.7 m long north-oriented "corridor" (Figure 28.11).

Interior hearths, or other indications of fire as scatters

of charcoal or burnt artefacts, were not recorded. Containing a highly restricted number of artefacts, the tent floor may seem to have served passive site functions e.g. as area for sleep or rest. A concentration of flint artefacts deposited outside the SSE margin of the tent ring and superimposed by structural stones may be interpreted to result from site activities *antedating* the tent ring, determined by C14-datings to c. 9600–9400 BP. A 1.2 m long aggregation of charcoal 0.8 m outside the SE sector of the tent ring, apparently an external hearth, has been dated within the same time range.

Structure B, 3–4 m NE of Structure A, had the shape of an irregular oval or rhombic stone circle with inner diameter between 3.0 and 3.2 m covering a net area of about 6.7 sq.m. The tent ring was made up by 51 rounded stones measuring between 10 and 40 cm, mainly 20–25 cm. A 1.0 m wide disjunction may represent a tent opening facing NNW, or could be the result of erosion. More likely the entrance has been by a 0.4–1.2 m long southwards oriented "corridor" similar to the feature in the northern part of Structure A (Figure 28.11).

The lithic material was clearly concentrated to the central and NE part of the tent floor with no indications of door dumping. A circular 0.4 wide hearth in the geometrical centre of the tent ring has been dated between to about 9400 BP, and a circular 0.7 m wide stonelined hearth 0.6 m outside the ESE part of the dwelling to 9750 BP. Based on the age of an interior hearth, which seems functionally related to the tent ring, Structure B *may* – but need not necessarily – be contemporaneous with Structure A. The only possible method to prove this, is by future identification of lithic refit patterns.

In sum the Fløyrlivatn investigations have brought into light four evident tent rings in the shape of oval or circular alignments of c. 20–55 structural stones. Three of the rings are closed, except for short intercepts indicating the possible position of tent openings. The inner diameter varies between 2.2 and 3.3 m, and the net floor space between 4.5 and 8.0 sq.m.

Two structures (Site 6B and 7) contain centrally positioned interior hearths, while one (Site 9) seems functionally related to an exterior hearth. In addition two structures (Site 6A and 6B) are surrounded by hearths appearing not to be contemporary with the tent structures. C-14 datings of the Fløyrlivatn tent rings cluster between c. 9600 and 9400 BP.

The Myrvatn-Fløyrlivatn group

The campsites: situation, size, and artefact inventory

Based on the presentations above, the Early Mesolithic sites at Myrvatn and Fløyrlivatn exhibit a number of common traits:

- All are closely lakeside oriented, normally positioned between 2 and 10 m away from the former waterfront and overlooking wide landscape areas.
- The sites are, with just one exception (Fløyrlivatn 9), situated on well-drained fine-sorted late glacial outwash.
- In spite of surface erosion, all find areas still contain remains of undisturbed cultural levels potent to define roughly the former extension and character of the sites.
- The horizontal scattering of artefacts is extremely restricted, ranging from about 8 to c. 50 sq.m. As the two largest sites (Myrvatn D and Fløyrlivatn 6) have been subject to re-use, the spaces occupied per encampment episode hardly exceed 10–15 sq.m.
- The artefact assemblages consist mainly of medium to high quality flint with minor supplements of rock crystal or quartz (except Myrvatn F). The inventory of formal tools is normally restricted to projectile points and lower amounts of scrapers. Other types as burins and borers occur as a clear element only in Myrvatn D.
- Of particular importance is the good preservation of charcoal, providing high-resolution datings of the Myrvatn sites to c. 9600–9000 BP and the Fløyrlivatn sites to c. 9750–9350 BP, and occurrence of tent ring structures.

The tent rings: basic elements, main function, dating

All tent rings found at Myrvatn and Fløyrlivatn are localised to horizontal, stone-cleared areas on the sites.

The archaeological visibility varies from a *latent* tent floor segregated mainly from the distribution of lithic artefacts (Myrvatn 1) to *evident* "text-book like" stone-lined circles (Fløyrlivatn 6 and 7). As the most disturbed tent structures were found in the by all other respects best preserved sites (Myrvatn I and D), human behaviour appears to have been more decisive for the preservation of the tent rings than the cumulative effect of all natural and man-triggered erosion during the subsequent millennia. In one extreme case the tent weight stones appear to have been deliberately tossed away before breaking up from the site. Normally the stones lie slightly dislocated from their original positions due to removal of the tent sheet.

