Johan E. Arntzen

SANDVIKA IN NORTHERN NORWAY: THE NORTHERNMOST 'BRONZE AGE' SETTLEMENT IN SCANDINAVIA

Abstract

In Sandvika, located at nearly 70° latitude in northern Norway, evidence of a settlement site with clear connections to the Nordic Bronze Age complex was investigated in 2013. The features uncovered included a three-aisled longhouse and several cooking pits. The artefacts consisted of asbestos-tempered ceramics, soapstone vessels and a fragment of a soapstone mould for casting a socketed axe. Burnt animal bones recovered from a fireplace indicate the presence of domesticated animals in the form of sheep or goat. Also fragments of seal and fish bones were uncovered, and seen in connection with the find of a fishing sinker a strictly agrarian economy is out of the question. ^{14}C-dating indicates a main habitation phase between c 1000–800 BC, a date also supported by the artefact material as well as the construction type of the building. The site mirrors the only other Late Bronze Age house in northern Norway as well as settlements further south. The Sandvika locality also sheds new light on the so-called drift sand sites found on the northern Norwegian coast. It is suggested that these sites have been of the same type as the one in Sandvika. Nonetheless, it is highlighted that this settlement hardly can be understood as a mirror image of what is found further south, and that it must be understood in light of its local and regional setting.

Keywords: northern Norway, Bronze Age, longhouse, asbestos ceramics, farming

Johan E. Arntzen, Tromsø University Museum, Department of Cultural Science, University of Tromsø – The Arctic University of Norway, N-9037 Tromsø, Norway: johan.arntzen@uit.no.

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INTRODUCTION

The Sandvika locality, located at nearly 70° latitude, is the northernmost example of a settlement site with clear connections to the Nordic Bronze Age within Scandinavia. The excavations, which took place in 2013, have provided results that will prove important in assessing a whole array of stray finds as well as lesser-known sites of similar type in northern Norway (Fig. 1).

With a location far above the Arctic Circle, the find of a bronze casting mould, bones of domesticated animals as well as house foundations similar to what is found within the Nordic Bronze Age area, the Sandvika site stands out as unique in both a Norwegian and Nordic context. Hence, the present article will aim to present the excavation results in detail. First, a brief overview of the background for the investigation is given. Thereafter the archaeological features that were uncovered as well as their interpretations are discussed. To situate the site between the eastern and northern hunter-gatherer-fisher communities and the southern farming communities, which have a different material culture, a discussion of the artefacts is given weight. Also important is the presentation of the limited but important palaeobotanical and osteological data from the excavation.

The totality of this evidence forms the basis for a discussion of which type of settlement this is, what economic strategies have been in place, and the 'uniqueness' of this type of settlement north of the Arctic Circle. Is this an outpost of the Nordic Bronze Age complex or is it something entirely different?

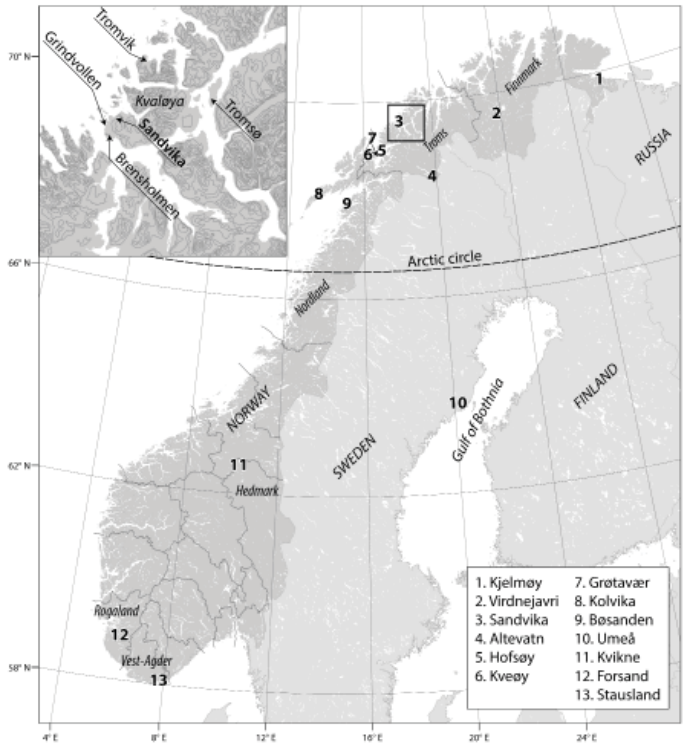

Fig. 1. Overview map showing the location of Sandvika as well as other key sites and areas mentioned in the text. Illustration: J.E. Arntzen

A note on the chronology

When it comes to chronological periods, it must be clarified that the term 'Early Metal Age' is generally used in favour of 'Bronze Age' for most of northern Fennoscandia (c 1800 BC–AD 1). The basis for this terminology is the marked differences in the archaeological material in this area as opposed to the south. The terminology is originally based in Finnish and Russian archaeology, but has been in use for northern Norway since the mid-1980s (Carpelan 1979; Olsen 1984; Jørgensen 1986). To avoid confusion, and since much of the discussion when it comes to Sandvika will be based on similarities and connections to the Nordic Bronze Age complex, the chronological framework common in southern Scandinavia will be used in the following (cf. Vandkilde et al. 1996).

BACKGROUND

Geography and climate

The settlement site in Sandvika is located to the southwestern part of the Kvaløya island in Tromsø Municipality in Troms County (18°5'30"E, 69°36'40"N). Kvaløya has an area of 737 km^2 and is the fifth largest island in mainland Norway. It is mountainous towards the inland and has several small fjords on the western side. The settlements are mainly located to the small strip of land between the coastline and the mountains towards the interior. From an archaeological viewpoint, Kvaløya has a fair number of sites and stray finds ranging from the Early Mesolithic up to the Medieval Age. The southwestern part of Kvaløya is particularly rich, and several high status grave finds dating to the Iron Age separates the area from other parts of the island (Binns 1978).

Although a marginal area for agriculture, fertile land, today mainly used for grazing and potato crops, is found all around the island. The Brensholmen area, located near the settlement site, is a moderately rich agricultural environment relative to the other places on Kvaløya. Although the fields are currently used mainly as grazing land, cereals were grown here in small quantities earlier. Agricultural statistics from 1723 show that merely 0.1 ha at the Brensholmen farm was sown with barley, implying that cereal growing was not crucial for the economy (Fjærvoll 1965; Vorren 2005).

The local climate is of a typical coastal type with rather mild winters, cool summers and more precipitation than the interior areas. The outer coastal zone, where Sandvika is located, is in general somewhat warmer than the interior, with an annual mean temperature c 1° above the area around the city of Tromsø. The potential growing season, measured in growing degree days, is hence somewhat longer here (Binns 1978: 16).

Climate reconstructions from the interior of Troms and northern Finland indicate a warmer and drier climate during the Late Neolithic and Bronze Age, with a July mean temperature 1–1.5° warmer than today (Seppä & Birks 2001; Bjune et al. 2004; Jensen & Vorren 2008). Marine proxy records indicate a similar situation, but also show smaller climatic shifts and fluctuations which need to be studied on a higher resolution (cf. Birks & Koç 2002; Husum & Hald 2004).

The 1990s survey and nearby archaeological sites

Initially discovered because of a new road construction connecting the communities of Brensholmen and Sommarøy to the eastern and northern part of the island, the Sandvika locality was archaeologically surveyed in 1994 (Helberg 1994). The site is located 360 metres south of the seashore in the bay of Sandvika (En. 'the Sand Bay'), a sandy beach area today being a popular summer excursion spot for the local inhabitants (Fig. 2). The bay is characterised by drift sand towards the ocean, but more hilly and rocky areas appear as the landscape rises towards the south.

The location for the excavation site is situated 10 metres above sea level in an area today mainly consisting of wetland. During the initial survey, six positive test pits dug within the driest part of the wetland indicated prehistoric settlement. The evidence took the form of charcoal-mixed layers, a possible fireplace, as well as finds of both ceramics and soapstone artefacts. A single ^{14}C-date, now known to derive from the 'collapse context' of a house, gave the result of 794–362 BC (T-11620; 2415±90 BP).

Other sites discovered in the immediate vicinity were two presumed settlements dated to the Late Bronze Age (5 and 6; for numbers, see Fig. 2), one semi-subterranean dwelling structure dated to the Late Neolithic (7) and a settlement site dated to the Migration Period (3). The Late Bronze Age finds consisted of only charcoal, pumice, fire-cracked rocks and a single piece of flint debris. The Migration Period site had both ard marks and ceramics. In addition, a single burial mound lies nearby the site, measuring only 4 metres in diameter and with a height of 0.5 metres (4). On the opposite side of the bay several small grave mounds and cairns as well as house foundations from the Medieval and Iron Ages are found (1 and 2).

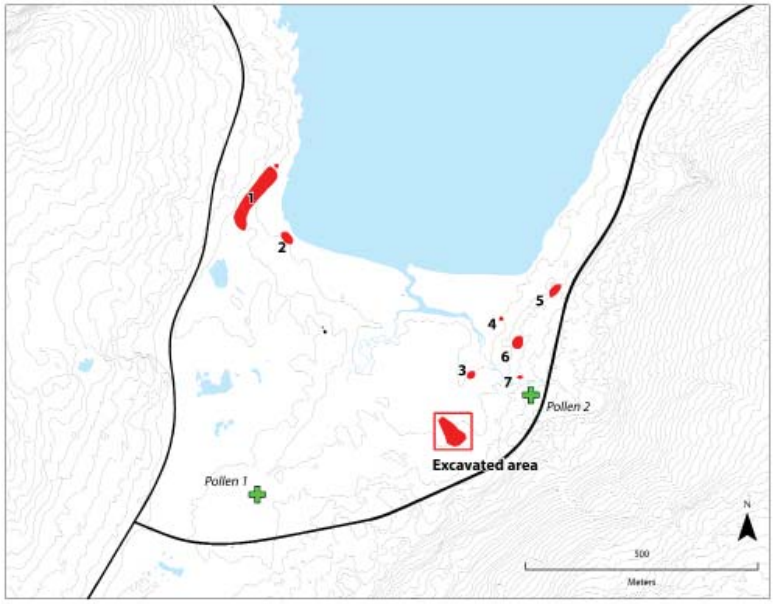

Fig. 2. Overview of the geographical location of Sandvika with the excavated area, pollen coring sites, as well as other known nearby prehistoric settlement sites marked. The equidistance of contours is 5 meters. Illustration: J.E. Arntzen.

Vegetation history

In connection with the survey two pollen cores from nearby mires were analysed (Tveraabak & Alm 1997). Core 2 was extracted 200 metres northeast of the settlement site while core 1 was extracted c 450 metres southwest of the site, at c 15 metres above sea level (Fig. 2). Core 2, which is the most relevant for the settlement site, reflects vegetation in the period between c 2900 BC (4150 BP) and the present. Four distinct vegetation zones could be discerned based on variations in the type and amount of pollen (see Fig. I in supplementary material). The first zone, c 2900–2300 BC (4150–3900 BP), is characterised by shifting amounts of birch (*Betula*), large amounts of grass (*Poaceae*), hawkbits (*Leontodon*-type) as well as charcoal particles. That this zone commences at the time when the sea level declined in the area is shown through the presence of coral sand in the bottom of the profile, as well as indicators of brackish water (*Hystrix*) in the lowest samples. All in all, the phase can be interpreted as having nearby settlements with pastures. Other possible apophytes present are garden sorrel (*Rumex acetosa*), Jacob's ladder (*Polemonium*) and species belonging to the pea family (*Fabaceae* indet.).

The second zone, c 2300–700/400 BC (3900–2400 BP), shows generally higher values of birch than the first zone, and high values of willow (*Salix*), while the values for grass, hawkbits and charcoal are lower than in the preceding zone. The influx for this zone is, however, very heterogeneous, with a marked peak for birch, alder (*Alnus*), willow and charcoal located at c 1900–1700 BC (3500 BP). This could be due to a movement of the settlement areas and could indicate that the pollen core reflects a very local vegetation picture.

Zone 3, c 700–400 BC to AD 600–700 (2400–1400 BP), shows a marked decrease for birch and an increase of herbs and charcoal, all in all a clear indication of increased human activity. A large increase in grass could be explained by the area being used as pasture. The last zone, c AD 600–700 to the present, is separated from the previous by a marked layer of drift sand in the profile. This layer was also found superimposed over the settlement area during the excavation. From this period onwards the human activity is strongly reduced and the vegetation mirrors a more closed landscape.

