Mesolithic man and the rising sea spotlighted by three tapes-transgressed sites in SW Norway

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Abstract

The Holocene (Tapes) transgression in West Norway, which started c. 9000 y b.p. and ended between 6700 and 4500 b.p., did not invariably disturb Mesolithic coast-line situated settlement sites. In SW Norway several sites, dating from c. 8400 to 6600 y b.p., have been found preserved underneath thick layers of raised beach sediments. These are compared with a small group of similar sites in NW Norway, dated between c. 8000 and 6300 b.p.

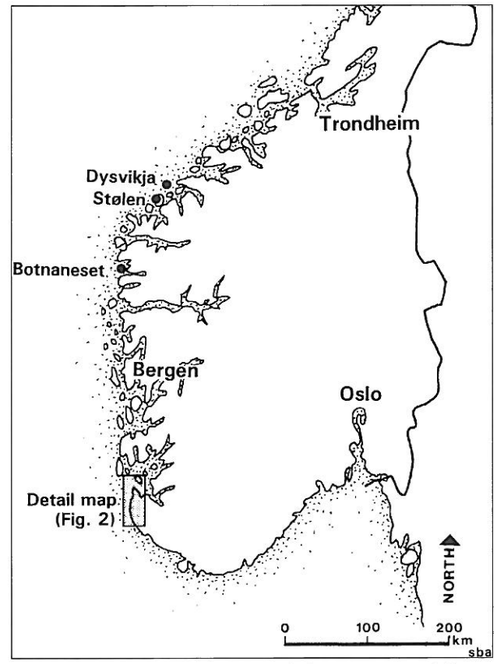

Fig. 1. Map of West Norway with the extension of the studied area in SW Norway (figure 2) and the position of transgressed sites in NW Norway mentioned in the text.

Introduction

Jæren, a 55 km long and c. 10 km wide moraine plain in the southwestern corner of Norway, with unsheltered sand and boulder coasts bordering the North Sea, has long stood out as a *terra incognita* concerning both Late Glacial and Early Holocene settlement and subsistence patterns. Freed from the inland ice sheet by at least 14,000 b.p., and probably as early as 15,500 b.p. (Anundsen 1985, 207), and directly facing the former dry North Sea Continent (Bang-Andersen 1992, 21–24), it should — theoretically — be the first part of Norway subjected to human enterprise and later settlement. Until recently, however, the Viste Cave outside Stavanger (Brøgger 1908, Lund 1951, Mikkelsen 1971, Bang-Andersen 1983), with a radiocarbon dating of the bottom layer of 7850 ± 120 b.p. (T-2664), has ranked as the oldest reliable evidence of settlement in this coastal area.

The complete lack of earlier sites on Jæren has long been interpreted as illusory — due partly to lack of research, but in particular due to *secondary blurring* caused by pronounced land-sea alterations. On North Jæren the Holocene (Tapes) transgression maximum may have distorted most or all of the strictly shore-bound sites from the period between c. 10,000 and 6000 b.p. (Bjerck 1986, 104–106). On South Jæren and further south along the Norwegian coast, Late Glacial and Early Mesolithic shore-bound sites may now be located at the present sea level, or even be submerged a few metres below (Simonsen 1975, 231–232).

The Tapes transgression, which started c. 9000 b.p. and lasted some five thousand years in Southwest Norway did, however, not necessarily erode, inundate and destroy *all* earlier evidence. Settlement sites localized near the tansgression maximum, or in sheltered on-shore positions, may have been sealed by the transgression ridge or covered by fine-grained marine sediment layers. This phenomenon is well documented in South Scandinavia, for instance along the Swedish west-coast and in Scania and Zealand (e.g. Wigforss et. al. 1983, 20–34, 187–195, Larsson 1982, 15–27, Christensen 1981, 91–107), where the Post-glacial shoreline displacement underwent a development relatively similar to that of West Norway.

Three open-air Jæren sites, which have been sealed and preserved by the Tapes event, will be presented and briefly discussed in order to shed new light on the 'submerged' period in Southwest Norway and the effects of the rising sea to Mesolithic man (figs. 1–2).