The shape of the *tent floors* is circular, or slightly elongated as an irregular oval or rhombe. Two of the tent rings (Myrvatn K and Fløyrlivatn 7) are partly open alignments of placed stones, while the remaining four appear as basically closed. The inner dimension varies between 1.8 and 3.8 m and the net floor area from 4.5 to 11.4 sq.m. with 7.1 as a mean value (Figure 28.12).

Possible *tent openings*, indicated by stone-free disjunction's or find-tongues exceeding the border of the tent ring, seem to have existed in most cases; facing the water (Myrvatnet K, Fløyrlivatn 7) or the adjacent beach

Site name	Tent ring type	Ground plan lay-out	Inner dimension in metres	Floor area in sq.m	Indoor fire	C14 age BP
Site I, Store Myrvatnet	I	oval/circular(?)	2.8 x 3.2	7.0	+	9000
Site D, Store Myrvatnet	IIIa	oval/rhombic	1.8 x 2.8	5.0	–	9400
Site K, Store Myrvatnet	IIa	circular/oval	3.8 x 3.8	11.4	–	9500
Site 9, Store Fløyrlivatnet	IIIa	oval/circular	2.0 x 2.4	4.5	–	9600
Site 7, Store Fløyrlivatnet	IIa	circular	2.7 x 3.3	8.0	+	9400
Site 6A, St. Fløyrlivatnet	IIIb	circular/rhombe	3.2 x 3.2	7.2	–	9600
Site 6B, St. Fløyrlivatnet	IIIa	oval/rhombic	3.0 x 3.2	6.7	+	9400

Figure 28.12 Collocation of tent ring data from the investigated areas. The codes, partly based on Newell (1981), distinguish: I. Structural stones lacking a discernible pattern. II. Open alignments of structural stones (IIa. partly distorted, IIb. intact). III. Enclosed alignments of structural stones (IIIa. partly distorted, IIIb. intact). Radiocarbon ages are expressed as approximate mean values.

line (Fløyrlivatn 6A and 6B). The evidence of tent openings is however generally of a hypothetical character and needs to be tested by later analyses.

The tent rings consist of between 20 and 70 *weight stones*, mostly c. 20–30 cm by largest dimension and well-rounded to prevent tearing up the tent cover. As some weights appear to be missing from most tent rings, removed by the campsite inhabitants or dislocated by later natural agents, this states absolute minimum numbers. The amount of structural stones actually necessary for fixing the tent sheets firmly to the ground depended on factors as wind exposure, tent height and size, and local availability of stones. Indications of other supporting elements as stakeholes, outside drainage ditches or guystones have not been documented from any site, but may well have existed.

Interior hearths were used in at least two of six tent rings (Fløyrlivatn 6B and 7) centrally positioned on the tent floor. Contemporary *exterior hearths* appear to have existed in at least two cases (Myrvatn K and Fløyrlivatn 9) adjacent to postulated door openings. Alternatively these outside hearths may represent ashes dumped out from former interior campfires.

Considering the distribution of finds, one half of the tents had most or all artefacts concentrated *in*side, and the other half the main artefact distributed *out*side. In both tent rings with internal hearths most or all artefacts were found indoor. Presupposing the total amount of lithic artefacts to be valid as a coarse indicator of function, and precluding the possibilities of interior clean-ups with door dumping, this may indicate some differentiation in the use of the tents. Beyond a basal function as shelter against wind, rain and snow, some tents were also areas for cooking, heating and tool manufacture, or more passive seclusions for rest and reflection.

The radiological datings of the tent rings need some further consideration.

Expressed in *uncalibrated* radiocarbon years, the oldest and youngest dates of the Myrvatn tent rings, or hearths functionally related to these, range between 9570 (9495±75 /Tua -1692) and 8910 (9040±130 /T-7994) BP, indicating a maximum time span of 660 years. The corresponding values from Fløyrlivatn are 9830 (9750± 80/ Beta-141301) and 9280 (9360±80 /Beta-141293) BP, or a maximum period of use covering 550 years. Two tent rings from Fløyrlivatn Site 6B and 9, predating all Myrvatn dates (see Appendix), suggest Early Mesolithic hunter groups to have pitched tents in this area some few hundred years earlier than at Myrvatn. On the other hand, as the tent floor in Myrvatn I postdates all Fløyrlivatn tent rings, the use of tents probably lasted some few hundred years longer at Myrvatn.