From the Brensholmen farm, located c 4 km southwest of the Sandvika locality, Vorren (2005) has found a possible start of agricultural activity between 1550–1250 BC through palynological investigations of nearby mires. Zone 2 in his diagram, dating to c 1250–600 BC, corresponds to the main settlement phase in Sandvika. This zone is characterised by a marked rise in the grass curve as well as the presence of both *Hordeum*- and *Triticum*-type pollen. It is possible that the earliest Cerealia-type pollen could be from wild grass types. At the neighbouring farm of Austein, there was found evidence of grass meadows at the same stage, but no cereal pollen was present. The dating of the Brensholmen cereal pollen is however in accordance with what has been documented for other parts of northern Norway south of the Malangen area (Johansen & Vorren 1986; Vorren et al. 1990; Jensen 2012).

EXCAVATION RESULTS

Methodology

The archaeological excavation strategy involved a contextual approach where the identification of features that could be related to potential house structures was prioritised. All such features, finds, samples, section lines, and field borders were documented digitally using a total station and the Intrasis field documentation system (SHMM 2013). More detailed section and plan documentation, as well as microtopograhic surveying, was done using the photogrammetry package Photoscan Professional (Agisoft 2013).

To maximise the potential evidence for agricultural activity, palaeobotanical sampling and analysis was emphasised at an early stage in the planning of the excavation. Sampling for pollen, macrofossils, phytoliths and fossil insects were all a part of the strategy. The botanical sampling and analysis was arranged through joint participation in a research programme with the University of Stavanger, and carried out by Assoc. Prof. Christin Jensen. Phytoliths and entomological samples were handled by Dr. Débora Zurro, Spanish National Research Council in Barcelona, and Dr. Eva Panagiotakopulu, Dept. of Geography, University of Edinburgh, respectively. The entomological samples have not yet been analysed. For the macrofossil sampling, all postholes that seemed relatively undisturbed were sampled while also several bulk samples from the presumed collapse context of the house (A1566, number refers to

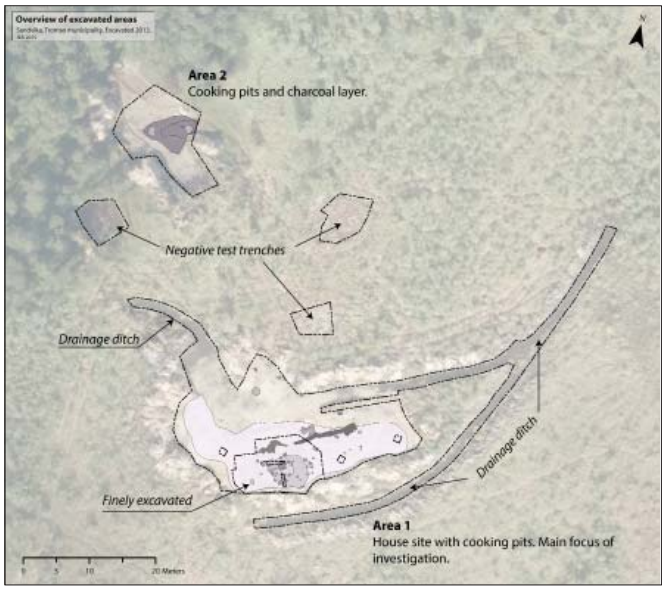

Fig. 3. Overview of the excavated areas in Sandvika. Background ortophoto by Geovekst. Illustration: J.E. Arntzen.

ID-numbers in the excavation database) as well as the fireplace and refuse pit were taken. In total 72 litres of soil were flotated using cold water and a 0.5-mm-sieve. Pollen was sampled from two profiles, one along the main axis of the house and one on the limit of the excavated area. 13 samples for phytolith analysis were gathered from several different archaeological features and control areas. Turf samples for entomological analysis were taken as a bulk profile from the western edge of Area 1. With the exception of the macrofossil samples, all material was gathered in situ by the above-mentioned experts.

Burnt animal bones were analysed by Dr. Sean Dexter Denham at the Archaeological Museum at the University of Stavanger (Denham 2014).

For radiocarbon dating, all samples were analysed by Beta Analytic ltd. Results have been calibrated using Calib 7.02 and the INTCAL 13 dataset (Stuiver & Reimer 1993; Reimer et al. 2013). Calibrated dates are in the text reported as calendar years in ranges within two standard deviations unless otherwise noted. All calibrated dates from previous investigations mentioned in the text have been recalibrated by the author.

Fieldwork

The excavation took place during June and July 2013. With limited funding, the inclusion of the archaeological field school at the University of Tromsø was of great value. The archaeology students took part for two weeks while the rest of the effort was put down by kind colleagues.

In preparing the investigation a detailed project plan was prepared (Arntzen 2013a). In this plan, the settlement site was to be delimited through a series of test trenches distributed from the centre of the presumed habitation area. All these trenches, as well as the final top soil stripping, were to be done mechanically by excavator.

Stratigraphy

The stratigraphy within the driest parts of the site consisted of a thick turf layer, 15–40 cm thick, and a white sand layer up to 15 cm thick. Beneath the turf and sand cover the culture layers started to appear. While laying out the first test trench it became apparent that the ground water table varied more than expected and that also the stratigraphic properties of the area differed considerably over small distances. The test trench strategy was therefore aborted in favour of excavating only the driest and most promising parts of the site.

The excavation was focused on two distinct areas (Fig. 3). Area 1 had a total extent of 688 m^2 and included the find spots of both the soapstone mould fragment and vessel sherds, as well as the ceramics from the 1990s survey. Beneath the turf and white sand cover, which were present in both areas, the main parts of Area 1 consisted of a dark brown to red sand layer on the surface where all traces of prehistoric activity were located. Dur-

ing the turf removal it became clear that both the northern, western and southern edges of the Area 1 became quickly flooded by ground water. To tackle this drainage ditches were excavated around the site, directing the ground water downhill towards the sea.

After all the turf was removed and the ground drained as much as possible, the main activity area stood out as a low ridge within the otherwise wet area. This 'island' within the wetland had an angled oblong shape and measured 32 metres in length and 10 metres in with (A1159). As the red sand cover was cleaned up by hand, small pieces of charcoal were uncovered. The charcoal scattering was clearly concentrated to the southwestern part of the area where also a darker and more compact sand composition was documented (A1257). Within this context an even more compacted and charcoal-mixed area was defined measuring 2 x 2.9 metres and covering the centre areas of the underlying house. This is interpreted as the compacted remains of the collapsed house (A1566).

With this part of Area 1 as a starting point, a zone of 100 m^2 was laid out where a more detailed excavation strategy was used. Here most of the removed soil was dry-sieved through a mesh of 4 x 4 mm and all defined structures documented and excavated.

The remainder of Area 1 was investigated using a coarser method where all surfaces were scraped by hand in several turns. Identified features were documented and sectioned while also three 1 x 1-metre-test-squares were finely excavated and sieved to rule out the possibility that something was missed outside of the finely excavated area.

Area 2, located c 30 metres north of Area 1, was wetter and less promising than the former. Here the activity area was composed of grey sand where the archaeological features were poorly preserved. Nevertheless, c 140 m^2 were uncovered and two cooking pits documented.

Between Areas 1 and 2 three negative test trenches were excavated. All showed no signs of human activity and had such a high water able that no closer examination could be done.

House 1

The nature of a drift sand area makes stratigraphic and contextual interpretation difficult. The law of superposition will not always apply, formerly clear features may be disturbed in many ways and artefact evidence will have moved both vertically and horizontally. A contextual approach was still instrumental in documenting House 1 in Sandvika, and would not have been possible without detailed digital documentation. The special circumstances concerning the shifting ground water table as well as the turf and drift sand covering up the site is likely to be the reason why House 1 still was discernible. To interpret the construction details, the extent and the type of building, several sources of information have been used. In the following these will be presented.

Postholes

In total, 18 features were interpreted as postholes (see Table 1 in supplementary materials). These all vary considerably in both size and shape. The average depth is only 11 cm, while the width and length averages at 30 and 37 cm. When it comes to horizontal shape seven features were round, five oval, three rectangular, while the rest were rather vague. When sectioned, nine of the features had a round bottom, seven were hazy, while the last two were flat (Fig. 4). After the abandonment of the site, sand drift, ground water variation as well as later human activity has obscured the traces of parts of the house construction. The postholes situated towards the centre of the house have been best preserved, most likely due to the house collapse covering up and protecting these structures.

Three postholes are of special importance when assessing the type of construction, namely the roof-bearing posts situated in the centre of the building. Two of these form an opposing pair at right angles to the long axis of the house (AS1783 and 2147). The distance between these posts, from centre to centre, measures 1.82 metres, a width comparable to other houses in Norway dated to this period. The third posthole interpreted as part of the roof-bearing construction lies 2 metres to the west of the pair, along the long axis of the house (AS3945). Located right next to this feature was another posthole (AS2539) possibly indicating that a post has been replaced due to wear or other circumstances. The roof-bearing features are discernible from the rest of the postholes because of their depth, shape and high charcoal concentration. The best preserved of these (AS1783) was lined with stone, and contained two pieces of asbestos-tempered ceramics, two coarse pieces of quartzite debris, a small piece

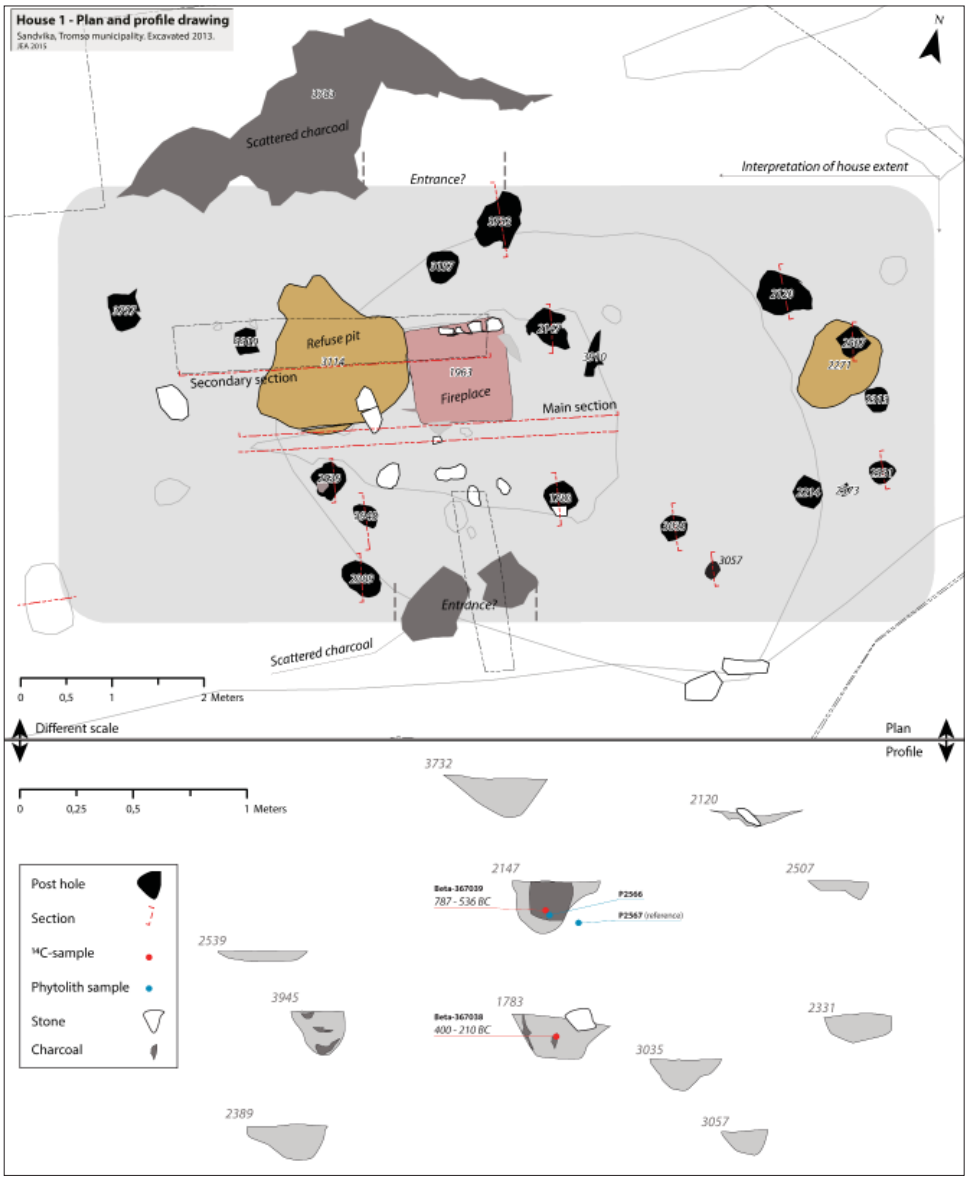

Fig. 4. Plan and profile drawing of House 1. Illustration: J.E. Arntzen.

of flint debris, as well as a piece of burnt animal bone. A piece of charcoal (Betula) recovered from the centre of the section gave the radiocarbon age of 400–210 BC (Beta-367038; 2270±30 BP). As this sample was taken at the centre of the section towards the top of the posthole, this age determination might reflect later activity after the abandonment of the house. A charcoal sample from the opposite feature (AS2147) gave the ^{14}C-determination of 787–536 BC (Beta-367039; 2500±30 BP). As this sample was recovered from a more compacted sand layer towards the bottom of the feature, it might be more reliable. As will be discussed below, these ages may however both be off by several hundred years.

