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KARLEBOTNBAKKEN RELOADED: SHIFTING THE CHRONOLOGICAL SIGNIFICANCE OF AN ICONIC LATE STONE AGE SITE IN VARANGERFJORD, NORTH NORWAY

Abstract

The Karlebotnbakken site in Varangerfjord, north Norway, was previously dated to ca. 2000 cal. BC. Karlebotnbakken has played a significant role in interpretations of social complexity in the Gressbakken Phase; a copper implement from the site has been linked to social status distinctions and interaction with early Bronze Age metal-producing societies in Russia. Multiple radiocarbon samples indicate the site midden actually dates to ca. 3000 cal. BC, removing it from the Gressbakken Phase. The new dating shifts involvement in metal exchange to 1000 years earlier, and together with the presence of Kierikki-like ceramics and amber, implies participation in a broader Finnish-Karelian interaction network during the late 4th millennium BC.

Keywords: north Norway, Finnmark, Varangerfjord, Late Stone Age, Early Metal Period, copper metallurgy

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INTRODUCTION

The archaeological record of the Late Stone Age settlements of Varangerfjord, north Norway, has been blessed by a number of sites with both semi-subterranean house structures and shell midden deposits that contain well-preserved faunal remains and artifacts of bone and antler. These localities have provided considerable grist for a wide range of interpretations of Stone Age settlement and social relations (e.g., Simonsen 1961; Engelstad 1984; Helskog 1984; Renouf 1989; Olsen 1994; Schanche 1994; Hodgetts 1999; 2010). Particular sites have gained a semi-iconic status by virtue of their unique finds, thus becoming important premise-deliverers for these interpretations. One of these iconic sites is Karlebotnbakken, a house and midden locality situated in the innermost portion of Varangerfjord (Fig. 1) and traditionally dated to the Gressbakken Phase (2200–1600 cal. BC). The Karlebotnbakken midden has contributed to studies of subsistence and settlement patterns (Olsen 1994; Schanche 1994; Hodgetts 1999), and its most noteworthy find – a copper dagger or point (Fig. 2) – has been an important basis for arguments concerning social complexity and long distance exchange systems with metal-producing societies to the east (Schanche 1989; 1994; Olsen 1994).

During the course of archaeological research related to shellfish exploitation at Karlebotnbakken, the opportunity arose to experiment with sclerochronology – the use of incremental layering in shells to construct chronologies (Jones 1983), a method analogous with dendrochronology. As part of this sclerochronology program, four AMS dates were run on the shell samples, which provided results considerably older than the Gressbakken Phase. Additional dates were obtained from samples of reindeer bone, and altogether the suite of dates confirmed that the midden was 1000 years older than assumed. Thus, an iconic Gressbakken Phase site was clearly not what it was believed to be.

This article presents the results of the radiocarbon dating in relation to the site context and discusses the broader culture-historical implications of the chronological revision. Before entering into the specifics, however, a brief presentation of the Gressbakken Phase is necessary in order situate Karlebotnbakken within its previously assumed culture-historical context.

THE GRESSBAKKEN PHASE: A SHORT SUMMARY

The period between 2200–1600 cal. BC on the coast of Finnmark in north Norway is associated with a distinctive semi-subterranean house form known as the 'Gressbakken type' (Olsen 1994; Schanche 1994). These houses are sometimes associated with substantial shell middens containing well-preserved bone and antler implements, bone refuse from subsistence activities, stone tools and manufacturing detritus, and fire-cracked rock discarded from hearth activities within the houses. Gressbakken houses often occur in groups, averaging around 7 structures, but with larger localities containing up to 30 houses (Simonsen 1961; Schanche 1994; Johansen 1998). The relatively large size of the houses has promoted interpretations that they may have sheltered multi-family coresidential units. The seemingly substantial and semi-subterranean construction, the accumulation of middens up to 80 cm deep, and the interpretation of the animal bone remains as indicating multi-season occupation, have all suggested that the dwellings represent year-round, multi-year sedentary settlements. Furthermore, overlapping radiocarbon dates from dwellings at multi-house sites have been suggested to indicate 'village' organization with large local populations. These large populations are then seen by some researchers to have developed some degree of hierarchical organization ('social complexity') as a response to both organizational stress and internal social strategies (Olsen 1994; Schanche 1994). The Karlebotnbakken site in inner Varangerfjord has played an important role in such discussions because of the find of a copper dagger or projectile point in the shell midden (Schanche 1989; 1994). This implement is seen as signalling participation in metal exchange networks extending into the Russian Urals, and as representing a material symbol of social status within the local community.