Lego I+II

The Mesolithic site Lego lies in an undulated sandy-moraine landscape about 4 kilometres upstream from the estuary of Figgjo, one of three major waterways in the Jæren area. Until reclaiming work took place just after the beginning of this century, the site was situated

A. Fischer (ed.) *Man and Sea in the Mesolithic*. Oxbow Books, Oxford. 1995.

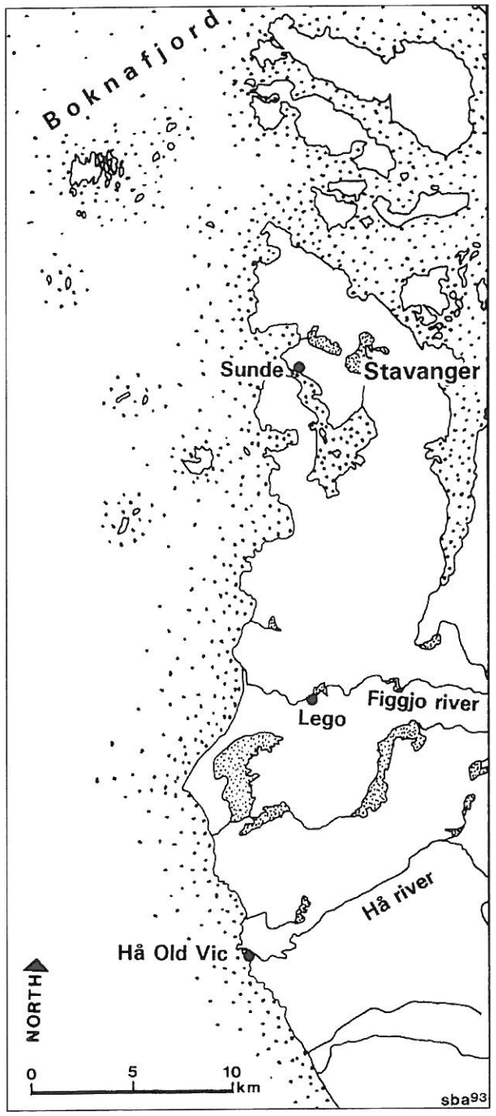

Fig. 2. Map of the Jæren area showing the location of the three transgressed Mesolithic sites discussed in the article.

on the southern side of the river outlet from Grudevatnet, a shallow lake with present water surface only 2.5 m a.s.l. (fig. 3).

The Lego site consists of two excavated areas, Lego I and Lego II, situated c. 15 m apart and separated by a shallow depression in the sandy river plain. The upper part of the findbearing layer varies between 4.5 and 5.5 m a.s.l. (fig. 4).

After being discovered by a local farmer, large parts of both sites, c. 100 sq. m at Lego I and 60 sq. m at

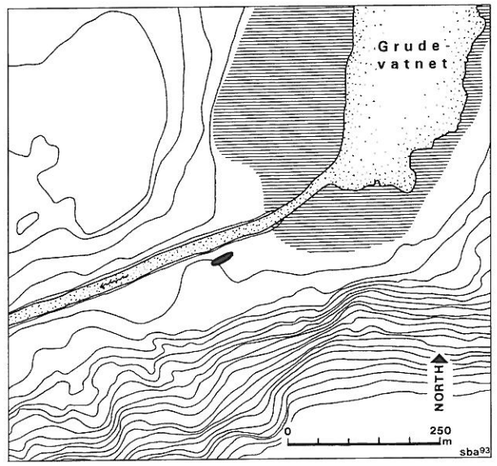

Fig. 3. Map showing the local setting of the Lego site. The former extent of Lake Grudevatnet (c. 5 m a.s.l.) is indicated by shading. Contour interval 2.5 m.

Lego II, were investigated by Harald Egenes Lund in 1937–1938.

An excavation report or a broader presentation and evaluation of this important site has never been published. Paradoxally, the geological history of Lego is far better known from the pollen analytical investigations carried out here by Knut Fægri in 1937 (Fægri 1940, 172–180).

Both of the site-areas revealed distinctive cultural layers resting directly on a sandy or gravelly substratum. The cultural layer of Lego II was superimposed by a thin transgression layer of marine gyttja, followed by a thicker formation of diatomaceous sediments (fig. 5).

At Lego I (the upstream part) superimposed layers were not preserved, presumably as a result of later wave erosion by Grudevatnet, which had a water level of 4.5–5 m a.s.l. until it was partially drained.

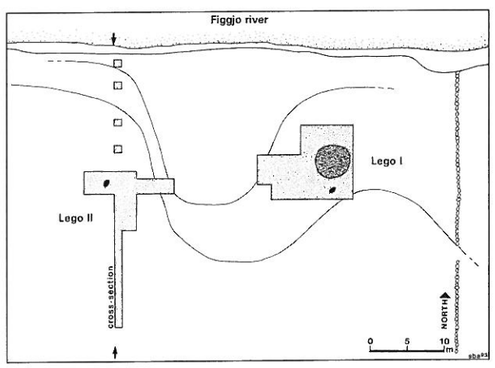

Fig. 4. Horizontal plan of Lego with excavated areas and localization of cross-section shown in figure 5. (Redrawn after H.E. Lund, unpublished).