Conclusions as these may easily be turned over by sources of error inherent in the C14-method. As known for a long time (e.g. Gulliksen 1980:101 pp; Gowlett 1986:98 pp) clear deviations exist between conventional dates and tree-ring calibrated calendar year dates, in particular during the Pre-boreal. Radiological research has proved plateaux of constant radiocarbon ages to existed at 9950 and 9550 uncalibrated years BP, the last covering as many as 400 calendar years (Becker and Kromer 1991:22 pp).

Calibrations of the Myrvatn and Fløyrlivatn dating series according to the latest available data using two sigma confidence intervals (Stuiver *et al.* 1998:1041 pp), determine the Myrvatn tent rings between 9200 and 7750 cal BC, or a period of maximum 1450 solar years. The values for the Fløyrlivatn tent rings range between 9350 and 8250 cal BC, or a maximum period of use covering 1100 years. Based on the lowest standard deviations, the tents in each area need not have been used longer than about 850 and 660 solar years respectively (see Appendix).

Without involving further details, calibrations confirm:

- the oldest tent rings to be at Fløyrlivatn (Sites 6 and 9),
- the youngest evidence of tent use to Myrvatn (Site I),
- some of the Myrvatn and Fløyrlivatn tent rings (e.g. Myrvatn D and Fløyrlivatn 7) as potentially contemporaneous; and
- tents in both areas to have been used over a longer

period of time than indicated by the uncalibrated radiocarbon datings.

The background: ecological setting, subsistence system

The dating of most of the Myrvatn and Fløyrlivatn tent rings to 9600–9400 BP, or the middle part of the Preboreal, determines human enterprise to have occurred within or soon after the Trollgaren ice-advance stage about 9700–9500 BP (Anundsen 1985:220). Tents also seem to have been used at Fløyrlivatn during a minor ice advance around 9300 BP.

With the inland ice sheet still covering mountain areas just some few kilometres further East, the environmental setting of the sites in both areas is likely to have been that of a periglacial tree-less landscape, climatically influenced by the continued presence of inland ice.

This is supported by wood-anatomical analyses of the charcoal from the Myrvatn sites, reflecting a low-alpine pioneer vegetation of willow scrubs and dwarf birch established on fresh mineral soils (Bang-Andersen 1990:224). The charcoal from Fløyrlivatn is more problematic palaeobotanically as some samples have turned out to contain oak and pine wood, most likely brought in from lowland areas (Bang-Andersen 2000:27 pp). Pollen analyses able to reconstruct the middle Preboreal non arboreal vegetation in the mountain areas South of Lysefjord, or high-resolutive quaternary deglaciation studies, have so far not been completed.

Concerning potential food resources available in recently deglaciated mountain landscapes as these, one is confined to use indirect evidence or qualified guesswork due to the complete lack of faunal remains in the sites.

Compared with groups known to have lived under similar natural conditions, wild reindeer *(Rangifer tarandus)* emerge as the only likely big game of importance. The reindeer herds need however not necessarily have been predated primarily for their meat. Skins, sinews and antler for tool production may have been even more demanded. The interpretation of the Myrvatn and Fløyrlivatn sites as special purpose hunting camps seems to be supported by the expedient flint tool inventories in the sites, almost exclusively projectile points and scrapers.

In logistic terms the sites appear to be the products of short-lasting early autumn hunting activities performed by mobile groups with home bases on the coast of SW Norway (Bang-Andersen 1990:224 pp, 1996b:435 pp). C14-datings in both study areas point to discontinuous series of stays of sporadic character, not separated by extremely long intervals.

The tents of reindeer hunters

Evident tent rings dating to the Late Pleistocene or Early Holocene are not known in other parts of southern Scandinavia, in spite of a the discovery and investigation

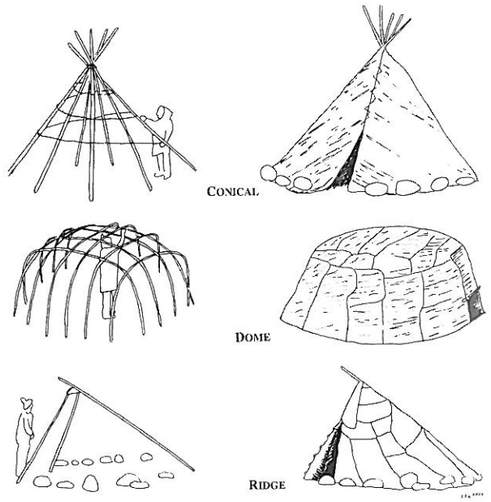

Figure 28.13 The three main types of tents within the circumpolar zone, based mainly on Faegre (1979).

of a increasing number of short-term camps or kill sites attributed to reindeer hunting (Holm and Rieck 1992:9 pp, Vang Petersen and Johansen 1993:20 pp; Larsson 1994:159 pp).