Not all archaeologists agree with these 'complexity' interpretations, as there is no compelling reason why these data need be seen as signalling social hierarchies (Hood 1995; Hodgetts 1999). There are also methodological problems embedded in these interpretations with respect to the use of middens and their contents to infer sedentism, as well as how to assess house longevity and contemporaneity (cf. Helskog 1984; Schanche 1994).

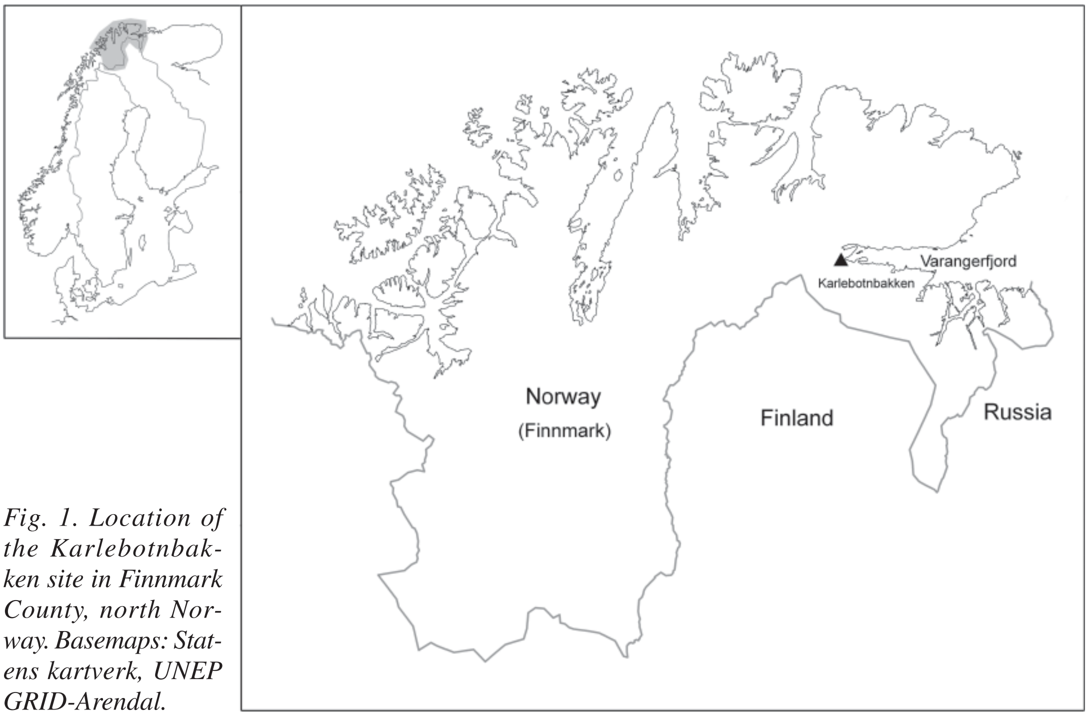

Fig. 1. Location of the Karlebotnbakken site in Finnmark County, north Norway. Basemaps: Statens kartverk, UNEP GRID-Arendal.

Fig. 2. Copper implement from the Karlebotnbakken midden. Scale 1:1. Photo courtesy of the Tromsø Museum.