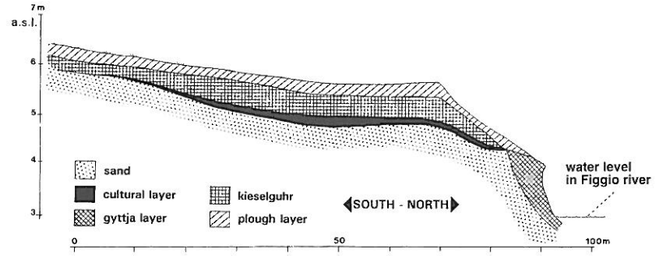

Fig. 5. Partly reconstructed cross-section S–N through the Lego site perpendicular to the river bed. The vertical scale is exaggerated ten times. (Simplified after Fægri 1940).

The gyttja layer has been dated by pollen analysis to the maximum of the Tapes transgression, which flooded Grudevatnet and the Figgjo river valley up to c. 7 m a.s.l. (Fægri 1940, 145, 175–176). According to this, the Lego site must have been abandoned by its inhabitants before the Atlantic / Sub Boreal transition about 5000 b.p.

A possible alternative interpretation is that the marine sand layer are the deposits of a tsunami (giant sea wave) which affected parts of the West Norwegian and East Scottish coastlines c. 7000 b.p. (Dawson et al. 1988, 271–276, Svendsen & Mangerud 1990, 133–134). However, provided the palynological dating is correct, this alternative has to be excluded.

The archaeological investigations by Lund affected only 15–20% of a potential findbearing area of 800–1000 sq.m. On Lego I a 15–30 cm thick cultural layer turned up directly under the plough layer. Most of the find material, exclusively lithics, was concentrated within a circular area, 4–4.5 m across, with a particularly high content of charcoal and burned hazel nut shells. The area was interpreted by the excavator as the probable floor of a dwelling.

The cultural layer at Lego II was buried by up to 1 metre of secondary deposits. It was generally thinner than at Lego I, and contained, with the exception of one hearth, no obvious site structures.

The total artefact inventory of the Lego site may be characterized as a homogenous blade and microblade industry, manufactured mainly from slender multifacial unipolar flint cores. Apart from a number of flake scrapers, the tool inventory is made up of small burins, geometrical microliths and (fragmentary) point-butted ground greenstone-axes. While only a few of the flint artefacts are water-rounded, a relatively large portion shows patination. There are no clear signs of secondary, Late Mesolithic or Neolithic, intrusion (table 1).

Based on typology, Lund interpreted Lego I and Lego II as contemporaneous, a conclusion which has gained support from later researchers (Mikkelsen 1971, 15–19, Bjerck 1983, 40). The impression of typological

	Hå Old Vic	**Lego I + II**	**Sunde 34**
Inv. No.	S. 10339–10340	S. 6701–6702	S. 10228–10229
Radiocarbon dating (mean value)	c. 8200 y. b.p.	c. 7600 y. b.p.	c. 6700 y. b.p.
Total amount of recovered artefacts	c. 2000	c. 4000	c. 6200
Grinding slabs	+	–	(+)
Ground greenstone axes	+	+	(+)
Conical blade- and microblade cores	+	+	+
Handle cores	–	–	+
Unifacial unipolar cores	+	+++	+
Multifacial unipolar cores	+	+	+++
Bipolar cores	–	–	(+)
Unworked blades	+	+++	+
Unworked microblades	+	+	+++
Burins	+++	+	–
Borers	–	+	+
Scrapers	(+)	+++	?
Knives	–	?	?
Microliths	–	+	–
Microburins	–	(+)	–

Table 1. Simplified comparison of the relative occurrences of artefact types on Tapes-transgressed sites on Jæren, ? indicating uncertainty, – absence, (+) low frequency, + distinct frequency and +++ high frequency.

homogenity has now been confirmed by two radiocarbon analyses of burned hazel nut shells, dating Lego I to 7590 ± 120 b.p. and Lego II to 7680 ± 150 b.p. (Bang-Andersen, in prep. table 2).

The exact sea-level during the period of settlement is unknown (Fægri 1940, 179), but it can hardly have been more than c. 2 m higher than today. This should indicate a lacustrine-riverine site orientation, one hundred metres or so upstream from the former river estuary.