Considering the other postholes, it is clear that many parts of the house construction cannot be reliably assessed. When it comes to the southern long side two features could represent the outer wall. The smallest one towards the east (AS3057) is of reasonable size (18 x 14 cm) for a roof-supporting post and had a clear charcoal

concentration towards the bottom. The other one was situated westward along the wall and was larger (46 x 33 cm). The latter had a narrowing width when viewed in section, comparable to the former posthole, perhaps suggesting that the post could have been removed by 'rocking'. The other long side features only a single clear posthole (AS3732) with a similar section as the largest one on the opposite side. The eastern short wall is documented through six postholes with varying size and shape. The most regularly shaped, closest to the southeastern corner (AS2331), measures 29 x 30 cm, and is otherwise comparable to the westernmost roof-supporting post (AS3945) in shape. The other features are hazy and difficult to interpret, perhaps both reflecting drift sand activity in the period after abandonment, as well as possibly illuminating how the site was abandoned. The western short wall was the part of the building where the fewest features were identified. Here only a single possible posthole was documented (AS1757). In the secondary section, documenting the refuse pit and fireplace, it is clear that this area in particular has been affected by sand drift to a large degree (Fig. 5). Other features interpreted as postholes are situated in areas where their structural significance is hard to assess. On the northern long side, one post could be related to an entrance (AS3157), while the other features could be related to internal structures within the building.

The fireplace and refuse pit

Of great importance for the interpretation of the house are a rectangular fireplace and a circular refuse pit. These two features were located side by side skewed slightly north and west of the central floor area. The fireplace measured 1 x 1 metres and was documented at several levels. The northern and western sides featured parts of a preserved stone lining. While much of the original stones were completely disintegrated the delimitation was quite clear towards the bottom of the feature (Fig. 6). The southern side had a visible strip of red burnt sand and gravel, probably the remains of stone lining also on this side. The only side without a clear delimitation was the eastern one, but as the gradual excavation was completed it became clear that also this side was delimited by a clearly defined ash layer. This deposit, which consisted of fine ash-mixed with sand and some charcoal particles, contained 139 g of burnt animal bone. The analysis of these will be presented below. The fireplace had a visible rectangular lower delimitation that was documented towards the bottom of the feature. This delimitation was smaller than the upper feature size, measuring 77 x 70 cm and located to the northwestern corner of the fireplace. In addition to burnt bones, seven small pieces of asbestos-tempered ceramics were recovered from the feature.

Located side by side to the fireplace a pit measuring c 1.6 x 1.7 metres was documented (Fig. 7).

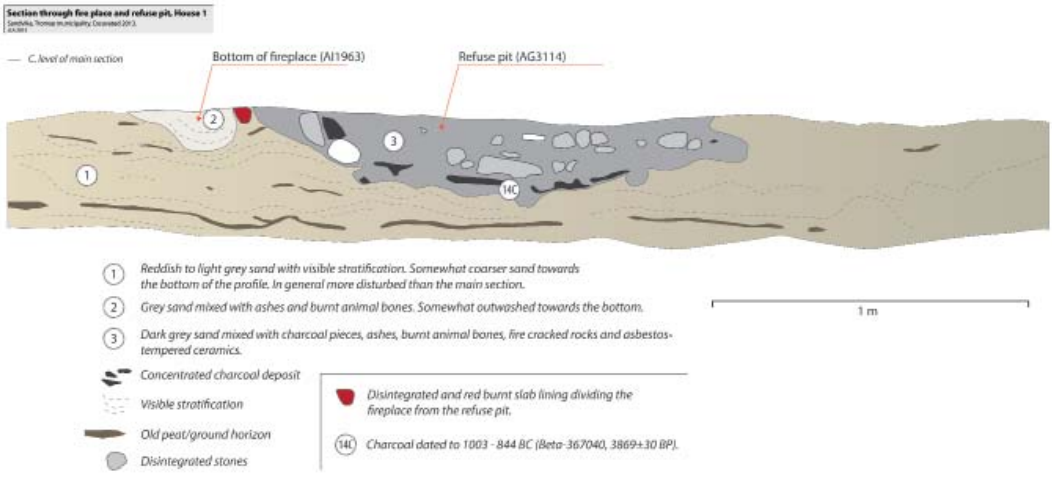

Fig. 5. Section through the fireplace and refuse pit. Illustration: J.E. Arntzen.

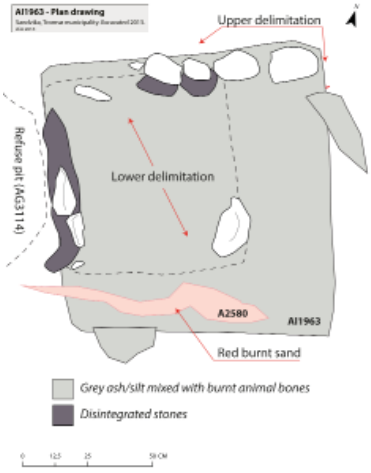

Fig. 6. Plan drawing of the stone-lined square fireplace. Illustration: J.E. Arntzen.

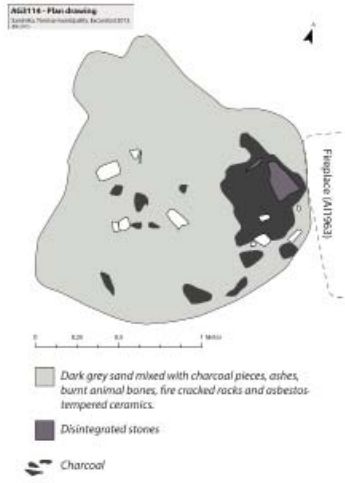

Fig. 7. Plan drawing of refuse pit (AG3114). Illustration: J.E. Arntzen.

The top parts were disturbed by drift sand activity, and the full extent of the feature could be documented c 20 cm below the uppermost part of the fireplace. The filling consisted of dark grey sand mixed with charcoal particles, some ashes, burnt animal bones (38 g), fire-cracked rocks (14 l), a piece of pumice with clear grinding marks and asbestos-tempered ceramics (22 sherds). In addition to these finds two pieces of retouched chert debris were found, both with burin edges. The deposits that composed the filling had a stickier composition than other deposits documented during the excavation. Considering the placement directly next to the fireplace and the contrasting filling, it seems plausible that it should be interpreted as some kind of refuse pit/storage used in conjunction with the fireplace. Since the filling of the fireplace contained only sparse amounts of charcoal and large amounts of ash, one interpretation could be that coal and ashes have been removed from the fireplace and discarded in the refuse pit. The fact that several pieces of ceramics were found deep into the pit supports the idea that the feature has been used to deliberately discard waste. By weight, 44% of the ceramics found during the excavation derive from the pit (64 out of 144 g). Viewed in section, it is clear that the fireplace and the refuse pit must have been in contemporaneous use and could have had a joint function. A radiocarbon determination from a single piece of charcoal, found towards the bottom of the pit, gave the result of 1003–844 BC (Beta-367040; 2780±30 BP).

The distribution of fire-cracked rocks and pumice

As a strategy to delimit the floor area of the house as well as document activity areas on the outside, the position of all pieces of fire-cracked rock and pumice above 5 cm in diameter was recorded. In total c 70 litres of fire-cracked rocks were found, comprising 277 measurements. This is excluding finds within defined features. 44 pieces of pumice were recorded of which seven had grinding marks. The horizontal distribution of fire-cracked rocks is clearly concentrated within the house floor, as interpreted from the structural features (Fig. 8). Several interesting details can be noted. Firstly, there is a marked concentration, distributed as small piles, along the southern long wall. There is also a large accumulation of rocks between the fireplace and refuse pit. Outside of the northern long wall fire-cracked rocks are evenly distributed, a detail that seen in connection with the charcoal flake feature on this side of the house could indicate that this is the main entrance area. The recorded pieces of pumice are also distributed with a clear concentration inside of the house. A single area has a particularly large amount of pumice that coincides with a fire-cracked rock concentration at the centre of the southern long wall. This is also an area with high amounts of charcoal that could be interpreted as an entrance.

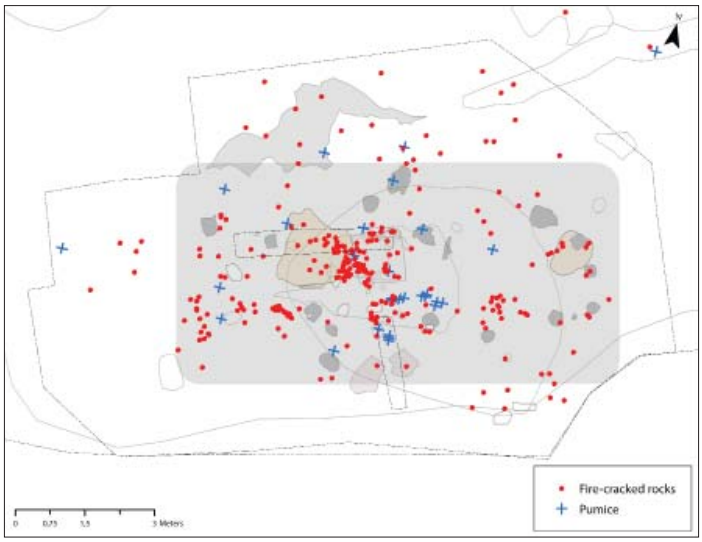

Fig. 8. The distribution of fire-cracked rocks and pumice (pieces above 5 cm in diameter). Illustration: J.E. Arntzen.

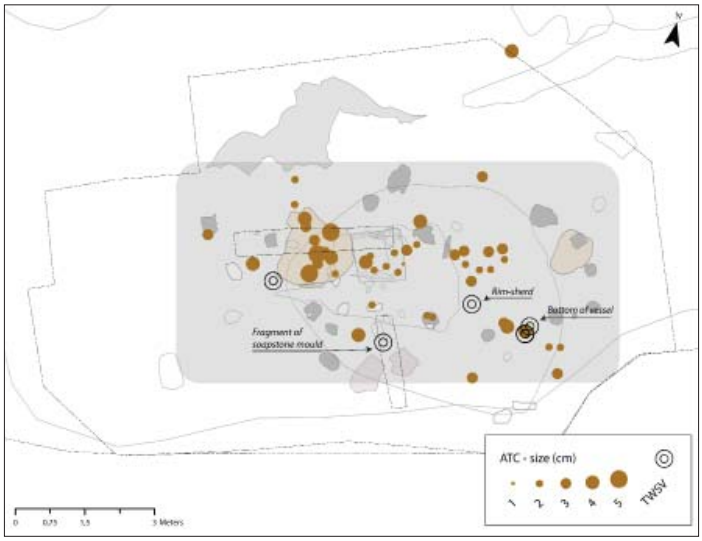

Fig. 9. The distribution of asbestos-tempered ceramics and thin-walled soapstone vessels. The size scale of the ceramics is designated by the length of the sherds (largest measurement). The find spots of the soapstone mould, rim sherd and bottom of the thin-walled soapstone vessel are also marked. Illustration: J.E. Arntzen

The distribution of ceramics and soapstone artefacts

A total of 90 sherds of asbestos-tempered ceramics were uncovered clearly concentrated within the floor area of House 1. As previously mentioned, 44% of the ceramics were uncovered in the refuse pit. As shown in Figure 9, the rest of the ceramics are distributed mainly towards the northern half of the house. The seven sherds of soapstone vessels that were found are distributed mainly towards the southern half of the building. When it comes to the overall distribution, the horizontal position of these artefacts support the interpretation of the house's extent.

The house construction

Even though the preservation conditions in Sandvika were poor it was possible to establish that the building that had been constructed there was similar to a longhouse. Combined with the distribution patterns shown by fire-cracked rocks, pumice, ceramics and thin-walled soapstone vessels a suggested size of the building can be set at 10 x 4 metres. The vertical distribution of the postholes, fire-cracked rocks, thin-walled soapstone vessels and ceramics can be used to throw light on post-depositional processes that have been at play.