As there are insufficient numbers of high precision radiocarbon dates from individual houses and sites to support realistic assessments of midden accumulation rates, house longevity and house contemporaneity, we need to explore alternative methods of measuring temporal relations at these sites. Given the presence of substantial shell midden accumulations at some localities, it seemed worthwhile to experiment with sclerochronology to assess the possibility of creating shell annual increment layer chronologies that might provide a more precise measure of midden accumulation rates, and thereby an indirect indication of house longevity (Helama & Hood in press). The long-lived bivalve *Arctica islandica* is well suited to this task (Jones 1983; Marchitto et al. 2000) and is generally abundant in the Gressbakken middens. The ideal goal was to see if it would be possible to correlate a local midden *Arctica islandica* sclerochronology with the dendrochronological record from northern Finland. We began the experiment with shells from the Karlebotnbakken site, but the radiocarbon dates run as part of the research program provided results that necessitate a complete reassessment of the site.

THE KARLEBOTNBAKKEN ARCHAEOLOGICAL CONTEXT

The Karlebotnbakken site is located in the inner portion of Varangerfjord, Finnmark County, in northeastern Norway (Fig. 1). In 1984 two semi-subterranean house structures as well as midden material were exposed by house construction activities, during which one of the dwellings was destroyed. The remaining house and midden were excavated in 1985 and 1986 (Schanche 1986; 1989). A significant portion of the house floor and walls was uncovered, revealing a structure ca. 10 m long, 5 m wide, and 20 cm deep, with a stone-set rectangular hearth running along the central long axis, an entrance passage on the seaward southern wall, and an annex on the western end-wall (Fig. 3).

Two separate shell midden deposits were situated outside the front wall, one on each side of the entrance passage. The shell-bearing component of the western midden was at least 9 m by 7 m in extent and up to 50 cm deep. About a third of this midden was excavated. The stratigraphic profile through the midden (Fig. 4, profile C–D) indicates a primary accumulation area for shell deposits bordering the house wall, with thinner shell deposits extending downslope. Notable in

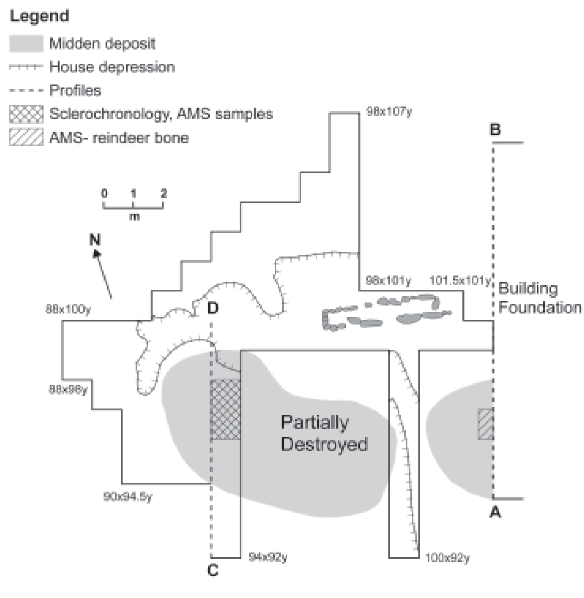

Fig. 3. Layout of the Karlebotnbakken site, showing the provenience of the AMS and sclerochronology samples. Re-drawn from Schanche (1986, 1989) by permission of the Tromsø Museum and the Norsk Arkeologisk Selskap.