In conclusion, the main importance of the Lego site rests with its *chronological cleanness*, due partly to the sealing effect of the Tapes transgression (or possibly a tsunami around 7000 b.p.), and the *dating* to between c. 7500 and 7800 b.p. — a period still weakly archaeologically represented and poorly understood in Southwest Norway.

Sunde 34

The second Mesolithic Tapes transgressed site to be detected and investigated on Jæren was Sunde 34, situated on the northern bank of the narrow inlet of Hafrsfjord on the west side of the Stavanger peninsula. The site has an open and unsheltered position 9–10 m a.s.l. in gently SW sloping terrain about 150 m from the present beach of Donevika, a small bay in the Hafrsfjord sound (fig. 6).

Threatened by plans for house building in the area, the site was investigated archaeologically 1979–1980 by Helge Braathen, and published in 1985 (Braathen 1985).

As most of the c. 125 sq.m large findbearing area seemed to be mixed, the excavation was concentrated to a 55 sq. m area partially covered by a fossil beach ridge. While the c. 0.5 m thick and barely discernable beach ridge superimposed a well-preserved 5–15 cm deep cultural layer only partly disturbed by modern drainage ditches, all traces of other prehistoric activities around Sunde 34 — earlier or later — proved to be totally destroyed by sea transgression and modern land-use.

Based on sections through the beach ridge (Braathen 1985, 23–38), and palynological and geological analyses (Thomsen 1982, 167–170), it is possible to reconstruct the main lines of the site formation process at Sunde 34. According to radiocarbon datings from the cultural layer (table 2), the site must have been established c. 6800 b.p. on deciduous peat which has been dated to 8260 ± 320 b.p. Parts of the bog were covered by a thin dune of windblown sand (fig. 7). As the sea-level was at least 6 m higher than today during the main period of settlement, the distance to the shoreline may be calculated to have been 50–75 m.

Some time after 6500 b.p. the postglacial (Tapes) transgression reached its maximum high of 9–10 m in northern Jæren, and parts of the settlement site was inundated and covered by a shallow beach ridge. Later, when sea-level regressed, eolian sand was blown all over the area. Several site features were identified underneath the beach ridge: a stone cobbled floor area, possible traces of a stone-lined tentring and bracken-covered resting places, postholes and four distinctive hearths — one indoor, three outdoor. No organical matter, except for charcoal and burned hazelnut shells, was preserved in the thin cultural layer.

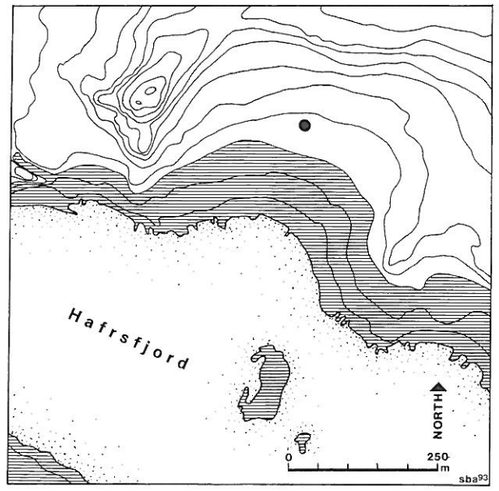

Fig. 6. Map showing the local setting of the Sunde 34 site. Former sea-level (c. 7.5 m a.s.l.) is indicated by shading. Contour interval 2.5 m.

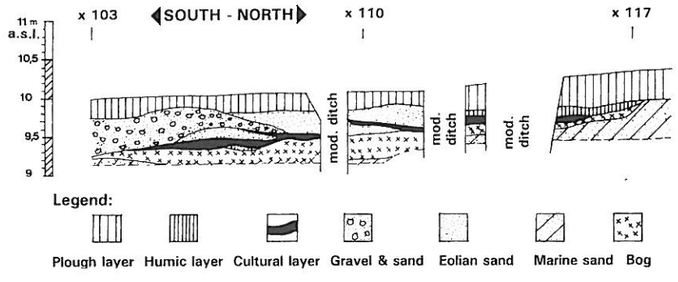

Fig. 7. Cross-section S–N showing the stratigraphy of the Sunde 34 site. The vertical scale is exaggerated. (Redrawn after Braathen 1979).