Tent ring like structures do occur in Late Glacial sites on the continental lowland plains. Within the Stellmoor valley in NW Germany a number of circular or semi-circular stone alignments interpreted as tent rings have been recorded from different chronological contexts (Rust 1958:29 pp). The main part of these, as an alleged 3.5–4 m wide tent ring in the Ahrensburgian levels of the site *Borneck-Ost*, turn out as problematic due to insufficient documentation, or possible sources of error as surface deformation by later trefalls. Some few structures like "Konzentration IV", a partly disturbed tent ring with central hearth in the late Magdalénien site *Gönnersdorf* in the upper Rhine valley (Terberger 1997:25 pp), may however prove to be of relevance for the interpretation of the Myrvatn-Fløyrlivatn tent rings, despite a wide gap in time and space and obvious differences in palaeo-ecologcial setting.

The most relevant basis for comparison and interpretation of tent foundations and framings seems to exist within the circumpolar tundra zone. Fundamentally the tents of recent Inuit reindeer or combined reindeer/seal hunting groups are of three types: conical, domed or ridged tents (Faegre 1979:99 pp) (Figure 28.13).

The *conicals* of caribou Eskimos, resembling the "larvos" of the Fennoscandian Saami population and the "tipis" of the North American plain Indians, have a circular frame of 7 or 8 poles tied together on the top, eventually strengthened by horizontal lines around the poles. The tent cover is usually 10 to 20 reindeer skins

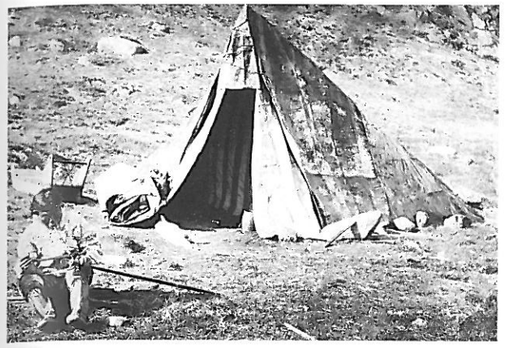

Figure 28.14 Inuit ridge tent at Angmagssalik, SE Greenland around 1900. Photo: J. Petersen (reproduced with kind permission from Nationalmuseet, Etnografisk samling, Copenhagen).

sewn together in a half circle or as two separate sheets, drawn over the back of the tent and latched over the door opening. Stones are placed on the outside edge of the cover hold it in place, forming a circular alignment.

The *domes* are more typical winter tents framed by 20–30 bent willow poles planted to the ground. As the edges of the tent cover were not fixed with weight stones, this type seems of minor importance for the interpretation of tent rings.

The *ridge* tents form the most characteristic Inuit tent, existing in a great variety of forms and formats. One main feature common to all types is the ridge pole supported by one or more, usually about ten upright poles. The tent covering, sewn together by 10 to 15 seal- or reindeer skins, is wrapped around the frame, laced together over the door and rolled over on the edges by stones. Most ridge tent variants will leave oval or ovate semi-open stone alignments after dismounting. Greenlanders use of these tents less than one century ago has been described by Kaj Birket-Smith (1924:154 pp) and Therkel Mathiassen (1928:131 pp) (Figure 28.14).

Both conical and ridged tents are designed for simple use and easy transportation; weight depending of tent size, the number of poles and the skin type used as cover. An advantage of the conical is a generous interior height with facilities for a centrally positioned hearth. The lower and tilted ridge tents are, on the other hand, more stable to prevailing strong winds. They may also be framed by far fewer poles, a scarce resource in most circumpolar and periglacial areas.

Palaeo-Eskimo research covering large parts of East and West Greenland, High-arctic Canada and North Alaska (e.g. Binford 1978:268; Grønnow *et al.* 1983:50 pp; Sandell and Sandell 1996:161 pp; Appel and Pind 1996:131 pp; Helmer 1996:97 pp) have demonstrated a wide time-span for the use of tents during seasonal reindeer or seal hunting. Like the tent rings from recent Inuit camps, the tent structures on the Palaeo-Eskimo sites