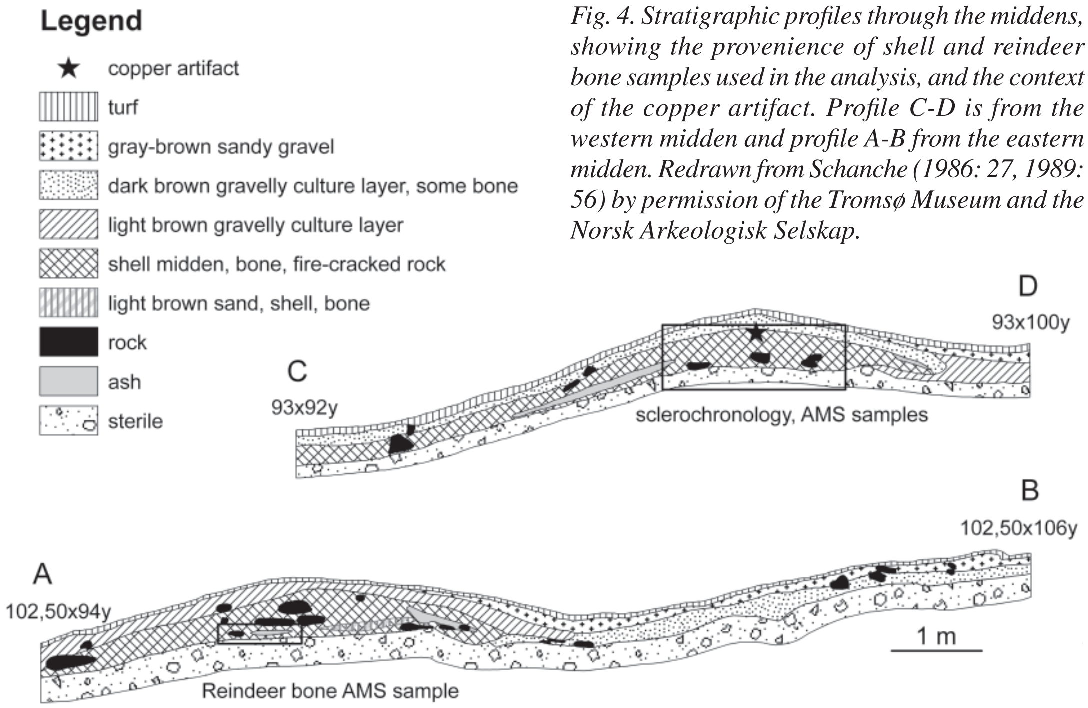

Fig. 4. Stratigraphic profiles through the middens, showing the provenience of shell and reindeer bone samples used in the analysis, and the context of the copper artifact. Profile C-D is from the western midden and profile A-B from the eastern midden. Redrawn from Schanche (1986: 27, 1989: 56) by permission of the Tromsø Museum and the Norsk Arkeologisk Selskap.

the profile, but not in the site report, is an overlying layer described as a dark brown, gravelly cultural layer with some bone. For the eastern midden, which was mostly destroyed, the shell deposit was about 6 m wide and ca. 50 cm deep. The stratigraphic profile (Fig. 4, profile A-B) indicates this midden was overlain with a light brown, gravelly cultural layer. The significance of these superpositional relations will become clearer after the entire dating context is considered.

The site was dated to the Gressbakken Phase (2200–1600 cal. BC) based on criteria of house form and artefact typology, as well as three radiocarbon dates (Schanche 1989). The house and middens were considered to be contemporary, partly on the basis of artefact typology, but also (implicitly) because of *a priori* expectations that Gressbakken houses are often associated with midden accumulations. Two radiocarbon dates falling within the Gressbakken Phase were derived from the hearth at the centre of the house floor (3390 ± 110 BP; birch charcoal) and from a concentration of rocks and charcoal in the annex on the western end wall of the house (3640 ± 140 BP; birch/pine charcoal). A third radiocarbon date was procured from a depth of 15 cm into the centre of the western shell midden (4480 ± 90 BP; pine charcoal), but the result was rejected by the excavator because of the potential 'old wood' problem involved in dating pine.