Site	Lab.ref.	Dating result b.p. (Half-Life 5570)	Cal.age one Sigma b.c. (Stuiver&Reimer 1993)
Lego I	T-7140	7590 ± 120	6470–6240
Lego II	T-7139	7680 ± 150	6610–6380
Sunde 34	T-3714	4930 ± 210	3960–3390
	T-3715	6600 ± 110	5590–5430
	T-3535	6710 ± 240	5760–5390
	T-3536	6910 ± 100	5850–5640
peat layer	T-3716	8260 ± 320	7750–6720
Hå Old Vic	T-7137	7950 ± 90	7010–6610
	T-5972	8140 ± 90	7260–7010
	T-7138	8430 ± 170	7570–7290
humic layer	T-6377A	4690 ± 110	3630–3350

Table 2. Radiocarbon datings of archaeological and geological layers on three Tapes transgressed sites in Jæren. All results have been processed by the Trondheim radiological dating laboratory.

The lithic inventory conclusively sealed by the beach ridge consists of c. 6200 artefacts, 97% of flint and 3% of rock crystal. Considering the artefact amount, the number of distinct flint tools is surprisingly low (see table 1). Only a minor portion of the material is water-rounded or patinated. Except for some few microblade borers, distinct daily-life tools such as scrapers, knives and burins have not been recognized. The paucity of complete tools may — at least partly — be explained by a high number of microblades, mostly produced from multifacial unipolar cores.

Tecnologically the Sunde site fits within the maximum of the 'Microblade Tradition', a conclusion which is supported by three radiocarbon datings ranging between 6910 ± 100 and 6600 ± 110 b.p. (table 2). If we exclude a dating to 4930 ± 210 b.p., which the investigator interprets as erraneous (Braathen 1985, 94–95), the settlement period seems to have been relatively short, possibly two hundred years or so.

Sunde 34 is important first of all because of its information about Late Mesolithic site structures and spatial organization. In a chronological sense the Sunde material may be treated as a homogenous, more or less "clean" inventory. However, due to the relatively thin beach ridge coverage and recent trench digging, there is a possibility of some later intrusion.

Hå Old Vic

The last Tapes transgressed site to be discovered on Jæren is situated near the mouth of the river Hå on the southern part of the Jæren moraine plain.

A large number of open Stone Age sites have for a long time been known along both sides of the lower part of the river, however all with cultural layers more or less disturbed by ploughing (Bang-Andersen 1970, 61–68). In 1984 a formerly unknown Mesolithic site of high research potential was discovered accidentally during the machine excavation of a 10 x 20 m house cellar in beach gravel deposits at Hå Old Vicarage, c. 500 m SE of the present estuary (fig. 8).

Below a 1.5–2 m thick belt of rounded cobbles and boulders a continous 5–20 cm deep cultural layer

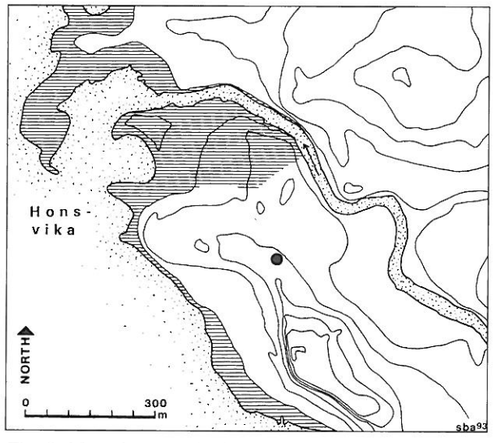

Fig. 8. Map showing the local setting of the Hå Old Vic site. Former sea-level (generally 2.5 m a.s.l., slightly modified near the southern river mouth area) is indicated by shading. Contour interval 2.5 m.

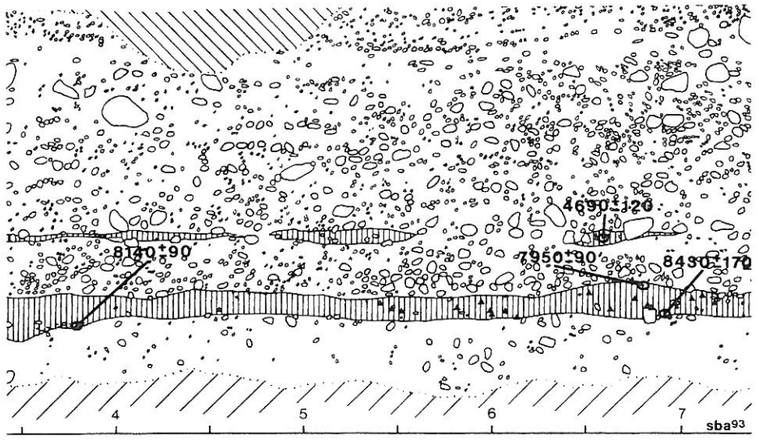

Fig. 9. Vertical section NW–SE along the investigated northeastern part of the the Hå Old Vic site, with exposed flint artefacts (triangles) and uncalibrated radiocarbon dates. (After Bang-Andersen & Thomsen 1993).