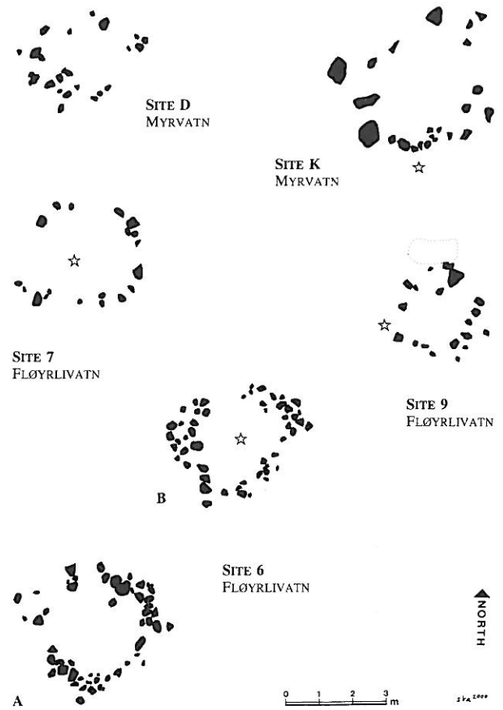

Figure 28.15 Comparison of tent rings at Myrvatn and Fløyrlivatn with contemporary hearths indicated by asterisks. All plans are to the same scale and compass point.

vary more by extension than by shape. In SW Greenland and High-Arctic Canada rings as wide as 5 or 6 m by inner dimension are reported (Appelt and Pind 1996:131 pp; Helmer 1996:98). Normally the tents appear to have been smaller, 3 or 4 m in diameter, producing floor areas of 7 to 12 sq.m.

A feature common to many circular Palaeo-Eskimo tent rings is a rectangular axial passage of partly upright stone slabs set 0,7–1,0 m apart. "Mid-passage structures" as these, often filled up with fire-cracked stones, are interpreted as places for heating and cooking (Appelt and Appelt 1996:131).

In the light of the ethnographical and archaeological data from wide circumpolar areas, some leads should exist for a further interpretation of the Myrvatn/Fløyrlivatn tent rings regarding the size, shape and handling of the *tents* once pitched inside the stone alignments (Figure 28.15).

As the weight stones have been rolled onto the edges of the tent covering, the inner diameter of the tent rings states a maximum tent floor area. Normally the actual floor-space must have been smaller due to a radically relocation of weight stones some short distance by the removal of the tent sheets. The sloping of the walls further limited the utilisable space.

Presupposing that the *net living floor* on the average was restricted to 80 % of the tent ring area, the efficient floor space of the Myrvatn and Fløyrlivatn tents has varied from 3.6 to 9.1 sq.m, with 5.7 sq.m as mean value. Compared to the interior space of present-day mountain tents, normally allotting about 1.2 sq.m per person, the tents used at Myrvatn and Fløyrlivatn group could hardly manage to accommodate more than 3 to 7 persons each. Interior use of fire may have further reduced the bed area in some of the tents.

Concise information about the height and shape of the Myrvatn-Fløyrlivatn tents appears difficult to arrive at due to the displacement of weight stones from their original positions. Generally oval or rhombic floor plans (as in Myrvatn D) should be supposed to reflect ridge constructions, and circular plans (Fløyrlivatn 7) conical tents. A conical shape is probably also indicated by centrally positioned hearths (as in Fløyrlivatn 6B), or by a circular artefact distribution (Myrvatn I). Accordingly, conical tents appear to have been dominating at Fløyrlivatn while both main types were probably used at Myrvatn.

The preference of conical tents may seem surprising. High efforts connected to the transportation of tent sheets and poles into these elevated areas and the harsh environment prevailing 9500 radiocarbon years ago taken into account, ridge tents should logically emerge as the most applicable type. However, at least at Fløyrlivatn, a basic requirements for tent warmth appears to have dominated more practical considerations as pack weight reduction and wind resistibility.

Despite extensive archaeological investigations in wide parts of the south Norwegian mountains, bringing to light a high number of well-preserved sites e.g. in the inner Sognefjord mountains, at the Hardangervidda plateau and in the Setesdal mountains (Johansen 1969:38 pp; Bang-Andersen 1989:338 pp; Indrelid 1994:11 pp), similar Mesolithic tent rings have only been recorded in one restricted area.

At lake *Holmavatnet* (1030 m a.s.l.), about 100 kms NNE of the Myrvatn-Fløyrlivatn area (Figure 28.1), tent rings were found in three sites excavated in 1963–1965. No radiocarbon datings are available. According to the artefact inventories two sites appear to be of Late Mesolithic or Early Neolithic age (Mikkelsen 1989:86 pp). A third site, *Bamsebubukta*, dated between 8000 and 6000 BP by occurrence of microblades and microblade cores, and containing the best preserved tent rings at Holmavatn (Rognes 1964:130 pp), attracts particular interest.