Shoreline displacement dating of archaeological sites in north Norway has for many years relied upon Møller and Holmeslet's (1998) Sea Level Change dating program (based on Møller 1989). In recent years, however, considerable problems have arisen in the application of sea level dating because of inaccuracies in the placement of isobase reference lines, uncertainties regarding both the timing and identification of shorelines pertaining to the Tapes Transgression, as well as the recognition of local variability. These problems are particularly acute in the Varangerfjord region, where it appears that the isobases used by the program are erroneous. Grydeland (2006) suggests that isobase 22 (rather than 28) is appropriate for the south shore of Varangerfjord, which seems to be consistent with the shoreline displacement diagram presented in Fletcher et al. (1993: 125). If that is reasonable, then the 19 m above sea level position of the Karlebotnbakken site would correspond to a maximum date of 5300 BP. Thus, in relation to the abovementioned radiocarbon dates, the Karlebotnbakken site lies at an unusually high elevation with respect to a Gressbakken Phase dating.

Artifacts were collected from the house floor, the middens and non-midden areas outside the house. Relatively few formal stone tools were recovered, although there was a large quantity of debitage. Ground slate points, either with stems or bevelled bases (resembling the Sunderøy type), as well as miniature ground slate single-edge knives, were considered to indicate a Gressbakken Phase dating. There were also several small fragments of ceramics interpreted as Late Comb Ceramic variants (found within the western shell midden deposits), as well as a fragment of asbestos-tempered ceramics (found just outside the annex on the western end of the house), all of which were viewed as implying a date near 2000 cal. BC. A large quantity of quartz scrapers was recovered, and although these are not time-diagnostic they are commonly associated with Gressbakken houses. A total of 130 worked bone and antler artifacts were found, including harpoons, leister prongs, fish hooks, perforated animal teeth, and anthropomorphic figurines (Schanche 1989). Broadly similar forms have been reported at other Gressbakken Phase middens (Simonsen 1961).

Perhaps the most significant artefact from the site is a copper dagger or projectile point, which was believed to date to the early Bronze Age and thus signal exchange system interactions eastward to the Russian Urals (Schanche 1989). Although the precise provenience of this implement is lacking in the catalogue, according to Schanche (1989: 62) the artefact was found in an undisturbed context 20 cm below the surface and 10 cm deep in the western 'midden layers'. In the original stratigraphic profile (Schanche 1986: 27) the notation 'R21' on the 97y line marks this location (denoted with a star in Fig. 4, profile C–D). A photo in the Tromsø Museum archive shows the implement lying *in situ* nearby several large *Arctica islandica* shells in a layer characterized by many shell fragments. The adjacent profile suggests this level was very close to the top of the midden, near the transition to overlying deposits characterized by rock fragments (the gray-brown gravelly layer in Fig. 4, profile C–D).

The midden contents were comprised of shell, fire-cracked rock fragments, stone and bone/antler artifacts, as well as subsistence-related animal bone remains. Most of the subsistence-related bone remains were comprised of fish (particularly cod), but there was also a significant component of mammal bones (mostly seal and reindeer) as well as bird bones (Schanche 1989). Preliminary analysis of the collected shell material indicates that by minimum number of individuals, 77 % consists of *Arctica islandica* and 22 % of *Littorina littorea*.

It is important to note that the midden deposits were excavated in 10 cm arbitrary levels, thus the chronological resolution is relatively coarse. For example, a shell sample from the lowermost level 5 could derive either from the very first deposition of midden material on the original ground surface or from a later depositional event when 8 or 9 cm of midden had already accumulated. Also, the excavation technique does not enable the identification of discrete dumping episodes, the documentation of which would provide a better understanding of how the midden was formed over time.

AMS RADIOCARBON DATES

A series of AMS radiocarbon dates were run on the four shell samples from the western midden to be used in the sclerochronological study, as well as two samples of reindeer bone from the same excavation units, and two of the same levels, as the shells. A third reindeer bone date was procured from the eastern shell midden in order to determine whether it was contemporary with the western midden or the house. Table 1 lists the radiocarbon dates from Karlebotnbakken.