showed up in full length along all four profile cuts. The settlement site should, accordingly, have a horizontal extension by far exceeding the c. 200 sq.m excavated and removed in such a devastative manner. Due to archaeological and quaternary geological rescue work carried out 1984–1986 (Bang-Andersen & Thomsen 1993, 9–20), the main character of this site, which is to be published in full later (Bang-Andersen, in prep.), can be recapitulated.

As it was impossible to locate and examine the removed cultural layer, the main investigations in 1986 were concentrated to the sharp-cut vertical sections still remaining on the site, 56 m altogether. Photographic documentation and precise drawings of all the profiles were made, artefacts were plotted and picked out, charcoal and hazel nut shell samples were taken for radiocarbon dating, and soil samples collected for for grain size and pollen analysis. Finally the archaeological content of a 3.5 m long, well-preserved vertical section of the site margin facing NE, which seemed to be representative for the site, was uncovered, hand trowelled and water sieved (fig. 9).

No less than 1900 flint artefacts, or 92% of the total artefact material recovered from the site, and all four C-14 datings, actually derive from this 0.9 sq.m large horizontal segment of the site. If the find frequecy here is representative for the cultural layer in toto, no less than 420,000 flint items were removed from the site before its discovery.

The formation of the Hå profile can be explained in this way: A Mesolithic settlement site was established directly on Late Glacial till identified as the Lista moraine, tentatively dated elsewhere to c. 15,500 b.p. According to radiocarbon datings of charred hazel nut shells from the lower and upper margin of the cultural layer, the period of settlement was restricted to between c. 8400 and 8000 b.p. (see tab. 2 for sample references).

The settlement was interrupted by a gradual rise in sea-level, which started c. 9000 b.p., and probably reached and sealed the upper level of the Hå site with a present altitude of 6.6 m by gravelly beach sediments soon after 8000 b.p. (Bang-Andersen & Thomsen 1993, 6). The Mesolithic population was left with no other alternative than to abandon the site and move to some higher-lying locality.

A sub-fossile, up to 5 cm thick humic horizon in the beach ridge formation, detected about 30 cm above the cultural layer, reflects a regression phase radiocarbon dated to c. 4700 b.p. (fig. 9). By this the Hå Old Vic site also provides vital information about landscape development history:

* The cultural layer gives a maximum date of c. 8000 b.p. for the formation of the beach ridge above the 6.6 m level on South Jæren, indicating a Early Atlantic sea-level of minimum 5 m a.s.l.

* The Tapes transgression in this area was double-peaked, with a maximum shortly after c. 4700 b.p.

* The beach ridge formation exceeded the present altitude of 8 m at Hå, and reached a top level of 9–9.5 m a.s.l., indicating a Postglacial sea-level in the area of c. 7.5 m in the Early Sub-Boreal chronozone.

During the period of settlement around 8200 b.p., which according to radiocarbon datings extends over a time-span of at least 200 years — possibly as much as 600 or 700 years — the sea was c. 2.5 m higher than it is today, and the site located on the top of a narrow isthmus about 250 m S of the former Hå estuary (fig. 8).

As also was the case at Lego and Sunde, no organic remains except charcoal and burned hazel nut shells were conserved, despite the two-metre thick beach ridge coverage. The artefact material, almost exclusively of flint, can be characterized as a blade and microblade industry based on conical and other unipolar cores (table 1). Small, angular side-burins, together with some few scrapers, pointbutted ground greenstone axes of "Nøstvet" type and sandstone or quartsite grinding slabs form the only distinct tool types. It should further be noted that only 6% of the lithic material is water-rounded, while as much as 35% shows clear signs of patination.

The Hå Old Vic site is significant for a number of reasons:

* The cultural layer, completely covered by geological deposits, constitutes an isolated capsule in time without intrusions from later settlement or other forms of "pollution".

* The settlement fixes a minimum-date for the Tapes transgression on South Jæren, and the superimposed shore ridge provides vital information on the actual process of the rise and fall in sea level.

* The site represents the oldest certainly-dated remains of human settlement on Jæren.

* Large parts of the site still remain intact for future research, right outside the cellar walls of a new-built house - which now contains a permanent exhibition about the surrounding Mesolithic site.