Two oval or hearthshaped tent rings, about 2.4 x 3.8 m and 2.4 x 3.3 m by inner dimension, were situated just two meters apart from each other. The main amount of artefacts and the only diagnostic hearth was located to the south-western tent ring. Irrespective of a time gap covering several thousand years, the Bamsebubukta site seems to exhibit close parallels to Fløyrlivatn 6 with its remains of two equally sized, possibly contemporary and activity-specific tents placed almost side by side.

However, a vast majority of the Middle/Late Mesolithic and Early/Middle Neolithic sites in the southern Norwegian mountains are virtually without any discernible traces of dwelling structures as tent rings or foundations for wind shields. Small rectangular huts, circular sunk pit houses and rock shelters seem, with some few exceptions, first to have been taken into use during the Late Neolithic, c. 3800–3500 BP (Indrelid 1994:229).

As apparently contradictory, the widespread occurrence of open, unprotected Mesolithic sites in the high mountains is a matter deserving far more intensive study. One explanation among several possible is that tents may perfectly well have been used *without* weight stones during climatic periods of milder and less windy conditions. This may for instance be relevant for the southern parts of the Hardangervidda which were covered by pine forests during parts of the Mesolithic (Moe *et al.* 1978:76 pp). The total lack of tent rings in the Late Glacial southern Scandinavian reindeer hunting sites is, however, far more difficult to comprehend in the light of the ethnographical evidence from sub-polar environments evincing tents as a prerequisite for subsistence and survival.

Appendix

C14 datings of tent ring structures in the two study areas

T-6489 *Site I,* Myrvatn (conv.)***: 9040 ±120 BP, calibrated age: BC 8600–7800

T-7994 *Site I*, Myrvatn (conv.)***: 9040 ±130 BP, calibrated age: BC 8600–7750

T-8293 *Site D*, Myrvatn (conv.)**: 9440 ±50 BP, calibrated age: BC 9150–8950 and BC 8900–8550.

T-8294 *Site D*, Myrvatn (conv.)**: 9460 ±80 BP, calibrated age: BC 9150–8450

T-8296 *Site D*, Myrvatn (conv.)**: 9420 ±80 BP, calibrated age: BC 9150–8450

TUa-1691 *Site K*, Myrvatn (AMS)*: 9485 ±65 BP, calibrated age: BC 9150–8600

TUa-1692 *Site K*, Myrvatn (AMS)**: 9495 ±75 BP, calibrated age: BC 9200–8600

Beta-141295 *Site 9*, Fløyrlivatn (AMS)*: 9720 ±80 BP, calibrated age: BC 9350–8800

Beta-141296 *Site 9*, Fløyrlivatn (AMS)*: 9490 ±70 BP, calibrated age: BC 9150–8600

Beta-141293 *Site 7*, Fløyrlivatn (AMS)****: 9360 ±80 BP, calibrated to: BC 9150–9000 and BC 8850–8250

Beta-141294 *Site 7*, Fløyrlivatn (AMS)****: 9400 ±70 BP, calibrated to: BC 9150–8950 and BC 8900–8450

Beta-141304 *Site 6A*, Fløyrlivatn (AMS)**: 9450 ±70 BP, calibrated age: BC 9150–8450

Beta-141305 *Site 6A*, Fløyrlivatn (AMS)**: 9630 ±80 BP, calibrated to: BC 9240–8780 and BC 8770–8740

Beta-141302 *Site 6A*, Fløyrlivatn (AMS)*: 9560 ± 80 BP, calibrated age: BC 9220–8640

Beta-141303 *Site 6A*, Fløyrlivatn (AMS)*: 9430 ± 70 BP, calibrated to: BC 9110–9005 and BC 8830–8545

Beta-141289 *Site 6B*, Fløyrlivatn (AMS)****: 9360 ±80 BP, calibrated to: BC 9150–9000 and BC 8850–8250

Beta-141300 *Site 6B*, Fløyrlivatn (AMS)****: 9460 ±70 BP, calibrated age: BC 9200–8600

Beta-141301 *Site 6B*, Fløyrlivatn (AMS)*: 9750 ± 80 BP, calibrated to: BC 9305–9125 and BC 8990–8910.