The four AMS dates on shell were derived from specimens of ocean quahog (*Arctica islandica*), one from each of levels 2 to 5 from the western midden (Fig. 4, profile C–D). The dated material was sampled from the outermost (youngest) growth increments of each shell. X-ray diffraction analyses of the samples prior to submission for dating indicate the shells have not been significantly affected by diagenetic recrystallization. The radiocarbon results exhibit the expected stratigraphic progression from oldest to youngest. Calibration using OxCal 3.10 (Bronk Ramsay 2005) with the marine calibration curve Marine04 (including a DR=58 ± 43, based on a sample of *Astarte crenata* from Varangerfjord; Mangerud & Gulliksen 1975; Mangerud et al. 2006) results in a 1σ overall time span for the shell midden of 3250–2870 cal. BC (or 3300–2820 cal. BC at 2σ).

In order to control for dating uncertainties related to the marine reservoir effect, two samples of reindeer bone were also AMS dated, one from the lowest level 5, one from overlying level 3. The resulting dates were in correct stratigraphic order, and calibration using Intcal04 brackets levels 5 to 3 between 3270–2875 cal. BC at 1σ (or 3330–2750 cal. BC at 2σ). Comparing the shell and bone dates from the same levels: at 1σ the level 3 bone sample is 2925–2875 cal. BC while the shell sample is 3050–2890 cal. BC, and the level 5 bone sample is 3270–2920 cal. BC while the shell sample is 3250–3000 cal. BC. Thus, there is good concordance between the shell and bone dates. The original conventional date run on pine charcoal was from a sample procured at a depth of 15 cm into the midden, roughly corresponding to the level 4/5 boundary. At 1σ this pine sample calibrates to 3340–3020 cal. BC, which corresponds reasonably well with the time span of 3250–2910 cal. BC for the shell samples from level 4 and level 5 and 3270–2920 cal. BC for the bone sample from level 5.

All seven of the radiocarbon dates from the midden are therefore stratigraphically consistent, both with respect to their superposition and with respect to the comparability of different sample materials from the same stratigraphic levels. A sum of the probabilities for all seven midden dates using OxCal 3.10 results in a 1σ span of 3110–2870 cal. BC (or a 2σ span of 3340–2850 cal. BC). The obvious culture-historical conclusion to be drawn from this is that the midden is about one thousand years older than the Gressbakken house structure, which was dated 2210–1530 cal. BC. It is therefore highly likely that the stratigraphic layer on top of the western shell midden — described as a dark brown, gravelly cultural layer with some bone — is a later refuse deposit derived from the Gressbakken house.

Finally, a single AMS date was run on reindeer bone from the shell midden east of the house entrance passage. The bone was from 60–70 cm below the surface, which corresponds to the basal level of the midden (Figure 4, profile A–B). The date of 4540 ± 30 BP (3360–3120 cal. BC at 1σ) overlaps with the date on reindeer bone from basal level 5 in the western midden. Thus, the two shell middens are broadly contemporary.

It can also be noted that the midden dates of 4500–4300 uncal. BP fit somewhat better with the shoreline displacement dates, assuming isobase 22 is applicable. The 19 m height of the site can be maximum-dated to 5300 uncal. BP; at 4400 uncal. BP the midden would have lain about 3.8 m above its contemporary sea level, which seems reasonable.

CULTURE-HISTORICAL IMPLICATIONS OF THE DATING

As noted already, the primary conclusion is that the house dated to the Gressbakken Phase has nothing to do with the shell midden. The Gressbakken house was either built into an earlier house depression associated with the shell midden, thereby eradicating traces of the earlier structure, or it was built adjacent to a free-standing midden deposit. The Gressbakken house would therefore have been situated ca. 6.5–7.5 m above its contemporary shoreline.