Discussion

The three settlement sites briefly presented above exhibit both similarity and difference:

Location: None of the sites were absolutely shoreline-bound during the period of settlement, situated between 2.5 and 4 m above former sea level and c. 50 to 250 m away from the shore line.

Inundation: All sites were inundated and superimposed by the Tapes transgression: the two coast-oriented sites (Hå Old Vic and Sunde 34) by massive beach ridge material; the inland lying site (Lego) by fine-grained marine layers sedimented by calmer water.

The time lapse between site abandoning and site superimposition is not finally settled. While Hå Old Vic may have been deserted relatively shortly before inundation, Lego was probably left well ahead of the rising sea level.

Preservation: Settlement features such as hearths and possible dwelling remains were preserved on both sites which have been subject to extensive archaeological excavations (Lego and Sunde 34). This may seem to indicate a relatively rapid inundation process, which only to a modest extent devastated the surface-exposed or slightly earth-covered cultural remains.

Due to serious damage brought about in recent times, the preservational conditions at Hå Old Vic are more difficult to evaluate. The deep cultural layer with charcoal and hazel nut shells in *in situ* contexts does, however, indicate only minor damage caused by wave action and superimposition.

Chronological significance: According to the impenetrable and undisturbed character of the superimposed beach sediments, both the Hå site and Lego II can be treated as closed contexts devoid of secondary artefact infiltration. By Norwegian standards their typological and chronological importance can hardly be overevaluated. Lego I and Sunde 34 may theoretically contain some material from later settlement phases.

Supplementary to their cultural historical potential the three Tapes-transgressed Jæren sites contain basic information about local landscape development, in particular the process of Postglacial beach line formation. *Sunde 34* determines the maximum age of the beach ridge on the 9.7 m level in North Jæren to c. 6600 b.p., *Lego II* fixes the maximum age of the transgression of the 5.0 m level in central Jæren to c. 7700 b.p., and *Hå Old Vic* the maximum age of the beach ridge formation on the 6.7 m level in South Jæren to c. 8000 b.p.. Furthermore, The Hå site section gives clear evidence of a double Tapes transgression, seperated by a regression phase around 4700 b.p.. As a similar interruption in the transgression progress has been discovered and dated to c. 4500 b.p. on Eigerøy, 40 km to the south (Simonsen 1975, 232), the shore formation in the southern parts of Rogaland probably underwent a more complex development than further north along the coasts of Western Norway. By this, Knut Fægri's fifty-year old hypothesis (Fægri 1940, 143) finally seems to get conclusive support.

In a wider geographical context the Tapes Maximum transgressed Jæren sites do have clear counterparts. During the last decade a number of Middle and Late Mesolithic settlement sites have been located and partly excavated on islands or in the head of fiords in the Boknafjord basin, north and east of Stavanger (Gjerland 1989, 308–311, Høgestøl 1990, 8–9, Krøger 1992, 11–13). However, until fuller archaeological reports and well-documented radiocarbon datings are available, it may seem problematic to take these sites into consideration.

The hitherto best documented Tapes transgressed "sister sites" are found on the northwestern coast of Norway, between Bergen and Trondheim (fig. 1).

At *Dysvikja* on the island of Fjørtoft, 25 km NE of Ålesund, a well-preserved cultural layer up to 10 cm deep was discovered underneath a 1.2 m thick beach ridge with top level c. 10 m a.s.l. (Indrelid 1973, 7–8). Several distinct hearths and parts of a possible birch barch floor were found in the cultural layer, which has been radiocarbon dated to c. 7900 b.p. (Indrelid 1974, fig. 10).

Just 7 km south, at *Stølen* on the island of Skuløy (Flemsøy), a site with a more complex stratification including four separate cultural layers has been investigated (Bjerck 1982, 87–93). The second oldest layer, radiocarbon dated to c. 6300 b.p., was encapsulated in a beach ridge formed by the Tapes maximum, which ended well before the next settlement episode c. 4500 b.p. (fig. 10).