As shown in Figure 10, the combined vertical distribution of these categories form a rounded

low ridge when plotted against the house's length. As mentioned above, the compacted deposits that initially led to the delimitation of House 1 are interpreted to be a collapse layer. When considering the vertical distribution of both artefacts and features that are a part of the house it seems that the collapsed masses have formed a protective seal on the central area of the building, while the edges have been more exposed to drift sand activity.

This explains why features towards the interior of the building have been better preserved and were easier to interpret than the ones closer to the short and long sides. The height at which postholes were documented has a range of 29 cm, something that explains the varying depth of the features when sectioned. Figure 10 also shows that both postholes, artefacts and fire-cracked rocks have a similar vertical distribution, something that can be taken to account that they represent a single settlement phase and that the 'vertical chaos' is due to colluvial activity and not multiple settlements.

The main section documented along the central axis of the house further illuminates the confusing stratigraphic situation (Fig. 11). The massive drift sand activity is shown through at least 14 different depositions, and at least two old peat horizons are discernible. Viewing the section it is also clear that the drift sand activity towards the western short side of the house has been more extensive than what is the case on opposite side.

Considering these factors it is possible to suggest what type of construction the house in Sandvika has been. The three roof-bearing posts indicate a three-aisled building. If the post-depositional factors are taken into account it is plausible that several postholes from roof-bearing posts have been erased by drift sand activity. It is possible that the building has had four pairs of roof-bearing posts. As mentioned above, the distance between the single preserved pair of roof-bearing posts resembles the construction details known from the only other longhouse dated to this period in northern Norway from Kveøy, further south in Troms. This building is estimated to have been somewhat more than 12 metres in length, with a width of 5–7 metres, and is dated to 892–781 BC (Arntzen 2013b: 22). At Forsandmoen in Rogaland, where the so far largest concentration of Bronze Age buildings in Norway has been documented, houses of this construction type are interpreted to have had two facing entrances centrally placed on each long side and to have been a combined dwelling and barn (Løken 1998: 117). The evidence in Sandvika also suggests facing entrances towards the centre of the house's long axis.

It must, however, be emphasised that the empirical material allows for alternative interpretations. The limited archaeological evidence for longhouse construction techniques in northern Norway is far from unambiguous. The only other excavated longhouses in the surroundings of Sandvika is the Merovingian-Period Tussøy house, located on an island 5 km north of Sandvika, and several houses at the Migration-Period Greipstad farm, located 20 km from Sandvika on the inner coast of Kvaløya (Munch 1965; Binns 1983). Although both excavations are limited in area and methodologically outdated, the posthole organisation both at Tussøy and for House I at Greipstad indicate two-aisled constructions. The largest Pre-Roman longhouse at Kveøy also deviates considerably from longhouses found further south in Norway, and can in fact have been two-aisled in construction (Arntzen 2013b: 26). A Pre-Roman house foundation excavated at Skålbunes in Nordland only has two discernible postholes and an interpretation as a three-aisled construction is far from certain (Arntzen 2012: 186–7). It is possible that architectural traditions within the northernmost part of Norway have been outside of the norm of what is found further south. More excavations of settlement sites from the Bronze and Iron Ages are needed to clarify this question.

Artefacts

Asbestos-tempered ceramics

Several authors have previously discussed the asbestos-tempered ceramics of northern Norway based on different points of departure. The most comprehensive study so far, dividing the bulk of the material into six distinct groups, has been done by Jørgensen & Olsen (1988). For the present study the two latest occurring types are the most relevant, namely the so-called Risvik and Kjelmøy ceramics. While the chronological limit for asbestos-tempered ceramics in northern Norway as a whole has been suggested to be c 2100 BC–AD 300, the Risvik and Kjelmøy types have a chronological span between 1100–270 BC and 900 BC–AD 300, respectively (Jørgensen & Olsen 1988: 61–9; Schanche 2000: 129; Sundquist 2000: 11–4; Andreassen 2002: 70–1). While the Kjelmøy

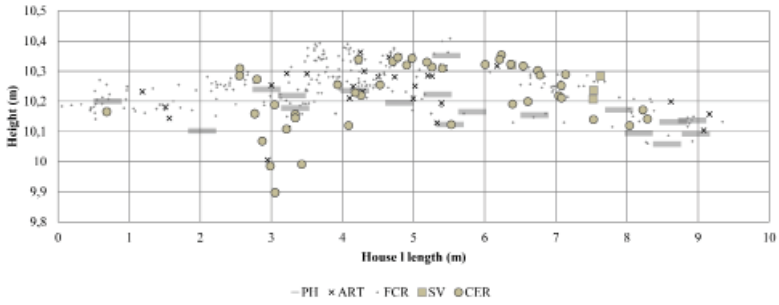

Fig. 10. Depth plot of postholes (PH), artefacts (ART), fire-cracked rocks (FCR), soapstone vessels (SV) and ceramics (CER) along the long axis of the house. The lowest outliers are artefacts from the refuse pit (AG3114). Illustration: J.E. Arntzen.

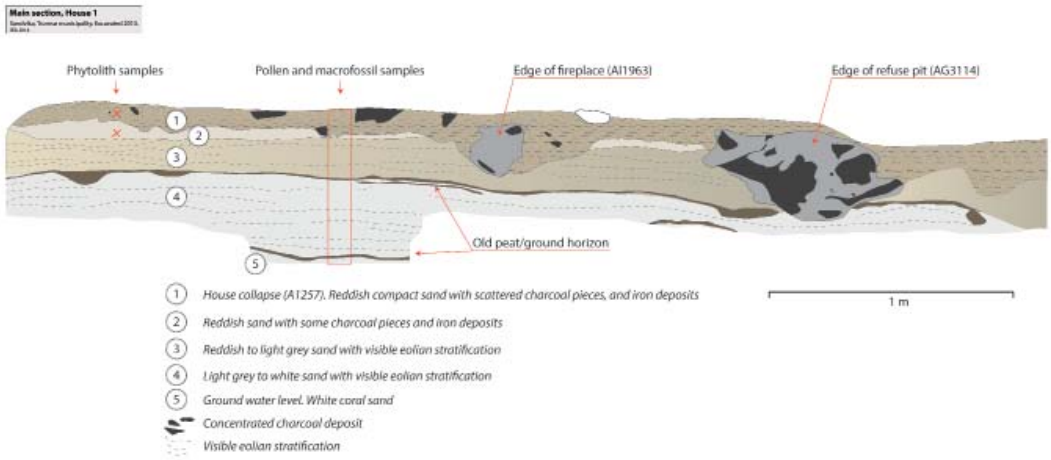

Fig. 11. Main section through House 1. Illustration: J.E. Arntzen.

type is linked to hunter-fisher-gatherer settlements north of the Troms region, both coast- and inland-bound, the Risvik type is linked to coastal settlements stretching all the way from northern Troms to the Helgeland area in the south. A form of dualism is suggested between the two, where the latter often has been discussed as a possible link between the northern border of farming and the Nordic Bronze Age complex (Munch 1962; Bakka 1976: 29–38; Jørgensen 1986; Jørgensen & Olsen 1988; Andreassen 2002). Further south a very similar type of asbestos-tempered ceramics can be found, stretching all the way to Vest-Agder County. The dating of this type is generally set to be between the Early Bronze Age and the Pre-Roman Iron Age (c 1800 BC–AD 1) (Ågotnes 1986: 104–7; Hop 2011: 61–2).

The typological definition mostly used for Risvik ceramics is that the rim should be slanting outwards and thickened, the tempering compact with short thick fibres, the wall thickness between 7 and 11 mm, a smoothed belt beneath the rim as opposed to the otherwise crude outer surface, and there should not be, with a few exceptions, any type of decoration present (Jørgensen & Olsen 1988: 15). The Kjelmøy type on the other hand is characterised by finely crushed asbestos tempering, a thin wall between 3 and 5 mm and comb and line decorations, with horizontal and diagonal crossing lines being the most common (Jørgensen & Olsen 1988: 13). Chronologically overlapping these two types are the Textile and Imitated textile ceramic groups, in general dated to 1800–900 BC and 2000/1800–500 BC, respectively. Important

to note is that the Textile ceramic groups are distributed all along the northern Norwegian coast, all the way to Nordland, while the Kjelmøy type has a main distribution within coastal and interior Finnmark. The different chronological main distribution of these ceramic types has been used to suggest a Textile-ceramic phase (1800–900 BC) followed by a Kjelmøy-ceramic phase (900 BC–AD 1) (Olsen 1994: 104–8). The Textile ceramics differ from the Risvik type in that it, in general, should have textile impressions covering the outer surface, but is otherwise similar when it comes to both asbestos tempering (compact with thick fibres of varying length) and wall thickness (5–9 mm). Imitated textile ceramics, which are the least common of the above-mentioned types, are characterised by small rhombic impressions on the outer surface and less asbestos tempering (Jørgensen & Olsen 1988: 17–20).

The typology presented above and the suggested groups are based on a mainly normative assessment of the ceramics. Considering the fact that a large proportion of the northern Norwegian material consists of small and poorly preserved sherds, an obvious problem with a typology like this is that rim shape, decorative elements, as well as vessel shape are a defining diagnostic element. Often the outer surface is missing, rim sherds are rare, and the contextual information is in general poor. Much of the typological classification that has been done is in this author's opinion based on a vague subjective assessment rather than verifiable qualities recognisable in the ceramics. While the Kjelmøy ceramics are clearly discernible from Textile, Imitated textile and Risvik ceramics, there is considerable overlap between the latter three types. Especially for the Risvik type, many finds have been made outside the context of a controlled excavation and many assemblages stem from drift sand areas similar to Sandvika.

The ceramics from Sandvika total at 90 sherds with a weight of 144 g. They are in general poorly preserved and few diagnostic elements are present. The thickness varies between 1.7 and 7.5 mm with a mean of 4.4 mm. Only a single rim sherd is present, measuring 4 x 2 cm with a thickness of 5 mm, rounded on the outside and being thinner away from the rim (Fig. 12). The tempering is moderate with small thin asbestos fibres. A weak dotted-line-decoration is visible stretching from the rim and diagonally down the sherd. Although uncertain because of the small size of the sherd, a vessel diameter of around 17 cm could be suggested. The tempering is in general varying with some sherds having very large and wide fibres and a crude surface while others are more polished with longer and thinner fibres. The majority of the smaller sherds (<3 cm) lack the outer surface, or it is severely weathered. When it comes to colour, taphonomic variables make any assessment meaningless. Sherds stemming from the charcoal-rich sticky deposits of the refuse pit are in general a lot darker than other ones. Three larger sherds stand out in that they have irregularly rectangular pin stamp decorations on the outer surface (Fig. 13). Dating of the soot layer from a sherd, most likely part of the lower wall of a vessel, gave the result of 1187–930 BC (Beta-389930; 2870±30 BP).

Although some sherds have a tempering similar to the Risvik ceramic type, they do not in general fit clearly into this category. Neither does the assemblage contain sherds that can be attributed to Kjelmøy, Textile or Imitated textile groups. Looking at the material as a whole it is clear that the ceramics present do not stem from a single vessel. The observable differences in tempering and thickness indicate that at least two to three different types have been in use.

Six finds of raw asbestos, five single fibres and two small lumps of raw material were found within the house floor. This does indicate that ceramic production could have taken place at the site.

Soapstone vessels

Thin-walled soapstone vessels differ considerably from later Iron Age and Medieval types and are chronologically isolated. The find spots are located to the coast with the main concentration in Rogaland and Hordaland. Northwards the number of finds declines gradually. The majority of the 21 find spots in northern Norway are located in the Helgeland region and only eight lie north of Saltfjellet (Arntzen 2013c: 187–9). The Sandvika find is by far the northernmost, with the nearest find being located c 130 km further south.

The first attempt at typologising these artefacts was done by Shetelig (1912) who dated the finds to the Pre-Roman Iron Age and including the Migration Period. The typology has later been discussed by Møllerup (1960), who considered the soapstone vessels a rather homogeneous ar-

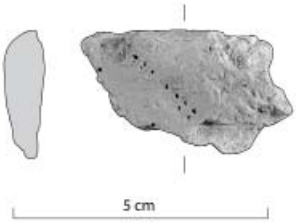

Fig. 12. Rim sherd with diagonal dotted line decoration from Sandvika. Illustration: J.E. Arntzen.