* Indirect datings deriving from external hearths

** Maximum datings by charcoal superimposed by tent weight stones

*** Datings of structural charcoal occurrences within tent floors

**** Datings of internal centrally positioned hearths

Uncalibrated ages are stated with the standard 1 sigma (68.2 %) confidence interval. All calibrated ages are with 2 sigma (95.4 %) confidence intervals according to atmospheric data from Stuiver *et al.*(1998) using database OxCal v.3.3. (Bronk Ramsey 1999).

References

Andersen, B.G. 1979. The deglaciation of Norway 15,000 - 10,000 B.P. *Boreas* 8, 79–87.

Andersen, S.H. 1973. Bro, en senglacial boplads på Fyn. *KUML* 1972, 7–60.

Anundsen, K. 1985. Changes in shore-line and ice-front position in Late Weichsel and Holocene, Southern Norway. *Norsk Geografisk Tidsskrift* 39, 205–225.

Appelt, M. and Pind, J. 1996. Nunnguaq – A Saqquaq Site from Godthåbsfjorden. In: Grønnow, B. and Pind, J. (eds.) *The Paleo-Eskimo Cultures of Greenland*, 129–142. Copenhagen.

Bang-Andersen, S. 1988a. Oppsiktsvekkende funn ved Myrvatnet. *Frå haug ok heidni, 1998* No. 4, 124–134.

—— 1988b. New Findings spotlighting the Earliest Postglacial Settlement in Southwest-Norway. *AmS-Skrifter*, Vol. 12, 39–51.

—— 1989. Mesolithic Adaptations in the Southern Norwegian Highlands. In: Bonsall, C. (ed.) *The Mesolithic in Europe*, 338–350. Edinburgh.

—— 1990. The Myrvatn Group, a Preboreal Find-Complex in Southwest- Norway. In: Vermeersch, P.M. and Van Peer, P. (eds.) *Contributions to the Mesolithic in Europe*. Studia Praehistorica Belgica, Vol.5, 215–226.

—— 1995. Den tidligste bosetning i Sørvest- Norge i nytt lys. In: *Steinalderkonferansen i Bergen 1993*. Arkeologiske Skrifter, No. 8, 65–80.

—— 1996a. The Colonization of Southwest Norway. An Ecological Approach. In: Larsson, L. (ed.) *The Earliest Settlement of Scandinavia and its relationship with neighbouring areas*. Acta Archaeologica Lundensia, Series in 8°, No.24, 219–234. Lund.

—— 1996b. Coast/inland relations in the Mesolithic of Southern Norway. In: Rowley-Conwy, P. (ed.): *Hunter-Gaterer Land Use*. World Archaeology 27, No.3, 427– 443.

—— 2000. Fortidens svarte gull. Nærmere om datering og miljøtolkning av Fløyrliboplassene. *Frá haug ok heidi 2000*, No. 4, 27–32.

Becker, B. and Kromer, B. 1991. Dendrochronology and radiocarbon calibration of the early Holocene. In: Barton, N., Roberts, A.J. and Roe, D.A. (eds.) *The Late Glacial in North-west Europe*. CBA research report 17, 22–24. Oxford.

Binford, L.R. 1978. *Nunamiut Ethnoarchaeology*. New York.

Birket-Smith, K. 1924. Ethnography of the Egedesminde District. *Meddelelser om Grønland* LXVI. Copenhagen.

Blankholm, H.P. 1987. Maglemosian Hutfloors: an Analysis of the Dwelling Unit, Social Unit and Intra-site Behavioural Patterns in Early Mesolithic Southern Scandinavia. In: Rowley-Conwy, P., Zvelebil, M. and Blankholm, H.P. (eds.) *Mesolithic Northwest Europe: Recent Trends*, 155–162. Sheffield.

Bronk Ramsey, C. 1999. *OxCal. v.3.3.* Internet address: www.rlaha.ox.ac.uk/oxcal/oxcal

Faegre, T. 1979. *Tents. Architecture of the nomads*. London.

Fredsjö, Å. 1953. *Studier i Västsveriges Äldre Stenålder*. Göteborg.

Grøn, O. 1989. General Spatial Behaviour in Small Dwellings: a Preliminary Study in Ethnoarchaeology and Social Psychology. In: Bonsall, C. (ed.) *The Mesolithic in Europe*, 99–10. Edinburgh.

—— 1995. *The Maglemose Culture: The reconstruction of the social organisation of a mesolithic culture in Northern Europe*. BAR International Series 616. Oxford.

Grønnow, B., Meldgaard, M. and Nielsen, J.B. 1983: *Aasivissuit – The Great Summer Camp*. Archaeological, ethnographical and zoo-archaeological studies of a caribou-hunting site in West Greenland. Meddelelser om Grønland. Man and Society 5. København.