The third, and last discovered, NW Norwegian site essential to questions concerning the relationship

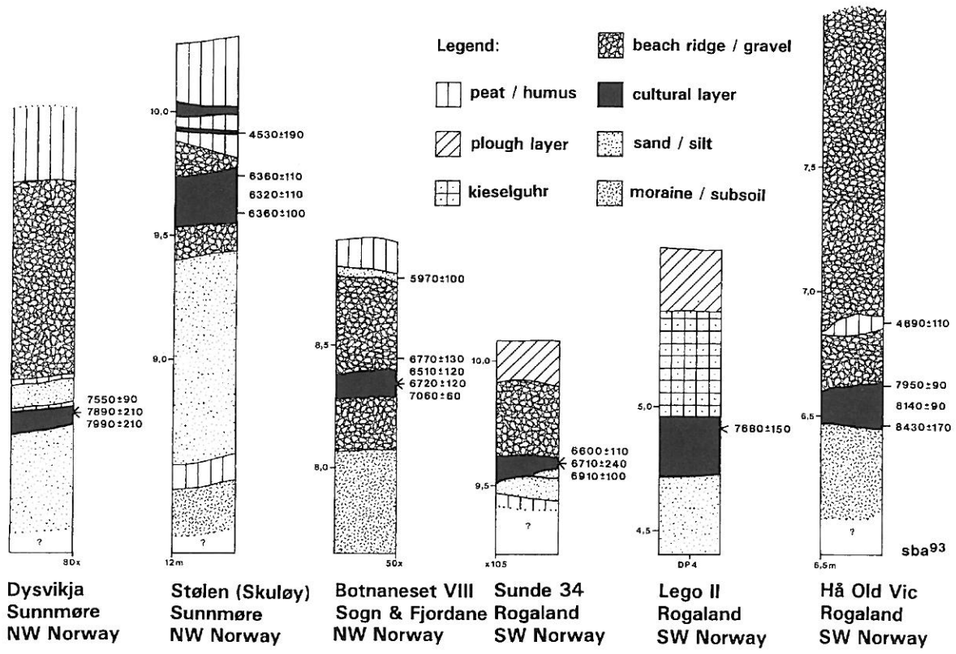

Fig. 10. Collocation of simplified vertical sections showing radiocarbon dates b.p. for cultural layers immediately under- or overlying deposits of the Tapes transgression on six "sister sites" along the West-Norwegian coast.

between Mesolithic man and the rising sea, is *Botnaneset VIII* in Flora, on the coast between Ålesund and Bergen (Olsen 1983, 72–132). This site which, like all the other sites mentioned above, belongs to the open-air type, is situated c. 9 m a.s.l. at a distance of 100 m from the sea-border. As at Stølen, a Late Mesolithic findproducing layer was entirely embedded within cobbles, gravel and sand belonging to the Tapes beach ridge.

Radiocarbon datings ranging between c. 7000 and 6500 b.p. fix a *terminus post quem* for the Tapes transgression in this area. Further, the C-14 dating of a thin cultural horizon overlying the beach ridge indicates a *terminus ante quem* of c. 6000 b.p. (fig. 10).

As geological evidence of a double peaked Tapes transgression on the coast of NW Norway is lacking (Svendsen & Mangerud 1990, 132–134), both the Stølen and Botnaneset sites must have been situated quite close to the former shore-line during a standstill in the transgression progress and piling up of beach ridges.

Conclusion

The main results of the preceding survey may be summarized as this:

* The coastal factor in the Mesolithic procurement and settlement pattern in West Norway, with pronounced shorebound site location, has resulted in an unequal archaeological record in the Jæren area, due to the Tapes transgression: most strictly shorebound Late Glacial and Early Mesolithic sites (antedating c. 8500 b.p.) have probably been transgressed and *destroyed.* On the other hand, a number of Middle and Late Mesolithic sites (dating between c. 8500 and 6500 b.p.) have been transgressed and *preserved.* An examination of the cultural layers of three sites superimposed by beach deposits reveals surprisingly little damage caused by wave abrasion or later mechanical compression.

* Together with a small group of "sister sites" on the outer coast of NW Norway, the Tapes-sealed Mesolithic sites in SW Norway form more or less closed archaeological contexts with time resolution and natural and cultural historical research potential by far surpassing the large amount of contemporary sites lacking marine-geological superimposition.

* The Tapes transgression in West Norway was nowhere uniform or contemporary, either in penetration or in its retreating stages, relative to uneven isostatic rebound and possible faultings. In the southwestern corner of Norway the transgression was double-peaked, reaching its peak during its last episode. Elsewhere in West Norway the transgression was single-peaked. Maximum sea level was probably reached 6700–6400 radiocarbon years b.p. in NW Norway, and 4700–4400 b.p. in the southernmost parts of SW Norway.

* The time is now ripe for more detailed contextual studies of the Tapes-transgressed Mesolithic cultural layers in West Norway, and their topgraphical and formative background. Interdisciplinary regional comparisons of transgressed sites along the changing coastlines of West Norway, West Sweden, Denmark, The Netherlands, East England and Scotland, above or below present sea line, should also be undertaken.

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