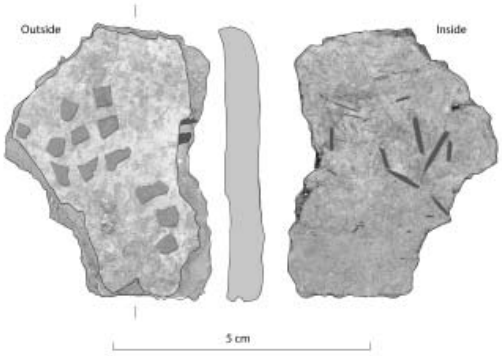

Fig. 13. Pin-stamp-decorated ceramics from Sandvika. The decorations and visible asbestos fibers have been highlighted. Illustration: J.E. Arntzen.

tefact group, mainly dated to the Late Pre-Roman Iron Age, where most of the variation could be attributed to geographical distribution and not to chronological differences. The discovery of the large soapstone quarry at Kvikne in Hedmark County is important when assessing the chronology of this artefact type as well as its role in society. Here evidence was found that more than 3000–4000 vessels had been hewn, possibly up to twice that much (Skjølsvold 1969). ^{14}C-dates deriving from wooden spades uncovered during the excavations have yielded dates stretching into the Late Bronze Age, but mainly concentrated to the Pre-Roman Iron Age (Skjølsvold 1969: 204, 235; Pilø 1989: 88)

More recently Pilø (1989) has revised both the typology and chronology where his main arguments are that the production of soapstone vessels did take place in the Late Bronze Age and that the production did not extend continuously into the Late Iron Age. In his typological and

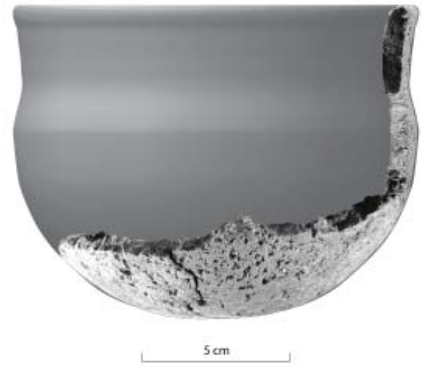

Fig. 14. Reconstruction of the soapstone vessel from Sandvika. The preserved parts are included in the illustration. Illustration: J.E. Arntzen.

chronological interpretation, which is based on dated contexts, he argues that the earliest vessels are bowl-shaped while the later ones take on a spherical form. Common features for the bowl-shaped type, which belong in the Late Bronze Age, are a broad band at the rim and a total lack of ornamentation. An important characteristic is also that the vessels have a distinctly greater width at the rim than height, giving them an 'open' shape (Pilø 1989: 93). The spherical ones, which mostly belong in the Pre-Roman Iron Age, are more standardised in size, have a rim diameter less than their height and are sometimes decorated with geometric lines at the rim (Pilø 1989: 94).

The Sandvika find consists of four sherds and a larger part of the vessel that was found upside down within the house floor. All finds clearly belong to the same vessel. Luckily both a rim sherd as well as a fragment of the middle of the vessel was found, making it possible to reliably assess the original shape and size (Fig. 14). The vessel was bowl-shaped, c 10.5 cm in height and 13.5 cm in width, and had a 2.5 cm wide band below the rim and no decorations. The vessel was up to 1.5 cm thick towards the bottom while gradually becoming thinner towards the rim. Below the band the thinnest parts were only 0.9 cm.

The outer surface of the vessel had scattered soot covering, while one of the sherds was completely covered by a charred crust. On the inside of the largest piece there were parts of a charred black film with pore structure, presumably a food crust. Unfortunately it has not been possible to carry out any chemical analysis of this com-

pound. A ^{14}C-date has however been obtained, giving the result of 896–802 BC (Beta-389928; 2680±30 BP).

Up until now, the oldest reliably dated soapstone vessel in Norway has been a find from Stausland in Vest-Agder County. The vessel, which was of the bowl-shaped type (although irregular in shape), was found during the excavation of a house site in a thick layer of burnt twigs (Johansen 1986: 85–6). A ^{14}C-dating of the find context, which by the author is considered to be reliably contemporaneous with the vessel, has given the date of 896–488 BC (T-3129; 2580±70 BP).

The Sandvika vessel is the most complete and largest find north of the Helgeland region, as the majority of the known artefacts consist of one to two small sherds. The fact that it was possible to directly date the charred crust on the inside of the vessel is especially important, and can be taken to affirm Pilø's dating of the bowl-shaped soapstone vessels to the Bronze Age. Thus far this is the only directly dated thin-walled soapstone vessel in Norway.

The fragment of a soapstone mould

Bronze Age moulds are a rare find in Norway, with only 32 known thus far (Engedal 2010: A17–18). Within northern Norway there are only six finds, of which four are fragments. Four of these are found in Finnmark, namely the two Jarfjord moulds (Ts.816–817), a fragment from Kjelmøy, as well as two possible fragments of ceramic moulds from Virdnejavri (Ts.8406bzo, cac). The moulds from Jarfjord and the fragment from Kjelmøy are most likely connected to eastern metal-using complexes such as Seima or Ananino. This could also be the case for one of the Kolvika-mould fragments (Jørgensen 1989: 142–3). Apart from the Sandvika find, the only mould that clearly belongs within the Nordic Bronze Age complex is the mould from Grøtavær in southern Troms. The find, which consists of one complete and one fragmented valve for a bi-valve mould for a socketed axe, is a stray find found by a local farmer while working the soil (Munch 1966). The mould has been for a small axe with a loop, around 6 cm in length with a cutting edge of 3 cm in width. This type is very common in the Nordic area and the finds are reliably dated to the Bronze Age periods V and VI (Baudou 1960:

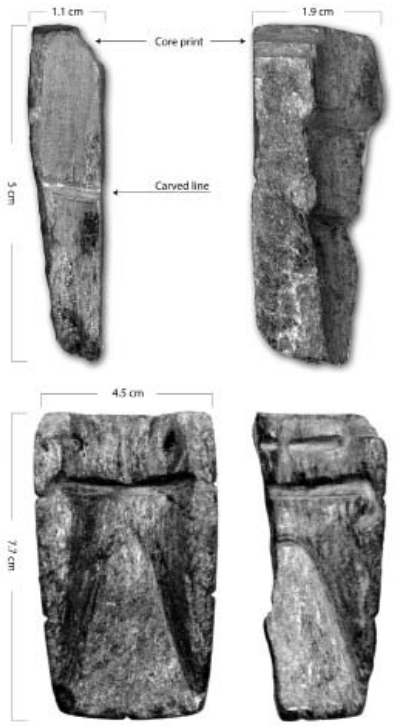

Fig. 15. The mould fragment from Sandvika (above) compared to the find from Grøtavær (below). Photo: J.E. Arntzen (above) and O. Kvalheim (below).

21; Jantzen 2008: E.168). In northern Norway only two socketed axes have been found, respectively a find from Trondenes, close to Grøtavær (Ts.11434.5), and a fragment of the cutting edge for a similar axe from Åsjorda in Steigen Municipality (Ts.4225). These can both likely be dated to the same period as the Grøtavær mould.

The Sandvika find is a corner of one of the valves of a bi-valve mould, measuring only 2 x 5 cm with a thickness of 1.1 cm (Fig. 15). As the fragment is split in half, the thickness has originally been greater. Luckily the preserved part has qualities that can be used to determine what type of mould it has been part of. The most interesting detail is the stepped facilities on the inside of the outer right topmost corner. The internal cavities of socketed axes were produced by precisely mounting a clay core within the mould. To hold these cores in place during casting it was important that the moulds had facilities to lock them with precision. These are termed *core prints* (Engedal

2010: 176–87). In a review of core prints from northwestern Scandinavia, Engedal (2010: 177) has divided the different types of design elements into six groups with sub-types. The stepped design element, which is present on the Sandvika find, is only known from the Grøtavær mould in Norway. When it comes to the preserved part of the original mould cavity, too few details are present to unequivocally determine the type of bronze object that has been cast. The top groove might be part of the core print design, and in that case it is very likely that the object that has been cast is a small socketed axe, comparable to the mould design from Grøtavær (Fig. 15). The core print design makes it very unlikely that the mould is of eastern origin.

Pumice with grind marks

A find category worth briefly discussing is the pieces of pumice that were uncovered distributed inside of the house floor. As was mentioned above, 44 pieces were found of which seven had clear grinding marks. Only the latter type has been collected. The type found in Sandvika is a dark brown variety, most likely a Dacitic type referred to by Binns (1972: 2307–8) as Tapes Pumice. Drift pumice is found on postglacial strandlines in several countries of northern Europe and the western Arctic (Binns 1972: 2303). Pumice is also found regularly when excavating coastal Mesolithic settlements in northern Norway, and the utility value of this material is underlined by the fact that pumice also is found on inland sites far away from the sea. The porous volcanic glass structure combined with the relative hardness of these rocks makes them ideal for grinding or polishing wood, bone, slate, antler and even possibly metal, and in crushed form pumice can also be used as a tempering agent for ceramics. With the exception of a brief discussion by Simonsen (1996: 173–81), this find type as an isolated category has not been given much attention. Based on different traces of use and grinding marks he divides the pumice into five categories: needle sharpeners, arrow shaft polishers, polishing rocks, ochre rasps and floaters (Simonsen 1996: 175–6). The material from Sandvika shows use wear comparable with Simonsen's definition of both arrow shaft polishers and needle sharpeners, but in general shows more irregular wear. The distinction between 'needle polishing wear' and 'shaft polishing wear' is primarily that the former consists of a V-shaped groove while the latter a U-shaped groove. With the exception of one find which has two parallel U-shaped grooves, most use wear on the Sandvika pumice seems to be the result of the sharpening of a cutting edge of some sort (V-shaped or sharp rectangular angled grooves). All the finds with grinding marks or other types of use wear have been thoroughly used. In all but one find multiple sides of the rock have been utilised so that much of the rocks have been grinded away.

Other find types

Of the other find types that were uncovered, 18 pieces of lithic debris are the most numerous. Of these seven could be determined as chert. As previously mentioned, two of these found in the refuse pit (AG3114) could have been used as burins. Of the nine finds of flint debris one piece has some cortex intact and seems to have been made from water-rolled and beach-deposited flint nodule. This is also the only flint object with a usable cutting edge. Two pieces of coarse quartzite, found in one of the roof-bearing postholes of the house, are the only finds of that material. Their position deep in the posthole might suggest a deliberate deposition.

A large sinker for hand-line fishing was found in the northeastern part of the House 1. This item, which is made of a beach-rolled oval rock, had a groove for fastening a rope or fishing line on one of the short edges while the opposite end was damaged, either during production or use. The sinker has a weight of 1.3 kg, which can indicate use on relatively deep water, possibly up to 140 metres (Simonsen 1979: 399; 1983). In a review of fishery technology in northern Norway from the Late Iron Age to the 16th century, Helberg reports the heaviest sinker in his dataset to be 1.4 kg, while all other sinkers are far lighter. This makes it probable that the Sandvika sinker has been used in deep water fishing or in an area with very strong currents (Helberg 1993: 101).

Another interesting find from Area 2 is an irregularly polished sandstone measuring c 6 x 7 cm. Two separate surfaces are polished, one of them curved while the other one is close to flat and angularly placed opposite to the former side. The polishing is finely done while the rest of the rock is very coarse. One explanation as to why

Fig. 16. Single-edged slate knife found in a small charcoal pit beneath House 1. The knife measures 11.5 cm in length and 7.6 cm across the cutting edge. It is 1.21 cm at the thickest. Illustration: J.E. Arntzen.

the polishing makes little sense is that the object originally was a conglomerate of different rock types where one type has disintegrated. Disintegrated rocks where found all over the Sandvika locality. Although impossible to establish with any certainty, considering the chronology as well as the other find types, the rock could be a pre-form for a Late Bronze Age 'ceremonial stone axe' (cf. Marstrander 1983).

A smooth flat oval stone measuring 7 x 6.5 cm with crushing marks all around was found next to a posthole (AS3732). On one of its long sides a few large pieces of the rock has come off, indicating that it broke during use and was discarded. This artefact must be interpreted as a hard hammer stone and can have been used to produce or maintain stone tools. Since there is so little lithic debris in Sandvika another explanation could be that it has been used to crush raw asbestos or animal bone.