Given the new dating of the midden, all interpretations that have used the bone material from Karlebotnbakken to draw inferences concerning Gressbakken Phase subsistence and settlement patterns are seriously undermined (e.g., Schanche 1994; Hodgetts 1999; 2010). More chronologically appropriate connections for the Karlebotnbakken bone assemblage are with Nyelv (Renouf 1989) and the earlier portion of Advik (Simonsen 1961) in Varangerfjord, as well as the midden at Iversfjord (E. Helskog 1983). Together, these localities point to an early phase of shellfish exploitation and substantial midden accumulation beginning by at least 3300 cal. BC. Likewise, the bone tools and ornaments from the midden have no direct relevance to socio-symbolic interpretations of the Gressbakken Phase (e.g., Myrvoll 1992; Olsen 1994: 89–91; Schanche 1994). The two anthropomorphic figures of bone (Schanche 1989: 61, 63) now have a chronological correspondence with the only other similar figure, which is from 'house d' at the Advik site (Simonsen 1961; Schanche 1989: 61), a non-Gressbakken dwelling form situated in the site's upper house cluster at ca. 19 meters above sea level, the same height as Karlebotnbakken (although the Advik house is not radiocarbon dated).

Certain anomalous artifacts found at Karlebotnbakken now make more sense. First and foremost are the five small ceramic fragments from the midden, described by Schanche (1989: 62, 66) as lacking temper and in two cases decorated with a combination of pits and lines of comb stamps. Four of the five specimens can be described more fully here. One is a small rim fragment, 10 mm thick. It is untempered, but the paste contains

Table 1. Radiocarbon Dates from Karlebotnbakken.

Lab No.	Uncal. BP	Calibrated[1] BC 1δ/2δ	Context	Material
Poz-30028	4715±35	3000–2870/3110–2820	west midden 93x97y L-2	*Arctica islandica* shell
Poz-30029	4760±35	3050–2890/3190–2850	west midden 93x97y L-3	*Arctica islandica* shell
Poz-30026	4805±35	3120–2910/3260–2890	west midden 93x96y L-4	*Arctica islandica* shell
Poz-30027	4840±40	3250–3000/3300–2910	west midden 93x96y L-5	*Arctica islandica* shell
TRa-248	4275±40	2925–2875/3020–2750	west midden 93x97y L-3	reindeer bone
TRa-249	4425±40	3270–2920/3330–2910	west midden 93x96y L-5	reindeer bone
TRa-413	4540±30	3360–3120/3370–3100	east midden 101,30–80x96y 60–70 cm	reindeer bone
T-7742	4480±90	3340–3020/3400–2900	west midden 93,20x96,30y 15 cm deep in midden	pine charcoal
T-7743	3390±110	1880–1530/2000–1400	hearth in house	birch charcoal
T-7744	3640±140	2210–1770/2500–1650	house floor	birch/pine charcoal

1) Intcal04, Marine04, DR=58±43

small quartz and mica fragments. The rim lip is flat, and is decorated with small rectangular comb impressions placed diagonally across the flat lip surface. A second specimen is a 0.8 mm thick wall fragment which exhibits a small round pit (2 mm wide) on its outer surface. The third example is a wall fragment, partly exfoliated on its interior, apparently untempered, with a width of at least 7 mm. It is well fired, compact, and bears a smoothed outer surface with an asymmetric pit (3 mm wide) produced by a small stick puncture. The last specimen is a partly exfoliated wall fragment, compact and without evident temper, and with a considerable amount of burned residue on its inner surface.

Schanche (1989: 66) compared these decorated fragments with what were believed to be Late Comb Ceramics found at Inari 13 Vuopaja in northern Finland (Simonsen 1963: 215–6) and indicated that Finnish archaeologist Christian Carpelan concurred with this designation. She then attributed the Karlebotnbakken specimens to the Late Comb Ceramic to Asbestos Ceramic transition at ca. 2000 BC, not realizing that the Finnish dates were uncalibrated BC. The new Karlebotnbakken midden dates of 3360–2870 cal. BC now place the ceramics at a time horizon contemporary with the transition between Kierikki and Pöljä asbestos ceramics in mid-northern Finland, ca. 3100 cal. BC, and with Late Comb Ceramics (Ka III) in southern Finland (Carpelan 1979; Pesonen 1999). Given that Carpelan (2004: 29–30) has now identified the Vuopaja ceramics as Kierikki Ware (with a radiocarbon date of ca. 3570 cal. BC on residue), the Karlebotnbakken specimens should probably be seen as a related phenomena.