Gulliksen, S. 1980. Calibration of Radiocarbon Dates: A Review. *Norwegian Archaeological Review* 13, No.2, 101–109.

Gowlett, J.A. 1986. Radiocarbon accelerator dating of the Upper Palaeolithic in Northwest Europe: a provisional view. In: Collcutt, S.N. (ed) *The Palaeolithic of Britain and its Nearest Neighbours: Recent Trends*, 98–102.

Helmer, J.W. 1996. Archaeology of the Middle Pre-Dorset Twin Ponds Site, Northern Devon Island N.W.T., High Arctic Canada. *Tübinger Monographien Zur Urgeschichte* 11, 97–109.

Holm, J. and Rieck, F. 1992. *Istidsjægere ved Jelssøerne. Hamburgkultur i Danmark*. Skrifter fra museumsrådet for Sønderjyllands amt, 5. Haderslev.

Indrelid, S. 1994. *Fangstfolk og bønder i fjellet. Bidrag til Hardangervidas førhistorie 8500 – 2500 år før nåtid*. Universitetes Oldsaksamlings Skrifter. Ny rekke, No.17. Oslo.

Johansen, A.B. 1969. *Høyfjellsfunn ved Lærdalsvassdraget. I.* Årbok for Universitetet i Bergen. Hum. ser. 1969, No. 4. Bergen.

Johansson, A.D. 1990. *Barmosegruppen. Præboreale bopladsfund i Sydsjælland*. Aarhus.

Larsson, L. 1974. A Contribution to the Knowledge of Mesolithic Huts in Southern Scandinavia. *Meddelanden från Lunds Universitets Historiska Museum* 1973–1974, 5–28.

—— 1994. The Earliest Settlement in Southern Sweden. Late Palcolithic Settlement Remains at Finjasjön, in the North of Scania. *Current Swedish Archaeology* 2, 159–177.

Mathiassen, T. 1928. Material Culture of the Iglulik Eskimos. *Report of the Fifth Thule Expedition 1921–24*, VI. No.1. Copenhagen.

Moe, D., Indrelid, S. and Kjos-Hanssen, O. 1978. A Study of Environment and Early Man in the Southern Norwegian Highlands. *Norwegian Archaeological Review* 11, No.2, 73–83.

Mikkelsen, E. 1989. fra jeger til bonde. Utviklingen av jordbruks-samfunn i Telemark i steinalder og bronsealder. *Universitetets Oldsaksamlings Skrifter. Ny rekke* No.11. Oslo.

Newell, R.H. 1981. Mesolithic Dwelling Structures: Facts and Fantasy. *Veröffentlichungen des Museums für Ur- und Frühgeschichte Potsdam*. Band 14/15/1980, 235–284.

Rognes, K. 1964. Innberetning om utgravning av steinaldertuft i Bamsebubukta ved Holmevann på Haukelifjell sommeren 1964. In: *Arkeologiske undersøkelser i Røldal-Suldal 1964 (File Report)*, 130–137.

Rust, A. 1958. *Die jungpaläolitische Zeltanlagen von Ahrensburg*. Offa-Bücher 15. Neumunster.

Sandell, H. and Sandell, B. 1996. Paleo-Eskimo Sites and Finds in the Scoresby Sound Area. In: Grønnow, B. and Pind, J. (eds.) *The Paleo-Eskimo Cultures of Greenland*. 161–173. Copenhagen.

Stapert, D. 1990. Within the tent or outside? Spatial patterns in late Palaeolithic sites. *Helinium* XXIX/1, 14–35.

Stuiver, M., Reimer, P.J., Bard, E., Beck, J.W., Burr, G.S., Hughen, K.A., Kromer, B., McCormac, G., van der Plicht, J. and Spurk, M. 1998. INTCAL98 Radiocarbon Age Calibration, 24000–0 cal BP *Radiocarbon* 40(3), 1041–1083.

Terberger, T. 1997. *Die Siedlungsbefunde des Magdalénien-Fundplatzes Gönnersdorf. Konzentrationen III und IV*. Stuttgart.

Tørhaug, V. and Åstveit, L.I. 2000. Steinalderboplassene ved Store Fløyrlivatnet. *Frá haug ok heidni 2000*, No.1, 35–39.

Vang Petersen, P. and Johansen, L. 1993. Sölbjerg – An Ahrensburgian Site on a Reindeer Migration Route through Eastern Denmark. *Journal of Danish Archaeology* 10 (1991), 20–37.