A boot-shaped single-edged red slate knife, similar to Gjessing (1942) (Fig. 16), was found in a small charcoal pit below the floor level of the house in the western end. The pit (AG3091), which measured 30 x 40 cm with an oval shape, was only 8 cm deep. The filling consisted of small- to medium-sized charcoal pieces mixed with dark brown sand. The context differed from the features that were interpreted as part of House 1, and could stratigraphically seem to have been superimposed by drift sand before House 1 was taken into use. A charcoal sample (*Betula*) from this context was dated, giving the result of 2461–2209 BC (Beta-389929; 3860±30 BP). This confirms that the locality was visited during the last part of the Neolithic/Late Stone Age. Since no other indication of this type of settlement was documented during the excavation, it is tempting to interpret this find as some form of ritual deposition. Semi-subterranean house foundations and dates to the same period were, as previously mentioned, documented closer to the sea in Sandvika during the 1990s survey. An overview of the artefacts found in Sandvika is given in Table 2 (see supplementary materials).

Burnt animal bone

In total, 188 g of burnt animal bone was recovered from the fireplace (AI1963) and the refuse pit (AG3114). In addition to these contexts two tiny fragments of burnt bone were found in two of the roof-bearing postholes (AS1783 and 2147). The largest amount, 150 g (80% of total), were recovered from the ash filling of the fireplace. The refuse pit contained 38 g (20% of total). The results of the osteological analysis are presented in Table 3 (see supplementary materials). Due to butchery practices, burning, post-depositional destruction and other factors the fragmentation level is very high. The data therefore have no quantitative meaning.

A number of elements from the lower leg (phalanges and metapodials) of sheep/goat were the most numerous of the identifiable bone fragments (Fig. 17). These are considered stereotypical butchery waste fragments. Some unidentified vertebral fragments belonging to a medium-sized mammal probably also belong in this category. A distal end from the phalanx of a seal was identified, although the type of seal could not be determined.

Rib fragments and a ramus fragment (posterior mandible) can be associated with small- to medium-sized mammals, along the size of a domestic cat. Two fragments of bird bone, estimated to belong to an animal the size of a thrush, were uncovered, while a number of fish bones (primarily vertebrae) also were present.

Little can be gathered from the butchery evidence other than that it might represent food preparation rather than consumption. The degree

Fig. 17. Burnt fragment of sheep/goat phalanx from the fireplace (AI1963). Photo: C. Jensen.

of burning is rather low suggesting that the bones were not deliberately used as fuel. With a single exception there is no evidence of larger fauna in the assemblage. If interpreted as general food waste this implies that the people in Sandvika were neither hunting nor keeping larger animals. It must however be taken into account that meat bearing elements could have been deposited elsewhere and that preservation conditions, perhaps related to the degree of burning, might be a factor. Four burnt bone fragments from the fireplace determined to be sheep/goat, in total 1.8 g, were dated to 1395–1135 BC (Beta-399126; 3030±30 BP). As will be discussed below, this age is likely to be too high.

Palaeobotanical evidence

Although much effort was put into sampling for macrofossils and pollen the results were disappointing. In general, all macrofossil samples were marred by a large amount of root entanglement. For the postholes, no finds of charred grain or other interesting plant material was found. For the fireplace, of which 24 litres of soil was flotated, not a single piece of charred plant matter was recovered. A 10-litre bulk sample from the collapse layer yielded a single charred crowberry (*Empetrum*) seed as well as a saltbush (*Atriplex*) seed. For the pollen and macrofossil series directly taken from the main section the macro-subfossils mirrored these results, with one exception. Three uncharred/partly charred seeds of opium poppy (*Papaver somniferum*) were found in the collapse layer, and may be regarded as contamination from a younger context. Other than a crowberry seed, no interesting plant material was present. The pollen analysis from the same profile showed birch, valerian (*Valeriana*), buttercup (*Ranunculus*), carnation (*Caryophyllaceae*) as well as grass (*Poacea*) and ferns (*Polypodiopsida*) for the house floor/collapse layer. Two samples taken from an old terrestrial surface 30 cm below the top of the collapse layer, long predating the house, contained birch, pine (*Pinus*), barley-type (*Hordeum*-t), mustards (*Brassicaceae*) and meadowrue (*Thalictrum*).

The phytolith analysis showed, based on the control samples, that a signal of human activity was present within the archaeological features. The assemblage was mainly composed of grass phytoliths within the habitation area, and especially in the sample from the fireplace. This could be interpreted as a result of the presence of grass either as a result of agricultural activity or as animal fodder inside of the house. The samples are however few and no clear conclusions can be drawn in regards to the presence of crops or crop production (Zurro 2014).

Other features

Within Area 1 several features have been left out of this presentation. West of House 1, a 10-metre-long shallow ditch found next to a couple of dubious postholes could represent the remains of another building. It could also be some structure related to House 1. No ^{14}C-dates exist for these structures. North of House 1 a cooking pit, measuring c 1 x 1 metres, as well as two postholes were uncovered. The cooking pit was dated to AD 29–213 (Beta-367037; 1900±30 BP) and represents activity postdating the main habitation phase of House 1.

Within Area 2 two cooking pits were uncovered as well as a washed-out layer of scattered charcoal. Both measured c 1 x 1 metres. One of the features was dated to 975–823 BC (Beta-367041; 2750±30 BP) confirming the contemporaneity with House 1.

Dating

Of the 10 radiocarbon dates available from the site all but the one related to the single-edged slate knife date from the period c 1400 BC–AD 200 (Table 4 in supplementary materials). As the

Neolithic date stands alone and cannot be related to the main settlement, it will not be discussed further.

The age span of the remainder of the radiocarbon dates varies considerably within the excavated area and several factors must be considered when assessing the true age and the main habitation phases (Fig. 18). The ^{14}C-date stemming from the burnt sheep/goat bones of the fireplace (AI1963) deviates from the expected age of the context. The dating has, however, been done on the carbonate fraction of the bone, and several sources of error are present. Recent experimental studies show that residual carbon present in calcined bones is not pristine, and that what one potentially is dating is the fuel used in the fire (Hüls et al. 2010; Van Strydonck et al. 2010; Zazzo et al. 2012: 862; Olsen et al. 2013). In an experiment including re-firing archaeological burnt bone material it was shown that in calcined bones with δ^{13}C values lower than -25‰, 67±3% to 91±8% of the carbon present in the carbonate came from CO^2 present in the atmosphere of combustion (Zazzo et al. 2012: 862). With a low δ^{13}C-value of -27‰, carbon from the fuel used in the firing of the bone is likely to have had an impact on the Sandvika date. Since the age determination is up to 200 years older than the most likely date for the settlement, the most probable cause could be the use of old driftwood as fuel in the fire. With the site located right next to a nearly 600-metre-long sandy beach, driftwood is likely to have been a readily available resource. This issue could be clarified if more bone from the fireplace was to be dated. This has however not been possible due to economic constraints.

Another date which might be somewhat early is the determination from the soot layer of the asbestos-tempered ceramics (Beta-389930). The soot layer was very thin and clay matrix from the scraping could have had an effect on the date. Reservoir effect could also play a role. Three of the latest determinations are possibly subject to error. These stem from two of the roof-bearing postholes as well as from the collapse context of the house (Beta-367039, T-11620 and Beta-367038). None of these dates come from completely sealed and reliable features and the charcoal dated is probably a mix of charcoal linked to the main settlement phase as well as from later activity in the area.

The white sand layer between zones 3 and 4 in the nearby pollen core (Tveraabak & Alm 1997) was, as previously mentioned, found superimposed over the culture layers of the habitation area where House 1 was found. Two radiocarbon dates, one below and one above the sand layer, shows that it was deposited during a short period of time between c AD 560–687 (1400±45 BP; T-11589) and AD 544–851 (1365±65 BP; T-11590). This is probably due to massive sand movement, possibly from an open and exposed nearby area, and could mark the end of permanent settlement in Sandvika. The sections through House 1 show at least

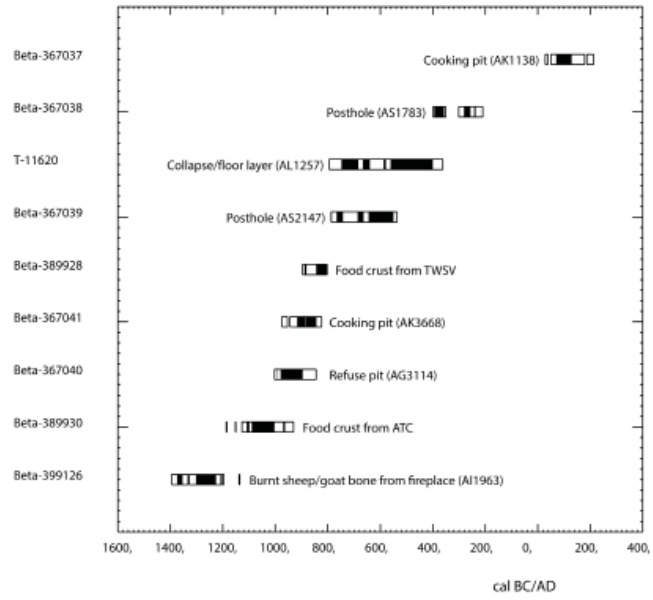

Fig. 18. Block plot showing calibrated ages BC/AD. Hollow boxes show 2σ-ranges while filled ones show 1σ -ranges.

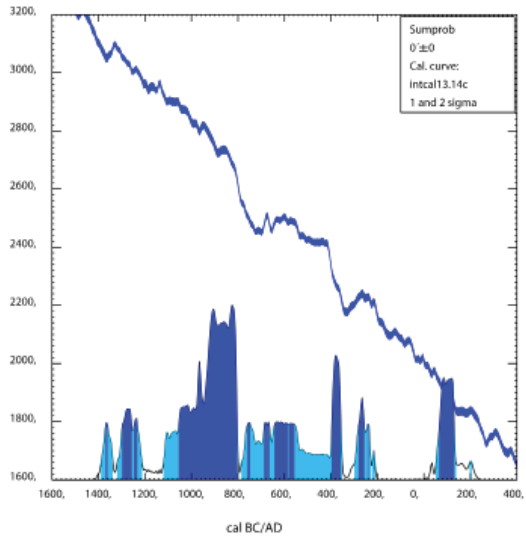

Fig. 19. Probability summation of nine radiocarbon dates from Sandvika.

two clear turf horizons predating the settlement. As no traces of fossil turf cover were found above the house collapse context, this would suggest that the house site was open and exposed to sand drift for a very long time, possibly for as much as 1500–1600 years. A Mesolithic site located c 800 metres southwest of the settlement has yielded dates to the Late Pre-Roman Iron Age and to the Migration Period (Barlindhaug 1994). The samples stem from charcoal scattered in the soil containing lithic debris. A Late Bronze Age/Pre-Roman Iron Age date was also the result from a site located c 3.3 km southwest of Sandvika where exclusively lithic debris was found and no clear features were uncovered (Lind pers.comm. 2012). The fact that charcoal from this particular time period is spread over such a large area outside of a clear archaeological context, could be the result of fire-clearance in connection with grazing. At least further south in Troms this may have been a common practice (Sjögren & Arntzen 2013).

This discussion leaves four dates as the most reliable when assessing the main settlement phases in Sandvika. These are the dates from the refuse pit within House 1 (Beta-367040), the cooking pit located in Area 2 (Beta-367041), the date stemming from the food crust of the soapstone vessel (Beta-389928) and the cooking pit from Area 1, nearby House 1 (Beta-367037). A probability summation of all the dates is shown in Fig. 19. Within 2σ the most likely period of settlement in the Bronze Age is the time between 1120–799 BC. Within 1σ this is narrowed to 1054–804 BC. When taking into account the features documented belonging to House 1, as well as the artefact types and their amount, it seems likely to be a single settlement phase. Typologically the bowl-shaped soap stone vessel is most likely dated to the Late Bronze Age (1100–500 BC), the mould fragment to Bronze Age periods V–VI (950–500 BC), and the ceramics to somewhere between 2000 BC–AD 200 (as no clear types were defined). The typology is not in conflict with the suggested ^{14}C-chronology and a main settlement phase between 1000–800 BC seems most probable. The cooking pit west in Area 1, which was dated to the years around BC/AD, shows that the area has been in later use.

DISCUSSION

Although a small site with a low amount of finds, the settlement in Sandvika has potential to complement the present research status on the Late Bronze Age in northern Norway to a great degree. Previous discussions as to the cultural affiliation of asbestos-tempered ceramics and early soapstone vessels have been based on a limited archaeological evidence. What has been lacking are details as to the settlement sites themselves, what types of buildings were in use, and the type of economy that was important. In Sandvika a three-aisled building with a probably joint-functioning fireplace and refuse pit as well as several cooking pits were present. The osteological analysis shows the presence of domesticated animals in the form of sheep or goat, while neither the pollen core nor the on-site botanical sampling gave results supporting the idea that cereals were part of the economy. This could be because of poor preservation conditions for macrofossils and pollen in the drift sand. Nearby pollen evidence does indicate that cereals were grown at the Brensholmen farm.