Certain lithic artifacts may also fit with the new dating, such as a preform for a large single-edge knife of slate and a small ground slate point. Large single-edge knives were more common prior to the Gressbakken Phase, during which the knives became miniaturized. The point appears to be a 'hybrid' of the Nyelv type (narrow width, diamond-shaped cross-section), generally dated between 5000–3000 cal. BC, and the Sunderøy point (fluted channel on both sides of the base) associated with the Gressbakken Phase. The point was found within the Gressbakken house, but the context may be problematic if the Gressbakken structure was built into an earlier dwelling.

Recently, a piece of amber was identified among materials derived from a layer at the base of the Karlebotnbakken midden (Ramstad 2006). Amber was an important component of interregional exchange systems in the Baltic during the third and fourth millennia BC (Ramstad 2006: 136–7; Zhulnikov 2008), so the find points to participation in those networks at ca. 3200–3000 cal. BC.

Finally, the chronological status and cultural significance of the famous copper dagger/point are transformed. As the implement was associated with the uppermost layer of the shell midden, providing it was not intrusive it should date to ca. 3200–2800 cal. BC, making it one of the earliest metal finds in northern Scandinavia. That would remove a central piece of evidence for arguments that participation in metal exchange systems during the early Bronze Age was an important catalyst for 'social complexity' in the Gressbakken Phase. Instead, initial participation in metal exchange is shifted to a much earlier time horizon. Current evidence from Finland and northeastern Sweden suggests copper implements were present during the Typical Comb Ceramic Period from ca. 3900 BC and into the following millennium (Taavitsainen 1982; Huurre 1985; Hálen 1994; 1996: 290–1; Huggert 1996, Lavento 2001: 119–20;

Costopoulos 2002). In Russian Karelia evidence for copper smelting has been found at several sites, including the Comb Ceramic locality Pegrema I, which has three radiocarbon dates between 4000–3500 cal. BC and one at 2900–2620 cal. BC (Zhuralev 1975; 1987; Zhuralev & Brublevskaya 1978; Chernykh 1992: 187–9).

However, the copper tool from Karlebotnbakken does not provide direct evidence of its provenience. Schanche (1989: 62) described the artefact as being formed by hammering and grinding. The Tromsø Museum archive contains a copy of what appears to be an energy dispersion spectrometer analysis performed at the University of Oslo in 1986/87. This analysis indicated the artefact was composed of copper, with the presence of Ca, Cl and P; as the latter three elements are most likely corrosion products, the implement is probably made of native copper. In comparison, spectrographic analyses of 23 Karelian copper artefacts (Zhuralev & Bublevskaya 1978: 156) revealed the presence of Ca, Cl, and P, but also Mg, Sr, Fe, Ae and As. The Karlebotnbakken implement therefore displays a different metallurgical signature than these Karelian specimens.

Nonetheless, the presence in the Karlebotnbakken midden of ceramics bearing a family resemblance to Kierikki Ware provides support for relating the copper tool from inner Varangerfjord to a Finnish-Karelian interaction system during the late 4th millennium BC. The 3200–2800 cal. BC date for the upper midden layer places the copper artefact contemporaneous with the village-like house settlements documented in the North Ostrobothnia region of northern Finland (Núñez & Okkonen 1999; Ikäheimo 2002; Vaneeckhout 2008; Núñez 2009). These associations suggest that Carpelan's (2004: 29) view of northwest Fennoscandia in the post-Säräisniemi 1 period as being largely aceramic and '…dominated by western, North Scandinavian connections…' needs to be re-evaluated.

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