The recent advent of top soil stripping as an archaeological survey and excavation method in northern Norway has yielded finds indicating that an agrarian economy was present at least in the areas from the middle of Troms County and southwards during the Late Bronze Age. As previously mentioned, indications of this have been known through palynological studies since the mid-1970s (Johansen & Vorren 1986; Jensen 2012). From

recent excavations and surveys especially Pre-Roman Iron Age settlements have been uncovered in the southern Troms area and southwards. These finds, which in many cases stem from limited test trench surveys, show fossil field deposits, cooking pits and in a few cases postholes and remains of longhouses (Arntzen 2013c: 186–7). Full-scale excavations within present day farming landscapes are still a rarity within the region and the previously mentioned excavation at Kveøy in southern Troms is the only example where Bronze Age construction remains as well as cooking pits and field deposits have been uncovered (Arntzen 2013b). Here no osteological material was uncovered, but both pollen and macrofossil analysis confirm that grazing probably took place and that barley was grown, possibly following a slash-and-burn practice during the Late Bronze Age (Sjögren & Arntzen 2013). The longhouse at Kveøy closely mirrors southern examples and is also clearly comparable to the house in Sandvika. The link between asbestos-tempered ceramics and this type of settlement is partially confirmed by the find of a couple of sherds in a Pre-Roman house at Kveøy and in another similar house at Skålbunes in Nordland, while several surveys also have produced this type of finds in relation to cooking pits and less-clear features probably related to the same type of settlement (Arntzen 2012: 187–92). None of these are however dated to the Bronze Age, they all belong in the Pre-Roman Iron Age. The picture is hence quite unclear when it comes to Late Bronze Age settlement types and their spread along the northern Norwegian coastline; Kveøy and Sandvika are the only definite finds with both longhouses and cooking pits. The Sandvika locality does, however, have striking similarities with an enigmatic site type, settlements located in drift sand areas along the northern Norwegian coastline, typical for stray finds of asbestos-tempered ceramics and soapstone vessels.

A preference for sand?

Around 52 find spots for asbestos-tempered ceramics and soapstone vessels are known from northern Norway where eight of these have yielded both types of finds. At least nine of these sites, all located to the outer coast, can be described as 'drift sand areas with fireplaces' (Arntzen 2013c: 189). In a review of find spots for asbestos ceramics in northwestern Norway, Ågotnes (1986: 106) reports a similar context for 12 out of 30 sites. Upon further scrutiny, several other sites that have yielded these types of finds also belong within this category. Common for the overwhelming majority of these sites is the lack of professional excavations. One exception, which is worth noting, is the Kolvika site, located on Vestvågøy in Lofoten (Jørgensen 1989). This site, where a small area was professionally excavated in 1969 and 1978, has yielded finds of slate tools, slate arrowheads, asbestos-tempered ceramics and several fireplaces. Topographically the site is located in a small bay between a mountain and a smaller rock where the settlements are found on a drift sand plain gently sloping towards the ocean. This localisation is strikingly similar to that of Sandvika. As the slate implements are reported to be found higher up in the slope than the ceramics, the site represents multiple settlements stretching from the Late Stone Age to the Early Iron Age. From this locality three ^{14}C-dates exist. Two of these, stemming from 'culture layers with asbestos ceramics' have yielded dates to 203 BC–AD 323 (T-2626; 1960±100 BP) and 106 BC–AD 329 (T-3517; 1940±70 BP) (Jørgensen 1989: 140). A third date from the food crust of an asbestos ceramic sherd gave the result of 2020–1263 BC (T-6150; 3330±150 BP) (Jørgensen & Olsen 1988: 62).

Fig. 20. Mould fragments from Kolvika. Photo: O. Kvalheim.

Kolvika is also the find spot for two soapstone mould fragments, both part of one of the valves for a bi-valve mould (Fig. 20). Although it has been suggested that one of the fragments is similar to a find from Jarfjord in Finnmark (Jørgensen 1989: 142), pointing to an eastern influence, the finds can in this author's opinion just as well point to the south, with one of the fragments possibly being for casting a standard bronze awl. Two of the fireplaces uncovered are strikingly similar to the one in Sandvika; both rectangular, about the same size as the Sandvika find, and both with stone lining. As no wetland or turf cover has formed in Kolvika in the time after the settlement was abandoned, the drift sand activity has been extensive. Today most of the sand has been blown away forming a crater in the ground with deep soil profiles exposed on both sides of the bay. The 1960s and 1970s excavations happened close to the edge of this massive erosion area, and it is likely the original centre area of the site was destroyed at the time of the excavation. No clear construction details were uncovered during the excavations, except for the stone-lined fireplaces, but this is likely because of drift sand activity and the lack of attention paid to these types of features by archaeologists at this time.

Another key site is located further south in Steigen Municipality: the Bøsanden locality, partly excavated during the 1950s (Moltu 1988). Both finds of asbestos-tempered ceramics, soapstone vessels, a ceremonial stone axe as well as slate implements, lithic debris and later Iron Age artefacts have been picked up in the drift sand throughout the years, mostly by amateurs. Several circular fireplaces, stone structures and possibly house grounds have been reportedly observed here as well (Lund 1954). No ^{14}C-dates exist, but the area otherwise stands out as a possible focal site for Nordic Bronze Age influences in northern Norway. Both rock carvings (cup marks), the only grave north of Helgeland with bronze objects, and several cairns of possible Bronze Age origin are in the immediate vicinity (Arntzen 2013c: 189–2). At Bøsanden the massive drift sand activity has been even greater than in Kolvika, and no traces of artefacts or features can be observed today.

Hofsøy, located at the southern tip of the Senja Island in Troms, is another locality worth mentioning in this regard. Here a longhouse of 40 metres in length was investigated between 1976–80. Although not an open drift sand area today, the settlement here too was located on a sandy plain near the sea shore. With multiple settlement phases, the house seems to be dated to the Early Roman Iron Age, but also evidence for Bronze Age settlement was found beneath the walls. A refuse pit, similar to the one in Sandvika, contained five cattle teeth as well as a tooth from sheep or goat (Johansen 1976–80; Lahtiperä 1980). Asbestos-tempered ceramics and a slate knife were also found and a ^{14}C-date from the pit gave the result of 1498–1059 BC (T-3028; 3060±80 BP) (Johansen 1982: 197). Since the excavation was limited to two small test trenches, placed across the length of the house, it is not possible to determine whether this pit was located inside of a house construction dated to the Bronze Age.

The fact that artefacts lay out in the open in drift sand areas is an obvious reason why so many finds have been reported throughout the years. It is however likely that these sites reflect the same type of settlement as the one in Sandvika, and that the choice of settling in areas with fine-grained sand has been a deliberate choice. It could be suggested that one reason for this settlement strategy has been agricultural practices and the need for well-drained easily re-workable soils.

The (many?) others

Thus far it has been suggested that the Sandvika settlement can have possible parallels further south in northern Norway, as well as in similar localities in the southwestern part of the country. It is also clear that this site and its settlement type are different from other contemporary settlements in the region. In the Troms area sites dated to the Bronze Age are few and poorly investigated. This is also the case for the Late Stone Age. One of the few excavated coastal semi-subterranean house sites in the vicinity, located at Grindvollen only 1.7 km southeast of Sandvika, can however be used to illustrate a widely different settlement type in use probably at the same time. This site is a directly shore-oriented settlement site with slate implements, lithic tools and debitage primarily dated to the Late Stone Age. One of the houses, a rectangular structure deviating from the otherwise round or oval dwellings, has at least two occupations between c 1900 and 120 BC (Blankholm 2011: 31). There are known 33 semi-subterranean house remains on Kvaløya, all situated to the outer coast. With the exception of a single stray find of a piece of asbestos ceramics from Tromvika

(Ts.5760), found in a semi-subterranean house by an amateur, little can be said of the chronological upper limit of these sites (Munch 1962: 22; Binns 1978: 45). Sandvika and Tromvika are the only find spots for asbestos ceramics on the island.

A more generalised picture of the Bronze Age hunter-gatherer-fisher settlements can be drawn based on the situation in Troms' northern neighbouring county Finnmark, where the archaeological material is greater and several large-scale cultural resources management -excavations have been done (cf. Helskog 1983; Olsen 1994; Hesjedal et al. 1996; 2009; Henriksen & Valen 2013a). Here the large and prominent Gressbakken-type pithouses along the coast seem to go out of use during the Textile-ceramic phase (1800–900 BC). Replacing these are smaller dwellings, often less deep and with less pronounced walls, culminating in open settlement sites without clear traces of dwellings during the closing of the Kjelmøy-ceramic phase. Bone implements and later iron was important in this technological community (Olsen 1994: 100–39). Bronze to Early Iron Age use of the semi-subterranean houses is however recorded on several coastal sites in Finnmark and in the interior (cf. Helskog 1983: 35; Hesjedal et al. 1996: 188–9; Skandfer 2012; Henriksen & Valen 2013b: 391). An important characteristic for the period is also a marked increase in the number of known settlement sites in the interior areas. Virdnejavri 112, a key site in the Alta-Kautokeino water system, shows clear specialisation towards reindeer hunting through the finds of 80 whole or fragmentary bifacially retouched points and flaking debris. This site, which also produced large amounts of Pasvik-type ceramics and a small amount of Kjelmøy ceramics, had its main occupation phase between 2100–1500 BC, but was also in use during the last millennium BC (Hood & Olsen 1988). The Kjelmøy-phase Virdnejavri 106 and Bárjesuolo sites, located nearby in the same water system, do however show specialisation towards leather working/ceramic production and lithic artefact production respectively. This indicates the presence of specialised settlement sites within the same inland settlement system (Olsen 1994: 122–4). Olsen interprets the period as a whole to imply increased movement between different coastal sites during the Textile-ceramic phase, while the Kjelmøy phase might also involve seasonal movements from the coast during winter to the inland during summer (Olsen 1994: 109–24).

For the northern and interior parts of Sweden settlement sites dated to the Bronze Age are high in number and show a clear orientation towards hunting (Baudou 1995: 97). Most sites are lacking dwelling structures and dominated by quartzite bifacial lithic technology as well as Sär 2 (Kjelmøy) ceramics. Forsberg has divided the settlement sites by the Ume and Lule river systems into different types based on statistical analysis of lithic debris patterning. He suggests two main camps with several transient camps in between, one located in the forest and occupied during winter and one utilised during late summer and autumn in the mountain foothill areas (Forsberg 1985: 271–5).

Next to the large inland lake of Leinavatn in Troms several Early to Late Bronze Age sites (c 1400 BC–AD 1) consisting in the main of lithic artefacts and debitage and with no dwelling structures have recently been investigated. These localities are interpreted as summer hunting and fishing stations and seen in connection to large-scale pit trap systems in the vicinity. With the exception of one site where Kjelmøy ceramics were found, lithic material was the sole artefact category present. Blankholm (2011: 31) proposes a summer-winter transhumance system, with the settlements located on the coast during winter. The lithic technology for these inland sites is dominated by bifacially retouched points, scrapers and debitage from surface flaking and retouching. This closely mirrors lithic technologies prevalent in Finnmark and northern Sweden during this time period.

In the interior, eastern and northern parts of Finland we also find mainly open ceramic settlement sites, presumably with a high degree of mobility and a main subsistence based on hunting (Edgren 1992: 141–51; Lavento 2001; 2005). By the coast of the Gulf of Bothnia a large amount of burial cairns, generally thought to represent an outpost of the Nordic Bronze Age complex, form an opposition to the hunter-gatherer-fisher sites (Meinander 1954; Baudou 1968; Carpelan 1979; Huurre 1986). Nordic Bronzes are however rare in these areas and settlement sites with longhouses and clear indications of farming are generally lacking (Lavento 2009: 128–9). The northernmost confirmed Nordic Bronze Age type settlement site in Sweden was found in 2012 in Norrland by the Ume River close to the City of Umeå (Heinerud & Larsson 2013). The find encompasses traces of at least four three-aisled longhouses, where,

as was the case at Kveøy and in Sandvika, only the inner roof-bearing posts have been preserved. The largest house was around 15 x 5 metres in size, while three smaller ones were only 6–8 x 4–5 m. All ^{14}C-dates are in the period 1500–500 BC. Interestingly, asbestos-tempered ceramics were found in connection with this site, in addition to ceramics of Nordic Bronze Age type.

The differences in material culture between the interior, eastern and northern hunter-gatherer-fisher settlements and the coastal Bronze Age settlements have been used to argue for a 'cultural dualism' between an Arctic and a Nordic Bronze Age (cf. Bakka 1976). In addition to the different ceramics' geographical distribution, also the spread of Seima bronzes and Ananino moulds, especially in the interior of Finland and northern Sweden, show an eastern influence and a contact network different from the southern Scandinavian area (Bakka 1976; Huurre 1986). Hansen & Olsen (2014: 28–31), among others, link the emergence of these contact networks as well as the appearance of the Kjelmøy ceramics in this geographically distinct area to the eventual consolidation of Sami ethnicity during the last millennium BC.

The above outline of the interior settlements in the Fennoscandian area does however show that a binary division between a coastal Nordic Bronze Age culture, and a northern- and eastern-influenced hunter-fisher-gatherer culture is an oversimplification. The prehistoric reality can be much better understood if the rigid culture categories are toned down in favour of a view where local and regional variability is allowed for. Using a perspective of local societies or communities in preference to larger culture categories can be useful in this regard. Such an approach has for the Bothnian area shown that the traditional dualistic top-down view cannot be supported by the archaeological material (cf. Forsberg 1999; 2012; Lavento 2005; Holmblad 2010). As the primary aim of the present article has been to present the empirical material from Sandvika in detail, a discussion involving deeper perspectives as to both contact networks and local societies will require a paper of its own.

CONCLUSION

The Sandvika locality is the northernmost example of a site with clear connections towards the Nordic Bronze Age complex. The similarities are striking when considering both the implementation of the architectural tradition of the longhouse, the cooking pit and the use of artefacts such as soapstone vessels and ceramics. The fact that asbestos-tempered ceramics were used shows affiliation with a tradition encompassing all of northern Fennoscandia and reaching south along the coast towards Sogn og Fjordane in Norway. The site is not 'the same' as other settlements in the region, probably relying both on animal husbandry and marine exploitation. Cereals and agricultural practices may have been a part of the economy, even though direct evidence of this was not found. Marine exploitation as shown through the finds of both seal and fish bone fragments as well as a fishing sinker rules out the possibility of a strictly agrarian economy. The comprehensive task of building and maintaining a longhouse, while managing domestic animals, does not suggest that the settlement took part in a transhumance system with summer exploitation of the inland. The extremely low occurrence of lithic tools and debitage suggests that the material culture deviated considerably from what was the case for the semi-subterranean house/coastal hunter-fisher-gatherer sites or the interior hunting sites. The low amount of finds as well as details in what was preserved of the house suggests a short time of settlement, perhaps lasting only a few years. What networks this settlement was part of, what role it played in its time, why they settled in Sandvika, and whether or not the Nordic Bronze Age influence was a result of migrating ideas or migrating people is a question which requires a re-evaluation of a long range of lesser-known sites of this type in northern Norway. Both large-scale excavations, focused on present day agricultural landscapes, as well as strategically focused smaller-scale research projects, such as the one in Sandvika, are needed to further advance the knowledge of this settlement type in northernmost Norway.

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ID	Shape (P)	Bottom (S)	Sides (S)	Length (cm)	Width (cm)	Depth (cm)	CC	Notes
1783	oval	flat	oblique	41	36	22	xxx	Roof-bearing.
2120	oval	oblique	vague	34	51	6	x	
2147	vague	round	curved	43	37	31	xxx	Roof-bearing
2214	round	vague	vague	37	31	2		Unclear
2313	round	vague	vague	27	24	4		
2331	rectangular	round	straight	29	30	12		
2373	round	vague	vague	12	10	8	x	
2389	oval	round	curved	46	33	12	xx	
2507	round	round	curved	46	30	16	x	Unclear
2539	oval	vague	curved	42	37	5	x	
3035	round	round	oblique	30	25	13		Iron dep.
3057	round	round	curved	18	14	13	xx	
3157	round	vague	vague	35	32	3	xx	
3319	rectangular	vague	vague	28	24	5	x	Unclear
3732	round	round	oblique	65	42	18	x	
3757	rectangular	vague	vague	39	31	3	xx	
3910	oblong	round	curved	51	14	8	x	Unclear
3945	oval	round	curved	29	22	22	xxx	Roof-bearing

Table 1. Overview of postholes related to House 1. The amount of charcoal (CC) mixed with the filling is designated as some (x), moderate (xx) and much (xxx).

Type	N	Weight (g)
Asbestos- tempered ceramics	90	143.64
Burnt animal bone*	23	189.98
Chert	7	5.08
Clay	2	0.52
Flint	9	9.86
Iron slag (?)	1	12.63
Pumice with grinding marks	7	99.49
Quartzite	2	6.9
Raw asbestos	6	6.89
Rock	3	1760
Slate knife	1	78.23
Soapstone vessels**	6	344.22
Total	160	2657.44

*Table 2. Overview of artefacts from Sandvika. * – Number of samples, not fragments; ** – Includes one fragment of a soapstone mould.*

ID	Context	Weight (g)	Notes
TS13792.78	Fireplace (AI1963)	0.58	Tarsometatarsus, bird (thrush-sized); slight burning evidence
TS13792.81	Fireplace (AI1963)	0.71	Unidentified mammal fragment, unburnt
TS13792.77	Fireplace (AI1963)	0.58	First phalanx, left/distal; sheep/goat; little to no burning
TS13792.73	Refuse pit (AG3114)	2,37	First phalanx, distal; seal; little to no burning
TS13792.82	Posthole (AS2147)	0.1	Unidentified bone fragment; little to no burning
TS13792.83	Posthole (AS1783)	0.14	Unidentified bone fragment; little to no burning
TS13792.72	Fireplace (AI1963)	0.34	Third phalanx, right/proximal; sheep/goat; no burning
TS13792.79	Fireplace (AI1963)	1.17	Scapula; unknown species; low- to mid-level burning
TS13792.76	Fireplace (AI1963)	2.45	Unidentified bone fragment; low- to mid-level burning
TS13792.74	Fireplace (AI1963)	1.01	Unidentified fragment; low-level burning
TS13792.80	Fireplace (AI1963)	0.3	Unidentified bone fragment; no burning
TS13792.75	Fireplace (AI1963)	0.75	Diaphyseal fragments; slight burning/ heat breakage
TS13792.71	Fireplace (AI1963)	2.86	Unidentifed fragment from larger mammal species; unburnt; butchery evidence
TS13792.69	Refuse pit (AG3114) < 1cm	15	Small burnt fragments; Some fish vertebrae First phalanx, proximal; unknown species
TS13792.69	Refuse pit (AG3114) > 1cm	21	Mid-level burning Fish bone fragments Scapula neck, mammal Some larger epiphyseal fragments, metapodials and phalanges; unknown mammal species
TS13792.68	Fireplace (AI1963) < 1cm	48	Various fish, bird, mammal fragments Mid-level burning First phalanx, distal; various phalangeal fragments; unknown species
TS13792.68	Fireplace (AI1963) > 1cm	91	Various fragments, mid-level burning Rib fragments, ramus/condyle (posterior mandible); unknown species (cat-sized mammal), Vertebral fragments, heavily eroded mandibular fragment; unknown species, medium-sized mammal Metapodial; disphyseal fragment; unknown species Metapodial; distal condylar fragment; sheep/goat Metacarpal fragments (2 elements); proximal; sheep/goat First phalanx; proximal (fusing); sheep/goat Second phalanx; proximal (1 fused; 1 fusing, 1 unfused) Tibiotarsus; proximal; bird (thrush-sized) Various fragments; fish

Table 3. Results from the osteological analysis of burnt animal bone from Sandvika. Analysed by Dr. Sean Dexter Denham (2014).

Lab ID	Context	Material	^{14}C-age (BP)	Calibrated age (1σ)	Calibrated age (2σ)
Beta-367037	Cooking pit (AK1138); Area 1	Charcoal (*Betula*)	1900±30	AD 71–129	AD 29–213
Beta-367038	Posthole (AS1783); House 1, Area 1	Charcoal (*Betula*)	2270±30	300–210 BC	395–237 BC
Beta-367039	Posthole (AS2147); House 1, Area 1	Charcoal (*Betula*)	2500±30	767–550 BC	787–536 BC
Beta-367040	Refuse pit (AG3114); House 1, Area 1	Charcoal (*Betula*)	2780±30	991–895 BC	1003–844 BC
Beta-367041	Cooking pit (AK3668); Area 2	Charcoal (*Betula*)	2750±30	916–843 BC	975–823 BC
Beta-389928	Soapstone vessel; House 1, Area 1	Food crust	2680±30	889–804 BC	896–802 BC
Beta-389929	Pit with slate knife (A3091)	Charcoal (*Betula*)	3860±30	2454–2236 BC	2461–2209 BC
Beta-389930	Ceramics; House 1, Area 1	Soot layer/food crust	2870±30	1109–1003 BC	1187–930 BC
T-11620	Collapse/floor layer; House 1, Area 1	Charcoal (*Betula*)	2415±90	748–400 BC	794–362 BC
Beta-399126	Burnt sheep/goat bone from fireplace (AI1963); House 1, Area 1	Burnt animal bone	3030±30	1374–1226 BC	1395–1135 BC

Table 4. Radiocarbon datings from Sandvika. With the exception of T-11620, all are AMS-determinations.

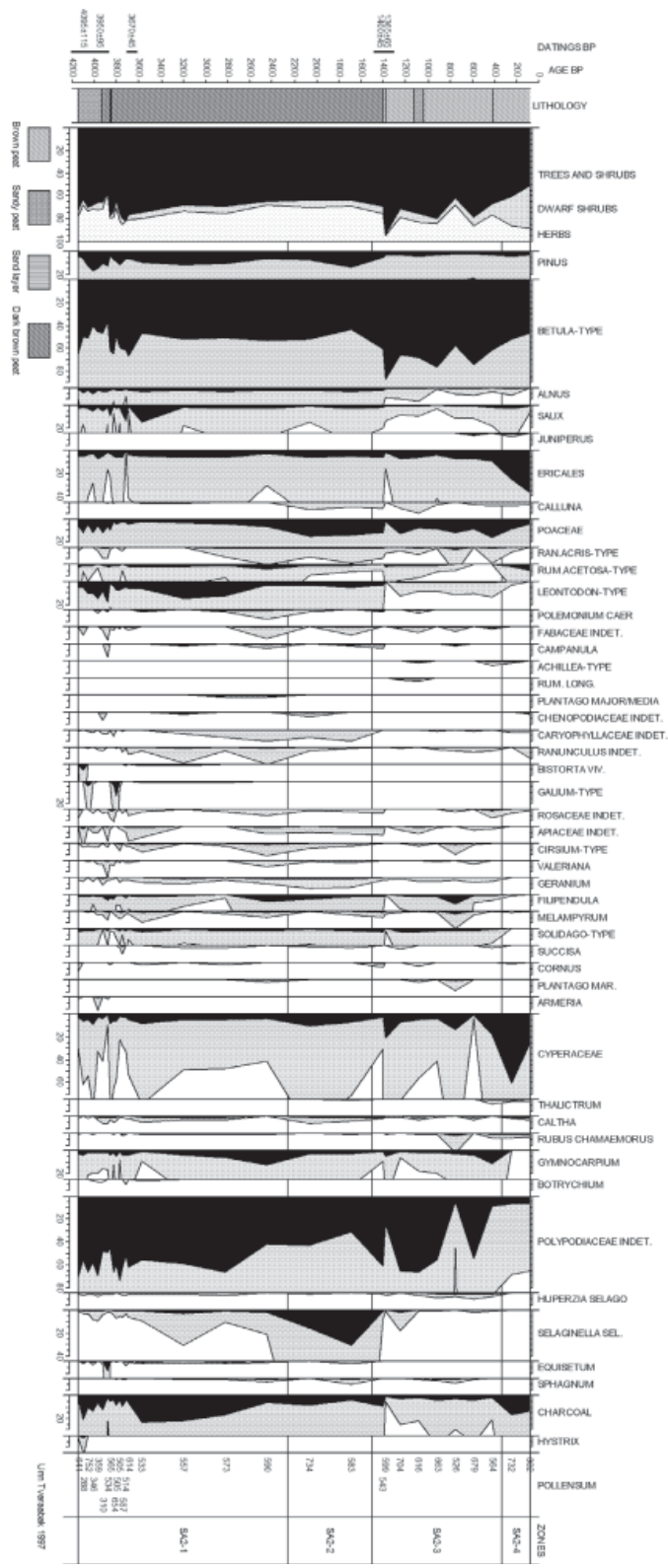

Fig. 1. Pollen diagram (percentage) of core 2 in Sandvika. Illustration: U. Tveraabak.